



## A generic revision and new combinations in the Hyptidinae (Lamiaceae), based on molecular and morphological evidence

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### Abstract

An earlier molecular study demonstrated the monophyly of the Hyptidinae and most of the genera within it. However, the largest genus, *Hyptis*, is paraphyletic and all other genera seem to be derived from a *Hyptis* ancestor. Most of the different lineages which comprise *Hyptis* are already established sections, some of which are now raised to generic rank, augmenting the subtribe to 19 genera and with a greatly reduced but monophyletic *Hyptis*, in which the genus *Peltodon* is included as a section. The sections *Mesosphaeria* and *Polydesmia* are also shown not to be monophyletic, making it necessary to reassign some species from the former to the latter, and then raising the two sections to generic rank as *Mesosphaerum* and *Cantinoa* respectively, the latter a new genus name. A new genus *Oocephalus* is also created from two former subsections of *Hyptis* sect. *Polydesmia*. The genus *Condea*, formed from three former sections of *Hyptis*, is itself divided into two sections. A key to all recognized genera is included, together with a generic conspectus, with brief distributional data, differentiating the new genera and listing their component species. The necessary nomenclatural changes comprise 142 new combinations, 30 new or replacement lectotypifications, four neotypes, 23 new synonymies, eight *stat. nov.*, six newly coined generic names, five new epitypes and four new names.

**Key words:** generic key, *Hyptis*, molecular data, morphology, new genera, taxonomy

### Introduction

The Lamiaceae have recently undergone major changes of both delimitation and reorganization of constituent taxa, as a result of morphological and molecular phylogenetic studies (e.g., Cantino 1992a, 1992b, Wagstaff *et al.* 1995, 1998), with many genera, formerly placed in Verbenaceae, being incorporated (Harley *et al.* 2004).

Currently, the family comprises about 7200 species, the largest within the order Lamiales, with 240 genera, divided among seven subfamilies (Harley *et al.* 2004), of which subfam. Nepetoideae contains over 50% of all species. Molecular studies on various groups of Nepetoideae have been published, in particular on Mentheae by Bräuchler *et al.* (2010), on Ocimeae by Paton *et al.* (2004) and more recently by Zhong *et al.* (2010) on the phylogeny of *Isodon* (Schrad. ex Benth.) Spach (Ocimeae) and allies, suggesting a close link between Hyptidinae and Hanceolinae. All these studies are causing a re-evaluation of morphological and other non-molecular characters, as well as advancing our understanding of probable evolutionary lines and past geographical dispersion. The Ocimeae, distributed through tropical regions, are characterized by having stamens declinate above the anterior corolla lip. Although with a largely Old World distribution, one subtribe, the Hyptidinae, which forms the subject of this paper, is almost exclusively neotropical, occurring throughout tropical and subtropical America, with perhaps two species extending their natural range to Africa, as well as several weedy species which are introduced into the Palaeotropics (Harley *et al.* 2004). Most species are to be found in a wide range of primarily savanna habitats, often in upland areas. The Hyptidinae are characterized by flowers arranged in variously modified bracteolate cymes, with corollas bearing stamens decurrent and held within the hinged anterior corolla lobe, which provides an explosive pollination mechanism (Harley 1971), and by the possession of nutlets with an expanded areole (Paton & Ryding 1988).

### Taxonomic History of *Hyptis* and relations

Bentham (1833), who published the first detailed account of the Labiatae, recognized four genera in the group: *Peltodon* Pohl, *Marsypianthes* Mart. ex Benth., *Hyptis* Jacq. and *Eriope* Humb. & Bonpl. ex Benth., considering it a natural group, although the name Hyptidinae did not receive formal recognition until it was proposed by Endlicher (1838). The largest of the genera is *Hyptis*, currently with about 280 species, of which Bentham wrote: “it would be more convenient to divide it into a number of genera”, but he was unable to find a satisfactory means of separating the wide range in inflorescence form that he encountered. Instead he treated the various groups he recognized as sections, later amplifying these in De Candolle’s Prodrômus (Bentham 1848). Also at this time, Schauer (1844) separated a fifth genus, the monotypic *Rhaphiodon* Schauer, treated by Bentham as a species of *Hyptis*. Kuntze (1891), in the Revisio Genera Plantarum, having discovered an earlier name for *Hyptis*, published a very large number of new combinations under the generic name of *Mesosphaerum* P.Browne (1756). These however were not generally accepted, leading to *Hyptis* Jacq. being made a conserved name (see McNeill *et al.* 2006) and considerably adding to the synonymy. No further generic additions were made, until Epling (1932) further dismembered *Hyptis* by publishing the Central American genus *Asterohyptis* Epling, with three species, characterized by the much reduced corollas and lacking the explosive pollination mechanism. This was followed by the recognition of *Eriopidion* Harley (1976), a monotypic genus, removed from *Eriope*, and the subsequent creation of *Hyptidendron* Harley and *Hypenia* (Mart. ex Benth.) Harley (Harley 1988), removing three sections from *Hyptis* to raise the number of generic taxa in the Hyptidinae to nine. Eight of these were accepted in the most recent account (Harley *et al.* 2004), although Atkinson (1999, unpublished thesis) suggested placing all species of *Hypenia* within *Eriope*, a change not justified according to Pastore *et al.* (2011) and not followed in the present paper.

Up to the mid-20<sup>th</sup> century, undoubtedly the most important contributions to the taxonomy of New World Labiatae were made by Carl Epling, those dealing with the Hyptidinae being particularly relevant here. Two publications, A Synopsis of South American Labiatae (Epling 1935, 1936a, 1936b, 1937) and the Revisión del género *Hyptis* (Labiatae) (Epling 1949), remain standard works, and established the infrageneric classification in *Hyptis* (see below). The most recent overview of the group (Harley *et al.* 2004) recognizes eight genera: *Hyptidendron*, *Eriope*, *Hypenia*, *Marsypianthes*, *Hyptis*, *Peltodon*, *Rhaphiodon* and *Asterohyptis*. *Eriopidion* was here placed in the synonymy of *Eriope*.

## Infrageneric classification of *Hyptis*

Bentham (1833) recognized 19 sections within *Hyptis* (Table 1), further dividing sect. *Cephalohyptis* Benth. into a number of subsections. Subsequently, he modified this system and recognized 20 sections (Bentham 1848), further dividing six of these into a series of subsections. Many of these taxa are still in current use. A number of minor changes were made by Schmidt (1858) in an account of Labiatae for the Flora Brasiliensis. He also introduced an entirely new infrageneric classification for *Hyptis*, based on inflorescence structure, which has been ignored by later workers. John Briquet, from Geneva, published an extensive series of papers on Labiatae, mostly in the latter half of the 19<sup>th</sup> century, which included many new taxa of Hyptidinae, especially from Paraguay. He also extensively revised infrageneric classifications, especially of *Hyptis* (Table 1), in Engler & Prantl's Pflanzenfamilien (Briquet 1897b). Epling (1933, 1935, 1936a, 1936b, 1937) further modified the infrageneric classification of *Hyptis*, basing his system mainly on Bentham, but with some changes proposed by Briquet. Later, in his revision of the genus (Epling 1949), he recognized a total of 26 sections, of which 15 had originally been proposed by Bentham and one by Briquet (1897), although subsequent changes had resulted in very different sectional delimitations (Table 1). Changes included *Hyptis* sects. *Spicaria* Benth. and *Pectinaria* Benth. being treated as subsections under *H. sect. Mesosphaeria* Benth.; *Hyptis* sect. *Oocephalus* Benth. became a subsection under *H. sect. Polydesmia* Benth.; *Hyptis* sect. *Xanthiophoea* Benth. was removed, with the three constituent species placed elsewhere: one becoming the type of the genus *Rhaphiodon*, another one, *Hyptis lagenaria* A.St.-Hil. ex Benth., being placed in *H. sect. Cyrta* Benth., and the third, *Hyptis lobata* A.St.-Hil. ex Benth., becoming the only representative of a new section, *H. sect. Hilaria* Epling; *Hyptis* sect. *Turbinaria* Benth. was placed in synonymy of *Hyptis* sect. *Umbellaria* Benth. [= *Hyptidendron* sect. *Umbellaria* (Benth.) Harley], *H. sect. Siagonarrhen* Mart. ex Benth. subsect. *Cymosae* Benth. in synonymy of sect. *Buddleioides* Benth., and *H. sect. Siagonarrhen* subsect. *Nudiflorae* Benth. into synonymy of *Hyptis* sect. *Hypenia* subsect. *Densiflorae* Benth. Epling (1933, 1936, 1937) also created 10 new sections (Table 1). He also raised *H. sect. Cephalohyptis* Benth. subsect. *Xylodontes* Benth. to sectional rank as *H. sect. Xylodontes* (Benth) Epling.

In the introduction to his monograph of the genus *Hyptis*, Epling (1949) followed Bentham in suggesting that a case could perhaps be made for the further division of *Hyptis* into a greater number of genera. While he felt at that time that this revolutionary step was not justified, increased knowledge, based on vastly increased collections, has now indicated that the idea was not without foundation.

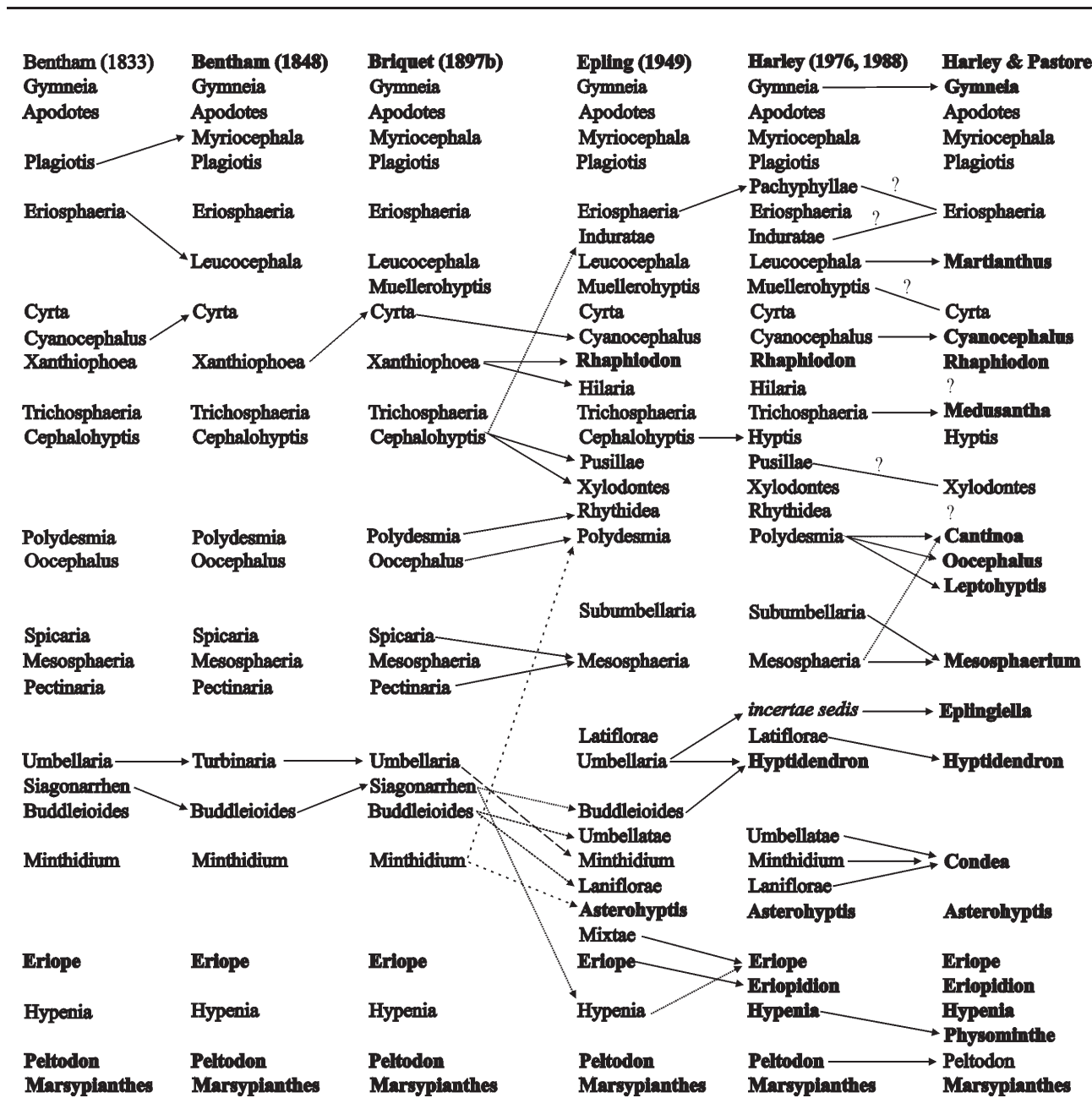
Harley (1976) also made a number of changes, including the change of the name of the section which contains the generic type, *H. sect. Cephalohyptis*, to *H. sect. Hyptis* to conform to ICBN rules (see McNeill *et al.* 2006). Five sections accepted by Epling were placed in synonymy or received a change of status. Harley transferred the only species of *Hyptis* sect. *Mixtae* Epling to *Eriope* (Harley 1976). In the same publication he also removed the species of *Hyptis* sect. *Siagonarrhen* subsect. *Nudiflorae*, including its type, *Hyptis latifolia* Mart. ex Benth., into the synonymy of *Eriope*. Later, *Hyptis* sect. *Pachyphyllae* (Epling) Harley, based on *H. sect. Eriosphaeria* subsect. *Pachyphyllae* Epling, was created (Harley 1986b). He also transferred *H. sect. Umbellaria* and *H. sect. Buddleioides* to the genus *Hyptidendron*, the former as a subsection and the latter in synonymy, and, in the same paper, raised *H. sect. Hypenia* to generic rank (Harley 1988). For a summary of these changes see Table 1. As a result of all these taxonomic changes, the number of accepted sections currently stands at 24. Most of these taxa had been defined by characters of the inflorescence and floral structure, and many form well-defined groups.

Concurrently with the taxonomy, a series of other studies has substantially contributed to our understanding of the interrelationships with the Hyptidinae. Among these are a series of anatomical studies by Rudall (1979, 1980, 1981b, 1981c), a brief palynological survey (Rudall 1981a), which now suggests a more detailed study would provide significant data to support the new taxonomy, and a survey of chromosome numbers (Harley & Heywood 1992) in which some possible relationships were discussed. More recently, Pastore *et al.* (2011) published a molecular phylogenetic analysis of the Hyptidinae, using nuclear sequences from the ITS and ETS regions, complemented by sampling four plastid regions (*trnL-F*, *matK*, *trnS-G*, *trnD-*

T). The sample included all genera of Hyptidinae, 22 of the 24 sections of *Hyptis* and totalled up to 180 species. Most of the large number of subsections recognized by Epling were also sampled, only a very few of these being unobtainable.

TABLE 1. Changes in the classification of Hyptidinae.

*Hyptis* sections are in normal type and genera are in bold-face. The arrows indicate the changes made.



The analyses demonstrate the monophyly of the Hyptidinae and of its constituent genera except for *Hyptis*, provided that *Hypenia vitifolia* (Pohl ex Benth.) Harley is excluded from *Hypenia*, *Eriope simplex* (A.St.-Hil. ex Benth.) Harley is transferred to *Hypenia* and *Hyptis eximia* Epling is transferred to *Hyptidendron*. These taxonomic changes are supported by the morphology. Indeed, for some time, the removal of *Hyptis vitifolia* from *Hypenia* had been considered by the senior author on purely morphological grounds. *Hyptis*, meanwhile, is shown to be highly polyphyletic, and represented by nine different lineages, often composed of single former sections of *Hyptis*. Two sections, *H. sect. Mesosphaeria* and *H. sect.*

*Polydesmia*, require some relocation of species, while *H. sect. Minthidium* Benth., *H. sect. Polydesmia* subsect. *Oocephalus* and *H. sect. Laniflorae* Epling are grouped to form a clade. The recognition of these at the generic level would leave *Hyptis* monophyletic but still very diverse. At the same time, the former genus *Peltodon* could now only be recognized at sectional level within *Hyptis*. There is however a need for much wider sampling within *Hyptis sensu stricto*, to resolve its internal sectional structure.

## Materials and Methods

Taxonomic studies of a large taxon such as the subtribe Hyptidinae, requires a synthesis of data obtained from a wide range of disciplines, summarized above, especially detailed studies of herbarium material representative of the taxa studied. Over many years, the senior author has been studying this group, both in the field and in the herbaria listed here: AAU, ALCB, B, BM, BR, C, CEN, CEPEC, COL, CTES, E, F, FLOR, G, HAL, HBR, HUEFS, INPA, IPA, IS, JBSD, JE, K, LE, LINN, M, MA, MANCH, MBM, MG, MO, MS, NY, OXF, P, R, RB, S, SP, SPF, TEPB, UB, UC, UEC, UFG, US, W, Z, ZT, with a view to preparing accounts for Flora Neotropica. Detailed morphological studies have provided an insight into their relationships, which with the new data from molecular studies enables us to set out a new classification. For the purposes of this paper, the original bibliography has been examined wherever possible, to check dates of publication, protologues and typification, and the volumes of Taxonomic Literature by Stafleu & Cowan published between 1976 and 1988 have been frequently consulted.

## Conclusions

The results from the molecular studies (Pastore *et al.* 2011) clearly require major changes to be made to the current classification of the Hyptidinae. One solution would be to reduce all other genera, including *Marsypianthes* and *Eriope*, to synonymy under *Hyptis*. This would leave a genus of over 400 species with a range of morphology, both vegetative and reproductive which would transcend that found in possibly any other genus of Angiosperms. The other alternative, chosen here, is to reorganize groupings along cladistic lines, redefining groupings where indicated, and recognizing a much larger number of genera, which would be morphologically more homogeneous, more narrowly defined and justified also on morphological, and in many cases by chromosomal and anatomical evidence also. A diagram displaying the phylogenetic relationships between the genera recognized here is displayed in Fig. 5. Nevertheless, these changes leave an open field for more detailed studies on a range of characters, often not previously considered significant, which will hopefully provide further support for the taxonomic changes now proposed.

The decision to erect a substantial number of new genera has resulted in a careful assessment of names already available, and names which need to be created. *Hyptis* was conserved against both *Condea* Adans. and *Mesosphaerum* P.Browne, which are earlier names (McNeill *et al.* 2006). Both of these now become available, as their types no longer fall within *Hyptis* as defined in this paper. Only two of the appropriate sectional names in *Hyptis* can be raised to generic rank: *Cyanocephalus* Benth. and *Gymneia* Benth., the others being already occupied. Apart from the large number of changes proposed for many New World species, there are also a number of weedy species introduced into the Old World tropics which are affected: *Hyptis suaveolens* (L.) Poit. and *Hyptis pectinata* (L.) Poit. become *Mesosphaerum suaveolens* (L.) Kuntze and *M. pectinatum* (L.) Kuntze respectively, and *Hyptis mutabilis* (Rich.) Briq. becomes *Cantinoa mutabilis* (Rich.) Harley & J.F.B.Pastore. *Hyptis spicigera* Lam. takes up the earlier Aublet epithet, which could not be used under *Hyptis*, to become *Cantinoa americana* (Aubl.) Harley & J.F.B.Pastore. Other species, such as *Hyptis brevipes* Poit., *H. lanceolata* Poir. and *H. capitata* Jacq., remain unchanged.

The following text provides a provisional key to genera, a conspectus of Hyptidinae, with descriptions and new combinations, where needed. The establishment of the new classification and nomenclature is a

priority and opens up the need for a more detailed search for characters which may prove to be diagnostic of the newly recognized genera, beyond those already used. Also, a number of species, which have been difficult to obtain, still require analysis to confirm their taxonomic position, although their absence does not affect the overall taxonomy and these are listed in the conspectus as “unplaced”. Within *Hyptis* (*sensu stricto*) much wider sampling is still required to evaluate infrageneric groupings and this is a task for the future. A list of Hyptidinae, with original names, the pre-1950 taxa as recognized by Epling, with their new taxonomic position, is provided (Appendix 1). Bibliographic references indicate where accepted names were published, if these occurred prior to this paper, and names which contain a new epithet are also listed. Epithet changes which only involve a change of gender are not provided.

## Key to Genera of Hyptidinae

1. Anterior lip of corolla thickened at base and reflexing at anthesis to release the stamens explosively. Flowers arranged variously. Plants of tropical and subtropical America ..... **2**
- 1\*. Anterior lip of corolla not thickened at base, nor reflexing at anthesis to release stamens explosively. Flowers in slender, elongate spikes, arranged in sessile or subsessile verticillasters, often 2 per leaf-axil, 6–12-flowered. Plants of Mexico and Central America ..... ***Asterohyptis***
2. Cymes usually 1-flowered (rarely up to 3–6-flowered), flowers with often inconspicuous paired bracteoles at base of calyx, or if not as described, then flowering stems waxy with often inflated internodes ..... **3**
- 2\*. Cymes usually many-flowered, flowers sometimes congested or modified into bracteate heads or capitula†, or in axillary fascicles. Paired bracteoles not present at base of calyx. Flowering stems never waxy or inflated ..... **6**
3. Cymes up to 3–6-flowered, pedunculate, flowers shortly pedicellate, calyx lacking inconspicuous paired bracteoles at base ..... ***Physoaminthe***
- 3\*. Cymes usually uniflorous and forming a raceme-like, often branched inflorescence, calyx with inconspicuous paired bracteoles at base, above a long or short peduncle (pseudo-pedicel), rarely some cymes 3-flowered and then pedicels long, slender ..... **4**
4. Calyx in fruit zygomorphic, with lobes unequal, posterior lip rounded or with posterior lobes partly connate. Corolla at anthesis, with tube abruptly contracted near base, usually lilac, pink or violet, sometimes yellowish in bud ..... **5**
- 4\*. Calyx in fruit actinomorphic, or almost so, with subequal lobes. Corolla at anthesis, with tube not abruptly contracted at base, lilac or pale blue, cream, yellow or red ..... ***Hypenia***
5. Calyx throat open, though sometimes closed by dense white hairs. Corolla tube often broadly campanulate or funnel-shaped. Base of style persistent, with stylopodium overtopping nutlets. Nutlets broad, slightly flattened or rarely winged ..... ***Eriope***
- 5\*. Calyx hygroscopic, throat closed by upper lobes when dry, lobes with a row of rigid hairs within. Corolla tube shortly and narrowly cylindrical. Stylopodium absent. Nutlets elongate, ±triquetrous ..... ***Eriopidion***
6. Flowers in lax, few-flowered cymes, or cymes many-flowered and then in ± spherical capituliform heads. Calyx lobes triangular, often reflexing in fruit. Gynoecium with persistent, short, quadrangular stylopodium equalling nutlets and attached to them until maturity. Nutlets cymbiform with an involute, lacinate margin and concave inner face ..... ***Marsypianthes***
- 6\*. Flowers arranged variously. Calyx lobes not reflexing in fruit. Stylopodium if present not as above. Nutlets ovoid or flattened, never concave nor lacinate..... **7**
7. Flowers in a spherical capitulum, dropping as a unit in fruit. Corolla tubular, deep purple. Calyx with 5–10 unequal spines ..... ***Rhaphiodon***
- 7\*. Flowers not as above, if in a capitulum or a capituliform head not dropping as a unit in fruit. Calyx lobes 5, not spinose, but sometimes subulate and rigid at apex ..... **8**
8. Flowers sessile to subsessile, in an ovoid, hemispherical or globose capitulum or capituliform head, surrounded by a distinct involucre of filamentous, ligulate to ovate bracteoles; when filamentous these sometimes obscured when capitula globose at anthesis. Capitula often pedunculate, forming panicles or corymbs or sometimes axillary from reduced or leaflike bracts, rarely sessile and forming elongate spiciform inflorescences ..... **9**
- 8\*. Flowers subsessile to long-pedicellate, variously arranged in a pedunculate or subsessile, congested or lax cyme but not in a capitulum, sometimes forming a long, spiciform inflorescence, or flowers in compact, cincinnate verticillasters or in fascicles, rarely solitary and then usually long-pedicellate, or in subumbellate, pedunculate or weakly globose cymes, bracteoles not forming an involucre, or if involucre present, bracteoles usually slender and enclosing a 10–15-flowered cymule or obscured in a dense, elongate broadly spiciform inflorescence ..... **13**

9. Flowers in ovoid heads, sessile or pedunculate and often enclosed by broad concave bracteoles when immature. Corollas long tubular, with short lobes, not spotted or marked on upper lip ..... *Oocephalus*
- 9\*. Flowers in hemispherical to globose capitula, with an involucre of ovate to ligulate, subulate or filamentous bracteoles. Corollas various, often spotted on upper lip ..... 10
10. Calyx lobes 3–4 times longer than the slender tube and terminating in a long filamentous apex. Capitula globose with long filamentous involucral bracteoles ..... *Medusantha*
- 10\*. Calyx lobes shorter, filamentous to ovate, capitula hemispherical or globose ..... 11
11. Capitula globose, > 10 mm diam., with filamentous or narrowly linear bracteoles which are often obscured by reflexing flowers at anthesis. Calyx tube usually strongly deflexed in mid-tube. Peduncles usually longer than adjacent internode ..... 12
- 11\*. Capitula hemispherical, with involucre of subulate, ligulate or lanceolate to ovate bracteoles, these usually not reflexing at maturity, or if globose with calyx tube deflexed, then less than 10 mm diam. and peduncles shorter than adjacent internode ..... *Hyptis*
12. Calyx lobes clavate, widening slightly near apex, stigma ± capitate. plants typical of cerrado and similar formations ..... *Cyanocephalus*
- 12\*. Calyx lobes subulate, never clavate, stigmas bilobed, plants of sandy areas in semi-arid regions ..... *Martianthus*
13. Stylopodium present, flowers in usually lax cymes. Trees or shrubs, rarely herbs ..... *Hyptidendron*
- 13\*. Stylopodium absent, flowers disposed variously. Shrubs, subshrubs or herbs, rarely trees ..... 14
14. Flowers sessile or subsessile, in few-flowered sessile cymes, with slender bracteoles, in the axils of reduced, inconspicuous bracts, forming slender, elongate, spiciform inflorescences. Calyx with ± scarious, deltoid flanges in sinus between calyx lobes, corolla tubular ..... *Leptohyptis*
- 14\*. Flowers arranged in fascicles in the axils of leaf-like bracts, or in sub-umbellate or congested, pedunculate cymes, or in globose verticillasters or cincinnate or few-flowered cymes, if inflorescence spiciform, usually not slender. Calyx lobes without flanges in sinus ..... 15
15. Flowers in fascicles, rarely solitary or flowers few on long pedicels, in the axils of often leaf-like bracts, or in shortly pedunculate sub-umbels, often forming elongate, raceme-like inflorescences, or rarely panicles. Corolla never blue. In varied habitats, sometimes subject to inundation ..... *Condea*
- 15\*. Flowers not in fascicles or pedunculate sub-umbels..... 16
16. Flowers in a dense, head-like cyme, on a short peduncle from the axils of leaf-like bracts. Leaves small. Corolla blue or violet-blue. Shrubs of sandy, semi-arid areas in NE Brazil ..... *Eplingiella*
- 16\*. Flowers not as above. Leaves and corolla various..... 17
17. Flowers in dense subglobose or globose verticillasters, formed from congested cincinni, in the axils of reduced bracts, and forming an elongate, often interrupted or congested terminal spike, with leaves often deflexed toward base of flowering stem. Bracteoles setaceous, rigid and almost spine-tipped, calyx strongly deflexed in mid-tube ..... *Gymneia*
- 17\*. Flowers in cincinnate or shortly dichotomous cymes, but never forming subglobose verticillasters. Bracteoles various, but not as above. Calyx tube straight ..... 18
18. Inflorescence usually an elongate spiciform or racemose thyrses. Flowers in pedunculate or sessile cymes, not forming cincinni, bracteoles ovate to lanceolate, often red-tinged and sometimes paleaceous, and often forming a small involucre around cymules, or bracts narrower, calyx lobes subequal or with posterior lobe broader ..... *Cantinoa*
- 18\*. Inflorescence an elongate, spiciform thyrses or often a diffuse leafy panicle of pedunculate, often cincinnate cymes or shortly pedunculate, few-flowered cymes in axils of foliose bracts, or compact, long-pedunculate, shortly cincinnate cymes forming a globose head. Bracteoles inconspicuous, never forming an involucre *Mesosphaerum*

† Note on the capitulum: In Hyptidinae, the flowers are arranged in a diverse array of forms. Especially in *Hyptis* sensu stricto, the flowers form a spherical or hemispherical capitulum. The flowers are sessile or almost so (pedicel less than 0.5 mm) and borne on a slightly swollen receptacle and surrounded by an involucre of linear to ovate bracteoles, which are not associated with the individual flowers. Some other groups, such as in the genus *Cantinoa*, the flowers are often in congested cymes or capituliform heads, usually fewer-flowered and with a numerical relationship between flowers and bracteoles, but the heads are not spherical or hemispherical in form. See other note on capitulum structure, under *Cyanocephalus*.

