



## A revised, phylogenetically-based concept of *Ceropegia* (Apocynaceae)

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### ABSTRACT

Recent phylogenetic reconstructions in the Ceropegieae (Apocynaceae-Asclepiadoideae) show that the 357 species of highly succulent stapeliads and four lineages of the 141 species of *Brachystelma* R.Br. ex Sims are nested within the 219 species of *Ceropegia* L.

The stapeliads, shown convincingly to be nested within *Ceropegia*, are primarily characterized by their non-climbing, highly succulent, tuberculate stems with fleshy flowers with a mostly short corolla-tube. However, highly succulent, tuberculate stems are not restricted to the stapeliads and are present in four lineages of *Ceropegia*. Furthermore, tubular flowers are also found among the stapeliads and are not restricted to *Ceropegia*. Since a slender, tubular corolla is extremely homoplasious within *Brachystelma*, *Ceropegia* and the stapeliads, we move away from this as defining *Ceropegia* to recognize some sections in which there is a range from slender, tubular flowers to almost flat flowers.

To re-establish a monophyletic *Ceropegia*, we propose a new classification in which *Brachystelma* and all genera of the stapeliads are placed in a greatly enlarged *Ceropegia*. This new concept of *Ceropegia* is defined by the lack of hard, wiry roots, the softly fleshy tissue of the peduncles and pedicels, the absence of any corolline corona, the presence of two well-developed series of the staminal corona and the presence of a compitum in the style-head leading to the fertilization of both ovaries. We transfer the species of *Brachystelma* into several sections of *Ceropegia* and reduce the 31 stapeliad genera to sections of *Ceropegia*, after which *Ceropegia* has 63 sections. Sect. *Chamaesiphon* H.Huber is the largest with 115 species, two sections among the stapeliads each contain over 50 species but the remaining sections are mostly considerably smaller. We provide diagnostic descriptions, lists of included species and distributions for each of the subdivisions that we recognise. Over 400 new combinations are made in *Ceropegia*.

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### 1. Introduction

The roughly 762 species of the tribe Ceropegiaeae (Apocynaceae-Asclepiadoideae) are made up of the four major groups: *Brachystelma* Sims (141 spp.), *Ceropegia* L. (219 spp.), the stem-succulents popularly known as the stapeliads (357 spp. in 31 genera: Bruyns et al., 2014) and an early-divergent group of about 45 species (Bruyns et al., 2015) in the genera *Anisotoma* Fenzl (3 spp.), *Conomitra* Fenzl (1 sp.), *Dittoceras* Hook.f. (1 sp.), *Emplectanthus* N.E.Br. (3 spp.), *Heterostemma* Wight & Arn. ( $\pm$  15 spp.), *Leptadenia* R.Br. ( $\pm$  5 spp.), *Neoschumannia* Schltr. (3 spp.), *Orthanthera* Wight (4 spp.), *Pentasachme* Wallich ex Wight (2 spp.) and *Riocreuxia* Decne. ( $\pm$  8 spp., Meve and Liede, 2004; Meve et al., 2017).

The species of *Brachystelma* and *Ceropegia* range from slender climbers to geophytes (in *Ceropegia* they are more rarely highly succulent climbers and sometimes even tuberculate-stemmed, non-climbing shrubs), often retreating to an underground tuber or a cluster of fleshy roots in the dry

season. They are widely distributed in seasonally dry places in and around the semi-arid regions of the Old World, from Macaronesia to the southern tip of Africa, in the Arabian Peninsula and in SE Asia from Pakistan to China, Philippines and Northern Australia.

*Ceropegia* was revised by Huber (1957), who recognized 153 species in 21 sections, including one for the six species of *Riocreuxia*, which he included in *Ceropegia*. Apart from Huber's placing of *Riocreuxia* in *Ceropegia* (from where it was removed again by Dyer, 1980), the generic circumscription of *Ceropegia* has not been controversial, as the generic synonymy of *Ceropegia* shows (Huber, 1957; Dyer, 1980). Huber's sections (Huber, 1957) have not been used by any subsequent authors, with Dyer (1980: 43) dismissing Huber's emphasis on pubescence as having led to 'some unnatural groupings'. Exploration since 1957 has unearthed much new information, from which regional revisions were published by Ansari (1984) for India, Bruyns (1985, 1986, 1989, 2014) for the former Cape Province in South Africa, the Canary Islands, the Arabian Peninsula and Namibia, respectively, Dyer (1980, 1983) for Southern Africa, Archer (1992) and Masinde (2012) for East Africa and Forster (1996) for the single Australian species.

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*Brachystelma* has never been revised as a whole. Many Southern African species of *Brachystelma* were segregated into various small genera by Harvey and Schlechter and others (see synonymy in Dyer, 1980), but these segregates were all placed in *Brachystelma* by N.E. Brown (1902–3, 1907–9; Phillips, 1951), who only kept *Macropetalum* Burch. ex Decne. (1 sp.) and *Tenaris* E. Mey. (5 spp.) separate from *Brachystelma*. These were later sunk into *Brachystelma* by Peckover (1996), resurrected again by Victor and Nicholas (1998) and sunk once more by Meve and Liede (2001a). The African species of *Brachystelma* were revised by Brown (1902–3, 1907–9) and updated in regional treatments by Bruyns (2014) for Namibia, Dyer (1980, 1983) for Southern Africa, Bullock (1963) and Masinde (2007) for East Africa. The Indian species were last revised by Hooker (1885) and the single Australian species by Forster (1988, 1996).

The 357 species of stapeliad are usually placed in 31 genera (Bruyns et al., 2014), of which the largest are *Huernia* R.Br. (54 spp., Bruyns, 2008), *Orbea* Haw. (53 spp., Bruyns, 2005) and *Caralluma* R.Br. (58 spp., Gilbert, 1990). Revisions exist for *Huernia* (Leach, 1988), *Stapelia* (Leach, 1985) and an expanded concept of *Orbea* (Bruyns, 2002) and the southern Africa species were reviewed in Bruyns (2005). However, the group is of considerable interest to specialist growers of succulents and has received much attention in popular journals. This has led to a very high level of taxonomic splitting (e.g. Plowes, 1995, where *Caralluma* was subdivided into 17 small genera of which six were monotypic), but this has not been accepted in recent regional treatments (e.g. Gilbert, 2003; Lavranos, 2006; Goyder et al., 2012).

Molecular phylogenetic investigations of the Ceropegieae began with several studies with limited sampling and data from only one or two gene-regions (Meve and Liede, 2001a, 2001b). These indicated that the stapeliads may be nested within *Ceropegia*. With 69 species of stapeliad (out of 357 species and with at least one species from each genus), but still only two gene-regions, Meve and Liede (2002) showed that the stapeliads are well-supported as monophyletic and are deeply nested within a poorly resolved *Ceropegia*. These conclusions were used to re-align some of the genera in the stapeliads, although this was not always statistically supported and has not always been accepted (e.g. Gilbert, 2009). Meve and Liede (2004) again showed that the stapeliads were nested in *Ceropegia*, but the resolution achieved with data from only a single gene-region was low and species of *Brachystelma*, *Ceropegia* and the stapeliads formed a comb nested in *Ceropegia* and neither *Brachystelma* nor the stapeliads were monophyletic. Meve and Liede-Schumann (2007) used 35 species of *Ceropegia* (out of 219 spp.) to show that *Ceropegia* was paraphyletic with a monophyletic *Brachystelma* (8 species out of 141, but unsupported and also containing *Ceropegia filiformis* (Burch.) Schltr.) and with the well-supported, monophyletic stapeliads nested within *Ceropegia*. The conclusion that *Brachystelma* was monophyletic and nested within *Ceropegia* was repeated in Ollerton et al. (2009), though the position of *C. filiformis* within *Brachystelma* was not mentioned again. Meve and Liede-Schumann (2007: 405) declared that each of the taxa involved (i.e. *Brachystelma*, *Ceropegia* and the stapeliads) was defined by 'a wide array of specific morphological characteristics'. Consequently, although it was paraphyletic, *Ceropegia* was still believed to be 'taxonomically sound' and so no taxonomic changes were considered to be necessary. Despite the general lack of resolution, these studies indicated that the stapeliads are probably monophyletic and are definitely nested in *Ceropegia*, but it was unclear to which species of *Ceropegia* they were most closely related. The monophyly of *Brachystelma* was uncertain, but its relationships were unknown and the sampling (a maximum of ten out of 141 species and these only from southern Africa) was too low to draw any conclusions.

To obtain a clearer picture of the evolution of the stapeliads, Bruyns et al. (2014) sampled 192 species (out of 357: i.e. nearly two thirds of

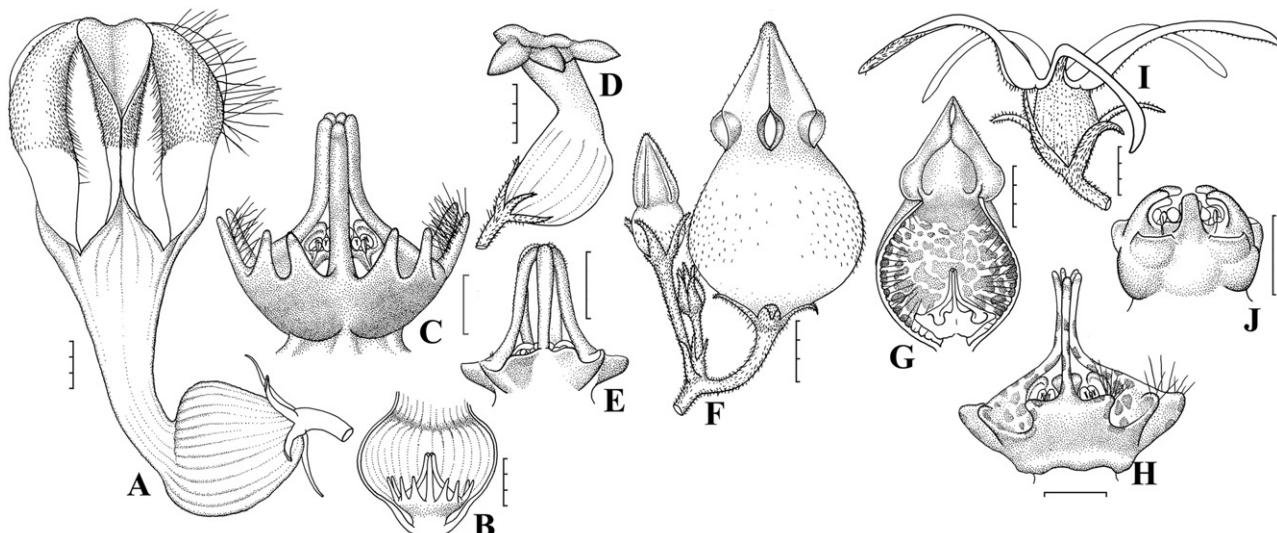
the total) and analysed data from seven gene-regions. This showed once more that the stapeliads are monophyletic and are deeply nested within *Ceropegia*. The currently used stapeliad genera (e.g. Bruyns, 2005) are mostly monophyletic and only minor adjustments are required to restore monophyly in a few cases.

That the evolution of *Brachystelma* and *Ceropegia* was much more complex than found through the limited sampling by Meve and Liede-Schumann (2007) and that *Brachystelma* is polyphyletic (rather than monophyletic) was first revealed by Surveswaran et al. (2009). They discovered that the Indian species of *Brachystelma* were monophyletic but were not closely allied to the African species and were nested within a different clade of *Ceropegia*. However, support for many of the clades was weak and relationships remained uncertain. To improve this resolution and support, Bruyns et al. (2015) used a far wider selection of species than before (71 spp. of *Brachystelma*, 75 spp. of *Ceropegia*: i.e. slightly under half of the total) and data from the same seven gene-regions of Bruyns et al. (2014). Analysis of this data showed that *Ceropegia* consisted of two major clades. In each of these major clades there is a trend from slender climber to small erect geophyte and each major clade contains succulents with tuberculate stems and greatly reduced leaves. Species of *Brachystelma* were retrieved in four lineages, two in each of the major clades of *Ceropegia*. In three of these four lineages of *Brachystelma* some species of *Ceropegia* with an erect, geophytic habit were nested. Again, the monophyletic stapeliads were deeply nested within one of the major clades of *Ceropegia* and, from the strong support of these nodes, its closest relatives in *Ceropegia* were clearly established.

In the most recent phylogenetic reconstructions (Bruyns et al., 2014, 2015) over half of the species of *Brachystelma*, *Ceropegia* and the stapeliads were sampled and we have made sufficient progress towards understanding evolutionary trends in this widespread and diverse Old World-group to re-assess the little-used sections erected by Huber (1957). We present arguments for enlarging the present concept of *Ceropegia* to include *Brachystelma* and the stapeliad genera. We transfer the species of *Brachystelma* into several sections of *Ceropegia* and recognize the monophyletic stapeliad genera as additional sections of *Ceropegia*. While this requires many name-changes, it will bring about greater nomenclatural stability as any adjustments in the groupings of species will no longer lead to generic changes. It also reflects the results of recent phylogenetic reconstruction and re-establishes a monophyletic *Ceropegia*.

## 2. Materials & methods

We used trees obtained in Bruyns et al. (2014, 2015) from analyses with Bayesian Inference (support measured in posterior probability, PP) and Maximum Likelihood (support measured in bootstrap percentage, BS) of data from five non-coding plastid loci (*psbA-trnH* intergenic spacer, *trnL-trnF* intergenic spacer, *trnS-trnG* intergenic region, *rps16* and the non-coding *rpl32-trnL* region) and two nuclear loci (internal transcribed spacer and glutamine synthetase region) for the two groups of taxa: one with 165 species of *Brachystelma* and *Ceropegia* and another with 194 species of stapeliad. Although the alignments of the respective data-sets are almost identical, these sets were not analysed together as the resultant trees include nearly 400 taxa which are difficult to exhibit in a readable manner. From these trees, we revise and modify the sections in *Ceropegia*, also employing morphological information in the literature and from herbarium material at BOL, BM, CAL, E, K, KMG, M, NBG, NH, NU, PRE, SAM, W, WIND, WU, Z. For species that were unsampled in Bruyns et al. (2014, 2015) we infer their sectional position by means of morphological and geographical data. We also provide brief, diagnostic descriptions, lists of included species and distributions for each of the subdivisions recognised.



**Fig. 1.** Variation in the corolla and corona in the traditional concept of *Ceropogia*: A–C, *C. salicifolia*, Nepal, Bruyns 2507 (BM, K); D–E, *C. melanops*, Ethiopia, Gilbert 3050 (K); F–H, *C. meleagris*, Nepal, Bruyns 2496 (K); I–J, *C. loranthiflora*, Ethiopia, Gilbert 2851 (K). [scale-bars or subdivisions indicate mm; A, D, F, I, corolla from side; B, G, J, corona from side].

### 3. Results & discussion

#### 3.1. Separating *Brachystelma* and *Ceropogia*

*Brachystelma* and *Ceropogia* were considered to be closely related by Brown (1902–3, 1907–9). Brown (1907–9: 834) separated *Brachystelma* from *Ceropogia* by ‘the corolla-tube being very short or absent’, though he had given a more nuanced view as ‘corolla-tube being saucer-shaped or campanulate and not inflated at the base’ in Brown (1902–3: 467). Dyer (1980) made the differences more precise. He characterised *Ceropogia* by ‘corolla tubular with the tube usually 2 to several times as long as its diameter at middle’ (as in Fig. 1A) and *Brachystelma* by ‘corolla opening nearly flat or tube campanulate, when tubular then less than twice as long as its diameter at middle’ (as in Fig. 2A).

In *Ceropogia* the corolla typically consists of a considerable, mostly slender tube which is basally swollen around the gynostegium, constricted above this then widening again towards its mouth, from where the shorter, narrow lobes usually first diverge and then bend inwards so as to remain joined at their tips at anthesis (as in Fig. 1A for *C. salicifolia* H.Huber). However, this is subject to much variation and three species of *Ceropogia* with unusually-shaped corollas are shown in Fig. 1(D, F and I): in Fig. 1D the corolla has short, broad lobes free at their tips and spreading; in Fig. 1F the corolla-tube is about as long as broad but is longer than the lobes; in Fig. 1I the tube is very slightly longer than broad but the lobes are much longer than the tube.

Obvious exceptions to the distinctions between the two genera are

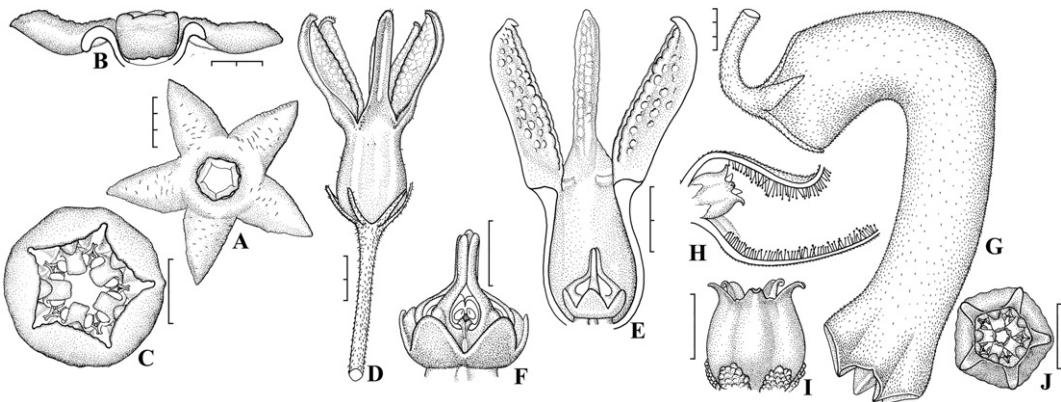
- (i) *Brachystelma gymnopus* (Schltr.) Bruyns (Fig. 2G). This was previously known as *Ceropogia pygmaea* Schinz on account of the corolla-tube being often more than twice as long as broad. It was moved to *Brachystelma* by Bruyns (1995) because of vegetative and coronal similarities to other *Brachystelma* and this was corroborated by its phylogenetic position (Fig. 1, Bruyns et al., 2015);
- (ii) *Brachystelma oianthum* Schltr., where the corolla-tube may be more than twice as long as broad. Brown (1907–9) included this in *Brachystelma* without comment (even though he had characterised *Brachystelma* a few pages before by its ‘very short or absent’ corolla-tube), but Dyer (1980: 7) considered that it was a ‘borderline case for inclusion in *Ceropogia* because of the relatively long...corolla-tube’. Bruyns et al. (Fig. 1, 2015) found

it nested among other species of *Brachystelma*.

- (iii) *Brachystelma mafekingense* N.E.Br. (Fig. 2D), where the length of the corolla-tube places it in *Brachystelma*. However, Dyer (1977) placed it in *Ceropogia* since ‘the weight of evidence is in favour of *Ceropogia*’ and because *C. pygmaea* was its nearest relative. The latter was corroborated (Fig. 1, Bruyns et al., 2015), placing it among other species of *Brachystelma* and not among species of *Ceropogia*.
- (iv) *Ceropogia loranthiflora* K.Schum. (Fig. 1I), where the tube is unusually short and this species would belong to *Brachystelma*. Brown (1902–3: 467) stated that ‘*Ceropogia loranthiflora* tends to connect the two genera’. For him, the climbing habit placed it in *Ceropogia* but he also mentioned that ‘except in habit there is no technical character whereby this plant differs from the genus *Brachystelma*’ (Brown (1902–3: 442)).
- (v) *Ceropogia melanops* H.Huber (Fig. 1D), where the corolla is reminiscent of that in *Brachystelma gymnopodium* (Fig. 2G) with short, spreading lobes. Again, the climbing habit and certain features of the flower (especially of the corona, see below) suggest a position in *Ceropogia*.

To justify the separation of *Brachystelma* from *Ceropogia*, Bruyns (1995) mentioned certain differences in their coronal structure. In *Ceropogia* most species have a characteristic coronal form (Fig. 1C, E and H): a shallowly cupular outer series in which the five pairs of bifid, deltate teeth only slightly exceed the bases of the inner series; the five dorsiventrally flattened, linear lobes of the inner series are incumbent on the backs of the anthers and then rise connivent in a column above the centre of the style-head. In *Brachystelma* the corona is more variable: the outer series is often more deeply cupular (Fig. 2C, J) and the inner series may consist of very small lobules that just touch the backs of the anthers near their bases. Nevertheless, in some species (e.g. *B. blepharanthera*, Fig. 3B; *B. macropetalum*, Fig. 3D; *B. mafekingense*, Fig. 2F) the corona is similar to that in *Ceropogia* with a short outer series and comparatively long lobes of the inner series. In *Ceropogia loranthiflora* (Fig. 1J), on the other hand, the corona is more reminiscent of that in *Brachystelma*. Therefore, although features of the corona can be used often to place species, they cannot be used to separate the two genera.

Vegetatively the two genera are often distinguished by habit (e.g. Brown, 1902–3: 467): the slender climbers of *Ceropogia* versus the small, erect herbs in *Brachystelma*. However, there are species of



**Fig. 2.** Variation in the corolla and corona in the traditional concept of *Brachystelma*: A–C, *B. brevipedicellatum*, South Africa, Bruyns 2372; D–F, *B. mafekingeense*, Namibia, Bruyns 1954 (K, WIND); G–J, *B. gymnopodium*, South Africa, Bruyns 2078 (NBG). [scale-bars or subdivisions indicate mm; A, corolla from front, D, G, corolla from side; B, E, H, corolla dissected to show location of corona; C, J, corona from front; F, I, corona from side].

*Ceropegia* that are erect herbs. Sometimes this is a consequence of loss of the climbing habit (e.g. the often erect *C. kituloensis* Masinde & F.Albers nested among other climbing species, Fig. 1, Bruyns et al., 2015) but there are also species of *Ceropegia* (such as *C. macmasteri* Dold, *C. spiralis* Wight and *C. turricula* E.A.Bruce, placed in *Ceropegia* because of their long-tubed corolla) which are small, erect herbs and are nested in *Brachystelma* (Fig. 1, Bruyns et al., 2015) so that the climbing habit here is convergent. According to Brown (1902–3: 442), *Ceropegia loranthiflora* is a climber with all its other features typical of *Brachystelma*.

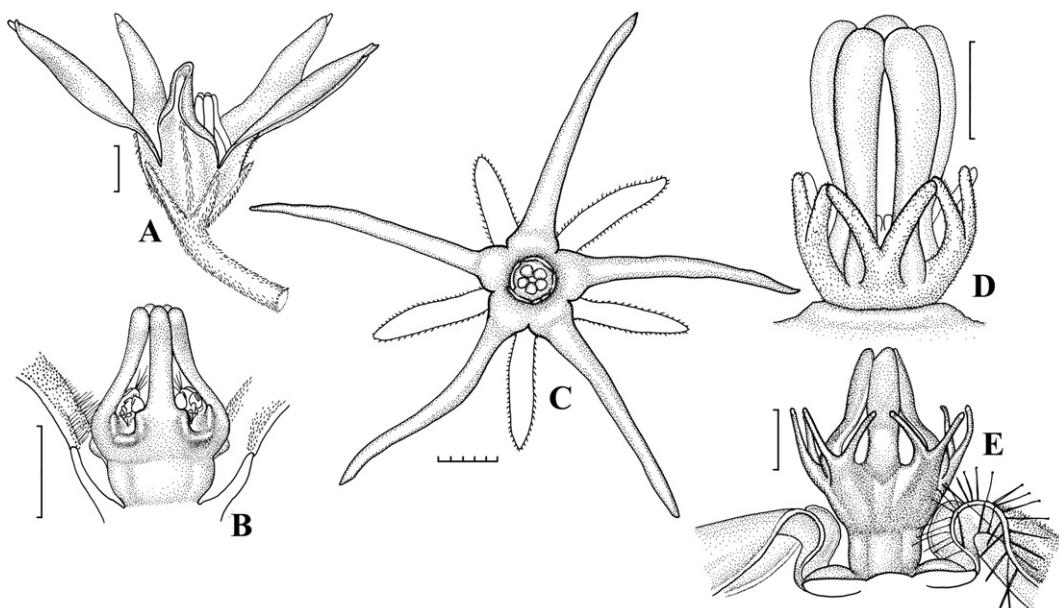
Meve and Liede-Schumann (2007) claimed that there is 'a wide array' of morphological features that separate *Brachystelma* and *Ceropegia*. However, they did not list any of them. The extensive morphological experience of N.E. Brown (1902–3, 1907–9), Dyer (1977, 1980, 1983) and Bruyns (1995) failed to reveal any more than the above distinctions between *Brachystelma* and *Ceropegia* and even these are subject to exceptions as indicated above and as shown in Figs. 1–3. Furthermore, one of the major findings of recent phylogenetic reconstructions (Figs. 4, 5, Bruyns et al., 2014; Fig. 3, Bruyns et al., 2015) in the Ceropegieae is the

remarkable extent of homoplasy in the shape of the corolla, emphasizing that floral shape is a poor indicator of relationships.

### 3.2. Separating the stapeliads and *Ceropegia*

#### 3.2.1. Do vegetative features separate the stapeliads from *Ceropegia*?

Typically, the stapeliads have fleshy (highly succulent) stems with leaves reduced to minute rudiments and borne on raised tubercles which are arranged and frequently also vertically fused into rows or 'angles' along the stems and branches (the unique exception is *Caralluma frerei* Rowley, which bears prominent, deciduous leaves and the tubercles are not arranged into rows). In addition, the stems are determinate, with growth continuing from axillary buds near the base. Consequently stems are rarely longer than 30 cm (often only 2–10 cm, though a few up to 2–3 m long exist). Among succulent climbers, *Ceropegia cimiciodora* Oberm. and *C. stapeliiformis* Haw. have stems to 15 mm thick and leaves reduced to minute rudiments borne on projecting tubercles. Their stems differ from typical stapeliad-stems by their climbing tendency, leading to the much greater length of the



**Fig. 3.** Coronal structures similar to those of *Ceropegia* in *Brachystelma* and the stapeliads: A–B, *Brachystelma blepharanthera*, Namibia, Bruyns 5703 (BOL); C–D, *B. macropetalum*, South Africa, A. Wood; *Caralluma arachnoidea*, Kenya ex hort. [scale-bars or subdivisions indicate mm; A, corolla from side, C, corolla from front; B, D, E, corona from side].

primary stem and in the lack of angles. The same phenomenon of thick stems bearing conspicuous tubercles with reduced leaves also developed independently in *Ceropegia* Sect. *Dimorphae* H. Huber ex Meve & Liede in climbing species (such as *C. armandii* Rauh, [Rauh, 1965](#)) and in non-climbing species such as *C. dimorpha* H. Humbert and *C. leroyi* Rauh & Marn.-Lap. ([Bruyns et al., 2015](#)). In *C. dimorpha* the plant develops into a succulent shrublet to 15 cm tall (stems to 20 mm thick) with prominent tubercles bearing ephemeral leaves. All stems are determinate and the primary stem is relatively short. *Ceropegia leroyi* forms a small under-shrub rarely more than 10 cm tall with ± erect, determinate succulent stems. Further independent development of a succulent, shrubby habit is also found in *C. dichotoma* and *C. fusca*, where the stems may reach 2 m tall and 50 mm thick, ± without any tendency to climb ([Bruyns, 1986](#); [Bruyns et al., 2015](#)). The climbing habit has also been lost (again independently) in *C. rupicola* Deflers, where the stems are fleshy (to 12 mm thick), determinate and with small tubercles bearing prominent leaves ([Bruyns, 1989](#); [Bruyns et al., 2015](#)).

Thus, while leafy, herbaceous members of *Ceropegia* (and all *Brachystelma*) are easily separated from stapeliads, some of the highly succulent members of *Ceropegia* with short, determinate stems differ from the stapeliads only in the lack of angles to the stems (in the stapeliads absent only in *Caralluma frerei*).

### 3.2.2. Are there significant differences in flower-bearing stems between *Ceropegia* and stapeliads?

In most species of *Ceropegia* the primary stem climbs before it changes (sometimes only after several metres) into a sympodial flower-bearing 'synflorescence' where small extra-axillary inflorescences (mostly borne on a small peduncle) develop alongside many of the leaf-pairs ([Troll, 1959](#); [Bruyns, 1985](#)). This is true of the highly succulent *C. cimiciodora*, *C. stapeliiformis* and *C. armandii* where, in addition, the 'synflorescence' is more slender than the lower vegetative parts. In *C. dimorpha* and *C. leroyi*, some stems are determinate and remain short (rarely more than 0.3 m long) and others elongate apically into a slender, deciduous, sympodial 'synflorescence' to 0.5 m tall ([Rauh, 1961](#)), which is strictly erect in *C. dimorpha* but may twine in *C. leroyi* ([Rauh, 1964](#)). In this 'synflorescence', small, extra-axillary inflorescences, each borne on a small peduncle develop alongside many of the leaf-pairs. In *Ceropegia dichotoma* and *C. fusca*, richly-flowered

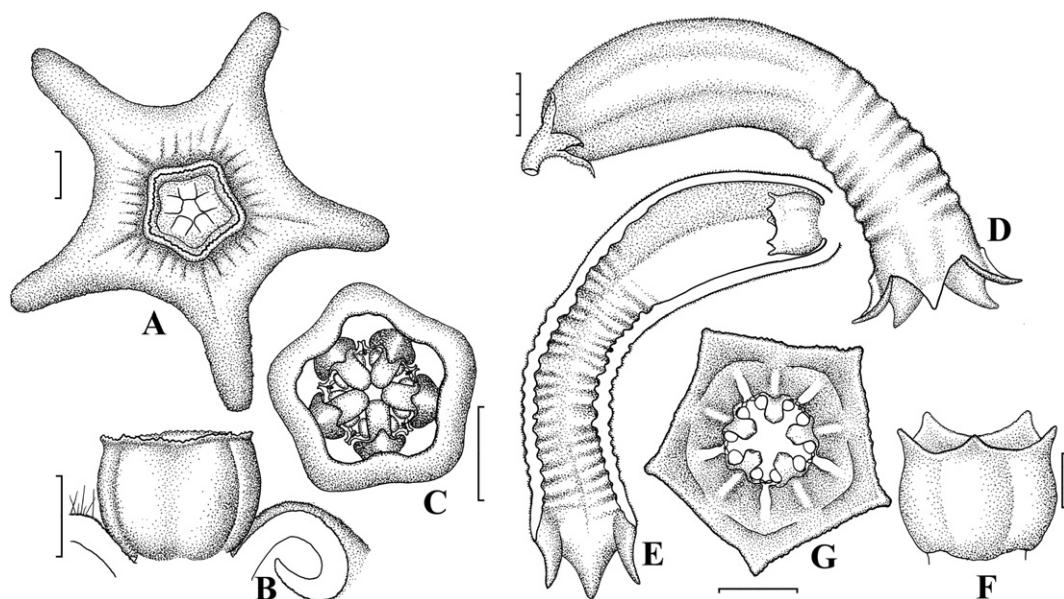
inflorescences are produced without elongation of the stems and without any peduncles ([Bruyns, 1986](#)).

Several early-diverging stapeliads in *Caralluma* R.Br. produce a similar sympodial flower-bearing 'synflorescence' to that in *Ceropegia* and especially to *C. dimorpha*: although many stems are determinate, others elongate apically (sometimes by as much as 1 m) to produce a slender, deciduous 'synflorescence' where many small (usually few-flowered) inflorescences arise in the axil of a bract alongside a pair of leafrudiments ([Wertel, 1976: 36](#)). This elongated 'synflorescence' is lost in more recently derived stapeliads, in which the inflorescences are fewer per stem (often more richly-flowered), embedded in the stems among the tubercles and frequently lack a peduncle ([Wertel, 1976](#)).

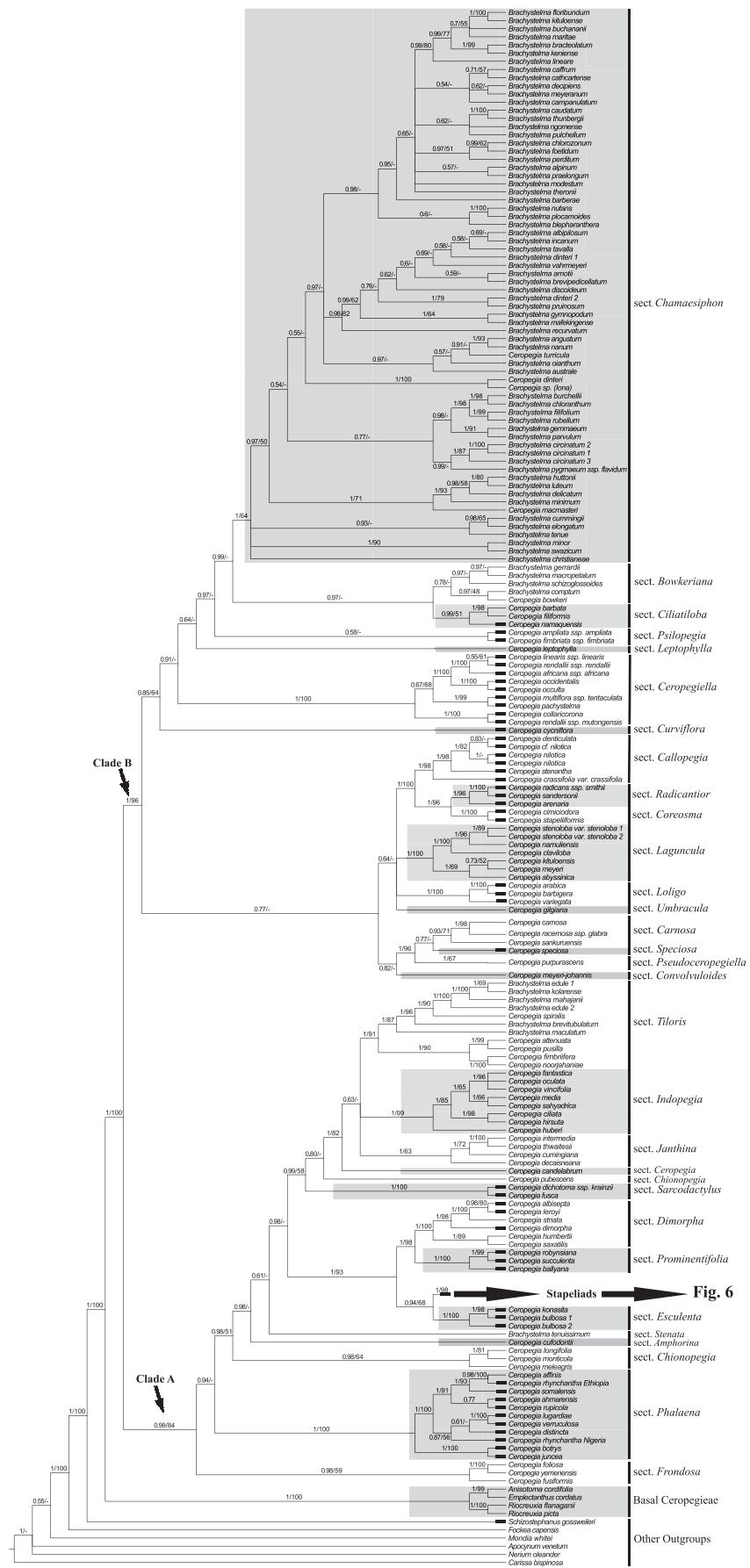
In many *Ceropegia* the stem may be several metres long before it switches over to a 'synflorescence' with sympodial growth and this appears to be very different to the stapeliads. However, there are close matches in the growth-form between certain highly succulent species of *Ceropegia* and some stapeliads. The most stapeliad-like of these (i.e. where the stems are very fleshy and determinate, bearing tubercles with small leaves) are closely related to the stapeliads (as in *Ceropegia dimorpha* and others in C. sect. *Dimorphae*, Fig. 1, [Bruyns et al., 2015](#)).

### 3.2.3. Do floral features separate the stapeliads from *Brachystelma* and *Ceropegia*?

Just as flowers in *Brachystelma* are mostly rotate or campanulate with some tubular exceptions (Fig. 2), most stapeliads also have rotate or campanulate flowers. However, there are some with markedly tubular flowers and it was shown that these are often closely related to others with flat flowers ([Bruyns et al., 2014](#)). The *Stapelia*-like flowers in *Brachystelma caudatum* (comparatively large to 45 mm diam., darkly coloured, similarly shaped and evil-smelling) led C.P. Thunberg to describe this species as *Stapelia caudata* Thunb. ([Dyer, 1983](#)). There is also evidence that the floral trap-mechanism characteristic of *Ceropegia* ([Vogel, 1961](#)) has developed in some of these very tubular-flowered stapeliads such as *Stapeliopsis neronis* Pillans ([Vogel, 1954](#)). Flowers in *Brachystelma brevipedicellatum* Turrill are similar in the shape of the corolla and corona to *Echidnopsis sharpei* A.C. White & B. Sloane (compare Figs. 2A–C and 4A–C) and those of *B. gymnopodium* to *Echidnopsis mijerteina* Lavranos (compare Figs. 2G–J and 4D–G). Furthermore, among early-divergent groups in the stapeliads ([Bruyns et al., 2014](#)), there are also species such as *Caralluma arachnoidea* (P.R.O. Bally) M.



**Fig. 4.** Similar flowers and coronas to *Brachystelma brevipedicellatum* and *B. gymnopodium* in the stapeliads in *Echidnopsis*: A–C, *E. sharpei*, Kenya, Lavranos & Newton 17698 (K); D–G, *E. mijerteina*, Somalia, Lavranos 8446 (K). [scale-bars or subdivisions indicate mm; A, corolla from front, D, corolla from side; E, dissected corolla from side; B, F, corona from side; C, G, corona from front].



Gilbert with a similar coronal form to *Ceropegia* (Fig. 3E). Although the flowers are more fleshy in the stapeliads (in some of the early-diverging groups this is restricted to a small disc around the gynostegium), many floral features of *Brachystelma* and *Ceropegia* are matched among the stapeliads and there are no unique floral characteristics separating these groups.

### 3.3. Restoring monophyly

The limited sampling of Meve and Liede-Schumann (2007) led to the conclusion that *Brachystelma* was monophyletic and *Ceropegia* was paraphyletic. Various authors have argued that paraphyletic taxa should be allowed (e.g. Brummitt, 2008 and references cited there), otherwise some genera may become too unwieldy and since recognising divergence in characters (which define some of the paraphyletic units) may make the classification more usable. Since it was also claimed that *Brachystelma*, *Ceropegia* and the stapeliads were separated by many distinguishing features, this was used to justify leaving the paraphyletic *Ceropegia* taxonomically unchanged (Meve and Liede-Schumann, 2007).

There are three main problems with this: (i) a monophyletic *Brachystelma* was a consequence of inadequate sampling; expanding the sampling showed that it is polyphyletic, consisting of four distinct lineages nested within *Ceropegia* (Bruyns et al., 2015); (ii) the paraphyly of *Ceropegia* is also an artefact of inadequate sampling; more detailed sampling showed that species of *Ceropegia* are nested among three of the four lineages of *Brachystelma* and *Ceropegia* is not paraphyletic but polyphyletic; (iii) these 'many distinguishing features' separating *Brachystelma*, *Ceropegia* and the stapeliads do not exist. These problems indicate that substantial re-alignment is necessary in this group.

