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# The phylogeny of *Linderniaceae* – The new genus *Linderniella*, and new combinations within *Bonnaya*, *Craterostigma*, *Lindernia*, *Micranthemum*, *Torenia* and *Vandellia*

**Abstract**

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The recently described *Linderniaceae* are a monophyletic group that emerged in the course of the disintegration of the *Scrophulariaceae* in the last years. First molecular studies sampled only a small fraction of the genera assigned to the *Linderniaceae*, but later *Lindernia* was shown to be non-monophyletic. Here we used a plastid *trnK/matK* sequence dataset to get further insights into the relationships within *Linderniaceae*. The genus *Lindernia* as accepted to date is shown to be polyphyletic. *Stemodiopsis* is found to be sister to the remaining *Linderniaceae*, and the genera *Psammetes* and *Bryodes* are found to be nested in a *Lindernia* s.str. clade. We present a taxonomic framework, taking account of the phylogenetic relationships in the family, and a first key to the genera. The genera *Bonnaya* and *Vandellia* are resurrected and a new genus *Linderniella* is described. The following eight replacement names are proposed: *Craterostigma engleri*, *C. tanzanicum*, *Lindernia benthamii*, *L. lemuriana*, *Linderniella pusilla*, *Torenia bonatii*, *T. davidii* and *T. philcoxii*. Seventy-seven new combinations are made in *Bonnaya*, *Craterostigma*, *Lindernia*, *Linderniella*, *Micranthemum*, *Torenia* and *Vandellia*.

Additional key words: *trnK*, *matK*, *Lamiales*, poikilohydric plants, desiccation tolerance

## Introduction

Research interest in *Lindernia* and related genera has increased in the last decade. One focus has been on nature conservation as the European *Lindernia procumbens* is a priority species of the Convention on the Conservation of European Wildlife and Natural Habitats (Appendix IV). The species is threatened by the destruction and also the management change of its habitats (i.e. ephemeral *Nanocyperion* communities in ponds) (Šumberová & al. 2012). Another focus has been the research on poikilohydric taxa. *Craterostigma* (Fig. 1A) and *Chamaegigas* (Fig. 1G) are well-known resurrection plants (e.g. Bartels & al. 1990; Fischer 1992), and also species of *Lindernia* have been shown to be poikilohydric (Phillips & al. 2008, see Fig. 1F).

An assemblage of taxa that would currently be circumscribed as *Linderniaceae* was first considered by Bentham (1846) to represent a subtribe within the *Gratioleae*. Based on *Lindernia*, the circumscription of genera was, however, controversially discussed resulting in a complex taxonomic history with proposals to unite all species into a broadly defined genus *Lindernia* or splitting them into 13 different genera (Fischer 1992). *Lindernia* was based on *L. procumbens* from Europe. Bentham (1835) recognized *Vandellia* (Fig. 1H) with 4 fertile stamens and *Bonnaya* with 2 fertile stamens and 2 staminodia. Bentham (1846) accepted *Artanema*,

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Fig. 1. *Linderniaceae* – A: *Craterostigma hirsutum*, Rwanda; B: *Linderniella pygmaea*, Madagascar; C, D: *Linderniella horombensis*, Madagascar; E: *Linderniella gracilis*, Rwanda; F: *Linderniella brevidens*, Kenya; G: *Chamaegigas intrepidus*, Namibia; H: *Vandellia diffusa*, Gabon; I, K: *Torenia stolonifera*, Madagascar; L: *Torenia thouarsii*, Gabon; M: *Torenia crustacea*, Gabon. – All photographs by E. Fischer except G by N. Jürgens.

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Fig. 2. *Linderniaceae* – A: *Lindernia viguieri*, Madagascar; B: *Lindernia rotundifolia*, Madagascar; C: *Lindernia benthamii* (= *Bryodes micrantha*), Madagascar; D: *Lindernia madagascariensis* (= *Psammetes madagascariensis*), Madagascar; E: *Crepidorhopalon microcarpaeoides*, Madagascar; F: *Crepidorhopalon tenuis*, Congo-Kinshasa; G, H: *Crepidorhopalon whytei*, Rwanda; I: *Hartliella capitata*, Congo-Kinshasa; K: *Stemodiopsis ruandensis*, Rwanda. – All photographs by E. Fischer except I by M. Schaijes.

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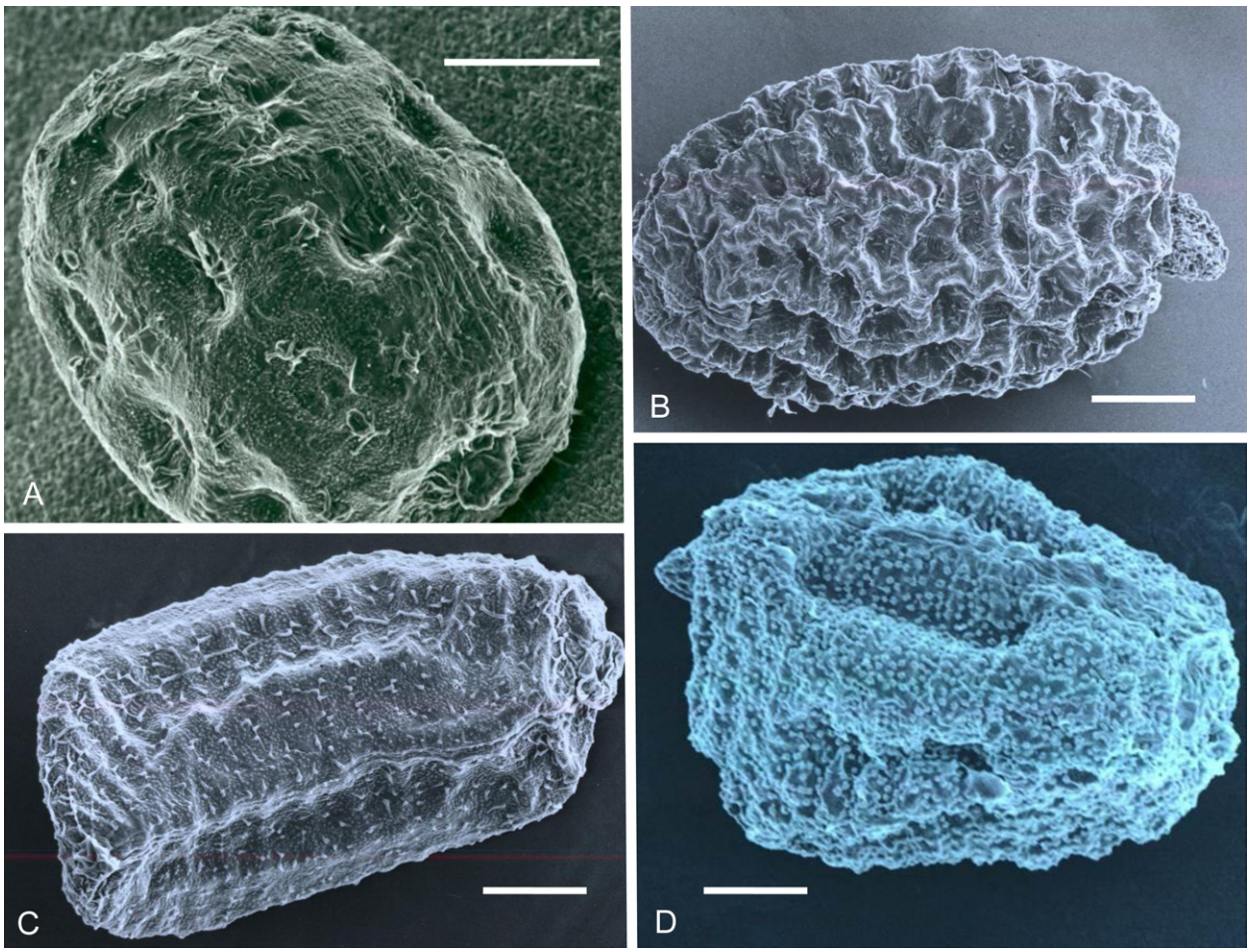


Fig. 3. SEM photographs of *Linderniaceae* seeds – A: *Torenia crustacea*; B: *Linderniella cerastioides*; C: *Lindernia rotundifolia*; D: *Crepidorhopalon microcarpaeoides*. – Scale bar 100 µm. – Photographs by E. Fischer.

*Bonnaya*, *Curanga* Juss. (= *Picria* Lour.), *Hemianthus*, *Ilysanthes*, *Lindernia*, *Micranthemum*, *Peplidium* Delile, *Torenia* (Fig. 1I, K) and *Vandellia* as genera within subtribe *Lindernieae*. The African genus *Craterostigma* was reduced to a section of *Torenia* (Bentham 1846). Hooker (1885) used the size of the fruit and the leaf venation for the distinction of *Bonnaya* (pinnate venation) and *Ilysanthes* (palmate venation). Urban (1884) lumped *Bonnaya* and *Ilysanthes* together with *Bazina* Raf. into *Ilysanthes* with 2 fertile stamens and *Ilyogeton*, *Tittmannia* and *Vandellia* with 4 fertile stamens into *Lindernia*. This concept of separating *Lindernia* and *Ilysanthes*, was also accepted by Wettstein (1891) and used until the 1960s (e.g. Hepper 1963). Other proposals, e.g. by Hance (1861) to unite *Torenia* and *Vandellia*, or by Müller (1882) to place *Bonnaya*, *Ilyogeton*, *Ilysanthes*, *Tittmannia*, *Vandellia* and a part of *Torenia* with *Lindernia* were not accepted. Wettstein (1891) also recognized *Craterostigma* because of its rosulate habit and *Torenia* because of the winged calyx as separate genera. This concept was modified by Engler (1897) based on taxa described from tropical Africa. He published a new circumscription of *Craterostigma*, where he placed species with a dense inflorescence, e.g. *C. crassifolium*, *C. goetzei*, *C. schweinfurthii* (originally described as *Torenia schweinfurthii*) and *C. welwitschii*. *Torenia* was mainly characterized by the winged calyx. Already Schlechter (1924), however, noted that *Torenia* was quite heterogeneous and many African taxa apparently misplaced in this genus.

A major achievement was made by Pennell (1935), who argued that a reduction of stamens cannot be used as a generic character. Subsequently he united *Ilysanthes* and *Lindernia* into a broadly circumscribed genus *Lindernia*. This was accepted by the majority of authors (e.g. Philcox 1968; Yamazaki 1985, 1990; Fischer 1992, 1995, 2004; Lewis 2000; Philcox 2008). However, doubts arose due to the morphological heterogeneity (e.g. Fischer 1992) whether *Lindernia* was really monophyletic. Yamazaki (1954a–b, 1955) already proposed a division into *Vandellia* with pinnate leaf venation, serrate leaf margin, a 1-celled chalazar haustorium, and alveolate endosperm (bothrospermous seeds, i.e. with rounded pits, see Fig. 3A, B), and *Lindernia* with palmate leaf venation, entire or only slightly dentate leaf margin, a 2-celled chalazar haustorium and smooth, non-alveolate endosperm (seeds as in Fig. 3C). Later the same author adopted the concept of Pennell (Yamazaki 1985, 1990). The genus *Craterostigma* was redefined by Fischer (1986)

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comprising rosulate plants with truncate inflorescences and bothrospermous seeds. Hepper (1987a) came to the same conclusion but transferred species like *C. gracile*, *C. schweinfurthii* and others to *Torenia* (Hepper 1987b). Philcox (1987, 1990) described several new species of *Torenia* which subsequently were transferred to *Crepidorhopalon* (Fischer 1992). This highly unnatural concept of *Craterostigma* and *Torenia* was even maintained later (Hepper 2008). Fischer (1989) united all former African species of *Craterostigma* with aulacospermous seeds (i.e. with longitudinal furrows, see Fig. 3D), non-rosulate habit and anatomically highly complex clavate hairs on the lower corolla-lip comprising a distinct multicellular base into the new genus *Crepidorhopalon*. Also plants formerly placed in *Lindernia*, *Torenia* or even *Stemodiopsis* (Fig. 2K) showed the above mentioned characters and were subsequently transferred to *Crepidorhopalon* (Fischer 1992, 1995, 1997a, 1999a–b). A further new genus of suffruticose metallophytes from Central Africa (Katanga), *Hartliella* Eb. Fisch. (Fig. 2I), was described and based on former species of *Lindernia* (Fischer 1992, 1999b). Morphological data already pointed out that the family *Scrophulariaceae* is not monophyletic (Fischer 1992). Molecular phylogenetic studies (Olmstead & Reeves 1995; Olmstead & al. 2001) confirmed the polyphyly of traditional *Scrophulariaceae* and lead to its disintegration. However, *Lindernia* and its relatives could not be placed. First molecular studies including members of the former tribe *Lindernieae* (Rahmanzadeh & al. 2005) revealed that they represented a new family, *Linderniaceae* as a further lineage distinct from *Scrophulariaceae* and *Plantaginaceae*. It also became evident that *Lindernia* sensu Pennell is not monophyletic, and that *Crepidorhopalon* and *Torenia* represent different clades. *Linderniaceae* as a separate lineage was confirmed by Albach & al. (2005), who included also *Micranthemum*, by Oxelman & al. (2005), who additionally included *Stemodiopsis*, and by Schäferhoff & al. (2010). Thus the objectives of the present paper are to provide a first detailed phylogeny of *Linderniaceae* and to elaborate the correct formal taxonomy for the revealed lineages.

## Material and methods

**Taxon sampling and plant material —** Taxon sampling included as many different genera of *Linderniaceae* as we could obtain. Also several species per genus were included where available. As outgroups for *Linderniaceae*, the genus *Byblis* Salisb. (*Byblidacaeae*) was used as it appeared as a close relative in a study of *Lamiales* phylogeny (Schäferhoff & al. 2010). Within *Linderniaceae*, the genera *Stemodiopsis* and *Micranthemum* were included to show their exact position. Voucher information and GenBank accession numbers of taxa included in this study are listed in Table 1.

**DNA extraction, purification and sequencing —** Total genomic DNA was isolated using the AVE Gene Plant Genomics DNA Mini Kit (AVE Gene, Korea) according to the manufacturer's protocol. As phylogenetic markers, the *trnK* intron including the coding *matK* gene was amplified in two overlapping halves, using standard PCR protocols. The 5´-part was amplified using trnK3914Fdi (GGGGTTGCTAACTCAACGG, Johnson & Soltis 1995), and LindmatK1714R (CTCCAAAGAAAGYC AGTTCCTCTT, Schäferhoff & al. 2010); for the 3´-part the primers ACmatK500F (TTCTTCTTTGCATT TATTACG, Müller & Borsch 2005), LindmatK1580F (TCAATTCATTCAACWTTTCCC, Schäferhoff & al. 2010), and trnK2R (AACTAGTCGGATGGAGTAG, Johnson & Soltis 1995) were used. Reactions were performed in 50 µl volumes containing 2 µl template DNA (10 ng/µl), 10 µl dNTP mix (1.25 mM each), 2 µl of each forward and reverse primer (20pm/µl), and 0.25 µl Taq polymerase (5 U/µl, Peqlab). Thermal cycling was carried out on a Biometra T3 thermocycler using the following PCR profiles: 1: 30 min at 96 °C, 1 min at 50 °C, 1: 30 min at 72 °C, 35 cycles of 30 sec at 96 °C, 1 min at 50 °C, 1: 30 min at 72 °C, and a final extension time of 10 min at 72 °C. Fragments were gel-purified on a 1.2 % agarose gel (Neeo-agarose, Roth), extracted with the Gel/PCR DNA Fragments Extraction Kit (AVE Gene, Korea) and sequenced on an ABI3730XL automated sequencer using the Macrogen sequencing service (Macrogen Inc., Seoul, Korea). Pherogram editing and contig assembly was done manually using PhyDE (Müller & al. 2006).