## Conspectus of Hyptidinae with new classification including new combinations, synonyms and typifications

*Asterohyptis* Epling (1932: 17). Type:—*Asterohyptis stellulata* (Benth.) Epling (1932: 17) ≡ *Hyptis stellulata* Bentham (1833: 129).

This genus, which is the only one of the tribe which does not occur in South America, has the flowers arranged in elongate, spike-like inflorescences, composed of few-flowered verticillasters, in axils of reduced bracts. The calyx lobes are subulate or filamentous, often rigid, spreading, corollas small, white, weakly 2-lipped with 5 subequal lobes and lacking the explosive pollination mechanism, with the thickened hinge at base of anterior corolla lip. The three or possibly four species (Turner 2011) extend from Mexico to Central America, in dry, open habitats. See Fig. 2B.

*Cantinoa* Harley & J.F.B.Pastore, *nom. et stat. nov.* ≡ *Hyptis* sect. *Polydesmia* Bentham (1833: 114) [non *Polydesmia* Boudier (1885): Fungj]. Type:—*Cantinoa carpinifolia* (Pohl ex Benth.) Harley & J.F.B.Pastore [= *Hyptis carpinifolia* Pohl ex Benth., lectotype designated by Epling 1936b].

= *Hyptis* section *Spicaria* Bentham (1833: 78) ≡ *Hyptis* sect. *Mesosphaeria* subsect. *Spicaria* (Bentham) Epling (1933: 96), *syn. nov.* Type:—*Hyptis spicigera* Benth., lectotype designated by Epling 1936b [= *Cantinoa americana* (Aubl.) Harley & J.F.B.Pastore].

= *Hyptis* sect. *Polydesmia* subsect. *Rigidae* Bentham (1848: 116), *syn. nov.* Type:—*Hyptis carpinifolia* Benth., lectotype designated by Epling 1936b [= *Cantinoa carpinifolia* (Benth.) Harley & J.F.B.Pastore].

= *Hyptis* sect. *Polydesmia* subsect. *Vulgares* Bentham (1848: 120), *syn. nov.* Type:—*Hyptis mutabilis* (Rich.) Briq., lectotype designated by Epling 1936b [= *Cantinoa mutabilis* (Rich.) Harley & J.F.B.Pastore].

= *Hyptis* sect. *Polydesmia* subsect. *Mutabiles* Epling (1933: 102), *syn. nov.* Type:—*Hyptis mutabilis* (Rich.) Briq. [= *Cantinoa mutabilis* (Rich.) Harley & J.F.B.Pastore].

This subsectional name is illegitimate, being a superfluous name for *Hyptis* subsection *Vulgares*. Epling (1933) mentions it only in his account of N American *Hyptis*, subsequently ignoring the name.

= *Hyptis* sect. *Mesosphaeria* subsect. *Plectranthodon* Epling (1936b: 237), *syn. nov.* Type:—*Hyptis plectranthoides* Benth. [= *Cantinoa plectranthoides* (Benth.) Harley & J.F.B.Pastore].

= *Hyptis* sect. *Polydesmia* subsect. *Malvastra* Epling (1936b: 254), *syn. nov.* Type:—*Hyptis vestita* Pohl ex Benth., lectotype designated by Epling 1936b [= *Cantinoa althaeifolia* (Pohl ex Benth.) Harley & J.F.B.Pastore].

*Cantinoa* is a genus composed of herbs, subshrubs or shrubs with often aromatic, mesomorphic leaves, sessile to long-petiolate. The flowers are borne in congested 12–26-flowered, ± ovoid cymes (cymules), not forming hemispherical or spherical capitula, the flowers subsessile and surrounded by rather slender to ovate, sometimes scarious bracteoles apparently equal in number to the flowers and sometimes investing them to form an involucre. The calyx has a straight tube with five usually subequal ± subulate lobes, these rarely absent or reduced, the corolla with well-developed, spreading limb. Gynoecium without stylopodium. The cymules often form branched synflorescences or may be congested to form ± oblong, terminal spikes. There are 23 species currently recognized, extending from SE United States to the Caribbean and S America as far as Argentina, and occurring in a variety of mostly mesophytic habitats. Two species are widespread and have been introduced into the Old World: *Cantinoa americana* (Aubl.) Harley & J.F.B.Pastore is frequent in the tropics as a weed of cultivation, and *C. mutabilis* (Rich.) Harley & J.F.B.Pastore has been recorded from S Africa. See Fig. 2D.

Epling (1949) recognized five subsections under *Hyptis* sect. *Polydesmia*. Of these, *Hyptis* subsects. *Oocephalus* and *Glomeratae* have here been placed in another genus, *Oocephalus* (Benth.) Harley & J.F.B.Pastore. *Hyptis* subsect. *Malvastra*, was erected by Epling (1936b) solely on the basis of the presence of dendroid hairs, but it can no longer be upheld, as these have now been found to occur in other species, e.g. *C. carpinifolia* (Benth.) Harley & J.F.B.Pastore (of subsect. *Rigidae* Benth.). Hybrids have now been recognized involving *C. mutabilis* (*H.* subsect. *Vulgares*) with both *C. carpinifolia* (*H.* subsect. *Rigidae*) and *C.*



*althaeifolia* (Pohl ex Benth.) Harley & J.F.B.Pastore (*H.* subsect. *Malvastra*). As a result there now seems little justification in maintaining these subsections at any rank.

The genus is named in honour of Dr Philip Cantino, Ohio, whose researches on Lamiaceae, especially the delimitation of its suprageneric taxa and his studies on the distinguishing characters between this family and the Verbenaceae, have greatly advanced our understanding of the group.

***Cantinoa americana*** (Aubl.) Harley & J.F.B.Pastore, *comb. nov.* ≡ *Nepeta americana* Aublet (1775: 623) ≡ *Hyptis americana* (Aubl.) Urban (1918: 322), *nom. illeg.* [non *Hyptis americana* (Poiret in Lamarck 1805: 571) Briquet 1897b: 338 = *Condea americana* (Poir.) Harley & J.F.B.Pastore] ≡ “*Nepeta foliis serratis, ovato-acutis, spicis imbricatis, acuminatis*” Burmann in Plumier (1758: 155). Type:—ANTILLES: without locality, Plumier (1758: t. 162, f. 2), lectotype designated here.

The original Aublet specimen, presumably from French Guiana, has not been found. However he cites the above polynomial and plate from the earlier Plumier volume, which enables the choice of Plumier’s plate as lectotype, although this was an illustration of a specimen from the Antilles, without further indication of provenance. To assist identification of the name we also propose an epitype, designated here: MEXICO. Morelos: Cuernavaca, 23 September 1896, *Pringle 6559* (K!).

= *Hyptis spicigera* Lamarck (1789: 185) ≡ *Mesosphaerum spicigerum* (Lam.) Kuntze (1891: 527). Type:—SIERRA LEONE (?). *Smeathman s.n.* (holotype P!, a specimen given to Lamarck by de Beauvois).

= *Hyptis lophantha* Martius ex Bentham (1833: 78) ≡ *Mesosphaerum lophanthum* (Mart. ex Benth.) Kuntze (1891: 526) Type:—BRAZIL. Minas Gerais: “in herbidis pascuis Serro Frio”, *Martius s.n.* (holotype M!).

= *Hyptis madagascariensis* Bojer (1837: 251), *nom. nud.*

= *Hyptis subverticillata* Andersson (1855: 197) ≡ *Mesosphaerum subverticillatum* (Andersson) Kuntze (1891: 527). Type:—ECUADOR. Galapagos Islands: Albemarle, *Andersson 207* (holotype S!; isotype P!).

= *Hyptis gonocephala* Wright ex Grisebach (1866: 212) ≡ *Mesosphaerum gonocephalum* (Wright ex Griseb.) Kuntze (1891: 526). Type:—CUBA. La Punta de La Junta, *Wright 3154* (holotype GOET; isotypes BM!, K!, NY!, S!, US!).

This species occurs as a weed in both the New and Old World tropics. Its native distribution is uncertain, though clearly in the Americas.

***Cantinoa althaeifolia*** (Pohl ex Benth.) Harley & J.F.B.Pastore, *comb. nov.* ≡ *Hyptis althaeifolia* (as *althaeaeifolia*) Pohl ex Bentham (1833: 115) ≡ *Mesosphaerum althaeefolium* (sic!) (Pohl ex Benth.) Kuntze (1891: 526). Type:—BRAZIL. Minas Gerais: Fazenda Vieira, *Pohl 2540* (lectotype W!, designated by Epling 1936b; isolectotype F!, K!).

= *Hyptis vestita* Bentham (1833: 114) ≡ *Mesosphaerum vestitum* (Benth.) Kuntze (1891: 527). Type:—BRAZIL. “In Brasilia meridionali”, *Sellow s.n.* (lectotype B†, designated by Epling 1936b, replacement lectotype K!, designated here; isolectotypes A!, E!, F!, HAL!, LE!, UC!).

***Cantinoa carpinifolia*** (Benth.) Harley & J.F.B.Pastore, *comb. nov.* ≡ *Hyptis carpinifolia* Bentham (1833: 115) ≡ *Mesosphaerum carpinifolium* (Benth.) Kuntze (1891: 526). Type:—BRAZIL. “In Brasilia meridionali”, *Sellow s.n.* (lectotype B†, designated by Epling 1936b; replacement lectotype K!, designated here).

= *Hyptis aquatica* Pohl ex Bentham (1833: 116) ≡ *Hyptis carpinifolia* var. *aquatica* (Pohl ex Benth.) Schmidt (1858: 130). Type:—BRAZIL. Minas Gerais: Rio da Prata, *Pohl 2924* (holotype W!; isotype K!).

***Cantinoa colombiana*** (Epling) Harley & J.F.B.Pastore, *comb. nov.* ≡ *Hyptis colombiana* Epling (1936b: 257). Type:—COLOMBIA. Magdalena: Santa Marta, *Smith 1490* (holotype US!; isotypes BR!, COL!, G!, K!, NY!, P!).

***Cantinoa dubia*** (Pohl ex Benth.) Harley & J.F.B.Pastore, *comb. nov.* ≡ *Hyptis dubia* Pohl ex Bentham (1833: 122) ≡ *Mesosphaerum dubium* (Pohl ex Benth.) Kuntze (1891: 526). Type:—BRAZIL. Minas Gerais: Rio Abaite, *Pohl 3276* (holotype W!; isotype K!).

= *Hyptis expansa* Pohl ex Bentham (1833: 122) ≡ *Mesosphaerum expansum* (Pohl ex Benth.) Kuntze (1891: 526). Type:—BRAZIL. Without locality, *Pohl s.n.* (holotype W!).

***Cantinoa duplicatodentata*** (Benth.) Harley & J.F.B.Pastore, *comb. nov.* ≡ *Hyptis duplicatodentata* Bentham (1833: 114) ≡ *Hyptis vestita* Benth. var. *duplicatodentata* (Pohl ex Benth.) Schmidt (1858: 128) ≡ *Mesosphaerum duplicatodentatum* (Pohl ex Benth.) Kuntze (1898: 260). Type:—BRAZIL. Minas Gerais: Rio Jequitinhonha, *Pohl 1912* (lectotype W!, designated by Epling 1936b; isolectotypes F!, K!).

= *Hyptis duplicatodentata* Pohl ex Benth. var. *virescens* Pohl ex Bentham (1833: 114). Type:—BRAZIL. Minas Gerais: Manoel Pereira, *Pohl 2968* (holotype W!; isotypes A!, K!).

***Cantinoa erythrostachys*** (Epling) Harley & J.F.B.Pastore, *comb. nov.* ≡ *Hyptis erythrostachys* Epling (1936b: 258). Type:—BRAZIL. Minas Gerais: Congonhas do Campo, *Stephan 55* (holotype BR; isotype fragment UC!).

***Cantinoa heterodon*** (Epling) Harley & J.F.B.Pastore, *comb. nov.* ≡ *Hyptis heterodon* Epling (1936b: 243). Type:—BRAZIL. São Paulo: Apiaí, *Puiggari 3234* (holotype P!; isotype UC!).

***Cantinoa impar*** (Epling) Harley & J.F.B.Pastore, *comb. nov.* ≡ *Hyptis impar* Epling (1936b: 257). Type:—BRAZIL. Mato Grosso: Triunfo, Rios Cuiabá e São Lourenço, *Hoehne 4563* (holotype UC!).

***Cantinoa indivisa*** (Pilg.) Harley & J.F.B.Pastore, *comb. nov.* ≡ *Hyptis indivisa* Pilger (1901: 190). Type:—BRAZIL. Mato Grosso: Cuiabá, 2 April 1899, *Pilger 399* (holotype B†, photo!).

***Cantinoa macrotera*** (Briq.) Harley & J.F.B.Pastore, *comb. nov.* ≡ *Hyptis macrotera* Briquet (1898: 210). Type:—BRAZIL. Minas Gerais: entre “Barbacena et Sitio”, 23 June 1879, *Glaziou 11314* (holotype G!; isotypes BR!, C!, K!, P!, UC!).

***Cantinoa multiseta*** (Benth.) Harley & J.F.B.Pastore, *comb. nov.* ≡ *Hyptis multiseta* Bentham (1848: 122). Type:—BRAZIL. Minas Gerais: Serra das Araras, June 1840, *Gardner 5104* (holotype K!; isotypes BM!, E!, OXF!, P!, US!, W!).

Epling (1949) treats this species in *Hyptis* sect. *Mesosphaeria*, and in the same publication also places it in synonymy under *H. mutabilis* in *Hyptis* sect. *Polydesmia*.

***Cantinoa muricata*** (Schott ex Benth.) Harley & J.F.B.Pastore, *comb. nov.* ≡ *Hyptis muricata* Schott ex Bentham (1833: 119). Type:—BRAZIL. Rio de Janeiro: *Schott 6167* (holotype W!).

***Cantinoa mutabilis*** (Rich.) Harley & J.F.B.Pastore, *comb. nov.* ≡ *Nepeta mutabilis* Richard (1792: 110) ≡ *Mesosphaerum mutabile* (Rich.) Kuntze (1891: 525) ≡ *Hyptis mutabilis* (Rich.) Briquet (1896: 788). Type:—FRENCH GUIANA. Cayenne, *Le Blond s.n.* (holotype P!; isotype G!).

= *Hyptis spicata* Poiteau (1806: 474, t. 28, f. 2). Type:—DOMINICAN REPUBLIC. Santo Domingo, *Richard s.n.* (holotype P!).

= *Hyptis canescens* Kunth in Humboldt, Bonpland & Kunth (1818: 321). Type:—VENEZUELA. Distrito Federal: Caracas, *Humboldt & Bonpland s.n.* (holotype P!).

= *Hyptis polystachya* Kunth in Humboldt, Bonpland & Kunth (1818: 321). Type:—MEXICO. Michoacán: inter Pátzcuaro & Ario Mexicanorum, *Humboldt & Bonpland s.n.* (holotype P!).

= *Hyptis micrantha* Pohl ex Bentham (1833: 120). Type:—BRAZIL. Goiás: ad Villa Boa, *Pohl 1619* (holotype W!; isotype BR!, K!).

= *Hyptis tenuiflora* Benth. (1833: 121). Type:—BRAZIL. Without locality, *Sacramento s.n.* (holotype P!).

= *Hyptis rostrata* Salzm. ex Benth. (1833: 121). Type:—BRAZIL. Bahia: near Salvador, *Salzmann s.n.* (lectotype K!, designated by Epling 1936b; isolectotypes G!, P!, W!).

= *Hyptis arvensis* Poeppig ex Benth. (1835: 712). Type:—PERU. Huánuco: Cuchero, *Poeppig 1097* (holotype BM!; isotype G-DC!).

= *Hyptis aspera* Martins & Galeotti (1844: 189). Type:—MEXICO. Veracruz: Mirador, *Galeotti 620* (holotype BR!; isotype K!).

= *Mesosphaerum yungasense* Britton ex Rusby (1895: 246). Type:—BOLIVIA. La Paz: Yungas, *Bang 622* (holotype NY!; isotype K!, US!).

= *Hyptis trichocalyx* Briquet (1897a: 21). Type:—PARAGUAY. Caaguazu: Cosme, *Balansa 996* (holotype P!).

= *Hyptis singularis* Glaziov (1911: 554), *nom. nud.* Reference specimen:—BRAZIL. Minas Gerais: Serra de Mantiqueira, João Aires, *Glaziov 1130* (P!).

= *Hyptis kerberi* Gandoger (1918: 66). Type:—MEXICO. Jalisco: Atoyac, *Kerber 139* (holotype LY; isotype P!).

= *Hyptis canaminensis* Rusby (1927: 342). Type:—BOLIVIA. La Paz: Cañamina, *Rusby 61* (holotype NY!; isotype UC!, fragment).

***Cantinoa* × *obvallata*** (Sprengel ex Benth.) Harley & J.F.B.Pastore, *comb. nov.* ≡ *Hyptis obvallata* Sprengel ex Benth. (1833: 115), *pro spec.* Type:—BRAZIL. Minas Gerais: Carandahy, *Sellow 1489* (lectotype B†, designated by Epling 1936b, replacement lectotype K!, designated here; isolectotypes A!, G-DC!, HAL!, P!, W!).

For further details see Harley (1999).

***Cantinoa pinetorum*** (Epling) Harley & J.F.B.Pastore, *comb. nov.* ≡ *Hyptis pinetorum* Epling (1933: 103). Type:—MEXICO. Jalisco: San Sebastián, *Mexia 1396* (holotype UC!; isotypes BM!, G!).

***Cantinoa plectranthoides*** (Benth.) Harley & J.F.B.Pastore, *comb. nov.* ≡ *Hyptis plectranthoides* Benth. (1833: 122) ≡ *Mesosphaerum plectranthoides* (Benth.) Kuntze (1891: 525). Type:—BRAZIL. “Brasilia meridionali” [Minas Gerais: “Matheus Lemes”, *fide* Epling], *Sellow 1942* (lectotype B†, designated by Epling 1936b, replacement lectotype K!, designated here; isolectotypes G!, HAL!).

= *Hyptis communis* A.St.-Hil. ex Benth. (1833: 123). Type:—BRAZIL. Minas Gerais: without locality, *St.-Hilaire 277* (lectotype P! designated by Epling 1936b; isolectotype F! fragment, K!).

The sheet in P originally annotated as type by Epling is different from the above and was selected in error. The specimen which Benth. cited in the protologue came from Minas Gerais, which was not the case of the annotated specimen, but Epling obviously realized his error before publication.

= *Hyptis pumila* Pohl ex Benth. (1833: 122) ≡ *Mesosphaerum pumilum* (Pohl ex Benth.) Kuntze (1891: 525). Type:—BRAZIL. Goiás: “ad Serra de Chrystais”, *Pohl 6060* (holotype W!).

***Cantinoa propinqua*** (Epling) Harley & J.F.B.Pastore, *comb. nov.* ≡ *Hyptis propinqua* Epling (1936b: 243). Type:—BRAZIL. Rio de Janeiro: Serra dos Orgãos, May 1837, *Gardner 574* (holotype K!; isotypes BM!, G!, OXF!, UC!, W!).

***Cantinoa racemulosa*** (Mart. ex Benth.) Harley & J.F.B.Pastore, *comb. nov.* ≡ *Hyptis racemulosa* Mart. ex Benth. (1833: 126) ≡ *Mesosphaerum racemosum* (Mart. ex Benth.) Kuntze (1891: 527). Type:—BRAZIL. Minas Gerais: Villa Rica, *Martius Obs. 780* (lectotype M!, designated here, but see note below).

In the protologue, after the species epithet, Benth. (1833) added “Martius MSS” in parenthesis, and he clearly referred to a specimen he saw in Munich (only). Epling (1936b) lectotypified *Hyptis racemulosa* with

the Martius duplicate at Kew (Epling 1936b: 243), saying that he could find no specimen either at M nor in the Martius herbarium (in BR). However a specimen exists in M, *Martius Obs. 780*, which is annotated by Bentham as *Hyptis racemulosa*, and also by Epling as “Type”.

***Cantinoa rubicunda*** (Pohl ex Benth.) Harley & J.F.B.Pastore, *comb. nov.* ≡ *Hyptis rubicunda* Pohl ex Bentham (1833: 118) ≡ *Mesosphaerum rubicundum* (Pohl ex Benth.) Kuntze (1891: 527). Type:—BRAZIL. Minas Gerais: Barra do Rio das Velhas, *Pohl 1769* (lectotype W!, designated by Epling 1936b; isolectotype K!).

= *Hyptis rubicunda* var. *grandifolia* Bentham (1848: 119). Type:—BRAZIL. Goiás: Serra da Santa Brigida, April 1840, *Gardner 3925* (holotype K!).

***Cantinoa similis*** (Epling) Harley & J.F.B.Pastore, *comb. nov.* ≡ *Hyptis similis* Epling (1936b: 258). Type:—BRAZIL. Mato Grosso: Cuiabá, Caxipó do Ponte, *Hoehne 4548* (holotype UC!).

***Cantinoa stricta*** (Benth.) Harley & J.F.B.Pastore, *comb. nov.* ≡ *Hyptis stricta* Bentham (1833: 79) ≡ *Mesosphaerum strictum* (Benth.) Kuntze (1891: 527). Type:—BRAZIL. Rio Grande do Sul: Cerro Agudo, 23 March 1823, *Sellow 4580* (lectotype B†, designated by Epling 1936b, replacement lectotype K!, designated here).

Bentham published this name with the protologue given as: “6.? H. STRICTA (Benth: in Herb. Mus. Reg. Berol. MSS.)”. See remarks under *Condea undulata* (Schrank) Harley & J.F.B.Pastore.

***Cantinoa subrotunda*** (Pohl ex Benth.) Harley & J.F.B.Pastore, *comb. nov.* ≡ *Hyptis subrotunda* Pohl ex Bentham (1833: 118) ≡ *Mesosphaerum subrotundum* (Pohl ex Benth.) Kuntze (1891: 527). Type:—BRAZIL. Goiás: Ponte Feito, *Pohl 2678* (holotype W!; isotype K!).

= *Hyptis parvifolia* Pohl ex Bentham (1833: 118) ≡ *Hyptis subrotunda* var. *angustifolia* Schmidt (1858: 131). Type:—BRAZIL. Goiás: Megaponte [Meiaponte, now Pirenópolis], *Pohl 2789* (holotype W!).

Although Pohl material from this locality is cited as Megaponte by Epling, it appears that Pohl wrote “Meyaponte” on the label. There has been much confusion over this name.

***Cantinoa* × *sylvularum*** (A.St.-Hil. ex Benth.) Harley & J.F.B.Pastore, *comb. nov.* ≡ *Hyptis sylvularum* A.St.-Hil. ex Bentham (1833: 119), *pro spec.* ≡ *Mesosphaerum sylvularum* (A.St.-Hil. ex Benth.) Kuntze (1891: 527). Type:—BRAZIL. Minas Gerais: capoeiras, *Saint-Hilaire 555* (holotype P!; isotype P!).

For further details, see Harley (1999).

***Cantinoa villicaulis*** (Epling) Harley & J.F.B.Pastore, *comb. nov.* ≡ *Hyptis villicaulis* Epling (1941: 554). Type:—BRAZIL. Mato Grosso: Marimondo, Rio São Lourenço, *Hoehne 2866* (holotype UC!).

***Cantinoa violacea*** (Pohl ex Benth.) Harley & J.F.B.Pastore, *comb. nov.* ≡ *Hyptis violacea* Pohl ex Bentham (1833: 116). Type:—BRAZIL. Goiás: Trahiras, *Pohl 1880* (holotype W!; isotype K!).

= *Hyptis arida* A.St.-Hil. ex Bentham (1833: 116) ≡ *Mesosphaerum aridum* (A.St.-Hil. ex Benth.) Kuntze (1891: 525). Type:—BRAZIL. Goiás: “in desertis meridionalibus” *Saint-Hilaire 816* (holotype P!; isotype P!).

***Condea*** Adanson (1763: 504). Type:—*Condea americana* (Poir.) Harley & J.F.B.Pastore [= *Satureja americana* Poirlet in Lamarck (1805: 571), lectotype designated by Kuntze 1891].

= *Hypothronia* Schrank (1824: 85). Type:—*Hypothronia undata* Schrank (1824: 85) [= *Condea undulata* (Schrank) Harley & J.F.B.Pastore]. See note under this species.

The genus *Condea* is characterized by an often spiciform or raceme-like thyrses of pedunculate or sessile cymes in which the intercalary cyme-axes are contracted. When cymes pedunculate, the flowers, which often

bear long pedicels, appear subumbellate, or appear fasciculate when peduncle absent. Flowers usually small, gynoeceium without stylopodium. There are 26 species, ranging from North America (One species in the western United States) and Central America to the Caribbean and South America.

The genus is divided into two sections here, which correspond to three sections recognized by Epling under *Hyptis* (1949). *Condea* sect. *Condea* is exactly equivalent to *H.* sect. *Minthidium*, while *H.* sect. *Umbellatae* Epling is placed in synonymy under *C.* sect. *Laniflorae* (Epling) Harley & J.F.B.Pastore.

### Key to sections of *Condea*

Flowers solitary or in fascicles, in the axils of reduced or leafy bracts, trichomes simple..... Sect. *Condea*  
Flowers in subumbellate, pedunculate cymes, or if cymes ±sessile, then trichomes dendroid..... Sect. *Laniflorae*

### *Condea* sect. *Condea*

= *Hyptis* sect. *Minthidium* Benth (1833: 128), *syn. nov.* Type:—*Hyptis verticillata* Jacq., lectotype designated by Epling 1936b [= *Condea verticillata* (Jacq.) Harley & J.F.B.Pastore].

= *Hyptis* sect. *Minthidium* subsect. *Campanulatae* Briquet (1897b: 337), *syn. nov.* Type:—*Hyptis fasciculata* Benth., lectotype designated here [= *Condea undulata* (Schrank) Harley & J.F.B.Pastore].

= *Hyptis* sect. *Hypenia* subsect. *Pubescentes* Briquet (1897b: 335), *syn. nov.* Type:—*Hyptis floribunda* Briq., lectotype designated by Epling 1936b [= *Condea floribunda* (Briq.) Harley & J.F.B.Pastore].

*Condea* section *Condea* is characterized by an indumentum of simple trichomes and with flowers solitary or in fascicles, in the axils of reduced or leaf-like bracts. In some species, the nutlets bear a swollen, corky swelling, which may act as a flotation device to aid dispersal. There are 16 species, centred in the Caribbean and in South America, with one species, *Condea verticillata*, more widespread, occurring in the Caribbean, Central America and western South America. See Fig. 1K.

*Condea americana* (Poir.) Harley & J.F.B.Pastore, *comb. nov.* ≡ *Satureja americana* Poir in Lamarck (1805: 571) [as *Satureia americana*] ≡ *Hyptis americana* (Poir.) Briquet (1897b: 338) [non (Aubl.) Urban 1918: 322] ≡ *Mesosphaerum americanum* (Poir.) Kuntze (1891: 525). Type:—"America" [DOMINICAN REPUBLIC?], "*Condea frutescens Satureiae foliis, flore albo*, Mss. Descript. Plant. Amer.", *Pouppé-Desportes s.n.* (holotype P-LA!).

= *Hyptis scoparia* Poiteau (1806: 475, t.31, f.2). Type:—DOMINICAN REPUBLIC. Cap Français, environs S. Martin, *Poiteau s.n.* (holotype P!).

= *Hyptis escobilla* Urban (1919: 143), *nom. illeg., p.p. excl. type.* See note under *Condea urbanii* Harley & J.F.B.Pastore.

*Condea chyliantha* (Urb. & Ekman) Harley & J.F.B.Pastore, *comb. nov.* ≡ *Hyptis chyliantha* Urb. & Ekman in Urban (1929: 48). Type:—HAITI. Massif du Nord, St. Michel de Atalaye, 21 December 1927, *Ekman 9430* (holotype S!; isotypes B†, BM!, C!, G!, K!, NY!, US!).

*Condea cubensis* (Urb.) Harley & J.F.B.Pastore, *comb. nov.* ≡ *Hyptis cubensis* Urban (1912: 367). Type:—CUBA. Partido de Consolación, *Wright 3150* (holotype B†; lectotype designated here: K!; isolectotypes BM!, G!, K!, MA!, P!, US!).

*Condea domingensis* (Urb.) Harley & J.F.B.Pastore, *comb. nov.* ≡ *Hyptis domingensis* Urban (1912: 368). Type:—DOMINICAN REPUBLIC. Prope Constanza, February 1910, *Türckheim 2897* (holotype B†; lectotype designated here: NY!; isolectotypes: BR!, G!, M!).

*Condea elegans* (Briq.) Harley & J.F.B.Pastore, *comb. nov.* ≡ *Eriope elegans* Briquet (1889: 114) ≡ *Hyptis elegans* (Briq.) Briquet (1897a: 19, t. 58). Type:—PARAGUAY. Paraguari: Paraguari, 25 March 1875, *Balansa 979* (holotype G!; isotypes BM!, BR!, K!).