How should monophyly be re-established at the generic level? One option would be to recognise an additional 30 small genera for the supported lineages within *Ceropegia*, place the species of *Brachystelma* in four of these genera and continue to recognise the 31 genera of stapeliad as before, making a total of 61 genera in the *Ceropegia*-alliance. This would require at least 200 new combinations for the species of *Ceropegia* in these 30 new genera. However, these species have always belonged in *Ceropegia* on account of their distinctive, tubular flowers, but the lineages into which they are grouped are as difficult to characterise as the sections of Huber (1957). Similarly, the four lineages into which *Brachystelma* is resolved are very difficult to characterise. Only some of those with fusiform roots rather than a tuber have ever been split off before from *Brachystelma*, but were included in *Brachystelma* again by N.E. Brown (1907–9). These would be included among these 30 genera and would add to the difficulty in separating them, also by weakening the single feature holding *Ceropegia* s.s. together (namely the shape of the flower). Further problems arise since the stapeliad genera are also very hard to separate in several cases. The key to the genera of southern Africa in Bruyns (2005) is difficult to use and several genera were keyed out more than once to accommodate the variation within them. The seven distinct genera suggested by Meve and Liede (2002) for the *Caralluma*-alliance are also extremely hard to characterise and very difficult to key out. Furthermore, small adjustments to these 31 genera to restore monophyly (for example in *Tromotriche* Haw., Bruyns et al., 2014) will make them even harder to characterise. All this suggests that while these genera were often very distinctive when described, the steady addition of new species has whittled away these distinctions. Now the stapeliads have been split into genera that are only distinguishable in many cases with great difficulty, if at all. After phylogenetic reconstruction this option was adopted in the ± 500 species in the succulent radiation in *Aloe* and allies

(Asphodelaceae: Aloooideae), and *Aloe* was split into 11 segregates (Manning et al., 2014). Although, many of these were previously recognized as genera, their morphological support is weak, making this unsatisfactory. In the *Ceropegia*-alliance this option involves over 200 new combinations into 60 genera (where previously there were 33) and many of these 60 genera would be morphologically weakly supported.

Another possibility would be to recognise the monophyletic entities Clades A and B of Fig. 5 as genera. However, these two clades cannot be characterised morphologically and so this is not an option. This is similar to the case of *Cynanchum* L. (Khanum et al., 2016), where two clades were retrieved, one also containing mainly succulents, but these two clades could not be characterised morphologically and so *Cynanchum* was expanded to include both.

A third option is to move all species of *Brachystelma* and the stapeliads to an expanded concept of *Ceropegia* or to the equally available *Stapelia* L. Since nearly 100 species already have names in *Stapelia*, moving them all to *Stapelia* would involve around 600 new combinations, including the over 200 names in *Ceropegia*. Moving them all to *Ceropegia* involves just over 400 new combinations. The relative stability of *Ceropegia* (which has few generic synonyms, Huber, 1957) suggests that it is preferable to leave these over 200 species in *Ceropegia* and move others into it. Morphological support can be found for placing all in *Ceropegia* (see Section 3.4 below), but then it is necessary to move away from distinguishing *Ceropegia* by the shape of its flowers. In this arrangement, *Ceropegia* contains 717 species, making it by far the largest genus in the Apocynaceae. Following this option is not without precedent. Phylogenetic reconstruction has led to *Cyperus* (Cyperaceae) being greatly expanded to about 700 species, with many other genera subsumed into it (Larridon et al., 2011; Bauters et al., 2014; Larridon et al., 2014). In the Ericaceae (e.g. Oliver, 2012), over 20 small genera were subsumed into *Erica* L. (with around 840 spp.), before phylogenetic reconstruction was attempted and this appears to have been corroborated by molecular techniques (though the tree obtained is not informative and support is largely lacking: Pirie et al., 2011). In *Syzygium* (Myrtaceae) phylogenetic reconstruction has resulted in the genus now having between 1200 and 1500 species (Craven & Biffen, 2010). Enlarging *Ceropegia* to recover monophyly would therefore follow the trend in these groups and follow the tendency for molecular investigations to lead to the recognition of larger genera (Humphreys and Linder, 2009).

An objection to enlarging *Ceropegia* to contain the stapeliads may be raised on account of the juxtaposition of this entirely succulent group among many non-succulent species. At present, the stapeliads are largely viewed as a separate, exclusively succulent group without consideration of how they may have arisen. Our analyses and others before them suggest clearly that they arose from within other partly to entirely non-succulent groups in *Ceropegia*. Their classification should reflect the fact that they are one of several entirely succulent lineages within *Ceropegia* (Fig. 5; Bruyns et al., 2015: Fig. 1), especially since other non-climbing, highly succulent species with tuberculate stems also exist within *Ceropegia*. The presence of succulent and non-succulent species in closely related groups is not unique to *Ceropegia*. Possibly the best example is *Euphorbia* L., traditionally an enormous genus of ± 2000 species. Recent phylogenetic work revealed that it consists of four major clades and monophyly was restored by including several much smaller genera within *Euphorbia* (Steinmann, 2003; Bruyns et al., 2006; Steinmann et al., 2007). However, succulents are distributed among all four major clades, often as entire lineages nested among non-succulent species and some of these succulent lineages are very recent and are exceedingly rich in species (Bruyns et al., 2011). In some cases highly succulent species are closely related to non-succulent species or to very small geophytes (e.g. Dorsey et al., 2013, for *E.* subg.

**Fig. 5.** Consensus tree from Bayesian analysis of total data (gaps excluded) of *Brachystelma*-*Ceropegia*. Numbers above or below branches indicate posterior probabilities/bootstrap percentages (the latter from an analysis of the same data using Maximum Likelihood: posterior probability >0.50 shown, bootstrap percentage >50% shown). The sections recognised in *Ceropegia* are indicated on the right.

*Euphorbia*). Another example is *Senecio* L., where several exclusively succulent clades are nested deeply among non-succulent species (Pelser et al., 2007), though some of these have subsequently been segregated from *Senecio*.

### 3.4. Characterizing *Ceropegia* s.l. and its sections

The Ceropegieae was characterized by Bruyns and Forster (1991) as having a pellucid germinating mouth on the outer margin of each pollinium ('outer' relative to the anther from which the pollinium is produced), which is the only part of the pollinium to be inserted into the guide-rails for pollination, a well-developed staminal corona generally present in two series and anthers mostly without sterile apical extensions. The expanded concept of *Ceropegia* proposed here is separated from the basal Ceropegieae by the lack of hard, wiry roots (even when fibrous in *Ceropegia* s.l. they are not wiry but are somewhat fleshy and soft; those that are swollen in the basal Ceropegieae, as in *Anisotoma*, *Emplectanthus*, *Riocreuxia* and *Sisyranthus*, are not fleshy and pliable), softly fleshy peduncles and pedicels, the absence of any corolline corona (present in several of the basal Ceropegieae), the presence (with a few exceptions) of two well-developed series of the staminal corona (usually only one series, the 'inner' one opposite the anthers, is present in the basal Ceropegieae) and the presence of a compitum within the style-head leading to the fertilization of both ovaries (absent in several of the basal Ceropegieae, where only one follicle then matures).

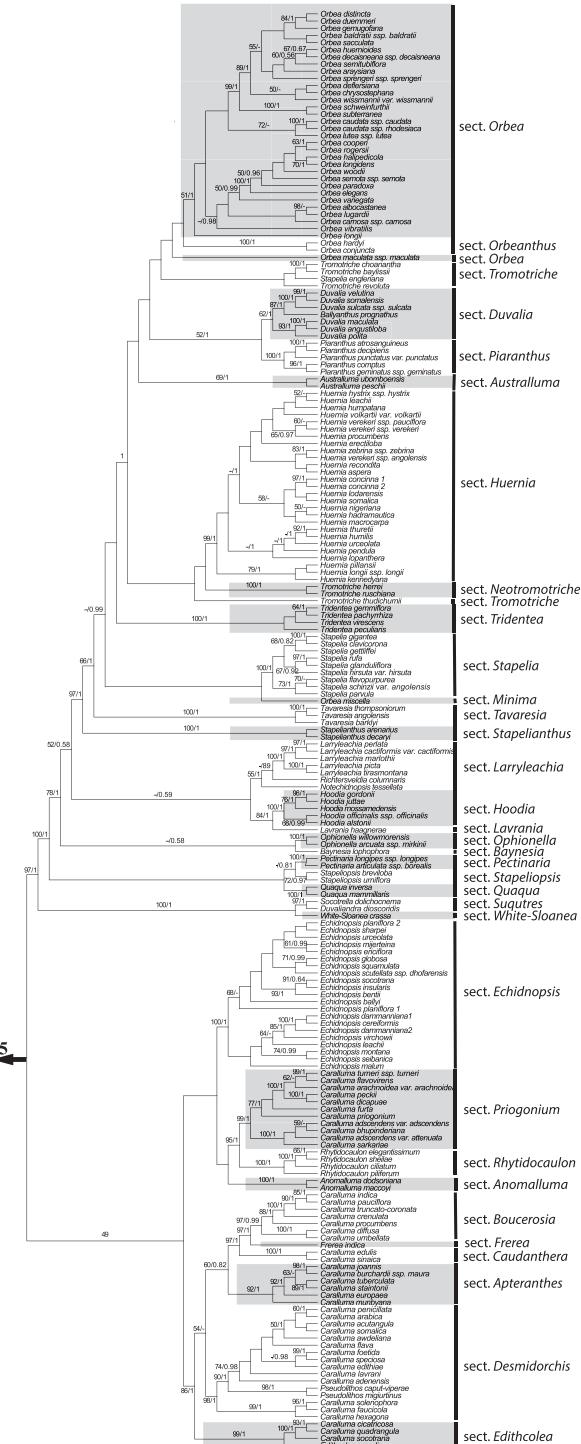
Huber (1957) based his sections of *Ceropegia* s.s. primarily on pubescence of the stems, leaves, inflorescences, the inside of the corolla-tube and the staminal corona, secondarily on vegetative features such as habit (erect versus twining) and succulence of the stems and leaves. Here we define sections by combinations of vegetative features such as presence or absence of tubers, succulence of stems and leaves and erect versus twining habit. In some cases features of the inflorescences (such as presence of a peduncle) and pubescence of the outer series of the staminal corona are also used, in these cases following Huber (1957) more directly.

## 4. Taxonomy

We present a revised taxonomy for *Ceropegia* based on recent phylogenetic reconstructions. Although they are statistically supported, Clades A and B of Fig. 5 are not recognized here as subgenera of *Ceropegia*, as we are unable to distinguish them morphologically. We recognise 30 sections in *Ceropegia* on the basis of supported clades that correspond to morphological groupings or, in some cases, weakly supported (or rarely unsupported) clades which nevertheless correspond to morphologically distinctive groups. For the stapeliads we establish 33 sections. These are partly based on well-supported clades of Fig. 6 which are corroborated by morphological features and partly also on current usage of genera, which was outlined in detail in Bruyns (2005) and in the phylogenetic treatments in Bruyns et al. (2010, 2014). Many of these sections were previously recognised as genera. However, in a few cases we include some species whose relationships are unresolved but where morphological features suggest their position.

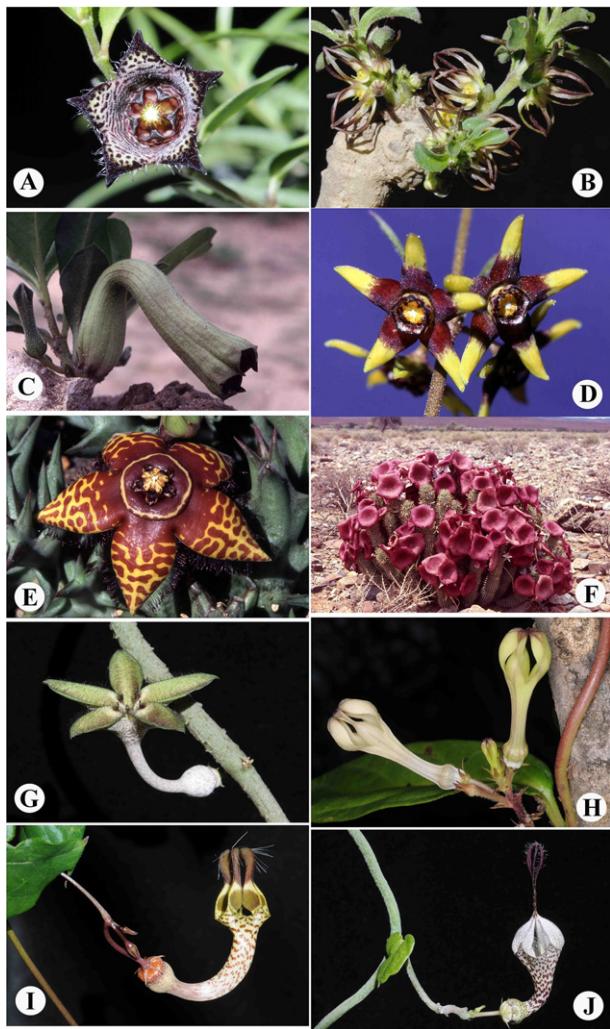
For each section and subsection we provide types, synonymy, a brief description, geographical distribution and the species included. Species sampled here in the molecular analyses of Bruyns et al. (2014, 2015) are indicated with an asterisk. A few species which we are unable to assign to a section are left at the end of the listing of the sections.

All names in *Brachystelma* are transferred to four sections of *Ceropegia* as indicated in Fig. 5. The largest of these sections is Sect. *Chamaesiphon*. Despite its size, we have not attempted to subdivide this section, since the groups within it were only poorly supported (Bruyns et al., 2015). We transfer the species of the stapeliads to *Ceropegia* according to the sections indicated in Fig. 6 and key these out among the sections of *Ceropegia*.



**Fig. 5.** Maximum Likelihood tree from Maximum Likelihood analysis of total data (gaps excluded) of the Ceropagia and Stapeliads. Numbers above or below branches indicate bootstrap percentages/posterior probabilities (the latter from Bayesian analysis of the same data: bootstrap percentage >50% shown; posterior probability >0.50 shown). The sections of *Ceropegia* into which the Stapeliads are divided are shown on the right hand side.

Although Huber's revision of *Ceropegia* has the date 1957 on it, it is sometimes cited as published in 1958. Dyer (1980, 1983) used '1958' since Huber gave it as published in 1958 in his account of the 'Asclepiadaceae' in the *Prodromus einer Flora von Südwest-Afrika* (Huber, 1967) and Masinde (2012) gave it as 1958. Huber also cited it as '1958' in his two accounts of the 'Asclepiadaceae' for the Flora of Ceylon (Huber, 1973, 1983). However, we were unable to establish the exact date of publication of this account, so the date is kept at 1957 here.



**Fig. 7.** Flowers of *Ceropagia*. A, *C. australis* (*Brachystelma australe*), South Africa, Bruyns 11304; B, *C. breviflora* (*Brachystelma pygmaeum*), South Africa, Bruyns 11834; C, *C. pygmaea* (*Brachystelma gymnopodium*), Namibia, Bruyns 5512; D, *C. mahajanii* (*Brachystelma mahajanii*), Vercaud, India, Bruyns 5912; E, *C. semota* ssp. *semota* (*Orbea semota* subsp. *semota*), Tanzania, Bruyns 9621; F, *C. gordoni* (*Hoodia gordoni*), Namibia, Bruyns 5655; G, *C. cimiciodora*, Swaziland, Bruyns 11870; H, *C. media*, Purandar, India, in habitat, Sept. 2009; I, *C. fusiformis*, Nigeria, Bruyns 12617; J, *C. verruculosa*, South Africa, Bruyns 11875. Photographs by P.V. Bruyns.

*Ceropagia* L., Sp. Pl. 1: 211 (1753). Type: *Ceropagia candelabrum* L. (lecto., designated by Hitchcock and Green, 1929: 136).

*Anomalluma* Plowes in Cact. Succ. J. (Los Angeles) 65: 167 (1993), **syn. nov.** Type: *Anomalluma dodsoniana* (Lavranos) Plowes.

*Apteranthes* Mikan in Nova Acta Phys.-Med. Acad. Caes. Leop.-Carol. Nat. Cur. 17: 593 (1835), **syn. nov.** Type: *Apteranthes gussoneana* Mikan.

*Australluma* Plowes in Haseltonia 3: 54 (1995), **syn. nov.** Type: *Australluma peschii* (Nel) Plowes.

*Ballyanthus* Bruyns in Aloe 37: 76 (2001), **syn. nov.** Type: *Ballyanthus prognathus* (P.R.O.Bally) Bruyns.

*Baynesia* Bruyns in Novon 10: 354 (2000), **syn. nov.** Type: *Baynesia lophophora* Bruyns.

*Boucerosia* Wight & Arn., Contr. Bot. India: 34 (1834), **syn. nov.** Type: *Boucerosia umbellata* (Haw.) Wight & Arn.

*Brachystelma* R.Br. ex Sims in Bot. Mag. 49: t. 2343 (1822), **syn. nov.** Type: *Brachystelma tuberosum* (Meerb.) R.Br.

*Caralluma* R.Br. in Mem. Wern. Nat. Hist. Soc. 1: 25 (1810), **syn. nov.** Type: *Caralluma adscendens* (Roxb.) Haw.

- Caudanthera* Plowes in Haseltonia 3: 58 (1995), **syn. nov.** Type: *Caudanthera sinica* (Decne.) Plowes.
- Desmidorchis* Ehrenb. in Linnaea 4: 94 (1829), **syn. nov.** Type: *Desmidorchis retrospiciens* Ehrenb.
- Duvalia* Haw., Syn. Pl. Succ.: 44 (1812), **syn. nov.** Type (lecto., designated by White & Sloane, 1937): *Duvalia elegans* (Masson) Haw.
- Duvaliandra* M.Gilbert in Cact. Succ. J. Gr. Brit. 42: 101 (1980), **syn. nov.** Type: *Duvaliandra dioscoridis* (Lavranos) M.Gilbert.
- Echidnopsis* Hook. f. in Bot. Mag. 97: t. 5930 (1871), **syn. nov.** Type: *Echidnopsis cereiformis* Hook.f.
- Edithcolea* N.E.Br. in Bull. Misc. Inform. 1895: 220 (1895), **syn. nov.** Type: *Edithcolea grandis* N.E.Br.
- Frerea* Dalzell in J. Linn. Soc., Bot. 8: 10 (1864), **syn. nov.** Type: *Frerea indica* Dalzell.
- Hoodia* Sweet, Hort. Brit., ed. 2: 359 (1830), **syn. nov.** Type: *Hoodia gordoni* (Masson) Sweet ex Decne.
- Huernia* R.Br. in Mem. Wern. Nat. Hist. Soc.: 22 (1810), **syn. nov.** Type (lecto., designated by White & Sloane, 1937): *Huernia campanulata* (Masson) Haw.
- Hutchinia* Wight & Arn., Contr. Bot. India: 34 (1834), **syn. nov.** Type: *Hutchinia indica* Wight & Arn.
- Larryleachia* Plowes in Excelsa 17: 5 (1996), **syn. nov.** Type: *Larryleachia cactiformis* (Hook.) Plowes.
- Lavraria* Plowes in Cact. Succ. J. (Los Angeles) 58: 122 (1986), **syn. nov.** Type: *Lavraria haagnerae* Plowes.
- Monolluma* Plowes in Haseltonia 3: 64 (1995), **syn. nov.** Type: *Monolluma quadrangula* (Forssk.) Plowes.
- Notechidnopsis* Lavranos & Bleck in Cact. Succ. J. (Los Angeles) 57: 255 (1985), **syn. nov.** Type: *Notechidnopsis tessellata* (Pillans) Lavranos & Bleck.
- Ophionella* Bruyns in Cact. Succ. J. Gr. Brit. 43: 70 (1981), **syn. nov.** Type: *Ophionella arcuata* (N.E.Br.) Bruyns.
- Orbea* Haw., Syn. Pl. Succ.: 37 (1812), **syn. nov.** Type: (lecto., designated by Brummitt, 2000): *Orbea variegata* (L.) Haw.
- Orbeanthus* L.C.Leach in Excelsa Taxon. Ser. 1: 71 (1978), **syn. nov.** Type: *Orbeanthus conjunctus* (A.C. White & B. Sloane) L.C.Leach.
- Pectinaria* Haw., Suppl. Pl. Succ.: 14 (1819), **syn. nov.** Type: *Pectinaria articulata* (Aiton) Haw.
- Pendulluma* Plowes in CactusWorld 31: 103 (2013), **syn. nov.** Type: *Pendulluma procumbens* (Gravely & Mayur.) Plowes.
- Piaranthus* R.Br. in Mem. Wern. Nat. Hist. Soc. 1: 23 (1810), **syn. nov.** Type (lecto., designated by White & Sloane, 1937): *Piaranthus punctatus* (Masson) Schult.
- Pleuralluma* Plowes in CactusWorld 26: 98 (2008), **syn. nov.** Type: *Pleuralluma lamellosa* (M.Gilbert & Thulin) Plowes.
- Pseudolithos* P.R.O.Bally in Candollea 20: 41 (1965), **syn. nov.** Type: *Pseudolithos sphaericus* (P.R.O.Bally) P.R.O.Bally.
- Pseudopectinaria* Lavranos in Cact. Succ. J. (Los Angeles) 43: 9 (1971), **syn. nov.** Type: *Pseudopectinaria malum* Lavranos.
- Quaqua* N.E. Brown in Gard. Chron. N.S., 12: 8 (1879), **syn. nov.** Type: *Quaqua hottentotorum* N.E.Br.
- Rhytidocaulon* P.R.O.Bally in Candollea 18: 336 (1963), **syn. nov.** Type: *Rhytidocaulon subscandens* P.R.O.Bally.
- Richtersveldia* Meve & Liede in Plant Syst. Evol. 234: 204 (2002), **syn. nov.** Type: *Richtersveldia columnaris* (Nel) Meve & Liede.
- Socotrella* Bruyns & A.G.Mill. in Novon 12: 330 (2002), **syn. nov.** Type: *Socotrella dolichocnema* Bruyns.
- Stapelia* L. Sp. Pl. 1: 217 (1753), **syn. nov.** Type *Stapelia hirsuta* L. (lecto., designated by Brummitt, 1995).
- Stapelianthus* Choux in A.C. White & B. Sloane, *Stap.*, ed. 1: 71 (1933), **syn. nov.** Type: *Stapelianthus madagascariensis* (Choux) Choux.

*Stapeliopsis* Pillans in *S. Afr. Garden. & Country Life* 18: 32 (1928), **syn. nov.** Type: *Stapeliopsis neronis* Pillans.

*Tavaresia* Welw. in Bol. Cons. Ultr., parte nao oficial 7: 79 (1854), **syn. nov.** Type: *Tavaresia angolensis* Welw.

*Tridentea* Haw., Syn. Pl. Succ.: 34 (1812), **syn. nov.** Type (lecto., designated by Leach, 1980): *Tridentea gemmiflora* (Masson) Haw.

*Tromotriche* Haw., Syn. Pl. Succ.: 36 (1812), **syn. nov.** Type: *Tromotriche revoluta* (Masson) Haw.

*White-Sloanea* Chiov. in *Malpighia* 34: 541 (1937), **syn. nov.** Type: *White-Sloanea crassa* (N.E.Br.) Chiov.

**Diagnostic features:** Slender often glabrous leafy herbaceous to fleshy succulent climbers with photosynthetic stems to small erect herbs often arising from tuber or cluster of fleshy roots, or fleshy mat- to clump- to shrub-forming succulents with soft fibrous roots, photosynthetic stems and very much reduced leaves. Flowers in extra-axillary sometimes fleshy-pedunculate cymes (sometimes dense clusters opening nearly simultaneously, usually few and opening successively) or in solitary to dense terminal clusters, with somewhat fleshy pedicels. Corolla rotate and sometimes lobed nearly to base (sometimes with ± flat fused part below lobes) to tubular, with tube often inflated at base around gynostegium and slender cylindrical above widening again towards mouth, lobes often remaining joined at tips, often darkly coloured inside and evil-smelling, corolline corona absent (for examples, see Fig. 7). Staminal corona present usually in two well-developed series, 'outer' alternating with anthers and 'inner' opposite anthers (outer occasionally much reduced but often fused into continuous cup-like structure). Follicles generally paired and slender, seeds with well-developed often swollen margins.

717 species in Macaronesia, widespread in Africa, southern Europe, Arabian Peninsula, southern Iran, Afghanistan to SE Asia, Himalaya to China to northern Australia, Madagascar. Found as slender climbers in forest-margins, in semi-arid places under or climbing on protective shrubs or in the open in semi-arid to arid habitats.

#### 4.1. Key to the sections of *Ceropegia*

1. Plant with 1 or more underground often flattened-discoid (rarely turnip-like) tubers, Stems annual and usually dying off into subterranean tuber in dry season.....2.
- Plant without tubers (sometimes with small swelling at base), stems annual or persistent, rootstock a cluster of fleshy roots or of fibrous roots.....12.
2. Plant from SE Asia to Australasia.....3.
  - Plant from Africa, Madagascar or Arabian Peninsula.....7.
3. Plant a short erect geophytic herb.....Sect. *Tilaris*.
  - Plant a slender climber.....4.
4. Plant with slightly fleshy leaves and fleshy tuber....Sect. *Esculentae*.
  - Leaves and tuber not fleshy.....5.
5. Corolla with tube at most half the length of lobes (or nearly absent).....Sect. *Tilaris*.
  - Corolla with tube longer than lobes (usually much longer than lobes), basal part of tube inflated around gynostegium then constricted above gynostegium into slender cylinder usually widening again towards mouth, lobes often remaining fused at tips to form cage over mouth of tube.....6.
6. Plant with solitary firm, starchy flattened-discoid tuber, with fine fibrous roots arising from it, leaves softly herbaceous ...Sect. *Indopegia*.
  - Plant with 1 to several slightly fleshy often inverted-top-shaped small tubers from which fleshy roots arise, leaves somewhat leathery.....Sect. *Ceropegia*.
7. Plant from Madagascar.....Sect. *Dimorphae*
  - Plant from Africa or Arabian Peninsula.....8.
8. Plant with one or more somewhat fleshy tubers (sometimes several connected by rhizomes).....9.
  - Plant with solitary starchy and not fleshy tuber.....11.
9. Leaves not fleshy.....Sect. *Pseudoceropegiaella*
  - Leaves slightly to very fleshy.....10.
10. Outer series of staminal corona without lobules behind inner series.....Sect. *Esculentae*
  - Outer series of staminal corona forming ± continuous cup including inner series.....Sect. *Ceropegiaella*.
11. Plant erect, not twining.....Sect. *Chamaesiphon*
  - Plant twining (rarely erect).....Sect. *Laguncula*.
12. Plant from SE Asia to Australasia.....13.
  - Plant from Africa, Madagascar or Arabian Peninsula.....15.
13. Stems succulent, leaves reduced to minute caducous rudiments 1–2 mm broad .....Sect. *Phalaena* (*C. juncea*).
  - Stems not succulent, leaves prominent and at least 5 mm broad.....14.
14. Evergreen glabrous climber with fibrous to very slightly swollen roots, inflorescences pedunculate.....Sect. *Janthina*.
  - Deciduous often finely pubescent climber to prostrate or erect herb with swollen roots, inflorescences pedunculate to sessile.....Sect. *Chionopegia*.
15. Plant from Madagascar.....Sect. *Dimorphae*
  - Plant from Africa or Arabian Peninsula.....16.
16. Stems fleshy and succulent and sometimes tuberculate.....17.
  - Stems wiry to soft and non-succulent.....32.
17. Stems tuberculate, tubercles usually organized into angles along stems.....18.
  - Stems not tuberculate, stems without angles.....19.
18. Stems twining towards tips to bear flowers, tubercles not organized into rows or fused into angles, with minute leaf-rudiments, flowers not fleshy, corolla-tube basally inflated around gynostegium then constricted above gynostegium into slender cylinder widening again towards mouth .....Sect. *Coreosma*.
  - Stems not twining, tubercles organized into rows or fused into angles (in *C. frerei* with conspicuous deciduous leaves otherwise with leaves reduced to rudiments), flowers fleshy (at least towards base), corolla-tube not as above.....41.
19. Plant a non-climbing shrub.....20.
  - Plant a slender climber or rambler.....21.
20. Leaves sessile, slender, linear, 10–60 mm long, inflorescences sessile, outer series of staminal corona mostly glabrous...Sect. *Sarcodactylus*.
  - Leaves petiolate, ovate-lanceolate to cordate, inflorescences pedunculate, outer series of staminal corona ciliate .....Sect. *Phalaena* (*C. rupicola*).
21. Stems and leaves fleshy, leaves lasting for several seasons.....Sect. *Radicantiores*
  - Stems succulent and leaves at most slightly fleshy, caducous or deciduous after growing season .....22.
22. Leaves reduced to small, caducous rudiments 1–3 mm broad.....23.
  - Leaves prominent and mostly at least 5 mm broad.....28.
23. Plant with fibrous roots.....24.
  - Plant with one or more clusters of swollen roots near base of stem.....25.
24. Stem slender and arising from small thickened base, leaves lanceolate, corolla without prominently spreading folds between lobes .....Sect. *Phalaena*.
  - Stem highly succulent and without thickened base, leaves deltate, corolla with prominently spreading folds between lobes...Sect. *Loligo* (*C. variegata*).
25. Stems rough to touch with fine longitudinal ridges.....27.

- Stems smooth (without fine longitudinal ridges).....26.
- 26. Corolla-lobes free at tips and not broader there, outer series of staminal corona ciliate.....Sect. *Ciliatilobae* (*C. namaquensis*).  
  - Corolla-lobes joined at tips and usually distinctly broader at tips, outer series of staminal corona glabrous ..... Sect. *Psilopegia*.
- 27. Corolla-tube broadly cylindrical and not dilating at mouth, inner series of staminal corona of 5 filiform lobules, outer series of staminal corona ciliate.....Sect. *Psilopegia* (*C. ampliata*).  
  - Corolla-tube narrowly cylindrical, distinctly dilating at mouth, inner series of staminal corona not filiform, outer series of staminal corona glabrous.....Sect. *Loligo* (*C. arabica*, *C. galeata*).
- 28. Stems with fine longitudinal ridges (and slightly angled), leaves usually similarly coloured to stems, outer series of staminal corona glabrous.....Sect. *Callopegia*.  
  - Stems cylindrical and without ridges, leaves usually paler than stems, outer series of staminal corona often ciliate .....29.
- 29. Stems and leaves pubescent, leaves fleshy.....Sect. *Curviflorae*  
  - Stems mostly glabrous (sometimes puberulous), leaves mostly glabrous and not fleshy.....30.
- 30. Outer series of staminal corona shallowly bowl-like to cup-like (with short teeth around mouth) around bases of inner series and much exceeded by inner series, gynostegium sometimes raised on stipe .....
- 31. Inside of tube hairless in basal inflation and just above it, gynostegium raised above base of tube on short stipe.....Sect. *Speciosae*  
  - Inside of tube with fine hairs in basal inflation and just above it, gynostegium not raised above base of tube on short stipe and spreading into base of tube.....Sect. *Phalaena*
- 32. Corolla with tube, often at least as long as lobes or longer, basally inflated around gynostegium then constricted above gynostegium into slender cylinder usually widening again towards mouth, lobes often remaining fused at tips to form cage over mouth of tube.....34.  
  - Corolla lobed almost to base, tube absent or very shallow (not as above).....33.
- 33. Stem somewhat angled or fluted, sometimes pubescent.....Sect. *Bowkeriana*  
  - Stem cylindrical, plant glabrous.....Sect. *Stenatae*
- 34. Non-twining herb usually with single erect stem, inflorescences sessile or very shortly pedunculate.....35.  
  - Twining or rhizomatous herb, inflorescences pedunculate.....36.
- 35. Leaves petiolate, corolla-lobes remaining fused at apices, plants from tropical Africa.....Sect. *Umbraticolae*  
  - Leaves very shortly petiolate or sessile, corolla-lobes free at apices, often pendulous around tube, plants from South Africa.....Sect. *Bowkeriana*
- 36. Tube of corolla broadly cylindrical, hardly dilating at mouth.....Sect. *Amphorina*  
  - Tube of corolla narrowly cylindrical in middle, distinctly widening towards mouth.....37.
- 37. Outer series of staminal corona half as long as to equalling inner series.....Sect. *Convolvulooides*  
  - Outer series of staminal corona much less than half as long as inner series.....38.
- 38. Each lobe of outer staminal series divided in middle to base.....Sect. *Carnosae*  
  - Lobes of outer staminal series notched in middle and not divided to bases.....39.
- 39. Plant from tropical Africa to Arabia.....Sect. *Frondosae*  
  - Plant from South Africa.....40.
- 40. Lobes of outer series of staminal corona deltate and not thickened near apices, lobes of corolla not twisted together above tube.....Sect. *Leptophyllae*  
  - Lobes of outer series of staminal corona thickened near apices and club-shaped, lobes of corolla twisted together above tube.....Sect. *Ciliatilobae*
- 41. Outer and inner series of coronal lobes vertically well separated on staminal tube and neither partly nor wholly fused to one another (outer corona often disc-like).....42.
- Outer and inner series of coronal lobes not vertically separated on staminal tube and partly or wholly fused to one another.....44.
- 42. Plant consisting of single, thick 4-angled stem without leaf-rudiments.....Sect. *White-Sloanea*  
  - Plant many-stemmed with small leaf-rudiments.....43.
- 43. Leaf-rudiments with or without small stipular denticles, corona raised above base of tube on stipe, outer series resting on rim or sides of small cupular tube formed entirely by annulus..Sect. *Duvalia*  
  - Leaf-rudiments without stipular denticles, corona very rarely raised above base of tube on stipe (c.f. *H. kennedyana*), outer series spreading on base of tube and often partly fused to it, tube often with annular thickening around mouth but not formed entirely by annulus.....Sect. *Huernia*
- 44. Tuberles on stem arranged into 6 or more angles.....45.  
  - Tuberles on stem arranged into 4–5 angles.....52.
- 45. Inflorescence usually only 1 per stem near base.....46.  
  - Inflorescences several per stem, mainly towards apex.....48.
- 46. Leaf-rudiment slightly sunken into apex of obtuse tubercle and < 1 mm long.....Sect. *Lavraria*  
  - Tuberle tapering into leaf-rudiment which is not at all sunken into apex of tubercle, leaf-rudiment at least 2 mm long.....47.
- 47. Tuberles each tipped with 3 sharp spines, outer corona with long slender lobules each tipped with tear-shaped knob....Sect. *Tavaresia*  
  - Tuberles each tipped with single soft bristle or minute leaf-rudiment but not with spine, outer corona bifid into narrowly deltate lobules without apical knobs.....Sect. *Stapelianthus*
- 48. Each tubercle tipped by small ovate-deltate leaf-rudiment (caducous or persistent as spike-like husk) often with small stipular glands at base.....Sect. *Echidnopsis*  
  - Each tubercle tipped by spine or conical rudiment or tip not distinguishable from rest of tubercle.....49.
- 49. Each tubercle on stem armed at apex (at least when young) with a spine (1.5–) 3–15 mm long.....Sect. *Hoodia*  
  - Each tubercle on stem with small persistent and not spine-like leaf-rudiment <1 mm long or leaf-rudiment absent.....50.
- 50. Stems with 10 or more angles, each tubercle with small conical leaf-rudiment usually sunken into apex.....Sect. *Larryleachia*  
  - Stems with 6–8 angles, leaf-rudiment not distinguishable from tubercle.....52.
- 51. Inflorescences each with single flower and single not flattened bract, outer corona forming pectinate ring around gynostegium, pollinia broader than long.....Sect. *Pectinaria*  
  - Inflorescences each with several flowers and bracts (basal bract distinctly flattened), outer corona not pectinate, pollinia longer than broad.....Sect. *Larryleachia*
- 52. Stems, pedicels, sepals and outside of corolla at least finely pubescent (stems sometimes nearly glabrous), leaf-rudiments deciduous, erect, corolla often with fine slender hairs inside.....53.  
  - Stems, pedicels, sepals and outside of corolla glabrous, leaf-rudiments spreading or absent.....54.
- 53. Stems erect.....Sect. *Stapelia*  
  - Stems mostly prostrate and often rhizomatous.....Sect. *Tromotriche* (*C. engleri*)
- 54. Inflorescences produced in upper half of stem, usually several per stem.....55.