**Alignment, indel coding, and phylogenetic analyses —** DNA sequences were aligned manually in PhyDE (www.phyde.de), taking microstructural changes into account as outlined elsewhere (Kelchner 2000; Löhne & Borsch 2005). Regions of uncertain homology were excluded from phylogenetic analyses. For maximum parsimony (MP) analyses, indels were coded according to simple indel coding (SIC) (Simmons & Ochoterena 2000) with help of the program SeqState (Müller 2005a).

Searches for the shortest tree were performed using the parsimony ratchet approach implemented in PRAP2 (Wall & al. 2008) using the following settings: 10 random addition cycles with 200 ratchet replicates, setting the weight for 25 % of the characters to 2. The files generated were executed in PAUP* v4.0b10 (Swofford 1998). Tree evaluation was performed with 10 000 bootstrap replicates (BS), each using TBR branch swapping and holding only one tree (Müller 2005b).

The model of best fit for the dataset was found to be the GTR+G+I model using jModelTest v.0.1.1 (Posada 2008). Bayesian inference (BI) of phylogeny was done using MrBayes v3.1.2 (Ronquist & Huelsenbeck 2003). Default priors were used, i.e. flat dirichlets (1.0, 1.0) for state frequencies and instantaneous substitution rates, a uniform prior (0.0, 50.0) for the shape parameter of the gamma distribution, a uniform prior (0.0, 1.0) for the pro-

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Table 1. Species, voucher information, and GenBank accession numbers of the sequences used in the present study.

| Family | Species | Voucher | GenBank accession number | Citation |
|---|---|---|---|---|
| *Linderniaceae* | *Artanema angustifolium* | Singapore, Perak, Kampong Permatang Serai, Dindings, *J. Sinclair 9876* (M) | FR728403 | this study |
| *Linderniaceae* | *Artanema fimbriatum* | Germany, Botanical Gardens Bonn 0-BONN-15545, *T. Borsch 3790* (BONN) | AY667460 | Rahmanzadeh & al. 2005 |
| *Linderniaceae* | *Bonnaya ciliata* (*Lindernia ciliata*) | Thailand, Koh Samui, *E. Fischer EF Th 677* (KOBL) | FR728401 | this study |
| *Linderniaceae* | *Bonnaya multiflora* (*Lindernia bonatii*) | Madagascar, Ambositra, *E. Fischer 10236* (KOBL) | FR728408 | this study |
| *Linderniaceae* | *Bonnaya ruellioides* (*Lindernia ruellioides*) | Thailand, Koh-Samui, *E. Fischer EF Th 690* (KOBL) | FR728402 | this study |
| *Linderniaceae* | *Chamaegigas intrepidus* | Südwestafrika [Namibia], Distr. Omaruru, Ohere-Oos, *H. Merxmüller 1580* (M) | FR728398 | this study |
| *Linderniaceae* | *Craterostigma crassifolium (Lindernia crassifolia)* | Angola, Huilla, *T. Leyens 347* (BONN) | FR728390 | this study |
| *Linderniaceae* | *Craterostigma engleri* (*Lindernia welwitschii*) | Angola, Huilla, *Lobin & al. s.n.* (BONN) | FR728391 | this study |
| *Linderniaceae* | *Craterostigma hirsutum* | Rwanda, Nyarubuye, *9003* (KOBL) | AF531776 | Rahmanzadeh & al. 2005 |
| *Linderniaceae* | *Craterostigma newtonii* (*Lindernia oliveriana*) | Rwanda, Lac Ihema, Akagera National Park, *E. Fischer s.n.* (KOBL) | FR728393 | this study |
| *Linderniaceae* | *Craterostigma nummulariifolium* (*Lindernia nummulariifolia*) | Nyungwe National Park, Cyamundongo, *E. Fischer 10256* (KOBL) | FR728392 | this study |
| *Linderniaceae* | *Craterostigma plantagineum* | Rwanda, Nyamata, *E. Fischer s.n.* (BG Bonn 19988) | FR728387 | this study |
| *Linderniaceae* | *Craterostigma pumilum* | Kenya, Nairobi, *E. Fischer 8759* (KOBL) | AY667462 | Rahmanzadeh & al 2005 |
| *Linderniaceae* | *Craterostigma pusillum* (*Lindernia acicularis*) | Rwanda, Nyarubuye, *E. Fischer 4230* (KOBL) | AY667465 | Rahmanzadeh & al 2005 |
| *Linderniaceae* | *Craterostigma* sp. nov. | Angola, Huilla, *T. Leyens 401* (BONN) | FR728389 | this study |
| *Linderniaceae* | *Craterostigma yaundense* (*Lindernia yaundensis*) | Cameroon, Yaunde, *S. Porembski 3858* (KOBL) | FR728388 | this study |
| *Linderniaceae* | *Crepidorhopalon bifolius* | Congo-Kinshasa, Katanga, Lubumbashi, *M. Faucon s.n.* (BRLU, KOBL) | FR728417 | this study |
| *Linderniaceae* | *Crepidorhopalon goetzei* | Congo-Kinshasa, Katanga, Lubumbashi, *M. Faucon s.n.* (BRLU, KOBL) | FR728419 | this study |
| *Linderniaceae* | *Crepidorhopalon microcarpaeoides* | Madagascar, Ambalavao, *E. Fischer 10296* (KOBL) | FR728418 | this study |
| *Linderniaceae* | *Crepidorhopalon perennis* | Congo-Kinshasa, Katanga, Lubumbashi, *M. Faucon s.n.*, *E. Fischer 16* (BRLU, KOBL) | FR728415 | this study |
| *Linderniaceae* | *Crepidorhopalon tenuis* | Congo-Kinshasa, Katanga, *M. Faucon s.n.*, *E. Fischer 3* (BRLU, KOBL) | FR728413 | this study |
| *Linderniaceae* | *Crepidorhopalon whytei* | Rwanda, Butare, *E. Fischer 7657* (KOBL) | AY667463 | Rahmanzadeh & al. 2005 |
| *Linderniaceae* | *Lindernia benthamii* (*Bryodes micrantha*) | Madagascar, Antsirabé, *E. Fischer 10258* (KOBL) | FN773532 | Schäferhoff & al. 2010 |
| *Linderniaceae* | *Lindernia bryoides* | Madagascar, Ambositra, *E. Fischer 10240* (KOBL) | FR728404 | this study |
| *Linderniaceae* | *Lindernia dubia* | Germany, *F. Müller s.n.* (BONN) | FR728411 | this study |
| *Linderniaceae* | *Lindernia madagascariensis (Psammetes madagascariensis)* | Madagascar, Ambositra, *E. Fischer 10234* (KOBL) | FR728410 | this study |
| *Linderniaceae* | *Lindernia procumbens* | Portugal, Baixo Alentejo, *H. Kalheber 99-1990* (BONN) | FR728409 | this study |
| *Linderniaceae* | *Lindernia rotundata* | Rwanda, Musanze, *E. Fischer 7320* (KOBL) | AY667469 | Rahmanzadeh & al. 2005 |

continued on next page

| Family | Species | Voucher | GenBank accession number | Citation |
|---|---|---|---|---|
| *Linderniaceae* | *Lindernia rotundifolia* | Madagascar, Ambositra, *E. Fischer 10241* (KOBL) | FR728406 | this study |
| *Linderniaceae* | *Lindernia microcalyx* | Germany, Botanical Garden Mainz, *E. Fischer s.n.* (BONN) | AY667468 | Rahmanzadeh & al. 2005 |
| *Linderniaceae* | *Lindernia viguieri* | Madagascar, Antsirabe, *E. Fischer 10267* (KOBL) | FR728407 | this study |
| *Linderniaceae* | *Linderniella brevidens (Lindernia brevidens)* | Kenya, Teita Hills, *E. Fischer 8022* (KOBL) | FN773545 | Schäferhoff & al. 2010 |
| *Linderniaceae* | *Linderniella gracilis (Lindernia exilis)* | Rwanda, Nyarubuye, *E. Fischer 12225* (KOBL) | FR728396 | this study |
| *Linderniaceae* | *Linderniella horombensis (Lindernia horombensis)* | Madagascar, Ambalavao, *E. Fischer 10298* (KOBL) | FR728394 | this study |
| *Linderniaceae* | *Linderniella pusilla (Lindernia philcoxii)* | Rwanda, Nyarubuye, *E. Fischer 553/87* (KOBL) | AY667466 | Rahmanzadeh & al. 2005 |
| *Linderniaceae* | *Linderniella pygmaea (Lindernia pygmaea)* | Madagascar, Ambalavao, *E. Fischer s.n.* (KOBL) | FR728395 | this study |
| *Linderniaceae* | *Micranthemum umbrosum* | Germany, Botanical Gardens Bonn, *Schäferhoff 43* (BONN) | FR773548 | Schäferhoff & al. 2010 |
| *Linderniaceae* | *Stemodiopsis ruandensis* | Rwanda, Rugarama, *E. Fischer 10352* (KOBL) | FN773559 | Schäferhoff & al. 2010 |
| *Linderniaceae* | *Torenia crustacea (Lindernia crustacea)* | Thailand, Koh-Samui, *E. Fischer EF Th 692* (KOBL) | FR728405 | this study |
| *Linderniaceae* | *Torenia diffusa (Torenia vagans)* | U.K., Royal Botanical Garden Edinburgh, *B. L. Burtt s.n.* (BONN) | AF531812 | Rahmanzadeh & al 2005 |
| *Linderniaceae* | *Torenia stolonifera* | Madagascar, Ranomafana, *E. Fischer 10249* (KOBL) | FN773561 | Schäferhoff & al. 2010 |
| *Linderniaceae* | *Vandellia diffusa (Lindernia diffusa)* | Dominican Republic, *T. Borsch 3837* (B) | FR728399 | this study |
| *Linderniaceae* | *Vandellia pusilla (Lindernia pusilla)* | Thailand, Koh-Samui, *E. Fischer*, *EF Th 691* (KOBL) | FR728397 | this study |
| *Linderniaceae* | *Vandellia senegalensis (Lindernia senegalensis)* | Gabon, Makokou, *E. Fischer s.n.* (KOBL) | FR822526 | this study |
| *Linderniaceae* | *Vandellia subracemosa (Lindernia subracemosa)* | Rwanda, Uwinka, *E. Fischer 1350* (BG Bonn 19990-2) (KOBL) | FR728400 | this study |
| *Byblidaceae* | *Byblis gigantea* Lindl. | Germany, Botanical Gardens Bonn 0-BONN-25514, *K. Müller 733* (MSUN) | AF531774 | Müller & al. 2004 |
| *Byblidaceae* | *Byblis lamellata* Conran & Lowrie | Germany, Botanical Gardens Bonn 0-BONN-25513, *K. Müller s.n.* (MSUN) | FR773534 | Schäferhoff & al. 2010 |
| *Byblidaceae* | *Byblis liniflora* Salisb. | Germany, Botanical Gardens Bonn 0-BONN-16008, *K. Müller s.n.* (MSUN) | FR773535 | Schäferhoff & al. 2010 |

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portion of invariable sites, and a uniform topological prior. Using the formula provided by Brown & al. (2010), we calculated an exponential rate parameter for the branch-length prior based on an average branch length estimate from an initial neighbor joining analysis in PAUP. Four categories were used to approximate the gamma distribution. Two runs with 5 million generations each were run, and four chains were run in parallel for each run, with the temperature set to 0.2. The chains were sampled every 100th generation, and a relative burn in fraction was conservatively set to 25 %. Convergence was assessed via mean and maximum potential scale reduction factors and mean/maximum standard deviation of split frequencies, which all clearly indicated that runs converged.

For maximum likelihood (ML) analyses, RAxML v7.0.0 (Stamatakis 2006) was used. The GTRGAMMA model was used during the search for the best tree, while the slightly simpler GTRCAT model was employed in RAxML during the 500 bootstrap replicates. Support values from all types of analysis were mapped on the tree topology from the Bayesian analysis and conflicting nodes were identified with help of TreeGraph2 (Stöver & Müller 2010).

## Results

**Molecular sequence data —** For most of the accessions, complete *trnK*/*matK* sequences were obtained. The total alignment comprised 2742 characters; 92 characters were excluded from phylogenetic analyses due to uncertain homology. Sequence lengths ranged from 1173 to 2488 nt (mean: 2350, SD 204; 33 % GC-content). Of the 2650 characters used for phylogenetic analyses, 33 % were variable, and 23 % were informative. Average sequences divergence was 5.63 % (S.E. 0.11).

The shortest trees from a parsimony ratchet analysis were 1634 steps long (CI 0.75, RI 0.90, RC 0.67). The tree topology of the Bayesian inference (BI) of phylogeny is given in Fig. 4, together with posterior probabilities (pp), Maximum Likelihood bootstrap (ML BS) and Maximum Parsimony bootstrap (MP BS) values. A phylogram from BI indicating relative branch lengths is shown in Fig. 5.