***Condea fastigiata*** (Benth.) Harley & J.F.B.Pastore, *comb. nov.* ≡ *Hyptis fastigiata* Bentham (1833: 130) ≡ *Mesosphaerum fastigiatum* (Benth.) Kuntze (1891: 526) ≡ *Hyptis fasciculata* var. *fastigiata* (Benth.) Schmidt (1858: 142) ≡ *Hyptis fasciculata* subsp. *fastigiata* (Benth.) Harley (1985a: 14). Type:—BRAZIL. "Brasilia meridionalis" *Sellow 2110* (holotype B†; lectotype K!, designated here).

= *Hyptis diaphora* Briquet (1896: 786) ≡ *Mesosphaerum diaphorum* (Briq.) Kuntze (1898: 260). Type:—BRAZIL. Minas Gerais: Contendas, *Kuntze s.n.* (holotype G!).

Recent fieldwork (Harley unpubl.) clearly indicates that *C. undulata* and *C. fastigiata* should be treated as two separate though closely related species, as Bentham (1833) originally proposed. For further details of diagnostic characters, see Harley (1985).

***Condea floribunda*** (Briq.) Harley & J.F.B.Pastore, *comb. nov.* ≡ *Hyptis floribunda* Briquet (1897a: 18). Type:—PARAGUAY. Cordillera: Arroyos y Esteros, July 1875, *Balansa 980* (holotype G!; isotype K!, P!).

***Condea mixta*** (Epling) Harley & J.F.B.Pastore, *comb. nov.* ≡ *Hyptis mixta* Epling (1944: 495). Type:—MEXICO. Oaxaca: Tuxtepec, Chiltepec and vicinity, July 1940, *Martinez-Calderón 251* (holotype US!; isotype UC!).

***Condea rivularis*** (Britton) Harley & J.F.B.Pastore, *comb. nov.* ≡ *Hyptis rivularis* Britton (1920: 100). Type:—CUBA. "Santa Clara cerca Trinidad a lo largo Río Toyaba", *Britton & Wilson 5567* (holotype NY!).

***Condea scandens*** (Epling) Harley & J.F.B.Pastore, *comb. nov.* ≡ *Hyptis scandens* Epling (1940: 239) ≡ *Hyptis ascendens* (*sphalm.*) Epling (1949: 246). Type:—GUATEMALA. Petén: El Paso, April 1932, *Lundell 4421* (holotype MICH!; isotype F!).

***Condea scoparioides*** (Urb.) Harley & J.F.B.Pastore, *comb. nov.* ≡ *Hyptis scoparioides* Urban (1912: 366). Type:—DOMINICAN REPUBLIC. La Vega: "prope Constanza in pineto 1200 m", *Türckheim 3543* (holotype B†; lectotype K!, designated here; isolectotypes BM!, BR!, M!, NY!).

***Condea thyrsoiflora*** (Epling) Harley & J.F.B.Pastore, *comb. nov.* ≡ *Hyptis thyrsoiflora* Epling (1936b: 237). Type:—BRAZIL. Minas Gerais: "Fazenda do Dias, Rio dos Peixes", *Pohl 2720* (holotype K!; isotypes BR!, OXF!, UC!, W!).

***Condea trichopes*** (Epling) Harley & J.F.B.Pastore, *comb. nov.* ≡ *Eriope trichopes* Epling (1944: 495) ≡ *Hyptis trichopes* (Epling) Harley (1973: 24). Type:—CUBA. Isle of Pines, vicinity of San Pedro, pine lands, 15–17 February 1916, *Britton et al. 14469* (holotype NY!; isotypes K!, US!).

***Condea undulata*** (Schrank) Harley & J.F.B.Pastore, *comb. nov.* ≡ *Hyptis undulata* Schrank (1822: 51–52). Type:—BRAZIL. A plant formerly cultivated in the Munich Botanical Garden, now apparently lost. Neotype designated here: BRAZIL. São Paulo: Parque do Estado, Instituto de Botânica, 26 March 2004, *Cordeiro & Harley 2805* (HUEFS!).

Schrank cultivated *Hyptis undulata* from seeds collected by Martius in Brazil, but apparently failed to keep a herbarium specimen. The name was included by Bentham, in the synonymy of the protologue of *Hyptis fasciculata*, with a question mark, and the short description fairly clearly indicates its identity. Unfortunately this means a change from the well-known name of this species.

= *Hypothronia undata* Schrank (1824: 85). Type:—NOT LOCALIZED. Neotype designated here: BRAZIL. Santa Catarina: Garuva, 2 May 2008, *Harley 55879* (HUEFS!).

The generic name *Hypothronia* was treated as doubtful by Bentham (who used the spelling *Hippothronia*) and by Epling, both of whom placed it in synonymy. The generic name is based on *Hypothronia undata*, which was published simultaneously. (It is possible that this is a misprint for *Hyptis undulata* Schrank, published a few years earlier). As is the case with many Schrank names, *H. undata* was probably based on a

cultivated specimen, and no type material has ever been located. The description given by Schrank is difficult to relate to any particular taxon, although both Bentham (1833: 130) and Epling (1949: 156) place this tentatively in the synonymy of *Hyptis fasciculata* [= *Condea undulata*]. Following their opinion, we accept that *Hypothronia undata* Schrank, may well be this, and have chosen a neotype to that effect.

= *Clinopodium verticillatum* Vellozo (1829: 242) [nec *Condea verticillata* (Jacq.) Harley & J.F.B.Pastore]. Type:—BRAZIL. Rio de Janeiro: Fl. Flumin. Icon. 6: t. 4. (1831), lectotype designated here [the original plate on parchment of "Flora Fluminensis" is in the Manuscript Section of the Biblioteca Nacional of Rio de Janeiro]. Epitype designated here: BRAZIL. Santa Catarina: Garuva, Sol Nascente, 9 May 1981, *Hatschbach 43874* (MBM; isoeatypes C!, K!, MU).

The epitype is to establish the identity of Vellozo's name as *Condea undulata*. It is impossible to determine which species was intended from the illustration, which could equally well have been either *C. undulata* or *C. fastigiata*.

= *Hyptis fasciculata* Bentham (1833: 130), *syn. nov.* ≡ *Mesosphaerum fasciculatum* (Benth.) Kuntze (1891: 516). Type:—BRAZIL. "Brasilia meridionalis", *Sellow 2030* (holotype B†; lectotype K!, designated here).

Bentham published this name in the protologue as: "174. H. FASCICULATA (Benth: in Herb. Mus. Reg. Berol. MSS.)" Bentham travelled widely in Europe and visited many herbaria, annotating specimens. The holotype, now destroyed, was therefore in Berlin.

= *Hyptis fasciculata* Benth. var. *tomentella* Bentham (1848: 129) ≡ *Hyptis fasciculata* var. *tomentosa* Schmidt (1858: 142). Type:—BRAZIL. Minas Gerais: "circa João Gomes", *Pohl 3768* (holotype W!).

Bentham apparently indicated a specimen from Minas Gerais for this variety by putting the words: "specimina magis tomentosa" after it. The same reference can be found also in his earlier work (Bentham 1833: 130), in which he cites the full locality, but without providing a name.

= *Hyptis eriocalyx* A.St.-Hil. ex Bentham (1833: 131) ≡ *Mesosphaerum eriocalyx* (A.St.-Hil. ex Benth.) Kuntze (1891: 526). Type:—BRAZIL. Minas Gerais: "ruisseau de Simão Pereira", *Saint-Hilaire B1 36* (holotype P!).

= *Lepechinia anomala* Epling (1960: 146). Type:—BRAZIL. Santa Catarina: "in capoeira ad Pilões, Palhoça", *Reitz & Klein 3227* (holotype UC!; isotypes HBR!, MO!).

***Condea urbanii*** Harley & J.F.B.Pastore, *nom. nov.* ≡ *Hyptis escobilla* Urban 1919: 143, *nom. illeg.* (excl. *syn. Satureja americana* Poir.). Type:—DOMINICAN REPUBLIC. Santo Domingo: Puerto Plata, 16 April 1887, *Eggers 1545* (lectotype K!, designated here; isolectotypes BM!, G!, M!, P!).

Although *Hyptis escobilla* Urb. is an illegitimate and superfluous name because the protologue included *Satureja americana* Poir. in synonymy, it is not typified by the type of *S. americana* (≡ *Condea americana*) because Urban designated a different type (Art. 7.5 of the Vienna Code, McNeill *et al.* 2006). Moreover Urban's description as well as the type appears to belong to a previously undescribed taxon, which now requires a new name. The specimen of *Hyptis escobilla* in Urban's own herbarium at B was obviously destroyed, and so we have selected a lectotype from K.

In spite of Urban's description, the apparent lack of ripe fruit, both in the type material and other collections cited by Epling, raises the possibility that this might be a hybrid with *Condea americana* as one of the parents.

***Condea verticillata*** (Jacq.) Harley & J.F.B.Pastore, *comb. nov.* ≡ *Hyptis verticillata* Jacquin (1787b: 101) ≡ *Mesosphaerum verticillatum* (Jacq.) Kuntze (1891: 525). Type:—DOMINICAN REPUBLIC. Without locality, but cultivated probably in Vienna: Jacquin, Icon. Pl. Rar.: t. 113, opp. p. 11 (1787), lectotype designated here. An epitype is also designated here: DOMINICAN REPUBLIC. Peravia, 18 November 1981, *Mejia & Pimental 18188* (K!).

Dates of publication of many of the plates are uncertain, see Stafleu & Cowan (1979: 411) and Schubert (1945). Jacquin's cultivated specimen, from seed originating in the Dominican Republic and perhaps formerly located in W, has never been found.

= *Mentha hyptiformis* Poir. in Lamarck (1797: 110). Type:—MARTINIQUE. *Anonymous 342* (holotype P!).  
= *Hyptis parviflora* Martens & Galeotti (1844: 186). Type:—MEXICO. Veracruz: Cordillera, June–October 1840, *Galeotti 677* (holotype BR!).  
= *Hyptis pringlei* Fernald (1900: 565). Type:—MEXICO. San Luis Potosí: Tamasopo canyon, 5 August 1890, *Pringle 3223* (lectotype GH!, designated by Epling 1933; isolectotypes BM!, JE!, K!, M!, NY!, P!, UC!).  
= *Hyptis axillaris* Fernald (1900: 565). Type:—MEXICO. Puebla: Metlaltoyuca, *Goldman 48* (lectotype US!, designated by Epling 1933; isolectotypes GH).

***Condea* sect. *Laniflorae*** (Epling) Harley & J.F.B.Pastore, *comb. nov.* ≡ *Hyptis* sect. *Laniflorae* Epling (1933: 89). Type:—*Condea laniflora* (Benth.) Harley & J.F.B.Pastore [= *Hyptis laniflora* Benth., lectotype designated by Epling 1933].

= *Hyptis* sect. *Umbellaria* Benth. subsect. *Eriocalycinae* Briquet (1897b: 337), *syn. nov.* Type:—*Hyptis laniflora* Benth., lectotype designated here [= *Condea laniflora* (Benth.) Harley & J.F.B.Pastore].

= *Hyptis* sect. *Buddleioides* subsect. *Umbellatae* Epling (1936b: 221), *syn. nov.* ≡ *Hyptis* sect. *Umbellatae* Epling (1949: 197). Type:—*Hyptis tafallae* Benth. [= *Condea tafallae* (Benth.) Harley & J.F.B.Pastore].

Shrubs with usually dendroid trichomes and flowers in pedunculate or sessile, subumbellate cymes, arranged in elongate spiciform or paniculate inflorescences; flowers without a stylopodium. There are nine species from the deserts of SW United States, Mexico, especially Baja California, and south to Guatemala, and two species in western South America. See Fig. 4F.

***Condea albida*** (Kunth) Harley & J.F.B.Pastore, *comb. nov.* ≡ *Hyptis albida* Kunth (in Humboldt, Bonpland & Kunth 1818: 319) ≡ *Mesosphaerum albidum* (Kunth) Kuntze (1891: 527). Type:—MEXICO. Michoacan: Lago de Cuitzeo, *Humboldt & Bonpland s.n.* (holotype P!).

***Condea anitae*** (Epling & Játiva) Harley & J.F.B.Pastore, *comb. nov.* ≡ *Hyptis anitae* Epling & Játiva (1968: 298). Type:—MEXICO. Baja California: Sierra de la Giganta, near Portezuelo. 3 October 1965, *Carter 5104* (holotype UC!; isotype BM!).

***Condea decipiens*** (M.E.Jones) Harley & J.F.B.Pastore, *comb. nov.* ≡ *Hyptis decipiens* Jones (1933: 53). Type:—MEXICO. Baja California: Triunfo, 6 October 1930, *Jones 27299* (holotype RSA; isotypes BM!, HUH, MEXU, MO!, UC!, US!).

***Condea emoryi*** (Torr.) Harley & J.F.B.Pastore, *comb. nov.* ≡ *Hyptis emoryi* Torrey (1861: 20) ≡ *Mesosphaerum emoryi* (Torr.) Kuntze (1891: 526). Type:—USA. Arizona: The Upper Colorado (River), 14 January 1857, *Newberry s.n.* (holotype NY!; isotype K!).

= *Hyptis lanata* Torrey (1858: 129), *nom. nud.* [non Pohl ex Bentham 1833].

= *Hyptis palmeri* Watson (1889: 68) ≡ *Mesosphaerum palmeri* (S.Watson) Goldman (1916: 363). Type:—MEXICO. Guaymas: without locality, 1885, *Palmer 278* (holotype GH; isotypes BM!, C!, K!, US!).

Epling (1949) cited as type of *Hyptis emoryi* an early Emory collection, now in the NY herbarium, from the same general locality (near Yuma), but this does not accord with the protologue. In an earlier paper, Torrey (1858) had erroneously named the Emory material *Hyptis lanata*, citing Bentham (1844a: 42). This must be an error for *Hyptis laniflora* Benth., which is the only *Hyptis* species from Baja California mentioned in that publication. Although the Emory collection is actually *H. emoryi*, the specimen cited in the protologue is the Newberry specimen, as given above. *Hyptis lanata* Pohl ex Bentham (1833) is an earlier legitimate name for a Brazilian species.

***Condea iodantha*** (Epling) Harley & J.F.B.Pastore, *comb. nov.* ≡ *Hyptis iodantha* Epling (1939: 16). Type:—MEXICO. Sonora: Zapo, 18 November 1936, *Hinton 9844* (holotype UC!; isotypes BM!, F!, G!, K!, US!).



***Condea jacobi*** (Fern.Alonso) Harley & J.F.B.Pastore, *comb. nov.* ≡ *Hyptis jacobi* Fernández-Alonso (2010: 127). Type:—COLOMBIA. Santander: Vía Málaga-Bucaramanga, Vereda Buenavista, 29 June 2009, *Fernández-Alonso 28193* (holotype COL!; isotypes COL!, G, HUA, K, M!, MA, MO, UIS, US).

This recently described taxon is well illustrated in the original paper, and clearly represents a distinct new species, related to *Condea tafallae*, but with dendroid trichomes as in the Central American species.

***Condea laniflora*** (Benth.) Harley & J.F.B.Pastore, *comb. nov.* ≡ *Hyptis laniflora* Bentham (1844: 42, t. 20) ≡ *Mesosphaerum laniflorum* (Benth.) Kuntze (1891: 526). Type:—MEXICO. Baja California: Cabo San Lucas, 1841, *Hinds s.n.* (holotype K!; isotype K!).

= *Mesosphaerum insulare* Standley & Goldman (1911: 375) ≡ *Hyptis insularis* (Standl. & Goldm.) Standley (1924: 1276) ≡ *Hyptis laniflora* var. *insularis* (Standl. & Goldm.) Johnston (1922: 1150). Type:—MEXICO. Baja California: Isla Espiritu Santo, 7 February 1906, *Nelson & Goldman 7503* (holotype US!; isotype UC!).

***Condea subtilis*** (Epling) Harley & J.F.B.Pastore, *comb. nov.* ≡ *Hyptis subtilis* Epling (1933: 79). Type:—MEXICO. State unknown: Sadovi, 1842, *Liebmann 15251* (holotype C!; isotype F!).

= *Hyptis perpulchra* (as *perpulcher*) Epling (1939: 15). Type:—MEXICO. Temascaltepec: Pungarancho, 18 October 1935, *Hinton et al. 8574* (holotype UC!; isotypes BM!, F!, K!, MO!, NY!, US!).

***Condea tafallae*** (Benth.) Harley & J.F.B.Pastore, *comb. nov.* ≡ *Hyptis tafallae* Bentham (1833: 132) ≡ *Mesosphaerum tafallae* (Benth.) Kuntze (1891: 527). Type:—PERU. Without locality, *Ruiz s.n.* [*Tafalla s.n.*] (holotype OXF Lambert Herbarium†; lectotype MA!, designated here; isolectotypes B†, P!).

The specimen in Madrid appears, according to the label, to have originally been in the Lambert Herbarium (OXF).

= *Hyptis tafalloides* Mansfeld (1925: 288). Type:—PERU. Ayacucho: between Tambo and Rio Apurimac, *Weberbauer 5608* (lectotype B†, designated by Epling 1936b; replacement lectotype F!, designated here).

= *Mesosphaerum grandiflorum* Rusby (1912: 116). Type:—BOLIVIA. La Paz: Apolo, 2 July 1902, *Williams 1512* (holotype NY!; isotype K!).

The species lacks dendroid trichomes, found in other members of the section.

***Condea tephrodes*** (A.Gray) Harley & J.F.B.Pastore, *comb. nov.* ≡ *Hyptis tephrodes* Gray (1862: 164) ≡ *Mesosphaerum tephrodes* (A.Gray) Kuntze (1891: 527). Type:—MEXICO. Baja California: Cape San Lucas, August 1859–January 1860, *Xantus 72* (holotype GH; isotypes K!, NY!, US).

***Condea tomentosa*** (Poit.) Harley & J.F.B.Pastore, *comb. nov.* ≡ *Hyptis tomentosa* Poiteau (1806: 469) ≡ *Mesosphaerum tomentosum* (Poit.) Kuntze (1891: 527) ≡ *Hyptis incana* Willdenow ex Steudel (1841: 794), *nom. nud.* Type:—MEXICO. Guerrero: Acapulco, *Bonpland & Humboldt s.n.* (holotype P!; isotypes B-W 10844-010! [Image ID 291330], P!).

***Cyanocephalus*** (Pohl ex Benth.) Harley & J.F.B.Pastore, *comb. et stat. nov.* ≡ *Hyptis* sect. *Cyanocephalus* Pohl ex Bentham (1833: 84). Type:—*Cyanocephalus lippioides* (Pohl. ex Benth.) Harley & J.F.B.Pastore [= *Hyptis lippioides* Pohl ex Benth., lectotype designated by Epling 1936b].

= *Hyptis* sect. *Cyrta* subsect. *Rigidae* Bentham (1848: 91), *nom. illeg.*, homonym (see Harley 1985c: 627) of *Hyptis* sect. *Polydesmia* Benth. subsect. *Rigidae* Bentham (1848: 116).

= *Hyptis* sect. *Cyrta* subsect. *Cordifoliae* Bentham (1848: 94) ≡ *Hyptis* sect. *Cyanocephalus* subsect. *Virgatae* Epling (1936b: 275), *nom. superfl.* Type:—*Hyptis cardiophylla* Pohl ex Benth., lectotype designated by Epling 1936b [= *Cyanocephalus cardiophyllus* (Pohl. ex Benth.) Harley & J.F.B.Pastore].

= *Hyptis* sect. *Cyrta* subsect. *Lobatae* Briquet (1897b: 346). Type:—*Hyptis tripartita* Briq. [= *Cyanocephalus tripartitus* (Briq.) Harley & J.F.B.Pastore].

= *Hyptis* sect. *Cyrta* subsect. *Argentae* Briquet (1897b: 346) ≡ *Hyptis* sect. *Cyanocephalus* subsect. *Argentae* (Briq.) Epling (1936b: 270). Type:—*Hyptis incana* Briq., lectotype designated by Epling 1936b [= *Cyanocephalus incanus* (Briq.) Harley & J.F.B.Pastore].

= *Hyptis* sect. *Cyanocephalus* subsect. *Rugosae* Epling (1933: 86). Type:—*Hyptis pedalipes* Griseb. [= *Cyanocephalus pedalipes* (Griseb.) Harley & J.F.B.Pastore].

Epling clearly intended that *Hyptis rugosa* Benth. should be the type of this subsection (Epling 1936b). However the subsectional name was published three years earlier (Epling 1933) with only one species cited: the Cuban *Hyptis pedalipes*, which therefore automatically becomes the type.

= *Hyptis* sect. *Cyanocephalus* subsect. *Longifoliae* Epling (1936b: 270). Type:—*Hyptis tenuifolia* Epling [= *Cyanocephalus tenuifolius* (Epling) Harley & J.F.B.Pastore].

= *Hyptis* sect. *Cyanocephalus* subsect. *Lippiastra* Epling (1936b: 272). Type:—*Hyptis lippiioides* Pohl ex Benth. [= *Cyanocephalus lippiioides* (Pohl ex Benth.) Harley & J.F.B.Pastore].

*Cyanocephalus* is composed of herbs and subshrubs, often strongly aromatic, with usually small leaves, entire or toothed to deeply pinnatifid. It is distinguished by its pedunculate capitula, globose even when immature, with narrowly linear, soft bracteoles (see note), which form an involucre, inconspicuous at anthesis, the calyx with linear, usually clavate lobes, with an oblique throat and tube usually down-curved to deflexed, above the middle. Gynoecium without stylopodium, style capitate, with stigmatic branches usually reduced. The sectional classification presented by Epling (1949) has proved unusable (Harley, 2006). There are 25 species currently recognized, mainly found in the cerrados of central Brazil, extending to eastern Paraguay and Bolivia. The type species is endemic to Cuba. See Fig. 1D, F.

Note:—The bracteolar nature of the involucre of the Hyptidinae capitulum can be demonstrated by a study of the structure of congested inflorescences in a number of species with less compact inflorescence units, where the flowers and bracteoles subtending them become reoriented, the flowers moving to an upper position related to the inflorescence axis, and the bracteole to a lower position, with foreshortening of the axes separating them (cincinnus or drepanium).

***Cyanocephalus adpressus*** (A.St.-Hil. ex Benth.) Harley & J.F.B.Pastore, *comb. nov.* ≡ *Hyptis adpressa* A.St.-Hil. ex Benth. (1833: 84) ≡ *Mesosphaerum adpressum* (A.St.-Hil. ex Benth.) Kuntze (1891: 526). Type:—BRAZIL. Goiás: in campis prope Forquilla, *St.-Hilaire C1 853* (holotype P!; isotypes F!, US!).

***Cyanocephalus apertiflorus*** (Epling) Harley & J.F.B.Pastore, *comb. nov.* ≡ *Hyptis apertiflora* Epling (1936b: 273). Type:—BRAZIL. Locality unknown, *Sellow s.n.* (holotype B†; lectotype UC!, designated here; isolectotype ZT!).

***Cyanocephalus bombycinus*** (Epling) Harley & J.F.B.Pastore, *comb. nov.* ≡ *Hyptis bombycina* Epling (1936b: 276). Type:—BRAZIL. Mato Grosso: Coxim, *Hoehne 2852* (holotype UC!).

***Cyanocephalus caprariifolius*** (Pohl ex Benth.) Harley & J.F.B.Pastore, *comb. nov.* ≡ *Hyptis caprariifolia* (as “*caprariaefolia*”) Pohl ex Benth. (1833: 83) ≡ *Mesosphaerum caprariifolium* (Pohl ex Benth.) Kuntze (1891: 526). Type:—BRAZIL. Goiás: Cristalina “Serra dos Chrystais”, *Pohl 1020* (lectotype W!, designated by Epling 1936b; isolectotypes K!, F!, UC!).

***Cyanocephalus cardiophyllus*** (Pohl ex Benth.) Harley & J.F.B.Pastore, *comb. nov.* ≡ *Hyptis cardiophylla* Pohl ex Benth. (1833: 84) ≡ *Mesosphaerum cardiophyllum* (Pohl ex Benth.) Kuntze (1891: 526). Type:—BRAZIL. Goiás: “Rio Urubu, Ouro Fino, Santa Luzia, Cap. Goyaz et ad Paracatu Cap. Min. G.” *Pohl 958* (lectotype W!, designated by Epling 1936b; possible isolectotype K!).

The label data on the type specimen in W indicates a range of specimens, from both Goiás and Minas Gerais. Epling (1949) cites the type as from Minas Gerais state, although there is no way to determine where the specimen came from.

***Cyanocephalus coriaceus*** (Benth.) Harley & J.F.B.Pastore, *comb. nov.* ≡ *Hyptis coriacea* Bentham (1848: 95) ≡ *Mesosphaerum coriaceum* (Benth.) Kuntze (1891: 526). Type:—BRAZIL. Minas Gerais: Diamantina, July 1840, *Gardner 5090* (holotype K!; isotype G!, OXF!, W!, B† photo!).

***Cyanocephalus cretatus*** (Epling) Harley & J.F.B.Pastore, *comb. nov.* ≡ *Hyptis cretata* Epling (1936b: 276). Type:—BRAZIL. Minas Gerais: Uberaba, *Riedel & Lund 2430* (holotype UC!; isotypes K!, LE!, NY!, US!).

***Cyanocephalus cuneatus*** (Pohl ex Benth.) Harley & J.F.B.Pastore, *comb. nov.* ≡ *Hyptis cuneata* Pohl ex Bentham (1833: 86) ≡ *Mesosphaerum cuneatum* (Pohl ex Benth.) Kuntze (1891: 526). Type:—BRAZIL. Minas Gerais: Rio Parahybuna, *Pohl 624* (holotype W!; isotype K!).

In the protologue Bentham does not mention a specimen at K, as he normally did. In this case he merely states: “Hab. in Brasilia: in campis desertorum ad Rio Parahybuna provinciae Minas Gerais, *Pohl!* (*v.s.sp. in herb. Mus. Caes. Reg. Bras. Vind.*)”. Bentham travelled widely in Europe, visiting many herbaria, whose specimens he annotated, and sometimes received duplicates of material at a later date.

= *Hyptis clavellifera* Bentham (1848: 91) ≡ *Mesosphaerum clavelliferum* (Benth.) Kuntze (1891: 526). Type:—BRAZIL. Goiás: between Arraias and São Domingos, May 1840, *Gardner 4307* (holotype K!; isotypes OXF!, B† photo!).

***Cyanocephalus delicatulus*** (Harley) Harley & J.F.B.Pastore, *comb. nov.* ≡ *Hyptis delicatula* Harley (1985c: 630). Type:—BRAZIL. Bahia: Serra do Sincorá, S of Mucugê, by Rio Paraguaçu, 7 February 1979, *Harley et al. 16103* (holotype CEPEC!; isotypes AAU!, E!, IPA!, K!, NY!, P!, U!, US!, SPF!).

***Cyanocephalus desertorum*** (Pohl ex Benth.) Harley & J.F.B.Pastore, *comb. nov.* ≡ *Hyptis desertorum* Pohl ex Bentham (1833: 83). Type:—BRAZIL. Minas Gerais: Rio Parahybuna, *Pohl 542* (holotype W!). = *Hyptis lasiocalyx* Pilger (1901: 190). Type:—BRAZIL. Mato Grosso: Cuiabá, 22 April 1849, *Meyer 512* (holotype B†).

***Cyanocephalus digitatus*** (Harley) Harley & J.F.B.Pastore, *comb. nov.* ≡ *Hyptis digitata* Harley (1985c: 632). Type:—BRAZIL. Goiás: Alto Paraíso de Goiás, Chapada dos Veadeiros, 28 September 1975, *Hatschbach & Kummrow 37241* (holotype MBM!; isotypes K!, MO!).

***Cyanocephalus incanus*** (Briq.) Harley & J.F.B.Pastore, *comb. nov.* ≡ *Hyptis incana* Briquet (1889: 111) [non *Hyptis incana* Willdenow ex Steudel (1841: 794), *nom.nud.*] ≡ *Hyptis albicoma* Epling (1936b: 276), *nom.superfl.* Type:—PARAGUAY. Guaira: entre Santa Bárbara y Borja, *Balansa 1001* (holotype G!; isotypes K!, P!).

Epling erected a new name for *Hyptis incana* Briq., believing incorrectly that the earlier Willdenow name was valid.

***Cyanocephalus lanatus*** (Pohl ex Benth.) Harley & J.F.B.Pastore, *comb. nov.* ≡ *Hyptis lanata* Pohl ex Bentham (1833: 84) ≡ *Mesosphaerum lanatum* (Pohl ex Benth.) Kuntze (1891: 526). Type:—BRAZIL. Goiás: Água Quente et Trahiras, *Pohl 1879* (holotype W!; isotypes K!, W!).

***Cyanocephalus lippioides*** (Pohl ex Benth.) Harley & J.F.B.Pastore, *comb. nov.* ≡ *Hyptis lippioides* Pohl ex Bentham (1833: 86) ≡ *Mesosphaerum lippioides* (Pohl ex Benth.) Kuntze (1891: 526). Type:—BRAZIL. Goiás: Chapada São Marcos ad Cabesseira Ribeirão Batalha, *Pohl 2866* (holotype W!; isotype K!).