- Inflorescences arising in lower half of stem, usually only 1 per stem.....75.
- 55. Outer corona much reduced to absent (as spreading lobes beneath guide-rails), deep nectarial cavity present beneath guide-rails.....56.
  - Outer corona not much reduced, nectarial cavity shallow or absent.....57.
- 56. Plant mat-forming with short, squat non-rhizomatous stems (5) 10–20 mm thick, tubercles each tipped by small deltoid tooth 0.5–6.0 mm long subtended by 2± spherical stipular denticles, gynostegium sessile.....Sect. *Piaranthus*
  - Plant rhizomatous with slender erect stems 4–8 mm thick, tubercles without leaf-rudiments or stipular structures, gynostegium stipitate.....Sect. *Suquates*
- 57. Young tubercle tipped with leaf-rudiment constricted slightly at base above tubercle.....58.
  - Young tubercle either without leaf-rudiment or with tubercle continuing (without constriction) into leaf-rudiment.....69.
- 58. Inflorescences many per stem, each small (1- to 3 (4)-flowered) and spread out along upper half of stem (often on slender, elongating apical portions of stem).....59.
- Inflorescences few per stem with many more than 5 flowers and often dense opening ± simultaneously, apical or near-apical on stems (never borne on slender, elongating apical portions of stem).....24.
- 59. Inflorescences borne on slender often cylindrical, elongating apical portions of stems.....60.
  - Stems not elongating and not more slender where inflorescences are present.....61.
- 60. Leaf-rudiments with small clusters of minute hairs around bases.....Sect. *Priogonium*
  - Leaf-rudiments with small stipular glands and without small clusters of minute hairs around bases.....Sect. *Caudanthera*
- 61. Surface of stem rugulose.....62.
  - Surface of stem smooth or covered with small convex polygons...63.
- 62. Stems gradually tapering towards tips, leaf-rudiments ovat-deltate to lanceolate, inflorescences sunken into folds of surface of stem.....Sect. *Rhytidocaulon*
  - Stems not tapering towards tips (where abruptly narrowed), leaf-rudiments cordate, inflorescences not sunken into folds of surface of stem.....Sect. *Baynesia*
- 63. Surface between stem-angles covered with small convex polygons tightly pressed against each other, inflorescence with 1–3 flowers opening successively and borne on small, caducous peduncle, corolla not papillate inside.....Sect. *Anomalluma*
  - Surface between stem-angles inflorescences without peduncle, corolla papillate inside.....Sect. *Australluma*
- 64. Stems bearing conspicuous leaves (at least 10 × 10 mm) towards tips during growing season, flowers solitary and borne among leaves.....Sect. *Freya*
  - Stems with minute leaf-rudiments (not more than 5 × 5 mm, usually much smaller) or leaf-rudiments absent, flowers exposed at tips of stems, rarely on elongated apical portions of stems....65.
- 65. Each inflorescence consisting of a single flower only with one small bract at its base .....Sect. *Edithcolea*
  - Inflorescences many-flowered (if only one then with several small bracts at its base, see **C. lavrani**, **C. pauciflora**) often with several to all flowers opening ± simultaneously in each inflorescence.....66.
- 66. Leaf-rudiments absent (even in young growth) and plant often reduced to single, globose stem.....Sect. *Sarcodon*
  - Leaf-rudiments present though often very small (at least in young growth).....67.
- 67. Inflorescences with flowers maturing in terminal position on stems.....68.
- Inflorescences with flowers maturing in lateral position near tips of stems.....Sect. *Apteranthes*
- 68. Leaf-rudiments without any stipular hairs or glands around bases.....Sect. *Boucerosia*
  - Leaf-rudiments with small stipular hairs around bases.....Sect. *Sarcodon*
- 69. Tuberclae obtuse and not tapering to acute or acuminate tip.....70.
  - Tuberclae not obtuse, tapering to acute to acuminate (sometimes soft to hard and spike-like) leaf-rudiment.....72.
- 70. Surface between stem-angles covered with small convex polygons tightly pressed against each other, inflorescence with 5 or more flowers opening ± simultaneously.....Sect. *Sarcodon*
  - Surface between stem-angles not covered with small convex polygons.....73.
- 71. Plant shrub-like and rooting on central stem only, flowers arising in several clusters often in vertical series in grooves on opposite sides of stem, without peduncle, flowers in cluster opening ± simultaneously, corona 2–3 mm broad, pollinia broader than long.....Sect. *Quaqua*
  - Plant clump-forming or rhizomatous and rooting on many side-branches, flowers arising in 1–several scattered inflorescences and opening in gradual succession, often developing small peduncle, corona 4–11 mm broad, pollinia longer than broad.....72.
- 72. Plant usually strongly rhizomatous or forming long pendulous stems, corolla inside smooth or faintly rugulose..Sect. *Tromotricha*
  - Plant not rhizomatous, forming neat, usually dense clumps, corolla inside with multicoloured network of ridges at least in corolla-tube (sometimes over whole surface).....Sect. *Neotromotricha*
- 73. Stems forming large untidily-spreading mat-like plant, tubercles usually very irregularly arranged, each tipped by sharp tooth, inflorescence consisting of single large flower at tip of stem subtended by single small bract.....Sect. *Edithcolea*
  - Plant not as above, tubercles usually arranged into 4 (rarely 5) clear angles, inflorescence not as above.....74.
- 74. Stems hard, surface micro-papillate (dull and not shiny), tubercle tapering into hardened tooth-like to spike-like leaf-rudiment, flowers arising in several clusters, often in vertical series in grooves on opposite sides of stem.....Sect. *Quaqua*
  - Stems soft, surface smooth (± shiny), tubercle tapering into soft tooth-like leaf-rudiment, flowers arising in 1–several scattered inflorescences.....Sect. *Orbea*
- 75. Surface of stems with raised longitudinal ridges, gynostegium dominated by comparatively large discrete dorsiventrally flattened ascending to erect (spreading in *S. arenarius*) outer corona lobes forming cup around small inner lobes (these adpressed to backs of anthers and rarely exceeding them), anthers and pollinia descending slightly towards centre of somewhat concave style head (plants from Madagascar).....Sect. *Stapelianthus*
  - Surface of stems without raised longitudinal ridges, outer corona lobes not as above, anthers and pollinia horizontal or ascending towards centre of flat to convex style head (plants not from Madagascar).....76.
- 76. Inner corona lobes laterally flattened, rising above anthers and connate in centre well above style head.....Sect. *Stapeliopsis*
  - Inner corona lobes dorsiventrally flattened and adpressed to backs of anthers for most of their length.....77.
- 77. Outer coronal series apparently absent, with gaps between comparatively large inner lobes.....Sect. *Suquates*
  - Outer coronal series present, filling gaps between inner series.....78.
- 78. Stems hard, surface micro-papillate (dull and not shiny), tubercle tapering into hardened tooth-like to spike-like leaf-rudiment, flowers arising in several dense clusters, often in vertical series in

- grooves on opposite sides of stem (opening ± simultaneously in each cluster).....Sect. *Quaqua*
- Stems comparatively soft, tubercles tipped with soft leaf-rudiment or none present, flowers usually in single inflorescence per stem and mainly solitary.....79.
79. Tuberles >2 mm long and clearly raised out of surface of stem, corona >3 mm tall, pollinia comparatively large (>0.4 mm long).....80.
- Tuberles <1 mm long and scarcely raised out of surface of stem, corona <1.5 mm tall, pollinia minute (<0.2 mm long).....Sect. *Ophionella*
80. Surface of stems micro-papillate (dull and not shiny), tubercles obtuse and not tapering to tip, leaf-rudiments ± absent.....Sect. *Tromotrichae*
- Surface of stems smooth (± shiny), tubercles not obtuse, tapering into leaf-rudiment, leaf-rudiments present.....81.
81. Leaf-rudiments deltoid to subulate, slightly constricted at base, caducous, with small multicellular hairs in stipular position and along margin but lacking stipular denticles, corolla usually covered with multicellular papillae.....Sect. *Tridentea*
- Tuberle tapering ± uniformly to tip and leaf-rudiment without basal constriction, without small hairs in stipular position but frequently with stipular denticles, corolla from deeply rugulose to smooth but rarely with multicellular papillae .....82.
82. Plant strongly rhizomatous, stems usually around 5 mm thick and mostly not more than 30 mm tall, flowers 10–18 mm diam.....Sect. *Minimae*
- Plant rarely rhizomatous but then stems 8–15 mm thick and 50–200 mm tall, flowers 25 mm in diam. or more.....Sect. *Orbea*

#### 4.1.1. Clade A

Members of Clade A (Fig. 5) are slender climbers (occasionally succulent and sometimes with much reduced leaves) to small erect geophytic herbs often arising from a tuber or almost leafless succulents with angled photosynthetic stems and fibrous roots. Their leaves are prominent to narrowly linear herbaceous or are much reduced and arise on tubercles in most of the highly succulent species.

514 spp.; Southern Africa to SE and E Asia, Malesia to northern Australia and in Madagascar.

1. **Sect. *Frondosae*** Bruyns, **sect. nov.** Type: *Ceropegia foliosa* Bruyns.  
*Diagnostic features:* Slender climbers (sometimes deciduous) with fibrous roots or cluster of fusiform roots. Stems annual or perennial, herbaceous, twining, glabrous to pubescent. Leaves herbaceous, deciduous, ovate or cordate to lanceolate, petiolate, glabrous to pubescent. Inflorescences pedunculate, glabrous to pubescent, flowers 1–5. Corolla with slender tube inflated at base and lobes remaining joined at tips.

*Distribution:* 7 spp.; Tropical Africa (West to East) and in the southern Arabian Peninsula.

*Included species:* \**C. foliosa* Bruyns, \**C. fusiformis* N.E.Br., *C. johnsonii* N.E.Br., *C. ngoyana* Malaisse, *C. sepium* Deflers, \**C. yemenensis* Meve & Mangelsdorff, *C. yorubana* Schltr.

2. **Sect. *Phalaena*** H.Huber in Mem. Soc. Brot. 12: 30 (1957). Type: *Ceropegia aristolochioides* Decne.

*Diagnostic features:* Slender climbers with fusiform or fibrous roots sometimes arising from swollen tuber-like base of stem. Stems perennial, photosynthetic, usually succulent, usually twining (occasionally erect or sometimes creeping), glabrous. Leaves usually slightly fleshy, deciduous or caducous, ovate or cordate to lanceolate or as small lanceolate to subulate rudiments, petiolate to sessile, glabrous except sometimes for fine marginal cilia. Inflorescences pedunculate to nearly sessile, usually glabrous, flowers 1–10 on sometimes fleshy pedicels. Corolla with slender

tube inflated at base and lobes remaining joined at tips.

*Distribution:* 24 spp.; Africa, southern Arabian Peninsula (including Socotra), southern India.

#### 2.1 Key to subsections of Sect. *Phalaena*

- 1. Leaves rudimentary (small, narrowly lanceolate to subulate) and caducous on slender fleshy stem, stem often with swollen rounded tuber-like structure at base bearing roots.....Subsect. *Junceae*.
- Leaves prominent, ovate-lanceolate to cordate, stems not swollen at base.....Subsect. *Aristolochioides*.

#### 2.2 Subsect. *Junceae* (H.Huber) Bruyns, **stat. nov.** C. ser. *Junceae*

H.Huber in Mem. Soc. Brot. 12: 31 (1957). Type: *Ceropegia juncea* Roxb.

*Diagnostic features:* Slender climber with fibrous roots usually arising from swollen tuber-like base of stem. Stems succulent, usually twining (occasionally creeping in *C. juncea*), glabrous. Leaves rudimentary and caducous, lanceolate to subulate, sessile, glabrous (or with minute marginal cilia). Inflorescences shortly pedunculate to sessile, glabrous, flowers 1–3.

*Distribution:* 7 spp.; North-East Africa, southern Arabian Peninsula (with one species on Socotra) and southern India.

*Included species:* \**C. botrys* K Schum., \**C. juncea* Roxb., *C. kaariyei* Thulin, *C. laikipiensis* Masinde. *C. lindenii* Lavranos, *C. subaphylla* K.Schum., *C. tihamana* Chaudhary & Lavranos.

#### 2.3 Subsect. *Aristolochioides* (H.Huber) Bruyns, **stat. nov.** C. ser. *Aristolochioides*

H.Huber in Mem. Soc. Brot. 12: 31 (1957). Type: *Ceropegia aristolochioides* Ser. *Arabicae* H.Huber in Mem. Soc. Brot. 12: 30 (1957). Type: *Ceropegia rupicola* Deflers.

*Diagnostic features:* Slender climber (shrub-like succulent in *C. rupicola*) with fibrous roots or cluster of fusiform roots and without tuber-like base. Stems usually succulent (only slightly in *C. affinis*), usually twining (erect in *C. rupicola*), glabrous and often glaucous. Leaves usually slightly succulent, deciduous, ovate or cordate, petiolate, usually glabrous (often darker than stems) except sometimes for fine marginal cilia. Inflorescences pedunculate, usually glabrous, flowers 1–10 opening in gradual succession on sometimes fleshy pedicels.

*Distribution:* 17 spp.; South Africa to West and North-east Africa to the southern Arabian Peninsula, with one species on Socotra.

*Included species:* \**C. affinis* Vatke, \**C. ahmarense* Masinde, *C. aristolochioides* Decne., \**C. distincta* N.E.Br., *C. gypsophila* Thulin, *C. haygarthii* Schltr., \**C. lugardiae* N.E.Br., *C. madens* Werderm., *C. peulhorum* A. Chev., \**C. rhynchantha* Schltr., \**C. rupicola* Deflers, *C. seticorona* E.A.Bruce (incl. *C. burgeri* M.Gilbert, *C. ererotana* M.Gilbert), \**C. somalensis* Chiov., *C. talbotii* S.Moore, \**C. verruculosa* (R.A.Dyer) D.V. Field, *C. volubilis* N.E.Br., *C. zambesiaca* Masinde & Meve.

#### 3. **Sect. *Chionopegia*** H.Huber in Mem. Soc. Brot. 12: 26 (1957). Type: *Ceropegia hookeri* C.B. Clarke ex Hook.f.

Sect. *Oreopegia* H.Huber in Mem. Soc. Brot. 12: 26 (1957). Type: *Ceropegia wallichii* Wight.

Ser. *Wallichianae* H.Huber in Mem. Soc. Brot. 12: 26 (1957). Type: *Ceropegia wallichii*.

Ser. *Macranthae* H.Huber in Mem. Soc. Brot. 12: 26 (1957). Type: *Ceropegia macrantha* Wight.

Ser. *Sinopegia* H.Huber in Mem. Soc. Brot. 12: 27 (1957). Type: *Ceropegia monticola* W.W. Sm.

Ser. *Monticolae* H.Huber in Mem. Soc. Brot. 12: 27 (1957). Type: *Ceropegia monticola*.

Ser. *Hylopegia* H.Huber in Mem. Soc. Brot. 12: 27 (1957). Type:

*Ceropogia lucida* Wall.

**Diagnostic features:** Slender climbers to small prostrate creeper or erect herbs with usually slightly fusiform roots. Stems annual, herbaceous, twining, trailing or rarely erect, glabrous to pubescent. Leaves herbaceous, deciduous, ovate to linear, petiolate to ± sessile, glabrous to pubescent. Inflorescences pedunculate to sessile, glabrous to pubescent, flowers 1–5 in gradual succession. Corolla with slender tube inflated at base or globose or cup-like and lobes remaining joined at tips (occasionally free).

**Distribution:** 22 spp.; Himalaya of Pakistan and India eastwards to China.

**Included species:** *C. bhutanica* Hara, *C. christenseniana* Hand.-Mazz., *C. dorjei* C.E.C. Fischer, *C. hookeri* C.B. Clarke ex Hook.f., *C. kachinensis* Prain, \**C. longifolia* Wall., *C. lucida* Wall., *C. ludlowii* H.Huber, *C. macrantha* Wight (incl. *C. raizadiana* Babu), *C. mairei* (Léveillé) H.Huber, \**C. meleagris* H.Huber, \**C. monticola* W.W.Sm., *C. muliensis* W.W. Sm., *C. nepalensis* (Radcl.-Sm.) Bruyns, *C. paohsingensis* Tsiang & P.T. Li, *C. poluniniana* Bruyns, \**C. pubescens* Wall., *C. salicifolia* H.Huber, *C. sinoerecta* M.Gilbert & P.T. Li, *C. teniana* Hand.-Mazz., *C. ugenii* C.E.C. Fischer, *C. wallichii* Wight.

**Taxonomic change:** *Ceropogia nepalensis* (Radcl.-Sm.) Bruyns, **comb. nov.** *Riocreuxia nepalensis* Radcl.-Sm. in Kew Bull. 21: 296 (1967).

**4. Sect. *Amphorina*** H.Huber in Mem. Soc. Brot. 12: 35 (1957). Type: *Ceropogia sobolifera* N.E.Br.

*C. ser. Soboliferae* H.Huber in Mem. Soc. Brot. 12: 35 (1957). Type: *Ceropogia sobolifera*.

**Diagnostic features:** Slender deciduous climbers with cluster of fusiform roots. Stems mostly annual, herbaceous, twining, pubescent. Leaves herbaceous, deciduous, ovate to lanceolate, petiolate, pubescent to glabrous. Inflorescences sessile to very shortly pedunculate, pubescent, flowers 1–10. Corolla with slender tube inflated (very considerably in *C. sobolifera*) at base and lobes remaining joined at tips.

**Distribution:** 2 spp.; North-east and East Africa.

**Included species:** \**C. cufodontii* Chiov., *C. sobolifera* N.E.Br.

**5. Sect. *Stenatae*** Bruyns, **sect. nov.** Type: *Ceropogia tenuissifolia* Bruyns.

**Diagnostic features:** Slender, erect herbs from cluster of fusiform roots. Stem annual, herbaceous, erect and usually unbranched, glabrous. Leaves herbaceous, deciduous, linear to linear-lanceolate, ± sessile, glabrous. Inflorescences sessile, glabrous, flowers 1–3 on very slender often pendulous pedicels. Corolla ± rotate with short tube, lobes free at tips and spreading, very slender linear to linear-lanceolate.

**Distribution:** 4 spp.; Tropical Africa south of the equator, from Angola to Tanzania.

**Included species:** *C. browniana* (S. Moore) Bruyns, *C. elegantula* (S. Moore) Bruyns, *C. neoarachnoidea* Bruyns, *C. tenuissifolia* Bruyns.

**Taxonomic changes:**

*Ceropogia browniana* (S. Moore) Bruyns, **comb. nov.** *Tenaris browniana* S. Moore in J. Bot. 50: 366 (1912).

*Ceropogia elegantula* (S. Moore) Bruyns, **comb. nov.** *Brachystelma elegantulum* S. Moore in J. Bot. 50: 366 (1912).

*Ceropogia neoarachnoidea* Bruyns, **nom. nov., non** *Ceropogia arachnoidea* (P.R.O. Bally) Bruyns. *Brachystelma arachnoideum* Masinde in Kew Bull. 62: 76 (2007).

\**Ceropogia tenuissifolia* Bruyns, **nom. nov., non** *Ceropogia tenuissima* S. Moore. *Brachystelma tenuissimum* Bruyns in Novon 19: 19 (2009).

**6. Sect. *Esculentae*** Bruyns, **sect. nov.** Type: *Ceropogia bulbosa* Roxb.

**Diagnostic features:** Small slender deciduous climbers or small erect succulents from a fleshy usually compressed and disc-like tuber. Stems often annual, wiry to slightly succulent, twining to erect, glabrous. Leaves slightly succulent, deciduous, linear to

ovate, shortly petiolate, glabrous. Inflorescences pedunculate to nearly sessile, glabrous, flowers 1–6. Corolla with slender tube inflated at base and lobes remaining joined at tips, <25 mm long.

**Distribution:** 5 spp.; West to North-East Africa, southern Arabian Peninsula, SE Asia from Pakistan to central and peninsular India.

**Included species:** \**C. bulbosa* Roxb. \**C. konasita* Masinde, *C. linophyllum* H.Huber, *C. praetermissa* J.Raynal & A.Raynal, *C. senegalensis* H.Huber.

**7. Sect. *Edithcolea*** (N.E.Br.) Bruyns, **comb. et stat. nov.** *Edithcolea* N.E.Br. in Bull. Misc. Inform. 1895: 220 (1895). Type: *Edithcolea grandis* N.E.Br. (= *Ceropogia sordida* (N.E.Br.) Bruyns)

*Monolluma* Plowes in Haseltonia 3: 64 (1995). Type: *Ceropogia quadrangula* (Forssk.) Bruyns (*Monolluma quadrangula* (Forssk.) Plowes).

*Sanguilluma* Plowes in Haseltonia 3: 65 (1995). Type: *Ceropogia socotrana* (Balf. f.) Bruyns (*Sanguilluma socotrana* (Balf.f) Plowes).

**Diagnostic features:** Non-rhizomatous succulent, either shrub-like or mat-forming and spiky (in *C. sordida*). Stems glabrous, smooth, 4- or 5-angled or with irregularly arranged tubercles. Leaves reduced to minute rudiments, sharply spike-like in *C. sordida*. Inflorescences one to few near or at tips of stems, each consisting of a single flower with one small bract at its base. Corolla usually with short tube (not divided nearly to base and often with broad flat area beyond tube), with free spreading lobes, staminal corona in two partially fused series.

**Distribution:** 4 spp.; East and North-east Africa from Tanzania and Kenya to southern Arabian Peninsula (and Socotra).

**Taxonomic changes:**

\**Ceropogia cicatricosa* (Deflers) Bruyns, **comb. nov.** *Boucerosia cicatricosa* Deflers, Voyage Yemen: 170 (1889).

\**Ceropogia quadrangula* (Forssk.) Bruyns, **comb. nov.** *Stapelia quadrangula* Forssk., Fl. Aegypt.-Arab.: 52 (1775).

\**Ceropogia socotrana* (Balf. f.) Bruyns, **comb. nov.** *Boucerosia socotrana* Balf. f. in Proc. Roy. Soc. Edinburgh 12: 79 (1884).

\**Ceropogia sordida* (N.E.Br.) Bruyns, **comb. nov.** *Edithcolea sordida* N.E.Br. in H.O.Forbes, Nat. Hist. Sokotra & Abd-el-Kuri: 486 (1903).

*Edithcolea grandis* N.E.Br. in Bull. Misc. Inform. 1895: 220 (1895). Type: Somaliland, Heinweina Valley, 3000', Mar. 1895, *Edith Colea* (K 000305983 lecto!, designated here), **syn. nov.**

**8. Sect. *Desmidorchis*** (Ehrenb.) Bruyns, **comb. et stat. nov.**

*Desmidorchis* Ehrenb. in Linnaea 4: 94 (1829). Type: *Ceropogia retrospiciens* (Ehrenb.) Bruyns (*Desmidorchis retrospiciens* Ehrenb.). *Sarcocodon* N.E.Br. in J. Linn. Soc. Bot. 17: 169 (1878). Type: *Sarcocodon speciosa* N.E.Br. (= *Ceropogia codonoides* (K.Schum.) Bruyns).

*Pseudolithos* P.R.O.Bally in Candollea 20: 41 (1965). Type: *Pseudolithos sphaericus* (P.R.O.Bally) P.R.O.Bally (= *Ceropogia migiurtina* (Chiov.) Bruyns).

*Crenulluma* Plowes in Haseltonia 3: 66 (1995). Type: *Ceropogia awdeliana* (Deflers) Bruyns (*Crenulluma awdeliana* (Deflers) Plowes). *Cylindrilluma* Plowes in Haseltonia 3: 62 (1995). Type: *Ceropogia solenophora* (Lavrano) Bruyns (*Cylindrilluma solenophora* (Lavrano) Plowes).

*Sulcolluma* Plowes in Haseltonia 3: 61 (1995). Type: *Ceropogia hexagona* (Lavrano) Bruyns (*Sulcolluma hexagona* (Lavrano) Plowes).

**Diagnostic features:** Non-rhizomatous succulent, either shrub-like and leaf-rudiments with small stipular hairs around bases or reduced to single thick quadrangular stem without leaf-rudiments. Stems glabrous, smooth, 4-angled. Leaves reduced to minute rudiments or absent. Inflorescences one to few at or near tip of stem, many-flowered (if only one-flowered then with several small bracts at its base, see *C. lavrani*) often with most to all flowers opening ± simultaneously. Corolla with short to long tube (not

divided nearly to base and sometimes with flat area beyond tube), with free spreading lobes, staminal corona in two partially fused series.

*Distribution:* 23 spp.; from 2° S (Tanzania) in East and North-east Africa to West Africa (in Sahel) and southern Arabian Peninsula.

*Taxonomic changes:*

\**Ceropagia adenensis* (Deflers) Bruyns, **comb. nov.** *Boucerosia adenensis* Deflers in Bull. Soc. Bot. France 43: 115 (1896).

\**Ceropagia arabensis* Bruyns, **nom. nov., non** *Ceropagia arabica* H. Huber *Caralluma arabica* N.E.Br. in Bull. Misc. Inform. 1895: 318 (1895).

\**Ceropagia awdeliana* (Deflers) Bruyns, **comb. nov.** *Boucerosia awdeliana* Deflers in Bull. Soc. Bot. France 43: 116 (1896).

\**Ceropagia caput-viperae* (Lavrano) Bruyns, **comb. nov.** *Pseudolithos caput-viperae* Lavrano in Cact. Succ. J. (Los Angeles) 46: 126 (1974).

\**Ceropagia codonoides* (K.Schum.) Bruyns, **comb. nov.** *Caralluma codonoides* K.Schum., in Engler, Pflanzenw. Ost-Afrikas. C: 328 (1895). Type: Tanzania, between Gonja and Kihurio, Volkens 2382 (missing). Tanzania, between Mkomazi and Kihurio, 2000', 9 September 1935, Greenway 4067 (PRE neo!, designated here, EA, isoneo!).

*Caralluma speciosa* (N.E.Br.) N.E.Br. in Gard. Chron. ser. 3, 12: 370 (1892). *Sarcocodon speciosus* N.E.Br. in J. Linn. Soc., Bot. 17: 170 (1878).

*Ceropagia cubiformis* (P.R.O.Bally) Bruyns, **comb. nov.** *Lithocaulon cubiforme* P.R.O.Bally in Candollea 17: 58 (1959).

\**Ceropagia edithiae* (N.E.Br.) Bruyns, **comb. nov.** *Caralluma edithiae* N.E.Br. in Bull. Misc. Inform. 1895: 219 (1895).

*Ceropagia ericamccoyae* (T.A.McCoy) Bruyns, **comb. nov.** *Sulcolluma ericamccoyae* T.A.McCoy in Cact. Succ. J. (Los Angeles) 85: 61 (2013).

\**Ceropagia faucicola* (Bruyns) Bruyns, **comb. nov.** *Caralluma faucicola* Bruyns in S. African. J. Bot. 76: 249 (2010).

\**Ceropagia flava* (N.E.Br.) Bruyns, **comb. nov.** *Caralluma flava* N.E. Br. in Bull. Misc. Inform. 1894: 335 (1894).

*Desmidorchis tardellii* Mosti & Raffaelli in Webbia 59: 289 (2004), **syn. nov.**

\**Ceropagia foetida* (E.A.Bruce) Bruyns, **comb. nov.** *Caralluma foetida* E.A.Bruce in Hooker's Icon. Pl. 34: t. 3371 (1938).

*Ceropagia gigas* (Dioli) Bruyns, **comb. nov.** *Pseudolithos gigas* Dioli in Kew Bull. 57: 985 (2002).

\**Ceropagia hexagona* (Lavrano) Bruyns, **comb. nov.** *Caralluma hexagona* Lavrano in J. S. African Bot. 29: 105 (1963).

*Ceropagia horwoodii* (P.R.O.Bally & Lavrano) Bruyns, **comb. nov.** *Pseudolithos horwoodii* P.R.O.Bally & Lavrano in Cact. Succ. J. (Los Angeles) 46: 220 (1974).

*Ceropagia impostor* (Jonkers) Bruyns, **comb. nov.** *Desmidorchis impostor* Jonkers in Bradleya 28: 76 (2010).

*Ceropagia kalmbacheriana* (Lavrano) Bruyns, **comb. nov.** *Caralluma kalmbacheriana* Lavrano in Cact. Succ. J. (Los Angeles) 37: 110 (1965).

\**Ceropagia lavrani* (Rauh & Wertel) Bruyns, **comb. nov.** *Caralluma lavrani* Rauh & Wertel in Kakt. und. Sukk. 16: 62 (1965).

\**Ceropagia migiurtina* (Chiov.) Bruyns, **comb. nov.** *White-Sloanea migiurtina* Chiov. In Malpighia 34: 542 (1937).

*Pseudolithos harardheranus* Dioli in Kew Bull. 57: 987 (2002), **syn. nov.**

\**Ceropagia penicillata* (Deflers) Bruyns, **comb. nov.** *Boucerosia penicillata* Deflers, Voyage Yemen: 169 (1889).

*Ceropagia petraea* (Lavrano) Bruyns, **comb. nov.** *Caralluma petraea* Lavrano in Cact. Succ. J. (Los Angeles) 55: 23 (1983).

\**Ceropagia retrospiciens* (Ehrenb.) Bruyns, **comb. nov.** *Desmidorchis retrospiciens* Ehrenb., Pollen Asclep. (Abh. Königl. Akad. Wiss. Berlin 1829): 13, t. 2, fig. 8 (1831). *Caralluma retrospiciens* (Ehrenb.) N.E.Br. in Gard. Chron., ser. 3, 12: 370 (1892).

(1892).

\**Ceropagia solenophora* (Lavrano) Bruyns, **comb. nov.** *Caralluma solenophora* Lavrano in J. S. African Bot. 29: 107 (1963).

\**Ceropagia somalicoides* Bruyns, **nom. nov., non** *Ceropagia somalica* (N.E.Br.) Bruyns *Caralluma somalica* N.E.Br. in Bull. Misc. Inform. 1895: 264 (1895).

**9. Sect. Apteranthes** (Mikan) Bruyns, **comb. et stat. nov.** *Apteranthes* Mikan in Nova Acta Phys.-Med. Acad. Caes. Leop.-Carol. Nat. Cur. 17: 593 (1835). Type: *Apteranthes gussoneana* Mikan (= *Ceropagia europaea* (Guss.) Bruyns).

*Borealluma* Plowes in Haseltonia 3: 63 (1995). Type: *Ceropagia munbyana* (Decne. ex Munby) Bruyns (*Borealluma munbyana* (Decne.) Plowes).

*Diagnostic features:* Non-rhizomatous to rhizomatous or mat-forming succulent. Stems glabrous, smooth, mostly 4-angled. Leaves reduced to minute rudiments, sometimes with small stipular hairs around bases. Inflorescences few, each usually many-flowered, maturing in lateral position towards tips of stems. Corolla usually with short tube (not divided nearly to base and often with slight flat area beyond tube), with free spreading lobes, staminal corona in two partially fused series.

*Distribution:* 6 spp.; Macaronesia, in the Mediterranean region of Africa and southern Europe to the Arabian Peninsula, Iran, Afghanistan, Pakistan, NW India and western Nepal.

*Taxonomic changes:*

\**Ceropagia burchardii* (N.E.Br.) Bruyns, **comb. nov.** *Caralluma burchardii* N.E.Br. in Bull. Misc. Inform. 1913: 121 (1913).

*Ceropagia burchardii* subsp. *burchardii*

*Ceropagia burchardii* subsp. *maura* (Maire) Bruyns, **comb. nov.** *Caralluma burchardii* var. *maura* Maire in Bull. Soc. Hist. Nat. Afrique N. 14: 156 (1923).

\**Ceropagia europaea* (Guss.) Bruyns, **comb. nov.** *Stapelia europaea* Guss., Fl. Sic. Prodri., Suppl. 1: 65 (1832).

*Ceropagia europaea* var. *europaea*

*Ceropagia europaea* var. *judaica* (Zohary) Bruyns, **comb. nov.** *Caralluma europaea* var. *judaica* Zohary in Palestine J. Bot. Jerusalem Ser. 2: 173 (1941).

\**Ceropagia joannis* (Maire) Bruyns, **comb. nov.** *Caralluma joannis* Maire in Bull. Soc. Hist. Nat. Afrique N. 31: 27 (1940).

\**Ceropagia munbyana* (Decne. ex Munby) Bruyns, **comb. nov.** *Boucerosia munbyana* Decne. ex Munby, Fl. Algérie: 25, t. suppl. (1847).

*Boucerosia munbyana* var. *hispanica* Coincy in J. Bot. (Morot) 12: 250 (1898). *Boucerosia hispanica* (Coincy) Coincy in J. Bot. (Morot) 13: 336 (1899). *Caralluma munbyana* subsp. *hispanica* (Coincy) M.B. Crespo & Mateo in Acta. Bot. Malac. 20: 285 (1995). *Apteranthes munbyana* subsp. *hispanica* (Coincy) M.B. Crespo & Mateo, Flora Montib. 32: 18 (2006), **syn. nov.**

\**Ceropagia plicatiloba* (Lavrano) Bruyns, **comb. nov.** *Caralluma plicatiloba* Lavrano in J. S. African Bot. 28: 211 (1962).

*Caralluma tuberculata* N.E.Br. in Gard. Chron., ser. 3, 12: 370 (1892), **syn. nov.**

\**Ceropagia staintonii* (H. Hara) Bruyns, **comb. nov.** *Caralluma staintonii* H. Hara in J. Jap. Bot. 52: 357 (1977).

**10. Sect. Caudanthera** (Plowes) Bruyns, **comb. et stat. nov.** *Caudanthera* Plowes in Haseltonia 3: 58 (1995). Type: *Ceropagia sinaica* (Decne.) Bruyns (*Caudanthera sinaica* (Decne.) Plowes).

*Cryptolluma* Plowes in Haseltonia 3: 57 (1995). Type: *Ceropagia edulis* (Edgew.) Bruyns (*Cryptolluma edulis* (Edgew.) Plowes).

*Spiralluma* Plowes in Haseltonia 3: 53 (1995). Type: *Spiralluma longidens* (N.E.Br.) Plowes (= *Ceropagia edulis* (Edgew.) Bruyns).

*Diagnostic features:* Small, shrub-like, non-rhizomatous succulent. Stems glabrous, smooth, 4-angled. Leaves reduced to minute ± lanceolate rudiments, without small stipular hairs or glands

around bases. Inflorescences many, 1- to 4-flowered on narrowed and usually almost cylindrical apical portion of stems. Corolla with or without short tube (sometimes divided nearly to base), without flat area beyond tube, with free spreading lobes, staminal corona in two partially fused series.

*Distribution:* 3 spp.; West and North-east Africa, Israel to southern Arabian Peninsula, Iran, Pakistan and India.

*Taxonomic changes:*

\**Ceropegia edulis* (Edgew.) Bruyns, **comb. nov.** *Boucerosia edulis* Edgew. in J. Proc. Linn. Soc., Bot. 6: 205 (1862).

*Ceropegia mireillae* (Lavrano) Bruyns, **comb. nov.** *Caralluma mireillae* Lavrano in Natl. Cact. Succ. J. 24: 79 (1969).

\**Ceropegia sinaica* (Decne.) Bruyns, **comb. nov.** *Boucerosia sinaica* Decne., in DC., Prodr. 8: 649 (1844).

Wight, Icon. Pl. Ind. Orient. 4 (4): 14, t. 1599 (1850).

\**Ceropegia indica* (Wight & Arn.) Bruyns, **comb. nov.** *Hutchinia indica* Wight & Arn., Contr. Bot. India: 34 (1834).

\**Ceropegia pauciflora* (Wight) Bruyns, **comb. nov.** *Boucerosia pauciflora* Wight in Madras J. Lit. Sci. 6: 473 (1837).

\**Ceropegia procumbens* (Gravely & Mayur.) Bruyns, **comb. nov.** *Caralluma procumbens* Gravely & Mayur. in Bull. Madr. Govt. Mus. NS 4 (1): 26 (1931).

\**Ceropegia umbellata* (Haw.) Bruyns, **comb. nov.** *Caralluma umbellata* Haw., Syn. Pl. Succ.: 47 (1812). Type: India, introduced to England in 1804, collector unknown (missing). India, Andhra Pradesh, Cuddapah distr., Veparkota, 1884, Gamble 15202 (CAL, neo!, designated here, K, isoneo!).

*Stapelia umbellata* Roxb., Pl. Coromandel 3 (2): 36, t. 241 (1815), **syn. nov.**

11. **Sect. Frerea** (Dalzell) Bruyns, **comb. et stat. nov.** *Frerea* Dalzell in J. Linn. Soc., Bot. 8: 10 (1864). Type: *Frerea indica* Dalzell (= *Ceropegia frerei* (Rowley) Bruyns).

*Diagnostic features:* Non-rhizomatous mat-forming succulent. Stems glabrous, smooth, rounded and without angles. Leaves prominent slightly fleshy and petiolate, without small hairs or glands in stipular position. Inflorescences several per stem and each 1- to 2-flowered among leaves. Corolla with very short tube but not divided nearly to base and with flat to slightly reflexed area beyond tube, with free spreading lobes, staminal corona in two partially fused series.

*Distribution:* 1 sp.; peninsular India, endemic to the northern part of the Western Ghats.

*Taxonomic changes:*

\**Ceropegia frerei* (Rowley) Bruyns, **comb. nov.** *Caralluma frerei* Rowley in Natl. Cact. Succ. J. 13: 78 (1958).

*Desmidorchis dalzellii* Almeida, Fl. Maharashtra 3 (A): 241 (2001), **syn. nov.**

*Frerea indica* Dalzell in J. Linn. Soc., Bot. 8: 10 (1864), **syn. nov.**

12. **Sect. Boucerosia** (Wight & Arn.) Bruyns, **comb. et stat. nov.**

*Boucerosia* Wight & Arn., Contr. Bot. India: 34 (1834). Type: *Ceropegia umbellata* (Haw.) Bruyns (*Boucerosia umbellata* (Haw.) Wight & Arn.).

*Hutchinia* Wight & Arn., Contr. Bot. India: 34 (1834). Type: *Ceropegia indica* Wight & Arn. (*Hutchinia indica* Wight & Arn.).

*Pendulluma* Plowes in CactusWorld 31: 103 (2013). Type: *Ceropegia procumbens* (Gravely & Mayur.) Bruyns (*Pendulluma procumbens* (Gravely & Mayur.) Plowes).

*Diagnostic features:* Non-rhizomatous mat- to clump-forming to rhizomatous succulent. Stems glabrous, smooth, 4-angled. Leaves reduced to minute sessile usually ovate rudiments, without small hairs or glands in stipular position. Inflorescences solitary per stem, many-flowered often with flowers opening ± simultaneously (single-flowered in *C. pauciflora*). Corolla usually with short tube (not divided nearly to base and often with flat area beyond tube), with free spreading lobes, staminal corona in two partially fused series.

*Distribution:* 6 spp.; India, Myanmar and Sri Lanka.

*Taxonomic changes:*

\**Ceropegia crenulata* (Wallich) Bruyns, **comb. nov.** *Caralluma crenulata* Wallich, Pl. Asiat. Rar. 1: 6, t. 7 (1829).

*Caralluma truncatocoronata* (Sedgw.) Gravely & Mayur. in Bull. Madr. Govt. Mus. NS 4 (1): 21 (1931) as 'truncato-coronata'. Type: India, Karnataka, Dharwar distr., Hubli, 2000', September 1919, Sedgwick (missing). India, Tamil Nadu, 11 km west of Chintamini, 22 September 1993, Bruyns 5935a (K, neo!, designated here, MO, isoneo!), **syn. nov.**

*Caralluma nilagiriana* Kumari & Subba Rao in J. Bombay Nat. Hist. Soc. 73: 194 (1976), **syn. nov.**

\**Ceropegia diffusa* (Wight) Bruyns, **comb. nov.** *Boucerosia diffusa*

13. **Sect. Anomalluma** (Plowes) Bruyns, **comb. et stat. nov.**

*Anomalluma* Plowes in Cact. Succ. J. (Los Angeles) 65: 167 (1993). Type: *Ceropegia dodsoniana* (Lavrano) Bruyns (*Anomalluma dodsoniana* (Lavrano) Plowes).

*Diagnostic features:* Very small mat-forming non-rhizomatous succulent. Stems glabrous, rugulose, 4-angled, Leaves reduced to minute rudiments, without small stipular hairs or glands around bases. Inflorescences 1 to several towards apex of stem, 1- to 3-flowered on small deciduous peduncle. Corolla with short tube, without flat area beyond tube, with free spreading lobes, staminal corona in two partially fused series.

*Distribution:* 2 spp.; Somaliland, southern Yemen and southern Oman.

*Taxonomic changes:*

- 2.1 \**Ceropegia dodsoniana* (Lavrano) Bruyns, **comb. nov.** *Caralluma dodsoniana* Lavrano in Cact. Succ. J. (Los Angeles) 43: 60 (1971).

- 2.2 \**Ceropegia maccoyi* (Lavrano & Mies) Bruyns, **comb. nov.** *Pseudolithos maccoyi* Lavrano & Mies in Asklepios 82: 29 (2001).

14. **Sect. Rhytidocaulon** (P.R.O.Bally) Bruyns, **comb. et stat. nov.**

*Rhytidocaulon* P.R.O.Bally in Candollea 18: 336 (1963), nom. cons. Type: *Ceropegia subscandens* (P.R.O.Bally) Bruyns (*Rhytidocaulon subscandens* P.R.O.Bally).

*Diagnostic features:* Small shrub-like non-rhizomatous few-stemmed succulent. Stems finely papillate, rugulose, weakly 4-angled. Leaves reduced to minute usually lanceolate-spathulate rudiments, with small glands in stipular position. Inflorescences several, 1- to 4-flowered sunken into folds of surface of stem usually towards apex (stems not becoming slender and rounded above in flowering part). Corolla without tube and lobed nearly to base, lobes free and spreading or remaining joined at tips, staminal corona in two partially fused series.

*Distribution:* 15 spp.; North-east Africa (Kenya to Eritrea) and in the southern Arabian Peninsula.

*Taxonomic changes:*

*Ceropegia arachnifera* Bruyns, **nom. nov., non** *Ceropegia arachnoidea* (P.R.O.Bally) Bruyns *Rhytidocaulon arachnoideum* T.A.McCoy in Cact. Succ. J. (Los Angeles) 78: 183 (2006).

*Ceropegia barica* (Thulin) Bruyns, **comb. nov.** *Rhytidocaulon baricum* Thulin in Nord. J. Bot. 23: 533 (2005).

\**Ceropegia ciliatula* Bruyns, **nom. nov., non** *Ceropegia ciliata* Wight. *Rhytidocaulon ciliatum* Hanáček & Říčánek in Asklepios 80: 19 (2000).

\**Ceropegia elegantissima* (Hanáček) Bruyns, **comb. nov.** *Rhytidocaulon elegantissimum* Hanáček & Říčánek in Haseltonia 17: 97 (2012).

*Ceropegia fulleri* (Lavrano & Mortimer) Bruyns, **comb. nov.** *Rhytidocaulon fulleri* Lavrano & Mortimer in Natl. Cact. Succ. J. 25: 3 (1970).

*Ceropeltis maccoyana* Bruyns, nom. nov., non *Ceropeltis maccoyi* (Lavrano & Mies) Bruyns. *Rhytidocaulon maccoyi* Lavrano & Mies in Cact. Succ. J. (Los Angeles) 73: 302 (2001).

*Ceropeltis macroloba* (Lavrano) Bruyns, comb. nov. *Rhytidocaulon macrolobum* Lavrano in Cact. Succ. J. (Los Angeles) 39: 3 (1967). *Ceropeltis macroloba* subsp. *macroloba*.

*Ceropeltis macroloba* subsp. *minima* (Meve & Collenette) Bruyns, comb. nov. *Rhytidocaulon macrolobum* subsp. *minimum* Meve & Collenette in Edinb. J. Bot. 56: 80 (1999). *Rhytidocaulon minimum* (Meve & Collenette) T.A.McCoy & Plowes in Cact. Succ. J. (Los Angeles) 87: 226 (2015).