**Relationships —** In addition to the taxa included in the study of Rahmanzadeh & al. (2005), *Bryodes*, *Micranthemum* and *Stemodiopsis* (Schäferhoff & al. 2010), as well as *Psammetes* and *Chamaegigas* are inferred to be part of *Linderniaceae*. *Stemodiopsis* is found sister to all remaining *Linderniaceae* with maximum support. There is strong support (pp 1.00, 100 % ML BS, 100 % MP BS) for two major clades within the remaining *Linderniaceae*. The first clade comprises the genus *Crepidorhopalon* (pp 1.00, 100 % ML BS, 100 % MP BS) and *Lindernia* s.str. including *Micranthemum*. The genera *Bryodes* and *Psammetes* (Fig. 2D) nest within the *Lindernia* clade and their position is well supported (pp 1.00, 98 % ML BS, 93 % MP BS and pp 1.00, 100 % ML BS, 100 % MP BS, respectively). The second major clade in *Linderniaceae* is also well supported (pp 1.00, 100 % ML BS, 99 & MP BS). Herein, *L. pusilla* and a clade with *Torenia* including *L. crustacea* (pp 1.00, 100 % ML BS, 100 % MP BS, Fig. 1M) are in unresolved positions. The clade comprised of the remainder of the *Linderniaceae* taxa is only well-supported in model-based analyses (pp1.00, 100 % ML BS, 79 % MP BS); herein a group with *Artanema*, *L. ciliata* and *L. ruellioides* (pp 1.00, 91 % ML BS, 83 % MP BS) branches first. The next-branching clade with *L. diffusa* and related taxa is well supported (pp 1.00, 97 % ML BS, 92 % MP BS). The remaining two major clades have only moderate support (pp 0.99, 97 % ML BS, 73 % MP BS and pp 1.00, 82 % ML BS, 65 % MP BS, respectively). The first branch covers *Chamaegigas intrepidus* and a well-supported clade with *L. horombensis* (Fig. 1C, D) and related taxa. The next moderately supported branch (pp 0.99, 97 % ML BS, 73 % MP BS) comprises *L. oliveriana* in a clade with *L. nummulariifolia* (pp 0.63, 59 % ML BS), and a clade with *L. crassifolia*, *L. welwitschii* and an undescribed species from Angola (pp 1.00, 99 % ML BS, 97 % MP BS). The last clade is well supported (pp 1.00, 100 % ML BS, 100 % MP BS) and covers the members of *Craterostigma* and *L. acicularis* with *L. yaundensis.*

## Discussion

Our results confirm the close relationship between *Stemodiopsis* and other taxa from *Linderniaceae*. The abaxial filaments are curved or twisted and thus match the general staminal morphology of *Linderniaceae*. *Stemodiopsis* is an African genus confined to rock outcrops with a centre of diversity in SE Africa (Fischer 1997b). There seems to be a progression from curved and twisted to geniculate abaxial stamens with partial reduction to staminodes occurring independently in several taxa (e.g. *Lindernia*, *Vandellia*).

Our results show that *Crepidorhopalon* with aulacospermous seeds (Hartl 1959) and clavate hairs on the lower corolla lip bearing a multicellular base (Fischer 1992) is a well-supported clade (pp 1.00, 100 % ML BS, 100 % MP BS), and that inclusion of its members in *Lindernia* (Philcox 2008) or *Torenia* (Hepper 2008) would result in polyphyletic genera. *Lindernia* s.str. is characterized by seeds with a smooth (non-alveolate) endosperm (Yamazaki 1954a–b, 1955; Hartl 1959; Fischer 1992). *Lindernia* here forms a clade that is well supported (pp 1.00, 100 % ML BS, 100 % MP BS) with the exception of *Lindernia dubia*. Our results show that the monotypic genera *Bryodes* and *Psammetes* (Fischer & Hepper 1997) are nested within the *Lindernia* clade. Both genera have mainly cleistogamous flowers. However, this is a feature that regularly occurs in *Lindernia* and

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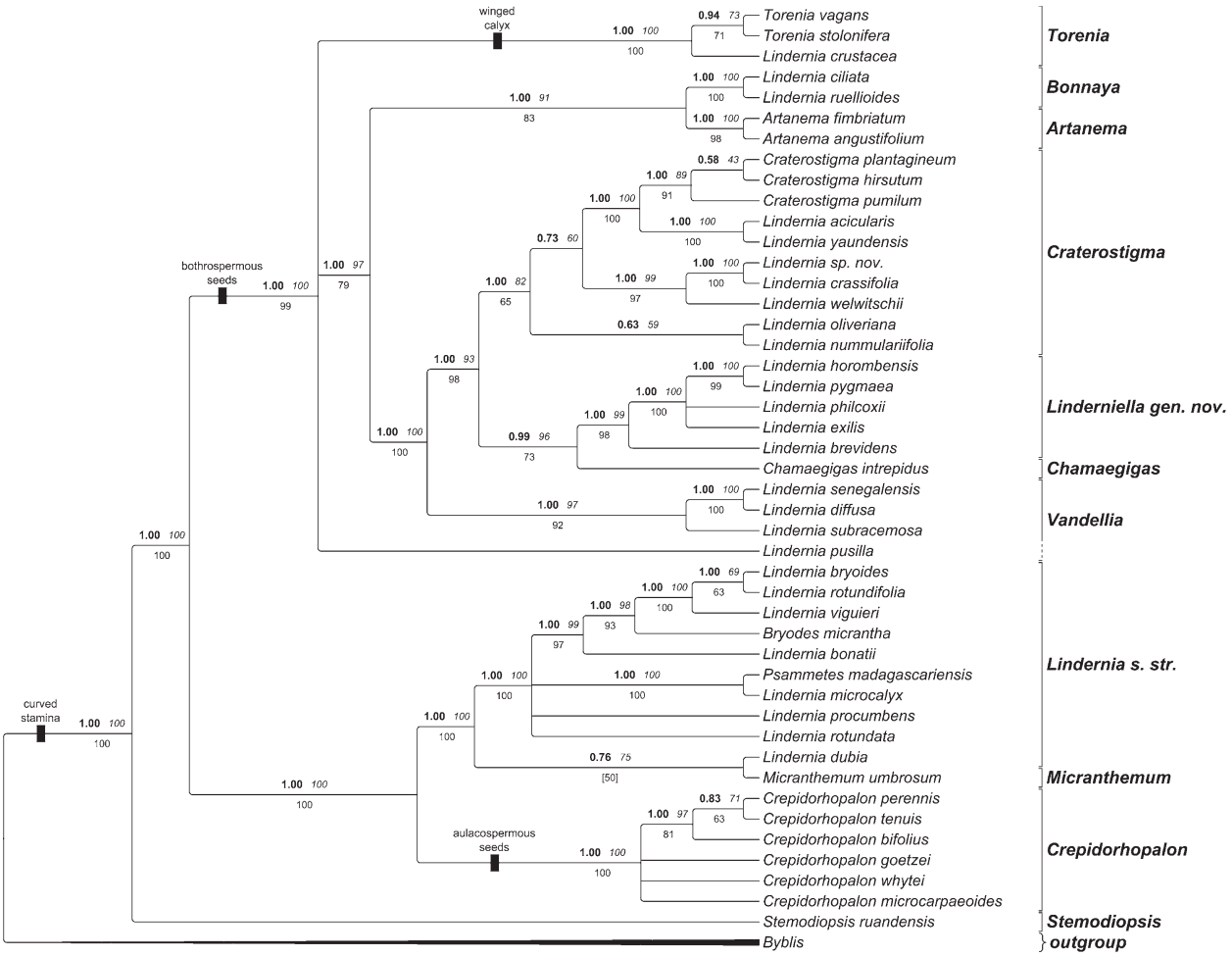


Fig. 4. Phylogeny of *Linderniaceae* inferred from parsimony, likelihood and Bayesian analysis of *trnK/matK* sequences. Topology from the Bayesian tree depicted, collapsing nodes not supported by >=50% in at least one of the three analyses. Bold numbers above branches are posterior probabilities from Bayesian inferences, italic numbers above branches are ML bootstrap values, numbers below branches indicate MP bootstrap proportions. Numbers in brackets indicate that the respective node was not supported by all three methodological approaches. The bracketed number then indicates the strongest support found for any node that contradicts the shown node. Names are according to Fischer (1992). To the right of the tree are taxonomic changes as suggested in this study.

also *Vandellia*. The type species of *Lindernia*, *L. procumbens* usually bears small cleistogamous flowers, and the form with chasmogamous flowers occurring mainly in the tropics has even been described as a different species (*Vandellia erecta* Benth.). *Psammetes* was considered to be exclusively cleistogamous, but the first author could discover chasmogamous plants in Madagascar. Both *Bryodes* and *Psammetes* are included here in *Lindernia*. *Micranthemum* (incl. *Hemianthus*) also bears abaxial stamens with clavate geniculations covered with glandular hairs. Their position close to *Lindernia*, already proposed by Albach & al. (2005), is thus confirmed. They share with *Lindernia* the non-alveolate endosperm. They form a well-supported clade (pp 1.00, 100 % ML BS, 100 % MP BS) with the species of *Lindernia* s.str. However, since so far only one species has been studied, *Micranthemum* is not included in *Lindernia.* Also several morphological differences exist between the two genera: the usually complete lack of adaxial stamina and the strong reduction of the corolla and especially the upper lip. The majority of species are resolved in a well-supported clade that is characterized by bothrospermous seeds with alveolate endosperm of the *Torenia* type (Hartl 1959; Fischer 1992). *Torenia* is maintained here, and *L. crustacea*, suggested to have affinities to *Torenia* by some previous authors, is shown to be indeed a member of *Torenia*. This group of species has been called *Lindernia* sect. *Torenioides* (e.g. Philcox 1968), and its members are transferred here to *Torenia*. *Lindernia ciliata*, *L. ruellioides* and *Artanema* form a moderately supported clade (pp 1.00, 91 % ML BS, 83 % MP BS) that can be divided into two well-supported clades. *Artanema* has a unique stamen morphology with two boss-like filament knees per abaxial stamen (Fischer 1999b, 2004). The genus comprises large herbs with usually very large flowers. For the clade with *L. ciliata* and *L. ruellioides*, the already existing name *Bonnaya* can be revived. In most recent treatments (e.g. Philcox 1968; Yamazaki

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1990) it was used as a subgenus of *Lindernia*. The species of *Bonnaya* share abaxial staminodes, pinnate leaf venation and bothrospermous seeds.

The well-supported clade around *Lindernia diffusa* can be called *Vandellia* as *L. diffusa* is the type species of that genus. Yamazaki (1954a–b, 1955) already proposed a division into *Vandellia* with pinnate leaf venation, serrate leaf margin, a 1-celled chalazar haustorium, and alveolate endosperm (bothrospermous seeds), and *Lindernia* with palmate leaf venation, entire or only slightly dentate leaf margin, a 2-celled chalazar haustorium and smooth (non-alveolate) endosperm. Although *L. pusilla* is found unresolved in the bothrospermous clade, its morphological resemblance to other members of *Vandellia* is so striking that the taxon is provisionally assigned to this genus. The poikilohydric *Chamaegigas intrepidus*, a local endemic of granitic outcrops in Namibia, is a morphologically very distinct plant with seeds with non-alveolate endosperm and basally rosulate leaves that are fused (Fischer 1992). Its position within the bothrospermous clade points toward a secondary loss of bothrospermy. Due to its isolated morphology the genus *Chamaegigas* is maintained here. *Lindernia horombensis* and *L. pygmaea* (Fig. 1B) from Madagascar and *L. brevidens*, *L. exilis* and *L. philcoxii* from East Africa form a well-supported clade for which no name is available. It is described here as the new genus, *Linderniella*.

The last major clade (pp 1.00, 82 % ML BS, 65 % MP BS) includes the genus *Craterostigma* and several taxa of *Lindernia*. The members of *Craterostigma* s.str. can easily be recognized by the usually rosulate, *Plantago*-like habit with truncate synflorescence. This type of habit is also represented in some members of the former genus *Lindernia* that also belong to the *Craterostigma* clade (e.g. *L. gossweileri*, *L. welwitschii*) and that also share the poikilohydry with *Craterostigma*. The only autapomorphy of core *Craterostigma* is the red to yellow-orange color in the intercellular spaces of the root cortex (Fischer 1992). Thus *Craterostigma* is included here as a more broadly defined and well-supported genus with the addition of *L. acicularis*, *L. nummulariifolia*, *L. oliveriana*, *L. welwitschii* and *L. yaundensis*.

Several genera of *Linderniaceae* already assigned to that family (Fischer 2004; Rahmanzadeh & al. 2005) have not been available for study up to now mainly due to the condition and age of herbarium specimens and the lack of fresh material. *Hartliella* with aulacospermous seeds comprises four species endemic to the copper belt of Katanga province in Congo-Kinshasa and N Zambia (Fischer 1999b, 2004). *Schizotorenia* with two species from Indo-Malesia also has aulacospermous seeds (Fischer 2004). The monotypic *Hemiarrhena plantaginea* from NW Australia, the monotypic *Legazpia polygonoides* from SE Asia, Micronesia and New Guinea, the monotypic *Pierranthus capitatus* from SE Asia and *Scolophyllum*, with three species from Thailand to Cambodia and Vietnam, have bothrospermous seeds (Fischer

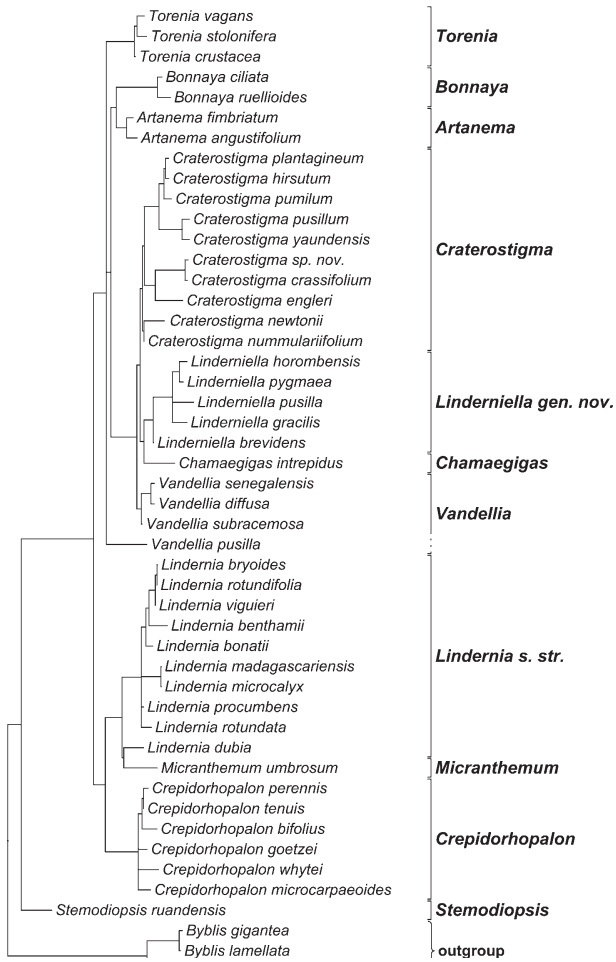


Fig. 5. Phylogram from Bayesian Inference of phylogeny with branch lengths giving the relative substitution rates using the GTR+G+I model. Taxa are named according to the taxonomic treatment suggested in this study.

2004). Fresh or younger herbarium material also has not been available for study for the eight Australian taxa of *Lindernia* subg. *Didymadenia* (Barker 1990, 1998). Barker (1990) characterized this subgenus by the presence of 2-celled sessile glands and 4- or 5-angled seeds, which are probably bothrospermous as the author stated "angles alternating with grooves" (Barker 1990: 80). As Barker also assigned to his new subgenus *L. scapigera* and *L. subulata*, which are placed here in *Vandellia*, the eight Australian taxa are included here in *Vandellia*.