= *Hyptis fragilifolia* A.St.-Hil. ex Bentham (1833: 85) ≡ *Mesosphaerum fragilifolium* (A.St.-Hil. ex Benth.) Kuntze (1891: 526). Type:—BRAZIL. Minas Gerais: Penha, *St.-Hilaire 1164* (holotype P!).

= *Hyptis nervosa* Pohl. ex Bentham (1833: 85) ≡ *Mesosphaerum nervosum* (Pohl ex Benth.) Kuntze (1891: 526). Type:—BRAZIL. Minas Gerais: “inter Estiva et Rio Preto”, *Pohl s.n.* (holotype W!; isotype K!).

There are two specimens on the type sheet of *H. nervosa* in W, of which the right hand specimen is labelled as type. Below it is a label listing three different collection numbers, at the top right hand side and the locality data: “Inter Estiva et Rio da Prata, inter Calumbis et Barreros, Cap. Minas Geraes”. The left hand specimen is unlabelled, but could well be part of the same collection or a different one from the other.

= *Hyptis candida* Pohl ex Bentham (1833: 85). Type:—BRAZIL. Minas Gerais: “inter Rio Jequitinhonha et Barreros”, *Pohl 6170* (holotype W!; isotype K!).

= *Hyptis rigida* Pohl. ex Bentham (1833: 85) ≡ *Mesosphaerum rigidum* (Pohl ex Benth.) Kuntze (1891: 527). Type:—BRAZIL. Minas Gerais: “inter Calumbis et Barreros”, *Pohl 6171* (holotype W!).

= *Hyptis subnuda* Briquet (1898: 231) ≡ *Mesosphaerum subnudum* Briquet (1898: 231). Type:—BRAZIL. São Paulo: Bocaina, *Glaziou 11308* (holotype G!; isotype LE!, P!).

***Cyanocephalus nitidulus*** (Benth.) Harley & J.F.B.Pastore, *comb. nov.* ≡ *Hyptis nitidula* Bentham (1848: 91) ≡ *Mesosphaerum nitidulum* (Benth.) Kuntze (1891: 526). Type:—BRAZIL. Goiás: Chapada da Mangabeira, September 1839, *Gardner 3392* (holotype K!; isotypes BR!, K!, OXF!).

***Cyanocephalus pedalipes*** (Griseb.) Harley & J.F.B.Pastore, *comb. nov.* ≡ *Hyptis pedalipes* Grisebach (1866: 213) ≡ *Mesosphaerum pedalipes* (Griseb.) Kuntze (1891: 526). Type:—CUBA. “Occidentalis”, unlocalized, *Wright 3152* (holotype GOET; isotypes NY!, P!, G!, K!).

***Cyanocephalus peduncularis*** (Benth.) Harley & J.F.B.Pastore, *comb. nov.* ≡ *Hyptis peduncularis* Bentham (1833: 87) ≡ *Mesosphaerum pedunculare* (Benth.) Kuntze (1891: 526). Type:—BRAZIL. Minas Gerais: Volta de Serra, October 1818, *Sellow* (lectotype B†, designated by Epling 1936b, replacement lectotype K!, designated by Harley 2006.) For comment on type locality and date of collection see Harley (2006).

= *Hyptis camporum* Bentham (1848: 92) ≡ *Mesosphaerum camporum* (Benth.) Kuntze (1891: 526). Type:—BRAZIL. Minas Gerais: Diamantina, July 1840, *Gardner 5091* (holotype K!; isotypes W!, OXF!).

***Cyanocephalus polioides*** (Briq.) Harley & J.F.B.Pastore, *comb. nov.* ≡ *Hyptis polioides* Briquet (1897: 35). Type:—PARAGUAY. Cordillera: Valenzuela, 18 January 1884, *Balansa 4557* (holotype P!).

Epling (1949) wrongly gives the name as *Hyptis polioides* Briq.

***Cyanocephalus rugosus*** (Benth.) Harley & J.F.B.Pastore, *comb. nov.* ≡ *Hyptis rugosa* Bentham (1833: 86) ≡ *Mesosphaerum rugosum* (Benth.) Kuntze (1891: 527). Type:—BRAZIL. Minas Gerais: Saquinho, *Sellow 1478* (lectotype B†, designated by Epling 1936b, replacement lectotype K!, designated here).

= *Hyptis albipes* A.St.-Hil. ex Bentham (1833: 88) ≡ *Mesosphaerum albipes* (A.St.-Hil. ex Benth.) Kuntze (1891: 526). Type:—BRAZIL. Minas Gerais: Rio Salgado, *St.-Hilaire 1856* (holotype P!; isotype F! fragment).

= *Hyptis arguta* Pohl ex Bentham (1833: 86) ≡ *Mesosphaerum argutum* (Pohl ex Benth.) Kuntze (1891: 526) ≡ *Hyptis rugosa* var. *villosissima* Schmidt (1858: 94). Type:—BRAZIL. Minas Gerais: Rio Parahybuna, *Pohl 539* (holotype W!).

= *Hyptis bisdentata* Pohl ex Bentham (1833: 87). Type:—BRAZIL. Minas Gerais: Fazenda Tallaio, inter Piedade et Fanado, *Pohl s.n.* (holotype W!; isotype K!). The label on the type sheet has three numbers: 2344, 3044, 540.

= *Hyptis brunnescens* Pohl ex Bentham (1833: 83) ≡ *Mesosphaerum brunnescens* (Pohl ex Benth.) Kuntze (1891: 526). Type:—BRAZIL. Goiás: Engenho dos Bois, *Pohl 1361* (holotype W!; isotype K!).

= *Hyptis incisa* A.St.-Hil. ex Bentham (1833: 87) ≡ *Mesosphaerum incisum* (A.St.-Hil. ex Benth.) Kuntze (1891: 526) ≡ *Hyptis rugosa* var. *incisa* (A.St.-Hil. ex Benth.) Epling (1936b: 274). Type:—BRAZIL. Minas Gerais: Salgado, *St.-Hilaire 1857* (lectotype P!, designated by Epling 1936b).

= *Hyptis longipes* A.St.-Hil. ex Bentham (1833: 88) ≡ *Mesosphaerum longipes* (A.St.-Hil. ex Benth.) Kuntze (1891: 526). Type:—BRAZIL. Minas Gerais: Minas Novas, “in sylvis siccis prope pagum Sucuriu”, *St.-Hilaire 1392* (holotype P!; isotype K!).

= *Hyptis reflexa* A.St.-Hil. ex Benth (1833: 83) ≡ *Mesosphaerum reflexum* (A.St.-Hil. ex Benth.) Kuntze (1891: 527). Type:—BRAZIL. Minas Gerais: Araxá, *St.-Hilaire 461* (holotype P!; isotype F!).

= *Hyptis araripensis* Benth (1848: 93) ≡ *Mesosphaerum araripense* (Benth.) Kuntze (1891: 526). Type:—BRAZIL. Ceará: Serra do Araripe, October 1838, *Gardner 1805* (holotype K!; isotypes OXF!, P!, W!, MANCH!).

= *Hyptis subsessilis* Benth (1848: 92). Type:—BRAZIL. Piauí: Serra da Batalha, May 1840, *Gardner 2927* (lectotype K!, designated by Epling 1936b; isolectotype OXF!).

= *Hyptis viscidula* Benth (1848: 92) ≡ *Mesosphaerum viscidulum* (Benth.) Kuntze (1891: 527). Type:—BRAZIL. Minas Gerais: between Rio Claro and São Romão, June 1840, *Gardner 5088* (lectotype K!, designated by Epling 1936b; isolectotype G!, OXF!).

As indicated by the extensive synonymy and the number of varieties which have been recognized, the species is morphologically extremely diverse. Epling (1949) recognized three varieties, but subsequent collections make these of doubtful value. A full study is required to determine the status of these forms.

***Cyanocephalus selaginifolius*** (Mart. ex Benth.) Harley & J.F.B.Pastore, *comb. nov.* ≡ *Hyptis selaginifolia* Mart. ex Benth (1833: 87) ≡ *Mesosphaerum selaginifolium* (Mart. ex Benth.) Kuntze (1891: 527). Type:—BRAZIL. Minas Gerais: “in campis, Serra de Santo Antonio”, *Martius s.n.* (holotype M!).

***Cyanocephalus tacianae*** (Harley) Harley & J.F.B.Pastore, *comb. nov.* ≡ *Hyptis tacianae* Harley (2006: 95). Type:—BRAZIL. Distrito Federal: Samambaia, Parque Boca da Mata, 28 May 1998, *Rezende 410* (holotype CEN!; isotypes K!, HUEFS!, UFG!).

***Cyanocephalus tagetifolius*** (Harley) Harley & J.F.B.Pastore, *comb. nov.* ≡ *Hyptis tagetifolia* Harley (1974: 134). Type:—BRAZIL. Goiás: ca. 20 km N of Alto Paraíso de Goiás, 25 March 1971, *Irwin et al. 33180* (holotype K!; isotypes NY!, UB!).

***Cyanocephalus tenuifolius*** (Epling) Harley & J.F.B.Pastore, *comb. nov.* ≡ *Hyptis tenuifolia* Epling (1936b: 270). Type:—BRAZIL. São Paulo: “inter São Simão et Casa Branca”, 1885, *Regnell III 923* (holotype S!).

***Cyanocephalus tripartitus*** (Briq.) Harley & J.F.B.Pastore, *comb. nov.* ≡ *Hyptis tripartita* Briquet (1889: 111). Type:—PARAGUAY. Caaguazú: Caaguazú, *Balansa 999* (holotype G!; isotypes BM!, K!, P!, S!).

***Cyanocephalus viaticus*** (Harley) Harley & J.F.B.Pastore, *comb. nov.* ≡ *Hyptis viatica* Harley (1985c: 628). Type:—BRAZIL. Minas Gerais: BR 4, km 878–879, 30 January 1965, *Pereira 9807* (holotype HB!; isotype K!).

***Eplingiella*** Harley & J.F.B.Pastore, *gen. nov.* *Hyptidendro* similis sed gynoecio sine stylopodio, et corollis forma propria lobis patentibus azureo-violaceis coloratis, et ab omnibus generibus Hyptidarum combinatione foliorum parvorum xeromorphorum et floribus brevemente pedicellatis in cymulis plusminusve paucifloribus bracteolatis, bracteolis parveolis inconspicuis, calycibus fructificantibus aut actinomorphis lobis curtis fauce barbato trichomatibus albis aut zygomorphis tubo ad medium deflexo, fauce non barbato, lobis subulatis haud clavatis differt. Type:—*Eplingiella fruticosa* (Salzm. ex Benth.) Harley & J.F.B.Pastore [= *Hyptis fruticosa* Salzm. ex Benth].

This genus is characterized by its shrubby habit, with small xeromorphic leaves, the flowers in 2–18-flowered pedunculate cymes, subtended by bracts similar to leaves, of shortly pedicellate flowers with small, inconspicuous, narrowly linear bracteoles. Corolla characteristic, with spreading lobes, blue to violet-blue. Fruiting calyx variable, that of *E. cuniloides* actinomorphous with short lobes and with dense white trichomes in throat and *E. fruticosa* zygomorphous, with mid-tube strongly curved and lobes subulate, not clavate and throat not bearded. Gynoecium without a stylopodium, style capitate or with stigmatic lobes very short. Nutlets narrowly ellipsoid, dark brown, strongly mucilaginous when wet.

There are two species at present recognized, from semi-arid, sandy areas in the upland interior of North-east Brazil, the type species descending to coastal sands and the other endemic to Morro do Chapéu, Chapada Diamantina, Bahia. See Fig. 3C.

Both species of *Eplingiella* were originally included by Epling (1936b) in *Hyptis* sect. *Umbellaria*, together with a group of other species, later removed to *Hyptidendron* sect. *Umbellaria* (Harley 1988), and characterized by the possession of a well developed stylopodium. Lacking this feature, the two species mentioned above remained unranked for a number of years, as they did not appear to fit in any of the sections of *Hyptis* recognized at that time. The molecular analysis, presented by Pastore *et al.* (2011), has shown that they form a distinct clade and justifies their recognition at generic level. The genus is named in honour of Carl Epling, whose contribution to the study of the New World Lamiaceae is immense.

***Eplingiella cuniloides*** (Epling) Harley & J.F.B.Pastore, *comb. nov.*  $\equiv$  *Hyptis cuniloides* Epling (1947: 517). Type:—BRAZIL. Bahia: Morro do Chapéu, April 1944, *Schery 587* (holotype MO!; isotype UC!).

***Eplingiella fruticosa*** (Salzmann. ex Benth.) Harley & J.F.B.Pastore, *comb. nov.*  $\equiv$  *Hyptis fruticosa* Salzm. ex Benth. (1833: 123)  $\equiv$  *Mesosphaerum fruticosum* (Salzm. ex Benth.) Kuntze (1891: 526). Type:—BRAZIL. Bahia: “in collibus aridis circa Bahiam” (Salvador), 1830, *Salzmann s.n.* (lectotype K!, designated by Epling 1936b; isolectotypes BR!, E!, G!, HAL!, P!).

***Eriope*** Humb. & Bonpl. ex Benth. (1833: 142). Type:—*Eriope nudiflora* Humb. & Bonpl. ex Benth. [= *Eriope crassipes* Benth.].

= *Hyptis* sect. *Siagonarrhen* Mart. ex Benth. subsect. *Nudiflorae* Benth. (1848: 134), *syn. nov.* Type:—*Hyptis latifolia* Mart. ex Benth., lectotype designated by Epling 1936b [= *Eriope latifolia* (Mart. ex Benth.) Harley].

= *Hyptis* sect. *Mixtae* (Epling) Epling (1949: 215), *syn. nov.* Type:—*Hyptis salviifolia* Pohl ex Benth. [*Eriope salviifolia* (Pohl ex Benth.) Harley].

Trees, shrubs or subshrubs, often aromatic; stems often geoxylic, sometimes virgate, often with conspicuous white, spreading setose hairs and a few species as in *Hypenia* with pruinose, fistulose internodes below inflorescence. Inflorescence elongate, raceme-like, simple or branched, with 1-flowered pedunculate cymes from the axils of caducous bracts, the peduncle appearing as a pedicel (pseudo-pedicel), but with a pair of usually inconspicuous bracteoles at its apex, at base of calyx. Calyx turbinate to campanulate, 5-lobed, the posterior lobes often becoming connate and indistinct in fruit, when throat closed by dense white hairs in many species; corolla strongly 2-lipped, violet or pink and often yellowish in bud, tube widening above and sometimes dorsally gibbous, usually constricted near base, posterior lip internally with dark striae and a whitish area at base. Gynoecium with conspicuous persistent stylopodium overtopping ovary. Nutlets slightly flattened to ovoid, rarely narrowly winged.

There are over 30 species occurring in savannas, especially cerrados of Central Brazil and in campo rupestre in mountain areas of Eastern Brazil, and in campinas in Amazonia, with a few species extending into neighbouring countries. See Fig. 2E.

Harley (1976) revised the genus, raising the number of species recognized by Epling (1936) from 18 to 20, by various taxonomic changes, reducing several to synonymy, describing four new species and transferring three species from *Hyptis*. Later (Harley 1992) further changes and additions were made.

***Eriopidion*** Harley (1976: 103)  $\equiv$  *Eriope* sect. *Tubiflorae* Epling (1936a: 190). Type:—*Eriopidion strictum* (Benth.) Harley [= *Eriope stricta* Benth. (1848: 142)].

The only species is a low perennial herb, sometimes slightly woody at base, strongly aromatic. It shares many of the characters found in species of *Eriope*, including the slender raceme-like inflorescence composed of 1-flowered cymes, but differs in the persistent bracts, the narrowly campanulate calyx with a broad hygroscopic posterior lobe, which folds when dry to close mouth of calyx, a gynoecium with stylopodium absent and with  $\pm$ triquetrous nutlets.

A monotypic genus (Harley 1976), with *Eriopidion strictum* a rare plant of dry, sandy areas within the caatinga zone of NE Brazil, reappearing in semi-arid vegetation by the lower Orinoco River, in Venezuela. See Fig. 1J.

***Gymneia*** (Benth.) Harley & J.F.B.Pastore, *comb. et stat. nov.* ≡ *Hyptis* Sect. *Gymneia* Bentham (1833: 77–78). Type:—*Gymneia platanifolia* (Mart. ex Benth.) Harley & J.F.B.Pastore [= *Hyptis platanifolia* Mart. ex Benth., lectotype designated by Epling 1936b].

= *Hyptis* sect. *Spiciformes* Schmidt (1858: 83), *syn. nov.* Type:—*Hyptis platanifolia* Mart. ex Benth., lectotype designated here [= *Gymneia platanifolia* (Mart. ex Benth.) Harley & J.F.B.Pastore].

*Gymneia* is composed of herbs or subshrubs, characterized by terminal inflorescences of elongate, congested or interrupted spikes, with flowers arranged in ± globose verticillasters in the axils of reduced bracts, the verticillasters formed of strongly congested cincinni with filiform bracteoles. Flowers with corollas small, fruiting calyx with strongly curved tube and oblique mouth, gynoecium without stylopodium, style ± capitate, stigma lobes much reduced. A very homogeneous genus of at least six species, occurring in the cerrados of central Brazil, with one species occurring in waste places in the caatingas of NE Brazil and disjunctly in eastern Bolivia, where it may have been introduced. See Figs. 2A, 3A.

***Gymneia ampelophylla*** (Epling) Harley & J.F.B.Pastore, *comb. nov.* ≡ *Hyptis ampelophylla* Epling (1936b: 279). Type:—BRAZIL. Tocantins: Porto Nacional [“Goiás, Porto Real”], 21 February 1829, *Burchell 8671-2* (holotype K!; isotypes K!).

***Gymneia interrupta*** (Pohl ex Benth.) Harley & J.F.B.Pastore, *comb. nov.* ≡ *Hyptis interrupta* Pohl ex Bentham (1833: 77) ≡ *Mesosphaerum interruptum* (Pohl ex Benth.) Kuntze (1891: 526). Type:—BRAZIL. Goiás: Santa Cruz, *Pohl 2758* (lectotype W!, designated by Epling 1936b; isolectotypes K!, W!).

= *Hyptis ovalifolia* Bentham (1848: 87) ≡ *Mesosphaerum ovalifolium* (Benth.) Kuntze (1891: 526), *syn. nov.* Type:—BRAZIL. Goiás: Serra Dourada, *Pohl 1497* (holotype W!; isotype K!).

The extensive collections now available show a range of intermediates between *Hyptis ovalifolia* and *G. interrupta*, especially in the interrupted or congested spikes of verticillasters and in the variable leaf shape, previously considered diagnostic, which requires that the two species be united.

***Gymneia malacophylla*** (Benth.) Harley & J.F.B.Pastore, *comb. nov.* ≡ *Hyptis malacophylla* Bentham (1848: 86) ≡ *Mesosphaerum malacophyllum* (Benth.) Kuntze (1891: 526). Type:—BRAZIL. Tocantins: between Natividade & Arraias, February 1841, *Gardner 3930* (holotype K!; isotype G!, OXF!).

***Gymneia platanifolia*** (Mart. ex Benth.) Harley & J.F.B.Pastore, *comb. nov.* ≡ *Hyptis platanifolia* Mart. ex Bentham (1833: 77) ≡ *Mesosphaerum platanifolium* (Mart. ex Benth.) Kuntze (1891: 526). Type:—BRAZIL. Bahia: “in campis ad Joazeiro”, *Martius Obs. 2361* (lectotype M!, designated by Epling 1936b; isolectotype M!).

***Gymneia virgata*** (Benth.) Harley & J.F.B.Pastore, *comb. nov.* ≡ *Hyptis virgata* Bentham (1833: 77) ≡ *Mesosphaerum virgatum* (Benth.) Kuntze (1891: 527). Type:—BRAZIL. Minas Gerais: *Sellow 1497* (lectotype B†, designated by Epling 1936b, replacement lectotype K!, designated here).

***Hypenia*** (Mart. ex Benth.) Harley (1988: 91) ≡ *Hyptis* sect. *Hypenia* Mart. ex Bentham (1833: 136). Type:—*Hypenia reticulata* (Mart. ex Benth.) Benth. [= *Hyptis reticulata* Mart. ex Benth., lectotype designated by Epling 1936b].

The genus is composed of shrubs or subshrubs of virgate habit, usually slightly aromatic, with erect, virgate stems and with at least the upper internodes pruinose, fistulose and sometimes slightly inflated, lower stems often with conspicuous white, spreading setose hairs. The inflorescence lax or congested and composed of 1-flowered cymes, rarely 3-flowered, the peduncle appearing as a pedicel, but with a pair of narrow and

inconspicuous or broad, persistent bracteoles at base of calyx. In many species the peduncles are elongate and very slender, while others have short peduncles and congested inflorescences. Calyx subactinomorphic, campanulate to tubular and distinctly 5-lobed with subequal lobes; corollas pale blue, lilac, red or yellow, small with short tube, to large, and then with elongate tube, tube usually contracted near base and with relatively short lobes; gynoecium with a very short stylopodium, much shorter than the ovary; nutlets ovoid. The species with a lax inflorescence of large red corollas, many of which have resupinate flowers (Atkinson, unpublished thesis), appear to be adapted to bird pollination, and are often visited by humming-birds.

The genus, with ca. 23 species, is typical of the upland lateritic savannas or cerrados and the shallow sandy soils of the campo rupestres in Goiás and the Serra do Espinhaço range of Eastern Brazil, extending to eastern Paraguay and Bolivia, with one species widespread in the caatingas of NE Brazil and with records from the Guayana Highlands of Venezuela. See Figs. 4C, E.

Harley (1988) erroneously published the combination *Hypenia durifolia* (Epling) Harley. The correct name should be based on the earlier *Hyptis sclerophylla* Epling, which is illegitimate under that genus.

***Hypenia sclerophylla*** (Epling) Harley & J.F.B.Pastore, *comb. nov.*  $\equiv$  *Hyptis sclerophylla* Epling (1936b: 234)  $\equiv$  *Hyptis durifolia* Epling (1949: 235)  $\equiv$  *Hypenia durifolia* (Epling) Harley (1988: 92). Type:—BRAZIL. Goiás: between Meiaponte (Pirenópolis) and Caisara, 23 October 1827, *Burchell 6325* (holotype K!). This is to correct the illegitimate combination made by Harley (1988).

***Hypenia simplex*** (A.St.-Hil. ex Benth.) Harley & J.F.B.Pastore, *comb. nov.*  $\equiv$  *Hyptis simplex* A.St.-Hil. ex Bentham (1833: 138)  $\equiv$  *Mesosphaerum simplex* (A.St.-Hil. ex Benth.) Kuntze (1891: 527)  $\equiv$  *Eriope simplex* (A.St.-Hil. ex Benth.) Harley (1988: 93). Type:—BRAZIL. Goiás: “inter saxa in Serra Dourada”, *St.-Hilaire 775* (holotype P!)  $\equiv$  *Hyptis campanulata* Bentham in (1848: 137)  $\equiv$  *Mesosphaerum campanulatum* (Benth.) Kuntze (1891: 526). Type:—BRAZIL. Tocantins: Serra da Natividade, January 1840, *Gardner 3923* (holotype K!).

The molecular data (Pastore *et al.* 2011) place this species as sister to the rest of *Hypenia*. This position is confirmed by an examination of the gynoecium structure, where the stylopodium is very small or absent, as in *Hypenia* and unlike that in *Eriope* where it overtops the nutlets. The species was originally removed from *Hyptis* to *Eriope* (Harley 1988), due to the similarity of its corolla, which bears a remarkable likeness to those of the latter genus.

***Hyptidendron*** Harley (1988: 90)  $\equiv$  *Hyptis* Sect. *Buddleioides* Bentham (1833: 132). Type:—*Hyptis membranacea* Benth., lectotype designated by Epling 1936b [= *Hyptidendron asperrimum* (Spreng.) Harley].  $\equiv$  *Hyptis* sect. *Siagonarrhen* Mart. ex Bentham (1833: 133)  $\equiv$  *Hyptis* sect. *Siagonarrhen* subsect. *Cymosae* Bentham (1848: 133). Type:—*Hyptis scabra* Benth., lectotype designated by Epling 1936b [= *Hyptidendron canum* (Benth.) Harley].  $\equiv$  *Hyptis* sect. *Latiflorae* Epling (1936a: 224), *syn. nov.* Type:—*Hyptis eximia* Epling.

The genus is composed of trees, shrubs or subshrubs, of varied habit, with an indumentum on leaves and stems of simple to in some species dendroid hairs, and with small to often large, coriaceous, sometimes aromatic leaves. The inflorescence is composed of thyrsoid, often paniculate flowers arranged in dichasial or monochasial cymes in the axils of usually foliar bracts, these sometimes conspicuous with white or purplish hairs. The pedicellate flowers have inconspicuous bracteoles, and an actinomorphic to weakly zygomorphic calyx with tube cylindrical to infundibuliform, straight, 5-lobed with subequal lobes; corollas bluish purple to lilac or rarely white, the tube cylindrical to infundibuliform; gynoecium with stylopodium overtopping ovary; nutlets ovoid to slightly flattened or narrowly winged.

The genus contains about 18 species, all occurring in S America from the Guayana Highlands and the Andes to Central Brazil, Bolivia and Paraguay. Several species are small trees or shrubs in the cerrados of Central Brazil (Harley 1988), and *H. arboreum* Benth.) Harley can grow up to 20 m high in relictual montane forests in Northern and Western S America. See Figs. 1C, E.



Molecular studies (Pastore *et al.* 2011) indicate that *Hyptis eximia* Epling, placed by Epling in a monotypic section *Latiflorae*, falls within this genus, making the following new combination necessary. The molecular data shows some conflict with the subsections recognized by Harley (1988). Until fuller data are available, it is proposed not to recognize them here.

***Hyptidendron eximium*** (Epling) Harley & J.F.B.Pastore, *comb. nov.*  $\equiv$  *Hyptis eximia* Epling (1936a: 223). Type:—BRAZIL. Mato Grosso: Barão de Melgaço, June 1918, *Kuhlmann 2279* (holotype UC!).

***Hyptis*** Jacquin (1787a: 101), *nom. cons.* (Briquet 1906). Type:—*Hyptis capitata* Jacq., *typ. cons.* (lectotype designated by Green 1929: 107).

*Hyptis* Jacq. was conserved against *Condea* Adans. and *Mesosphaerum* P.Browne. However the types of these two genera no longer fall within our concept of *Hyptis*, so the names again become available.

A genus of annual or perennial herbs, subshrubs, or shrubs, of variable habit, with flowers in pedunculate to sessile, cymose capitula with an involucre of bracteoles, and borne singly in the axils of foliaceous or reduced bracts and sometimes forming complex synflorescences. Flowers usually small, with narrow, cylindrical calyx, often accrescent in fruit, usually with subequal lobes; corolla small often white or occasionally lilac and with spotted posterior lip, tube cylindrical; Nutlets ovoid or narrowly ellipsoid.

A genus of around 144 species, distributed in tropical and subtropical zones from North America to the Caribbean and southward to Argentina and Peru, often occurring in humid savannas. A few species extend to the Old World tropics, mainly as weeds. See Figs. 1H, 2C, 3B, 3D, 4G.

The molecular studies (Pastore *et al.* 2011) on which the taxonomic changes provided in this paper are largely based, require a much reduced genus *Hyptis*. Of the 26 sections previously recognized by Epling (1949), only ten remain, with a few, such as *Hyptis* sections *Induratae* and *Pachyphyllae* now shown to fall within *H.* sect. *Eriosphaeria* Benth. *Hyptis* sect. *Polydesmia*, partially dismembered, and a sister group to the reduced *Hyptis* clade, is now treated at generic level as *Cantinoa* and includes several species formerly in *H.* sect. *Mesosphaeria*. The genus *Peltodon* is shown to be grouped within *Hyptis*. There are still questions to be answered with respect to inter-relationships within this remodelled *Hyptis*, but it is hoped that future studies, with much wider sampling, will enable a reevaluation of its infrageneric classification. The ten sections of *Hyptis* remaining, which need further investigation, are: *Hyptis* sect *Hyptis*, *H.* sect. *Pusillae* Epling, *H.* sect. *Hilaria*, *H.* sect. *Cyrta*, *H.* sect. *Plagiotis* Benth., *H.* sect. *Myriocephala* Benth., *H.* sect. *Muellerohyptis* Briq., *H.* sect. *Xylodontes*, *H.* sect. *Apodotes* Benth. and *H.* sect. *Eriosphaeria*. The only changes we propose at this time are as follows:

***Hyptis* section *Peltodon*** (Pohl) Harley & J.F.B.Pastore, *comb. & stat. nov.*  $\equiv$  *Peltodon* Pohl (1827: 66). Type:—*Peltodon radicans* Pohl, lectotype designated by Epling 1936b [= *Hyptis radicans* (Pohl) Harley & J.F.B.Pastore].