*Ceropeltis paradoxica* Bruyns, nom. nov., non *Ceropeltis paradoxo* (I.Verdi.) Bruyns *Rhytidocaulon paradoxum* P.R.O.Bally in Candollea 18: 339 (1963).

\**Ceropeltis piluliferum* Bruyns, nom. nov., non *Ceropeltis pilifera* (L.f.) Bruyns *Rhytidocaulon piliferum* Lavrano in Cact. Succ. J. (Los Angeles) 43: 62 (1971).

*Ceropeltis richardiana* (Lavrano) Bruyns, comb. nov. *Rhytidocaulon richardianum* Lavrano in Cact. Succ. J. (Los Angeles) 63: 167 (1991).

\**Ceropeltis sheilae* (D.V.Field) Bruyns, comb. nov. *Rhytidocaulon sheilae* D.V.Field in Kew Bull. 36: 51 (1981).

*Rhytidocaulon molamatarense* T.A.McCoy & Plowes in Cact. Succ. J. (Los Angeles) 87: 223 (2015), syn. nov.

Note: The main difference given for this new species is that it is apparently disjunct from *C. sheilae* and occurs in a different habitat. However, the flora of this region remains poorly known and this disjunction is likely only to be apparent. The differences in habitat (low-lying, alluvial sediments in seasonal water-courses for *C. sheilae* and rocky slopes on limestone for the new species) are not correct for other collections of *C. sheilae* from Yemen (North), where it occurs on steep rocky slopes at 2200 m (e.g. PVB 10171 at E).

*Ceropeltis specksi* (T.A.McCoy) Bruyns, comb. nov. *Rhytidocaulon specksi* T.A.McCoy, Kakt. and. Sukk. 56: 261 (2005).

*Ceropeltis splendidior* Bruyns, nom. nov., non *Ceropeltis splendida* (K.Schum.) H.Huber *Rhytidocaulon splendidum* T.A.McCoy in Cact. Succ. J. (Los Angeles) 75: 154 (2003).

*Ceropeltis subscandens* (P.R.O.Bally) Bruyns, comb. nov. *Rhytidocaulon subscandens* P.R.O.Bally in Candollea 18: 337 (1963).

*Rhytidocaulon pseudosubscandens* T.A.McCoy in Asklepios 96: 9 (2006), syn. nov.

*Ceropeltis torta* (N.E.Br.) Bruyns, comb. nov. *Caralluma torta* N.E. Br. in Bull. Misc. Inform. 1901: 142 (1901).

15. Sect. *Lalacruma* K.Schum. in Engl. & Prantl, Nat. Pflanzenfam. 4 (2): 278 (1895). *Caralluma* subsect. *Lalacruma* (K.Schum.) P.R.O.Bally in Candollea 24: 3 (1969). Type: *Ceropeltis gracilipes* (K.Schum.) Bruyns (*Caralluma gracilipes* K.Schum.).

*Caralluma* R.Br. in Mem. Wern. Nat. Hist. Soc. 1: 25 (1810). Type: *Ceropeltis adscendens* (Roxb.) Bruyns (*Caralluma adscendens* (Roxb.) Haw.).

*Spathulopetalum* Chiov. in Ann. Bot. (Rome) 10: 392 (1912). Type: *Ceropeltis dicapuae* (Chiov.) Bruyns (*Spathulopetalum dicapuae* Chiov.).

*Caralluma* subsect. *Priogonium* P.R.O.Bally in Candollea 24: 2 (1969). Type: *Ceropeltis priogonium* (K.Schum.) Bruyns.

*Sauvalluma* Plowes in Haseltonia 3: 52 (1995). Type: *Ceropeltis furta* (P.R.O.Bally) Bruyns (*Sauvalluma furta* (P.R.O.Bally) Plowes).

*Somalluma* Plowes in Haseltonia 3: 56 (1995). Type: *Ceropeltis baradii* (Lavrano) Bruyns (*Somalluma baradii* (Lavrano) Plowes).

*Pleuralluma* Plowes in CactusWorld 26: 98 (2008). Type: *Ceropeltis lamellosa* (M.Gilbert & Thulin) Bruyns (*Pleuralluma lamellosa* (M.Gilbert & Thulin) Plowes).

Diagnostic features: Dwarf to medium-sized shrub-like non-rhizomatous succulent. Stems glabrous, smooth, 4-angled.

Leaves reduced to minute usually lanceolate rudiments, with small hairs and/or small glands in stipular position. Inflorescences many, 1- to 4-flowered along narrowed and usually almost cylindrical apical portion of stems. Corolla often without tube and lobed nearly to base, with free spreading lobes, staminal corona in two partially fused series (apparently only one in *C. lamellosa*).

Distribution: 20 spp.; Africa north of 2° S, and in peninsular India, Sri Lanka and Myanmar.

### 15.1 Key to the subsections of Sect. *Lalacruma*

1. Lobes of corolla becoming distinctly narrow towards bases and somewhat vibratile around small, flat platform surrounding corona ..... Subsect. *Flaccidiflorae*.
  - Lobes of corolla usually widening towards bases (not becoming narrower towards bases) and not vibratile..... 2.
2. Inner (staminal) coronal lobes much longer than anthers and usually rising up in column in centre (occasionally widely diverging beyond them, see *C. lamellosa*) ..... Subsect. *Flaccidiflorae*.
  - Inner (staminal) coronal lobes shorter than anthers or if exceeding anthers then not rising in column in centre..... Subsect. *Flaccidiflorae*.
3. Outer (interstaminal) lobes of corona bifid nearly to base into fine diverging lobules..... Subsect. *Indianae* [the positions of *C. sudanica* and *C. vaduliae* remain unclear].

### 15.2 Subsect. *Flaccidiflorae* P.R.O.Bally in Candollea 24: 3 (1969). Type: *Ceropeltis dicapuae* (Chiov.) Bruyns (*Caralluma dicapuae* (Chiov.) Chiov.).

Diagnostic features: Dwarf to medium-sized shrub-like non-rhizomatous succulent. Stems glabrous, smooth, 4-angled. Leaves reduced to minute usually lanceolate rudiments, with small hairs and/or small glands in stipular position. Inflorescences many, 1- to 4-flowered along narrowed and usually almost cylindrical apical portion of stems. Corolla without tube and lobed nearly to base, with free spreading lobes, staminal corona in two partially fused series (apparently only one in *C. lamellosa*).

Distribution: 16 spp.; East and North-east Africa north of 2° S.

Taxonomic changes:

\**Ceropeltis arachnoidea* (P.R.O.Bally) Bruyns, comb. nov. *Caralluma gracilipes* subsp. *arachnoidea* P.R.O.Bally in Candollea 24: 10 (1969).

*Ceropeltis arachnoidea* subsp. *arachnoidea*.

*Caralluma flavovirens* L.E. Newton in Asklepios 74: 25 (1998), syn. nov.

*Ceropeltis arachnoidea* var. *breviloba* (P.R.O.Bally) Bruyns, comb. nov. *Caralluma gracilipes* var. *breviloba* P.R.O.Bally in Candollea 24: 14 (1969).

*Ceropeltis baradii* (Lavrano) Bruyns, comb. nov. *Caralluma baradii* Lavrano in Cact. Succ. J. (Los Angeles) 65: 246 (1993).

*Ceropeltis congestiflora* (P.R.O.Bally) Bruyns, comb. nov. *Caralluma congestiflora* P.R.O.Bally in Candollea 20: 13 (1965).

\**Ceropeltis dicapuae* (Chiov.) Bruyns, comb. nov. *Spathulopetalum dicapuae* Chiov. Ann. Bot. (Rome) 10: 392 (1912). Type: Eritrea, Habab between Chelamet and Oazata (16° 04'N 38° 42'E), 11 May 1892, Terraciano & Pappi 498 (955) (FT, lecto!, designated here).

Note: Chiovenda cited three collections Terraciano & Pappi 955, Pappi 8289 (FT!); Pappi 8314 (FT!), of which the first is now selected as lectotype.

*Ceropeltis edwardsiae* (M.Gilbert) Bruyns, comb. nov. *Caralluma gracilipes* subsp. *edwardsiae* M.Gilbert in Natl. Cact. Succ. J. 32: 30 (1977).

\**Ceropeltis furta* (P.R.O.Bally) Bruyns, comb. nov. *Caralluma furta* P.R.O.Bally in Candollea 18: 345 (1963).

*Ceropeltis gracilipes* (K.Schum.) Bruyns, comb. nov. *Caralluma*

*gracilipes* K.Schum. in Engl. Pfl. Ost Afr. C: 328 (1895).  
*Ceropogia lamellosa* (M.Gilbert & Thulin) Bruyns, **comb. nov.**  
*Caralluma lamellosa* M.Gilbert & Thulin in Nord. J. Bot. 23: 523 (2005).  
*Ceropogia longiflorica* Bruyns, **nom. nov., non** *Ceropogia longiflora* Roem. & Schult. *Caralluma longiflora* M.Gilbert in Bradleya 8: 13 (1990).  
*Ceropogia moniliformis* (P.R.O.Bally) Bruyns, **comb. nov.** *Caralluma moniliformis* P.R.O.Bally in Candollea 20: 17 (1965).  
\**Ceropogia peckii* (P.R.O.Bally) Bruyns, **comb. nov.** *Caralluma peckii* P.R.O.Bally in Candollea 18: 14 (1962).  
\**Ceropogia priogonium* (K.Schum.) Bruyns, **comb. nov.** *Caralluma priogonium* K.Schum. in Bot. Jahrb. Syst. 34: 327 (1904). Type: Tanzania, between Gonja and Kihurio, Engler 1521a (missing). Tanzania, between Mkomazi and Kihurio, 2000', 9 September 1935, Greenway 4066 (K, neo!, designated here).  
\**Ceropogia turneri* (E.A.Bruce) Bruyns, **comb. nov.** *Caralluma turneri* E.A.Bruce in Hooker's Icon. Pl. 34: t. 3339 (1937).  
*Ceropogia turneri* subsp. *turneri*.  
*Ceropogia turneri* subsp. *ukambensis* (P.R.O.Bally) Bruyns, **comb. nov.** *C. dicapuae* subsp. *ukambensis* P.R.O.Bally in Candollea 24: 19 (1969).  
*Ceropogia vaduliae* (Lavrano) Bruyns, **comb. nov.** *Caralluma vaduliae* Lavrano in Cact. Succ. J. (Los Angeles) 63: 171 (1991).  
*Ceropogia sudanica* (Bruyns) Bruyns, **comb. nov.** *Caralluma sudanica* Bruyns in Aloe 41: 79 (2004).  
*Ceropogia wilhelmii* (Thulin) Bruyns, **comb. nov.** *Caralluma wilhelmii* Thulin in Kew Bull. 64: 477 (2009).

### 15.3 Subsect. *Indianae* Bruyns, **subsect. nov.** Type: *Ceropogia adscendens* (Roxb.) Bruyns.

*Diagnostic features:* Small to medium-sized shrub-like non-rhizomatous succulent. Stems glabrous, smooth, 4-angled. Leaves reduced to minute usually lanceolate rudiments, with small hairs and/or small glands in stipular position. Inflorescences many, 1- to 4-flowered along narrowed and usually almost cylindrical apical portion of stems. Corolla with short tube and lobed to just beyond it, with free spreading lobes, staminal corona in two partially fused series.

*Distribution:* 4 spp.; India, Myanmar, Sri Lanka (*C. adscendens* var. *fimbriata* is also widespread in southern Arabian Peninsula to West Africa but widely cultivated and probably introduced outside SE Asia).

*Taxonomic changes:*

\**Ceropogia adscendens* (Roxb.) Bruyns, **comb. nov.** *Stapelia adscendens* Roxb., Pl. Coromandel 1 (1): 28, t. 30 (1795).

*Ceropogia adscendens* var. *adscendens*.

*Caralluma bicolor* V.S. Ramach., S. Joseph, H.A. John & Sofya in Nord. J. Bot. 29: 447 (2011), **syn. nov.**

*Ceropogia adscendens* var. *attenuata* (Wight) Bruyns, **comb. nov.** *Caralluma attenuata* Wight, Icon. Pl. Ind. Orient. 4 (1): 15, t. 1268 (1848).

*Ceropogia adscendens* var. *fimbriata* (Wallich) Bruyns, **comb. nov.** *Caralluma fimbriata* Wallich, Pl. Asiatic. Rar. 1: 7, t. 8 (1829).

\**Ceropogia bhupinderana* (Sarkaria) Bruyns, **comb. nov.** *Caralluma bhupinderana* Sarkaria in Natl. Cact. Succ. J. 35: 68 (1980).

*Caralluma adscendens* var. *geniculata* Gravely & Mayur. in Bull. Madr. Govt. Mus. NS 4 (1): 16 (1931). *Caralluma geniculata* (Gravely & Mayur.) Meve & Liede in Pl. Syst. Evol. 234: 197 (2002), **syn. nov.**

*Caralluma adscendens* var. *gracilis* Gravely & Mayur. in Bull. Madr. Govt. Mus. NS 4 (1): 14 (1931). *Caralluma gracilis* (Gravely & Mayur.) Plowes in Asklepios 116: 16 (2013), **syn. nov.**

*Caralluma adscendens* var. *carinata* Gravely & Mayur. in Bull. Madr. Govt. Mus. NS 4 (1): 16 (1931). *Caralluma carinata* (Gravely & Mayur.) Plowes in Asklepios 116: 15 (2013), **syn. nov.**

\**Ceropogia sarkariae* (Lavrano & R. Frandsen) Bruyns, **comb. nov.**

*Caralluma sarkariae* Lavrano & R. Frandsen in Cact. Succ. J. (Los Angeles) 50: 211 (1978).  
*Caralluma sarkariae* var. *longipedicellata* Aditya in Asklepios 110: 21 (2011), **syn. nov.**  
*Ceropogia stalagmifera* (C.E.C. Fischer) Bruyns, **comb. nov.** *Caralluma stalagmifera* C.E.C. Fischer in Bull. Misc. Inform. 1925: 430 (1925).  
*Caralluma moorei* Aditya in Asklepios 110: 7 (2011), **syn. nov.**  
*Caralluma stalagmifera* var. *intermedia* Karupp. & Pull. in Rheedea 17: 45 (2007), **syn. nov.**  
*Caralluma stalagmifera* var. *longipetala* Karupp. & Pull. in Rheedea 17: 42 (2007), **syn. nov.**

### 16. Sect. *Echidnopsis* (Hook. f.) Bruyns, **comb. et stat. nov.**

*Echidnopsis* Hook. f. in Bot. Mag. 97: t. 5930 (1871). Type: *Ceropogia cereiformis* (Hook.f.) Bruyns (*Echidnopsis cereiformis* Hook.f.)

*Diagnostic features:* Small mat-forming sometimes rhizomatous succulent. Stems finely papillate, smooth to rugulose, (5-) 6-to 20-angled. Leaves reduced to minute sessile ovate to lanceolate rudiments (sometimes drying out to spike-like husks), with small glands in stipular position. Inflorescences several, 1- to 4-flowered usually towards apex of stem (stems not becoming slender and rounded above in flowering part). Corolla with short to long tube (not divided nearly to base and often with slight flat area beyond tube), lobes free and usually spreading, staminal corona in two partially fused series (sometimes outer series deeply cupular).

*Distribution:* 29 spp.; East and North-east Africa, southern Arabian Peninsula (including five species on Socotra).

Note: Sect. *Echidnopsis* is divided into five subsections, three from the sections erected in Bruyns (1988), a new subsection for *C. montana* and *C. seibanica* and another for *C. malum*, as the results of Bruyns & al. (2014) suggested.

#### 16.1 Key to the subsections of Sect. *Echidnopsis*

1. Corolla clearly papillate outside, 18–22 mm broad, apple-shaped, with lobes inflexed into tube....Subsect. *Pseudopectinaria*.
  - Corolla glabrous outside (rarely finely papillate), not more than 10 mm broad, rotate to urceolate with lobes spreading beyond mouth of tube.....2.
  2. Tubercles on stem with rugulose surface, not papillate.....Subsect. *Glabrae*.
    - Tubercles of stem smooth or finely papillate, not rugose.....3.
  3. Tubercles of stem laterally flattened and joined vertically into rows along stems with grooves between rows, papillate; outer series of corona reduced to small spreading lobes (occasionally absent) between much broader dorsal parts of inner lobes.....Subsect. *Echidnopsis*.
    - Tubercles of stems conical to hemispherical, arranged into but not joined vertically into rows along stem, outer series of corona fused into low to fairly deep cupular structure containing rest of gynostegium.....3.
  4. Stems strongly rhizomatous (sometimes spreading up to 15 cm underground), corolla-lobes mostly at least 3 times longer than depth of tube (cf. *C. angustilobulata*).....Subsect. *Montanae*.
    - Stems rarely rhizomatous (rarely spreading more than 20 mm underground), corolla-lobes less than 3 times as long as depth of tube.....Subsect. *Vadosicornae*.

#### 16.2 Subsect. *Pseudopectinaria* (Lavrano) Bruyns, **comb. et stat. nov.**

*Pseudopectinaria* Lavrano in Cact. Succ. J. (Los Angeles) 43: 9 (1971) *Echidnopsis* sect. *Pseudopectinaria* (Lavrano) M.Gilbert in Nordic J. Bot. 33: 653 (2015). Type: *Ceropogia malum* (Lavrano) Bruyns (*Pseudopectinaria malum* Lavrano).

*Diagnostic features:* Small prostrate non-rhizomatous succulent.

Stems finely papillate, smooth, (5-) 6-angled, angles laterally compressed and continuous along stem. Leaves deltate. Inflorescences few, 1-flowered. Corolla apple-shaped with tube 18–22 mm long and as broad, with short lobes inflexed into tube and remaining joined at tips; outer series of staminal corona deeply cupular with constricted mouth.

*Distribution:* 1 sp.; Ethiopia, Kenya, Somalia, Somaliland.

*Taxonomic changes:*

\**Ceropegia malum* (Lavrano) Bruyns, **comb. nov.** *Pseudopectinaria malum* Lavranos in Cact. Succ. J. (Los Angeles) 43: 10 (1971).

#### 16.3 Subsect. *Montanae* Bruyns, **subsect. nov.** Type: *Ceropegia seibanica* (Lavrano) Bruyns.

*Echidnopsis* sect. *Soboliferae* M.Gilbert in Nordic J. Bot. 33: 653 (2015). Type: *Echidnopsis montana* (R.A.Dyer & E.A.Bruce) P.R.-O.Bally.

*Diagnostic features:* Mat- or clump-forming rhizomatous succulent. Stems finely papillate, smooth, 6-to 8-angled, with hexagonal to quadrangular tubercles arranged (not fused) into vertical rows. Leaves ovate to ovate-deltate. Inflorescences several, 1- to 2-flowered. Corolla with very short tube and lobes divided nearly to base, lobes widely spreading and 3 or more times as long as depth of tube; outer series of staminal corona shallowly cupular.

*Distribution:* 2 spp.; Ethiopia, Yemen (S).

*Taxonomic changes:*

\**Ceropegia montana* (R.A.Dyer & E.A.Bruce) Bruyns, **comb. nov.** *Caralluma montana* R.A.Dyer & E.A.Bruce in Fl. Pl. Africa 26: t. 1034 (1948).

\**Ceropegia seibanica* (Lavrano) Bruyns, **comb. nov.** *Echidnopsis seibanica* Lavranos in J. S. African Bot. 30: 88 (1964).

#### 16.4 Subsect. *Glabrae* (Bruyns) Bruyns, **comb. et stat. nov.** *Echidnopsis* sect. *Glabrae* Bruyns in Bradleya 6: 8 (1988). Type: *Ceropegia leachii* (Lavrano) Bruyns (*Echidnopsis leachii* Lavranos).

*Diagnostic features:* Mat-forming non-rhizomatous succulent. Stems not papillate, rugulose, 6-angled. Leaves ovate-deltate. Inflorescences several, 1- to 4-flowered. Corolla with shallow tube to tube longer than lobes, lobes free and erect to spreading, outer series of staminal corona shallowly cupular.

*Distribution:* 1 sp.; Ruaha River valley, Tanzania.

*Taxonomic changes:*

\**Ceropegia leachii* (Lavrano) Bruyns, **comb. nov.** *Echidnopsis leachii* Lavranos in Natl. Cact. Succ. J. 27: 69 (1972).

*Ceropegia leachii* var. *leachii*.

*Ceropegia leachii* var. *oviflora* (T.A.McCoy) Bruyns, **comb. et stat. nov.** *Echidnopsis oviflora* T.A.McCoy in Kakt. and. Sukk. 54: 214 (2003). Type: Tanzania, Ruaha River Gorge, Mbaga Mt., north of track from Malolo to Idodoma, Specks 1264 (MO; isotype UPS, both missing). Tanzania, south of Irondo towards Malolo, 750 m, Bruyns 9669 (BOL, neo!, designated here; E, M, UPS, W, isoneo!). Note: Two collections from north of Malolo and separated by some 26 km (Bruyns 9664 at BOL, E, M and Bruyns 9669 at BOL, E, M, UPS, W) have yielded plants with oviform flowers with a dark shiny exterior of the corolla, corresponding closely to what was described as '*Echidnopsis oviflora*'. Typical *Ceropegia leachii*, with shallowly bowl-shaped flowers with dull exterior is only known closer to the Ruaha River itself. No intermediates have been found. We therefore recognise '*E. oviflora*' here at the level of variety.

#### 16.5 Subsect. *Echidnopsis*

*Diagnostic features:* Mat-forming to few-stemmed non-rhizomatous succulent. Stems finely papillate, smooth, with tubercles fused into (6) 8 angles along stem. Leaves ovate. Inflorescences many, 1- to 2-flowered. Corolla rotate or slightly reflexed to campanulate, with very shallow tube, lobes free, erect to slightly reflexed, outer series of staminal corona reduced to small spreading lobes (occasionally

absent) between much broader dorsal parts of inner lobes.

*Distribution:* 4 spp.; North-east to East Africa, Sudan (Red Sea Hills) to Kenya.

*Taxonomic changes:*

\**Ceropegia cereiformis* (Hook. f.) Bruyns, **comb. nov.** *Echidnopsis cereiformis* Hook. f. in Bot. Mag. 97: t. 5930 (1871).

*Echidnopsis kohaitoensis* Plowes in CactusWorld 31: 214 (2013), **syn. nov.**

Note: Although Gilbert (2015) discussed '*E. kohaitoensis*' and declared that it was 'easily distinguished from *E. dammanniana*', he did not list it among the taxa that he recognised in his Table 1, so it is unclear what he decided about its status. Collections from around the Kohaito Plateau in southern Eritrea (Bruyns 10129 at BOL, E, M, W) showed many intermediates between this 'species' and *Ceropegia cereiformis* in respect of the size of the corolla and the colouring of its interior and so the name is reduced to synonymy here.

\**Ceropegia dammanniana* (Sprenger) Bruyns, **comb. nov.** *Echidnopsis dammanniana* Sprenger, Cat. Dammann & Co. 59: 4, Fig. 5 (1892).

*Ceropegia nubica* (N.E.Br.) Bruyns, **comb. nov.** *Echidnopsis nubica* N. E.Br. in Bull. Misc. Inform. 1895: 263 (1895).

*Echidnopsis uraiyatiana* Dioli in Haseltonia 13: 61 (2007), **syn. nov.**

\**Ceropegia virchowii* (K.Schum.) Bruyns, **comb. nov.** *Echidnopsis virchowii* K.Schum. in Monatsschr. Kakteenk. 3: 98 (1893).

*Echidnopsis thulinii* M.Gilbert in Nordic J. Bot. 33: 646 (2015), **syn. nov.**

Note: *Echidnopsis thulinii* was described from a single plant collected at 2200 m near Tabah Pass, north of Erigavo, Somaliland. *E. stellata* was described from the same area, but from lower down at ± 1200 m. *E. thulinii* was said to differ from *E. virchowii* by the lack of the unusual papillae on the inside of the corolla and by the slightly longer lobes of the inner corona. The latter feature is not useful, as the corona is actually variable in this respect (see Fig. 5, Bruyns, 1988). Other collections from this area have yielded plants where the inside of the corolla is papillate (as in '*E. stellata*') and others where it is glabrous, so this new species is reduced to synonymy.

#### 16.6 Subsect. *Vadosicorona* (Bruyns) Bruyns, **comb. et stat. nov.**

*Echidnopsis* sect. *Vadosicorona* Bruyns in Bradleya 6: 14 (1988). Type: *Ceropegia scutellata* (Deflers) Bruyns (*Echidnopsis scutellata* (Deflers) A. Berger).

*Echidnopsis* sect. *Profundicorona* Bruyns in Bradleya 6: 31 (1988). Type: *Ceropegia sharpii* (A.C. White & B. Sloane) Bruyns (*Echidnopsis sharpii* A.C. White & B. Sloane).

*Diagnostic features:* Mat-forming rarely slightly rhizomatous succulent. Stems finely papillate, smooth, tubercles arranged into 6 to 20 rows but not vertically fused into them. Leaves reduced to minute sessile ovate to lanceolate rudiments (sometimes drying out to spike-like husks), with small glands in stipular position. Inflorescences several, 1- to 4-flowered. Corolla almost rotate to urceolate with shallow to deep tube sometimes constricted at mouth, lobes free and spreading, outer series of staminal corona fused into shallow to deep cup.

*Distribution:* 21 spp. including \**Ceropegia squamulata* Decne.; Arabian Peninsula, north-east to East Africa from Eritrea to northern Tanzania.

*Taxonomic changes:*

*Ceropegia angustilobulata* Bruyns, **nom. nov., non** *Ceropegia angustiloba* De Wildem. *Echidnopsis angustiloba* E.A.Bruce & P.R.-O.Bally in Cact. Succ. J. (Los Angeles) 13: 180 (1941).

*Ceropegia archeriana* Bruyns, **nom. nov., non** *Ceropegia archeri* (L.C.Leach) Bruyns. *Echidnopsis archeri* P.R.O.Bally in Cact. Succ. J. Gr. Brit. 19: 63 (1957).

*Echidnopsis similis* Plowes in Haseltonia 1: 82 (1993), **syn. nov.**

- \**Ceropegia ballyi* (Marn.-Lap.) Bruyns, **comb. nov.** *Stapeliopsis ballyi* Marn.-Lap. in *Cactus* (Paris) 65: 186 (1959).
- \**Ceropegia bentii* (N.E.Br. ex Hook. f.) Bruyns, **comb. nov.** *Echidnopsis bentii* N.E.Br. ex Hook. f. in *Bot. Mag.* 127: t. 7760 (1901).
- Ceropegia bihendulensis* (P.R.O.Bally) Bruyns, **comb. nov.** *Echidnopsis bihendulensis* P.R.O.Bally in *Cact. Succ. J. Gr. Brit.* 19: 58 (1957).
- Ceropegia chrysanthoides* (Lavranois) Bruyns, **nom. nov., non** *Ceropegia chrysantha* Svent. *Echidnopsis chrysantha* Lavranos in *Cact. Succ. J. (Los Angeles)* 43: 65 (1971).
- \**Ceropegia ericiflora* (Lavranois) Bruyns, **comb. nov.** *Echidnopsis ericiflora* Lavranos in *Natl. Cact. Succ. J.* 27: 70 (1972).
- Ceropegia inconspicua* (Bruyns) Bruyns, **comb. nov.** *Echidnopsis inconspicua* Bruyns in *Edinb. J. Bot.* 61: 9 (2005).
- \**Ceropegia insularis* (Lavranois) Bruyns, **comb. nov.** *Echidnopsis insularis* Lavranos in *Cact. Succ. J. (Los Angeles)* 42: 136 (1970).
- Ceropegia mariae* (Lavranois) Bruyns, **comb. nov.** *Echidnopsis mariae* Lavranos in *Cact. Succ. J. (Los Angeles)* 54: 215 (1982). Type: Kenya, Gof Choba, Lavranos & Bleck 19527 (specimens cited from E, EA, K all missing). Kenya, Gof Choba, Marsabit, Bally 12565 (K, neol!, designated here).
- Echidnopsis scutellata* subsp. *australis* Bruyns in *Bradleya* 6: 19 (1988), **syn. nov.**
- \**Ceropegia mijerteina* (Lavranois) Bruyns, **comb. nov.** *Echidnopsis mijerteina* Lavranos in *Cact. Succ. J. (Los Angeles)* 43: 64 (1971).
- Ceropegia milleri* (Lavranois) Bruyns, **comb. nov.** *Echidnopsis milleri* Lavranos in *Cact. Succ. J. (Los Angeles)* 65: 294 (1993).
- Ceropegia modestiflora* (P.R.O.Bally ex Plowes) Bruyns, **nom. nov., non** *Ceropegia modesta* (N.E.Br.) Bruyns. *Echidnopsis modesta* P.R.O.Bally ex Plowes in *Haseltonia* 1: 77 (1993);
- \**Ceropegia planiflora* (P.R.O.Bally) Bruyns, **comb. nov.** *Echidnopsis planiflora* P.R.O.Bally in *Cact. Succ. J. Gr. Brit.* 18: 109 (1956).
- Echidnopsis flavicorona* Plowes in *Haseltonia* 1: 72 (1993), **syn. nov.**
- Echidnopsis hirsuta* Plowes in *Haseltonia* 1: 74 (1993), **syn. nov.**
- Echidnopsis rubrolutea* Plowes in *Haseltonia* 1: 76 (1993), **syn. nov.**
- Echidnopsis plowesiana* Orlando, Kakt. and. Sukk. 55: 158 (2004), **syn. nov.**
- Ceropegia radians* (Bleck) Bruyns, **comb. nov.** *Echidnopsis radians* Bleck in *Cact. Succ. J. (Los Angeles)* 49: 263 (1977). Type: Kenya, near Barsaloi (given as Baragoi), Powys sub Lavranos 12,554 (specimens cited from E, EA, K all missing). Kenya, Baragoi, escarpment on lava, 6400', October 1960, Classen sub Bally S49a (K, neol!, designated here).
- \**Ceropegia scutellata* (Deflers) Bruyns, **comb. nov.** *Caralluma scutellata* Deflers in *Bull. Soc. Bot. France* 43: 114, t. 4 (1896).
- Ceropegia scutellata* subsp. *scutellata*.
- Echidnopsis yemenensis* Plowes in *Haseltonia* 1: 71 (1993), **syn. nov.**
- Echidnopsis globosa* Thulin & Hjerson, *Nord. J. Bot.* 15: 261 (1995), **syn. nov.**
- Echidnopsis faraqensis* T.A.McCoy & Orlando in *Cact. Succ. J. (Los Angeles)* 75: 116 (2003), **syn. nov.**
- Ceropegia scutellata* subsp. *dhofarensis* (Bruyns) Bruyns, **comb. nov.**
- Echidnopsis scutellata* subsp. *dhofarensis* Bruyns in *Bradleya* 6: 18 (1988).
- \**Ceropegia sharpei* (A.C.White & B.Sloane) Bruyns, **comb. nov.**
- Echidnopsis sharpei* A.C.White & B.Sloane in *Cact. Succ. J. (Los Angeles)* 11: 67 (1939).
- Ceropegia sharpei* subsp. *sharpei*.
- Ceropegia sharpei* subsp. *repens* (R.A.Dyer & I.Verd.) Bruyns, **comb. nov.**
- Echidnopsis repens* R.A.Dyer & I.Verrd. in *Cact. Succ. J. (Los Angeles)* 11: 68 (1939).
- Ceropegia sharpei* subsp. *ciliata* (P.R.O.Bally) Bruyns, **comb. nov.**
- Echidnopsis ciliata* P.R.O.Bally in *Cact. Succ. J. Gr. Brit.* 19: 58 (1957).
- \**Ceropegia socotrica* Bruyns, **nom. nov., non** *Ceropegia socotrana* (Balf.f.) Bruyns *Echidnopsis socotrana* Lavranos in *Cact. Succ. J. (Los Angeles)* 65: 294 (1993).
- \**Ceropegia urceolata* (Bally) Bruyns, **comb. nov.** *Echidnopsis urceolata* Bally in *Candollea* 18: 342 (1963).
- Echidnopsis specksii* T.A.McCoy in *Kakt. and. Sukk.* 54: 215 (2003), **syn. nov.** Type: Ethiopia, Sidamo, along track towards Welensu Ranch, Specks 787 (MO, missing; isotype UBT, UPS, missing).
- Ceropegia watsonii* (P.R.O.Bally) Bruyns, **comb. nov.** *Echidnopsis watsonii* P.R.O.Bally in *Candollea* 18: 343 (1963).
17. **Sect. White-Sloanea** (Chiov.) Bruyns, **comb. et stat. nov.** *White-Sloanea* Chiov. in *Malpighia* 34: 541 (1937). Type: *Ceropegia crassa* (N.E.Br.) Bruyns (*White-Sloanea crassa* (N.E.Br.) Chiov.). *Drakebrockmania* A.C. White & B. Sloane, Stapf, ed. 2, 1: 401 (1937), nom. illegit., non *Drake-Brockmania* Stapf (1912). Type: *Ceropegia crassa* (N.E.Br.) Bruyns (*Drakebrockmania crassa* (N.E.Br.) A.C. White & B. Sloane).
- Diagnostic features:* Small squat single-stemmed succulent. Stems glabrous, smooth, 4-angled. Leaves absent. Inflorescences 1–several along angles near base of stem, 1- to 6-flowered in gradual succession with small peduncle developing gradually. Corolla with tube, lobes free and spreading, staminal corona in two well separated series.
- Distribution:* 1 sp.; Somaliland in North-east Africa.
- Taxonomic changes:*
- \**Ceropegia crassa* (N.E.Br.) Bruyns, **comb. nov.** *Caralluma crassa* N.E.Br. in *Gard. Chron.*, ser. 3, 98: 6 (1935).
18. **Sect. Suqutres** Bruyns, **sect. nov.** Type: *Ceropegia dolichocnema* (Bruyns) Bruyns.
- Duvaliandra* M.Gilbert in *Cact. Succ. J. Gr. Brit.* 42: 101 (1980). Type: *Ceropegia dioscoridis* (Lavranois) Bruyns (*Duvaliandra dioscoridis* (Lavranois) M.Gilbert).
- Socotrella* Bruyns & A.G.Mill. in *Novon* 12: 330 (2002). Type: *Ceropegia dolichocnema* (Bruyns) Bruyns (*Socotrella dolichocnema* Bruyns).
- Diagnostic features:* Small mat-forming or rhizomatous succulent. Stems glabrous, smooth, 4-angled. Leaves absent. Inflorescences few near apex of stems, 1- to 3-flowered, without peduncle. Corolla with tube, lobes free and spreading, staminal corona reduced to single series behind anthers.
- Distribution:* 2 spp.; Socotra.
- Taxonomic changes:*
- \**Ceropegia dioscoridis* (Lavranois) Bruyns, **comb. nov.** *Caralluma dioscoridis* Lavranos in *Hooker's Icon. Pl.* 37: t. 3687 (1971).
- \**Ceropegia dolichocnema* (Bruyns) Bruyns, **comb. nov.** *Socotrella dolichocnema* Bruyns in *Novon* 12: 330 (2002).
19. **Sect. Quaqua** (N.E.Br.) Bruyns, **comb. et stat. nov.** *Quaqua* N.E. Brown in *Gard. Chron. N.S.*, 12: 8 (1879). Type: *Ceropegia incarnata* subsp. *hottentotorum* (N.E.Br.) Bruyns (= *Quaqua hottentotorum* N.E.Br.).
- Diagnostic features:* Shrub- to clump-forming non-rhizomatous succulent. Stems glabrous, smooth, hard, 4- to 5-angled. Leaves reduced to minute rudiments fashioned into hard spikes or rounded and obsolete, sometimes with small tubercles in stipular position. Inflorescences several to many, 1- to 4- (20-) flowered, usually towards apex of stem (rarely towards base) in grooves between angles (stems not becoming slender and rounded above in flowering part). Corolla with short to long tube (not lobed to base and often with slight flat area beyond tube), lobes free and usually spreading, staminal corona in two partially fused series.
- Distribution:* 19 spp.; south-western Namibia and in western and southern South Africa, especially diverse in areas receiving rain in winter.
- Taxonomic changes:*
- \**Ceropegia acutiloba* (N.E.Br.) Bruyns, **comb. nov.** *Caralluma acutiloba* N.E.Br., *Fl. Cap.* 4 (1): 877 (1909).
- \**Ceropegia arenicola* (N.E.Br.) Bruyns, **comb. nov.** *Caralluma*