## Taxonomy

The following list covers all accepted taxa of *Linderniaceae* genera in alphabetical order. New combinations and replacement names are made according to the new circumscription of taxa in the new genus *Linderniella* and in *Bonnaya*, *Craterostigma*, *Lindernia*, *Micranthemum*, *Torenia* and *Vandellia*. The species not represented in the molecular analysis are assigned to genera according to their morphology.

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***Linderniaceae*** Borsch, Kai Müll. & Eb. Fisch. in Pl. Biol. (Stuttgart) 7: 76. 2005 ≡ *Lindernieae* Rchb., Fl. Germ. Excurs.: 385. 1831–1832. – Type: *Lindernia* All.

**Artificial key to genera**

1. Bracteoles present; perennial prostrate to ascending subshrubs; corolla white, palate on lower lip present; filaments twisted or curved; fruit reflexed; tropical Africa . . . . . 15. ***Stemodiopsis***
– Bracteoles absent; corolla not as above . . . . . 2
2. Plants minute, prostrate to ascending; upper lip of corolla absent or present, lobes of lower lip rounded, entire; calyx 4-lobed to middle, except for lower side, where cleft extends to base; or calyx 5-lobed; leaves orbicular; Central America and Caribbean . . . . . 11. ***Micranthemum***
– Plants not as above, usually more robust . . . . . 3
3. Seeds without alveolate endosperm, seed surface ± smooth or only weakly furrowed, endosperm weakly polygonal or undulate in transverse section . . . . . 4
– Seeds with alveolate endosperm, seed surface with rounded pits (bothrospermous) or longitudinal furrows (aulacospermous), endosperm star-shaped in transverse section . . . . . 5
4. Aquatic plants with basal rosette, with 2-lobed complex leaves, originating by connation of two adjacent leaves of one whorl; cleistogamous flowers absent; Namibia . . . . . 3. ***Chamaegigas***
– Plants of humid places or aquatic, if with basal rosette then leaves simple, not 2-lobed; cleistogamous flowers often present, prevailing in some species (e.g. *L. procumbens*, *L. benthamii*, *L. madagascariensis*) . . . . . 9. ***Lindernia***
5. Seeds with longitudinal furrows (aulacospermous); all 4 stamens fertile . . . . . 6
– Seeds with rounded pits (bothrospermous); sometimes 2 stamens reduced to staminodes . . . . . 8
6. Plants procumbent, creeping; leaf venation pinnate; flowers in very lax racemes; calyx deeply divided, with 5 linear-lanceolate lobes; Asia . . . . . 13. ***Schizotorenia***
– Plants erect or ascending (except *Crepidorhopalon scaettae*, a creeper); leaf venation palmate; flowers generally in dense racemes or in capitula, only occasionally lax racemes; calyx with long tube and 5 short teeth, if deeply divided then corolla less than 1 cm long; Africa and Madagascar . . . . . 7
7. Lower lip of corolla with yellow club-shaped hairs on a pluricellular base; leaves linear-lanceolate to ovate, smooth; filaments of the abaxial stamens with a basal spur-like appendage, tip of spur rounded and with glandular hairs; plants mostly annuals, only 2 species perennial . . . . . 5. ***Crepidorhopalon***
– Lower lip of corolla lacking yellow club-shaped hairs with pluricellular base; leaves largely ovoid, leathery, somewhat shining; filament of abaxial stamens only weakly curved with a small basal knee-like appendage present or absent; perennial plants with large subterraneous woody rhizomes on heavy metal soil . . . . . 6. ***Hartliella***
8. Rosulate herbs; fertile stamens 2, one pair reduced to filiform staminodes, anthers with 2 unequal mucronate thecae or monothecous; Australia . . . . . 7. ***Hemiarrhena***
– Rosulate or non-rosulate herbs, fertile stamens 2 or 4, anthers equal (except *Torenia sylvicola* with unequal but rounded anthers) . . . . . 9
9. Plants with a basal, decussate and distinct leaf rosette, lacking the terminal main inflorescence; flowering shoots all axillary . . . . . 10
– Plants without basal leaf rosette, or leaf rosette small, inconspicuous, the stem with decussate leaves and often long internodes; terminal main inflorescence and paracladia generally well developed . . . . . 11
10. Leaves large, broadly ovoid to lanceolate, acuminate; abaxial stamens perfect, with a Z-shaped filament; roots of vivid red or orange colour . . . . . 4. ***Craterostigma* s.str.**
– Leaves small, ovoid to lanceolate, obtuse; abaxial stamina usually reduced to staminodes, roots whitish . . . . . 4. ***Craterostigma* s.l.**
11. Plants from tropical Africa usually confined to rock outcrops . . . . . 12
– Plants from Africa, Asia and South America on open soil in savanna or rainforest, or as weeds . . . . . 13
12. Robust plants, sometimes small subshrubs; stems usually elongate with distant leaves, abaxial stamens fertile (except *C. niamniamense*, *C. pusillum* with abaxial staminodes) . . . . . 4. ***Craterostigma* s.l.**
– Small and delicate plants, usually annuals; basal leaves either in small inconspicuous rosettes or distant; abaxial stamens usually reduced to staminodes, rarely fertile (in *L. bolusii*, *L. boutiqueana*, *L. brevidens* and *L. cerastioides*) . . . . . 10. ***Linderniella***
13. Leaf venation palmate . . . . . 14
– Leaf venation pinnate . . . . . 15
14. Inflorescence capitate, enclosed by closely overlapping large involucral leaves with semiorbicular base and long acuminate apex, differing from linear-lanceolate stem leaves . . . . . 12. ***Pierranthus***
– Inflorescence a lax raceme, rarely capitate (*C. crassifolium*), but then involucral leaves not differing from stem leaves . . . . . 4. ***Craterostigma* s.l.**
15. The 2 abaxial stamens reduced to staminodes . . . 16
– All 4 stamens perfect . . . . . 17
16. Leaves serrate or pinnatifid with aristate teeth, generally only midvein clearly visible; corolla with long (c. 15 mm) weakly curved tube; staminodes mammiform or obtuse at apex . . . . . 14. ***Scolophyllum***
– Leaves entire or denticulate, rarely serrate, generally lateral veins clearly visible; corolla with short tube (less than 10 mm, often less than 5 mm); staminodes clavate . . . . . 2. ***Bonnaya***

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17. Plants large; stem generally more than 50 cm tall; corolla more than 2 cm long, abaxial stamens with 2 boss-like geniculations . . . . . 1. ***Artanema***
– Plants much smaller, stem generally not more than 30 cm tall, if stem decumbent then occasionally to 50 cm long; corolla generally <2 cm long (but see *Torenia*); abaxial stamens with 1 curved or spur-like geniculation . . . . . 18
18. Calyx suborbicular, with 3 broad wings between ridges, auriculate at base, 3-dentate at apex . . . . . 8. ***Legazpia***
– Calyx tubular, winged or wingless, if winged then with 5 wings, 5-lobed . . . . . 19
19. Dehiscence of capsule poricidal, opening on both sides of septum at same time as dehiscence of calyx; ovary with apical and internal hairs . . . . . 16. ***Torenia* s.str.**
– Dehiscence of capsule septicidal; ovary without apical hairs or hairs within locule . . . . . 20
20. Fruit usually not exceeding length of calyx; leaves usually ovate with distinctly pinnate venation . . . . . 16. ***Torenia* s.l. (*T. crustacea* group)**
– Fruit usually distinctly exceeding length of calyx; leaves either ovate with distinctly pinnate venation or linear to lanceolate, then often only midvein visible . . . . . 17. ***Vandellia***

**1. *Artanema*** D. Don in Sweet, Brit. Fl. Gard. 6: t. 234. 1834, nom cons. – Type: *A. fimbriatum* (Hook. ex Graham) D. Don.

**1. *Artanema angustifolium*** Benth., Scroph. Ind.: 39. 1835.

*Distribution* — India.

**2. *Artanema bantamense*** Backer in Bull. Jard. Bot. Buitenzorg, ser. 2, 12: 37. 1913.

*Distribution* — Indonesia (Java).

**3. *Artanema fimbriatum*** (Hook. ex Graham) D. Don in Sweet, Brit. Fl. Gard. 6: t. 234. 1834 ≡ *Torenia fimbriata* Hook. ex Graham in Edinburgh New Philos. J. 1831: 379. 1831.

*Distribution* — Australia.

**4. *Artanema longifolium*** (L.) Vatke in Linnaea 43: 307. 1882 ≡ *Columnea longifolia* L., Syst. Nat., ed. 12, 2: 427; Mant. Pl. 1: 90. 1767.

= *Artanema sesamoides* Benth., Scroph. Ind.: 39. 1835.

= *Artanema cabrae* De Wild. & T. Durand in Bull. Soc. Roy. Bot. Belgique 38(1, Compt. Rend.): 131. 1899.

*Distribution* — Côte d'Ivoire, Ghana, Togo, Nigeria, Cameroon, Gabon, Congo-Brazzaville, Central African Republic, Congo-Kinshasa, Uganda, Tanzania, Sri Lanka, India, Thailand, Cambodia, Vietnam, Malaysia, Indonesia (Java, Sumatra), Borneo, Philippines.

**2. *Bonnaya*** Link & Otto, Icon. Pl. Select.: 25. 1821 ≡ *Lindernia* subg. *Bonnaya* (Link & Otto) T. Yamaz. – Type: *B. brachiata* Link & Otto [= *B. ciliata* (Colsm.) Spreng. subsp. *ciliata*].

**1. *Bonnaya aculeata*** (Bonati) Eb. Fisch., Schäferh. & Kai Müll., **comb. nov.** ≡ *Ilysanthes aculeata* Bonati in Bull. Soc. Bot. France 55: 541. 1908 ≡ *Lindernia aculeata* (Bonati) T. Yamaz. in J. Jap. Bot. 53: 2. 1978.

*Distribution* — Cambodia, Laos.

**2. *Bonnaya antipoda*** (L.) Druce in Rep. Bot. Exch. Club. Brit. Isles 3: 415. 1914 ≡ *Ruellia antipoda* L., Sp. Pl. 2: 635. 1753 ≡ *Ilysanthes antipoda* (L.) Merr., Interpr. Rumph. Herb. Amboin.: 467. 1917 ≡ *Lindernia antipoda* (L.) Alston in Trimen, Handb. Fl. Ceyl. 6(Suppl., 2): 214. 1931 ≡ *Vandellia antipoda* (L.) T. Yamaz. in J. Jap. Bot. 30: 177. 1955.

= *Lindernia verbenifolia* (Colsm.) Pennell in Acad. Nat. Sci. Philadelphia Mongr. 5: 31. 1943 ≡ *Gratiola verbenifolia* Colsm., Prodr. Descr. Gratiol.: 9. 1793.

*Distribution* — Sri Lanka and India to China, Japan, Malaysia, Australia, New Guinea, Micronesia and Polynesia; introduced in U.S.A. (Louisiana), Mexico and Venezuela.

**3. *Bonnaya cephalantha*** (T. Yamaz.) Eb. Fisch., Schäferh. & Kai Müll., **comb. nov.** ≡ *Lindernia cephalantha* T. Yamaz. in J. Jap. Bot. 53: 1. 1978.

*Distribution* — Thailand.

**4. *Bonnaya ciliata*** (Colsm.) Spreng., Syst. Veg. 1: 41. 1824 ≡ *Gratiola ciliata* Colsm., Prodr. Descr. Gratiol.: 14. 1793 ≡ *Lindernia ciliata* (Colsm.) Pennell in Brittonia 2: 182. 1936 ≡ *Ilysanthes ciliata* (Colsm.) Kuntze, Revis. Gen. Pl. 2: 461. 1891.

**4.1. *Bonnaya ciliata*** (Colsm.) Spreng. subsp. ***ciliata***

= *Gratiola serrata* Roxb., Fl. Ind. 1: 140. 1820 ≡ *Ilysanthes serrata* (Roxb.) Urb. in Ber. Deutsch. Bot. Ges. 2: 436. 1884.

= *Bonnaya brachiata* Link & Otto, Icon. Pl. Select.: 25. 1821.

= *Bonnaya bracteoides* Blatt. & Hallb. in J. Bombay Nat. Hist. Soc. 25: 416. 1918 ≡ *Lindernia bracteoides* (Blatt. & Hallb.) Mukerjee in J. Ind. Bot. Soc. 24: 133. 1945.

*Distribution* — India, Nepal, Myanmar, S China, Cambodia, Laos, Vietnam, Malaysia, Philippines, New Guinea, Australia; introduced in U.S.A. (Florida).

**4.2. *Bonnaya ciliata*** subsp. ***sivarajanii*** (Tandyekk. & N. Mohanan) Eb. Fisch., Schäferh. & Kai Müll., **comb. nov.** ≡ *Lindernia ciliata* subsp. *sivarajanii* Tandyekk. & N. Mohanan in Nordic. J. Bot. 28: 202. 2010.

*Distribution* — India.

**5. *Bonnaya cyrtotricha*** (P. C. Tsoong & T. C. Ku) Eb. Fisch., Schäferh. & Kai Müll., **comb. nov.** ≡ *Lindernia cyrtotricha* P. C. Tsoong & T. C. Ku in P. C. Tsoong & H. P. Yang, Fl. Reipubl. Popularis Sin. 67(2): 398. 1979.

*Distribution* — China.

**6. *Bonnaya estaminodiosa*** Blatt. & Hallb. in J. Bombay Nat. Hist. Soc. 25: 416. 1918 ≡ *Lindernia estaminodiosa* (Blatt. & Hallb.) Mukerjee in J. Ind. Bot. Soc. 24: 133. 1945.

*Distribution* — India.

**7. *Bonnaya multiflora*** Bonati in Bull. Soc. Bot. France 55: 542. 1908 ≡ *Vandellia multiflora* (Bonati) T. Yamaz.

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in J. Jap. Bot. 30: 177. 1955, nom. illeg. [non *Vandellia multiflora* (Roxb.) G. Don, Gen. Hist. 4: 549. 1837–1838] ≡ *Vandellia bonatii* T. Yamaz. in Bull. Natl. Sci. Mus., Tokyo, n.s., 6: 371. 1963 ≡ *Lindernia bonatii* (T. Yamaz.) Philcox in Taxon 19: 649. 1970 [non *Lindernia multiflora* (Roxb.) Mukerjee in J. Ind. Bot. Soc. 24: 131. 1945].
= *Ilysanthes viatica* Kerr ex Barnett in Kew Bull. 16: 489. 1963 ≡ *Lindernia viatica* (Kerr ex Barnett) Philcox in Taxon 19: 649. 1970.

*Distribution* — Taiwan, Thailand, Cambodia, Vietnam.

**8. *Bonnaya oppositifolia*** (Retz.) Spreng., Syst. Veg. 1: 41. 1824 ≡ *Gratiola oppositifolia* Retz., Observ. Bot. 4: 8. 1786 ≡ *Ilysanthes oppositifolia* (Retz.) Urb. in Ber. Deutsch. Bot. Ges. 2: 435. 1884 ≡ *Vandellia oppositifolia* (Retz.) Haines, Bot. Bihar Orissa 4: 634. 1922 ≡ *Lindernia oppositifolia* (Retz.) Mukherjee in J. Ind. Bot. Soc. 24: 134. 1945.