Epling (1936b) wrote: “A genus scarcely separate from *Hyptis* and coordinate with its sections”—a comment confirmed by the molecular data (Pastore *et al.* 2011).

*Hyptis* sect. *Peltodon* is easily recognized by the small, spreading, foliaceous appendage at the apex of each calyx lobe. The flowers are arranged in robust, subglobose capitula, with a conspicuous involucre of broad, often coloured bracteoles.

Five species are known, mainly occurring in cerrado or other similar savanna formations or in margins of Atlantic forest, in eastern and southern Brazil extending into eastern Paraguay and Argentina. See Fig. 1H.

***Hyptis campestris*** Harley & J.F.B.Pastore, *nom. nov.*  $\equiv$  *Peltodon tomentosus* Pohl (1827: 69) [non *Hyptis tomentosa* Poiteau 1806]. Type:—BRAZIL. Minas Gerais: “Fazenda de Almas, in via de Paracatu do Príncipe ad Rio S. Antônio”, *Pohl 3352* (holotype W!; isotype K!).

***Hyptis comaroides*** (Briq.) Harley & J.F.B.Pastore, *comb. nov.* ≡ *Peltodon comaroides* Briquet. (1889: 110). Type:—PARAGUAY. Guairá: “Itapé dans les prairies”, *Balansa 1008* (holotype G!; isotype K!). = *Peltodon longipes* A.St.-Hil. ex Bentham (1833: 63) [non *Hyptis longipes* A.St.-Hil. ex Bentham 1833: 88]. Type:—BRAZIL. Rio Grande do Sul: “ad rivulos prope Santa (?São) Borja in Missionibus Uruguayensibus”, *St.-Hilaire 2656* (holotype P!).

***Hyptis meridionalis*** Harley & J.F.B.Pastore, *nom. nov.* ≡ *Peltodon rugosus* Tolmatchew (1923: 62) [non *Hyptis rugosa* Bentham 1833: 86]. Type:—BRAZIL. Paraná: in campis montosis, prope Castro, March 1826, *Riedel 361* (holotype LE!).

Epling (1936b) gives *Dusén s.n.* from Paraná (S) as holotype, but this is not in accord with the protologue!

***Hyptis pusilla*** (Pohl) Harley & J.F.B.Pastore, *comb. nov.* ≡ *Peltodon pusillus* Pohl (1827: 67). Type:—BRAZIL. Tocantins (as “Goyaz”): “circa Trahiras et Natividade”, *Pohl 2407* (holotype W!; isotype K!).

***Hyptis radicans*** (Pohl) Harley & J.F.B.Pastore, *comb. nov.* ≡ *Peltodon radicans* Pohl (1827: 68). Type:—BRAZIL. Minas Gerais: Ouro Preto [“Villa Ricca”], December 1820–January 1821, *Pohl 3640* (holotype W!; isotype K!).

= *Clinopodium repens* Vellozo (1829: 242) [non *Clinopodium repens* Roxburgh (1814: 44, *nom.nud.*) 1832: 13. ≡ *Peltodon repens* (Vell.) Kuntze (1898: 260). Type:—BRAZIL. Rio de Janeiro: Fl. Flumin. Icon. 6: t. 7 (1831).

Epitype designated here: BRAZIL. São Paulo: Ubatuba, Picinguaba, 6 February 1988, *Ribeiro & Cunha 177* (HUEFS!).

***Leptohyptis*** Harley & J.F.B.Pastore, *nom. et stat. nov.* ≡ *Hyptis* sect. *Minthidium* Benth. subsect. *Tubulosae* Briquet (1897b: 377) ≡ *Hyptis* sect. *Polydesmia* Benth. subsect. *Tubulosae* (Briq.) Harley (1985b: 615). Type:—*Leptohyptis macrostachys* (Benth.) Harley & J.F.B.Pastore [= *Hyptis macrostachys* Benth., lectotype designated by Harley 1985b].

= *Hyptis* sect. *Leptostachys* Epling (1936b: 262) ≡ *Hyptis* sect. *Polydesmia* Benth. subsect. *Leptostachys* Epling (1949: 298) [non *Leptostachys* G.Mey. (1818): Poaceae] Type:—*Hyptis macrostachys* Benth., lectotype designated by Epling 1936b [= *Leptohyptis macrostachys* (Benth.) Harley & J.F.B.Pastore].

An easily recognized genus, of slender shrubs bearing elongate, slender spikes of sessile cymes, distinguished especially by the delicate triangular scale in the sinus between each lobe of the calyx, and by the slender, tubular corollas with short lobes.

There are five species, mostly restricted to drier montane areas of NE Brazil, in Bahia, Pernambuco and Minas Gerais. See Figs. 1L, 4D.

***Leptohyptis calida*** (Mart. ex Benth.) Harley & J.F.B.Pastore, *comb. nov.* ≡ *Hyptis calida* Mart. ex Bentham (1833: 131) ≡ *Mesosphaerum calidum* (Mart. ex Benth.) Kuntze (1891: 526). Type:—BRAZIL. Minas Gerais: “in Serra Santo Antonio in deserto Serro Frio”, *Martius s.n.* (holotype M!; isotypes UC!, K!).

***Leptohyptis leptostachys*** (Epling) Harley & J.F.B.Pastore, *comb. nov.* ≡ *Hyptis leptostachys* Epling (1936b: 263). Type:—BRAZIL. Minas Gerais: Ouro Preto, 1882, *Glaziou 14194* (holotype K!; isotype P!).

subsp. ***leptostachys***

subsp. ***caatingae*** (Harley) Harley & J.F.B.Pastore, *comb. nov.* ≡ *Hyptis leptostachys* Epling subsp. *caatingae* Harley (1985b: 616–617). Type:—BRAZIL. Bahia: 10 km from town, on road to Marcolino Moura, roadside through caatinga, 25 March 1977, *Harley et al. 20012* (holotype CEPEC!; isotypes AAU!, IPA!, K!, NY!, SPF!, U!, UEC!, US!).

***Leptohyptis macrostachys*** (Benth.) Harley & J.F.B.Pastore, *comb. nov.* ≡ *Hyptis macrostachys* Bentham (1848: 130) ≡ *Mesosphaerum macrostachyum* (Benth.) Kuntze (1891: 526). Type:—BRAZIL. Bahia: Jaguarari, Serra Jacobina, *Blanchet 2582* (lectotype K!, designated by Epling 1936b; isolectotypes BM!, E!, G!, K!, P!, US!).

***Leptohyptis pinheiroi*** (Harley) Harley & J.F.B.Pastore, *comb. nov.* ≡ *Hyptis pinheiroi* Harley (1985b: 623–624). Type:—BRAZIL. Bahia: Umburanas, Delfino, Serra do Curral Feio, 16 km NW of Lagoinha on the side of road to Minas do Mimoso, 950–1000m, 4 March 1974, *Harley et al. 16689* (holotype CEPEC!; isotypes K!, NY!).

***Leptohyptis siphonantha*** (Harley) Harley & J.F.B.Pastore, *comb. nov.* ≡ *Hyptis siphonantha* Harley (1974: 132). Type:—BRAZIL. Bahia: Seabra, Serra da Água de Rega, 28 km N of Seabra, 23 February 1971, *Irwin et al. 30757* (holotype K!, MO photo!; isotypes M!, NY!, UB!).

***Marsypianthes*** Mart. ex Bentham (1833: 64). Type —*Marsypianthes hyptoides* Mart. ex Bentham (1833: 64), *nom. illeg.* [= *Marsypianthes chamaedrys* (Vahl) Kuntze].

Subshrubs or perennial herbs, glandular-viscid, sometimes geoxylic with membranous leaves and axillary, few- to many-flowered cymes from the axils of foliar bracts, cymes either pedunculate with a lax sub-globose cluster of many flowers subtended by elliptic-lanceolate to linear bracteoles or sessile and 1- to few-flowered. Flowers pedicellate, calyx actinomorphic, broadly infundibuliform, with equal ±deltate to lanceolate lobes, connivent to erect at first, often becoming spreading to strongly reflexed in fruit; corolla bluish lilac or pale yellow, with tube cylindrical and with anterior lobe much shorter than the others; gynoecium with a persistent, thickened and angled stylopodium which is fused throughout its length to the inner face of the four ovary lobes; on ripening, the four mericarps (nutlets) break free and have a domed outer surface and a concave inner surface with a thin lacinate involute margin. The gynoecial structure is unique within the family, the shed nutlets strongly resembling minute tortoises!

*Marsypianthes* contains about five species, primarily in cerrado, in Central, West and Northeast Brazil, extending to Paraguay and Argentina. *M. chamaedrys* (Vahl) Kuntze is a very polymorphic herb or subshrub, mainly of disturbed ground extending from Mexico and the Caribbean, southwards to Peru, Bolivia and N Argentina. Species limits in the genus still remain to be clearly defined. See Fig. 3F.

***Martianthus*** Harley & J.F.B.Pastore, *nom. et stat. nov.* ≡ *Hyptis* sect. *Leucocephala* Bentham (1848: 89) [non *Leucocephala* Roxburgh (1832: 612): Eriocaulaceae]. Type:— *Martianthus leucocephalus* (Mart. ex Benth.) Harley & J.F.B.Pastore [= *Hyptis leucocephala* Mart. ex Benth.].

The genus *Martianthus* bears flowers in compact, globose, pedunculate capitula with an involucre of narrowly linear, membranous bracteoles, obscured when the capitulum matures. The fruiting calyx tube is usually curved downward, from the middle, and the gynoecium has no stylopodium. These same morphological characters are shared with *Cyanocephalus*. *Martianthus* differs from the latter genus, in its non-clavate calyx lobes, the corolla lobes are usually very dark vinaceous or purple, sometimes dark pink, especially at the apex, with a paler tube and the stigma is usually distinctly lobed, rather than capitate. There are four species, three restricted to the caatingas or dry montane semi-arid areas of Northeast Brazil, with an outlying species in similar semi-arid conditions in Huarochi, coastal Peru. (On the other hand, the genus *Cyanocephalus* is a characteristic component of cerrado, a seasonal vegetation type centred in Central Brazil). See Fig. 4B.

***Martianthus elongatus*** (Benth) Harley & J.F.B.Pastore, *comb. nov.* ≡ *Hyptis elongata* Bentham (1833: 88) ≡ *Mesosphaerum elongatum* (Benth.) Kuntze (1891: 526). Type:—PERU. Province unknown: Tonga, *Ruiz & Pavon s.n.* (lectotype OXF!, designated by Epling 1936b; isolectotypes G!, MA!, P!).

*Martianthus leucocephalus* (Mart. ex Benth.) J.F.B.Pastore, *comb. nov.*  $\equiv$  *Hyptis leucocephala* Mart. ex Bentham (1833: 89)  $\equiv$  *Mesosphaerum leucocephalum* (Mart. ex Benth.) Kuntze (1891: 526). Type:—BRAZIL. Bahia: prope Joazeiro, fl. S. Francisco, *Martius s.n.* (holotype M!).

*Martianthus sancti-gabrielii* (Harley) Harley & J.F.B.Pastore, *comb. nov.*  $\equiv$  *Hyptis sancti-gabrielii* Harley (2001: 686). Type:—BRAZIL. Bahia: São Gabriel, Alto da Lagoa Nova, 28 May 2000, *Harley & Giulietti 53920* (holotype HUEFS!; isotype MO).

*Martianthus stachydifolius* (Epling) Harley & J.F.B.Pastore, *comb. nov.*  $\equiv$  *Hyptis stachydifolia* Epling (1936b: 264). Type:—BRAZIL. Bahia: Serra de São Ignácio, February 1907, *Ule 7550* (holotype K!; isotype G!, HBG!).

*Medusantha* Harley & J.F.B.Pastore, *nom. et stat. nov.*  $\equiv$  *Hyptis* sect. *Trichosphaeria* Bentham (1833: 95) [non *Trichosphaeria* Focke (1870): Fungi]. Type:—*Medusantha eriophylla* (Pohl ex Benth.) Harley & J.F.B.Pastore [= *Hyptis eriophylla* Pohl ex Benth., lectotype designated by Epling 1936b].

= *Hyptis* sect. *Trichosphaeria* subsect. *Plumosae* Epling (1936b: 280), *syn. nov.* Type:—*Hyptis plumosa* Benth. [= *Medusantha plumosa* (Benth.) Harley & J.F.B.Pastore].

= *Hyptis* sect. *Trichosphaeria* subsect. *Crinitae* Epling (1936b: 281), *syn. nov.* Type:—*Hyptis crinita* Benth. [= *Medusantha crinita* (Benth.) Harley & J.F.B.Pastore].

*Medusantha* is a small, rather homogeneous group, easily recognized by the flowers in globose capitula, with an involucre of soft, filiform bracteoles and the flowers with calyx tube straight, and long filiform calyx lobes (hence “medusoid”—Epling 1936b), a very slender corolla tube and a gynoeceium without a stylopodium, style capitate with stigmatic branches reduced. Butterflies are strongly attracted to at least some of the species. There are eight species, mostly occurring in the cerrados of central Brazil. *Medusantha martiusii* is a characteristic shrub of the caatinga vegetation in semi-arid areas of the Brazilian North-east. See Fig. 4A.

*Medusantha carvalhoi* (Harley) Harley & J.F.B.Pastore, *comb. nov.*  $\equiv$  *Hyptis carvalhoi* Harley (1986a: 141, 143). Type:—BRAZIL. Bahia: Serra do Sincorá, 4 km S of Ibicoara road, 25 March 1980, *Harley et al. 20934* (holotype CEPEC!; isotype K!, NY!).

*Medusantha crinita* (Benth.) Harley & J.F.B.Pastore, *comb. nov.*  $\equiv$  *Hyptis crinita* Bentham (1833: 95)  $\equiv$  *Mesosphaerum crinitum* (Benth.) Kuntze (1891: 526). Type:—BRAZIL. Minas Gerais: Serra do Galheiro, *Sellow s.n.* (lectotype B†, designated by Epling 1936b, replacement lectotype K!, designated here; isolectotype LE!).

= *Hyptis crinita* Benth. var. *polycephala* Bentham (1833: 95). Type:—BRAZIL. Without locality, *Sellow s.n.* (holotype K!).

= *Hyptis spiraeifolia* Mart. ex Bentham (1833: 95)  $\equiv$  *Mesosphaerum spiraeifolium* (Mart. ex Benth.) Kuntze (1891: 527). Type:—BRAZIL. Minas Gerais: in campis desertis Serro Frio ad flumen Jequitinhonha, *Martius s.n.* (holotype M!).

There are two Sellow specimens of *Medusantha crinita* in K. Epling erroneously annotated the wrong specimen as isotype of *Hyptis crinita*, as this sheet clearly says “*Hyptis crinita*  $\beta$  Benth.” in Bentham’s hand. This refers to *Hyptis crinita* var.  $\beta$  *polycephala* Benth., *foliis minoribus magis tomentosis, capitulis numerosis*. The specimen clearly matches this description and is here taken as holotype of this variety. It is the other Sellow specimen in K, which is here designated as a replacement lectotype of the typical variety.

*Medusantha eriophylla* (Pohl ex Benth.) Harley & J.F.B.Pastore, *comb. nov.*  $\equiv$  *Hyptis eriophylla* Pohl ex Bentham (1833: 96)  $\equiv$  *Mesosphaerum eriophyllum* (Pohl ex Benth.) Kuntze (1891: 526). Type:—BRAZIL. Goiás: ad Megaponte [Meiaponte], Santa Lucia, *Pohl 1072* (lectotype W!, designated by Epling 1936b; isolectotype K!).

var. *eriophylla*

var. *coriifolia* (Benth.) Harley & J.F.B.Pastore, *comb. nov.* ≡ *Hyptis eriophylla* var. *coriifolia* Bentham (1833: 96). Type:—BRAZIL. Minas Gerais: Corrego Boa Vista, Serra Bom Jardim, *Pohl 2880* (lectotype W!, designated by Epling 1936b; isolectotype K!).

*Medusantha martiusii* (Benth.) Harley & J.F.B.Pastore, *comb. nov.* ≡ *Hyptis martiusii* Bentham (1833: 95–96) ≡ *Mesosphaerum martiusii* (Benth.) Kuntze (1891: 526) (as “*Martinsii*”). Type:—BRAZIL. Bahia: inter Santa Anna et Santo Antonio das Queimadas, *Martius s.n.* (lectotype M!, designated by Epling 1936b). = *Hyptis brachyphylla* Mart. ex Bentham (1833: 96) ≡ *Mesosphaerum brachyphyllum* (Mart. ex Benth.) Kuntze (1891: 526). Type:—BRAZIL. Minas Gerais: in campis, Serra Frio, *Martius s.n.* (holotype M!).

*Medusantha mollissima* (Benth.) Harley & J.F.B.Pastore, *comb. nov.* ≡ *Hyptis mollissima* Bentham (1833: 85) ≡ *Mesosphaerum mollissimum* (Benth.) Kuntze (1891: 526). Type:—BRAZIL. Minas Gerais: Paranna, *Sellow 1479* (lectotype B†, designated by Epling 1936b, replacement lectotype K!, designated here).

*Medusantha multiflora* (Pohl ex Benth.) Harley & J.F.B.Pastore, *comb. nov.*  
≡ *Hyptis multiflora* Pohl ex Bentham (1833: 96) ≡ *Mesosphaerum multiflorum* (Pohl ex Benth.) Kuntze (1891: 526). Type:—BRAZIL. Minas Gerais: inter Rio Jequitinhonha et Columbus, *Pohl 3163* (lectotype W!, designated by Epling 1936b; isolectotype K!).

*Medusantha plumosa* (Benth.) Harley & J.F.B.Pastore, *comb. nov.* ≡ *Hyptis plumosa* Bentham (1848: 94) ≡ *Mesosphaerum plumosum* (Benth.) Kuntze (1891: 526). Type:—BRAZIL. Minas Gerais: Formigas, July 1840, *Gardner 5086* (holotype K!; isotype OXF!).

*Medusantha simulans* (Epling) Harley & J.F.B.Pastore, *comb. nov.* ≡ *Hyptis simulans* Epling (1936b: 282). Type:—BRAZIL. Ceará: Serra do Araripe in “caatinga”, 17 April 1910, *Löfgren 566* (holotype S!; isotype UC!, fragment only).

*Mesosphaerum* Browne (1756: 257). Type:—*Mesosphaerum suaveolens* (L.) Kuntze [= *Ballota suaveolens* L., lectotype designated by Kuntze 1891].

= *Hyptis* sect. *Mesosphaeria* Benth. (1833: 122), *pro parte*. Type:—*Hyptis suaveolens* (L.) Poit., lectotype designated by Epling 1936b [= *Mesosphaerum suaveolens* (L.) Kuntze].

= *Brotera* Sprengel (1802: 151, t. 12), *nom. illeg.* [non Cavanilles 1799]. Type:—*Brotera persica* Spreng. [= *Mesosphaerum pectinatum* (L.) Kuntze].

= *Schaueria* Hasskarl (1842: 25), *nom. illeg.* [non Nees 1838]. Type:—*Schaueria graveolens* (Blume) Hassk. [= *Mesosphaerum suaveolens* (L.) Kuntze].

= *Gnoteris* Rafinesque (1838: 76). Type:—*Gnoteris cordata* Raf., lectotype designated here [= *Mesosphaerum suaveolens* (L.) Kuntze].

= *Hyptis* sect. *Subumbellaria* Epling (1933: 79), *syn. nov.* Type:—*Hyptis asperifolia* Standley [= *Mesosphaerum asperifolium* (Standl.) Harley & J.F.B.Pastore].

= *Hyptis* sect. *Mesosphaeria* subsect. *Fruticosae* Epling (1936b: 246), *syn. nov.* Type:—*Hyptis melissoides* Kunth [= *Mesosphaerum melissoides* (Kunth) Kuntze].

= *Hyptis* sect. *Mesosphaeria* subsect. *Pectinaria* (Benth.) Epling (1936b: 241) ≡ *Hyptis* sect. *Pectinaria* Bentham (1833: 127). Type:—*Hyptis pectinata* (L.) Poit. [= *Mesosphaerum pectinatum* (L.) Kuntze].

Bentham (1833) included only one species, *H. pectinata*, in his *Hyptis* section *Pectinaria*, which was reduced to a subsection of sect. *Mesosphaeria* by Epling (1936b), with seven other species and later expanded to 14 (Epling 1949).

= *Hyptis* sect. *Mesosphaeria* subsect. *Eriocephalae* Epling (1936b: 246). Type:—*Hyptis eriocephala* Benth. [= *Mesosphaerum eriocephalum* (Benth.) Harley & J.F.B.Pastore].

*Mesosphaerum*, as delimited in this paper, is characterized by an inflorescence with several to many flowers usually in lax or more congested cincinnate, pedunculate, sometimes weakly capitate cymes, flowers shortly pedicellate, subtended by small bracteoles not forming an involucre, and with a subactinomorphic calyx, often with white hairs in the throat, and the gynoecium without a stylopodium. There are about 25 species, with a primarily Andean distribution, extending also into the mountains of Central America and Mexico. *Mesosphaerum sidifolium* (including *Hyptis umbrosa* Salzm. ex Benth.) has a wider distribution, extending also into eastern Brazil, while *M. irwinii* is endemic to the mountains of Bahia, Northeast Brazil. Two species, *M. pectinatum* and *M. suaveolens*, have become common weeds, widespread in the tropics and extending into the Old World. See Fig. 2F.

Epling (1949) originally recognized 32 species in *Hyptis* sect. *Mesosphaeria*, divided into five subsections: *Eriocephalae* Epling (14 species) largely Andean, *Spicaria* (Benth.) Epling (two species), *Pectinaria* (Benth.) Epling (c. 14 species, including two pantropical weeds. *H. pectinata* (L.) Poit. and *H. suaveolens* (L.) Poit.), and two monotypic subsections *Ocimoideae* Epling and *Plectranthodon* Epling. The molecular evidence (Pastore *et al.* 2011) demonstrates that sect. *Mesosphaeria* is polyphyletic, comprising at least two different lineages. One of these, composed of species of *Hyptis* sect. *Mesosphaeria* subsect. *Pectinaria* pro parte, subsect. *Spicaria* and subsect. *Plectranthodon* has now been included here in the newly recognized genus *Cantinoa*, along with former members of *Hyptis* sect. *Polydesmia*. *Cantinoa* is shown from molecular studies to be sister to *Hyptis sensu stricto*. The other lineage, which comprises *Hyptis* sect. *Mesosphaeria* subsect. *Pectinaria* pro parte, including *H. pectinata* and *H. suaveolens*, and *Hyptis* sect. *Mesosphaeria* subsect. *Eriocephalae*, is here recognized as the genus: *Mesosphaerum* P. Browne. No attempt at this stage, has been made to recognize sections within *Mesosphaerum*, especially as there is still doubt how these will eventually be disposed. Indeed the monotypic *Hyptis* subsect. *Ocimoideae* remains to be analysed. Wider sampling of the constituent species is needed.

In the list below, we have included all species considered definitely to belong to the genus *Mesosphaerum*. The necessary combination for twelve of the species had already been made by Kuntze (1891).

***Mesosphaerum argutifolium*** (Epling) Harley & J.F.B.Pastore, *comb. nov.*  $\equiv$  *Hyptis argutifolia* Epling (1936b: 245). Type:—ECUADOR. Loja: Yangana, 18 December 1876, *André 4592* (holotype K!).

***Mesosphaerum asperifolium*** (Standley) Harley & J.F.B.Pastore, *comb. nov.*  $\equiv$  *Hyptis asperifolia* Standley (1930: 40). Type:—HONDURAS. Dept. Comayagua: near Siguatepeque, 14–27 February 1928, *Standley 56231* (holotype US!; isotypes F!, G!, K!).

***Mesosphaerum chacapoyense*** (Briq.) Harley & J.F.B.Pastore, *comb. nov.*  $\equiv$  *Hyptis chacapoyensis* Briquet (1898: 204). Type:—PERU. Amazonas: Chachapoyas, *Mathews 3151* (holotype G!; isotypes K!, OXF!). = *Hyptis polyantha* var. *longiflora* Bentham (1848: 124). Type:—PERU. Amazonas: Chachapoyas, *Mathews 3151* (holotype K!; isotypes G!, OXF!).

The variety described by Bentham is based on the same type collection as Briquet's species, although the former was based on a specimen at Kew and the latter based on a specimen in Geneva.

***Mesosphaerum collinum*** (Brandege) Harley & J.F.B.Pastore, *comb. nov.*  $\equiv$  *Hyptis collina* Brandege (1893: 164). Type:—MEXICO. Baja California: San José del Cabo, 16 September 1891, *Brandege 468* (holotype UC!; isotypes G!, NY!).

***Mesosphaerum diffusum*** (Epling) Harley & J.F.B.Pastore, *comb. nov.*  $\equiv$  *Hyptis diffusa* Epling (1936b: 242). Type:—COLOMBIA. Magdalena: Santa Marta. Near Onaea, 4 December 1898, *Smith 1373* (holotype US!; isotypes BR!, COL!, G!, K!, NY!, P!, S!).

*Mesosphaerum diversifolium* (Benth.) Kuntze (1891: 526) ≡ *Hyptis diversifolia* Bentham (1844b: 144). Type:—PERU. Loja: “Catamayo, prope Loxa”, *Hartweg 803* (holotype K!; isotypes G!, NY!, OXF!, P!, W!).

*Mesosphaerum eriocephalum* (Benth.) Kuntze (1891: 526) ≡ *Hyptis eriocephala* Bentham (1848: 124). Type:—PERU. Amazonas: Chachapoyas, 1835, *Mathews 1530* (holotype K!; isotype OXF!). = *Hyptis kuntzeanum* Briq. (*Mesosphaerum kuntzeanum*) (1896: 787), *syn. nov.* Type:—BOLIVIA. Cochabamba: Cochabamba, April 1892, *Kuntze s.n.* (holotype G!; isotype NY!).

For the above, and a number of other taxa, Briquet published the name of the new species under *Hyptis*, followed by *Mesosphaerum* in parenthesis. This latter name is here treated as invalid.

*Mesosphaerum gymnocaulon* (Epling) Harley & J.F.B.Pastore, *comb. nov.* ≡ *Hyptis gymnocaulos* Epling (1936b: 246). Type:—ECUADOR. Galapagos Islands: Albemarle, Cowley Bay, 10 August 1905, *Stewart 3326* (holotype GH; isotypes K!, NY!, US!).

*Mesosphaerum irwinii* (Harley) Harley & J.F.B.Pastore, *comb. nov.* ≡ *Hyptis irwinii* Harley (1974: 130). Type:—BRAZIL. Bahia: Valley of the Rio das Ondas, ca. 24 km N of Seabra, 28 February 1971, *Irwin et al. 31277* (holotype K!; isotype NY!, UB!).

*Mesosphaerum lachnosphaerium* (Epling) Harley & J.F.B.Pastore, *comb. nov.* ≡ *Hyptis lachnosphaeria* Epling (1936b: 247). Type:—ECUADOR. Chimborazo, Huigra, *Hitchcock 20365* (holotype US!; isotypes K!, NY!).

*Mesosphaerum marrubiifolium* (Epling & Mathias) Harley & J.F.B.Pastore, *comb. nov.* ≡ *Hyptis marrubiifolia* Epling & Mathias (1957: 229). Type:—PERU. Amazonas: 10 km SE of Balzas, *Evinger 508* (holotype US!).

*Mesosphaerum melissoides* (Kunth) Kuntze (1891: 526) ≡ *Hyptis melissoides* Kunth in Humboldt, Bonpland & Kunth (1818: 320). Type:—COLOMBIA. “Prope pagum El Tablón et ripam fluminis Juanambu, Regno Novo Granatensi”, *Bonpland 2129* (holotype: P!). Epling (1949) erroneously placed the type collection in Ecuador. This and all subsequent collections are from Colombia (Fernández-Alonso 1995).

*Mesosphaerum oblongifolium* (Benth.) Kuntze (1891: 526) ≡ *Hyptis oblongifolia* Bentham (1848: 125). Type:—MEXICO. Oaxaca: Juquila, *Jurgensen 71* (holotype K!; isotype G!, OXF!). = *Hyptis viejensis* Oersted in Bentham & Oersted (1854: 34) ≡ *Mesosphaerum viejensis* (Oerst.) Kuntze (1891: 527). Type:—NICARAGUA. Nueva Segovia: Volcan Viejo, *Oersted s.n.* (holotype C!; isotype K!).

The specimen at K is numbered 44, but appears to be the same collection. Epling (1933, 1949) gives Volcan Viejo as from Costa Rica, but this is erroneous, as Oersted refers to Nicaragua in the protologue. There are apparently no other records of *Hyptis oblongifolia* from Costa Rica.

= *Hyptis nicaraguensis* Oersted in Bentham & Oersted (1854: 34), *syn. nov.* Type:—NICARAGUA. Granada: prope Granada, *Oersted 15761* (holotype C!).

= *Hyptis vulcanica* Seemann (1854: 188) ≡ *Mesosphaerum vulcanicum* (Seem.) Kuntze (1891: 526). Type:—PANAMA. Chiriqui : Mt. Chiriqui, *Seemann 1603* (holotype BM!; isotype K!).