- arenicola* N.E.Br., Fl. Cap. 4 (1): 883 (1909).  
*Ceropogia arenicola* subsp. *arenicola*.  
*Ceropogia arenicola* subsp. *pilifera* (Bruyns) Bruyns, **comb. nov.**  
*Quaqua armata* subsp. *pilifera* Bruyns in Bradleya 1: 68 (1983).  
*Ceropogia arida* (Masson) Bruyns, **comb. nov.** *Stapelia arida* Masson, Stap. Nov.: 21, t. 33 (1797).  
*Ceropogia armata* (N.E.Br.) Bruyns, **comb. nov.** *Caralluma armata* N.E.Br. in Hooker's Icon. Pl. 20: t. 1902 (1890).  
*Ceropogia armata* subsp. *armata*.  
*Ceropogia armata* subsp. *maritima* (Bruyns) Bruyns, **comb. nov.**  
*Quaqua armata* subsp. *maritima* Bruyns in Bradleya 1: 66 (1983).  
*Ceropogia aurea* (C.A. Lückh.) Bruyns, **comb. nov.** *Caralluma aurea* C.A. Lückh. in 'S. A. G.' 29: 94 (1938).  
*Ceropogia bayeriana* (Bruyns) Bruyns, **comb. nov.** *Quaqua parviflora* subsp. *bayeriana* Bruyns in Bradleya 1: 52 (1983).  
*Ceropogia cincta* (C.A. Lückh.) Bruyns, **comb. nov.** *Caralluma cincta* C.A. Lückh. in S. Afr. Garden. & Country Life 25: 57 (1935).  
*Ceropogia framesii* (Pillans) Bruyns, **comb. nov.** *Caralluma framesii* Pillans in S. Afr. Garden. & Country Life 18: 62 (1928), special reprint.  
*Ceropogia incarnata* (L.f.) Bruyns, **comb. nov.** *Stapelia incarnata* L.f., Suppl. Pl.: 171 (1782).  
*Ceropogia incarnata* subsp. *incarnata*.  
*Ceropogia incarnata* subsp. *tentaculata* (Bruyns) Bruyns, **comb. nov.**  
*Quaqua incarnata* subsp. *incarnata* var. *tentaculata* Bruyns in Bradleya 1: 40 (1983).  
*Ceropogia incarnata* subsp. *hottentotorum* (N.E.Br.) Bruyns, **comb. nov.** *Quaqua hottentotorum* N.E.Br. in Gard. Chron. N.S., 12: 8 (1879).  
\**Ceropogia inversa* (N.E.Br.) Bruyns, **comb. nov.** *Caralluma inversa* N.E.Br. in Gard. Chron. ser. 3, 33: 354 (1903).  
*Ceropogia lineariloba* Bruyns, **nom. nov., non** *Ceropogia linearis* E. Mey. *Caralluma linearis* N.E.Br. in Hooker's Icon. Pl. 20: t. 1903a (1890).  
\**Ceropogia mammillaris* (L.) Bruyns, **comb. nov.** *Stapelia mammillaris* L., Mant. Pl. 2: 216 (1771).  
*Ceropogia multioriflora* Bruyns, **nom. nov., non** *Ceropogia multiflora* Baker. *Caralluma multiflora* R.A.Dyer in Bothalia 12: 253 (1977).  
*Ceropogia nevillei* Bruyns, **nom. nov., non** *Ceropogia pillansii* (N.E.Br.) Bruyns. *Caralluma pillansii* N.E.Br., Fl. Cap. 4 (1): 876 (1909).  
*Ceropogia pallens* (Bruyns) Bruyns, **comb. nov.** *Quaqua pallens* Bruyns in Bot. Jahrb. Syst. 121: 355 (1999).  
*Ceropogia parvioriflora* Bruyns, **nom. nov., non** *Ceropogia parviflora* Trimen. *Stapelia parviflora* Masson, Stap. Nov.: 22, t. 35 (1797).  
*Ceropogia parvioriflora* subsp. *parvioriflora*.  
*Ceropogia parvioriflora* subsp. *dependens* (N.E.Br.) Bruyns, **comb. nov.** *Caralluma dependens* N.E.Br. in Hooker's Icon. Pl. 20: t. 1903b (1890).  
*Ceropogia parvioriflora* subsp. *gracilis* (C.A. Lückh.) Bruyns, **comb. nov.** *Caralluma gracilis* C.A. Lückh. in 'S. A. G.' 28: 228 (1938).  
*Ceropogia parvioriflora* subsp. *swanepoelii* (Lavranos) Bruyns, **comb. nov.** *Caralluma swanepoelii* Lavranos in J. S. African Bot. 38: 97 (1972).  
*Ceropogia parvioriflora* subsp. *confusa* (Plowes) Bruyns, **comb. nov.** *Quaqua confusa* Plowes in Excelsa 16: 92 (1994).  
*Ceropogia pruinosa* (Masson) Bruyns, **comb. nov.** *Stapelia pruinosa* Masson, Stap. Nov.: 24, t. 41 (1798).  
*Ceropogia pulchra* (Bruyns) Bruyns, **comb. nov.** *Quaqua parviflora* subsp. *pulchra* Bruyns in Bradleya 1: 52 (1983).  
*Ceropogia ramosa* (Masson) Bruyns, **comb. nov.** *Stapelia ramosa* Masson, Stap. Nov.: 21, t. 32 (1797).
20. **Sect. Stapeliopsis** (Pillans) Bruyns, **comb. et stat. nov.** *Stapeliopsis* Pillans in S. Afr. Garden. & Country Life 18: 32 (1928). Type: *Ceropogia neronis* (Pillans) Bruyns (*Stapeliopsis neronis* Pillans). Diagnostic features: Small mat-forming often non-rhizomatous succulent. Stems glabrous, smooth to papillate, hard to soft, 4-angled. Leaves reduced to minute rudiments fashioned into short deltoid points, without stipular structures. Inflorescence 1 per stem, 1- to 6-flowered, towards base of stem between angles. Corolla with short to long tube (not lobed to base and often with slight flat area beyond tube), lobes free and spreading to remaining joined at tips, staminal corona in two partially fused series, inner laterally flattened, usually much exceeding outer in length and touching backs of anthers only near their bases. Distribution: 8 spp.; southern Namibia, western and southern South Africa.
- Taxonomic changes:
- \**Ceropogia brevilobulata* Bruyns, **nom. nov., non** *Ceropogia breviloba* Jum. & Perr. *Pectinaria breviloba* R.A.Dyer in J. S. African Bot. 20: 155 (1954).
  - Ceropogia exasperata* (Bruyns) Bruyns, **comb. nov.** *Pectinaria exasperata* Bruyns in J. S. African Bot. 44: 153 (1978).
  - Ceropogia khamiesbergensis* (Bruyns) Bruyns, **comb. nov.** *Stapeliopsis khamiesbergensis* Bruyns in Aloe 39: 82 (2002).
  - Ceropogia neronis* (Pillans) Bruyns, **comb. nov.** *Stapeliopsis neronis* Pillans in S. Afr. Garden. & Country Life 18: 32 (1928).
  - Ceropogia pillansioides* Bruyns, **nom. nov., non** *Ceropogia pillansii* (N.E.Br.) Bruyns. *Pectinaria pillansii* N.E.Br., Fl. Cap. 4 (1): 869 (1909).
  - Ceropogia stayneri* (M.B. Bayer) Bruyns, **comb. nov.** *Pectinaria stayneri* M.B. Bayer in J. S. African Bot. 41: 166 (1975).
  - Ceropogia tulipiflora* (C.A. Lückh.) Bruyns, **comb. nov.** *Pectinaria tulipiflora* C.A. Lückh. in S. Afr. Garden. & Country Life 34: 101 (1934).
  - Stapeliopsis saxatilis* (N.E.Br.) Bruyns in Cact. Succ. J. Gr. Brit. 43: 77 (1981). *Pectinaria saxatilis* N.E.Br. in Gard. Chron., ser. 3, 35: 211 (1904), **syn. nov.**
  - \**Ceropogia urniflora* (Lavranos) Bruyns, **comb. nov.** *Stapeliopsis urniflora* Lavranos in J. S. African Bot. 32: 195 (1966), as '*urnaeflora*'.
21. **Sect. Pectinaria** (Haw.) Bruyns, **comb. et stat. nov.** *Pectinaria* Haw., Suppl. Pl. Succ.: 14 (1819), nom. cons. Type: *Ceropogia articulata* (Aiton) Bruyns (*Pectinaria articulata* (Aiton) Haw.). Diagnostic features: Dwarf mat-forming non-rhizomatous succulent. Stems short, glabrous, finely papillate, soft, 5- to 6-angled. Leaves reduced to minute rudiments fashioned into short deltoid points, without stipular structures. Inflorescences several, 1- to 3-flowered, towards apex of stem in grooves between angles (stems not becoming slender and rounded above in flowering part). Corolla with short tube (not lobed to base and often with slight flat area beyond tube), lobes free and spreading to remaining joined at tips, staminal corona in two partially fused series. Distribution: 3 spp.; western South Africa.
- 21.1 **Key to the subsections of Sect. Pectinaria.**
- 1. Lobes of corolla remaining joined at tips and connate over centre of flower...Subsect. *Cleistanthae*.
    - Lobes of corolla free at tips and spreading.....Subsect. *Erectiflorae*.
- 21.2 **Subsect. Cleistanthae** Bruyns, **subsect. nov.** Type: *Ceropogia articulata* (Aiton) Bruyns. Diagnostic features: Corolla bud-like, lobes remaining joined at tips and connate over centre of flower. Distribution: 1 sp.; western South Africa.
- \**Ceropogia articulata* (Aiton) Bruyns, **comb. nov.** *Stapelia articulata* Aiton, Hort. Kew., ed. 1, 1: 310 (1789).
  - Ceropogia articulata* subsp. *articulata*.
  - Pectinaria flavescens* Plowes in Excelsa 20: 17 (2003), **syn. nov.**

- Ceropogia articulata* subsp. *asperiflora* (N.E.Br.) Bruyns, **comb. nov.**  
*Pectinaria asperiflora* N.E.Br., Fl. Cap. 4 (1): 871 (1909).
- Ceropogia articulata* subsp. *namaquensis* (N.E.Br.) Bruyns, **comb. nov.** *Pectinaria articulata* var. *namaquensis* N.E.Br., Fl. Cap. 4 (1): 871 (1909).
- Pectinaria erinacea* Plowes in Aloe 51: 25 (2014), **syn. nov.**
- Ceropogia articulata* subsp. *borealis* (Bruyns) Bruyns, **comb. nov.**  
*Pectinaria articulata* subsp. *borealis* Bruyns in Cact. Succ. J. Gr. Brit. 43: 67 (1981).
- 21.3 Subsect. *Erectiflorae*** (Bruyns) Bruyns, **comb. et stat. nov.**  
*Pectinaria* sect. *Erectiflorae* Bruyns in Cact. Succ. J. Gr. Brit. 43: 63 (1981). Type: *Ceropogia longipes* (N.E.Br.) Bruyns (*Pectinaria longipes* (N.E.Br.) Bruyns).  
*Vadulia* Plowes in Excelsa 20: 18 (2003). Type: *Ceropogia longipes* (N.E.Br.) Bruyns (*Vadulia longipes* (N.E.Br.) Plowes.).  
*Diagnostic features:* Corolla rotate, lobes free at tips and widely spreading.  
*Distribution:* 2 spp.; western South Africa.  
*Taxonomic changes:*  
\**Ceropogia longipes* (N.E.Br.) Bruyns, **comb. nov.** *Caralluma longipes* N.E.Br., Fl. Cap. 4 (1): 887 (1909).  
*Ceropogia longipes* subsp. *longipes*.  
*Ceropogia longipes* subsp. *villetii* (C.A. Lückh.) Bruyns, **comb. nov.** *Caralluma longipes* var. *villetii* C.A. Lückh. in 'S.A.G.' 28: 228 (1938).  
*Ceropogia maughanii* (R.A.Dyer) Bruyns, **comb. nov.** *Caralluma maughanii* R.A.Dyer in Rec. Albany Mus. 4: 115 (1931).
- 22. Sect. *Baynesia*** (Bruyns) Bruyns, **comb. et stat. nov.** *Baynesia* Bruyns in Novon 10: 354 (2000). Type: *Ceropogia lophophora* (Bruyns) Bruyns (*Baynesia lophophora* Bruyns).  
*Diagnostic features:* Dwarf non-rhizomatous succulent. Stems glabrous, rugulose, soft, 4-angled. Leaves reduced to minute ovate rudiments, without stipular structures. Inflorescences many per stem towards apex between angles, 1- to 4-flowered. Corolla with short tube (not lobed to base and often with slight flat area beyond tube), lobes free and spreading, staminal corona in two partially fused series.  
*Distribution:* 1 sp.; mountainous areas of north-western Namibia.  
*Taxonomic changes:*  
\**Ceropogia lophophora* (Bruyns) Bruyns, **comb. nov.** *Baynesia lophophora* Bruyns in Novon 10: 354 (2000).
- 23. Sect. *Ophionella*** (Bruyns) Bruyns, **comb. et stat. nov.** *Ophionella* Bruyns in Cact. Succ. J. Gr. Brit. 43: 70 (1981). Type: *Ceropogia arcuata* (N.E.Br.) Bruyns (*Ophionella arcuata* (N.E.Br.) Bruyns).  
*Diagnostic features:* Dwarf densely mat-forming non-rhizomatous succulent. Stems glabrous, finely papillate, soft, 4-angled. Leaves reduced to short deltoid point, without stipular structures. Inflorescence 1 towards base of stem between angles, 1- to 4-flowered. Corolla with short tube (not lobed to base), lobes usually remaining joined at tips, staminal corona in two partially fused series, inner pressed to backs of anthers.  
*Distribution:* 2 spp.; southern South Africa.  
*Taxonomic changes:*  
\**Ceropogia arcuata* (N.E.Br.) Bruyns, **comb. nov.** *Pectinaria arcuata* N.E.Br., Fl. Cap. 4 (1): 870 (1909).  
*Ceropogia arcuata* subsp. *arcuata*.  
*Ceropogia arcuata* subsp. *mirkini* (Pillans) Bruyns, **comb. nov.** *Pectinaria mirkini* Pillans in J. S. African Bot. 5: 64 (1939).  
\**Ceropogia willowmorensis* (Bruyns) Bruyns, **comb. nov.** *Ophionella willowmorensis* Bruyns in J. Linn. Soc., Bot. 131: 396 (1999).
- 24. Sect. *Lavrania*** (Plowes) Bruyns, **comb. et stat. nov.** *Lavrania* Plowes in Cact. Succ. J. (Los Angeles) 58: 122 (1986). Type: *Ceropogia haagnerae* (Plowes) Bruyns (*Lavrania haagnerae* Plowes).  
*Diagnostic features:* Small shrub-forming non-rhizomatous succulent. Stems glabrous, smooth, 10- to 12-angled. Leaves reduced to short conical point, without stipular structures. Inflorescence 1 towards base of stem between angles, 1- to 10-flowered. Corolla with short tube (not lobed to base and with slight flat area beyond tube), lobes free and spreading, staminal corona in two partially fused series.  
*Distribution:* 1 sp.; very local in northern Namibia.  
*Taxonomic changes:*  
\**Ceropogia haagnerae* (Plowes) Bruyns, **comb. nov.** *Lavrania haagnerae* Plowes in Cact. Succ. J. (Los Angeles) 58: 123 (1986).
- 25. Sect. *Hoodia*** (Sweet) Bruyns, **comb. et stat. nov.** *Hoodia* Sweet, Hort. Brit., ed. 2: 359 (1830). Type: *Ceropogia gordoni* (Masson) Bruyns (*Hoodia gordoni* (Masson) Sweet ex Decne.).  
*Diagnostic features:* Shrub-forming non-rhizomatous succulent. Stems glabrous, smooth, hard, 11- to 34-angled. Leaves reduced to weak to sharp spike, without stipular structures. Inflorescences many per stem towards apex in grooves between angles, mostly 1- to 6-flowered. Corolla with short tube (not lobed to base and often with flat area beyond tube sometimes large and plate-like), lobes free and spreading, staminal corona in two partially fused series.  
*Distribution:* 14 spp.; Angola, Botswana, Namibia, South Africa and Zimbabwe.  
*Taxonomic changes:*  
\**Ceropogia alstonii* (N.E.Br.) Bruyns, **comb. nov.** *Trichocaulon alstonii* N.E.Br. in Bull. Misc. Inform. 1906: 166 (1906).  
*Ceropogia colei* (Plowes) Bruyns, **comb. nov.** *Hoodia colei* Plowes in Asklepios 56: 8 (1992). *Trichocaulon pillansii* N.E.Br. in Gard. Chron., ser. 3, 35: 242 (1904).  
*Hoodia grandis* (N.E.Br.) Plowes in Asklepios 56: 9 (1992). *Trichocaulon grande* N.E.Br., Fl. Cap. 4 (1): 892 (1909), **syn. nov.**  
*Ceropogia currorii* (Hook.) Bruyns, **comb. nov.** *Scytanthus currorii* Hook. in Hooker's Icon. Pl. 7: t. 605–606 (1844).  
*Ceropogia currorii* subsp. *currorii*.  
*Ceropogia currorii* subsp. *lugardii* (N.E.Br.) Bruyns, Bruyns, **comb. nov.** *Hoodia lugardii* N.E.Br., Fl. Trop. Afr. 4 (1): 491 (1903).  
*Ceropogia dregei* (N.E.Br.) Bruyns, **comb. nov.** *Hoodia dregei* N.E.Br., Fl. Cap. 4 (1): 897 (1909).  
*Ceropogia flavanthera* Bruyns, **nom. nov.**, **non** *Ceropogia flava* (N.E.Br.) Bruyns. *Trichocaulon flavum* N.E.Br. in J. Linn. Soc., Bot. 17: 165, t. 11, fig. 2–4 (1878).  
*Ceropogia floriparva* Bruyns, **nom. nov.**, **non** *Ceropogia parviflora* Trimen. *Hoodia parviflora* N.E.Br. in Bull. Misc. Inform. 1895: 265 (1895).  
\**Ceropogia gordoni* (Masson) Bruyns, **comb. nov.** *Stapelia gordoni* Masson, Stap. Nov.: 24, t. 40 (1797).  
\**Ceropogia juttae* (Dinter) Bruyns, **comb. nov.** *Hoodia juttae* Dinter, Neue Pflanzen Deutsch-SWA's: 34, fig. 25 (1914).  
\**Ceropogia mossamedensis* (L.C.Leach) Bruyns, **comb. nov.** *Trichocaulon mossamedense* L.C.Leach in J. S. African Bot. 40: 15 (1974).  
\**Ceropogia officinalis* (N.E.Br.) Bruyns, **comb. nov.** *Trichocaulon officinale* N.E.Br. in Bull. Misc. Inform. 1895: 264 (1895).  
*Ceropogia officinalis* subsp. *officinalis*.  
*Ceropogia officinalis* subsp. *delaetiana* (Dinter) Bruyns, **comb. nov.** *Trichocaulon delaetianum* Dinter in Feddes Repert. Spec. Nov. Regni Veg. 19: 155 (1923).  
*Ceropogia pedicellata* (Schinz) Bruyns, **comb. nov.** *Trichocaulon pedicellatum* Schinz in Verh. Vereins Prov. Brandenburg 30: 266 (1888).  
*Ceropogia pilifera* (L.f.) Bruyns, **comb. nov.** *Stapelia pilifera* L.f., Suppl. Pl.: 171 (1782).  
*Ceropogia pilifera* subsp. *pilifera*.  
*Ceropogia pilifera* subsp. *annulata* (N.E.Br.) Bruyns, **comb. nov.**

- Trichocaulon annulatum* N.E.Br., Fl. Cap. 4 (1): 889 (1909).  
*Ceropegia ruschii* (Dinter) Bruyns, **comb. nov.** *Hoodia ruschii* Dinter in Feddes Repert. Spec. Nov. Regni Veg. 30: 192 (1932).  
*Ceropegia triebneri* (Nel) Bruyns, **comb. nov.** *Trichocaulon triebneri* Nel in Kakteenk. 1935: 117 (1935).
26. **Sect. Larryleachia** (Plowes) Bruyns, **comb. et stat. nov.** *Larryleachia* Plowes in *Excelsa* 17: 5 (1996). Type: *Ceropegia cactiformis* (Hook.) Bruyns (*Larryleachia cactiformis* (Hook.) Plowes).  
*Notechidnopsis* Lavranos & Bleck in Cact. Succ. J. (Los Angeles) 57: 255 (1985). Type: *Ceropegia tessellata* (Pillans) Bruyns (*Notechidnopsis tessellata* (Pillans) Lavranos & Bleck).  
*Richtersveldia* Meve & Liede in Plant Syst. Evol. 234: 204 (2002). Type: *Ceropegia columnaris* (Nel) Bruyns (*Richtersveldia columnaris* (Nel) Meve & Liede).  
**Diagnostic features:** Dwarf shrub-forming or mat-forming rarely rhizomatous succulent. Stems glabrous, smooth, firm, 6- to 19-angled (tuberles sometimes very irregularly arranged). Leaves reduced to deltoid point or minute dorsiventrally flattened rudiment, without stipular structures. Inflorescences many per stem towards apex between tuberles, mostly 1- to 6-flowered. Corolla with short tube (not lobed to base and often with flat area beyond tube), lobes free and spreading, staminal corona in two partially fused series.  
**Distribution:** 7 spp.; mainly along the margins of the Namib Desert in Namibia and western South Africa.  
**Taxonomic changes:**  
\**Ceropegia cactiformis* (Hook.) Bruyns, **comb. nov.** *Stapelia cactiformis* Hook. in Bot. Mag. 70: t. 4127 (1844).  
*Ceropegia cactiformis* var. *cactiformis*.  
*Ceropegia cactiformis* var. *felina* (Cole) Bruyns, **comb. nov.** *Trichocaulon felinum* Cole in Aloe 22: 6 (1985).  
\**Ceropegia columnaris* (Nel) Bruyns, **comb. nov.** *Trichocaulon columnare* Nel, Kakteenk. 1933: 135 (1933).  
\**Ceropegia marlothii* (N.E.Br.) Bruyns, **comb. nov.** *Trichocaulon marlothii* N.E.Br., Fl. Cap. 4 (1): 894 (1909).  
\**Ceropegia perlata* (Dinter) Bruyns, **comb. nov.** *Trichocaulon perlatum* Dinter in Feddes Repert. Spec. Nov. Regni Veg. 19: 155 (1923).  
\**Ceropegia picta* (N.E.Br.) Bruyns, **comb. nov.** *Trichocaulon pictum* N. E.Br. in Bull. Misc. Inform. 1909: 307 (1909).  
\**Ceropegia tessellata* (Pillans) Bruyns, **comb. nov.** *Caralluma tessellata* Pillans in Bull. Misc. Inform. 1933: 187 (1933).  
\**Ceropegia tirasmontana* (Plowes) Bruyns, **comb. nov.** *Leachiella tirasmontana* Plowes in Brit. Cact. Succ. J. 11: 58 (1993).
27. **Sect. Stapelianthus** (Choux) Bruyns, **comb. et stat. nov.** *Stapelianthus* Choux in A.C. White & B. Sloane, *Stap.*, ed. 1: 71 (1933). Type: *Ceropegia malagascica* Bruyns (= *Stapelianthus madagascariensis* (Choux) Choux).  
**Diagnostic features:** Small mat-forming non-rhizomatous succulent. Stems glabrous, smooth to bullate, 4- to 8-angled (or irregularly covered with tuberles). Leaves reduced to deltoid point or filiform, without stipular structures. Inflorescence 1 towards base of stem between tuberles, 1- to 4-flowered. Corolla with short to urceolate tube (not lobed to base and sometimes with flat area beyond tube), lobes free and spreading, staminal corona in two partially fused series.  
**Distribution:** 7 spp.; Madagascar.  
**Taxonomic changes:**  
\**Ceropegia areniphila* Bruyns, **nom. nov.**, **non** *Ceropegia arenaria* R.A.Dyer. *Stapelianthus arenarius* Bosser & Morat in Adansonia, sér. 2, 11: 340 (1971).  
\**Ceropegia decaryana* Bruyns, **nom. nov.**, **non** *Ceropegia decaryi* Choux. *Stapelianthus decaryi* Choux in Ann. Inst. t.-Géol. Colon. Marseille, ser. 5, 2: 7. 1934 (1934).
- Ceropegia insignanthera* Bruyns, **nom. nov.**, **non** *Ceropegia insignis* R.A.Dyer. *Stapelianthus insignis* Desc. in Naturaliste Malgache 9: 181 (1957).  
*Ceropegia keraudreniae* (Bosscher & Morat) Bruyns, **comb. nov.** *Stapelianthus keraudreniae* Bosscher & Morat in Adansonia, sér. 2, 11: 337 (1971) as 'keraudreniae'.  
*Ceropegia malagascica* Bruyns, **nom. nov.**, **non** *Ceropegia madagascariensis* Decne. *Stapeliopsis madagascariensis* Choux in Compt. Rend. Hebd. Séances Acad. Sci. 193: 1444 (1931).  
*Ceropegia montagnacii* (Boiteau) Bruyns, **comb. nov.** *Stapelia montagnacii* Boiteau in Bull. Trimestriel Acad. Malgache N.S. 24: 83 (1942).  
*Ceropegia pilosa* (Lavranos & D.S. Hardy) Bruyns, **comb. nov.** *Stapelianthus pilosus* Lavranos & D.S. Hardy in J. S. African Bot. 27: 237 (1961). *Trichocaulon decaryi* Choux in Ann. Inst. Bot.-Géol. Colon. Marseille, ser. 4, 10: 10 (1932).
28. **Sect. Tavaresia** (Welw.) Bruyns, **comb. et stat. nov.** *Tavaresia* Welw. in Bol. Cons. Ultr., parte nao oficial 7: 79 (1854). Type: *Tavaresia angolensis* Welw. (= *Ceropegia tavaresii* Welw. ex Bruyns).  
Mat-forming non-rhizomatous succulent. Stems glabrous, smooth, 6- to 14-angled. Leaves reduced to 3 fine sharp bristles on each tubercle, without stipular structures. Inflorescence 1 towards base of stem between tuberles, 1- to 4-flowered. Corolla with deeply cup-like to cylindrical tube, lobes free and spreading, staminal corona in two partially fused series.  
**Distribution:** 3 spp.; southern Africa in Angola, Botswana, Namibia, South Africa, Zimbabwe.  
\**Ceropegia barklyana* Bruyns, **nom. nov.**, **non** *Ceropegia barklyi* Hook.f. *Decabelone barklyi* Dyer in Bot. Mag. 101: t. 6203 (1875).  
\**Ceropegia tavaresii* Welw. ex Bruyns, **comb. nov.** *Huernia tavaresii* Welw. in Bol. Cons. Ultram. 24: 252 (1856), **nom. nud.**  
*Tavaresia angolensis* Welw. in Bol. Cons. Ultram. 7: 79 (1854), **syn. nov.**  
*Decabelone elegans* Decne. in Ann. Sci. Nat. Bot., sér. 5, 13: 404, t. 2 (1871), **syn. nov.**  
\**Ceropegia thompsoniorum* (Van Jaarsveld & Nagel) Bruyns, **comb. nov.** *Tavaresia thompsoniorum* Van Jaarsveld & Nagel in Asklepios 76: 9 (1999) as 'thompsonii'.
29. **Sect. Minimae** Bruyns, **sect. nov.** Type: *Ceropegia miscella* (N.E.Br.) Bruyns.  
**Diagnostic features:** Dwarf rhizomatous succulent. Stems glabrous, smooth, 4-angled. Leaves reduced to soft tooth, without stipular structures. Inflorescence 1 towards base of stem between tuberles, 1- to 4-flowered. Corolla with short bowl-shaped tube, lobes free and spreading (not lobed to base and sometimes with small flat area beyond tube), staminal corona in two partially fused series, inner pressed to backs of anthers without dorsal projections.  
**Distribution:** 1 sp.; arid parts of southern South Africa but of very sporadic occurrence.  
**Taxonomic changes:**  
\**Ceropegia miscella* (N.E.Br.) Bruyns, **comb. nov.** *Stapelia miscella* N.E.Br., Fl. Cap. 4 (1): 977 (1909).
30. **Sect. Stapelia** (L.) Bruyns, **sect. nov.** *Stapelia* L. Sp. Pl. 1: 217 (1753). Lectotype (designated by Brummitt, 1995): *Stapelia hirsuta* L. (= *Ceropegia pulvinata* (Masson) Bruyns).  
**Diagnostic features:** Densely or loosely clump-forming non-rhizomatous succulent. Stems pubescent to nearly glabrous, papillate, mostly 4-angled. Leaves reduced to small deltoid to lanceolate rudiment, with minute glandular stipules. Inflorescences 1 towards base of stem between tuberles or several towards apex of stem, 1- to 4-flowered. Corolla with short bowl-shaped (rarely deeply

cup-like) tube (not lobed right to base and sometimes with flat area beyond tube), lobes free and spreading, staminal corona in two partially fused series, inner pressed to backs of anthers often with prominent laterally flattened dorsal projections.

*Distribution:* 27 spp.; southern Africa and extending northwards to Angola and Malawi.

*Taxonomic changes:*

*Ceropegia arenosa* (C.A. Lückh.) Bruyns, **comb. nov.** *Stapelia arenosa* C.A. Lückh. in S. Afr. Garden. & Country Life 25: 96 (1935). *Ceropegia cedrimontana* (Frandsen) Bruyns, **comb. nov.** *Stapelia cedrimontana* Frandsen in Cact. Succ. J. (Los Angeles) 47: 260 (1975).

\**Ceropegia clavicorona* (I. Verd.) Bruyns, **comb. nov.** *Stapelia clavicorona* I. Verd. in Fl. Pl. South Africa 11: t. 407 (1931).

*Ceropegia divaricata* (Masson) Bruyns, **comb. nov.** *Stapelia divaricata* Masson, Stap. Nov.: 17, t. 22 (1797).

*Ceropegia erectiflora* (N.E.Br.) Bruyns, **comb. nov.** *Stapelia erectiflora* N.E.Br. in Gard. Chron., ser. 3, 6: 650 (1889).

\**Ceropegia flavopurpurea* (Marloth) Bruyns, **comb. nov.** *Stapelia flavopurpurea* Marloth in Trans. S. African Philos. Soc. 18: 48, t. 5, fig. 1 (1907). Type: South Africa, Laingsburg distr., fl. March 1906, Marloth 4227 (missing). South Africa, Asbestos Hills, near Prieska, Marloth 5117 (PRE, neo!, designated here; GRA, isoneo!).

*Note:* This specimen was designated as lectotype by Bruyns (2005), but, although annotated by Marloth as 'Type', it was not mentioned in the protologue and cannot therefore be a lectotype.

\**Ceropegia gettliffei* (Pott) Bruyns, **comb. nov.** *Stapelia gettliffei* Pott in Ann. Transvaal Mus. 3: 226, t. 13 (1913).

\**Ceropegia gigantea* (N.E.Br.) Bruyns, **comb. nov.** *Stapelia gigantea* N.E.Br. in Gard. Chron. N.S., 7: 684 (1877). Type: South Africa, Natal, Gerrard 717 (K, lecto!, designated here).

*Note:* Brown (1877) cited two collections, Plant (K!) and Gerrard 717 (K!). The latter is selected as lectotype here as this was not designated properly in Bruyns (2005).

\**Ceropegia glanduliflora* (Masson) Bruyns, **comb. nov.** *Stapelia glanduliflora* Masson, Stap. Nov.: 16, t. 19 (1797).

*Ceropegia grandiflora* (Masson) Bruyns, **comb. nov.** *Stapelia grandiflora* Masson, Stap. Nov.: 13, t. 11 (1797).

*Ceropegia grandiflora* var. *grandiflora*.

*Ceropegia grandiflora* var. *conformis* (N.E.Br.) Bruyns, **comb. nov.** *Stapelia conformis* N.E.Br., Fl. Cap. 4 (1): 959 (1909).

*Ceropegia indocta* Nel Bruyns, **comb. nov.** *Stapelia indocta* Nel in Sukkulenkunde 2: 33 (1948). Type: South Africa, Cape, Namaqualand, Nuwerus, Nel 415 (missing). South Africa, Cape, 15 miles NW of Bitterfontein, Bruyns 1300 (NBG, neo!, designated here).

*Stapelia acuminata* Masson, Stap. Nov.: 15, t. 17 (1797), **syn. nov.**

*Ceropegia juttae* (Dinter) Bruyns, **comb. nov.** *Stapelia juttae* Dinter, Neue Pflanzen Deutsch-SWAs: 53, t. 60 (1914).

*Stapelia portae-taurinae* Dinter & A. Berger in Bot. Jahrb. Syst. 50, Suppl.: 592 (1914), **syn. nov.**

*Stapelia similis* N.E.Br. in Bull. Misc. Inform. 1911: 358 (1911), **syn. nov.**

*Ceropegia leendertziae* (N.E.Br.) Bruyns, **comb. nov.** *Stapelia leendertziae* N.E.Br. in Ann. Transvaal Mus. 2: 168 (1910).

*Ceropegia longipedicellata* (A. Berger) Bruyns, **comb. nov.** *Stapelia kwebensis* var. *longipedicellata* A. Berger, Stap. u. Klein.: 318 (1910).

*Stapelia kwebensis* N.E.Br., Fl. Trop. Afr. 4 (1): 501 (1903), **syn. nov.**

*Ceropegia nevillepillansii* Bruyns, **nom. nov., non** *Ceropegia pillansii* (N.E.Br.) Bruyns. *Stapelia pillansii* N.E.Br. in Gard. Chron., ser. 3, 35: 242 (1904).

*Ceropegia obducta* (L.C.Leach) Bruyns, **comb. nov.** *Stapelia obducta* L.C.Leach in S. African J. Bot. 3: 169 (1984).

*Ceropegia olivacea* (N.E.Br.) Bruyns, **comb. nov.** *Stapelia olivacea* N.E.Br. in Gard. Chron. N.S., 3: 136 (1875).

*Ceropegia paniculata* (Willd.) Bruyns, **comb. nov.** *Stapelia paniculata* Willd., Enum. Pl. Suppl.: 13 (1814).

*Ceropegia paniculata* subsp. *paniculata*.

*Ceropegia paniculata* subsp. *scitula* (L.C.Leach) Bruyns, **comb. nov.** *Stapelia scitula* L.C.Leach in S. African J. Bot. 3: 174 (1984).

*Ceropegia paniculata* subsp. *kougabergensis* (L.C.Leach) Bruyns, **comb. nov.** *Stapelia kougabergensis* L.C.Leach in S. African J. Bot. 3: 176 (1984).

\**Ceropegia parvulior* (Kers) Bruyns, **nom. nov., non** *Ceropegia parvula* (N.E.Br.) Bruyns. *Stapelia parvula* Kers in Bot. Notiser 122: 173 (1969).

*Ceropegia pearsonii* (N.E.Br.) Bruyns, **comb. nov.** *Stapelia pearsonii* N.E.Br. in Bull. Misc. Inform. 1913: 304 (1913).

\**Ceropegia pulvinata* (Masson) Bruyns, **comb. nov.** *Stapelia pulvinata* Masson, Stap. Nov.: 13, t. 13 (1797).

*Stapelia hirsuta* L., Sp. Pl. 1: 217 (1753), **syn. nov.**

*Stapelia asterias* Masson, Stap. Nov.: 14, t. 14 (1797), **syn. nov.**

*Stapelia sororia* Masson, Stap. Nov.: 23, t. 39 (1797), **syn. nov.**

*Ceropegia pulvinata* var. *pulvinata*.

*Ceropegia pulvinata* var. *glabericaulis* (N.E.Br.) Bruyns, **comb. nov.** *Stapelia glabericaulis* N.E.Br. in Hooker's Icon. Pl. 20: t. 1917 (1890).

*Stapelia tsomoensis* N.E.Br. in Gard. Chron. N.S., 18: 168 (1882), **syn. nov.**

*Stapelia forcipis* E. Phillips & Letty in Fl. Pl. South Africa 12: t. 460 (1932). *Gonostemon glabericaulis* var. *forcipis* (E. Phillips & Letty) P.V. Heath in Calyx 3: 8 (1993), **syn. nov.**

*Note:* The use of the varietal name 'var. *tsomoensis*' in Bruyns (2005) was incorrect. When Heath created the combination *Gonostemon glabericaulis* var. *forcipis*, he automatically created 'var. *glabericaulis*' as well. These have priority at varietal rank.

*Ceropegia pulvinata* var. *praetermissa* (L.C.Leach) Bruyns, **comb. nov.** *Stapelia praetermissa* L.C.Leach in S. African J. Bot. 3: 171 (1984).

*Stapelia baylissii* L.C.Leach in S. African J. Bot. 3: 172 (1984), **syn. nov.**

*Stapelia praetermissa* var. *luteola* L.C.Leach in S. African J. Bot. 3: 172 (1984), **syn. nov.**

*Note:* The use of the varietal name 'var. *baylissii*' in Bruyns (2005) was incorrect. When Leach created *Stapelia praetermissa* var. *luteola*, he automatically created 'var. *praetermissa*' as well. These have priority at varietal rank.

*Ceropegia pulvinata* var. *vetula* (Masson) Bruyns, **comb. nov.** *Stapelia vetula* Masson, Stap. Nov.: 15, t. 16 (1797).

*Ceropegia pulvinata* var. *gariepensis* (Pillans) Bruyns, **comb. nov.** *Stapelia gariepensis* Pillans in S. Afr. Garden. & Country Life 18: 62 (1928), special reprint.

\**Ceropegia rufa* (Masson) Bruyns, **comb. nov.** *Stapelia rufa* Masson, Stap. Nov.: 16, t. 20 (1797).

*Ceropegia rubiginosa* (Nel) Bruyns, **comb. nov.** *Stapelia rubiginosa* Nel in Jahrb. Deutschen Kakteen.-Ges. 3: 20 (1935).

\**Ceropegia schinzii* (A. Berger & Schltr.) Bruyns, **comb. nov.** *Stapelia schinzii* A. Berger & Schltr. in Vierteljahrsschr. Naturf. Ges. Zürich 53: 491 (1909).

*Ceropegia schinzii* var. *schinzii*.

*Ceropegia schinzii* var. *bergeriana* (Dinter) Bruyns, **comb. nov.** *Stapelia bergeriana* Dinter, Neue Pflanzen Deutsch-SWAs.: 51 (1914).

*Ceropegia schinzii* var. *angolensis* (Kers) Bruyns, **comb. nov.** *Stapelia schinzii* var. *angolensis* Kers in Bot. Notiser 122: 176 (1969).

*Ceropegia surrecta* (N.E.Br.) Bruyns, **comb. nov.** *Stapelia surrecta* N.E.Br., Fl. Cap. 4 (1): 970 (1909).

*Ceropegia unicornis* (C.A. Lückh.) Bruyns, **comb. nov.** *Stapelia unicornis* C.A. Lückh. in 'S. A. G.' 28: 228 (1938).

*Ceropegia villetiae* (C.A. Lückh.) Bruyns, **comb. nov.** *Stapelia villetiae* C.A. Lückh. in 'S. A. G.' 28: 228 (1938).