*Distribution* — India.

**9. *Bonnaya ruellioides*** (Colsm.) Spreng., Syst. Veg. 1: 41. 1824 ≡ *Gratiola ruellioides* Colsm., Prodr. Descr. Gratiol.: 12. 1793 ≡ *Lindernia ruellioides* (Colsm.) Pennell in Brittonia 2: 182. 1936 ≡ *Ilysanthes ruellioides* (Colsm.) Kuntze, Revis. Gen. Pl. 2: 462. 1891.
= *Gratiola reptans* Roxb., Fl. Ind. 1: 140. 1820 ≡ *Bonnaya reptans* (Roxb.) Spreng., Syst. Veg. 1: 41. 1824 ≡ *Lindernia reptans* (Roxb.) F. Muell., Descr. Notes Papuan Pl. 2(7): 31. 1886.

*Distribution* — India, Myanmar, S China, Cambodia, Laos, Vietnam, Malaysia, Philippines, New Guinea.

**10. *Bonnaya succosa*** (Kerr ex Barnett) Eb. Fisch., Schäferh. & Kai Müll., **comb. nov.** ≡ *Ilysanthes succosa* Kerr ex Barnett in Kew Bull. 16: 489. 1963 ≡ *Lindernia succosa* (Kerr ex Barnett) Philcox in Taxon 19: 649. 1970.

*Distribution* — Thailand, Laos.

**11. *Bonnaya tenuifolia*** (Colsm.) Spreng., Syst. Veg. 1: 42. 1824 ≡ *Gratiola tenuifolia* Colsm., Prodr. Descr. Gratiol.: 8. 1793 ≡ *Vandellia tenuifolia* (Colsm.) Haines, Bot. Bihar Orissa 4: 634. 1922 ≡ *Ilysanthes tenuifolia* (Colsm.) Urb. in Ber. Deutsch. Bot. Ges. 2: 435. 1884.

*Distribution* — Sri Lanka, India, S China, Cambodia, Vietnam, Malaysia.

**12. *Bonnaya zanzibarica*** (Eb. Fisch. & Hepper) Eb. Fisch., Schäferh. & Kai Müll., **comb. nov.** ≡ *Lindernia zanzibarica* Eb. Fisch. & Hepper in Kew Bull. 46: 529. 1991.

*Distribution* — Kenya, Tanzania (including Zanzibar).

**3. *Chamaegigas*** Dinter, Ber. Tätigk. Naturw. Ges. Isis 1913–1915: 38. 1916 – Type: *C. intrepidus* Dinter.

**1. *Chamaegigas intrepidus*** Dinter, Ber. Tätigk. Naturw. Ges. Isis 1913–1915: 38. 1916.

*Distribution* — Namibia.

**4. *Craterostigma*** Hochst. in Flora 24: 668. 1841. – Type (designated by Phillips, Gen. S. Afr. Fl. Pl., ed. 2: 673. 1951): *C. plantagineum* Hochst.
= *Strigina* Engl. in Bot. Jahrb. Syst. 23: 516. 1897. – Type: *S. pusilla* Engl. ≡ *Craterostigma pusillum* (Engl.) Eb. Fisch., Schäferh. & Kai Müll.

***Craterostigma plantagineum* group**

Mainly tropical African with two species in Arabia extending to India.

**1. *Craterostigma alatum*** Hepper in Kew Bull. 42: 945. 1987.

*Distribution* — Kenya, Tanzania.

**2. *Craterostigma hirsutum*** S. Moore in J. Bot. 38: 461. 1900.

*Distribution* — Rwanda, Uganda, Kenya, Tanzania, Malawi, Zimbabwe, Mozambique.

**3. *Craterostigma lanceolatum*** (Engl.) Skan in Oliver & al., Fl. Trop. Afr. 4(2): 331. 1906 ≡ *Craterostigma nanum* var. *lanceolatum* Engl., Pflanzenw. Ost-Afrikas C: 357. 1895.
= *Craterostigma ndassekerense* Engl. in Bot. Jahrb. Syst. 57: 611. 1922.

*Distribution* — Congo-Kinshasa, Rwanda, Burundi, Uganda, Kenya, Tanzania, Malawi, Zambia, Zimbabwe.

**4. *Craterostigma longicarpum*** Hepper in Kew Bull. 42: 945. 1987.

*Distribution* — Ethiopa, Uganda, Kenya, Tanzania.

**5. *Craterostigma plantagineum*** Hochst. in Flora 24: 669. 1841 ≡ *Torenia plantaginea* (Hochst.) Benth. in Candolle, Prodr. 10: 411. 1846.

*Distribution* — Niger, Chad, Sudan, Ethiopia, Somalia, Congo-Kinshasa, Rwanda, Burundi, Uganda, Kenya, Tanzania, Angola, Zambia, Zimbabwe, Botswana, Namibia, South Africa, Yemen, India.

**6. *Craterostigma pumilum*** Hochst. in Flora 24: 670. 1841 ≡ *Torenia pumila* (Hochst.) Benth. in Candolle, Prodr. 10: 411. 1846.

*Distribution* — Ethiopia, Sudan, Somalia, Uganda, Kenya, Tanzania, Zambia, Botswana, Yemen (including Socotra), Saudi Arabia.

**7. *Craterostigma purpureum*** Lebrun & L. Touss. in Bull. Jard. Bot. État Bruxelles 17: 83. 1943 ≡ *Lindernia purpurea* (Lebrun & L. Touss.) R. Germ. in Bull. Jard. Bot. État Bruxelles 22: 75. 1952.

*Distribution* — Congo-Kinshasa.

**8. *Craterostigma smithii*** S. Moore in J. Bot. 38: 461. 1900.
= *Craterostigma boranense* Chiov., Missione Biol. Borana 4: 206. 1939.

*Distribution* — Ethiopia, Kenya, Tanzania.

**9. *Craterostigma wilmsii*** Engl. ex Diels in Bot. Jahrb. Syst. 26: 122. 1898.

*Distribution* — South Africa.

***Craterostigma abyssinicum* group**

The following species appear within the *Craterostigma* clade and are included here in a broadly defined genus *Craterostigma*.

**10. *Craterostigma abyssinicum*** (Engl.) Eb. Fisch., Schäferh. & Kai Müll., **comb. nov.** ≡ *Lindernia abyssinica* Engl. in Bot. Jahrb. Syst. 23: 503. 1897.

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*Distribution* — Nigeria, Cameroon, Sudan, Ethiopia, Uganda, Kenya, Tanzania.

**11. *Craterostigma angolense*** (Skan) Eb. Fisch., Schäferh. & Kai Müll., **comb. nov.** ≡ *Torenia angolensis* Skan in Oliver & al., Fl. Trop. Afr. 4(2): 335. 1906 ≡ *Lindernia angolensis* (Skan) Eb. Fisch. in Trop. Subtrop. Pflanzenwelt 81: 254. 1992.

*Distribution* — Angola.

**12. *Craterostigma crassifolium*** Engl. in Bot. Jahrb. Syst. 23: 500. 1897 ≡ *Lindernia crassifolia* (Engl.) Eb. Fisch. in Trop. Subtrop. Pflanzenwelt 81: 256. 1992.

*Distribution* — Angola.

**13. *Craterostigma engleri*** Eb. Fisch., Schäferh. & Kai Müll., **nom. nov.** ≡ *Ilysanthes welwitschii* Engl. in Bot. Jahrb. Syst. 23: 504. 1897 [non *Craterostigma welwitschii* Engl. in Bot. Jahrb. Syst. 23: 501. 1897] ≡ *Lindernia welwitschii* (Engl.) Eb. Fisch. in Trop. Subtrop. Pflanzenwelt 81: 283. 1992.

*Distribution* — Angola.

A replacement name is required because the name *Craterostigma welwitschii* already exists.

**14. *Craterostigma gossweileri*** (S. Moore) Eb. Fisch., Schäferh. & Kai Müll., **comb. nov.** ≡ *Ilysanthes gossweileri* S. Moore in J. Bot. 57: 215. 1919 ≡ *Lindernia scapoidea* Eb. Fisch. in Trop. Subtrop. Pflanzenwelt 81: 285. 1992 [non *Lindernia gossweileri* S. Moore in J. Bot. 45: 87. 1907].

*Distribution* — Angola.

The original epithet *gossweileri*, which when combined under *Lindernia* would form a homonym of *L. gossweileri* and therefore required the replacement name *L. scapoidea,* can now be maintained in *Craterostigma*.

**15. *Craterostigma kigomense*** (Eb. Fisch.) Eb. Fisch., Schäferh. & Kai Müll., **comb. nov.** ≡ *Lindernia kigomensis* Eb. Fisch. in Bull. Jard. Bot. Natl. Belg. 67: 362. 1999. – *Lindernia* "species alpha" Philcox in Ghazanfar & al., Fl. Trop. E. Africa, Scrophular.: 82. 2008.

*Distribution* — Tanzania.

**16. *Craterostigma lindernioides*** E. A. Bruce in Bull. Misc. Inform. Kew 1933: 474. 1933 ≡ *Lindernia lindernioides* (E. A. Bruce ) Philcox in Ghazanfar & al., Fl. Trop. E. Africa, Scrophular.: 76. 2008.

*Distribution* — Uganda, Tanzania.

**17. *Craterostigma newtonii*** (Engl.) Eb. Fisch., Schäferh. & Kai Müll., **comb. nov.** ≡ *Lindernia newtonii* Engl. in Bot. Jahrb. Syst. 23: 503. 1897.

= *Vandellia lobelioides* Oliv. in Trans. Linn. Soc. London 29: 120. 1875, nom. illeg. [non *Vandellia lobelioides* F. Muell. in Trans. & Proc. Philos. Inst. Victoria 3: 61. 1859] ≡ *Lindernia lobelioides* Wettst. in Engler & Prantl, Nat. Pflanzenfam. 4(3b): 80. 1891, nom. illeg. [non *Lindernia lobelioides* (F. Muell.) F. Muell., Syst. Census Austral. Pl.: 97. 1882] ≡ *Lindernia oliveriana* Dandy in Andrews, Fl. Pl. Sudan 3: 139. 1956.

*Distribution* — Togo, Nigeria, Central African Republic, Congo-Kinshasa, Rwanda, Sudan, Ethiopia, Uganda, Kenya, Tanzania, Zambia, Zimbabwe, Malawi, Angola.

The new combination is based on the earliest legitimate name for the species, *L. newtonii*. *Vandellia lobelioides* Oliv. and *Lindernia lobelioides* Wettst. are earlier names, but both are later homonyms and therefore illegitimate.

**18. *Craterostigma niamniamense*** (Eb. Fisch. & Hepper) Eb. Fisch., Schäferh. & Kai Müll., **comb. nov.** ≡ *Lindernia niamniamensis* Eb. Fisch. & Hepper in Kew Bull. 46: 534. 1991.

*Distribution* — Sudan, Uganda.

**19. *Craterostigma nummulariifolium*** (D. Don) Eb. Fisch., Schäferh. & Kai Müll., **comb. nov.** ≡ *Vandellia nummulariifolia* D. Don, Prodr. Fl. Nepal.: 86. 1825 ≡ *Lindernia nummulariifolia* (D. Don) Wettst. in Engler & Prantl, Nat. Pflanzenfam. 4(3b): 79. 1891 ≡ *Pyxidaria nummulariifolia* (D. Don) Kuntze, Revis. Gen. Pl. 2: 464. 1891.

= *Vandellia chinensis* T. Yamaz. in J. Jap. Bot. 30: 178. 1955 ≡ *Lindernia chinensis* (T. Yamaz.) Philcox in Taxon 19: 649. 1970.

= *Mitranthus latifolius* Hochst. in Flora 27: 108. 1844.

= *Vandellia corymbosa* Baker in J. Bot. 20: 221. 1882.

= *Bryodes perrieri* Bonati, Bull. Soc. Bot. Genève, ser. 2, 15: 104. 1924.

*Distribution* — Sierra Leone, Côte d'Ivoire, Nigeria, Cameroon, Gabon, Sudan, Ethiopia, Congo-Kinshasa, Rwanda, Burundi, Uganda, Kenya, Tanzania, Angola, Zambia, Malawi, Zimbabwe, Madagascar; India, Nepal, Myanmar, China, Thailand, Vietnam.

**20. *Craterostigma pusillum*** (Engl.) Eb. Fisch., Schäferh. & Kai Müll., **comb. nov.** ≡ *Strigina pusilla* Engl. in Bot. Jahrb. Syst. 23: 516. 1897 ≡ *Lindernia acicularis* Eb. Fisch. in Bull. Jard. Bot. Natl. Belg. 59: 446. 1989 [non *Lindernia pusilla* (Willd.) Bold., Zakfl. Java: 165. 1916].

*Distribution* — Rwanda, Burundi, Tanzania.

*Strigina* was described by Engler as a new genus closely related to *Striga*. However, it represents a close relative of *Lindernia* and was subsequently transferred to that genus (Fischer 1989; Bidgood 1992).

**21. *Craterostigma stuhlmannii*** (Engl.) Eb. Fisch., Schäferh. & Kai Müll., **comb. nov.** ≡ *Lindernia stuhlmannii* Engl., Pflanzenw. Ost-Afrikas C: 357. 1895.

*Distribution* — Tanzania.

**22. *Craterostigma sudanicum*** (Eb. Fisch. & Hepper) Eb. Fisch., Schäferh. & Kai Müll., **comb. nov.** ≡ *Lindernia sudanica* Eb. Fisch. & Hepper in Kew Bull. 46: 530. 1991.

*Distribution* — Sudan, Uganda.

**23. *Craterostigma syncerus*** (Seine, Eb. Fisch. & Barthlott) Eb. Fisch., Schäferh. & Kai Müll., **comb. nov.** ≡ *Lindernia syncerus* Seine, Eb. Fisch. & Barthlott in Feddes Repert. 106: 8. 1995.

*Distribution* — Zimbabwe.

**24. *Craterostigma tanzanicum*** Eb. Fisch., Schäferh. & Kai Müll., **nom. nov.** ≡ *Lindernia longicarpa* Eb. Fisch. & Hepper in Kew Bull. 46: 534. 1991 [non *Craterostigma longicarpum* Hepper in Kew Bull. 42: 945. 1987].

*Distribution* — Tanzania.

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A replacement name is required because the name *Craterostigma longicarpum* Hepper already exists.

**25. *Craterostigma yaundense*** (S. Moore) Eb. Fisch., Schäferh. & Kai Müll., **comb. nov.** ≡ *Ilysanthes yaundensis* S. Moore in J. Bot. 57: 216. 1919 ≡ *Lindernia yaundensis* (S. Moore) Eb. Fisch. in Trop. Subtrop. Pflanzenwelt 81: 286. 1992.