= *Hyptis chapalensis* Briquet (*Mesosphaerum chapalense* Briq.) (1898: 203). Type:—MEXICO. Jalisco: rich mountains near Lake Chapala, 9 December 1889, *Pringle 2440* (holotype G!; isotypes BM!, F!, K!, LE!, M!, MEL!, MO photo!, P!).

= *Hyptis arborescens* Epling (1933: 100), *syn. nov.* Type:—NICARAGUA. Nueva Segovia: Volcán El Viejo, 18–22 January 1903, *Baker 18* (holotype MO!; isotype NY!).

**Mesosphaerum obtusatum** (Benth.) Kuntze (1891: 526) ≡ *Hyptis obtusata* Bentham (1846: 241). Type:—ECUADOR. Pichincha: “Ad pontem Guapulo prope Quito”, *Hartweg 1322* (holotype K!; isotype OXF!).

The specimen at OXF erroneously gives the collection locality as Colombia.

**Mesosphaerum pectinatum** (L.) Kuntze (1891: 525) ≡ *Nepeta pectinata* Linnaeus (1759: 1097) ≡ *Bystropogon pectinatus* (L.) L'Héritier (1789: 19) ≡ *Hyptis pectinata* (L.) Poiteau (1806: 474). Type:—JAMAICA. Without locality, *Browne s.n.*, *Herb. Linneanum* 726.31 (LINN!, lectotype designated by Howard 1989).

= *Brotera persica* Sprengel (1802: 151, t. 12) ≡ *Hyptis persica* (Spreng.) Poiteau (1806: 471). Type:—Cultivated material from Halle Botanic Garden, from seed collected in Iran (Persia) by Oliver & Bruguère, not found, although two specimens in the Willdenow herbarium (B-W 10839-010! [Image ID 361203], B-W 10839-020! [Image ID 361211]) might be relevant, but lack collection data.

= *Hyptis nepetoides* Fisch. ex Schrank (1822: 52). Type:—A cultivated plant, probably from Brazil, not located. Neotype selected here: BRAZIL. Bahia: Feira de Santana, 16 September 2003, *Ribeiro 68* (HUEFS).

There is a specimen of *Mesosphaerum pectinatum* at M, possibly collected by Martius, which might represent the living plant from which *H. nepetoides* was described, which was said to have come originally from Brazil. There is, however, insufficient information available on the sheet. Schrank often did not preserve dried material of the cultivated plants to which he gave names, and therefore many of these have not been unequivocally identified. It is therefore necessary to choose a neotype.

**Mesosphaerum perbullatum** (Fern.Alonso) Harley & J.F.B.Pastore, *comb. nov.* ≡ *Hyptis perbullata* Fernández-Alonso (1995: 475–476). Type:—COLOMBIA. Boyaca: W of Tibarrosa, between Duitarama and Sogamoza, *Wood 3762* (holotype COL!; isotype K!).

**Mesosphaerum pilosum** (Benth.) Kuntze (1891: 526) ≡ *Hyptis pilosa* Bentham (1833: 124). Type:—PERU. Without locality, 1827, *Pavon s.n.* (holotype OXF!; isotypes G!, MA!, P!).

**Mesosphaerum pseudoglaucum** (Epling) Harley & J.F.B.Pastore, *comb. nov.* ≡ *Hyptis pseudoglauca* Epling (1936b: 247). Type:—ECUADOR. Province unknown: San Pedro, *Townsend A-107* (holotype US!).

**Mesosphaerum purdiaei** (Benth.) Kuntze (1891: 527) ≡ *Hyptis purdiaei* Bentham (1848: 125). Type:—COLOMBIA. Magdalena: Santa Marta, July 1844, *Purdie s.n.* (holotype K!; isotype UC!).

**Mesosphaerum septentrionale** (Epling) Harley & J.F.B.Pastore, *comb. nov.* ≡ *Hyptis septentrionalis* Epling (1833: 98). Type:—MEXICO. Durango: San Ramón, 21 April–18 May 1906, *Palmer III* (holotype US!; isotypes K!, G!, NY!, MO!).

**Mesosphaerum sidifolium** (L'Hérit.) Harley & J.F.B.Pastore, *comb. nov.* ≡ *Bystropogon sidifolius* L'Héritier (1787: 19) ≡ *Hyptis sidifolia* (L'Hérit.) Briquet (1898: 204). Type:—PERU. Without locality, *Dombey s.n.* (holotype P!).

= *Hyptis polyantha* Poiteau (1806: 470) ≡ *Mesosphaerum polyanthum* (Poit.) Kuntze (1891: 526). Type:—ECUADOR. Loja: Gonzanama, *Bonpland s.n.* (holotype P!; B photo!).

= *Hyptis silvestris* Epling (1936b: 249). Type:—COLOMBIA. Tolima: La Virginia, Libano, 22 December 1917, *Pennell 3274* (holotype NY!; isotype US!).

= *Hyptis umbrosa* Salzm. ex Bentham (1833: 125). Type:—BRAZIL. Bahia: “in umbrosis”, *Salzmann s.n.* (lectotype K!, designated by Epling 1936b; isolectotypes E!, G-DC!, P!).

= *Hyptis graveolens* Salzm. ex Bentham (1833: 125), *nom. illeg.* (non *Hyptis graveolens* Schrank 1822: 52). Type:—BRAZIL. Bahia: “in maritimis”, *Salzmann s.n.* (holotype K!; isotypes E!, G-DC!).



This species is extremely variable especially in leaf morphology and indumentum. Fernández-Alonso (1995) has placed *Hyptis silvestris* in synonymy of “*Hyptis sidifolia*”, as it differs primarily in leaf indumentum and peduncle length, and after careful study we have accepted this, as these characters occur individually in material from other parts of the range of *H. sidifolia*. For fuller details on synonymy of this species see Harley (2006).

***Mesosphaerum suaveolens*** (L.) Kuntze (1891: 525) ≡ *Ballota suaveolens* Linnaeus (1759: 1100) ≡ *Hyptis suaveolens* (L.) Poiteau (1806: 474) Type:—JAMAICA. Browne *s.n.* (LINN 737.6!), lectotype designated by Epling 1949).

= *Hyptis ebracteata* R. Brown in Aiton (1811: 391), *nom. superfl.*

= *Hyptis plumieri* Poiteau (1806: 473). Type:—VENEZUELA. Distrito Federal: Caracas, *Humboldt & Bonpland s.n.* (holotype ?P).

= *Hyptis graveolens* Schrank (1828: 56). Type:—A cultivated specimen, not traced with certainty, from seed collected by Martius in Brazil.

The type specimen of *H. graveolens* has not been definitely located, although there is a specimen of *Mesosphaerum suaveolens*, annotated by Martius as *Hyptis graveolens* at M! (see Harley 1985a).

= *Hyptis congesta* Leonard (1927: 70). Type:—HAITI. S. Michel de l'Attalaye, *Leonard 7594* (holotype US!).

***Mesosphaerum urticoides*** (Kunth) Kuntze (1891: 527) [as “*urticodes*”] ≡ *Hyptis urticoides* Kunth in Humboldt, Bonpland & Kunth (1818: 320). Type:—MEXICO. Tabasco: prope Jalapa, *Bonpland s.n.* (holotype P!).

= *Hyptis lilacina* Chamisso & Schlechtendal (1830: 101). Type:—MEXICO. Tabasco: Jalapa, *Schiede & Deppe 152* (lectotype B†, designated by Epling 1936b, replacement lectotype HAL!, designated here; isolectotype BM?).

The material at BM lacks a collection number, so must remain doubtful.

***Oocephalus*** (Benth.) Harley & J.F.B.Pastore, *comb. et stat. nov.* ≡ *Hyptis* sect. *Oocephalus* Bentham (1833: 84) ≡ *Hyptis* sect. *Polydesmia* subsect. *Oocephalus* (Benth.) Epling (1936b: 250). Type:—*Oocephalus lacunosus* (Pohl. ex Benth.) Harley & J.F.B.Pastore [= *Hyptis lacunosa* Pohl ex Benth., lectotype designated by Epling 1936b].

= *Hyptis* sect. *Polydesmia* subsect. *Glomeratae* Bentham (1848: 119), *pro parte, syn. nov.* Type:—*Oocephalus oppositiflorus* (Schrank) Harley & J.F.B.Pastore [= *Hyptis glomerata* Mart. ex Schrank, lectotype designated by Epling 1936b].

Shrubs or subshrubs, rarely herbs with usually small or medium-sized leaves, sessile or shortly petiolate, distinguished by the possession of an inflorescence of congested, pedunculate or sessile cymes, few- to many-flowered, not forming a globose or semi-globose capitulum, but ± ovoid in form, enveloped by an involucre of usually broad, ovate or lanceolate bracteoles, especially in bud, rarely narrower and not enveloping the cymes. Flowers sessile or subsessile, corollas with an elongate tube, lobes usually short. Gynoecium without stylopodium. 14 species are recognized here, typically in campo rupestre of the Serra do Espinhaço of Minas Gerais and Bahia and in similar habitats in Goiás. One species, *O. oppositiflorus*, is spreading through Brazil into disturbed habitats and has a wider distribution, extending into eastern Bolivia. Further research is needed to define more clearly the characters of the genus. See Figs. 1A, 4H.

***Oocephalus argyrophyllus*** (Harley) Harley & J.F.B.Pastore, *comb. nov.* ≡ *Hyptis argyrophylla* Harley (1985b: 614). Type:—BRAZIL. Bahia: Barra da Estiva on Ibicoara Road by the Rio Preto, 27 January 1974, *Harley et al. 15515* (holotype CEPEC!; isotypes AAU!, K!, NY!, SPF!, U!, UEC!, US!).

var. ***argyrophyllus***

var. *pedunculatus* (Harley) Harley & J.F.B.Pastore, *comb. nov.* ≡ *Hyptis argyrophylla* var. *pedunculata* Harley (1985b: 615). Type:—BRAZIL. Bahia: Serra do Sincorá, 8 km SW of Mucugê, on road from Cascavel near Fazenda Paraguaçu, 6 February 1974, *Harley et al. 16076* (holotype CEPEC!; isotype K!).

*Oocephalus crassifolius* (Mart. ex Benth.) Harley & J.F.B.Pastore, *comb. nov.* ≡ *Hyptis crassifolia* Mart. ex Bentham (1833: 94) ≡ *Mesosphaerum crassifolium* (Mart. ex Benth.) Kuntze (1891: 526). Type:—BRAZIL. Bahia: “in petrosis ad Vila do Rio de Contas”, *Martius Obs. 1976* (holotype M!).

*Oocephalus foliosus* (A.St.-Hil. ex Benth.) Harley & J.F.B.Pastore, *comb. nov.* ≡ *Hyptis foliosa* A.St.-Hil. ex Bentham (1833: 117) ≡ *Mesosphaerum foliosum* (A.St.-Hil. ex Benth.) Kuntze (1891: 526). Type:—BRAZIL. Goiás: *Saint-Hilaire C3 709* (holotype P!; isotype UC!).

*Oocephalus hagei* (Harley) Harley & J.F.B.Pastore, *comb. nov.* ≡ *Hyptis hagei* Harley (1986a: 145). Type:—BRAZIL. Bahia: Lençóis, Serra da Larginha, ca. 2 km NE of Caeté Açu (Capão Grande), 25 May 1980, *Harley et al. 22533* (holotype CEPEC!; isotype K!).

The bracteoles of this species are atypical for the genus, in being very slender and not enveloping the flowers. However Rudall (pers. com. in Harley 1986a) has demonstrated the very characteristic leaf anatomy which places this species unequivocally with the genus *Oocephalus*, confirmed by the molecular results.

*Oocephalus halimifolius* (Mart. ex Benth.) Harley & J.F.B.Pastore, *comb. nov.* ≡ *Hyptis halimifolia* Mart. ex Bentham (1833: 94) ≡ *Mesosphaerum halimifolium* (Mart. ex Benth.) Kuntze (1891: 526). Type:—BRAZIL. Bahia: “campis altis petrosis, Vila do Rio de Contas”, October 1818, *Martius s.n.* (holotype M!; isotype M!).

*Oocephalus lacunosus* (Pohl ex Benth.) Harley & J.F.B.Pastore, *comb. nov.* ≡ *Hyptis lacunosa* Pohl ex Bentham (1833: 94) ≡ *Mesosphaerum lacunosum* (Pohl ex Benth.) Kuntze (1891: 526). Type:—BRAZIL. Minas Gerais: Santa Ingrazia, *Pohl 3194* (lectotype W!, designated by Epling 1936b; isolectotype K!). = *Hyptis cordifolia* Glaziou (1911: 551), *nom. nud.* Reference specimen: BRAZIL. Minas Gerais: “Biribirya a Mocotó”, 28 March 1892, *Glaziou 19703* (K!, P!).

*Oocephalus lythroides* (Pohl ex Benth.) Harley & J.F.B.Pastore, *comb. nov.* ≡ *Hyptis lythroides* Pohl ex Bentham (1833: 118) ≡ *Mesosphaerum lythroides* (Pohl ex Benth.) Kuntze (1891: 526) [as “*lythroides*”]. Type:—BRAZIL. Goiás: Fazenda Água Fria, *Pohl 1483* (holotype W!; isotype K!).

*Oocephalus niveus* (Epling) Harley & J.F.B.Pastore, *comb. nov.* ≡ *Hyptis nivea* Epling (1936b: 252). Type:—BRAZIL. Goiás(?): entre Rio Tocantins et Os Porcos, 3 January 1895, *Glaziou 21934* (holotype K!; isotype P!).

The type locality has not been traced. The greater part of the the Rio Tocantins is in Tocantins State (formerly a part of Goiás) though a part of the upper reaches of the river extend into Goiás State. The only extant population known is in the Chapada dos Veadeiros, Goiás.

*Oocephalus nubicola* (Harley) Harley & J.F.B.Pastore, *comb. nov.* ≡ *Hyptis nubicola* Harley (1992: 578). Type:—BRAZIL. Bahia: Rio de Contas, Pico das Almas, 18 March 1977, *Harley et al. 19614* (holotype CEPEC!; isotype K!).

*Oocephalus oppositiflorus* (Schrank) Harley & J.F.B.Pastore, *comb. nov.* ≡ *Hyptis oppositiflora* Schrank (1822: 52). Type:—Probably a cultivated plant, not localized. Neotype designated here: BRAZIL. Distrito Federal: Samambaia, 4 May 1996, *Rezende 459* (CEN). = *Hyptis glomerata* Mart. ex Schrank (1828: 55). Type:—BRAZIL. Minas Gerais: “in humidis campis ad Burityzais deserti”, *Martius s.n.* (holotype M!).

= *Hyptis pauciflora* Pohl ex Benth (1833: 117) ≡ *Mesosphaerum pauciflorum* (Pohl) Kuntze (1891: 526). Type:—BRAZIL. Goiás: Megaponte [Meiaponte, now Pirenópolis], Pohl 2795 (holotype W!; isotype K!).  
= *Hyptis glomerata* var. *villosa* Benth (1848: 120). Type:—BRAZIL. Minas Gerais: without locality, Claussen s.n. (holotype K!; isotype K!).

Unfortunately, the earliest name for this species is that of Schrank, which supersedes the well-known epithet of “*glomerata*”. The cultivated plant on which the current name is based was grown from seed collected in Brazil by Martius, but no specimen appears to exist.

***Oocephalus pauciflorus*** (Harley) Harley & J.F.B.Pastore, *comb. & stat. nov.* ≡ *Hyptis halimifolia* Mart. ex Benth. var. *pauciflora* Harley (1985b: 612). Type:—BRAZIL. Bahia: Serra das Almas, ca. 25 km WNW of town of Rio de Contas, 19 March 1976, Harley et al. 19676 (holotype CEPEC!; isotypes AAU!, IPA!, K!, NY!, SPF!, U!, UEC!, US!).

Field observations and study of the substantial number of collections of both this taxon and of *Oocephalus halimifolius* indicate that they are morphologically quite distinct and have differing altitudinal ranges and ecological requirements and are therefore best treated as distinct species.

***Oocephalus petraeus*** (A.St.-Hil. ex Benth.) Harley & J.F.B.Pastore, *comb. nov.* ≡ *Hyptis petraea* A.St.-Hil. ex Benth (1833: 117) ≡ *Mesosphaerum petraeum* (A.St.-Hil. ex Benth.) Kuntze (1891: 526). Type:—BRAZIL. Minas Gerais: "un endroit pierreux près Taioba", Saint-Hilaire B1 1740 (holotype P!; isotype UC!).

***Oocephalus piranii*** (Harley) Harley & J.F.B.Pastore, *comb. nov.* ≡ *Hyptis piranii* Harley (1992: 572). Type:—BRAZIL. Minas Gerais: Grão Mogol, descida para Jambreiro, 15 July 1990, Pirani et al. CFRCR 13069 (holotype SPF!; isotype K!).

***Oocephalus silvinae*** (Harley) Harley & J.F.B.Pastore *comb. nov.* ≡ *Hyptis silvinae* Harley (1985b: 624). Type:—BRAZIL. Bahia: Pico das Almas, 19 March 1977, Harley et al. 19701 (holotype CEPEC!; isotypes AAU!, E!, IPA!, K!, NY!, U!, UEC!, US!, SPF!, K!, NY!).

***Physominthe*** Harley & J.F.B.Pastore, **gen. nov.** *Hypeniae habitu virgato cum internodiis superis inflatis, glabris et pruinosis conveniens sed inflorescentia cymis pedunculatis paucifloris usque 3–6-floribus instructis et basi calycis bracteolis binatis destituto differt.* Type:—*Physominthe vitifolia* (Pohl ex Benth.) Harley & J.F.B.Pastore [= *Hyptis vitifolia* Pohl ex Benth.].

Shrubs or subshrubs, often aromatic; stems virgate, erect, upper internodes glabrous, pruinose, usually strongly fistulose and inflated, nodes and lower stems often with long, rigid setose hairs; leaves lobed, sometimes weakly so; inflorescence thyrsoid, lax, formed of pedunculate, subumbellate, few-flowered cymes (with intercalary axes reduced), 3- to 6-flowered, flowers shortly pedicellate from the axils of minute, subulate bracts; flowers small with calyx ± actinomorphic, turbinate at anthesis, becoming ± campanulate in fruit, bracteoles reduced, when present borne near base of cyme, never paired at base of calyx, style deciduous from below nutlets, stylopodium absent.

Similar, in its virgate habit with upper internodes inflated, glabrous and pruinose, to *Hypenia*, in which it was formerly included, and some species of *Eriope*, and differing from all species of both these genera in lacking a pair of bracteoles at base of calyx. Chromosome number  $2n = 28$ , differing from numbers found in *Eriope* ( $2n = 20$ ) and *Hypenia* ( $2n = 20, 12$ ). See Harley & Heywood (1992). The genus is restricted to upland cerrado areas of Bahia, Minas Gerais, Goiás and São Paulo. One species so far described with another awaiting publication. See Figs. 1B, 3E.

***Physominthe vitifolia*** (Pohl ex Benth.) Harley & J.F.B.Pastore, *comb. nov.* ≡ *Hyptis vitifolia* Pohl ex Benth (1833: 138) ≡ *Mesosphaerum vitifolium* (Pohl ex Benth.) Kuntze (1891: 527) ≡ *Hypenia vitifolia* (Pohl ex

Benth.) Harley (1988: 91). Type:—BRAZIL. Goiás: “ad Santa Cruz”, *Pohl 6059* (holotype W!).  
= *Hyptis calophylla* A.St.-Hil. ex Bentham (1833: 138) ≡ *Mesosphaerum calophyllum* (A.St.-Hil. ex Benth.) Kuntze (1891: 526). Type:—BRAZIL. Minas Gerais: Morro do Indaia, Minas Novas, *St.-Hilaire B1 1155* (holotype P!; isotype P!).  
= *Hyptis glaziovii* Briquet (1894: 716). Type:—BRAZIL. São Paulo: Campos do Bocaina, près S. José dos Barreiros, 6 April 1892, *Glaziou 13047* (holotype G!; isotype P!).

***Rhaphiodon*** Schauer (1844: 345). Type:—*Rhaphiodon echinus* (Nees & Mart.) Schauer [= *Zappania echinus* Nees & Mart.].

= *Hyptis* sect. *Xanthiophaea* Bentham (1833: 70. Type:—*Hyptis sideritis* Mart. ex Benth., lectotype designated by Epling (1936a: 186).

Epling excluded two of the three species which Bentham recognized in *Hyptis* Sect. *Xanthiophaea*. However he misspelt the genus as *Raphiodon*, a name frequently encountered in herbaria.

*Rhaphiodon* is a monotypic genus, with *R. echinus* the only species. It is a prostrate, aromatic herb, with flowers in long-pedunculate spherical heads, with spinose involucre bracteoles and the calyx with lobes composed of up to ca 11 spines, corolla long-tubular, bright purple, the spinose fruiting head, with only one nutlet per flower, falling as a unit. It occurs in seasonally damp, disturbed areas, especially along roadsides in the caatingas of Northeast Brazil extending southwards to N Minas Gerais State. See Figs. 1G, 3G.

## Sections unplaced to genus

*Hyptis* sect. *Rhytidea* Epling (1933: 80), with two species, *H. rhytidea* Bentham (1839: 21) and *H. pseudolantana* Epling (1941: 553), may possibly belong in *Condea* Adans. *Hyptis rhytidea* was shown to be sister to the *Condea* clade (Pastore *et al.* 2011). Further studies are needed to explore this relationship.

*Hyptis* sect. *Hilaria* Epling (1936b: 280). Type:—*Hyptis lobata* A.St.-Hil. ex Bentham (1833: 97). A monotypic section, which is only known from the type: BRAZIL. São Paulo: São José dos Campos? [São Jozé], *Saint-Hilaire 664* (holotype P!; isotype F!). This species may well be related to *Hyptis lagenaria* A.St.-Hil. ex Bentham (1833: 98), in *Hyptis* sect. *Cyrta*, but further material is needed to establish its correct position.

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## APPENDIX 1. Register of earlier names of Hyptidinae with changes accepted in this paper.

This is a list of species names recognized by Epling (1949) with the addition of names of more recent taxa published subsequently, followed by the genus to which they are assigned in this paper and in the last column a reference to the work in which this change was published, if not in the present work.

FORMER GENUS	SPECIES	AUTHOR	ACCEPTED GENUS	NOTES OF CHANGE
<i>Eriope</i>	<i>alpestris</i>	Mart. ex Benth.	<i>Eriope</i>	
<i>Eriope</i>	<i>anamariae</i>	Harley	<i>Eriope</i>	
<i>Eriope</i>	<i>angustifolia</i>	Epling	<i>Eriope</i>	
<i>Eriope</i>	<i>arenaria</i>	Harley	<i>Eriope</i>	
<i>Eriope</i>	<i>complicata</i>	Mart. ex Benth.	<i>Eriope</i>	
<i>Eriope</i>	<i>confusa</i>	Harley	<i>Eriope</i>	
<i>Eriope</i>	<i>crassifolia</i>	Mart. ex Benth.	<i>Eriope</i>	
<i>Eriope</i>	<i>crassipes</i>	Benth.	<i>Eriope</i>	
<i>Eriope</i>	<i>exaltata</i>	Harley	<i>Eriope</i>	
<i>Eriope</i>	<i>filifolia</i>	Benth.	<i>Eriope</i>	
<i>Eriope</i>	<i>foetida</i>	Pohl ex Benth.	<i>Eriope</i>	
<i>Eriope</i>	<i>glandulosa</i>	(Harley) Harley	<i>Eriope</i>	
<i>Eriope</i>	<i>hypenioides</i>	Mart ex Benth.	<i>Eriope</i>	
<i>Eriope</i>	<i>luetzelburgii</i>	Harley	<i>Eriope</i>	
<i>Eriope</i>	<i>macrostachya</i>	Mart ex Benth.	<i>Eriope</i>	
<i>Eriope</i>	<i>micrantha</i>	Benth. in DC.	<i>Hypenia</i>	Harley 1988
<i>Eriope</i>	<i>monticola</i>	Harley	<i>Eriope</i>	
<i>Eriope</i>	<i>obovata</i>	Epling	<i>Eriope</i>	
<i>Eriope</i>	<i>parvifolia</i>	Mart. ex Benth.	<i>Eriope</i>	
<i>Eriope</i>	<i>polyphylla</i>	Mart. ex Benth.	<i>Eriope</i>	
<i>Eriope</i>	<i>simplex</i>	(A.St.-Hil. ex Benth.) Harley	<i>Hypenia</i>	see <i>Hyptis simplex</i>
<i>Eriope</i>	<i>sincorana</i>	Harley	<i>Eriope</i>	
<i>Eriope</i>	<i>stricta</i>	Benth.	<i>Eriopidion</i>	Harley 1976
<i>Eriope</i>	<i>tumidicaulis</i>	Harley	<i>Eriope</i>	
<i>Eriope</i>	<i>velutina</i>	Epling	<i>Eriope</i>	
<i>Eriope</i>	<i>xavantium</i>	Harley	<i>Eriope</i>	
<i>Hyptis</i>	<i>actinocephala</i>	Griseb.	<i>Hyptis</i>	
<i>Hyptis</i>	<i>adamantium</i>	A.St.-Hil. ex Benth.	<i>Hyptis</i>	
<i>Hyptis</i>	<i>adpressa</i>	A.St.-Hil. ex Benth.	<i>Cyanocephalus</i>	
<i>Hyptis</i>	<i>alata</i>	(Raf.) Shinnars	<i>Hyptis</i>	
<i>Hyptis</i>	<i>albicoma</i>	Epling	<i>Cyanocephalus</i>	= <i>Cyanocephalus incanus</i>
<i>Hyptis</i>	<i>albida</i>	Kunth	<i>Condea</i> sect. <i>Laniflorae</i>	
<i>Hyptis</i>	<i>alpestris</i>	A. St.-Hil. ex Benth.	<i>Hyptis</i>	
<i>Hyptis</i>	<i>althaeifolia</i>	Pohl ex Benth.	<i>Cantinoa</i>	
<i>Hyptis</i>	<i>alutacea</i>	Pohl ex Benth.	<i>Hyptis</i>	
<i>Hyptis</i>	<i>amaurocaulos</i>	Briq.	<i>Hyptis</i>	
<i>Hyptis</i>	<i>americana</i>	(Poir.) Briq.	<i>Condea</i> sect. <i>Condea</i>	
<i>Hyptis</i>	<i>americana</i>	(Aubl.) Urb.	<i>Cantinoa</i>	

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APPENDIX 1 (continued)

FORMER GENUS	SPECIES	AUTHOR	ACCEPTED GENUS	NOTES OF CHANGE
<i>Hyptis</i>	<i>amethystoides</i>	Benth.	<i>Hyptidendron</i>	Harley 1988
<i>Hyptis</i>	<i>ammotropha</i>	Wright ex Griseb.	<i>Hyptis</i>	
<i>Hyptis</i>	<i>ampelophylla</i>	Epling	<i>Gymneia</i>	
<i>Hyptis</i>	<i>angulosa</i>	Schott ex Benth.	<i>Hyptis</i>	
<i>Hyptis</i>	<i>angustifolia</i>	Pohl ex Benth.	<i>Hyptis</i>	
<i>Hyptis</i>	<i>anitae</i>	Epling & Játiva	<i>Condea</i> sect. <i>Laniflorae</i>	
<i>Hyptis</i>	<i>apertiflora</i>	Epling	<i>Cyanocephalus</i>	
<i>Hyptis</i>	<i>arborea</i>	Benth.	<i>Hyptidendron</i>	Harley 1988
<i>Hyptis</i>	<i>arbuscula</i>	Epling	<i>Hyptidendron</i>	Harley 1988
<i>Hyptis</i>	<i>arenaria</i>	Benth. in DC.	<i>Hyptis</i>	
<i>Hyptis</i>	<i>argentea</i>	Epling & Mathias	<i>Hyptis</i>	
<i>Hyptis</i>	<i>argutifolia</i>	Epling	<i>Mesosphaerum</i>	
<i>Hyptis</i>	<i>argyrophylla</i>	Harley	<i>Oocephalus</i>	
<i>Hyptis</i>	<i>aristulata</i>	Epling	<i>Hypenia</i>	Harley 1988
<i>Hyptis</i>	<i>armillata</i>	Epling	<i>Hyptis</i>	
<i>Hyptis</i>	<i>asperifolia</i>	Standley	<i>Mesosphaerum</i>	
<i>Hyptis</i>	<i>asperrima</i>	(Spreng.) Epling	<i>Hyptidendron</i>	Harley 1988
<i>Hyptis</i>	<i>asteroides</i>	A.St.-Hil. ex Benth.	<i>Hyptis</i>	
<i>Hyptis</i>	<i>atrorubens</i>	Poit.	<i>Hyptis</i>	
<i>Hyptis</i>	<i>australis</i>	Epling	<i>Hyptis</i>	
<i>Hyptis</i>	<i>bahiensis</i>	Harley	<i>Hyptis</i>	
<i>Hyptis</i>	<i>balansae</i>	Briq.	<i>Hyptis</i>	
<i>Hyptis</i>	<i>blanchetii</i>	Benth.	<i>Eriope</i>	Harley 1988
<i>Hyptis</i>	<i>bombycina</i>	Epling	<i>Cyanocephalus</i>	
<i>Hyptis</i>	<i>brachiata</i>	Briq.	<i>Hyptis</i>	
<i>Hyptis</i>	<i>brachypoda</i>	Epling	<i>Hyptis</i>	
<i>Hyptis</i>	<i>brachystachys</i>	Pohl ex Benth.	<i>Hypenia</i>	Harley 1988
<i>Hyptis</i>	<i>brevipes</i>	Poit.	<i>Hyptis</i>	
<i>Hyptis</i>	<i>caduca</i>	Epling	<i>Hyptis</i>	
<i>Hyptis</i>	<i>caespitosa</i>	A.St.-Hil. ex Benth.	<i>Hyptis</i>	
<i>Hyptis</i>	<i>calida</i>	Mart. ex Benth.	<i>Leptohyptis</i>	
<i>Hyptis</i>	<i>calycina</i>	Pohl ex Benth.	<i>Hypenia</i>	Harley 1988
<i>Hyptis</i>	<i>cana</i>	Pohl ex Benth.	<i>Hyptidendron</i>	Harley 1988
<i>Hyptis</i>	<i>capitata</i>	Jacq.	<i>Hyptis</i>	
<i>Hyptis</i>	<i>caprariifolia</i>	Pohl ex Benth.	<i>Cyanocephalus</i>	
<i>Hyptis</i>	<i>cardiophylla</i>	Pohl ex Benth.	<i>Cyanocephalus</i>	
<i>Hyptis</i>	<i>carpinifolia</i>	Benth.	<i>Cantinoa</i>	
<i>Hyptis</i>	<i>carvalhoi</i>	Harley	<i>Medusantha</i>	
<i>Hyptis</i>	<i>caudata</i>	Epling & Játiva	<i>Hyptidendron</i>	Harley 1988
<i>Hyptis</i>	<i>chacapoyensis</i>	Briq.	<i>Mesosphaerum</i>	
<i>Hyptis</i>	<i>chyliantha</i>	Urb. & Ekman	<i>Condea</i> sect. <i>Condea</i>	
<i>Hyptis</i>	<i>claussenii</i>	Benth.	<i>Hyptidendron</i>	Harley 1988