- 31. Sect. *Tridentea*** (Haw.) Bruyns, **comb. et stat. nov.** *Tridentea* Haw., Syn. Pl. Succ.: 34 (1812). Lectotype (designated by Leach, 1980): *Ceropegia gemmiflora* (Masson) Bruyns (*Tridentea gemmiflora* (Masson) Haw.).
- Diagnostic features:* Clump-forming non-rhizomatous succulent. Stems glabrous, smooth, 4-angled. Leaves reduced to small deltoid to lanceolate rudiment, with minute stipular hairs. Inflorescence 1 towards base of stem between tubercles, 1- to 10-flowered and often gradually developing knobby peduncle. Corolla with short bowl-shaped (to cup-like) tube (not lobed right to base and sometimes with flat area beyond tube), lobes free and spreading, staminal corona in two series partially fused together, inner pressed to backs of anthers often with prominent laterally flattened dorsal projections.
- Distribution:* 8 spp.; southern Africa in Botswana, Namibia and South Africa.
- Taxonomic changes:*
- Ceropegia ausana* (Dinter & A. Berger ex Dinter) Bruyns, **comb. nov.** *Stapelia ausana* Dinter & A. Berger ex Dinter in Feddes Repert. Spec. Nov. Regni Veg. 23: 365 (1927).
- Stapelia jucunda* N.E.Br., Fl. Cap. 4 (1): 975 (1909), **syn. nov.**
- Stapelia cincta* Marloth in Trans. Roy. Soc. S. Africa 3: 125 (1913), **syn. nov.**
- Stapelia dinteri* A. Berger in Dinter, Neue Pflanzen Deutsch-SWA: 51 (1914), **syn. nov.**
- Ceropegia dwequensis* (C.A. Lückh.) Bruyns, **comb. nov.** *Stapelia dwequensis* C.A. Lückh. in A.C. White & B. Sloane, Stap., ed. 2, 2: 511 (1937).
- \**Ceropegia gemmiflora* (Masson) Bruyns, **comb. nov.** *Stapelia gemmiflora* Masson, Stap. Nov.: 14, t. 15 (1797).
- Ceropegia marientalensis* (Nel) Bruyns, **comb. nov.** *Stapelia marientalensis* Nel in Kakteenk. 1935: 118 (1935).
- Ceropegia marientalensis* subsp. *marientalensis*.
- Ceropegia marientalensis* subsp. *albipilosa* (Giess) Bruyns, **comb. nov.** *Stapelia albipilosa* Giess in Mitteil. Bot. Staatssamm. München 11: 349 (1974).
- \**Ceropegia pachyrrhiza* (Dinter) Bruyns, **comb. nov.** *Stapelia pachyrrhiza* Dinter in Feddes Repert. Spec. Nov. Regni Veg. 19: 154 (1923).
- Ceropegia parvipuncta* (N.E.Br.) Bruyns, **comb. nov.** *Stapelia parvipuncta* N.E.Br. in Hooker's Icon. Pl. 20: t. 1923 (1890).
- Ceropegia parvipuncta* subsp. *parvipuncta*.
- Ceropegia parvipuncta* subsp. *truncata* (C.A. Lückh.) Bruyns, **comb. nov.** *Stapelia parvipuncta* var. *truncata* C.A. Lückh. in A.C. White & B. Sloane, Stap., ed. 2, 3: 1145 (1937).
- \**Ceropegia peculiaris* (C.A. Lückh.) Bruyns, **comb. nov.** *Stapelia peculiaris* C.A. Lückh. in 'S. A. G.' 29: 94 (1938).
- \**Ceropegia virescens* (N.E.Br.) Bruyns, **comb. nov.** *Stapelia virescens* N.E.Br. in Hooker's Icon. Pl. 20: t. 1910 b (1890). Lectotype (designated here): —South Africa, Karoo, on the road to the diamond fields, Dickson sub Barkly 35 (K!).
- Note:* Leach (1980) did not designate a lectotype from among the two syntypes, so this is done here.
- 32. Sect. *Neotromotriche*** (Haw.) Bruyns, **sect. nov.** Type: *Ceropegia penduliflora* (Sweet) Bruyns.
- Diagnostic features:* Clump-forming rarely rhizomatous succulent. Stems glabrous, finely papillate, mostly 4-angled. Leaves absent (tubercles rounded at tips), without stipular structures. Inflorescences 1 towards base of stem between tubercles or few towards apex of stem, 1- to 6-flowered and often gradually developing knobby peduncle. Corolla with bowl-shaped (rarely deeply cup-like) tube (not lobed right to base and sometimes with flat area beyond tube), lobes free and spreading, staminal corona in two series partially fused together, inner pressed to backs of anthers often with prominent laterally flattened dorsal projections.
- Distribution:* 5 spp.; semi-arid to arid parts of southern Namibia and western South Africa, mainly in areas receiving rainfall in winter.
- Taxonomic changes:*
- Ceropegia aperta* (Masson) Bruyns, **comb. nov.** *Stapelia aperta* Masson, Stap. Nov.: 23, t. 37 (1797).
- Ceropegia penduliflora* (Sweet) Bruyns, **comb. nov.** *Caruncularia penduliflora* Sweet, Hort. Brit., ed. 2: 359 (1830). Lectotype (designated here): Jacq., Stap.: t. 61.
- Stapelia pedunculata* Masson, Stap. Nov.: 17, t. 21 (1797), **syn. nov.**
- Ceropegia penduliflora* subsp. *penduliflora*.
- Ceropegia penduliflora* subsp. *longipes* (C.A. Lückh.) Bruyns, **comb. nov.** *Stapelia longipes* C.A. Lückh. in S. Afr. Garden. & Country Life 24: 245 (1934).
- \**Ceropegia ruschiana* (Dinter) Bruyns, **comb. nov.** *Stapelia ruschiana* Dinter in Feddes Repert. Spec. Nov. Regni Veg. 19: 177 (1923).
- \**Ceropegia tigrina* (Nel) Bruyns, **comb. nov.** *Stapelia tigrina* Nel, Kakteenk. 1933: 133 (1933). *Stapelia neliana* A.C. White & B. Sloane, Stap., ed. 2, 2: 638 (1937), nom. superfl. Type: South Africa, Hellskloof, Herre sub STE 6049 (missing). White & Sloane, Stap., ed. 2, 2: Fig. 607 (lecto., designated here).
- Note:* As Leach (1980) pointed out, the type is missing, but he did not designate a lectotype, so this is done here.
- Stapelia herrei* Nel, Kakteenk. 1933: 69 (1933), **syn. nov.**
- Ceropegia umdausensis* (Nel) Bruyns, **comb. nov.** *Caralluma umdausensis* Nel in Jahrb. Deutschen Kakt.-Ges. 3: 22 (1935).
- 33. Sect. *Huernia*** (R.Br.) Bruyns, **comb. et stat. nov.** *Huernia* R.Br. in Mem. Wern. Nat. Hist. Soc.: 22 (1810). Lectotype (designated by White & Sloane, 1937): *Huernia campanulata* (Masson) Haw. (= *Ceropegia clavigera* (Jacq.) Bruyns).
- Diagnostic features:* Mat-forming rarely rhizomatous sometimes prostrate or pendulous succulent. Stems glabrous, smooth, 4- to 16-angled. Leaves reduced to soft point or rarely fine bristle, without stipular structures. Inflorescence 1 towards base of stem between tubercles, 1- to 6-flowered. Corolla with short bowl-shaped to deeply cup-like tube, lobes free and spreading (not lobed to base and sometimes with flat area beyond tube), staminal corona in two well separated series, inner pressed to backs of anthers often with prominent transversely rounded dorsal projections.
- Distribution:* 54 spp.; South Africa to West Africa (Nigeria), East and North-east Africa, southern Arabian Peninsula to South-eastern Yemen.
- Taxonomic changes:*
- \**Ceropegia angolensis* (L.C.Leach) Bruyns, **comb. & stat. nov.** *Huernia verekeri* var. *angolensis* L.C.Leach in J. S. African Bot. 40: 19 (1974).
- Ceropegia archeri* (L.C.Leach) Bruyns, **comb. nov.** *Huernia archeri* L.C.Leach in Excelsa Tax. Ser. 4: 88 (1988).
- \**Ceropegia aspera* (N.E.Br.) Bruyns, **comb. nov.** *Huernia aspera* N.E. Br. in Gard. Chron., ser. 3, 2: 364 (1887).
- Ceropegia blyderiverensis* (L.C.Leach) Bruyns, **comb. nov.** *Huernia quinta* var. *blyderiverensis* L.C.Leach in Excelsa Taxon. Ser. 4: 178 (1988).
- Ceropegia calosticta* (Bruyns) Bruyns, **comb. nov.** *Huernia calosticta* Bruyns in Bothalia 38: 83 (2008).
- Ceropegia clavigera* (Jacq.) Bruyns, **comb. nov.** *Stapelia clavigera* Jacq., Stap.: t. 5 (1806–19).
- Ceropegia clavigera* subsp. *clavigera*.
- Stapelia barbata* Masson, Stap. Nov.: 11, t. 7 (1796). *Huernia barbata* (Masson) Haw., Syn. Pl. Succ.: 31 (1812), **syn. nov.**
- Stapelia campanulata* Masson, Stap. Nov.: 11, t. 6 (1796). *Huernia campanulata* (Masson) Haw., Syn. Pl. Succ.: 28 (1812), **syn. nov.**
- Ceropegia clavigera* subsp. *ingeae* (Lavranos) Bruyns, **comb. nov.** *Huernia ingeae* Lavranos in Cact. & Succ. J. (Los Angeles) 54: 99 (1982).
- Ceropegia concinna* (N.E.Br.) Bruyns, **comb. nov.** *Huernia concinna* N.

*E.Br.*, Fl. Trop. Afr. 4 (1): 497 (1903). Type: Somaliland, cult. Cambridge, Lort-Phillips (K 000305 956 lecto!, designated here).

*Huernia lavrani* LC.Leach in Excelsa 12: 94 (1986), **syn. nov.**

*Huernia formosa* LC.Leach in Excelsa 12: 95 (1986), **syn. nov.**

Note: As Leach (1986) pointed out, the type specimen of *H. concinna* is clearly the specimen of Lort Phillips at K but it also consists of two elements, one that corresponds fairly closely to Taubert's and Schumann's figures (with a fairly tall corona) and one (with a much shorter corona) that corresponds more closely to the figure in Hooker (1903), though not to certain aspects of Hooker's description. The latter is selected as lectotype here.

*Ceropegia erinacea* (P.R.O.Bally) Bruyns, **comb. nov.** *Huernia erinacea* P.R.O.Bally in Fl. Pl. Africa 31: t. 1206 (1956).

\**Ceropegia erectiloba* (L.C.Leach & Lavranos) Bruyns, **comb. nov.** *Huernia erectiloba* L.C.Leach & Lavranos in Kirkia 3: 38 (1963).

*Ceropegia guttata* (Masson) Bruyns, **comb. nov.** *Stapelia guttata* Masson, Stap. Nov.: 10, t. 4 (1796).

*Ceropegia guttata* subsp. *guttata*.

*Ceropegia guttata* subsp. *reticulata* (Masson) Bruyns, **comb. nov.** *Stapelia reticulata* Masson, Stap. Nov.: 9, t. 2 (1796).

\**Ceropegia hadramautica* (Lavranos) Bruyns, **comb. nov.** *Huernia hadhramautica* Lavranos in J. S. African Bot. 29: 99 (1963).

*Huernia rubra* Plowes in Asklepios 64: 20 (1995), **syn. nov.**

*Ceropegia hallii* (E. & B.M. Lamb) Bruyns, **comb. nov.** *Huernia hallii* E. & B.M. Lamb, Natl. Cact. & Succ. J. 13: 57 (1958).

*Ceropegia herrei* (A.C. White & B. Sloane) Bruyns, **comb. nov.** *Huernia herrei* A.C. White & B. Sloane, Stap., ed. 2, 3: 1179 (1937).

*Huernia namaquensis* Pillans in J. Bot. 68: 102 (1930), **syn. nov.**

*Ceropegia hislopii* (Turrill) Bruyns, **comb. nov.** *Huernia hislopii* Turrill in Bull. Misc. Inform. 1922: 30 (1922).

*Ceropegia hislopii* subsp. *hislopii*.

*Ceropegia hislopii* subsp. *cashelensis* (L.C.Leach & Plowes) Bruyns, **comb. nov.** *Huernia longituba* subsp. *cashelensis* L.C.Leach & Plowes in J. S. African Bot. 32: 49 (1966).

*Ceropegia hislopii* subsp. *robusta* (L.C.Leach & Plowes) Bruyns, **comb. nov.** *Huernia hislopii* subsp. *robusta* L.C.Leach & Plowes in J. S. African Bot. 32: 53 (1966).

\**Ceropegia humilior* (L.C. Leach) Bruyns, **nom. nov., non** *Ceropegia humilis* N.E.Br. *Stapelia humilis* Masson, Stap. Nov.: 10, t. 5 (1796).

*Huernia thudichumii* L.C.Leach in Excelsa Taxon. Ser. 4: 132 (1988), **syn. nov.**

\**Ceropegia humpatana* (Bruyns) Bruyns, **comb. nov.** *Huernia humpatana* Bruyns in S. Afr. J. Bot. 76: 585 (2010).

\**Ceropegia hystrix* (Hook.f.) Bruyns, **comb. nov.** *Stapelia hystrix* Hook. f. in Bot. Mag. 95: t. 5751 (1869). Type: South Africa, Natal, McKen (missing). Bot. Mag.: t. 5751 (lecto., designated here).

*Ceropegia Hystrix* subsp. *hystrix*.

*Ceropegia hystrix* subsp. *parvula* (L.C.Leach) Bruyns, **comb. nov.** *Huernia hystrix* var. *parvula* L.C.Leach in J. S. African Bot. 42: 450 (1976).

\**Ceropegia kennedyana* (Lavranos) Bruyns, **comb. nov.** *Huernia kennedyana* Lavranos in J. S. African Bot. 31: 313 (1965).

*Ceropegia kirkii* (N.E.Br.) Bruyns, **comb. nov.** *Huernia kirkii* N.E.Br., Fl. Cap. 4 (1): 920 (1909).

*Ceropegia laevis* (J.R.I. Wood) Bruyns, **comb. nov.** *Huernia laevis* J.R.I. Wood in Kew Bull. 39: 128 (1984).

\**Ceropegia leachiana* Bruyns, **nom. nov., non** *Ceropegia leachii* (Lavranos) Bruyns. *Huernia leachii* Lavranos in J. S. African Bot. 25: 311 (1959).

*Ceropegia lenewtonii* (Plowes) Bruyns, **comb. nov.** *Huernia lenewtonii* Plowes in Asklepios 64: 21 (1995).

*Huernia keniensis* R.E. Fries in Acta Hort. Berg. 9: 79 (1929), **syn. nov.**

*Ceropegia levyi* (Obermeyer) Bruyns, **comb. nov.** *Huernia levyi* Obermeyer in Fl. Pl. South Africa 16: t. 616 (1936).

\**Ceropegia lodarensis* (Lavranos) Bruyns, **comb. nov.** *Huernia lodarensis* Lavranos in J. S. African Bot. 30: 87 (1964).

*Ceropegia loeseneriana* (Schltr.) Bruyns, **comb. nov.** *Huernia loeseneriana* Schlr. in Bot. Jahrb. Syst. 20, Beibl. 51: 55 (1895).

\**Ceropegia longii* (Pillans) Bruyns, **comb. nov.** *Huernia longii* Pillans in J. S. African Bot. 5: 65 (1939).

*Ceropegia longii* subsp. *longii*.

*Ceropegia longii* subsp. *echidnopsioides* (L.C.Leach) Bruyns, **comb. nov.** *Huernia pillansii* subsp. *echidnopsioides* L.C.Leach in J. S. African Bot. 34: 140 (1968).

*Ceropegia longituba* (N.E.Br.) Bruyns, **comb. nov.** *Huernia longituba* N.E.Br., Fl. Cap. 4 (1): 912 (1909).

\**Ceropegia lopanthera* (Bruyns) Bruyns, **comb. nov.** *Huernia lopanthera* Bruyns in Bothalia 37: 23 (2007).

\**Ceropegia macrocarpa* (Sprenger) Bruyns, **comb. nov.** *Huernia macrocarpa* Sprenger in Cat. Dammann & Co. 59: 4 (1892).

*Ceropegia macrocarpa* subsp. *macrocarpa*.

*Ceropegia macrocarpa* subsp. *harerghensis* (M.Gilbert) Bruyns, **comb. nov.** *Huernia macrocarpa* subsp. *harerghensis* M.Gilbert in Nord. J. Bot. 22: 209 (2003).

*Ceropegia marnierana* (Lavranos) Bruyns, **comb. nov.** *Huernia marnierana* Lavranos in J. S. African Bot. 29: 97 (1963) as 'marnieriana'.

\**Ceropegia nigeriana* (Lavranos) Bruyns, **comb. nov.** *Huernia nigeriana* Lavranos in J. S. African Bot. 27: 233 (1961).

*Ceropegia nouhuysii* (I. Verd.) Bruyns, **comb. nov.** *Huernia nouhuysii* I. Verd. in Fl. Pl. South Africa 11: t. 412 (1931).

*Ceropegia occultiflora* Bruyns, **nom. nov., non** *Ceropegia occulta* R.A.Dyer. *Huernia occulta* L.C.Leach & Plowes in J. S. African Bot. 32: 57 (1966).

*Ceropegia oculatoides* Bruyns, **nom. nov., non** *Ceropegia oculata* Hook. *Huernia oculata* Hook. f. in Bot. Mag. 108: t. 6658 (1882).

\**Ceropegia pendula* (E.A.Bruce) Bruyns, **comb. nov.** *Huernia pendula* E.A.Bruce in Fl. Pl. Africa 28: t. 1108 (1951).

*Ceropegia piersii* (N.E.Br.) Bruyns, **comb. nov.** *Huernia piersii* N.E.Br., Fl. Cap. 4 (1): 909 (1909).

\**Ceropegia pillansii* Bruyns, **comb. nov.** *Huernia pillansii* N.E.Br. in Gard. Chron., ser. 3, 35: 50 (1904).

*Ceropegia plowesii* (L.C.Leach) Bruyns, **comb. nov.** *Huernia plowesii* L.C.Leach in Excelsa Taxon. Ser. 4: 134 (1988).

*Ceropegia praestans* (N.E.Br.) Bruyns, **comb. nov.** *Huernia praestans* N.E.Br., Fl. Cap. 4 (1): 914 (1909).

\**Ceropegia procumbentior* Bruyns, **nom. nov., non** *Ceropegia procumbens* (Gravely & Mayur.) Bruyns. *Duvalia procumbens* R.A.Dyer in Fl. Pl. Africa 31: t. 1218 (1956).

*Ceropegia quinta* (E. Phillips) Bruyns, **comb. nov.** *Huernia scabra* N.E.Br. var. *quinta* E. Phillips in Fl. Pl. South Africa 12: t. 444 (1932).

\**Ceropegia recondita* (M.Gilbert) Bruyns, **comb. nov.** *Huernia recondita* M.Gilbert in Cact. Succ. J. (Los Angeles) 47: 6 (1975).

*Ceropegia rosea* (L.E. Newton & Lavranos) Bruyns, **comb. nov.** *Huernia rosea* L.E. Newton & Lavranos in Cact. Succ. J. (Los Angeles) 65: 279 (1993).

*Ceropegia similis* Bruyns, **nom. nov., non** *Ceropegia similis* N.E.Br. *Huernia similis* N.E.Br., Bull. Misc. Inform. 1895: 265 (1895).

\**Ceropegia somalica* (N.E.Br.) Bruyns, **comb. nov.** *Huernia somalica* N.E.Br. in Bull. Misc. Inform. 1898: 309 (1898).

*Ceropegia stapelioides* (Schltr.) Bruyns, **comb. nov.** *Huernia stapelioides* Schlr., Bot. Jahrb. Syst. 20, Beibl. 51: 55 (1895).

*Ceropegia tanganyikensis* (E.A.Bruce & P.R.O.Bally) Bruyns, **comb. nov.** *Duvalia tanganyikensis* E.A.Bruce & P.R.O.Bally in Cact. Succ. J. (Los Angeles) 13: 179 (1941).

*Huernia andreaeana* (Rauh) L.C.Leach in Bothalia 10: 54. 1969. *Duvalia andreaeana* Rauh in Kakt. und Sukk. 12: 117 (1961), **syn. nov.**

\**Ceropegia thuretii* (F. Cels) Bruyns, **comb. nov.** *Huernia thuretii* F. Cels in L'Horticul. Franç.: 73, t. 3 (1866).

*Ceropegia transvaalensis* (Stent) Bruyns, **comb. nov.** *Huernia transvaalensis* Stent in Bull. Misc. Inform. 1914: 249 (1914).

\**Ceropegia urceolata* (L.C.Leach) Bruyns, **comb. nov.** *Huernia urceolata* L.C.Leach in Fl. Pl. Africa 39: t. 1550 (1969).  
 \**Ceropegia verekeri* (Stent) Bruyns, **comb. nov.** *Huernia verekeri* Stent in Bull. Misc. Inform. 1933: 145 (1933).  
*Ceropegia verekeri* subsp. *verekeri*.  
*Ceropegia verekeri* subsp. *pauciflora* (L.C.Leach) Bruyns, **comb. nov.** *Huernia verekeri* var. *pauciflora* L.C.Leach in Bothalia 10: 49 (1969).  
 \**Ceropegia volkartii* (Peitsch. ex Werderm. & Peitsch.) Bruyns, **comb. nov.** *Huernia volkartii* Peitsch. ex Werderm. & Peitsch. in Gartenflora 85: 78 (1936).  
*Ceropegia volkartii* var. *volkartii*.  
*Ceropegia volkartii* var. *repens* (Lavranos) Bruyns, **comb. nov.** *Huernia repens* Lavranos in J. S. African Bot. 27: 11 (1960).  
*Ceropegia whitesloaneana* (Nel) Bruyns, **comb. nov.** *Huernia whitesloaneana* Nel in Cact. Succ. J. (Los Angeles) 8: 9 (1936).  
 \**Ceropegia zebra* (N.E.Br.) Bruyns, **comb. nov.** *Huernia zebra* N. E.Br., Fl. Cap. 4 (1): 921 (1909).  
*Ceropegia zebra* subsp. *zebra*.  
*Ceropegia zebra* subsp. *insigniflora* (C.A. Maass) Bruyns, **comb. nov.** *Huernia insigniflora* C.A. Maass in Möllers Deutsche Gärtn.-Zeitung 43: 79 (1928).

**34. Sect. *Australluma*** (Plowes) Bruyns, **comb. et stat. nov.** *Australluma* Plowes in Haseltonia 3: 54 (1995). Type: *Ceropegia peschii* (Nel) Bruyns (*Australluma peschii* (Nel) Plowes).  
 Diagnostic features: Small rhizomatous succulent. Stems often short above ground, glabrous, smooth, 4-angled. Leaves reduced to small deltoid rudiment, usually with minute stipular denticles. Inflorescences several towards apex of stem, 1- to 4-flowered. Corolla with very short bowl-shaped tube (not lobed right to base and sometimes with slight flat area beyond tube), lobes free and spreading, staminal corona in two partially fused series, inner pressed to backs of anthers without dorsal projections.  
 Distribution: 2 spp.; southern Africa in Angola, Moçambique, Namibia, South Africa, Swaziland and Zimbabwe.  
 Taxonomic changes:

\**Ceropegia peschii* (Nel) Bruyns, **comb. nov.** *Caralluma peschii* Nel in Jahrb. Deutsch. Kakteen-Ges. 1 (6): 41 (1935).  
 \**Ceropegia ubomboensis* (I. Verd.) Bruyns, **comb. nov.** *Caralluma ubomboensis* I. Verd. in Fl. Pl. South Africa 12: t. 443 (1932).

**35. Sect. *Piaranthus*** (R.Br.) Bruyns, **comb. et stat. nov.** *Piaranthus* R.Br. in Mem. Wern. Nat. Hist. Soc. 1: 23 (1810). Lectotype (designated by White & Sloane, 1937): *Ceropegia punctata* (Masson) Bruyns (*Piaranthus punctatus* (Masson) Schult.).  
*Huerniopsis* N.E.Br. in J. Linn. Soc. Bot. 17: 171 (1878). Type: *Ceropegia decipiens* (N.E.Br.) Bruyns (*Huerniopsis decipiens* N.E.Br.).  
 Diagnostic features: Mat-forming non-rhizomatous succulent. Stems short, glabrous, finely papillate, 4-angled. Leaves reduced to small deltoid rudiment, usually with minute ± spherical stipular denticles. Inflorescences several near apex of stem, 1- to 6-flowered. Corolla without tube and lobed right to base or with cup-like tube (without flat area beyond tube), lobes free and spreading, staminal corona reduced to one series pressed to backs of anthers without dorsal projections.  
 Distribution: 7 spp.; southern Africa in Botswana, Namibia and South Africa.

Taxonomic changes:

\**Ceropegia atrosanguinea* (N.E.Br.) Bruyns, **comb. nov.** *Stapelia atrosanguinea* N.E.Br. in Gard. Chron., ser. 3, 30: 425 (1901).  
 \**Ceropegia compta* (N.E.Br.) Bruyns, **comb. nov.** *Piaranthus comptus* N.E.Br. in Hooker's Icon. Pl. 20: t. 1924B (1890).  
*Ceropegia cornuta* (N.E.Br.) Bruyns, **comb. nov.** *Piaranthus cornutus* N.E.Br., Fl. Cap. 4 (1): 1018 (1909).  
*Ceropegia cornuta* var. *cornuta*.  
*Ceropegia cornuta* var. *ruschii* (Nel) Bruyns, **comb. nov.** *Piaranthus*

*ruschii* Nel in A.C. White & B. Sloane, Stap., ed. 2, 2: 813 (1937).  
 \**Ceropegia decipiens* (N.E.Br.) Bruyns, **comb. nov.** *Huerniopsis decipiens* N.E.Br. in J. Linn. Soc. Bot. 17: 171 (1878).  
 \**Ceropegia geminata* (Masson) Bruyns, **comb. nov.** *Stapelia geminata* Masson, Stap. Nov.: 18, t. 25 (1797).  
*Ceropegia geminata* subsp. *geminata*.  
*Ceropegia geminata* subsp. *decora* (Masson) Bruyns, **comb. nov.** *Stapelia decorata* Masson, Stap. Nov.: 19, t. 26 (1797).  
*Piaranthus erratus* Plowes in Bradleya 32: 131 (2014), **syn. nov.**  
*Ceropegia parvula* (N.E.Br.) Bruyns, **comb. nov.** *Piaranthus parvulus* N.E.Br., Fl. Cap. 4 (1): 1023 (1909).  
 \**Ceropegia punctata* (Masson) Bruyns, **comb. nov.** *Stapelia punctata* Masson, Stap. Nov.: 18, t. 24 (1797).  
*Ceropegia punctata* var. *punctata*.  
*Ceropegia punctata* var. *framesii* (Pillans) Bruyns, **comb. nov.** *Piaranthus framesii* Pillans in S. Afr. Garden. & Country Life 18: 62 (1928), special reprint.

**36. Sect. *Duvalia*** (Haw.) Bruyns, **comb. et stat. nov.** *Duvalia* Haw., Syn. Pl. Succ.: 44 (1812). Lectotype (designated by White & Sloane, 1937): *Duvalia elegans* (Masson) Haw. (= *Ceropegia jacquiniana* (Schult.) Bruyns).

Diagnostic features: Mat-forming rarely rhizomatous succulent. Stems short, glabrous, smooth, 4- to 6-angled. Leaves reduced to small deltoid rudiment, often with minute stipular denticles. Inflorescence 1 towards base of stem, 1- to 6-flowered sometimes developing small knobby peduncle. Corolla with very short bowl-shaped tube (not lobed right to base and sometimes with slight flat area beyond tube), lobes free and spreading, staminal corona in two well separated series, outer usually ring-like and covering tube, inner pressed to backs of anthers with prominent transversely rounded dorsal projections.  
 16 spp. in two subsections, one in North-east Africa and southern Arabian Peninsula and the other from southern Africa to Malawi.

### 36.1 Key to the subsections of Sect. *Duvalia*.

1. Stems uniformly green to brownish or reddish, leaf-rudiments flattened above with small stipular denticles at base.....Subsect. *Stipulatae*.
1. Stems greyish green usually conspicuously mottled with red-brown, leaf-rudiments conical, stipular denticles absent.....Subsect. *Arabicae*.

**36.2 Subsect. *Arabicae*** (Meve & F. Albers) Bruyns, **comb. et stat. nov.**, *Duvalia* sect. *Arabicae* Meve & F. Albers in Mitt. Inst. Allg. Bot. Hamburg 23b: 597 (1990). Type: *Ceropegia sulcata* (N.E.Br.) Bruyns (*Duvalia sulcata* N.E.Br.).

*Ballyanthus* Bruyns in Aloe 37: 76 (2001). Type: *Ceropegia prognatha* (P.R.O.Bally) Bruyns (*Ballyanthus prognathus* (P.R.O.Bally) Bruyns).  
 Diagnostic features: Stems greyish green usually conspicuously mottled with red-brown. Leaf-rudiments conical, without stipular denticles.

Distribution: 6 spp.; North-east Africa and southern Arabian Peninsula.

Taxonomic changes:

*Ceropegia eilensis* (Lavranos) Bruyns, **comb. nov.** *Duvalia eilensis* Lavranos in Cact. Succ. J. (Los Angeles) 44: 260 (1972).  
*Ceropegia galgallensis* (Lavranos) Bruyns, **comb. nov.** *Duvalia galgallensis* Lavranos in Cact. Succ. J. (Los Angeles) 46: 184 (1974).  
 \**Ceropegia prognatha* (P.R.O.Bally) Bruyns, **comb. nov.** *Stapelia prognatha* P.R.O.Bally in Candollea 18: 339 (1963).  
*Ballyanthus major* Plowes in CactusWorld 31: 291 (2013), **syn. nov.**  
 \**Ceropegia somalilandica* Bruyns, **nom. nov., non** *Ceropegia somalensis* Chiov. *Duvalia somalensis* Lavranos in Cact. Succ. J. (Los Angeles) 43: 65 (1971).

- \**Ceropegia sulcata* (N.E.Br.) Bruyns, **comb. nov.** *Duvalia sulcata* N.E.Br. in Bull. Misc. Inform. 1910: 193 (1910).
- Ceropegia sulcata* subsp. *sulcata*.
- Ceropegia sulcata* subsp. *seminuda* (Lavrano) Bruyns, **comb. et stat. nov.** *D. sulcata* var. *seminuda* Lavranos in Cact. Succ. J. (Los Angeles) 39: 5 (1967).
- \**Ceropegia velutina* (Lavrano) Bruyns, **comb. nov.** *Duvalia velutina* Lavranos in Cact. Succ. J. (Los Angeles) 55: 24 (1983).
- 36.3 Subsect. *Stipulatae*** Bruyns, **subsect. nov.** Type: *Ceropegia caespitosa* (Masson) Bruyns.  
*Diagnostic features:* Plant sometimes rhizomatous (*C. polita*). Stems uniformly green to brownish or reddish. Leaf-rudiments flattened above, with small stipular denticles at base.  
*Distribution:* 10 spp.; South Africa to Malawi.  
*Taxonomic changes:*  
 \**Ceropegia angustilobulata* Bruyns, **nom. nov., non** *Ceropegia angustiloba* De Wildem. *Duvalia angustiloba* N.E.Br. in Gard. Chron. N.S., 20: 230 (1883).  
*Ceropegia caespitosa* (Masson) Bruyns, **comb. nov.** *Stapelia caespitosa* Masson, Stap. Nov.: 20, t. 29 (1797).  
*Ceropegia caespitosa* subsp. *caespitosa*.  
*Ceropegia caespitosa* subsp. *pubescens* (N.E.Br.) Bruyns, **comb. et stat. nov.** *Duvalia pubescens* N.E.Br., Fl. Cap. 4 (1): 1029 (1909).  
*Ceropegia caespitosa* subsp. *vestita* (Meve) Bruyns, **comb. et stat. nov.** *Duvalia vestita* Meve in Kakt. and. Sukk. 39: 197 (1988).  
*Ceropegia corderoyi* (Hook. f.) Bruyns, **comb. nov.** *Stapelia corderoyi* Hook. f. in Bot. Mag. 100: t. 6082 (1874).  
*Ceropegia immaculata* (C.A. Lückh.) Bruyns, **comb. nov.** *D. maculata* var. *immaculata* C.A. Lückh. in A.C. White & B. Sloane, Stap., ed. 2, 3: 1144 (1937).  
*Ceropegia jacquiniana* (Schult.) Bruyns, **comb. nov.** *Stapelia jacquiniana* Schult. in Roem. & Schult., Syst. Veg. 6: 45 (1820).  
*Duvalia elegans* (Masson) Haw., Syn. Pl. Succ.: 44 (1812). *Stapelia elegans* Masson, Stap. Nov.: 19, t. 27 (1797), **syn. nov.**  
 \**Ceropegia minuta* (Nel) Bruyns, **comb. nov.** *Duvalia minuta* Nel in A.C. White & B. Sloane, Stap., ed. 2, 3: 1168 (1937).  
*Duvalia maculata* N.E.Br., Fl. Cap. 4 (1): 1033 (1909), **syn. nov.**  
*Ceropegia modesta* (N.E.Br.) Bruyns, **comb. nov.** *Duvalia modesta* N.E.Br., Fl. Cap. 4 (1): 1028 (1909).  
*Ceropegia parvianthera* Bruyns, **nom. nov., non** *Ceropegia parviflora* Trimen. *Duvalia parviflora* N.E.Br., Fl. Cap. 4 (1): 1034 (1909).  
*Ceropegia pillansiana* (N.E.Br.) Bruyns, **nom. nov., non** *Ceropegia pillansii* (N.E.Br.) Bruyns. *Duvalia pillansii* N.E.Br., Fl. Cap. 4 (1): 1026 (1909).  
 \**Ceropegia polita* (N.E.Br.) Bruyns, **comb. nov.** *Duvalia polita* N.E.Br. in Gard. Chron. N.S., 6: 130 (1876).
- 37. Sect. *Tromotrichie*** (Haw.) Bruyns, **comb. et stat. nov.** *Tromotrichie* Haw., Syn. Pl. Succ.: 36 (1812). Type: *Ceropegia revoluta* (Masson) Bruyns (*Tromotrichie revoluta* (Masson) Haw.).  
*Diagnostic features:* Small, mat-forming, sometimes rhizomatous succulent. Stems often long (sometimes pendulous to 2 m or more), glabrous or pubescent, finely papillate, 4-angled. Leaves reduced to small deltoid rudiment or absent (tuberous rounded), sometimes with minute stipular denticles. Inflorescences 1 towards base of stem or few near apex, 1- to 6-flowered. Corolla with short bowl-shaped or deep cup-like tube (not lobed right to base and sometimes with slight flat area beyond tube), lobes free and spreading, staminal corona in two partially fused series, inner pressed to backs of anthers with prominent laterally flattened dorsal projections.  
*Distribution:* 5 spp.; southern and western parts of South Africa.  
*Taxonomic changes:*  
 \**Ceropegia baylissii* (L.C.Leach) Bruyns, **comb. nov.** *Stapelianthus baylissii* L.C.Leach in J. S. African Bot. 34: 136 (1968).
- \**Ceropegia choanantha* (Lavrano & H. Hall) Bruyns, **comb. nov.** *Stapelia choanantha* Lavranos & H. Hall in J. S. African Bot. 30: 107 (1964).  
\*i<sub>Ceropegia engleriana (Schltr.) Bruyns, **comb. nov.** *Stapelia engleriana* Schltr. in Bot. Jahrb. Syst. 38: 49, fig. 8 (1905).  
\*i<sub>Ceropegia revoluta (Masson) Bruyns, **comb. nov.** *Stapelia revoluta* Masson, Stap. Nov.: 12, t. 10 (1796).  
\*i<sub>Ceropegia thudichumii</sub> (Pillans) Bruyns, **comb. nov.** *Stapelia thudichumii* Pillans in J. S. African Bot. 25: 375 (1959).</sub></sub>
- 38. Sect. *Orbeanthus*** (L.C.Leach) Bruyns, **comb. et stat. nov.** *Orbeanthus* L.C.Leach in Excelsa Taxon. Ser. 1: 71 (1978). Type: *Ceropegia conjuncta* (A.C. White & B. Sloane) Bruyns (*Orbeanthus conjunctus* (A.C. White & B. Sloane) L.C.Leach).  
*Diagnostic features:* Prostrate, mat-forming non-rhizomatous succulent. Stems glabrous, smooth, 4-angled. Leaves reduced to small deltoid rudiment, usually without stipular structures. Inflorescence 1 towards base of stem, 1- to 3-flowered. Corolla with bowl-shaped tube (not lobed right to base and sometimes with flat area beyond tube), lobes free and spreading, staminal corona in two partially fused series, inner pressed to backs of anthers without dorsal projections.  
*Distribution:* 2 spp.; north-eastern South Africa.  
*Taxonomic changes:*  
 \**Ceropegia conjuncta* (A.C. White & B. Sloane) Bruyns, **comb. nov.** *Stultitia conjuncta* A.C. White & B. Sloane in Cact. Succ. J. (Los Angeles) 10: 69 (1938).  
 \**Ceropegia hardyi* (R.A.Dyer) Bruyns, **comb. nov.** *Stultitia hardyi* R.A.Dyer in Fl. Pl. Africa 36: t. 1403 (1963).
- 39. Sect. *Orbea*** (Haw.) Bruyns, **comb. et stat. nov.** *Orbea* Haw., Syn. Pl. Succ.: 37 (1812), *nom. cons.* Lectotype (designated by Brummitt, 2000): *Orbea variegata* (L.) Haw. (= *Ceropegia mixta* (Masson) Bruyns).  
*Pachycymbium* L.C.Leach in Excelsa Taxon. Ser. 1: 69 (1978). Type: *Ceropegia keithii* (R.A.Dyer) Bruyns (*Pachycymbium keithii* (R.A.Dyer) L.C.Leach).  
*Angolluma* Munster in Cact. Succ. J. (Woollahra) 17: 63 (1990). Type: *Angolluma decaisneana* (Lem.) L.E. Newton (= *Ceropegia venenosa* (Maire) Bruyns).  
*Diagnostic features:* Mat- to clump-forming sometimes rhizomatous succulent. Stems glabrous, smooth, 4-angled. Leaves reduced to soft tapering cylindrical (rarely deltoid) rudiment, often with minute stipular denticles. Inflorescences 1 towards base of stem between tubercles or several towards tips of stems, 1- to 20-flowered (sometimes opening simultaneously). Corolla with short to deep bowl-shaped tube (not lobed right to base and sometimes with slight flat area beyond tube), lobes free and spreading, staminal corona in two partially fused series, inner pressed to backs of anthers often with prominent transversely rounded dorsal projections.  
*Distribution:* 53 spp.; widespread in Africa from South Africa to North-west Africa, East and North-east Africa, also in the southern Arabian Peninsula from Saudi Arabia to South-eastern Yemen and southern Oman.  
*Taxonomic changes:*  
*Ceropegia abayensis* (M.Gilbert) Bruyns, **comb. nov.** *Caralluma abayensis* M.Gilbert in Cact. Succ. J. Gr. Brit. 40: 46 (1978).  
*Angolluma kulaensis* Plowes in CactusWorld 31: 210 (2013), **syn. nov.**  
 \**Ceropegia albocastanea* (Marloth) Bruyns, **comb. nov.** *Stapelia albocastanea* Marloth in Trans. Roy. Soc. S. Afr. 3: 124 (1913).  
 \**Ceropegia araysiana* (Lavrano & Bilaidi) Bruyns, **comb. nov.** *Stultitia araysiana* Lavranos & Bilaidi in Cact. Succ. J. (Los Angeles) 43: 207 (1971).  
 \**Ceropegia baldratii* (A.C. White & B. Sloane) Bruyns, **comb. nov.**