*Distribution* — Cameroon.

**5. *Crepidorhopalon*** Eb. Fisch. in Feddes Repert. 100: 443. 1989. – Type: *C. schweinfurthii* (Oliv.) Eb. Fisch.

**1. *Crepidorhopalon affinis*** (De Wild.) Eb. Fisch. ex Govaerts, World Checkl. Seed Pl. 3(1): 20. 1999 ≡ *Torenia affinis* De Wild. in Ann. Mus. Congo Belge, Bot., ser. 4, 1: 122. 1903.

*Distribution* — Congo-Kinshasa.

**2. *Crepidorhopalon alatocalycinus*** Eb. Fisch. in Bull. Jard. Bot. Natl. Belg. 59: 454. 1989.

*Distribution* — Congo-Kinshasa, Zambia.

**3. *Crepidorhopalon bifolius*** (Skan) Eb. Fisch. in Bull. Jard. Bot. Natl. Belg. 60: 413. 1990 ≡ *Lindernia bifolia* Skan in Oliver & al., Fl. Trop. Afr. 4(2): 343. 1906.

*Distribution* — Congo-Kinshasa, Tanzania, Zambia.

**4. *Crepidorhopalon chironioides*** (S. Moore) Eb. Fisch. in Feddes Repert. 100: 444. 1989 ≡ *Craterostigma chironioides* S. Moore in J. Bot. 57: 215. 1919.

= *Craterostigma kundalungense* Engl. in Bot. Jahrb. Syst. 57: 612. 1922.

*Distribution* — Congo-Kinshasa.

**5. *Crepidorhopalon debilis*** (Skan) Eb. Fisch. in Feddes Repert. 106: 8. 1995 ≡ *Lindernia debilis* Skan in Oliver & al., Fl. Trop. Afr. 4(2): 344. 1906.

= *Lindernia minima* R. G. N. Young in Candollea 14: 9. 1952, nom. illeg. [non *Lindernia minima* (Benth.) Mukerjee in J. Ind. Bot. Soc. 24: 132. 1945] ≡ *Lindernia fugax* R. G. N. Young in Candollea 15: 125. 1956.

*Distribution* — Senegal, Côte d'Ivoire, Ghana, Nigeria, Cameroon, Sudan, Congo-Kinshasa, Uganda, Tanzania, Zimbabwe, South Africa.

**6. *Crepidorhopalon goetzei*** (Engl.) Eb. Fisch. in Feddes Repert. 100: 444. 1989 ≡ *Craterostigma goetzei* Engl. in Bot. Jahrb. Syst. 28: 477. 1900 ≡ *Torenia goetzei* (Engl.) Hepper in Bol. Soc. Brot., ser. 2, 60: 271. 1987.

= *Torenia brevifolia* Engl. & Pilg. in Bot. Jahrb. Syst. 45: 214. 1910.

*Distribution* — Congo-Kinshasa, Burundi, Tanzania, Zambia, Malawi.

**7. *Crepidorhopalon gracilis*** (Pilg.) Eb. Fisch. in Feddes Repert. 100: 443. 1989 ≡ *Craterostigma gracile* Pilg. in Bot Jahrb. Syst. 45: 213. 1910 ≡ *Torenia ledermannii* Hepper in Bol. Soc. Brot., ser. 2, 60: 271. 1987.

= *Craterostigma guineense* Hepper in Kew Bull. 14: 407. 1960.

*Distribution* — Senegal, Mali, Guinea-Bissau, Guinea, Cameroon, Congo-Kinshasa, Tanzania, Zambia.

**8. *Crepidorhopalon hartlii*** Eb. Fisch. in Bull. Jard. Bot. Natl. Belg. 59: 453. 1989.

*Distribution* — Congo-Kinshasa.

**9. *Crepidorhopalon hepperi*** Eb. Fisch. in Bull. Jard. Bot. Natl. Belg. 60: 410. 1990 ≡ *Lindernia hepperi* (Eb. Fisch.) Philcox in Ghazanfar & al., Fl. Trop. E. Africa, Scrophular.: 72. 2008.

*Distribution* — Kenya, Tanzania.

**10. *Crepidorhopalon involucratus*** (Philcox) Eb. Fisch. in Trop. Subtrop. Pflanzenwelt 81: 197. 1992 ≡ *Torenia involucrata* Philcox in Bol. Soc. Brot., ser. 2, 60: 267. 1987.

*Distribution* — Zambia.

**11. *Crepidorhopalon latibracteatus*** (Skan) Eb. Fisch. in Feddes Repert. 100: 444. 1989 ≡ *Craterostigma latibracteatum* Skan in Oliver & al., Fl. Trop. Afr. 4(2): 333. 1906 ≡ *Torenia latibracteata* (Skan) Hepper in Bol. Soc. Brot., ser. 2, 60: 271. 1987.

*Distribution* — Congo-Brazzaville, Congo-Kinshasa.

**12. *Crepidorhopalon laxiflorus*** Eb. Fisch. in Bull. Jard. Bot. Natl. Belg. 60: 410. 1990.

*Distribution* — Congo-Kinshasa.

**13. *Crepidorhopalon malaissei*** Eb. Fisch. in Bull. Jard. Bot. Natl. Belg. 59: 450. 1989.

*Distribution* — Congo-Kinshasa.

**14. *Crepidorhopalon manganicolus*** Eb. Fisch. in Bull. Jard. Bot. Natl. Belg. 59: 455. 1989.

*Distribution* — Congo-Kinshasa, Angola, Zambia.

**15. *Crepidorhopalon membranocalycinus*** Eb. Fisch. in Feddes Repert. 100: 444. 1989.

*Distribution* — Congo-Kinshasa.

**16. *Crepidorhopalon microcarpaeoides*** (Bonati) Eb. Fisch. in Bull. Mus. Natl. Hist. Nat., B, Adansonia, ser. 4, 17: 252. 1995 ≡ *Lindernia microcarpaeoides* Bonati in Bull. Soc. Bot. Genève, ser. 2, 15: 101. 1924.

*Distribution* — Madagascar.

**17. *Crepidorhopalon parviflorus*** (Philcox) Eb. Fisch. in Bull. Jard. Bot. Natl. Belg. 67: 378. 1999 ≡ *Torenia latibracteata* subsp. *parviflora* Philcox in Bol. Soc. Brot., ser. 2, 60: 267. 1987 ≡ *Crepidorhopalon latibracteatus* subsp. *parviflorus* (Philcox) Eb. Fisch. in Trop. Subtrop. Pflanzenwelt 81: 155. 1992.

*Distribution* — Burundi, Kenya, Tanzania, Zambia, Mozambique.

**18. *Crepidorhopalon perennis*** (P. A. Duvign.) Eb. Fisch. in Bull. Jard. Bot. Natl. Belg. 60: 413. 1990 ≡ *Lindernia perennis* P. A. Duvign. in Bull. Soc. Roy. Bot. Belgique 90: 256. 1958.

*Distribution* — Congo-Kinshasa.

**19. *Crepidorhopalon robynsii*** Eb. Fisch. in Bull. Jard. Bot. Natl. Belg. 67: 371. 1999.

*Distribution* — Congo-Kinshasa.

**20. *Crepidorhopalon rupestris*** (Engl.) Eb. Fisch. in Bull. Jard. Bot. Natl. Belg. 67: 376. 1999 ≡ *Lindernia rupestris* Engl. in Bot. Jahrb. Syst. 30: 402. 1901.

= *Crepidorhopalon insularis* (Skan) Eb. Fisch. in Bull. Jard. Bot. Natl. Belg. 59: 457. 1989 ≡ *Lindernia insularis* Skan in Oliver & al., Fl. Trop. Afr. 4(2): 342. 1906.

= *Lindernia subscaposa* Mildbr. in Notizbl. Bot. Gart. Berlin-Dahlem 8: 233. 1922.

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*Distribution* — Congo-Kinshasa, Burundi, Uganda, Kenya, Tanzania, Zambia, Malawi, Zimbabwe.

**21. *Crepidorhopalon scaettae*** (Staner) Eb. Fisch. in Bull. Jard. Bot. Natl. Belg. 66: 78. 1997 ≡ *Stemodiopsis scaettae* Staner in Rev. Zool. Bot. Africaines 24: 220. 1933.

*Distribution* — Congo-Kinshasa.

**22. *Crepidorhopalon schweinfurthii*** (Oliv.) Eb. Fisch. in Trop. Subtrop. Pflanzenwelt 81: 130. 1992 ≡ *Torenia schweinfurthii* Oliv. in Hooker's Icon. Pl. 13: t. 1256. 1878 ≡ *Craterostigma schweinfurthii* (Oliv.) Engl. in Bot. Jahrb. Syst. 23: 501. 1897.

*Distribution* — Mali, Côte d'Ivoire, Ghana, Togo, Benin, Nigeria, Cameroon, Central African Republic, Sudan, Congo-Kinshasa, Uganda, Tanzania, Angola, Zambia, Mozambique.

**23. *Crepidorhopalon spicatus*** (Engl.) Eb. Fisch. in Feddes Repert. 100: 444. 1989 ≡ *Torenia spicata* Engl. in Bot. Jahrb. Syst. 23: 502. 1897.

= *Torenia inaequalifolia* Engl. in Bot. Jahrb. Syst. 23: 502. 1897.

= *Lindernia dinteri* Schinz in Mém. Herb. Boissier 20: 27. 1900.

*Distribution* — Senegal, Mali, Guinea, Côte d'Ivoire, Burkina Faso, Ghana, Togo, Nigeria, Cameroon, Chad, Sudan, Congo-Kinshasa, Tanzania, Angola, Zambia, Malawi, Zimbabwe, Botswana, Namibie, South Africa.

**24. *Crepidorhopalon symoensii*** Eb. Fisch. in Bull. Jard. Bot. Natl. Belg. 59: 451. 1989.

*Distribution* — Congo-Kinshasa.

**25. *Crepidorhopalon tanzanicus*** Eb. Fisch. in Bull. Jard. Bot. Natl. Belg. 67: 374. 1999.

*Distribution* — Tanzania.

**26. *Crepidorhopalon tenuifolius*** (Philcox) Eb. Fisch. in Trop. Subtrop. Pflanzenwelt 81: 141. 1992 ≡ *Torenia tenuifolia* Philcox in Bol. Soc. Brot., ser. 2, 60: 267. 1987.

*Distribution* — Congo-Kinshasa, Burundi, Zambia.

**27. *Crepidorhopalon tenuis*** (S. Moore) Eb. Fisch. in Bull. Jard. Bot. Natl. Belg. 59: 457. 1989 ≡ *Lindernia tenuis* S. Moore in J. Bot. 56: 10. 1918.

= *Lindernia damblonii* P. A. Duvign., Bull. Soc. Roy. Bot. Belgique 90: 256. 1958 ≡ *Crepidorhopalon damblonii* (P. A. Duvign.) Eb. Fisch. in Feddes Repert. 100: 444. 1989.

*Distribution* — Congo-Kinshasa, Burundi, Tanzania, Zambia.

**28. *Crepidorhopalon uvens*** (Hiern) Eb. Fisch. in Bull. Jard. Bot. Natl. Belg. 60: 413. 1990 ≡ *Lindernia uvens* Hiern, Cat. Afr. Pl. 1: 763. 1898.

*Distribution* — Cameroon, Congo-Kinshasa, Angola, Zambia.

**29. *Crepidorhopalon welwitschii*** (Engl.) Eb. Fisch. in Feddes Repert. 100: 443. 1989 ≡ *Craterostigma welwitschii* Engl. in Bot. Jahrb. Syst. 23: 501. 1897.

*Distribution* — Angola.

**30. *Crepidorhopalon whytei*** (Skan) Eb. Fisch. in Feddes Repert. 100: 444. 1989 ≡ *Lindernia whytei* Skan in Oliver & al., Fl. Trop. Afr. 4(2): 340. 1906.

= *Lindernia gossweileri* S. Moore in J. Bot. 45: 87. 1907.

= *Torenia mildbraedii* Pilg. in Mildbraed, Wiss. Erg. Deut. Zentr.-Afr. Exped., Bot. 2: 285. 1911.

*Distribution* — Ethiopia, Congo-Kinshasa, Rwanda, Burundi, Sudan, Uganda, Kenya, Tanzania, Zimbabwe, Angola.

**6. *Hartliella*** Eb. Fisch. in Trop. Subtrop. Pflanzenwelt 81: 204. 1992. – Type: *H. suffruticosa* (Lisowski & Mielcarek) Eb. Fisch.

The genus has aulacospermous seeds and is probably closely related to *Crepidorhopalon*.

**1. *Hartliella bampsii*** (Eb. Fisch.) Eb. Fisch. in Trop. Subtrop. Pflanzenwelt 81: 209. 1992 ≡ *Lindernia bampsii* Eb. Fisch. in Bull. Jard. Bot. Natl. Belg. 59: 449. 1989.

*Distribution* — Congo-Kinshasa.

**2. *Hartliella capitata*** (Eb. Fisch.) Eb. Fisch. in Trop. Subtrop. Pflanzenwelt 81: 211. 1992 ≡ *Lindernia capitata* Eb. Fisch. in Bull. Jard. Bot. Natl. Belg. 59: 448. 1989.

*Distribution* — Congo-Kinshasa, Zambia.

**3. *Hartliella cupricola*** Eb. Fisch. in Trop. Subtrop. Pflanzenwelt 81: 207. 1992.

*Distribution* — Congo-Kinshasa.

**4. *Hartliella suffruticosa*** (Lisowski & Mielcarek) Eb. Fisch. in Trop. Subtrop. Pflanzenwelt 81: 204. 1992 ≡ *Lindernia suffruticosa* Lisowski & Mielcarek, Bull. Jard. Bot. Natl. Belg. 54: 127. 1984.

*Distribution* — Congo-Kinshasa.

**7. *Hemiarrhena*** Benth., Fl. Austral. 4: 518. 1868. – Type: *H. plantaginea* (F. Muell.) Benth.

The genus has bothrospermous seeds and shows relationships to *Bonnaya*. The abaxial stamens are reduced to staminodes and the leaves show a pinnate venation.

**1. *Hemiarrhena plantaginea*** (F. Muell.) Benth., Fl. Austral. 4: 518. 1868 ≡ *Vandellia plantaginea* F. Muell. in Trans. & Proc. Philos. Inst. Victoria 3: 62. 1859 ≡ *Lindernia plantaginea* (F. Muell.) F. Muell., Fragm. 6: 102. 1868.

*Distribution* — Tropical NW Australia.

**8. *Legazpia*** Blanco, Fl. Filip., ed. 2: 338. 1845. – Type: *L. triptera* Blanco [= *L. polygonoides* (Benth.) T. Yamaz.].

**1. *Legazpia polygonoides*** (Benth.) T. Yamaz. in J. Jap. Bot. 30: 359. 1955 ≡ *Torenia polygonoides* Benth., Scroph. Ind.: 39. 1835.