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APPENDIX 1 (continued)

FORMER GENUS	SPECIES	AUTHOR	ACCEPTED GENUS	NOTES OF CHANGE
<i>Hyptis</i>	<i>colligata</i>	Epling & Jativa	<i>Hyptis</i>	
<i>Hyptis</i>	<i>collina</i>	Brandegee	<i>Mesosphaerum</i>	
<i>Hyptis</i>	<i>colombiana</i>	Epling	<i>Cantinoa</i>	
<i>Hyptis</i>	<i>colubrimontis</i>	Epling & Jativa	<i>Hyptis</i>	
<i>Hyptis</i>	<i>complicata</i>	A.St.-Hil. ex Benth.	<i>Hyptis</i>	
<i>Hyptis</i>	<i>concinna</i>	Benth. in DC.	<i>Hypenia</i>	Harley 1988
<i>Hyptis</i>	<i>conferta</i>	Pohl ex Benth.	<i>Hyptis</i>	
<i>Hyptis</i>	<i>conspersa</i>	Benth.	<i>Hyptidendron</i>	Harley 1988
<i>Hyptis</i>	<i>coriacea</i>	Benth. in DC.	<i>Cyanocephalus</i>	
<i>Hyptis</i>	<i>corymbosa</i>	Benth. in DC.	<i>Hyptis</i>	
<i>Hyptis</i>	<i>crassifolia</i>	Mart. ex Benth.	<i>Oocephalus</i>	
<i>Hyptis</i>	<i>crassipes</i>	Epling	<i>Hyptis</i>	
<i>Hyptis</i>	<i>crenata</i>	Pohl ex Benth.	<i>Hyptis</i>	
<i>Hyptis</i>	<i>cretata</i>	Epling	<i>Cyanocephalus</i>	
<i>Hyptis</i>	<i>crinita</i>	Benth.	<i>Medusantha</i>	
<i>Hyptis</i>	<i>crispata</i>	Pohl ex Benth.	<i>Hypenia</i>	Harley 1988
<i>Hyptis</i>	<i>cruciformis</i>	Epling	<i>Hyptis</i>	
<i>Hyptis</i>	<i>cubensis</i>	Urb.	<i>Condea</i> sect. <i>Condea</i>	
<i>Hyptis</i>	<i>cuneata</i>	Pohl ex Benth.	<i>Cyanocephalus</i>	
<i>Hyptis</i>	<i>cuniloides</i>	Epling	<i>Eplingiella</i>	
<i>Hyptis</i>	<i>cymulosa</i>	Benth. in DC.	<i>Unplaced</i>	?
<i>Hyptis</i>	<i>decipiens</i>	M.E. Jones	<i>Condea</i> sect. <i>Laniflorae</i>	
<i>Hyptis</i>	<i>delicatula</i>	Harley	<i>Cyanocephalus</i>	
<i>Hyptis</i>	<i>densiflora</i>	Pohl ex Benth.	<i>Hypenia</i>	Harley 1988
<i>Hyptis</i>	<i>desertorum</i>	Pohl ex Benth.	<i>Cyanocephalus</i>	
<i>Hyptis</i>	<i>dictiocalyx</i>	Benth.	<i>Hyptidendron</i>	Harley 1988
<i>Hyptis</i>	<i>dictyodea</i>	Pohl ex Benth.	<i>Hyptis</i>	
<i>Hyptis</i>	<i>diffusa</i>	Epling	<i>Mesosphaerum</i>	
<i>Hyptis</i>	<i>digitata</i>	Harley	<i>Cyanocephalus</i>	
<i>Hyptis</i>	<i>dilatata</i>	Benth. in DC.	<i>Hyptis</i>	
<i>Hyptis</i>	<i>ditassoides</i>	Mart. ex Benth.	<i>Hyptis</i>	
<i>Hyptis</i>	<i>divaricata</i>	Pohl ex Benth.	<i>Hyptis</i>	
<i>Hyptis</i>	<i>diversifolia</i>	Benth.	<i>Mesosphaerum</i>	Kuntze 1891
<i>Hyptis</i>	<i>domingensis</i>	Urb.	<i>Condea</i> sect. <i>Condea</i>	
<i>Hyptis</i>	<i>dubia</i>	Pohl ex Benth.	<i>Cantinoa</i>	
<i>Hyptis</i>	<i>dumetorum</i>	Morong	<i>Hyptis</i>	
<i>Hyptis</i>	<i>duplicato-dentata</i>	Pohl ex Benth.	<i>Cantinoa</i>	
<i>Hyptis</i>	<i>durifolia</i>	Epling	<i>Hypenia</i>	= <i>Hypenia sclerophylla</i>
<i>Hyptis</i>	<i>effusa</i>	S.Moore	<i>Hypenia</i>	= <i>Hypenia micrantha</i>
<i>Hyptis</i>	<i>elegans</i>	(Briq.) Briq.	<i>Condea</i> sect. <i>Condea</i>	
<i>Hyptis</i>	<i>elongata</i>	Benth.	<i>Martianthus</i>	

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APPENDIX 1 (continued)

FORMER GENUS	SPECIES	AUTHOR	ACCEPTED GENUS	NOTES OF CHANGE
<i>Hyptis</i>	<i>emoryi</i>	Torrey	<i>Condea</i> sect. <i>Laniflorae</i>	
<i>Hyptis</i>	<i>eriocaulooides</i>	Rich.	<i>Hyptis</i>	
<i>Hyptis</i>	<i>eriocephala</i>	Benth. in DC.	<i>Mesosphaerum</i>	Kuntze 1891
<i>Hyptis</i>	<i>eriophylla</i>	Pohl ex Benth.	<i>Medusantha</i>	
<i>Hyptis</i>	<i>erythrostachys</i>	Epling	<i>Cantinoa</i>	
<i>Hyptis</i>	<i>escobilla</i>	Urb., <i>nom. illeg.</i>	<i>Condea</i> sect. <i>Condea</i>	see <i>Condea americana</i>
<i>Hyptis</i>	<i>eximia</i>	Epling	<i>Hyptidendron</i>	
<i>Hyptis</i>	<i>fallax</i>	Harley	<i>Hyptis</i>	
<i>Hyptis</i>	<i>fasciculata</i>	Benth.	<i>Condea</i> sect. <i>Condea</i>	See <i>Condea undulata</i>
<i>Hyptis</i>	<i>fastigiata</i>	Benth.	<i>Condea</i> sect. <i>Condea</i>	
<i>Hyptis</i>	<i>ferruginosa</i>	Pohl ex Benth.	<i>Hyptis</i>	
<i>Hyptis</i>	<i>floribunda</i>	Briq.	<i>Condea</i> sect. <i>Condea</i>	
<i>Hyptis</i>	<i>florida</i>	Benth.	<i>Hyptis</i>	
<i>Hyptis</i>	<i>foliosa</i>	A.St.-Hil. ex Benth.	<i>Oocephalus</i>	
<i>Hyptis</i>	<i>frondosa</i>	S. Moore	<i>Hyptis</i>	
<i>Hyptis</i>	<i>fruticosa</i>	Salzm. ex Benth.	<i>Eplingiella</i>	
<i>Hyptis</i>	<i>fulva</i>	Epling	<i>Hyptis</i>	
<i>Hyptis</i>	<i>gardneri</i>	Briq.	<i>Hyptis</i>	
<i>Hyptis</i>	<i>glomerata</i>	Mart. ex Schrank	<i>Oocephalus</i>	see <i>Oocephalus oppositiflorus</i>
<i>Hyptis</i>	<i>glutinosa</i>	Benth.	<i>Hyptidendron</i>	Harley 1988
<i>Hyptis</i>	<i>goyavensis</i>	A.St.-Hil. ex Benth.	<i>Hyptis</i>	
<i>Hyptis</i>	<i>guanchezii</i>	Harley	<i>Hyptis</i>	
<i>Hyptis</i>	<i>gymnocaulos</i>	Epling	<i>Mesosphaerum</i>	
<i>Hyptis</i>	<i>hagei</i>	Harley	<i>Oocephalus</i>	
<i>Hyptis</i>	<i>halimifolia</i>	Mart. ex Benth.	<i>Oocephalus</i>	
<i>Hyptis</i>	<i>halimifolia</i> var. <i>pauciflora</i>	Harley	<i>Oocephalus</i>	= <i>Oocephalus pauciflorus</i>
<i>Hyptis</i>	<i>hamatidens</i>	Epling & Jativa	<i>Hyptis</i>	
<i>Hyptis</i>	<i>hassleri</i>	Briq.	<i>Hyptis</i>	
<i>Hyptis</i>	<i>havanensis</i>	Britton ex Epling	<i>Hyptis</i>	
<i>Hyptis</i>	<i>heterodon</i>	Epling	<i>Cantinoa</i>	
<i>Hyptis</i>	<i>heterophylla</i>	Benth. in DC.	<i>Hyptis</i>	
<i>Hyptis</i>	<i>hilarii</i>	Benth.	<i>Hyptis</i>	
<i>Hyptis</i>	<i>hirsuta</i>	Kunth	<i>Hyptis</i>	
<i>Hyptis</i>	<i>hispida</i>	Benth. in DC.	<i>Hyptis</i>	
<i>Hyptis</i>	<i>homalophylla</i>	Pohl ex Benth.	<i>Hyptis</i>	
<i>Hyptis</i>	<i>huberi</i>	Harley	<i>Hyptis</i>	
<i>Hyptis</i>	<i>humilis</i>	Benth. in DC.	<i>Hyptis</i>	
<i>Hyptis</i>	<i>hygrobia</i>	Briq.	<i>Hyptis</i>	
<i>Hyptis</i>	<i>hypoleuca</i>	Benth.	<i>Eriope</i>	Harley 1976
<i>Hyptis</i>	<i>imbricata</i>	Pohl ex Benth.	<i>Hyptis</i>	

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APPENDIX 1 (continued)

FORMER GENUS	SPECIES	AUTHOR	ACCEPTED GENUS	NOTES OF CHANGE
<i>Hyptis</i>	<i>imbricatiformis</i>	Harley	<i>Hyptis</i>	
<i>Hyptis</i>	<i>impar</i>	Epling	<i>Cantinoa</i>	
<i>Hyptis</i>	<i>incana</i>	Briq.	<i>Cyanocephalus</i>	
<i>Hyptis</i>	<i>indivisa</i>	Pilg.	<i>Cantinoa</i>	
<i>Hyptis</i>	<i>inelegans</i>	Epling	<i>Hypenia</i>	Harley 1988
<i>Hyptis</i>	<i>inodora</i>	Schrank	<i>Hyptis</i>	
<i>Hyptis</i>	<i>intermedia</i>	Epling	<i>Hyptis</i>	
<i>Hyptis</i>	<i>interrupta</i>	Pohl ex Benth.	<i>Gymneia</i>	
<i>Hyptis</i>	<i>involutrata</i>	Benth.	<i>Hyptis</i>	
<i>Hyptis</i>	<i>iodantha</i>	Epling	<i>Condea</i> sect. <i>Laniflorae</i>	
<i>Hyptis</i>	<i>irwinii</i>	Harley	<i>Mesosphaerum</i>	
<i>Hyptis</i>	<i>jacobi</i>	Fernando-Alonso	<i>Condea</i> sect. <i>Laniflorae</i>	
<i>Hyptis</i>	<i>kramerioides</i>	Harley & J.F.B.Pastore	<i>Hyptis</i>	
<i>Hyptis</i>	<i>lachnosphaeria</i>	Epling	<i>Mesosphaerum</i>	
<i>Hyptis</i>	<i>laciniata</i>	Benth.	<i>Hyptis</i>	
<i>Hyptis</i>	<i>lacunosa</i>	Pohl ex Benth.	<i>Oocephalus</i>	
<i>Hyptis</i>	<i>lacustris</i>	A.St.-Hil. ex Benth.	<i>Hyptis</i>	
<i>Hyptis</i>	<i>lagenaria</i>	A.St.-Hil. ex Benth.	<i>Hyptis</i>	
<i>Hyptis</i>	<i>lanata</i>	Pohl ex Benth.	<i>Cyanocephalus</i>	
<i>Hyptis</i>	<i>lanceolata</i>	Poir.	<i>Hyptis</i>	
<i>Hyptis</i>	<i>laniflora</i>	Benth.	<i>Condea</i> sect. <i>Laniflorae</i>	
<i>Hyptis</i>	<i>lantaniifolia</i>	Poit.	<i>Hyptis</i>	
<i>Hyptis</i>	<i>lanuginosa</i>	Glaz. ex Epling	<i>Hyptis</i>	
<i>Hyptis</i>	<i>lappacea</i>	Benth.	<i>Hyptis</i>	
<i>Hyptis</i>	<i>lappulacea</i>	Mart. ex Benth.	<i>Hyptis</i>	
<i>Hyptis</i>	<i>latifolia</i>	Mart. ex Benth.	<i>Eriope</i>	Harley 1976
<i>Hyptis</i>	<i>lavandulacea</i>	Pohl ex Benth.	<i>Hyptis</i>	
<i>Hyptis</i>	<i>leptoclada</i>	Benth. in DC.	<i>Hyptis</i>	
<i>Hyptis</i>	<i>leptostachys</i>	Epling	<i>Leptohyptis</i>	
<i>Hyptis</i>	<i>leucocephala</i>	Mart. ex Benth.	<i>Martianthus</i>	
<i>Hyptis</i>	<i>leucophylla</i>	Pohl ex Benth.	<i>Hyptidendron</i>	Harley 1988
<i>Hyptis</i>	<i>linarioides</i>	Pohl ex Benth.	<i>Hyptis</i>	
<i>Hyptis</i>	<i>lippioides</i>	Pohl ex Benth.	<i>Cyanocephalus</i>	
<i>Hyptis</i>	<i>lobata</i>	A.St.Hil. ex Benth.	<i>Unplaced</i>	?
<i>Hyptis</i>	<i>longifolia</i>	Pohl ex Benth.	<i>Hyptis</i>	
<i>Hyptis</i>	<i>longipes</i>	A.St.-Hil. ex Benth.	<i>Cyanocephalus</i>	= <i>Cyanocephalus rugosus</i>
<i>Hyptis</i>	<i>lorentziana</i>	O.Hoffm.	<i>Hyptis</i>	
<i>Hyptis</i>	<i>loseneriana</i>	Pilg.	<i>Hyptis?</i>	
<i>Hyptis</i>	<i>lucida</i>	Pohl ex Benth.	<i>Hyptis</i>	
<i>Hyptis</i>	<i>lutescens</i>	Pohl ex Benth.	<i>Hyptis</i>	
<i>Hyptis</i>	<i>luticola</i>	Epling	<i>Hyptis</i>	

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APPENDIX 1 (continued)

FORMER GENUS	SPECIES	AUTHOR	ACCEPTED GENUS	NOTES OF CHANGE
<i>Hyptis</i>	<i>lythroides</i>	Pohl ex Benth.	<i>Oocephalus</i>	
<i>Hyptis</i>	<i>machrisae</i>	Epling	<i>Eriope</i>	Harley 1988
<i>Hyptis</i>	<i>macrantha</i>	A.St.-Hil. ex Benth.	<i>Hypenia</i>	Harley 1988
<i>Hyptis</i>	<i>macrocephala</i>	M.Martens & Galeotti	<i>Hyptis</i>	
<i>Hyptis</i>	<i>macrosiphon</i>	Briq.	<i>Hypenia</i>	Harley 1988
<i>Hyptis</i>	<i>macrostachys</i>	Benth. in DC.	<i>Leptohyptis</i>	
<i>Hyptis</i>	<i>macrotera</i>	Briq.	<i>Cantinoa</i>	
<i>Hyptis</i>	<i>malacophylla</i>	Benth. in DC.	<i>Gymneia</i>	
<i>Hyptis</i>	<i>mariannarum</i>	Briq.	<i>Hyptis</i>	
<i>Hyptis</i>	<i>marifolia</i>	Benth.	<i>Hypenia</i>	Harley 1988
<i>Hyptis</i>	<i>marrubifolia</i>	Epling & Mathias	<i>Mesosphaerum</i>	
<i>Hyptis</i>	<i>marrubioides</i>	Epling	<i>Hyptis</i>	
<i>Hyptis</i>	<i>martiusii</i>	Benth.	<i>Medusantha</i>	
<i>Hyptis</i>	<i>maya</i>	Harley	<i>Hyptis</i>	
<i>Hyptis</i>	<i>melissoides</i>	Kunth	<i>Mesosphaerum</i>	Kuntze, 1891
<i>Hyptis</i>	<i>microphylla</i>	Pohl ex Benth.	<i>Hyptis</i>	
<i>Hyptis</i>	<i>microsphaera</i>	Epling	<i>Hyptis</i>	
<i>Hyptis</i>	<i>minutifolia</i>	Griseb.	<i>Hyptis</i>	
<i>Hyptis</i>	<i>mixta</i>	Epling	<i>Condea</i> sect. <i>Condea</i>	
<i>Hyptis</i>	<i>mociniana</i>	Benth.	<i>Asterohyptis</i>	Epling 1932
<i>Hyptis</i>	<i>mollis</i>	Pohl ex Benth.	<i>Hyptis</i>	
<i>Hyptis</i>	<i>mollissima</i>	Benth.	<i>Medusantha</i>	
<i>Hyptis</i>	<i>monticola</i>	Mart. ex Benth.	<i>Hyptis</i>	
<i>Hyptis</i>	<i>muelleri</i>	Briq.	<i>Hyptis</i>	
<i>Hyptis</i>	<i>multibracteata</i>	Benth.	<i>Hyptis</i> ?	
<i>Hyptis</i>	<i>multiflora</i>	Pohl ex Benth.	<i>Medusantha</i>	
<i>Hyptis</i>	<i>multisetata</i>	Benth. in DC.	<i>Cantinoa</i>	
<i>Hyptis</i>	<i>muricata</i>	Schott ex Benth.	<i>Cantinoa</i>	
<i>Hyptis</i>	<i>mutabilis</i>	(Rich.) Briq.	<i>Cantinoa</i>	
<i>Hyptis</i>	<i>nigrescens</i>	Pohl ex Benth.	<i>Hyptis</i>	
<i>Hyptis</i>	<i>nitidula</i>	Benth. in DC.	<i>Cyanocephalus</i>	
<i>Hyptis</i>	<i>nivea</i>	Epling	<i>Oocephalus</i>	
<i>Hyptis</i>	<i>nubicola</i>	Harley	<i>Oocephalus</i>	
<i>Hyptis</i>	<i>nudicaulis</i>	Benth.	<i>Hyptis</i>	
<i>Hyptis</i>	<i>oblongifolia</i>	Benth. in DC.	<i>Mesosphaerum</i>	Kuntze 1891
<i>Hyptis</i>	<i>obtectata</i>	Benth. in DC.	<i>Hyptis</i>	
<i>Hyptis</i>	<i>obtusata</i>	Benth.	<i>Mesosphaerum</i>	Kuntze, 1891
<i>Hyptis</i>	<i>obtusiflora</i>	Presl ex Benth.	<i>Hyptis</i>	
<i>Hyptis</i>	<i>odorata</i>	Benth.	<i>Hyptis</i>	
<i>Hyptis</i>	<i>orbiculata</i>	Pohl ex Benth.	<i>Hyptis</i>	
<i>Hyptis</i>	<i>origanoides</i>	Pohl ex Benth.	<i>Hyptis</i>	
<i>Hyptis</i>	<i>ovalifolia</i>	Benth.	<i>Gymneia</i>	= <i>Gymneia interrupta</i>

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APPENDIX 1 (continued)

FORMER GENUS	SPECIES	AUTHOR	ACCEPTED GENUS	NOTES OF CHANGE
<i>Hyptis</i>	<i>ovata</i>	Pohl ex Benth.	<i>Hyptis</i>	
<i>Hyptis</i>	<i>pachyarthra</i>	Briq.	<i>Hyptis</i>	
<i>Hyptis</i>	<i>pachycephala</i>	Epling	<i>Hyptis</i>	
<i>Hyptis</i>	<i>pachyphylla</i>	Epling	<i>Hyptis</i>	
<i>Hyptis</i>	<i>paludosa</i>	A.St.-Hil. ex Benth.	<i>Hyptis</i>	
<i>Hyptis</i>	<i>paniculata</i>	Benth.	<i>Hypenia</i>	Harley 1988
<i>Hyptis</i>	<i>paradisi</i>	Harley	<i>Hypenia</i>	Harley 1988
<i>Hyptis</i>	<i>parkeri</i>	Benth.	<i>Hyptis</i>	
<i>Hyptis</i>	<i>passerina</i>	Mart. ex Benth.	<i>Hyptis</i>	
<i>Hyptis</i>	<i>paupercula</i>	Epling	<i>Hyptis</i>	
<i>Hyptis</i>	<i>pectinata</i>	(L.) Poit.	<i>Mesosphaerum</i>	Kuntze 1891
<i>Hyptis</i>	<i>pedalipes</i>	Griseb.	<i>Cyanocephalus</i>	
<i>Hyptis</i>	<i>peduncularis</i>	Benth.	<i>Cyanocephalus</i>	
<i>Hyptis</i>	<i>penaeoides</i>	Taub.	<i>Hyptis</i>	
<i>Hyptis</i>	<i>perbullata</i>	Fernando-Alonso	<i>Mesosphaerum</i>	
<i>Hyptis</i>	<i>personata</i>	Epling	<i>Hyptis</i>	
<i>Hyptis</i>	<i>petiolaris</i>	Pohl ex Benth.	<i>Hyptis</i>	
<i>Hyptis</i>	<i>petraea</i>	A.St.-Hil. ex Benth.	<i>Oocephalus</i>	
<i>Hyptis</i>	<i>pilosa</i>	Benth.	<i>Mesosphaerum</i>	
<i>Hyptis</i>	<i>pinetorum</i>	Epling	<i>Cantinoa</i>	
<i>Hyptis</i>	<i>pinheiroi</i>	Harley	<i>Leptohyptis</i>	
<i>Hyptis</i>	<i>piranii</i>	Harley	<i>Oocephalus</i>	
<i>Hyptis</i>	<i>platanifolia</i>	Mart. ex Benth.	<i>Gymneia</i>	
<i>Hyptis</i>	<i>plectranthoides</i>	Benth.	<i>Cantinoa</i>	
<i>Hyptis</i>	<i>plumosa</i>	Benth. in DC.	<i>Medusantha</i>	
<i>Hyptis</i>	<i>poliodes</i>	Briq.	<i>Cyanocephalus</i>	
<i>Hyptis</i>	<i>propinqua</i>	Epling	<i>Cantinoa</i>	
<i>Hyptis</i>	<i>proteooides</i>	A.St.-Hil. ex Benth.	<i>Hyptis</i>	
<i>Hyptis</i>	<i>pruinosa</i>	Pohl ex Benth.	<i>Hypenia</i>	Harley 1988
<i>Hyptis</i>	<i>pseudoglauca</i>	Epling	<i>Mesosphaerum</i>	
<i>Hyptis</i>	<i>pseudolantana</i>	Epling	<i>Condea ?</i>	Unplaced
<i>Hyptis</i>	<i>pseudosinuata</i>	Epling	<i>Hyptis</i>	
<i>Hyptis</i>	<i>pulchella</i>	Briq.	<i>Hyptis</i>	
<i>Hyptis</i>	<i>pulegioides</i>	Pohl ex Benth.	<i>Hyptis</i>	
<i>Hyptis</i>	<i>purdiaei</i>	Benth. in DC.	<i>Mesosphaerum</i>	Kuntze 1891
<i>Hyptis</i>	<i>pycnocephala</i>	Benth. in DC.	<i>Hyptis</i>	
<i>Hyptis</i>	<i>pyriformis</i>	Epling & Játiva	<i>Hyptis</i>	
<i>Hyptis</i>	<i>racemulosa</i>	Mart. ex Benth.	<i>Cantinoa</i>	
<i>Hyptis</i>	<i>ramosa</i>	Pohl ex Benth.	<i>Hyptis</i>	
<i>Hyptis</i>	<i>recurvata</i>	Poit.	<i>Hyptis</i>	
<i>Hyptis</i>	<i>remota</i>	Pohl ex Benth.	<i>Hyptis</i>	
<i>Hyptis</i>	<i>reticulata</i>	Mart. ex Benth.	<i>Hypenia</i>	Harley 1988

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APPENDIX 1 (continued)

FORMER GENUS	SPECIES	AUTHOR	ACCEPTED GENUS	NOTES OF CHANGE
<i>Hyptis</i>	<i>rhabdocalyx</i>	Mart. ex Benth.	<i>Hyptidendron</i>	Harley 1989
<i>Hyptis</i>	<i>rhomboidea</i>	M Martens & Galeotti	<i>Hyptis</i>	
<i>Hyptis</i>	<i>rhyptidiophylla</i>	Briq.	<i>Hyptis</i>	
<i>Hyptis</i>	<i>rhytidea</i>	Benth.	<i>Condea</i> ?	Unplaced
<i>Hyptis</i>	<i>riparia</i>	Harley	<i>Hyptis</i>	
<i>Hyptis</i>	<i>rivularis</i>	Britton	<i>Condea</i> sect. <i>Condea</i>	
<i>Hyptis</i>	<i>rondonica</i>	Harley	<i>Hyptidendron</i>	Harley 1988
<i>Hyptis</i>	<i>rondonii</i>	Epling	<i>Hyptis</i>	
<i>Hyptis</i>	<i>rotundifolia</i>	Benth.	<i>Hyptis</i>	
<i>Hyptis</i>	<i>rubicunda</i>	Pohl ex Benth.	<i>Cantinoa</i>	
<i>Hyptis</i>	<i>rubiginosa</i>	Benth.	<i>Hyptis</i>	
<i>Hyptis</i>	<i>rugosa</i>	Benth.	<i>Cyanocephalus</i>	
<i>Hyptis</i>	<i>salicina</i>	J.A.Schmidt	<i>Hyptis</i>	
<i>Hyptis</i>	<i>salviifolia</i>	Pohl ex Benth.	<i>Eriope</i>	Harley 1976
<i>Hyptis</i>	<i>salzmannii</i>	Benth.	<i>Hypenia</i>	Harley 1988
<i>Hyptis</i>	<i>sancti-gabrielii</i>	Harley	<i>Martianthus</i>	
<i>Hyptis</i>	<i>savannarum</i>	Briq.	<i>Hyptis</i>	
<i>Hyptis</i>	<i>saxatilis</i>	A.St.-Hil. ex Benth.	<i>Hyptis</i>	
<i>Hyptis</i>	<i>scandens</i>	Epling	<i>Condea</i> sect. <i>Condea</i>	
<i>Hyptis</i>	<i>sclerophylla</i>	Epling	<i>Hypenia</i>	
<i>Hyptis</i>	<i>scoparioides</i>	Urb.	<i>Condea</i> sect. <i>Condea</i>	
<i>Hyptis</i>	<i>seemannii</i>	(Gray) Epling	<i>Asterohyptis</i>	Epling 1932
<i>Hyptis</i>	<i>selaginifolia</i>	Mart. ex Benth.	<i>Cyanocephalus</i>	
<i>Hyptis</i>	<i>septentrionalis</i>	Epling	<i>Mesosphaerum</i>	
<i>Hyptis</i>	<i>sericea</i>	Benth.	<i>Hyptis</i> ?	
<i>Hyptis</i>	<i>shaferi</i>	Britton	<i>Hyptis</i>	
<i>Hyptis</i>	<i>sidiifolia</i>	(L'Hérit.) Briq.	<i>Mesosphaerum</i>	
<i>Hyptis</i>	<i>silvestris</i>	Epling	<i>Mesosphaerum</i>	
<i>Hyptis</i>	<i>silvinae</i>	Harley	<i>Oocephalus</i>	
<i>Hyptis</i>	<i>similis</i>	Epling	<i>Cantinoa</i>	
<i>Hyptis</i>	<i>simplex</i>	A.St.-Hil. ex Benth.	<i>Hypenia</i>	see also <i>Eriope simplex</i>
<i>Hyptis</i>	<i>simulans</i>	Epling	<i>Medusantha</i>	
<i>Hyptis</i>	<i>sinuata</i>	Pohl ex Benth.	<i>Hyptis</i>	
<i>Hyptis</i>	<i>siphonantha</i>	Harley	<i>Leptohyptis</i>	
<i>Hyptis</i>	<i>spicigera</i>	Lam.	<i>Cantinoa</i>	= <i>Cantinoa americana</i>
<i>Hyptis</i>	<i>stachydifolia</i>	Epling	<i>Martianthus</i>	
<i>Hyptis</i>	<i>stellulata</i>	Benth.	<i>Asterohyptis</i>	Epling 1932
<i>Hyptis</i>	<i>stricta</i>	Benth.	<i>Cantinoa</i>	
<i>Hyptis</i>	<i>suaveolens</i>	(L.) Poit.	<i>Mesosphaerum</i>	Kuntze 1891
<i>Hyptis</i>	<i>subrosea</i>	Harley	<i>Hypenia</i>	Harley 1988