- Caralluma baldratii* A.C. White & B. Sloane, Stap., ed. 2, 1: 268 (1937).
- Ceropegia baldratii* subsp. *baldratii*.
- Ceropegia baldratii* subsp. *somalensis* (Bruyns) Bruyns, **comb. nov.** *Orbea baldratii* subsp. *somalensis* Bruyns in *Aloe* 37: 73 (2001).
- \**Ceropegia caudata* (N.E.Br.) Bruyns, **comb. nov.** *Caralluma caudata* N.E.Br., Fl. Trop. Afr. 4 (1): 485 (1903).
- Ceropegia caudata* subsp. *caudata*.
- Ceropegia caudata* subsp. *rhodesiaca* (L.C.Leach) Bruyns, **comb. nov.** *Caralluma caudata* subsp. *rhodesiaca* L.C.Leach in *Bothalia* 11: 134 (1973).
- \**Ceropegia chrysostephana* (Deflers) Bruyns, **comb. nov.** *Stapelia chrysostephana* Deflers in *Bull. Soc. Bot. France* 43: 117 (1896).
- Ceropegia ciliatioris* Bruyns, **nom. nov.**, non *Ceropegia ciliata* Wight. *Stapelia ciliata* Thunb., *Prod. Pl. Cap.* 1: 46 (1794).
- Ceropegia circes* (M.Gilbert) Bruyns, **comb. nov.** *Caralluma circes* M.Gilbert in *Cact. Succ. J. Gr. Brit.* 40: 48 (1978).
- \**Ceropegia cooperi* (N.E.Br.) Bruyns, **comb. nov.** *Stapelia cooperi* N.E.Br., Fl. Cap. 4 (1): 974 (1909).
- \**Ceropegia deflersiana* (Lavranos) Bruyns, **comb. nov.** *Caralluma deflersiana* Lavranos in *J. S. Afr. Bot.* 29: 103 (1963).
- Ceropegia denboefii* (Lavranos) Bruyns, **comb. nov.** *Caralluma denboefii* Lavranos in *Cact. Succ. J. (Los Angeles)* 55: 119 (1983).
- \**Ceropegia distinctantha* Bruyns, **nom. nov.**, non *Ceropegia distincta* N.E.Br. *Caralluma distincta* E.A.Bruce in *Hooker's. Icon. Pl.* 35: t. 3415 (1940).
- \**Ceropegia duemmeri* (N.E. Brown) Bruyns, **comb. nov.** *Stapelia duemmeri* N.E. Brown in *Gard. Chron.*, ser. 3, 61: 132 (1917) as 'dummeri'.
- Note: Although N.E. Brown mentioned that this species had been collected by Richard Dümmer, he named it *Stapelia dummeri*. This error of spelling is corrected here.
- \**Ceropegia elegantior* Bruyns, **sp. nov.** Type:—South Africa, Transvaal, south-eastern foothills of Blouberg, Winter & Nienaber 434 (holotype PRE!; isotypes BOL!, SRGH).
- Note: Our analyses (Fig. 1, Bruyns & al., 2014) show that this species (designated there as 'Orbea elegans') is part of the concept of *Orbea* Haw. put forward by Leach (1978) but they do not show to which species it is most closely related. This species differs from others in the former genus *Orbea* by its prominent, dark maroon and relatively smooth annulus, by the unusual outer coronal lobes which are deeply excavated into two mandible-like, horizontally spreading dorsiventrally flattened outer lobules that come together towards their tips with a further small horizontally spreading tooth in the middle that slightly closes up the gap between the outer lobules.
- Both attempts by Plowes to describe this species as *Orbea elegans* were invalid. In the first case (Plowes, 2004a) since two specimens were cited without a 'Type' being designated and in the second (Plowes, 2004b) since no diagnosis was provided. We rectify these errors here. The name *Ceropegia elegans* Wall. makes a new name necessary here.
- \**Ceropegia gemugofana* (M.Gilbert) Bruyns, **comb. nov.** *Caralluma gemugofana* M.Gilbert in *Cact. Succ. J. Gr. Brit.* 40: 43 (1978).
- Ceropegia gerstneri* (Letty) Bruyns, **comb. nov.** *Caralluma gerstneri* Letty in *Fl. Pl. South Africa* 16: t. 631 (1936).
- Ceropegia gerstneri* subsp. *gerstneri*.
- Ceropegia gerstneri* subsp. *elongata* (R.A.Dyer) Bruyns, **comb. nov.** *Caralluma gerstneri* subsp. *elongata* R.A.Dyer in *Fl. Pl. Africa* 40: t. 1567 (1969).
- \**Ceropegia halipedicola* (L.C.Leach) Bruyns, **comb. nov.** *Orbea halipedicola* L.C.Leach in *Excelsa Taxon. Ser.* 1: 40 (1978).
- \**Ceropegia huernioides* (P.R.O.Bally) Bruyns, **comb. nov.** *Caralluma huernioides* P.R.O.Bally in *Candollea* 20: 15 (1965).
- Ceropegia huillensis* (Hiern) Bruyns, **comb. nov.** *Caralluma huillensis* Hiern, *Cat. Afr. Pl.* 1 (3): 697 (1898).
- Ceropegia huillensis* subsp. *huillensis*.
- Ceropegia huillensis* subsp. *flava* (Bruyns) Bruyns, **comb. nov.** *Orbea huillensis* subsp. *flava* Bruyns in *Aloe* 37: 75 (2001).
- Ceropegia irrorata* (Masson) Bruyns, **comb. nov.** *Stapelia irrorata* Masson, *Stap. Nov.*: 12, t. 9 (1796).
- Stapelia verrucosa* Masson, *Stap. Nov.*: 11, t. 8 (1796), **syn. nov.**
- \**Ceropegia keithii* (R.A.Dyer) Bruyns (R.A.Dyer) Bruyns, **comb. nov.** *Caralluma keithii* R.A.Dyer in *Fl. Pl. South Africa* 15: t. 600 (1935).
- Ceropegia keithii* subsp. *keithii*.
- Ceropegia keithii* subsp. *carnosa* (Stent) Bruyns, **comb. nov.** *Caralluma carnosa* Stent in *Bull. Misc. Inform.* 1916: 42 (1916).
- Ceropegia knobelii* (E. Phillips) Bruyns, **comb. nov.** *Stapelia knobelii* E. Phillips in *Fl. Pl. South Africa* 10: t. 363 (1930).
- Ceropegia laikipika* Bruyns, **nom. nov.**, non *Ceropegia laikipiensis* Masinde. *Pachycymbium laikipiense* M.Gilbert in *Bradleya* 8: 24 (1990).
- Ceropegia laticorona* (M.Gilbert) Bruyns, **comb. nov.** *Caralluma sprengeri* subsp. *laticorona* M.Gilbert in *Cact. Succ. J. Gr. Brit.* 40: 41 (1978).
- \**Ceropegia longiana* Bruyns, **nom. nov.**, non *Ceropegia longii* (Pillans) Bruyns *Stapelia longii* C.A. Lückh. in *S. Afr. Garden. & Country Life* 25: 96 (1935).
- \**Ceropegia longidens* (N.E.Br.) Bruyns, **comb. nov.** *Stapelia longidens* N.E.Br. in *Gard. Chron.*, ser. 3, 18: 324 (1895).
- \**Ceropegia lugardianai* Bruyns, **nom. nov.**, non *Ceropegia lugardiae* N.E.Br. *Caralluma lugardii* N.E.Br., Fl. Trop. Afr. 4 (1): 487 (1903).
- \**Ceropegia lutea* (N.E.Br.) Bruyns, **comb. nov.** *Caralluma lutea* N.E.Br. in *Hooker's. Icon. Pl.* 20: t. 1901 (1890).
- Ceropegia lutea* subsp. *lutea*.
- Orbeopsis matabelensis* Plowes in *Asklepios* 118: 9 (2014), **syn. nov.**
- Ceropegia lutea* subsp. *vaga* (N.E.Br.) Bruyns, **comb. nov.** *Stapelia vaga* N.E.Br. in *Bull. Misc. Inform.* 1895: 265 (1895).
- Ceropegia luntii* (N.E. Br.) Bruyns, **comb. nov.** *Caralluma luntii* N.E. Br. in *Bull. Misc. Inform.* 1894: 335 (1894).
- Ceropegia macloughlinii* (I. Verd.) Bruyns, **comb. nov.** *Stapelia macloughlinii* I. Verd. in *Fl. Pl. South Africa* 21: t. 812 (1941).
- Ceropegia melanantha* (Schltr.) Bruyns, **comb. nov.** *Stapelia melanantha* Schltr. in *Bot. Jahrb. Syst.* 38: 50 (1905).
- Orbeopsis rubra* Plowes in *Asklepios* 118: 16 (2014), **syn. nov.**
- Orbeopsis karibensis* Plowes in *Asklepios* 118: 17 (2014), **syn. nov.**
- \**Ceropegia mixta* (Masson) Bruyns, **comb. nov.** *Stapelia mixta* Masson, *Stap. Nov.*: 23, t. 38 (1797).
- Stapelia variegata* L., *Sp. Pl.* 1: 217 (1753). *Orbea variegata* (L.) Haw., *Syn. Pl. Succ.*: 40 (1812), **syn. nov.**
- Ceropegia namaquana* Bruyns, **nom. nov.**, non *Ceropegia namquensis* Bruyns. *Stapelia namaquensis* N.E.Br. in *Gard. Chron. N.S.*, 18: 648 (1882).
- \**Ceropegia paradoxa* (I. Verd.) Bruyns, **comb. nov.** *Stultitia paraoxa* I. Verd. in *Fl. Pl. South Africa* 17: t. 677 (1937).
- Ceropegia pulchella* (Masson) Bruyns, **comb. nov.** *Stapelia pulchella* Masson, *Stap. Nov.*: 22, t. 36 (1797).
- \**Ceropegia rangeana* (Dinter & A. Berger) Bruyns, **comb. nov.** *Caralluma rangeana* Dinter & A. Berger in *Bot. Jahrb. Syst.* 50, *Suppl.*: 591 (1914).
- Ceropegia rangeana* subsp. *rangeana*.
- Ceropegia rangeana* subsp. *kaokoensis* (Bruyns) Bruyns, **comb. nov.** *Orbea maculata* subsp. *kaokoensis* Bruyns in *Aloe* 37: 75 (2001). *Orbea kaokoensis* (Bruyns) Plowes in *Bradleya* 31: 162 (2013).
- Ceropegia rangeana* subsp. *maculata* (N.E.Br.) Bruyns, **comb. nov.** *Caralluma maculata* N.E.Br., Fl. Trop. Afr. 4 (1): 487 (1903).

\**Ceropegia rogersii* (L. Bolus) Bruyns, **comb. nov.** *Stapelia rogersii* L. Bolus in Ann. Bolus Herb. 1: 194 (1915).

\**Ceropegia sacculata* (N.E. Brown) Bruyns, **comb. nov.** *Caralluma sacculata* N.E. Brown in Bull. Misc. Inform. 1909: 328 (1909).

\**Ceropegia schweinfurthii* (A. Berger) Bruyns, **comb. nov.** *Caralluma schweinfurthii* A. Berger, Stapel. & Klein.: 103 (1910).

\**Ceropegia semitubiflora* (L.E. Newton) Bruyns, **comb. nov.** *Angolluma semitubiflora* L.E. Newton in Cact. Succ. J. (Los Angeles) 65: 198 (1993).

\**Ceropegia semota* (N.E. Brown) Bruyns, **comb. nov.** *Stapelia semota* N.E. Brown in Cact. Succ. J. (Los Angeles) 4: 393 (1933). *Ceropegia semota* subsp. *semota*.

*Ceropegia semota* subsp. *orientalis* (Bruyns) Bruyns, **comb. nov.** *Orbea semota* subsp. *orientalis* Bruyns in Syst. Bot. Monogr. 63: 136 (2002).

\**Ceropegia sprengeri* (Schweinfurth ex Sprenger) Bruyns, **comb. nov.** *Huernia sprengeri* Schweinfurth ex Sprenger in Cat. Dammann & Co. 65: 4 (1893).

*Ceropegia sprengeri* subsp. *sprengeri*.

*Ceropegia sprengeri* subsp. *foetida* (M.Gilbert) Bruyns, **comb. nov.** *Caralluma sprengeri* subsp. *foetida* M.Gilbert in Cact. Succ. J. Gr. Brit. 40: 42 (1978).

*Ceropegia sprengeri* subsp. *ogadensis* (M.Gilbert) Bruyns, **comb. nov.** *Caralluma sprengeri* subsp. *ogadensis* M.Gilbert in Cact. Succ. J. Gr. Brit. 40: 43 (1978).

*Ceropegia sprengeri* subsp. *commutata* (A. Berger) Bruyns, **comb. nov.** *Caralluma commutata* A. Berger, Stapel. & Klein.: 105 (1910).

\**Ceropegia subterranea* (E.A.Bruce & P.R.O.Bally) Bruyns, **comb. nov.** *Caralluma subterranea* E.A.Bruce & P.R.O.Bally in Cact. Succ. J. (Los Angeles) 13: 165 (1941).

*Ceropegia taitica* (Bruyns) Bruyns, **comb. nov.** *Orbea taitica* Bruyns in Syst. Bot. Monogr. 63: 97 (2002).

*Angolluma doddsiae* Plowes & T.A.McCoy in Asklepios 103: 14 (2008), **syn. nov.**

*Ceropegia tapscottii* (I. Verd.) Bruyns, **comb. nov.** *Stapelia tapscottii* I. Verd. in Bull. Misc. Inform. 1927: 357 (1927).

*Ceropegia tubiformis* (E.A.Bruce & P.R.O.Bally) Bruyns, **comb. nov.** *Caralluma tubiformis* E.A.Bruce & P.R.O.Bally in Cact. Succ. J. (Los Angeles) 13: 167 (1941).

*Ceropegia umbracula* (M.D. Henderson) Bruyns, **comb. nov.** *Stultitia umbracula* M.D. Henderson in Fl. Pl. Africa 35: t. 1374 (1962).

*Ceropegia valida* (N.E.Br.) Bruyns, **comb. nov.** *Caralluma valida* N. E.Br. in Bull. Misc. Inform. 1895: 264 (1895).

*Ceropegia valida* subsp. *valida*.

*Ceropegia valida* subsp. *occidentalis* (Bruyns) Bruyns, **comb. nov.** *Orbea valida* subsp. *occidentalis* Bruyns in Aloe 37: 76 (2001).

\**Ceropegia venenosa* (Maire) Bruyns, **comb. nov.** *Caralluma venenosa* Maire in Bull. Soc. Hist. Nat. Afrique N. 22: 305 (1931). *Ceropegia venenosa* subsp. *venenosa*.

*Orbea decaisneana* (Lemaire) Bruyns in Aloe 37: 74. 2001.

*Boucerosia decaisneana* Lemaire, Hort. Uni. 5: 99 (1843), **syn. nov.**

*Ceropegia venenosa* subsp. *hesperidum* (Maire) Bruyns, **comb. nov.** *Caralluma hesperidum* Maire in Bull. Soc. Hist. Nat. Afrique N. 13: 17 (1922).

\**Ceropegia vibratilis* (P.R.O.Bally) Bruyns, **comb. nov.** *Caralluma vibratilis* E.A.Bruce & P.R.O.Bally in Cact. Succ. J. (Los Angeles) 13: 179 (1941).

*Ceropegia wilsonii* (P.R.O.Bally) Bruyns, **comb. nov.** *Caralluma wilsonii* P.R.O.Bally in Candollea 21: 371 (1967).

\**Ceropegia wissmannii* (O. Schwartz) Bruyns, **comb. nov.** *Caralluma wissmannii* O. Schwartz in Mitt. Inst. allg. Bot. Hamburg 10: 195 (1939).

*Ceropegia wissmannii* subsp. *wissmannii*.

*Ceropegia wissmannii* subsp. *parviloba* (O. Schwartz) Bruyns,

**comb. nov.** *Orbea wissmannii* var. *parviloba* Bruyns in Aloe 37: 76 (2001).

\**Ceropegia woodiana* Bruyns, **nom. nov., non** *Ceropegia woodii* Schltr. *Stapelia woodii* N.E.Br. in Gard. Chron., ser. 3, 11: 554 (1892).

40. **Sect. Prominentifoliae** Bruyns, **sect. nov.** Type: *Ceropegia ballyana* Bullock.

*Diagnostic features:* Slender often tall climbers with fibrous roots. Stems usually succulent and perennial, photosynthetic, twining, glabrous and often glaucous. Leaves usually slightly fleshy, deciduous, ovate or cordate, petiolate, usually glabrous (often darker than stems). Inflorescences pedunculate, glabrous, flowers 1–10 in gradual succession on sometimes fleshy pedicels (sometimes with very prominent sepals). Corolla with slender tube inflated at base and lobes remaining joined at tips.

*Distribution:* 3 spp.; East to North-east Africa.

*Included species:* \**C. ballyana* Bullock, \**C. robynsiana* Werderm., \**C. succulenta* E.A.Bruce.

41. **Sect. Dimorphae** H.Huber ex Meve & Liede, Phyton (Horn) 34: 138 (1994) as 'Dimorpha'. Type: *Ceropegia dimorpha* Humbert.

*Diagnostic features:* Slender deciduous climbers with tuber to highly succulent climbers with photosynthetic stems or small shrub-forming succulents with erect, tuberculate photosynthetic stems and fibrous roots. Stems annual, herbaceous and twining to perennial, highly succulent and photosynthetic, twining or erect, often with prominent tubercles, glabrous. Leaves herbaceous, deciduous or caducous in succulent-stemmed species, ovate to lanceolate or linear, petiolate, glabrous. Inflorescences sessile to pedunculate, glabrous, flowers 1–3 (10). Corolla with slender tube inflated at base and lobes usually remaining joined at tips.

*Distribution:* 21 spp.; Madagascar and the Comores.

*Included species:* \**C. albisepta* Jum. & Perr., *C. ambovombensis* Rauh & Gerold, *C. armandii* Rauh, *C. bosseri* Rauh, \**C. dimorpha* Humbert, *C. gikyi* Rauh & Gerold, *C. hermannii* Rauh & M. Teissier, *C. hofstaetteri* Rauh, \**C. humbertii* H.Huber, *C. leryoi* Rauh & Marn.-Lap., *C. madagascariensis* Decne., *C. mayottae* H.Huber, *C. petignatii* Rauh, *C. pseudodimorpha* Rauh, *C. razafindratsirana* (Rauh & Buchloh) Rauh, *C. robivelonae* Rauh & Gerold, \**C. saxatilis* Jum. & Perr., *C. scabra* Jum. & Perr., *C. simoniae* Rauh, \**C. striata* Meve & Masinde, *C. viridis* Choux.

*Note:* *Ceropegia adrienneae* Rauh & Gerold (Rauh, 1998) was not validly published since it lacked the necessary diagnosis in Latin, at that time obligatory. However, the material described there is so similar to *C. petignatii* and *C. gikyi* that it is not validated here. The name of this section is changed from 'Dimorpha' to conform to ICBN Art. 21.1.

42. **Sect. Sarcodactylus** H.Huber in Mem. Soc. Brot. 12: 29 (1957). Type: *Ceropegia dichotoma* Haw.

*Ser. Canarienses* H.Huber in Mem. Soc. Brot. 12: 30 (1957). Type: *Ceropegia dichotoma* Haw.

*Diagnostic features:* Shrub-forming succulent to 2 m tall, with fibrous roots. Stems perennial, highly succulent, photosynthetic, erect and branching mainly from base, glabrous. Leaves slightly fleshy, rapidly caducous, linear, sessile, glabrous. Inflorescences sessile, glabrous, flowers 1–10 (20) opening in gradual succession to ± simultaneously. Corolla with slender tube inflated at base and lobes remaining joined at tips.

*Distribution:* 2 spp.; Canary Islands.

*Included species:* \**C. dichotoma* Haw., \**C. fusca* Bolle.

43. **Sect. Ceropegia**.

*Diagnostic features:* Slender climbers arising from small swollen, irregularly ± spherical tuber-like bases (often several along

stem). Stems perennial, wiry to slightly succulent, twining, glabrous. Leaves herbaceous-leathery, deciduous, cordate to ovate-lanceolate or lanceolate, petiolate, glabrous. Inflorescences pedunculate, glabrous, flowers 1–8 in succession. Corolla with slender tube inflated at base and lobes remaining joined at tips.

*Distribution:* 1 sp.; southern peninsular India, Sri Lanka.  
*Included species:* \**C. candelabrum* L. (incl. *C. munnarana* P. Umam. & P. Daniel).

**44. Sect. *Janthina*** H.Huber in Mem. Soc. Brot. 12: 29 (1957). Type: *Ceropagia elegans* Wall.

*Diagnostic features:* Slender evergreen climbers with fibrous or slightly swollen roots. Stems perennial, herbaceous to slightly fleshy, green, twining, glabrous. Leaves herbaceous, non-deciduous, cordate to ovate-lanceolate, petiolate, usually glabrous. Inflorescences pedunculate, glabrous, flowers 1–8 in succession. Corolla with slender tube inflated at base and lobes remaining joined at tips.

*Distribution:* 11 spp.; South-east Asia (India, Sri Lanka, Malaysia), Malesia (Philippines), northern Australia. In India they are found in the western Ghats (mainly in the south with high rainfall in two seasons) and on the Andaman Islands.

*Included species:* *C. andamanica* Sreek., Veenak. & Prasanth, \**C. cumingiana* Decne., \**C. decaisneana* Wight, *C. elegans* Wall., \**C. intermedia* Wight, *C. lankaviensis* Rintz, *C. maculata* Bedd. (incl. *C. schumanniana* K. Swarupanandan & J.K. Mangaly), *C. manoharii* Sujanpal, P.M. Salim, A. Kumar & Sasidh., *C. metziana* Miq., *C. parviflora* Trimen, \**C. thwaitesii* Hook.

**45. Sect. *Indopezia*** H.Huber in Mem. Soc. Brot. 12: 28 (1957). Type: *Ceropagia hirsuta* Wight & Arn.

Sect. *Buprestis* H.Huber in Mem. Soc. Brot. 12: 29 (1957). Type: *Ceropagia ciliata* Wight.

*Diagnostic features:* Slender geophytic climbers (erect in the *C. lawii* complex) with firm, starchy usually compressed and disc-like tuber. Stems annual, herbaceous and often wiry, twining to erect, glabrous to pubescent. Leaves herbaceous, deciduous, cordate to ovate-lanceolate or lanceolate, petiolate, glabrous to pubescent. Inflorescences pedunculate, glabrous, flowers 1–8 in succession. Corolla with slender tube inflated at base and lobes remaining joined at tips.

*Distribution:* 17 spp.; Endemic to the Western Ghats of peninsular India, especially in Maharashtra in the north of range, which experiences heavy rain in summer and marked dry winters.

*Included species:* *C. barnesii* E.A.Bruce & Chatterjee, *C. beddomei* Hook.f., *C. bhatii* S.R.Yadav & Shendage, \**C. ciliata* Wight, *C. ensifolia* Bedd., *C. evansii* McCann, \**C. fantastica* Sedgewick, \**C. hirsuta*, \**C. huberi* Ansari, \**C. lawii* Hook.f. (incl. *C. karulensis* Punekar & al., *C. maccannii* Ansari, *C. maharashrensis* Punekar & al., *C. panchganiensis* Blatt. & McCann, *C. rollae* Hemadri, *C. sahyadrica* Ansari & B. G. Kulk.), \**C. media* (H.Huber) Ansari, \**C. oculata* Hook.f., *C. odorata* Nimmo ex Hook.f., *C. omissa* H.Huber, *C. pullaiahii* Kullayiswamy, Sandhyarani & Karuppusamy, *C. santapaui* Wadhwa & Ansari, \**C. vincifolia* Hook.

**46. Sect. *Tiloris*** H.Huber in Mem. Soc. Brot. 12: 33 (1957). Type: *Ceropagia attenuata* Hook.

Ser. *Attenuatae* H.Huber in Mem. Soc. Brot. 12: 33 (1957). Type: *Ceropagia attenuata*.

Ser. *Pusillae* H.Huber in Mem. Soc. Brot. 12: 27 (1957). Type: *Ceropagia pusilla* Wight & Arn.

*Eriopetalum* Wight, Contr. Bot. India: 35. 183 (1834). Type: not designated.

*Microstemma* R.Br., Prodr.: 459 (1810). Type: *M. tuberosum* R.Br. (*Ceropagia glabriflora* (F. Muell.) Bruyns).

*Diagnostic features:* Small erect slender (occasionally twining) geophytic herbs arising from firm, starchy, usually compressed

and disc-like tuber (turnip-shaped in *C. bourneae*). Stems annual, wiry, erect (sometimes twining), glabrous. Leaves herbaceous, deciduous, lanceolate to linear, shortly petiolate to sessile, glabrous (or with fine marginal cilia). Inflorescences sessile, glabrous, flowers 1–3 in succession (opening before leaves develop in small erect species with lobes much longer than tube). Corolla with slender tube inflated at base and lobes remaining joined at tips or with short tube and lobes free (occasionally rotate) or remaining joined at tips.

*Distribution:* 38 spp.; India and South-east Asia, Malesia (New Guinea, Phillipines) to northern Australia.

*Included species:* *C. acicularis* Kidyoo, *C. aridicola* W.W. Sm., *C. arnottiana* Wight, \**C. attenuata* Hook., *C. attenuatula* Bruyns, \**C. bourneae* (Gamble) Bruyns, \**C. brevitubulata* Bedd., *C. ciliatior* Bruyns, \**C. edulissima* Bruyns, *C. elenaduensis* (Sathyam. Char.) Bruyns, \**C. fimbriifera* Bedd., *C. glabra* (Hook.f.) Bruyns, *C. glabriflora* (F.Muell.) Bruyns, *C. jainii* Ansari & B. G. Kulk., *C. kerrii* (Craib) Bruyns, \**C. kolarensis* (Arekal & T. M. Ramakrishna) Bruyns, *C. laevigata* (Wight) Bruyns, *C. lankana* (Dassan. & Jayas.) Bruyns, *C. mahabalei* Hemadri & Ansari, \**C. mahajanii* (Kambale & S. R. Yadav) Bruyns, *C. malwanensis* (S.R. Yadav & N.P. Singh) Bruyns, *C. merrilliana* Bruyns, *C. nana* Coll. & Hemsl., \**C. noorjahaniae* Ansari, *C. parvissima* Bruyns, *C. pullaiahiana* Bruyns, \**C. pusilla* Wight & Arn., *C. sootepensis* Craib, *C. spaniflora* Bruyns, \**C. spiralis* Wight, *C. swarupa* (Kishore & Goyder) Bruyns, *C. tenuicaulis* Kidyoo, *C. thailandica* Meve (incl. *C. suddee* Kidyoo), *C. vartakii* (Kambale & S.R. Yadav) Bruyns, *C. volubicalis* Bruyns.

*Taxonomic changes:*

*Ceropagia attenuatula* Bruyns, **nom. nov.**, **non** *Ceropagia attenuata* Hook. *Eriopetalum attenuatum* Wight, Contr. Bot. India: 35 (1834).

\**Ceropagia bourneae* (Gamble) Bruyns, **comb. nov.** *Brachystelma bourneae* Gamble in Bull. Misc. Inform. 1922: 120 (1922). Type: India, Tamil Nadu, Madurai District, Pulney Hills: Kodaikanal Ghat, 31 Aug. 1898, A.G. & E.G. Bourne 1020 (K, lecto!, designated here).

*Brachystelma maculatum* Hook.f., Fl. Brit. India 4: 65 (1883), **syn. nov.**

*Brachystelma rangacharii* Gamble in Bull. Misc. Inform. 1922: 120 (1922), **syn. nov.**

*Brachystelma penchalakonense* Rasingam, Chorghe, Meve, Sankara Rao & Prasanna in Kew Bull. 68: 663 (2013), **syn. nov.** *Brachystelma nallamalanum* K. Prasad & B.R.P.Rao in J. Threat. Taxa 5: 4904 (2013) as "nallamalayana", **syn. nov.**

\**Ceropagia brevitubulata* Bedd., Icon. Pl. Ind. Or. 38. t. 174 (1874). *Brachystelma brevitubulatum* (Bedd.) Gamble, Fl. Madras 2: 852 (1923).

*Ceropagia ciliatior* Bruyns, **nom. nov.**, **non** *Ceropagia ciliata* Wight. *Brachystelma ciliatum* Arekal & T. M. Ramakrishna in Curr. Sci. 50: 145 (1981).

\**Ceropagia edulissima* Bruyns, **nom. nov.**, **non** *Ceropagia edulis* (Edgew.) Bruyns. *Brachystelma edule* Collett & Hemsl. in J. Linn. Soc., Bot. 28. 89, t. 14 (1890) as 'edulis'.

*Ceropagia elenaduensis* (Sathyam. Char.) Bruyns, **comb. nov.** *Brachystelma elenaduense* Sathyam. Char. in Curr. Sci. 47: 965 (1978) as 'elenaduensis'.

*Ceropagia glabra* (Hook.f.) Bruyns, **comb. nov.** *Brachystelma glabrum* Hook.f., Fl. Brit. India 4: 65 (1883).

*Ceropagia glabriflora* (F.Muell.) Bruyns, **comb. nov.** *Microstemma glabriflorum* F. Muell., Fragm. 1: 58 (1858).

*Ceropagia kerrii* (Craib) Bruyns, **comb. nov.** *Brachystelma kerrii* Craib in Bull. Misc. Inform. 1911: 420 (1911).

\**Ceropagia kolarensis* (Arekal & T. M. Ramakrishna) Bruyns, **comb. nov.** *Brachystelma kolarensis* Arekal & T. M. Ramakrishna

in Proc. Indian Acad. Sci. Pl. Sci. 90: 203 (1981) as 'kolarensis'. *Ceropegia laevigata* (Wight) Bruyns, **comb. nov.** *Eriopetalum laevigatum* Wight, Contr. Bot. India: 35 (1834). *Ceropegia lankana* (Dassan. & Jayas.) Bruyns, **comb. nov.** *Brachystelma lankanum* Dassan. & Jayas. in Ceylon J. Sci., Biol. Sci. 11: 39 (1974) as 'lankana'. \**Ceropegia mahajanii* (Kambale & S. R. Yadav) Bruyns, **comb. nov.** *Brachystelma mahajanii* Kambale & S. R. Yadav in Kew Bull. 69–9493: 2 (2014). *Ceropegia malwanensis* (S.R. Yadav & N.P. Singh) Bruyns, **comb. nov.** *Brachystelma malwanense* S.R. Yadav & N.P. Singh in Kew Bull. 48: 59 (1993). *Brachystelma naorojii* P.Tetali, D.K.Kulk., S.Tetali & M.-S.Kumbhojkar in Rheedea 8: 75 (1998), **syn. nov.** *Ceropegia matthewiana* (Bruyns & Britto) Bruyns, **comb. nov.** *Brachystelma matthewiana* Bruyns & Britto in Haseltonia 22: 51 (2016). *Ceropegia merrilliana* Bruyns, **nom. nov., non** *Ceropegia merrillii* Schltr. *Brachystelma merrillii* Schltr. in Repert. Spec. Nov. Regni Veg. 13: 566 (1915). *Ceropegia parvissima* Bruyns, **nom. nov., non** *Ceropegia parviflora* Trimen. *Eriopetalum parviflorum* Wight, Contr. Bot. India: 35 (1834). *Ceropegia pullaiahiana* Bruyns, **nom. nov., non** *Ceropegia pullaiahii* Kullayiswamy, Sandhyarani & Karuppusamy. *Brachystelma pullaiahii* B.R.P. Rao, K. Prasad, Sadas., S.K. Basha, M.V.S. Babu & Prasanna in Taiwania 56: 223 (2011) as 'pullaiahii'. *Ceropegia rapinatiana* (Britto & Bruyns) Bruyns, **comb. nov.** *Brachystelma rapinatinum* Britto & Bruyns in Haseltonia 22: 50 (2016). *Ceropegia saldanhae* (Britto & Bruyns) Bruyns, **comb. nov.** *Brachystelma saldanhae* Britto & Bruyns in Haseltonia 22: 52 (2016). *Ceropegia spaniflora* Bruyns, **nom. nov., non** *Ceropegia pauciflora* (Wight) Bruyns. *Brachystelma pauciflorum* Duthie, Fl. Upper Gangetic Plain 2: 64 (1911). *Ceropegia swarupa* (Kishore & Goyder) Bruyns, **comb. nov.** *Brachystelma swarupa* Kishore & Goyder in Kew Bull. 56: 210 (2001). *Ceropegia vartakii* (Kambale & S.R. Yadav) Bruyns, **comb. nov.** *Brachystelma vartakii* Kambale & S.R. Yadav in Kew Bull. 69–9493: 2 (2014). *Ceropegia volubicaulis* Bruyns, **nom. nov., non** *Ceropegia volubilis* N.E.Br. *Brachystelma volubile* Hook.f., Fl. Brit. India 4: 65 (1883).

#### 4.1.2. Clade B

Members of Clade B (Fig. 5) are slender climbers that are occasionally fleshy or they are small erect geophytic herbs often arising from a tuber or with a cluster of fusiform roots. Leaves are prominent and herbaceous or fleshy and occasionally are reduced to small, fleshy rudiments.

*Distribution:* 201 spp.; South Africa to West and North-east Africa, two species are found in the southern Arabian Peninsula, with two species that occur both on Madagascar and in Africa (*C. ampliata* E. Mey. and *C. carnosa* E. Mey.). No species are known from South-east Asia in Clade B.

**47. Sect. *Convolvuloides*** (H.Huber) Bruyns, **stat. nov.** Ser. *Convolvuloides* H.Huber in Mem. Soc. Brot. 12: 36 (1957). Type: *Ceropegia convolvuloides* A. Rich.  
*Diagnostic features:* Slender climber from cluster of fusiform roots. Stems annual, herbaceous, twining, pubescent. Leaves herbaceous, deciduous, usually cordate, petiolate, usually pubescent. Inflorescences pedunculate, pubescent, flowers 1–8. Corolla with slender tube inflated at base and lobes remaining joined at tips.  
*Distribution:* 4 spp.; South tropical to North-east Africa.  
*Included species:* *C. convolvuloides* A. Rich., *C. filicorona* Masinde, \**C. meyeri-johannis* Engl., *C. verticillata* Masinde.

- 48. Sect. *Pseudoceropegiella*** Bruyns, **sect. nov.** Type: *Ceropegia purpurascens* K.Schum.  
*Diagnostic features:* Slender climber from one or more fleshy compressed and disc-like tubers often in vertical sequence. Stems partly deciduous, wiry, twining, glabrous. Leaves delicate and non-succulent, deciduous, ovate to ovate-lanceolate, petiolate, sparsely pubescent to glabrous. Inflorescences pedunculate, usually glabrous, flowers 1–5. Corolla with slender tube inflated at base and lobes remaining joined at tips, <25 mm long.  
*Distribution:* 1 sp., Tropical southern Africa to East Africa.  
*Included species:* \**C. purpurascens* K. Schum.
- 49. Sect. *Speciosae*** (H.Huber) Bruyns, **stat. nov.** Ser. *Speciosae* H.Huber in Mem. Soc. Brot. 12: 35 (1957). Type: *Ceropegia speciosa* H.Huber.  
*Diagnostic features:* Slender succulent climber from fibrous roots. Stems perennial, partly photosynthetic, succulent, twining, glabrous. Leaves herbaceous, deciduous, ovate, petiolate, glabrous. Inflorescences on slender ultimate growth, pedunculate, glabrous, flowers 1–4 on slightly fleshy pedicels. Corolla with slender tube inflated at base and lobes remaining joined at tips.  
*Distribution:* 1 sp.; Malawi, Tanzania and Zambia.  
*Included species:* \**C. speciosa* H.Huber.
- 50. Sect. *Carnosae*** Bruyns, **sect. nov.** Type: *C. carnosa* E. Mey.  
*Diagnostic features:* Slender climber from one or more clusters of fusiform roots or with fibrous roots. Stems perennial, partly photosynthetic, wiry to slightly fleshy, twining, glabrous to sparsely pubescent. Leaves herbaceous and sometimes slightly leathery or fleshy, deciduous to persistent, ovate to elliptic, petiolate, glabrous to finely pubescent. Inflorescences pedunculate, glabrous to finely pubescent, flowers 1–6. Corolla with slender tube inflated at base and lobes remaining joined at tips. Outer series of staminal corona very deeply sculptured (right to base) in middle.  
*Distribution:* 2 spp.; South Africa to West and North-East Africa and on Madagascar.  
*Included species:* \**C. carnosa* E. Mey. (incl. *C. racemosa* N.E.Br., Bruyns, 2014), \**C. sankuruensis* Schltr.  
*Taxonomic change:* With the inclusion (Bruyns, 2014) of *C. racemosa* in *C. carnosa*, the following new combination is necessary for the Madagascan representatives of this species which are closely allied to those from Africa (Fig. 5):  
\**Ceropegia carnosa* subsp. *glabra* (H.Huber) Bruyns, **comb. nov.** *C. racemosa* subsp. *glabra* H.Huber in Mem. Soc. Brot. 12: 96 (1957).
- 51. Sect. *Umbraticolae*** (H.Huber) Bruyns, **stat. nov.** C. ser. *Umbraticolae* H.Huber in Mem. Soc. Brot. 12: 36 (1957). Type: *Ceropegia umbraticola* K.Schum.  
Ser. *Mirabilis* H.Huber in Mem. Soc. Brot. 12: 36 (1957). Type: *Ceropegia mirabilis* H.Huber.  
*Diagnostic features:* Slender erect herb with cluster of slender to stout fusiform roots. Stems annual, erect and often solitary, pubescent. Leaves herbaceous, deciduous, ovate to narrowly linear, petiolate, usually pubescent. Inflorescences ± sessile, usually pubescent, flowers 1–3. Corolla with slender tube inflated at base and lobes remaining joined at tips.  
*Distribution:* 9 spp.; southern tropical to East Africa.  
*Included species:* *C. damannii* Stopp, *C. filipendula* K.Schum., \**C. gilgiana* Werderm., *C. illegitima* H.Huber, *C. kundelunguensis* Malaisse, *C. mendesii* Stopp, *C. mirabilis* H.Huber, *C. schajiesiorum* Malaisse, *C. umbraticola* K.Schum.
- 52. Sect. *Loligo*** Chiov., Fl. Somalia 2: 303 (1932). Type: *Ceropegia variegata* Decne.  
*Diagnostic features:* Slender succulent creeper or climber with cluster of fusiform roots or fibrous roots. Stems perennial,

photosynthetic, succulent to highly succulent, creeping to clambering and often only twining to flower, sometimes tuberculate, glabrous, sap cloudy. Leaves rudimentary and caducous, often arising from slight tubercle, cordate-ovate to lanceolate, sessile, glabrous (or with minute marginal cilia). Inflorescences on slender ultimate growth, sessile to pedunculate, glabrous, flowers 1–4 on fleshy pedicels. Corolla with slender tube inflated at base and lobes remaining joined at tips.

*Distribution:* 3 spp.; East Africa to southern Arabian Peninsula. *Included species:* \**C. arabica* H.Huber (incl. *C. barbigera* Bruyns, *C. powysii* D.V. Field), \**C. galeata* H.Huber, \**C. variegata* Decne.

53. **Sect. Laguncula** H.Huber in Mem. Soc. Brot. 12: 35 (1957). Type: *Ceropogia abyssinica* Decne.

Ser. *Nigrae* H.Huber in Mem. Soc. Brot. 12: 36 (1957). Type: *Ceropogia nigra* N.E.Br.

Ser. *Abyssinicae* H.Huber in Mem. Soc. Brot. 12: 37 (1957). Type: *Ceropogia abyssinica*.

Ser. *Ringentes* H.Huber in Mem. Soc. Brot. 12: 37 (1957). Type: *Ceropogia ringens* A. Rich.

Sect. *Astropegia* H.Huber in Mem. Soc. Brot. 12: 38 (1957). Type: *Ceropogia furcata* Werderm.

*Diagnostic features:* Slender non-succulent geophytic climber or erect herb from small, firm starchy usually compressed and disc-like tuber. Stem annual, wiry, twining to erect, sparsely to densely pubescent. Leaves delicate and non-succulent, deciduous, ovate to deltate to linear, petiolate, pubescent to nearly glabrous, entire or margins dentate or variously toothed (often variable in single population and in individuals). Inflorescences ± sessile, usually pubescent, flowers 1–many, sometimes opening ± simultaneously. Corolla with slender tube inflated at base and lobes remaining joined at tips, often almost black on inside on lobes and in mouth of tube, mostly <25 mm long.

*Distribution:* 21 spp.; subtropical South Africa to West and North-east Africa (to Eritrea).

*Included species:* \**C. abyssinica*, *C. achtentii* De Wildem., \**C. claviloba* Werderm., *C. furcata*, *C. inflata* Hochst. ex Werderm., \**C. kituloensis* Masinde & F. Albers, *C. loranthiflora* K.Schum., *C. manderensis* Masinde, *C. melanops* H. Huber (incl. *C. microgaster* M. Gilbert), \**C. meyeri* Decne., *C. muzingana* Malaisse, \**C. namuliensis* Bruyns, *C. nephroloba* (H. Huber) Bruyns, *C. nigra* (incl. *C. recurvata* M. Gilbert), *C. papillata* N.E.Br., *C. paricyma* N.E.Br., *C. ringens*, *C. ringoetii* De Wildem., \**C. stenoloba* Chiov., *C. swaziorum* D.V. Field, *C. vanderystii* De Wildem.

#### Taxonomic change:

*Ceropogia nephroloba* (H. Huber) Bruyns, **stat. nov.** *C. sobolifera* var. *nephroloba* H. Huber in Mem. Soc. Brot. 12: 201 (1957).

*Note:* *Ceropogia nephroloba* has a small, starchy tuber with deciduous stem and leaves and soft, herbaceous leaves of very variable shape, corolla with blackish surface on the inside of the lobes, making it a typical member of this section. In all these features it is very different from *C. sobolifera* (fusiform roots rather than a tuber etc.) and there is no reason to keep it as a variety under that species, whose affinities are assumed to lie elsewhere.

54. **Sect. Coreosma** H.Huber in Mem. Soc. Brot. 12: 31 (1957). Type: *Ceropogia stapeliiformis* Haw.

*Diagnostic features:* Creeping succulent with fibrous roots at nodes. Stems perennial, photosynthetic, highly succulent (to 15 mm thick), creeping and only rising up and twining to flower, tuberculate, glabrous. Leaves rudimentary and caducous, arising from tubercle, cordate-ovate to deltate, sessile, glabrous. Inflorescences on slender ultimate growth, pedunculate, glabrous, flowers 1–4 on fleshy pedicels. Corolla with slender tube inflated at base and lobes free at tips.

*Distribution:* 2 spp.; southern Africa in Moçambique, South Africa and Swaziland. *Included species:* \**C. cimiciodora* Oberm., \**C. stapeliiformis* Haw.

55. **Sect. Radicantiores** Bruyns, **sect. nov.** Type: *Ceropogia radicans* Schltr.

*Diagnostic features:* Creeping succulent with clusters of fusiform roots at nodes. Stems perennial, photosynthetic, succulent, creeping and only rising up and twining to flower, glabrous. Leaves fleshy and lasting several years, circular to ovate-lanceolate (sometimes almost obsolete on some stems in *C. arenaria*), petiolate, glabrous. Inflorescences pedunculate, glabrous, flowers 1–4 on fleshy pedicels. Corolla with slender tube inflated at base and lobes remaining joined at tips.

*Distribution:* 3 spp.; southern Africa in Moçambique, South Africa and Swaziland.

*Included species:* \**C. arenaria* R.A.Dyer, \**C. radicans* Schltr., \**C. sandersonii* Hook.f.

56. **Sect. Callopegia** H.Huber in Mem. Soc. Brot. 12: 31 (1957). Type: *Ceropogia nilotica* Kotschy.

Ser. *Stenantheae* H.Huber in Mem. Soc. Brot. 12: 32 (1957). Type: *Ceropogia stenantha* K.Schum.