= *Legazpia mucronulata* (Benth.) T. Yamaz. in J. Jap. Bot. 30: 359. 1955 ≡ *Torenia mucronulata* Benth. in Candolle, Prodr. 10: 409. 1846.

= *Legazpia triptera* Blanco, Fl. Filip., ed. 2: 339. 1845.

*Distribution* — Cambodia, Laos, Vietnam, Thailand, Micronesia, New Guinea.

*Legazpia polygonoides* has bothrospermous seeds. It is closely related to *Torenia*, but differs in the suborbicular calyx with 3 broad wings between the ridges, auriculate at base and 3-dentate at apex (Fischer 2004). *Torenia* has a calyx with 5 wings.

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**9. *Lindernia*** All. in Mélanges Philos. Math. Soc. Roy. Turin 3(1): 178. 1766 ≡ *Pyxidaria* Kuntze, Revis. Gen. Pl. 2: 464. 1891. – Type: *L. palustris* Hartmann [= *L. procumbens* (Krock.) Philcox].
= *Ilysanthes* Raf., Ann. Nat.: 13. 1820. – Type: *I. riparia* Raf. [= *Lindernia dubia* (L.) Pennell].
= *Bryodes* Benth. in Candolle, Prodr. 10: 433. 1846. – Type: *B. micrantha* Benth. ≡ *Lindernia benthamii* Eb. Fisch., Schäferh. & Kai Müll.
= *Psammetes* Hepper in Hooker's Icon. Pl. 36: t. 3582. 1962. – Type: *P. nigerica* Hepper [= *Lindernia madagascariensis* (Bonati) Eb. Fisch., Schäferh. & Kai Müll.].

**1. *Lindernia alsinoides*** R. Br., Prodr. Fl. Nov. Holland.: 441. 1810 ≡ *Tittmannia alsinoides* (R. Br.) Spreng., Syst. Veget. 2. 1825 ≡ *Ilyogeton alsinoides* (R. Br.) Endl. in Repert. Bot. Syst. 3: 297. 1844 ≡ *Vandellia alsinoides* (R. Br.) Benth., Prodr. (DC) 10 : 415. 1846 ≡ *Pyxidaria alsinoides* (R. Br.) Kuntze, Rev. Gen. Pl. 2 : 464. 1891.
= *Ilyogeton subulatum* Endl. in Repert. Bot. Syst. 3: 297. 1844.

*Distribution* — Australia.

**2. *Lindernia alterniflora*** (C. Wright) Alain in Contr. Ocas. Mus. Hist. Nat. Colegio "De La Salle" 15: 13. 1956 ≡ *Bonnaya alterniflora* C. Wright in Anales Acad. Ci. Med. Habana 7: 40. 1870 ≡ *Ilysanthes alterniflora* (C. Wright) Urb. in Ber. Deutsch. Bot. Ges. 2: 436. 1884.

*Distribution* — Cuba.

**3. *Lindernia benthamii*** Eb. Fisch., Schäferh. & Kai Müll., **nom. nov.** ≡ *Bryodes micrantha* Benth. in Candolle, Prodr. 10: 433. 1846 [non *Lindernia micrantha* D. Don, Prodr. Fl. Nepal.: 85. 1825].

*Distribution* — Madagascar.

The monotypic genus *Bryodes* (Fischer & Hepper 1997) is nested within *Lindernia*. A replacement name is required because the name *Lindernia micrantha* already exists.

**4. *Lindernia brachyphylla*** Pennell in Fieldiana, Bot. 28: 519. 1953.
= *Lindernia barrosorum* L. B. Sm. in Los Angeles County Mus. Contr. Sci. 23: 5. 1958.

*Distribution* — Venezuela, Guyana, Brazil.

**5. *Lindernia bryoides*** Eb. Fisch. in Bull. Mus. Natl. Hist. Nat., B, Adansonia, ser. 4, 17: 248. 1995.

*Distribution* — Madagascar.

**6. *Lindernia capensis*** Thunb., Prodr. Pl. Cap.: 104. 1800 ≡ *Ilysanthes capensis* (Thunb.) Benth. in Candolle, Prodr. 10: 419. 1846.

*Distribution* — South Africa.

**7. *Lindernia conferta*** (Hiern) Philcox, Bol. Soc. Brot., ser. 2, 60: 268. 1987 ≡ *Ilysanthes conferta* Hiern in Harvey, Fl. Cap. 4(2): 365. 1904.
= *Ilysanthes plantaginella* S. Moore in J. Bot. 43: 49. 1905.

*Distribution* — Congo-Kinshasa, Zimbabwe, South Africa.

**8. *Lindernia congesta*** (A. Raynal) Eb. Fisch. in Trop. Subtrop. Pflanzenwelt 81: 317. 1992 ≡ *Ilysanthes congesta* A. Raynal in Adansonia, n.s, 7: 348. 1967.

*Distribution* — Senegal (Cap-Vert), Tanzania.

**9. *Lindernia dubia*** (L.) Pennell in Acad. Nat. Sci. Philadelphia Monogr. 1: 141. 1935 ≡ *Gratiola dubia* L., Sp. Pl. 1: 17. 1753 ≡ *Capraria gratioloides* L., Syst. Nat., ed. 10, 2: 1117. 1759, nom. illeg. ≡ *Lindernia pyxidaria* L., Mant. Pl. 2: 252. 1771, nom. illeg. ≡ *Ilysanthes gratioloides* Benth. in Candolle, Prodr. 10: 419. 1846, nom. illeg. ≡ *Lindernia gratioloides* J. Lloyd & Foucaud, Fl. Ouest France, ed. 4: 246. 1886, nom. illeg. ≡ *Limnophila dubia* (L.) M. R. Almeida, Fl. Maharashtra 3B: 393. 2001, nom. illeg. [non *Limnophila dubia* Bonati in Bull. Soc. Bot. France 55: 511. 1908].
= *Lindernia dubia* var. *riparia* (Raf.) Fernald in Rhodora 44: 444. 1942 ≡ *Ilysanthes riparia* Raf. in Ann. Nat.: 13. 1820.
= *Lindernia anagallidea* (Michx.) Pennell in Acad. Nat. Sci. Philadelphia Monogr. 1: 152. 1935 ≡ *Gratiola anagallidea* Michx., Fl. Bor.-Amer. (Michaux) 1: 6. 1803.
= *Lindernia dilatata* Muhl. ex Elliott, Sketch Bot. S. Carolina 1: 16. 1816.

*Distribution* — Canada, U.S.A., Cuba, Dominican Republic, Puerto Rico, Mexico, Belize, Guatemala, Honduras, Nicaragua, Panama, Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, Paraguay, Peru, Venezuela; introduced in Europe and E Asia.

**10. *Lindernia grandiflora*** Nutt., Gen. N. Amer. Pl. 2: 43. 1818 ≡ *Ilysanthes grandiflora* (Nutt.) Benth. in Candolle, Prodr. 10: 418. 1846.
= *Bazina nudiflora* Raf., Autik. Bot.: 45. 1840.

*Distribution* — U.S.A. (Florida).

**11. *Lindernia hyssopioides*** (L.) Haines, Bot. Bihar Orissa 4: 635. 1922 ≡ *Gratiola hyssopioides* L., Mant. Pl. 2: 174. 1771 ≡ *Ilysanthes hyssopioides* (L.) Benth. in Candolle, Prodr. 10: 419. 1846.

*Distribution* — Sri Lanka, India, S China, Vietnam, Indonesia (Java, Sumatra).

**12. *Lindernia jiuhuanica*** X. H. Guo & X. L. Liu in Acta Phytotax. Sin. 26: 153. 1988.

*Distribution* — China.

**13. *Lindernia lemuriana*** Eb. Fisch., Schäferh. & Kai Müll., **nom. nov.** ≡ *Ilysanthes micrantha* Bonati in Bull. Soc. Bot. Genève, ser. 2, 18: 10. 1926, nom. illeg. [non *Ilysanthes micrantha* S. Moore in J. Bot. 49: 158. 1911, nec *Lindernia micrantha* D. Don, Prodr. Fl. Nepal.: 85. 1825] ≡ *Lindernia bonatii* Eb. Fisch. in Bull. Mus. Natl. Hist. Nat., B, Adansonia, ser. 4, 17: 242. 1995, nom. illeg. [non *Lindernia bonatii* (T. Yamaz.) Philcox in Taxon 19: 649. 1970].

*Distribution* — Madagascar.

*Lindernia bonatii* was published as a replacement name because *Ilysanthes micrantha* is a later homonym, and therefore illegitimate, and the name *L. micrantha* already exists. However, because *L. bonatii* is also a later homonym, a new replacement name is required.

**14. *Lindernia linearifolia*** (Engl.) Eb. Fisch. in Trop. Subtrop. Pflanzenwelt 81: 319. 1992 ≡ *Craterostigma linearifolium* Engl. in Bot. Jahrb. Syst. 23: 501. 1897.

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*Distribution* — Angola.

**15. *Lindernia madagascariensis*** (Bonati) Eb. Fisch., Schäferh. & Kai Müll., **comb. nov.** ≡ *Bryodes madagascariensis* Bonati in Bull. Soc. Bot. Genève, ser. 2, 15: 103. 1924 ≡ *Psammetes madagascariensis* (Bonati) Eb. Fischer & Hepper in Kew Bull. 52: 750. 1997.
= *Psammetes nigerica* Hepper in Hooker's Icon. Pl. 36: t. 3582. 1962.

*Distribution* — Nigeria, Madagascar.

The monotypic *Psammetes* is nested within *Lindernia*.

**16. *Lindernia madayiparensis*** Rateesh, Sunil & Nandakumar in Int. J. Pl. Anim. Environ. Sci. 2(3): 59. 2012.

*Distribution* — India.

**17. *Lindernia manilaliana*** Sivar. in Kew Bull. 31: 151. 1976.

*Distribution* — India.

**18. *Lindernia microcalyx*** Pennell & Stehlé in Stehlé & al., Fl. Guadeloupe 2(1): 217. 1938.

*Distribution* — Guadeloupe, Jamaica, Martinique.

Lewis (2000) placed this species into the synonymy of *Lindernia rotundifolia*. However, our analysis shows that it differs from typical *L. rotundifolia* (Fig. 4, 5) and it is therefore reinstated here. Probably *L. rotundifolia* s.l. comprises several taxa, and a critical revision of the complex is required.

**19. *Lindernia minima*** (Benth.) Mukerjee in J. Ind. Bot. Soc. 24: 132. 1945 ≡ *Ilysanthes minima* Benth. in Candolle, Prodr. 10: 420. 1846.

*Distribution* — India.

**20. *Lindernia monroi*** (S. Moore) Eb. Fisch. in Trop. Subtrop. Pflanzenwelt 81: 322. 1992 ≡ *Craterostigma monroi* S. Moore in J. Bot. 57: 214. 1919 ≡ *Torenia monroi* (S. Moore) Philcox in Bol. Soc. Brot., ser. 2, 60: 267. 1987.
= *Lindernia dongolensis* E. A. Bruce in Bothalia 6: 235. 1951.

*Distribution* — Zimbabwe, Angola, South Africa.

**21. *Lindernia monticola*** Nutt., Gen. N. Amer. Pl. 2: Addit. [1]. 1818 ≡ *Ilysanthes monticola* (Nutt.) Raf., Autik. Bot.: 45. 1840.
= *Lindernia refracta* Elliott, Sketch Bot. S. Carolina 1: 579. 1821 ≡ *Ilysanthes refracta* (Elliott) Raf., Autik. Bot.: 46. 1840.
= *Lindernia saxicola* M. A. Curtis in Amer. J. Sci. 44: 83. 1843 ≡ *Ilysanthes saxicola* (M. A. Curtis) Chapm., Fl. South. U.S.: 294. 1860 ≡ *Ilysanthes refracta* var. *saxicola* (M. A. Curtis) A. Gray, Syn. Fl. N. Amer. 2(1): 283. 1878.

*Distribution* — SE U.S.A.

**22. *Lindernia natans*** Eb. Fisch. in Bull. Mus. Natl. Hist. Nat., B, Adansonia, ser. 4, 17: 250. 1995.

*Distribution* — Madagascar.

**23. *Lindernia paludosa*** (Bonati) Eb. Fisch. in Bull. Mus. Natl. Hist. Nat., B, Adansonia, ser. 4, 17: 245. 1995 ≡ *Ilysanthes paludosa* Bonati in Bull. Soc. Bot. Genève, ser. 2, 18: 5. 1926.
= *Ilysanthes longipes* Bonati in Bull. Soc. Bot. Genève, ser. 2, 18: 7. 1926.
= *Ilysanthes macrantha* Bonati in Bull. Soc. Bot. Genève, ser. 2, 18: 6. 1926.
= *Ilysanthes macrophylla* Bonati in Bull. Soc. Bot. Genève, ser. 2, 18: 8. 1926.
= *Ilysanthes perrieri* Bonati in Bull. Soc. Bot. Genève, ser. 2, 18: 11. 1926.

*Distribution* — Madagascar.

**24. *Lindernia parviflora*** (Roxb.) Haines, Bot. Bihar Orissa 4: 635. 1922 ≡ *Gratiola parviflora* Roxb., Pl. Coromandel 3: 3. 1811 ≡ *Ilysanthes parviflora* (Roxb.) Benth. in Candolle, Prodr. 10: 419. 1846.
= *Ilysanthes radicans* Pilg. in Mildbraed, Wiss. Erg. Deut. Zentr.-Afr. Exped., Bot. 2: 286. 1911.

*Distribution* — Senegal, Mali, Ghana, Nigeria, Gabon, Chad, Sudan, Ethiopia, Somalia, Congo-Kinshasa, Rwanda, Burundi, Uganda, Kenya, Tanzania, Zambia, Malawi, Zimbabwe, Mozambique, Botswana, Namibia, South Africa, Madagascar, Mauritius, India, Sri Lanka, Vietnam.

**25. *Lindernia procumbens*** (Krock.) Philcox in Taxon 14: 30. 1965 ≡ *Anagalloides procumbens* Krock., Fl. Siles. 2(1): 398. 1790 ≡ *Pyxidaria procumbens* (Krock.) Borbás, Békésvármegye Fl.: 80. 1881.
= *Lindernia palustris* Hartmann, Primae Lin. Inst. Bot., ed. 2: 77. 1767, nom. utique rej.
= *Vandellia erecta* Benth., Scroph. Ind.: 36. 1835.

*Distribution* — Europe, E to SE Asia.

**26. *Lindernia rotundata*** (Pilg.) Eb. Fisch. in Bull. Jard. Bot. Natl. Belg. 67: 366. 1999 ≡ *Ilysanthes rotundata* Pilg. in Bot. Jahrb. Syst. 45: 214. 1910.

*Distribution* — Nigeria, Cameroon, Ethiopia, Congo-Kinshasa, Rwanda, Uganda, Tanzania, Malawi.