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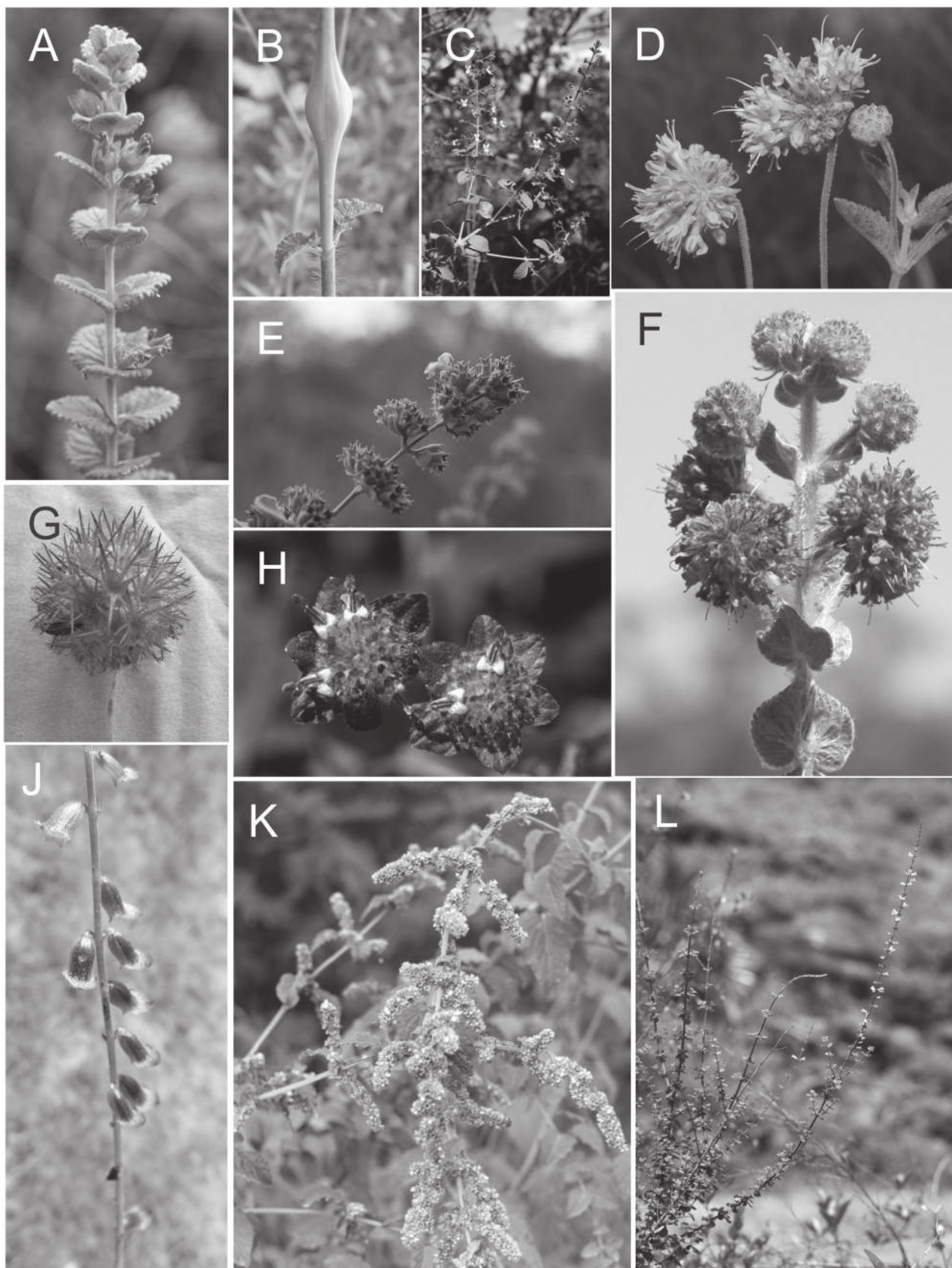
APPENDIX 1 (continued)

FORMER GENUS	SPECIES	AUTHOR	ACCEPTED GENUS	NOTES OF CHANGE
<i>Hyptis</i>	<i>subrotunda</i>	Pohl ex Benth.	<i>Cantinoa</i>	
<i>Hyptis</i>	<i>subtilis</i>	Epling	<i>Condea</i> sect. <i>Laniflorae</i>	
<i>Hyptis</i>	<i>subviolacea</i>	Briq.	<i>Hyptis</i>	
<i>Hyptis</i>	<i>tacianae</i>	Harley	<i>Cyanocephalus</i>	
<i>Hyptis</i>	<i>tafallae</i>	Benth.	<i>Condea</i> sect. <i>Laniflorae</i>	
<i>Hyptis</i>	<i>tagetifolia</i>	Harley	<i>Cyanocephalus</i>	
<i>Hyptis</i>	<i>tenuifolia</i>	Epling	<i>Cyanocephalus</i>	
<i>Hyptis</i>	<i>tephrodes</i>	A. Gray	<i>Condea</i> sect. <i>Laniflorae</i>	
<i>Hyptis</i>	<i>tetracephala</i>	Bordignon	<i>Hyptis</i>	
<i>Hyptis</i>	<i>tetragona</i>	Pohl ex Benth.	<i>Hyptis?</i>	
<i>Hyptis</i>	<i>thyrsiflora</i>	Epling	<i>Condea</i> sect. <i>Condea</i>	
<i>Hyptis</i>	<i>tomentosa</i>	Poit.	<i>Condea</i> sect. <i>Laniflorae</i>	
<i>Hyptis</i>	<i>tricephala</i>	A.St.-Hil. ex Benth.	<i>Hyptis</i>	
<i>Hyptis</i>	<i>trichopes</i>	(Epling) Harley	<i>Condea</i> sect. <i>Condea</i>	
<i>Hyptis</i>	<i>tripartita</i>	Briq.	<i>Cyanocephalus</i>	
<i>Hyptis</i>	<i>tumidicalyx</i>	Epling & Játiva	<i>Hyptis</i>	
<i>Hyptis</i>	<i>turnerifolia</i>	Mart. ex Benth.	<i>Hyptis</i>	
<i>Hyptis</i>	<i>uliginosa</i>	A.St.-Hil. ex Benth.	<i>Hyptis</i>	
<i>Hyptis</i>	<i>uncinata</i>	Benth.	<i>Hyptis</i>	
<i>Hyptis</i>	<i>unilateralis</i>	Epling	<i>Hyptidendron</i>	Harley 1988
<i>Hyptis</i>	<i>urticoides</i>	Kunth	<i>Mesosphaerum</i>	Kuntze 1891
<i>Hyptis</i>	<i>vauthieri</i>	Briq.	<i>Hyptidendron</i>	Harley 1988
<i>Hyptis</i>	<i>velutina</i>	Pohl ex Benth.	<i>Hyptis</i>	
<i>Hyptis</i>	<i>vepretorum</i>	Mart. ex Benth.	<i>Hyptidendron</i>	Harley 1988
<i>Hyptis</i>	<i>verticillata</i>	Jacq.	<i>Condea</i> sect. <i>Condea</i>	
<i>Hyptis</i>	<i>viatica</i>	Harley	<i>Cyanocephalus</i>	
<i>Hyptis</i>	<i>vilis</i>	Kunth & Bouche	<i>Hyptis</i>	
<i>Hyptis</i>	<i>villicaulis</i>	Epling	<i>Cantinoa</i>	
<i>Hyptis</i>	<i>villosa</i>	Pohl ex Benth.	<i>Hyptis</i>	
<i>Hyptis</i>	<i>viminea</i>	Epling	<i>Hyptis</i>	
<i>Hyptis</i>	<i>violacea</i>	Pohl ex Benth.	<i>Cantinoa</i>	
<i>Hyptis</i>	<i>virgata</i>	Benth.	<i>Gymneia</i>	
<i>Hyptis</i>	<i>vitifolia</i>	Pohl ex Benth.	<i>Physominthe</i>	see <i>Hypenia vitifolia</i>
<i>Hyptis</i>	<i>xanthiocephala</i>	Mart. ex Benth.	<i>Hyptis</i>	
<i>Hypenia</i>	<i>durifolia</i>	(Epling) Harley	<i>Hypenia</i>	= <i>Hypenia sclerophylla</i>
<i>Hypenia</i>	<i>vitifolia</i>	(Pohl ex Benth) Harley	<i>Physominthe</i>	see <i>Hyptis vitifolia</i>
<i>Marsypianthes</i>	<i>burchellii</i>	Epling	<i>Marsypianthes</i>	
<i>Marsypianthes</i>	<i>chamaedryx</i>	(Vahl) Kuntze	<i>Marsypianthes</i>	
<i>Marsypianthes</i>	<i>foliolosa</i>	Benth. in DC.	<i>Marsypianthes</i>	
<i>Marsypianthes</i>	<i>hassleri</i>	Briq.	<i>Marsypianthes</i>	
<i>Marsypianthes</i>	<i>montana</i>	Benth.	<i>Marsypianthes</i>	

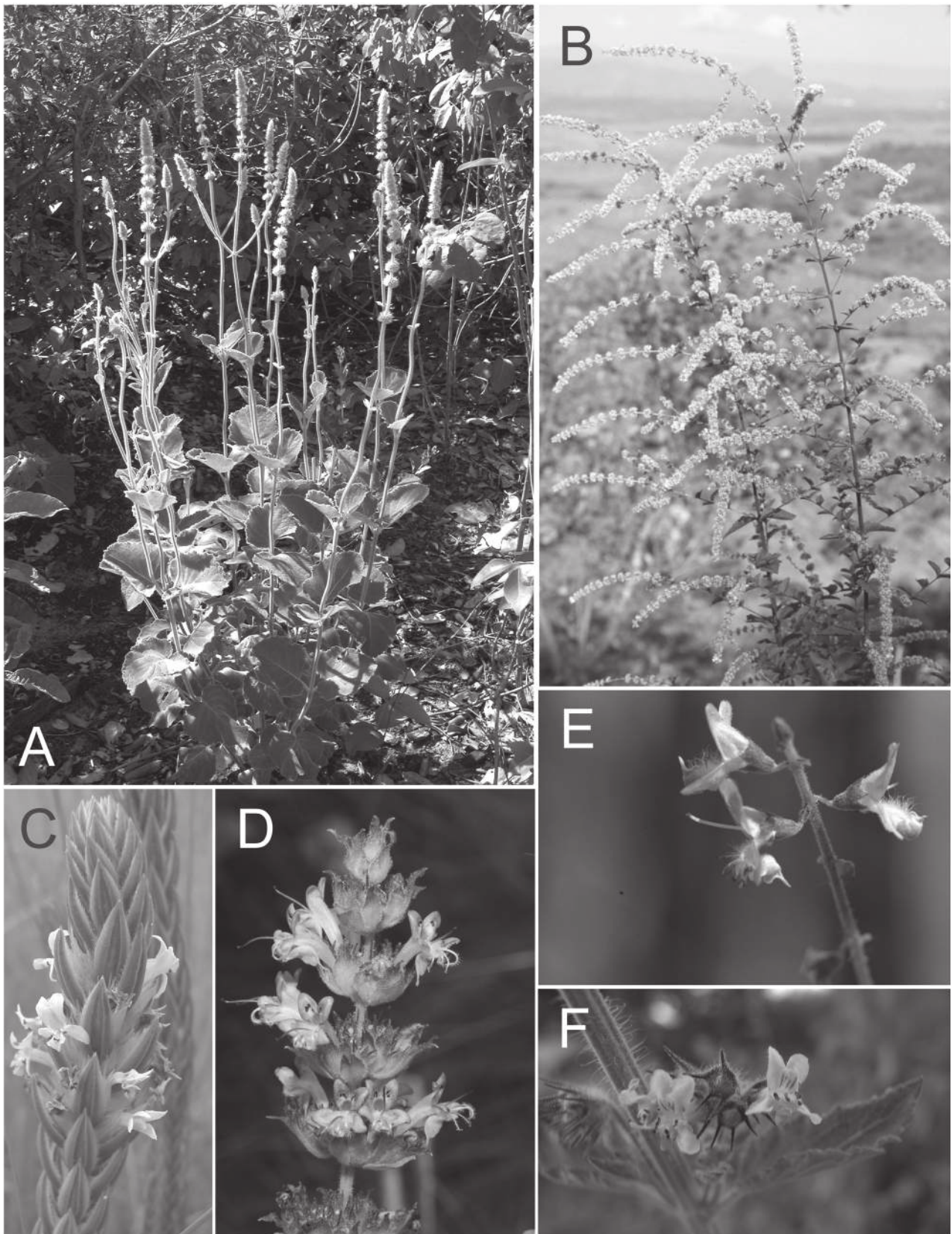
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**APPENDIX 1** (continued)

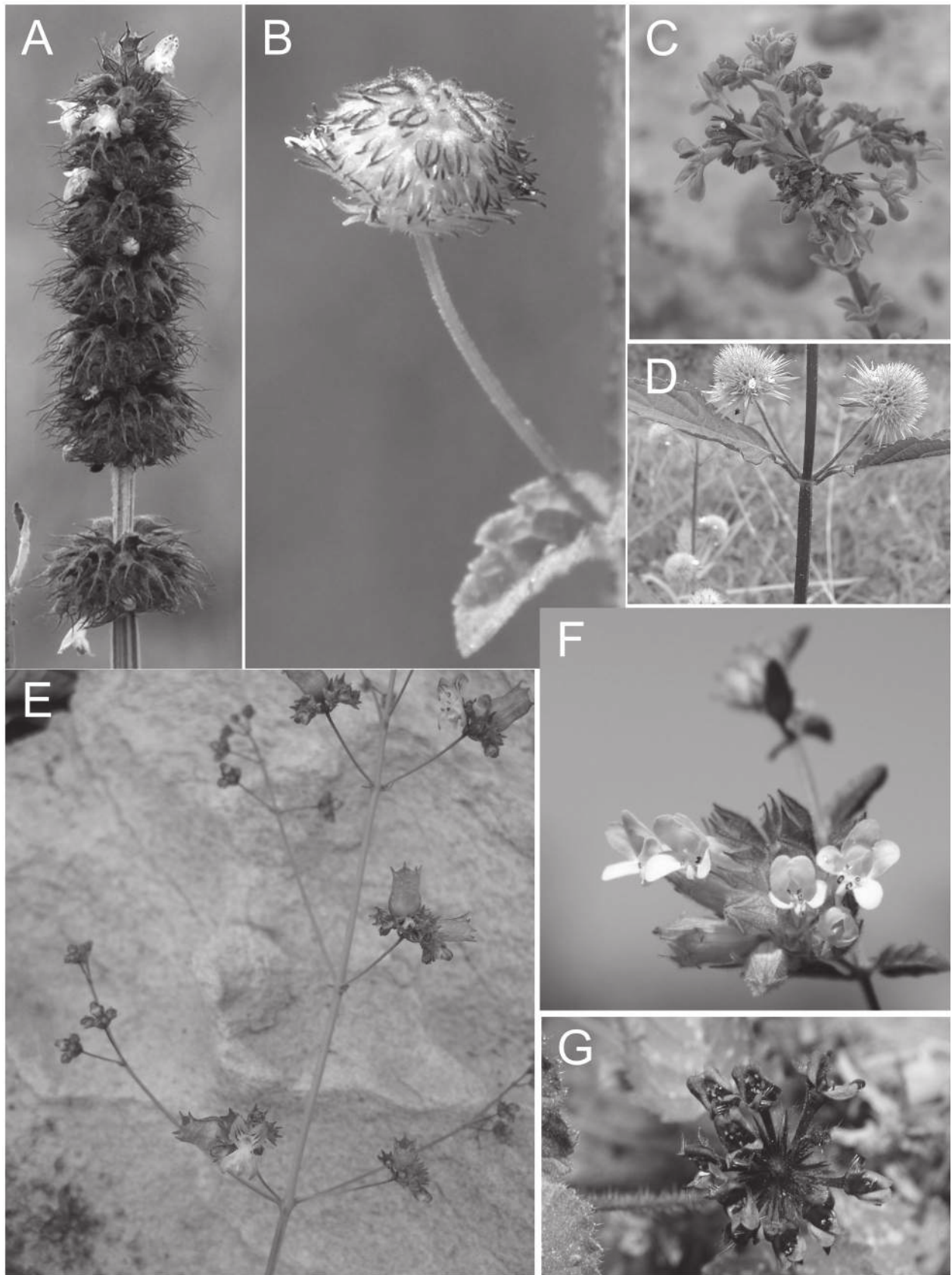
FORMER GENUS	SPECIES	AUTHOR	ACCEPTED GENUS	NOTES OF CHANGE
<i>Peltodon</i>	<i>comaroides</i>	Briq.	<i>Hyptis</i> sect. <i>Peltodon</i>	
<i>Peltodon</i>	<i>longipes</i>	A.St.-Hil. ex Benth.	<i>Hyptis</i> sect. <i>Peltodon</i>	= <i>Hyptis comaroides</i>
<i>Peltodon</i>	<i>pusillus</i>	Pohl	<i>Hyptis</i> sect. <i>Peltodon</i>	
<i>Peltodon</i>	<i>radicans</i>	Pohl	<i>Hyptis</i> sect. <i>Peltodon</i>	
<i>Peltodon</i>	<i>rugosus</i>	Tolmatchew	<i>Hyptis</i> sect. <i>Peltodon</i>	= <i>Hyptis meridionalis</i>
<i>Peltodon</i>	<i>tomentosus</i>	Pohl	<i>Hyptis</i> sect. <i>Peltodon</i>	= <i>Hyptis campestris</i>
<i>Rhaphiodon</i>	<i>echinus</i>	(Nees & Mart.) Schauer	<i>Rhaphiodon</i>	



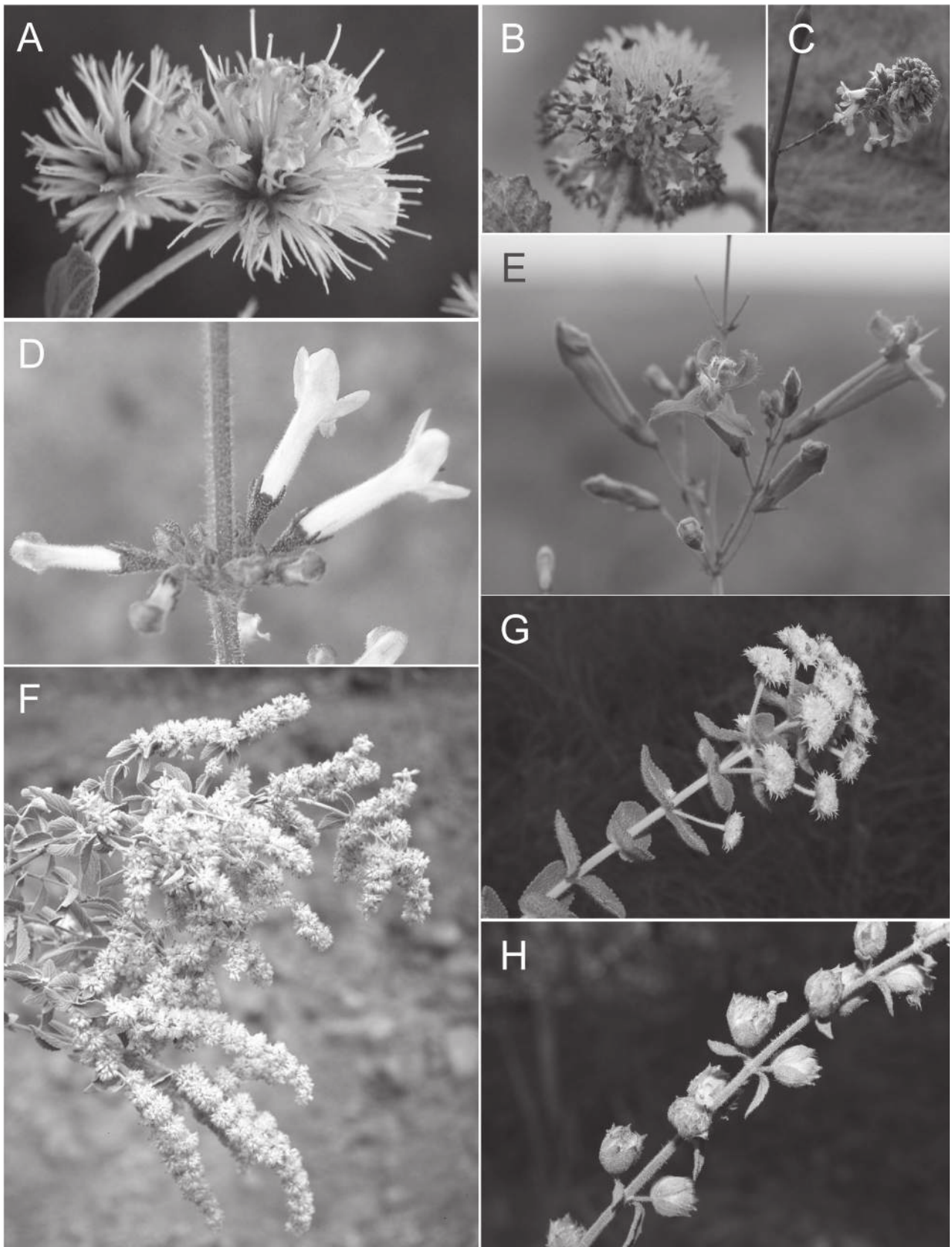
**FIGURE 1.** A. *Oocephalus silvinae*; B. *Physominthe vitifolia*; C. *Hyptidendron caudatum*; D. *Cyanocephalus rugosus*; E. *Hyptidendron canum*; F. *Cyanocephalus lanatus*; G. *Rhapsiodon echinus* (fr.); H. *Hyptis radicans*; J. *Eriopidion strictum*; K. *Condea undulata*; L. *Leptohyptis macrostachys*. Photos A, E, G, H, J–L by R. Harley; B by A. Paton; C, D, F by H. Moreira.



**FIGURE 2.** A. *Gymneia malacophylla*; B. *Asterohyptis stellulata*; C. *Hyptis imbricatiformis*; D. *Cantinoa carpinifolia*; E. *Eriope crassipes*; F. *Mesosphaerum suaveolens*. Photos A–C, E, F by R. Harley; D by D. Cardoso.



**FIGURE 3.** A. *Gymneia virgata*; B. *Hyptis recurvata*; C. *Eplingiella cuniloides*; D. *Hyptis ramosa*; E. *Physominthe vitifolia*; F. *Marsypianthes burchellii*; G. *Raphiodon echinus* (fl.). Photos A, B, F by H. Moreira; C, G by R. Harley; D, E by A. Paton.



**FIGURE 4.** **A.** *Medusantha eriophylla*; **B.** *Martianthus stachydifolius*; **C.** *Hypenia marifolia*; **D.** *Leptohyptis macrostachys*; **E.** *Hypenia* sp.; **F.** *Condea albida*; **G.** *Hyptis crenata*; **H.** *Oocephalus oppositiflorus*. Photos A–C, F, H by R. Harley; D by J.F. Pastore; E by H. Moreira; G by D. Cardoso.

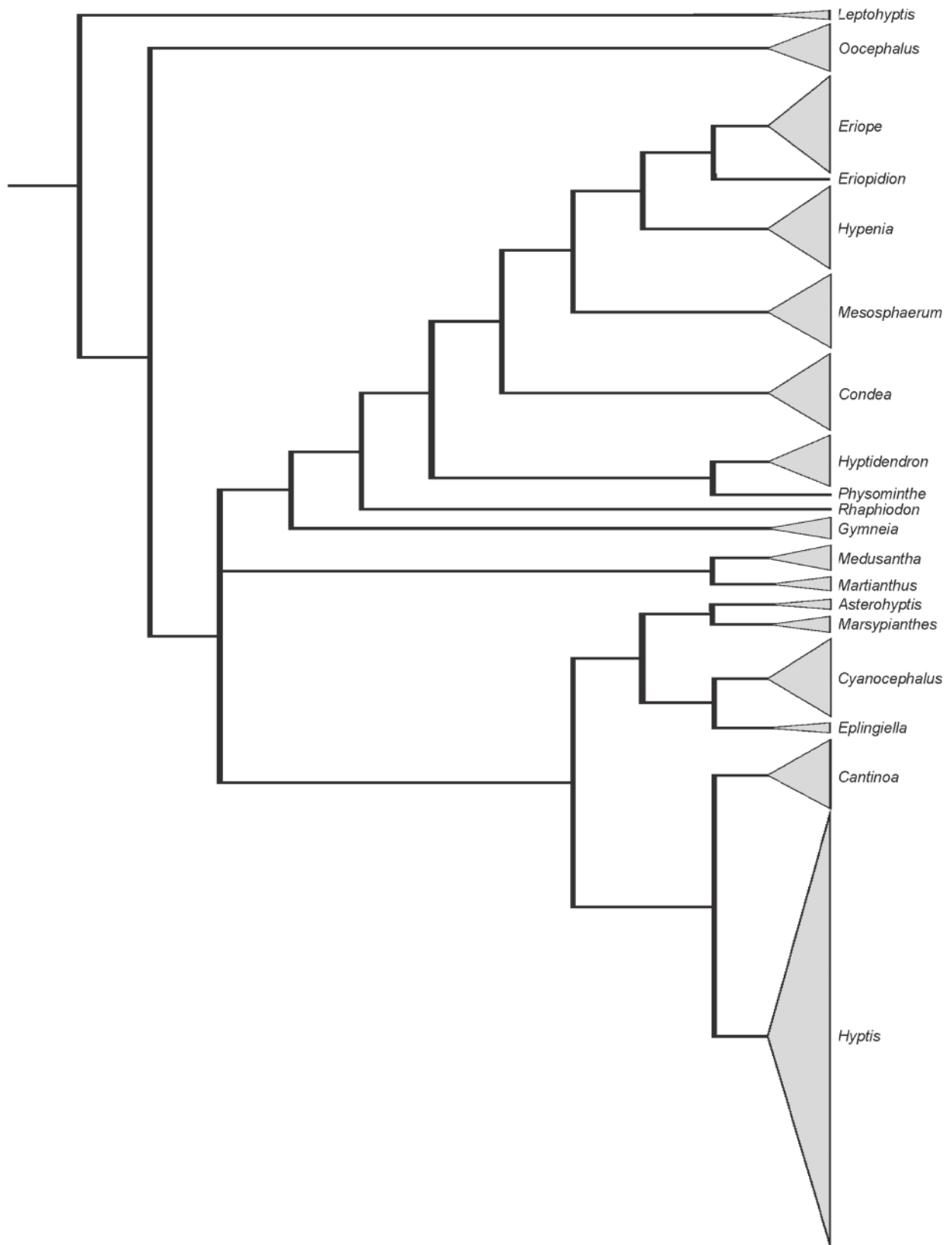


FIGURE 5. Phylogenetic relationships of genera of Hyptidinae