*Diagnostic features:* Slender succulent climber from cluster of fusiform roots. Stems often deciduous above-ground in dry season and breaking up at nodes when drying out, photosynthetic, succulent and slightly angled in cross-section, usually twining (occasionally erect), glabrous. Leaves slightly to very fleshy, deciduous, ovate to lanceolate or linear, petiolate, glabrous except sometimes for fine marginal cilia, margins sometimes finely toothed. Inflorescences pedunculate (nearly sessile in *C. stenantha*), glabrous, flowers 1–7 on sometimes fleshy pedicels. Corolla with slender tube inflated at base and lobes remaining joined at tips.

*Distribution:* 5 spp.; South Africa to West and East Africa.

*Included species:* \**C. crassifolia* Schltr., \**C. denticulata* N.E.Br., \**C. nilotica* Kotschy, \**C. stenantha*, *C. yampwapwa* Masinde.

57. **Sect. Curviflorae** Bruyns, **sect. nov.** Type: *Ceropogia cycniflora* R.A.Dyer.

*Diagnostic features:* Slender climber from cluster of fusiform roots. Stem mostly perennial, partly photosynthetic, slightly fleshy, twining, pubescent. Leaves slightly fleshy, deciduous to persistent, ovate-lanceolate, petiolate, pubescent. Inflorescences pedunculate, pubescent, flowers 1–3. Corolla with slender tube inflated at base and lobes remaining joined at tips.

*Distribution:* 1 sp.; South Africa.

*Included species:* \**C. cycniflora* R.A.Dyer.

58. **Sect. Ceropegiella** H.Huber in Mem. Soc. Brot. 12: 32 (1957). Type: *Ceropogia africana* R.Br.

Ser. *Africanae* H.Huber in Mem. Soc. Brot. 12: 32 (1957). Type: *Ceropogia africana*.

Ser. *Multiflorae* H.Huber in Mem. Soc. Brot. 12: 32 (1957). Type: *Ceropogia multiflora* Bak.

*Diagnostic features:* Small succulent climbers or tiny erect to creeping or rhizomatous succulents from one or more fleshy usually compressed and disc-like tubers. Stems often many, annual to perennial, partly photosynthetic, fleshy, clambering to twining, glabrous to pubescent. Leaves succulent, deciduous to persistent, linear to ovate or cordate, petiolate, glabrous to pubescent. Inflorescences pedunculate, glabrous, flowers 1–many, sometimes opening ± simultaneously. Corolla with slender tube inflated at base and lobes remaining joined at tips, <25 mm long.

*Distribution:* 14 spp.; Africa, from South Africa to Ethiopia.

*Included species:* \**C. africana*, *C. cancellata* Reichb., *C. conrathii*

Schltr., \**C. collaricorona* Werderm. (= *C. imbricata* E.A.Bruce & P.R.O.Bally), *C. decidua* E.A.Bruce, *C. floribunda* N.E.Br., *C. inornata* Masinde, \**C. linearis* E. Mey., *C. maiuscula* H.Huber, \**C. multiflora*, \**C. occidentalis* R.A.Dyer, \**C. occulta* R.A.Dyer, \**C. pachystelma* Schltr., \**C. rendallii* N.E.Br.

**Taxonomic change.** According to Fig. 5, *C. rendallii* subsp. *mutongensis* is much more closely allied to *C. collaricorona* (= *C. imbricata*) than to *C. rendallii*. Although it was placed under *C. rendallii* because of its somewhat similar umbrella-like top of the corolla (Masinde, 2012), it lacks the particularly deep pouches of the outer coronal series and the laterally flattened inner coronal lobes that are typical of *C. rendallii*. Its staminal corona is therefore more typical of *C. collaricorona* than of *C. rendallii*, corroborating the results of the molecular data. Consequently we have:

\**Ceropegia collaricorona* subsp. *mutongensis* (Masinde) Bruyns, **comb. nov.** *C. rendallii* subsp. *mutongensis* Masinde, Fl. Trop. East Afr., Apocynaceae (Part 2): 246 (2012).

59. **Sect. Leptophyllae** Bruyns, **sect. nov.** Type: *Ceropegia leptophylla* Bruyns.

**Diagnostic features:** Very slender climber from cluster of fusiform roots. Stem annual, wiry, twining, glabrous. Leaves herbaceous, deciduous, narrowly linear, petiolate, glabrous. Inflorescences pedunculate, glabrous, flowers 1–3. Corolla with slender tube inflated at base and lobes remaining joined at tips.

**Distribution:** 1 sp.; southern South Africa.

**Included species:** \**C. leptophylla* Bruyns.

60. **Sect. Psilopegia** H.Huber in Mem. Soc. Brot. 12: 34 (1957). Type: *Ceropegia zeyheri* Schltr.

**Diagnostic features:** Slender creeping, clambering or climbing succulent from cluster of fusiform roots. Stems perennial, photosynthetic, succulent, often only twining to flower, glabrous, sap cloudy. Leaves rudimentary and caducous, lanceolate to subulate, sessile, glabrous (or with minute marginal cilia). Inflorescences usually on more slender ultimate growth, sessile, glabrous, flowers 1–3 on fleshy pedicels. Corolla with slender tube inflated at base and lobes remaining joined at tips.

**Distribution:** 3 spp.; South Africa with *C. ampliata* from South Africa to southern coastal Kenya and in southern Madagascar.

**Included species:** \**C. ampliata* E.Mey. \**C. fimbriata* E. Mey., *C. zeyheri* Schltr.

61. **Sect. Ciliatilobae** Bruyns, **sect. nov.** Type: *Ceropegia barbata* R.A.Dyer.

**Diagnostic features:** Slender wiry to succulent climbers from cluster of fusiform roots. Stem annual or perennial, sometimes photosynthetic, wiry to succulent, twining, glabrous. Leaves herbaceous and deciduous to rudimentary and caducous in *C. namaquensis*, lanceolate to linear or linear-filiform, very shortly petiolate to sessile, glabrous (or with minute marginal cilia). Inflorescences on upper part of stem, pedunculate to sessile, glabrous, flowers 1–3 on fleshy pedicels. Corolla with slender tube inflated at base, lobes twisted in bud and remaining joined at tips (*C. barbata*) or becoming free at anthesis.

**Distribution:** 3 spp.; South Africa (Karoo to Richtersveld) and southern Namibia (*C. filiformis*).

**Included species:** \**C. barbata* R.A.Dyer. \**C. filiformis* (Burch.) Schltr., \**C. namaquensis* Bruyns.

62. **Sect. Bowkeriana** (H.Huber) Bruyns, **stat. nov.** Ser. *Bowkeriana* H.Huber in Mem. Soc. Brot. 12: 33 (1957). Type: *Ceropegia bowkeri* Harv.

**Diagnostic features:** Small, erect geophytic herbs to 0.4 m tall from cluster of fleshy fusiform roots. Stem annual, slightly wiry and often finely longitudinally fluted, not twining, glabrous to softly

pubescent. Leaves herbaceous to slightly leathery, deciduous, very narrowly linear to oblong-lanceolate or ovate, shortly petiolate to sessile, glabrous (or with minute marginal cilia) to pubescent. Inflorescences near tip of stem, sessile, glabrous to pubescent, flowers 1–2 (3). Corolla divided nearly to base into free often erect and often noticeably replicate lobes or with slender tube inflated at base and lobes free at tips (often widely spreading).

**Distribution:** 13 spp.; South Africa.

**Included species:** \**C. bowkeri* Harv., *C. cana* (R.A.Dyer) Bruyns, *C. franksiae* (N.E.Br.) Bruyns, \**C. gerrardii* (Harv.) Bruyns, *C. longifoliata* Bruyns, \**C. macropetala* (Schltr.) Bruyns, \**C. neocompta* Bruyns, *C. ramosissima* (Schltr.) Bruyns, *C. rudatisii* Schltr., *C. sandersoniana* Bruyns, *C. scabriflora* N.E.Br., \**C. schizoglossoides* (Schltr.) Bruyns, *C. tomentosa* Schltr.

**Taxonomic changes:**

*Ceropegia cana* (R.A.Dyer) Bruyns, **comb. nov.** *Brachystelma canum* R.A.Dyer in Bothalia 12: 254 (1977).

*Ceropegia franksiae* (N.E.Br.) Bruyns, **comb. nov.** *Brachystelma franksiae* N.E.Br., in Wood, Natal Pl. 6: t. 588 (1912).

*Ceropegia franksiae* subsp. *franksiae*.

*Ceropegia franksiae* subsp. *grandiflora* (A.P. Dold & Bruyns) Bruyns, **comb. nov.** *Brachystelma franksiae* subsp. *grandiflorum* A.P. Dold & Bruyns in Bothalia 33: 105 (2003).

\**Ceropegia gerrardii* (Harv.) Bruyns, **comb. nov.** *Brachystelma gerrardii* Harv., Thes. Cap. 2: 61, t. 196 (1863).

*Ceropegia longifoliata* Bruyns, **nom. nov.**, **non** *Ceropegia longifolia* Wall. *Brachystelma longifolia* Schltr. in Bot. Jahrb. Syst. 20, Beibl. 51: 50 (1895).

\**Ceropegia macropetala* (Schltr.) Bruyns, **comb. nov.** *Brachystelma macropetala* Schltr. in Bot. Jahrb. Syst. 20, Beibl. 51: 51 (1895).

\**Ceropegia neocompta* Bruyns, **nom. nov.**, **non** *Ceropegia compta* (N.E.Br.) Bruyns. *Brachystelma comptum* N.E.Br., Fl. Cap. 4 (1): 854 (1908).

*Ceropegia ramosissima* (Schltr.) Bruyns, **comb. nov.** *Brachystelma ramosissima* Schltr. in Bot. Jahrb. Syst. 20, Beibl. 51: 50 (1895).

*Ceropegia sandersoniana* Bruyns, **nom. nov.**, **non** *Ceropegia sandersonii* Hook.f. *Lasiostelma sandersonii* Oliv. in Hooker's Icon. Pl. 15: 39, t. 1449 (1883).

\**Ceropegia schizoglossoides* (Schltr.) Bruyns, **comb. nov.** *Sisyranthus schizoglossoides* Schltr. in J. Bot. 32: 357 (1894).

63. **Sect. Chamaesiphon** H.Huber in Mem. Soc. Brot. 12: 34 (1957).

Type: *Ceropegia pygmaea* Schinz.

Ser. *Campanulatae* H.Huber in Mem. Soc. Brot. 12: 33 (1957). Type: *Ceropegia campanulata* G. Don.

*Brachystelma* R.Br. ex Sims in Bot. Mag. 49: t. 2343 (1822), *nom. cons.* Type: *Brachystelma tuberosum* (Meerb.) R.Br. as 'tuberosa' (*Ceropegia spathulata* (Lindl.) Bruyns).

**Diagnostic features:** Small erect geophytic herbs arising from firm, starchy usually compressed and disc-like tuber (somewhat turnip-shaped in *C. blepharanthera*). Stem annual, herbaceous, not twining, pubescent to rarely glabrous. Leaves herbaceous, deciduous, very narrowly linear to oblong-lanceolate or ovate, pediolate to nearly sessile, pubescent to rarely glabrous. Inflorescences next to nodes among well-developed leaves, sessile, pubescent to glabrous, flowers 1–3 (rarely in dense simultaneously opening clusters of up to 20). Corolla usually with short (occasionally long) tube (but generally not divided nearly to base) with free lobes spreading from around its mouth or with slender tube inflated at base and lobes free to remaining joined at tips.

**Distribution:** 115 spp.; Africa, from South Africa to West Africa and to Eritrea in North-east Africa but not in the Mediterranean region, also absent from the Arabian Peninsula.

**Included species:** *C. antennifera* Schltr. (incl. *C. craibii* J.E. Victor), *C. campanulata* G.Don, *C. cataphyllaris* Bullock, *C. deightonii* Hutch.

& Dalz., \**C. dinteri* Schltr., *C. insignis* R.A.Dyer, *C. ledermannii* Schltr., \**C. macmasteri* A.P. Dold, \**C. pygmaea* Schinz (= *Brachystelma gymnopodium* (Schltr.) Bruyns), *C. stentiae* E.A.Bruce, \**C. turricula* E.A.Bruce, *C. tourana* A. Chev. and the 103 species listed below.

*Taxonomic changes:*

\**Ceropogia albipilosa* (A. Lancaster ex Peckover) Bruyns, **comb. nov.** *Brachystelma albipilosum* A. Lancaster ex Peckover in *Cact. Succ. J. (Los Angeles)* 69: 155 (1997).

\**Ceropogia alpina* (R.A.Dyer) Bruyns, **comb. nov.** *Brachystelma alpinum* R.A.Dyer in *J. S. African Bot.* 43: 18 (1977).

\**Ceropogia angustata* Bruyns, **nom. nov.**, **non** *Ceropogia angusta* N.E.Br. *Brachystelma angustum* Peckover in *Aloe* 31: 60 (1994).

\**Ceropogia arnotii* (Bak.) Bruyns, **comb. nov.** *Brachystelma arnotii* Bak in *Refug. Bot. t. 9* (1869) as 'arnottii'.

\**Ceropogia australis* (R.A.Dyer) Bruyns, **comb. nov.** *Brachystelma australe* R.A.Dyer in *J. S. African Bot.* 43: 12 (1977).

\**Ceropogia barberae* (Harv. ex Hook f.) Bruyns, **comb. nov.** *Brachystelma barberae* Harv. ex Hook.f. in *Bot. Mag.* 92: t. 5607 (1866) as 'barberiae'.

*Ceropogia bikitaensis* (Peckover) Bruyns, **comb. nov.** *Brachystelma bikitaense* Peckover in *Aloe* 32: 78 (1995), as 'bikitaensis'.

\**Ceropogia blepharanthera* (H.Huber) Bruyns, **comb. nov.** *Brachystelma blepharanthera* H.Huber in *Mitt. Bot. Staatssammel. München* 4: 33 (1961).

\**Ceropogia bracteolata* (Meve) Bruyns, **comb. nov.** *Brachystelma bracteolatum* Meve in *Kew Bull.* 52: 711 (1997).

\**Ceropogia breviflora* (Schltr.) Bruyns, **comb. nov.** *Dichaelia breviflora* Schltr. in *Bot. Jahrb. Syst.* 20, Beibl. 51: 49 (1895). *Brachystelma pygmaeum* var. *breviflorum* (Schltr.) N.E.Br., Fl. Cap. 4 (!): 857 (1908). Type: South Africa, Transvaal, Mooifontein near Heidelberg, Schlechter 3568 (missing). South Africa, Natal, Vernon Crooke's Reserve, 10 January 1991, Bruyns 4426 (BOL, neo!, designated here, PRE, isoneo!).

*Brachystelma pygmaeum* (Schltr.) N.E.Br., Fl. Cap. 4 (1): 857 (1908). *Dichaelia pygmaea* Schltr. in *J. Bot.* 32: 262 (1894), **syn. nov.**

*Ceropogia breviflora* subsp. *breviflora*.

*Ceropogia breviflora* subsp. *flavida* (Schltr.) Bruyns, **comb. nov.** *Brachystelma flavidum* Schltr. in *Bot. Jahrb. Syst.* 40: 94 (1907). *Brachystelma pygmaeum* N.E.Br. subsp. *flavidum* (Schltr.) R.A.Dyer in *Bothalia* 12: 629 (1979). Type: South Africa, Natal, Fairfield, Alexandra-County, 750 m, 9 Aug. 1909, Rudatis 459 (NBG, neo!, designated here; PRE, isoneo!).

Note: Schlechter cited a specimen: 'fl. August 1905, Rudatis 68', from the same locality as the neotype, but this specimen Rudatis 68 has not been located.

\**Ceropogia brevipedicellata* (Turrill) Bruyns, **comb. nov.** *Brachystelma brevipedicellatum* Turrill in *Bull. Misc. Inform.* 1922: 29 (1922).

*Ceropogia bruceae* (R.A.Dyer) Bruyns, **comb. nov.** *Brachystelma bruceae* R.A.Dyer in *J. S. African Bot.* 43: 13 (1977).

*Ceropogia bruceae* subsp. *bruceae*.

*Ceropogia bruceae* subsp. *hirsuta* (R.A.Dyer) Bruyns, **comb. nov.** *Brachystelma bruceae* subsp. *hirsutum* R.A.Dyer in *J. S. African Bot.* 43: 16 (1977).

\**Ceropogia buchananii* (N.E.Br.) Bruyns, **comb. nov.** *Brachystelma buchananii* N.E.Br. in *Bull. Misc. Inform.* 1895: 263 (1895).

\**Ceropogia burchelliana* Bruyns, **nom. nov.**, **non** *Ceropogia burchellii* (K.Schum.) H.Huber. *Macropetalum burchellii* Decne, DC., *Prodri.* 8: 627 (1844).

*Brachystelma burchellii* var. *grandiflorum* (N.E.Br.) Meve in *Pl. Syst. Evol.* 228: 103 (2001). *Macropetalum burchellii* var. *grandiflorum* N.E.Br., Fl. Cap. 4 (1): 799 (1908), **syn. nov.**

\**Ceropogia caffra* (Schltr.) Bruyns, **comb. nov.** *Tapeinostelma caffrum* Schltr. in *Verh. Bot. Vereins Prov. Brandenburg* 35: 54 (1893).

\**Ceropogia campanuliformis* Bruyns, **nom. nov.**, **non** *Ceropogia campanulata* G.Don. *Brachystelma campanulatum* N.E.Br., Fl. Cap. 4 (1): 838 (1908).

\**Ceropogia cathcartensis* (R.A.Dyer) Bruyns, **comb. nov.** *Brachystelma cathartense* R.A.Dyer in *Bothalia* 10: 431 (1971).

\**Ceropogia chlorantha* (Schltr.) Bruyns, **comb. nov.** *Tenaris chlorantha* Schltr. in *Bot. Jahrb. Syst.* 20, Beibl. 51: 44 (1895). Type: South Africa, near Pretoria, 4900', 8 Jan. 1894, Schlechter 4152 (BOL, lecto!, designated here; Z, isolecto!).

\**Ceropogia chlorozona* (E.A.Bruce) Bruyns, **comb. nov.** *Brachystelma chlorozonum* E.A.Bruce in *Hooker's Icon. Pl.* 34: t. 3370 (1938).

\**Ceropogia christianeae* (Peckover) Bruyns, **comb. nov.** *Brachystelma christianeae* Peckover in *Aloe* 29: 56 (1992).

\**Ceropogia circinata* (E. Mey.) Bruyns, **comb. nov.** *Brachystelma circinatum* E. Mey., *Comm. Pl. Afr. Austr.*: 196 (1838).

*Ceropogia coddii* (R.A.Dyer) Bruyns, **comb. nov.** *Brachystelma coddii* R.A.Dyer in *Fl. Pl. Africa* 30. t. 1181 (1955).

*Ceropogia codonantha* (Bruyns) Bruyns, **comb. nov.** *Brachystelma codonanthum* Bruyns in *Bothalia* 25: 157 (1995).

\**Ceropogia cummingii* (A.P.Dold) Bruyns, **comb. nov.** *Brachystelma cummingii* A.P.Dold in *Bothalia* 32: 71 (2002).

*Ceropogia cupulata* (R.A.Dyer) Bruyns, **comb. nov.** *Brachystelma cupulatum* R.A.Dyer in *Bothalia* 10: 375 (1971).

*Ceropogia daverrichardsonii* Bruyns, **nom. nov.**, **non** *Ceropogia richardsiae* Masinde. *Brachystelma richardsii* Peckover in *Excelsa* 17: 33 (1996).

\**Ceropogia decipientiflora* Bruyns, **nom. nov.**, **non** *Ceropogia decipiens* (Bruyns) Bruyns. *Brachystelma decipiens* N.E.Br., Fl. Cap. 4 (1): 842 (1908).

\**Ceropogia delicata* (R.A.Dyer) Bruyns, **comb. nov.** *Brachystelma delicatum* R.A.Dyer in *Bothalia* 12: 53 (1976).

*Ceropogia differens* Bruyns, **nom. nov.**, **non** *Ceropogia dimorpha* Humbert. *Brachystelma dimorphum* R.A.Dyer in *Bothalia* 12: 627 (1979).

*Ceropogia differens* subsp. *differens*.

*Ceropogia differens* subsp. *grata* (R.A.Dyer) Bruyns, **comb. nov.** *Brachystelma dimorphum* subsp. *gratum* R.A.Dyer in *Bothalia* 12: 628 (1979).

\**Ceropogia dinteriana* Bruyns, **nom. nov.**, **non** *Ceropogia dinteri* Schltr. *Brachystelma dinteri* Schltr. in *Bot. Jahrb. Syst.* 51: 144 (1913).

\**Ceropogia discoidea* (R.A.Dyer) Bruyns, **comb. nov.** *Brachystelma discoideum* R.A.Dyer in *Fl. Pl. Africa* 42: t. 1668 (1973).

*Ceropogia duplicita* (R.A.Dyer) Bruyns, **comb. nov.** *Brachystelma duplicitum* R.A.Dyer in *Bothalia* 12: 629. 1979. *Brachystelma floribundum* R.A.Dyer in *Fl. Pl. Africa* 31: t. 1224 (1956), nom illegit., non Turrill (1922).

*Ceropogia dyeri* (K. Balkwill, M. Balkwill & Cadman) Bruyns, **comb. nov.** *Brachystelma dyeri* K. Balkwill, M. Balkwill & Cadman in *S. African J. Bot.* 54: 61 (1988).

\**Ceropogia elongata* (Schltr.) Bruyns, **comb. nov.** *Dichaelia elongata* Schltr. in *Bot. Jahrb. Syst.* 18, Beibl. 45: 35 (1894). Type: South Africa, Somerset East div., Boschberg, 2500', 10 May 1893, Schlechter 2699 (missing). South Africa, Cape, Springs Nature Reserve, Dold 4365 (GRA, neo!, designated here).

*Ceropogia exilis* (Bullock) Bruyns, **comb. nov.** *Brachystelma exile* Bullock in *Kew Bull.* 17: 191 (1963).

*Ceropogia festucifolia* (E.A.Bruce) Bruyns, **comb. nov.** *Brachystelma festucifolium* E.A.Bruce in *Hooker's Icon. Pl.* 34: t. 3369 (1938).

\**Ceropogia filifolia* (Schltr.) Bruyns, **comb. nov.** *Macropetalum filifolium* Schltr. in *Bot. Jahrb. Syst.* 38: 36 (1905). Type: South Africa, Komatiopoort, 330 m, 14 Dec. 1897, Schlechter 11733 (BR, lecto!, designated here; BM!, BOL!, E!, GRA!, K!, Z! isolecto!).

\**Ceropogia floribundior* Bruyns, **nom. nov.**, **non** *Ceropogia floribunda* N.E.Br. *Brachystelma floribundum* Turrill in *Bull. Misc.*

Inform. 1922: 197 (1922).

*Ceropegia floribundior* var. *floribundior*.

*Ceropegia floribundior* var. *milmakito* (Masinde) Bruyns, **comb. nov.** *Brachystelma floribundum* var. *milmakito* Masinde in Kew Bull. 62: 64 (2007).

\**Ceropegia foetidissima* Bruyns, **nom. nov., non** *Ceropegia foetida* (E.A.Bruce) Bruyns. *Brachystelma foetidum* Schltr. in Bot. Jahrb. Syst. 20, Beibl. 51: 52 (1895).

\**Ceropegia gemmea* (R.A.Dyer) Bruyns, **comb. nov.** *Brachystelma gemmeum* R.A.Dyer in Bothalia 12: 628 (1979).

*Ceropegia glenensis* (R.A.Dyer) Bruyns, **comb. nov.** *Brachystelma glenense* R.A.Dyer in Bothalia 12: 54 (1976).

*Ceropegia gracilior* Bruyns, **nom. nov., non** *Ceropegia gracilis* Beddome. *Brachystelma gracile* E.A.Bruce in Fl. Pl. Africa 27: t. 1077 (1949) as 'gracilis'.

*Ceropegia gracillima* (R.A.Dyer) Bruyns, **comb. nov.** *Brachystelma gracillimum* R.A.Dyer in J. S. African Bot. 11: 112 (1945).

*Ceropegia hirtella* (Weim.) Bruyns, **comb. nov.** *Brachystelma hirtellum* Weim. In Bot. Not. 1935: 406 (1935).

\**Ceropegia huttonii* (Harv.) Bruyns, **comb. nov.** *Brachystelma huttonii* (Harv.) **N.E.Br.**, Fl. Cap. 4 (1): 845 (1908). *Decaceras huttonii* Harv., Thes. Cap. 2: 9, t. 114 (1863).

\**Ceropegia incana* (R.A.Dyer) Bruyns, **comb. nov.** *Brachystelma incanum* R.A.Dyer in Bothalia 12: 54 (1976).

*Ceropegia inconspicuor* Bruyns, **nom. nov., non** *Ceropegia inconspicua* (Bruyns) Bruyns. *Brachystelma inconspicuum* S. Venter in Excelsa 13: 106 (1988).

*Ceropegia johnstonii* (**N.E.Br.**) Bruyns, **comb. nov.** *Brachystelma johnstonii* **N.E.Br.** in Hooker's Icon. Pl. 28: t. 2754 (1903).

\**Ceropegia kenyana* Bruyns, **nom. nov., non** *Ceropegia keniensis* Masinde. *Brachystelma keniense* Schweinf., in Höhnel, zum Rudolph See, Anhang: 8 (1892).

*Ceropegia kerzneri* (Peckover) Bruyns, **comb. nov.** *Brachystelma kerzneri* Peckover in Aloe 31: 85 (1994).

\**Ceropegia kituloana* Bruyns, **nom. nov., non** *Ceropegia kituloensis* Masinde & F.Albers. *Brachystelma coddii* subsp. *kituloense* (Goyder) Masinde in Kew Bull. 62: 50 (2007). *Brachystelma kituloense* Goyder, Kew Bull. 45: 729. 1990 as 'kituloensis'.

*Ceropegia lancasteri* (Boege) Bruyns, **comb. nov.** *Brachystelma lancasteri* Boege in Excelsa 16: 30 (1994).

*Ceropegia letestui* (Pellegr.) Bruyns, **comb. nov.** *Brachystelma letestui* Pellegr. in Bull. Mus. Natl. Hist. Nat. 32: 393 (1926).

\**Ceropegia linearior* Bruyns, **nom. nov., non** *Ceropegia linearis* E.Mey. *Brachystelma lineare* A. Rich., Tent. Fl. Abyss. 2: 49 (1850).

\**Ceropegia luteiflora* Bruyns, **nom. nov., non** *Ceropegia lutea* (**N.E.Br.**) Bruyns. *Brachystelma luteum* Peckover in Aloe 29: 66 (1992), as 'luted'.

\**Ceropegia mafekingensis* (**N.E.Br.**) R.A.Dyer in Bothalia 12: 256 (1977). *Brachystelma mafekingense* **N.E.Br.**, Fl. Cap. 4 (1): 854 (1908). Type: South Africa, Mafeking, Green sub Schönland 1683 (missing). Namibia, Otjitu, Grootfontein, Dinter 2701 (SAM, neo!, designated here, WIND, isoneo!).

\**Ceropegia maritae* (Peckover) Bruyns, **comb. nov.** *Brachystelma maritae* Peckover in Cact. Succ. J. (Los Angeles) 68: 3 (1996).

*Ceropegia megasepala* (Peckover) Bruyns, **comb. nov.** *Brachystelma megasepalum* Peckover in Kakteen und. Sukk. 47: 250 (1996).

\**Ceropegia meyeriana* (Schltr.) Bruyns, **comb. nov.** *Brachystelma meyerianum* Schltr. in Bot. Jahrb. Syst. 21, Beibl. 54: 14 (1896) as 'meyerianum'. Type: South Africa, Cape, near Komgha, 2000', Dec. 1892, Flanagan 1365 (BOL, lecto!, designated here; isolecto. NH!, PRE!, SAM!).

Note: When he described *B. meyeriana*, Schlechter cited: *Brachystelma tuberosum* E. Mey: Comm. Pl. Afr. Austr.: 196. 1838 nec R.Br. Type: South Africa, Cape, Katberg, between Kat River and Klipplaat River, Drège 3439 (K 000305659, K).

*Brachystelma caffrum* Schlr., Bot. Jahrb. Syst. 18, Beibl. 45: 13. 1894

nec **N.E.Br.** (1894). Type: South Africa, near Komgha, 2000', December 1892, Flanagan 1365 (BOL, NH, PRE, SAM).

Therefore one of these specimens must be the lectotype and **Dyer (1980)** was wrong to choose Sim 1508 as the lectotype. This is rectified here.

*Ceropegia micriforma* Bruyns, **nom. nov., non** *Ceropegia micrantha* Merrill. *Brachystelma micranthum* E. Mey., Comm. Pl. Afr. Austr.: 196 (1838). Type: South Africa, Queenstown distr., near Shiloh, 4000–5000', Drège (K, lecto!, designated here).

Note: The other specimen cited, namely 'Los Tafelberg', Drège has not been located.

\**Ceropegia minima* (R.A.Dyer) Bruyns, **comb. nov.** *Brachystelma minimum* R.A.Dyer in Bothalia 12: 447 (1978).

\**Ceropegia minor* (E.A.Bruce) Bruyns, **comb. nov.** *Brachystelma minor* E.A.Bruce in Fl. Pl. Africa 27. t. 1096a (1951).

\**Ceropegia modestantha* Bruyns, **nom. nov., non** *Ceropegia modesta* (**N.E.Br.**) Bruyns. *Brachystelma modestum* R.A.Dyer in Fl. Pl. Africa 30. t. 1165a (1954).

*Ceropegia molaventi* (Peckover & A.E. van Wyk) Bruyns, **comb. nov.** *Brachystelma molaventi* Peckover & A.E. van Wyk in Aloe 36: 46 (1999).

*Ceropegia montiphila* Bruyns, **nom. nov., non** *Ceropegia montana* (R.A.Dyer & E.A.Bruce) Bruyns *Brachystelma montanum* R.A.Dyer in Bothalia 6: 540 (1956).

\**Ceropegia nanior* Bruyns, **nom. nov., non** *Ceropegia nana* Coll. & Hemsl. *Brachystelma nanum* (Schltr.) **N.E.Br.**, Fl. Cap. 4 (1): 848 (1908). *Lasiostelma nanum* Schltr. in Bot. Jahrb. Syst. 38: 37 (1905). Type: South Africa, Free State, Renosterkop near Vaal River, Jan., Zeyher 509 (CAL, lecto!, designated here).

Note: The holotype at B is missing and this specimen is a duplicate of it, so it is suitable as a lectotype.

*Ceropegia neofurcata* Bruyns, **nom. nov., non** *Ceropegia furcata* Werderm. *Brachystelma furcatum* Boege in Excelsa 16: 29 (1994).

*Ceropegia neo-omissa* Bruyns, **nom. nov., non** *Ceropegia omissa* H.Huber. *Brachystelma omissum* Bullock in Kew Bull. 17: 193 (1963).

\**Ceropegia ngomensis* (R.A.Dyer) Bruyns, **comb. nov.** *Brachystelma ngomense* R.A.Dyer in Bothalia 12: 255 (1977).

\**Ceropegia nutans* (Bruyns) Bruyns, **comb. nov.** *Brachystelma nutans* Bruyns in Novon 16: 452 (2006).

*Ceropegia occidentalis* Bruyns, **nom. nov., non** *Ceropegia occidentalis* R.A.Dyer. *Brachystelma occidentale* Schlr. in Verh. Bot. Vereins Prov. Brandenburg 35: 53 (1893). Type: South Africa, Cape Peninsula near Smitswinkel Bay, 350', 17 Apr. 1892, Schlechter 666 (K, lecto!, designated here; BOL, isolecto!, sketch).

Note: The holotype at B is missing and the specimen at K is part of it, so it is suitable as a lectotype.

\**Ceropegia oiantha* (Schltr.) Bruyns, **comb. nov.** *Brachystelma oianthum* Schltr. in Bot. Jahrb. Syst. 20, Beibl. 51: 53 (1895). Type: South Africa, Transvaal, 7 miles west of Potchefstroom towards Modderfontein, 16 Jan. 1947, Louw 1545 (PRE, neo!, designated here).

Note: Neither of the specimens cited, namely Transvaal, near Potchefstroom, Mooifontein, 5500', 22 October 1893, Schlechter 3557; Elandspruit Mountains, 6000', 18 December 1893, Schlechter 3993 has been located so a neotype is selected.

*Ceropegia pachypodium* (R.A.Dyer) Bruyns, **comb. nov.** *Brachystelma pachypodium* R.A.Dyer in Fl. Pl. Africa 32. t. 1269 (1958).

\**Ceropegia parvior* Bruyns, **nom. nov., non** *Ceropegia parvula* (**N.E.Br.**) Bruyns. *Brachystelma parvulum* R.A.Dyer in Bothalia 12: 447 (1978).

\**Ceropegia perdita* (R.A.Dyer) Bruyns, **comb. nov.** *Brachystelma perditum* R.A.Dyer in J. S. African Bot. 43: 10 (1977).

*Ceropegia petrophila* Bruyns, **nom. nov., non** *Ceropegia petraea* (Lavrano) Bruyns. *Brachystelma petraeum* R.A.Dyer in J. S. African Bot. 43: 17 (1977).

- \**Ceropeltis plocamoides* (Oliv.) Bruyns, **comb. nov.** *Brachystelma plocamoides* Oliv. in Trans. Linn. Soc. London 29: 112 (1875).
- \**Ceropeltis paelonga* (S.Moore) Bruyns, **comb. nov.** *Brachystelma paelongum* S.Moore in J. Bot. 40: 384 (1902).
- Ceropeltis prostrata* (E.A.Bruce) Bruyns, **comb. nov.** *Brachystelma prostratum* E.A.Bruce in Kew Bull. 3: 462 (1949).
- \**Ceropeltis pruinosa* Bruyns, **nom. nov., non** *Ceropeltis pruinosa* (Masson) Bruyns. *Brachystelma pruinosa* Bruyns in Novon 19: 18 (2009).
- \**Ceropeltis pulchellior* Bruyns, **nom. nov., non** *Ceropeltis pulchella* (Masson) Bruyns. *Micraster pulchellus* Harv., Gen. S. Afr. Pl., ed. 2: 242 (1868).
- Ceropeltis punctifera* Bruyns, **nom. nov., non** *Ceropeltis punctata* (Masson) Bruyns. *Brachystelma punctatum* Boeke in Excelsa 16: 31 (1994).
- \**Ceropeltis recurvirostra* Bruyns, **nom. nov., non** *Ceropeltis recurvata* M.Gilbert. *Brachystelma recurvatum* Bruyns in Bothalia 25: 156 (1995).
- Ceropeltis remota* (R.A.Dyer) Bruyns, **comb. nov.** *Brachystelma remotum* R.A.Dyer in Bothalia 12: 55 (1976).
- \**Ceropeltis rubella* (E. Mey.) Bruyns, **comb. nov.** *Tenaris rubella* E. Mey., Comm. Pl. Afr. Austr.: 198 (1838). Lectotype (designated here): South Africa, Uitenhage div., Addo, 1837, Drège 2227 (K 000305406!; duplicate K!).
- Ceropeltis sabuliphila* Bruyns, **nom. nov., non** *Ceropeltis arenaria* R.A.Dyer. *Brachystelma arenarium* S.Moore in J. Bot. 50: 365 (1912).
- Ceropeltis schinzii* Bruyns, **nom. nov., non** *Ceropeltis schinzi* (A. Berger & Schltr.) Bruyns. *Craterostemma schinzi* K.Schum. in Bot. Jahrb. Syst. 17: 154 (1893).
- Ceropeltis schoenlandiana* (Schltr.) Bruyns, **comb. nov.** *Brachystelma schoenlandianum* Schltr. in Bot. Jahrb. Syst. 18, Beibl. 45: 35 (1894). Type: South Africa, dry hills near Uitenhage, 160 m, 17 April 1893, Schlechter 2585 (missing).
- Note: This species is not known from any other collections so a neotype cannot be designated.
- Ceropeltis schultzei* (Schltr.) Bruyns, **comb. nov.** *Kinepetalum schultzei* Schltr. in Bot. Jahrb. Syst. 51: 150 (1913).
- Ceropeltis setosa* (Peckover) Bruyns, **comb. nov.** *Brachystelma setosum* Peckover in Aloe 31: 76 (1994).
- Ceropeltis simplex* (Schltr.) Bruyns, **comb. nov.** *Brachystelma simplex* Schltr. in Bot. Jahrb. Syst. 38: 40 (1905). Type: Moçambique, Inhambane distr., bush at Machisugu, 30 m, February 1898, Schlechter 12,121 (missing). Moçambique, 11 km SW of Pomene, 100 m, 10 January 2004, Bruyns 9755 (BOL, neo!, designated here).
- Ceropeltis spathulata* (Lindl.) Bruyns, **comb. nov.** *Brachystelma spathulatum* Lindl. in Bot Reg. 13: t. 1113 (1827). Type: Bot Reg. 13: t. 1113. 1827 (lecto., designated here).
- Note: No specimen is known to exist of the collection illustrated here.
- Brachystelma tuberosum* (Meerburg) Sims in Bot. Mag. 49: t. 2343 (1822) as 'tuberosa'. *Stapelia tuberosa* Meerburg, Pl. Rar. Depict.: sub. t. 54, fig. 1 (1789), **syn. nov.**
- Brachystelma caudatum* N.E.Br. in J. Linn. Soc., Bot. 17: 169 (1878). *Stapelia caudata* Thunb., Prodr. Pl. Cap. 1: 46 (1794), **syn. nov.**
- Ceropeltis stellata* (E.A.Bruce & R.A.Dyer) Bruyns, **comb. nov.** *Brachystelma stellatum* E.A.Bruce & R.A.Dyer in Fl. Pl. Africa 30. t. 1165b (1954).
- Ceropeltis stenifolia* Bruyns, **nom. nov., non** *Ceropeltis stenophylla* C.K.Schneider. *Siphonostelma stenophyllum* Schltr. in Bot. Jahrb. Syst. 51: 148 (1913).
- \**Ceropeltis swazica* (R.A.Dyer) Bruyns, **comb. nov.** *Brachystelma swazicum* R.A.Dyer in Bothalia 12: 56 (1976).
- Ceropeltis tabularia* (R.A.Dyer) Bruyns, **comb. nov.** *Brachystelma tabularium* R.A.Dyer in Bothalia 12: 629 (1979).

- \**Ceropeltis tavalla* (K.Schum.) Bruyns, **comb. nov.** *Brachystelma tavalla* K.Schum. in Bot. Jahrb. Syst. 28: 459 (1900).
- \**Ceropeltis tenella* (R.A.Dyer) Bruyns, **comb. nov.** *Brachystelma tenellum* R.A.Dyer in Fl. Pl. Africa 42: t. 1664 (1973).
- \**Ceropeltis tenuior* Bruyns, **nom. nov., non** *Ceropeltis tenuis* N.E.Br. *Brachystelma tenuie* R.A.Dyer in Bothalia 10: 376 (1971).
- \**Ceropeltis theronii* (Bruyns) Bruyns, **comb. nov.** *Brachystelma theronii* Bruyns in Novon 19: 21 (2009).
- \**Ceropeltis thunbergii* (N.E.Br.) Bruyns, **comb. nov.** *Brachystelma thunbergii* N.E.Br., Fl. Cap. 4 (1): 843 (1908).
- \**Ceropeltis vahrmeijeri* (R.A.Dyer) Bruyns, **comb. nov.** *Brachystelma vahrmeijeri* R.A.Dyer in Bothalia 10: 378 (1971).
- Ceropeltis villosa* (Schltr.) Bruyns, **comb. nov.** *Dichaelia villosa* Schltr. in Bot. Jahrb. Syst. 18, Beibl. 45: 25 (1894).

#### 64. Unplaced species

The following species probably belong to Clade B, but cannot be placed in a section with confidence: *Ceropeltis keniensis* Masinde, *Ceropeltis richardsiae* Masinde.

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