**27. *Lindernia rotundifolia*** (L.) Alston in Trimen, Handb. Fl. Ceyl. 6(Suppl., 2): 214. 1931 ≡ *Gratiola rotundifolia* L., Mant. Pl. 2: 174. 1771 ≡ *Ilysanthes rotundifolia* (L.) Benth. in Candolle, Prodr. 10: 420. 1846.
= *Ilysanthes oblongifolia* Baker in J. Bot. 20: 221. 1882.
= *Ilysanthes hypericifolia* Bonati in Bull. Soc. Bot. Genève, ser. 2, 18: 10. 1926.
= *Ilysanthes madagascariensis* Bonati in Bull. Soc. Bot. Genève, ser. 2, 18: 12. 1926.

*Distribution* — Belize, Guatemala, Honduras, Nicaragua, Brazil, Colombia, French Guiana, Paraguay, Peru, E Africa, Madagascar, Sri Lanka, India, China.

**28. *Lindernia srilankana*** L. H. Cramer & Philcox in Ceylon J. Sci., Biol. Sci. 11: 35. 1974.

*Distribution* — Sri Lanka.

**29. *Lindernia tridentata*** (Small) D. Q. Lewis in Castanea 65: 105. 2000 ≡ *Ilysanthes tridentata* Small in Bull. Torrey Bot. Club 23: 297. 1896.

*Distribution* — Mexico.

**30. *Lindernia viguieri*** (Bonati) Eb. Fisch. in Bull. Mus. Natl. Hist. Nat., B, Adansonia, ser. 4, 17: 240. 1995 ≡ *Ilysanthes viguieri* Bonati in Bull. Soc. Bot. Genève, ser. 2. 18: 3. 1926.
= *Ilysanthes pseudoviguieri* Bonati in Bull. Soc. Bot. Genève, ser. 2. 18: 4. 1926.

*Distribution* — Madagascar.

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**10. *Linderniella*** Eb. Fisch., Schäferh. & Kai Müll., **gen. nov.**

Plantae rosulatae vel caulibus elongatis instructae, folia opposita nervibus palmatis, flores staminibus fertilibus 2 et staminodiis geniculatis abaxialibus instructi, raro staminibus fertilibus 4 (solo in *L. boutiqueana*, *L. brevidente* et *L. cerastioidi*), semina bothrosperma. – Typus: *L. pygmaea* (Bonati) Eb. Fisch., Schäferh. & Kai Müll.

The new genus covers mainly rosulate rupicolous species; some of them, however, also have elongated stems. Except for *Linderniella boutiqueana*, *L. brevidens* and *L. cerastioides* the abaxial stamens are reduced to staminodes or bear only minute, reduced anthers (in *L. horombensis* and *L. pygmaea*). The seeds are bothrospermous. *Linderniella brevidens* is the only species that is not restricted to rock outcrops.

**1. *Linderniella andongensis*** (Hiern) Eb. Fisch., Schäferh. & Kai Müll., **comb. nov.** ≡ *Ilysanthes andongensis* Hiern, Cat. Afr. Pl. 1: 765. 1898 ≡ *Lindernia andongensis* (Hiern) Eb. Fisch. in Trop. Subtrop. Pflanzenwelt 81: 304. 1992, comb. inval.

*Distribution* — Angola.

**2. *Linderniella bolusii*** (Hiern) Eb. Fisch., Schäferh. & Kai Müll., **comb. nov.** ≡ *Ilysanthes bolusii* Hiern in Harvey, Fl. Cap. 4(2): 367. 1904 ≡ *Lindernia bolusii* (Hiern) Eb. Fisch. in Trop. Subtrop. Pflanzenwelt 81: 261. 1992.

*Distribution* — Ethiopia, Uganda, Kenya, South Africa.

**3. *Linderniella boutiqueana*** (Germain) Eb. Fisch., Schäferh. & Kai Müll., **comb. nov.** ≡ *Lindernia boutiqueana* R. Germ. in Bull. Jard. Bot. État. Bruxelles 22: 74. 1952.

*Distribution* — Burundi.

**4. *Linderniella brevidens*** (Skan) Eb. Fisch., Schäferh. & Kai Müll., **comb. nov.** ≡ *Lindernia brevidens* Skan in Oliver & al., Fl. Trop. Afr. 4(2): 339. 1906.

*Distribution* — Kenya, Tanzania.

**5. *Linderniella cerastioides*** (Bonati) Eb. Fisch., Schäferh. & Kai Müll., **comb. nov.** ≡ *Craterostigma cerastioides* Bonati in Bull. Soc. Bot. Genève, ser. 2, 15: 106. 1924 ≡ *Lindernia andringitrae* Eb. Fisch. in Bull. Mus. Natl. Hist. Nat., B, Adansonia, ser. 4, 17: 236. 1995 [non *Lindernia cerastioides* T. Yamaz., J. Jap. Bot. 53: 97. 1978].

*Distribution* — Madagascar.

**6. *Linderniella gracilis*** (Skan) Eb. Fisch., Schäferh. & Kai Müll., **comb. nov.** ≡ *Ilysanthes gracilis* Skan in Oliver & al., Fl. Trop. Afr. 4(2): 349. 1906 ≡ *Lindernia exilis* Philcox in Bol. Soc. Brot., ser. 2, 60: 269. 1987 [non *Lindernia gracilis* (Bonati) Bonati, Fl. Gén. Indoch. 4: 416. 1927].

*Distribution* — Côte d'Ivoire, Sierra Leone, Ghana, Nigeria, Central African Republic, Sudan, Congo-Kinshasa, Rwanda, Burundi.

**7. *Linderniella hartlii*** (Eb. Fisch. & Hepper) Eb. Fisch., Schäferh. & Kai Müll., **comb. nov.** ≡ *Lindernia hartlii* Eb. Fisch. & Hepper in Bull. Jard. Bot. Natl. Belg. 59: 447. 1989.

*Distribution* — Congo-Kinshasa, Tanzania.

**8. *Linderniella horombensis*** (Eb. Fisch.) Eb. Fisch., Schäferh. & Kai Müll., **comb. nov.** ≡ *Lindernia horombensis* Eb. Fisch. in Bull. Mus. Natl. Hist. Nat., B, Adansonia, ser. 4, 17: 238. 1995.

*Distribution* — Madagascar.

**9. *Linderniella mbalaensis*** (Eb. Fisch.) Eb. Fisch., Schäferh. & Kai Müll., **comb. nov.** ≡ *Lindernia mbalaensis* Eb. Fisch. in Bull. Jard. Bot. Natl. Belg. 67: 361. 1999.

*Distribution* — Zambia.

**10. *Linderniella nana*** (Engl.) Eb. Fisch., Schäferh. & Kai Müll., **comb. nov.** ≡ *Ilysanthes nana* Engl. in Bot. Jahrb. Syst. 23: 505. 1897 ≡ *Lindernia nana* (Engl.) Roessler in Mitt. Bot. Staatssamml. München 5: 691. 1965.

= *Ilysanthes schlechteri* Hiern in Harvey, Fl. Cap. 4(2): 365. 1904.

*Distribution* — Ethiopia, Congo-Kinshasa, Rwanda, Uganda, Kenya, Tanzania, Angola, Zambia, Zimbabwe, Namibia, South Africa.

**11. *Linderniella pulchella*** (Skan) Eb. Fisch., Schäferh. & Kai Müll., **comb. nov.** ≡ *Ilysanthes pulchella* Skan in Oliver & al., Fl. Trop. Afr. 4(2): 348. 1906 ≡ *Lindernia pulchella* (Skan) Philcox in Bol. Soc. Brot., ser. 2, 60: 268. 1987.

= *Ilysanthes purpurascens* Hutch., Botanist S. Africa: 461. 1946.

= *Ilysanthes saxatilis* Norl. in Bot. Not. 1951: 115. 1951.

= *Ilysanthes pulchella* subsp. *rhodesiana* Norl. in Bot. Not. 1951: 113. 1951.

*Distribution* — Sudan, Ethiopia, Congo-Kinshasa, Uganda, Tanzania, Angola, Zambia, Malawi, Zimbabwe, Mozambique, South Africa.

**12. *Linderniella pusilla*** Eb. Fisch., Schäferh. & Kai Müll., **nom. nov.** ≡ *Bonnaya pusilla* Oliv. in Trans. Linn. Soc. London 29: 121. 1875, nom. illeg. [non *Bonnaya pusilla* Benth., Scroph. Ind.: 33. 1835, nec *Bonnaya pusilla* Griff., Not. Pl. Asiat. 4: 107. 1854] ≡ *Ilysanthes pusilla* Urb. in Ber. Deutsch. Bot. Ges. 2: 435. 1884 ≡ *Lindernia philcoxii* Eb. Fisch. in Trop. Subtrop. Pflanzenwelt 81: 295. 1992, nom. illeg. ≡ *Lindernia serpens* Philcox in Ghazanfar & al., Fl. Trop. E. Africa, Scrophular.: 89. 2008 [non *Lindernia pusilla* (Willd.) Bold., Zakfl. Java: 165. 1916].

= *Ilysanthes rupicola* Lanza, Missione Biol. Borana 4: 208. 1939.

*Distribution* — Ethiopia, Congo-Kinshasa, Rwanda, Burundi, Uganda, Kenya, Tanzania.

The taxonomic history of this taxon is confusing. Described as *Bonnaya pusilla* Oliv., which is a later homonym and therefore illegitimate, it was transferred to *Ilysanthes* by Urban (1884), whose *I. pusilla* was a replacement name. Fischer (1992) transferred it to *Lindernia*, proposing *L. philcoxii* as a replacement name, because the name *L. pusilla* already existed, but *I. ugandensis* was cited as a synonym, which made the name

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*L. philcoxii* nomenclaturally superfluous and therefore illegitimate. Careful study of the type of *I. ugandensis* showed that it is different from *I. pusilla*. Thus Philcox (2008) proposed *L. serpens* as another replacement name. The replacement name published here in *Linderniella* reuses the original epithet of *B. pusilla*, which is also that of the earliest legitimate name for the species, *I. pusilla*.

**13. *Linderniella pygmaea*** (Bonati) Eb. Fisch., Schäferh. & Kai Müll., **comb. nov.** ≡ *Craterostigma pygmaeum* Bonati in Bull. Soc. Bot. Genève, ser. 2, 15: 107. 1924 ≡ *Lindernia pygmaea* (Bonati) Eb. Fisch. in Bull. Mus. Natl. Hist. Nat., B, Adansonia, ser. 4, 17: 234. 1995.

*Distribution* — Madagascar.

**14. *Linderniella trichotoma*** (Oliv.) Eb. Fisch., Schäferh. & Kai Müll., **comb. nov.** ≡ *Bonnaya trichotoma* Oliv. in Trans. Linn. Soc. London 29: 121. 1875 ≡ *Ilysanthes trichotoma* (Oliv.) Urb. in Ber. Deutsch. Bot. Ges. 4: 435. 1884 ≡ *Lindernia madiensis* Dandy in Andrews, Fl. Pl. Sudan 3: 139. 1956 [non *Lindernia trichotoma* Schltr. in Bot. Jahrb. Syst. 59: 107. 1924, nom. illeg.].

= *Ilysanthes schweinfurthii* Engl. in Bot. Jahrb. Syst. 23: 504. 1897 ≡ *Lindernia schweinfurthii* (Engl.) Dandy in Andrews, Fl. Pl. Sudan 3: 139. 1956.

= *Ilysanthes barteri* Skan in Oliver & al., Fl. Trop. Afr. 4(2): 350. 1906.

= *Ilysanthes albertina* S. Moore in J. Bot. 45: 331. 1907.

*Distribution* — Senegal, Guinea-Bissau, Guinea, Sierra Leone, Liberia, Côte d'Ivoire, Burkina Faso, Ghana, Togo, Nigeria, Cameroon, Central African Republic, Sudan, Ethiopia, Congo-Kinshasa, Rwanda, Burundi, Uganda, Kenya, Tanzania, Zambia.

**15. *Linderniella ugandensis*** (Skan) Eb. Fisch., Schäferh. & Kai Müll., **comb. nov.** ≡ *Ilysanthes ugandensis* Skan in Oliver & al., Fl. Trop. Afr. 4(2): 348. 1906 ≡ *Lindernia ugandensis* (Skan) Philcox in Ghazanfar & al., Fl. Trop. E. Africa, Scrophular.: 86. 2008.

*Distribution* — Uganda.

**16. *Linderniella wilmsii*** (Engl. ex Diels) Eb. Fisch., Schäferh. & Kai Müll., **comb. nov.** ≡ *Ilysanthes wilmsii* Engl. ex Diels in Bot. Jahrb. Syst. 26: 123. 1898 ≡ *Lindernia wilmsii* (Engl. ex Diels) Philcox in Bol. Soc. Brot., ser. 2, 60: 268. 1987.

= *Ilysanthes muddii* Hiern in Harvey, Fl. Cap. 4(2): 366. 1904.

*Distribution* — Congo-Kinshasa, Rwanda, Burundi, Uganda, Kenya, Tanzania, Angola, Zambia, Zimbabwe, Mozambique, South Africa.

**11. *Micranthemum*** Michx., Fl. Bor.-Amer. 1: 10. 1803, nom. cons. ≡ *Globifera* J. F. Gmel., Syst. Nat. 2: 32. 1791. – Type: *M. orbiculatum* Michx., nom. illeg. ≡ *M. umbrosum* (J. F. Gmel.) S. F. Blake.

= *Hemianthus* Nutt. in J. Acad. Nat. Sci. Philadelphia 1: 119. 1817. – Type: *H. micranthemoides* Nutt. ≡ *Micranthemum micranthemoides* (Nutt.) Wettst.

= *Amphiolanthus* Griseb., Cat. Pl. Cub.: 186. 1866. – Type (designated by Pennell in Proc. Acad. Nat. Sci. Philadelphia 75: 15. 1923): *A. bryoides* Griseb. ≡ *Micranthemum bryoides* (Griseb.) M. Gómez.

The genus *Micranthemum* is in need of a taxonomic revision because species delimitations are sometimes weakly defined.

**1. *Micranthemum arenarioides*** (Griseb.) M. Gómez, Anal. Hist. Nat. 23: 277. 1894 ≡ *Amphiolanthus arenarioides* Griseb., Cat. Pl. Cub.: 187. 1866 ≡ *Globifera arenarioides* (Griseb.) Kuntze, Revis. Gen. Pl. 2: 461. 1891.

*Distribution* — Cuba.

**2. *Micranthemum bryoides*** (Griseb.) M. Gómez, Anal. Hist. Nat. 23: 277. 1894 ≡ *Amphiolanthus bryoides* Griseb., Cat. Pl. Cub.: 186. 1866 ≡ *Globifera bryoides* (Griseb.) Kuntze, Revis. Gen. Pl. 2: 461. 1891.

*Distribution* — Cuba.

**3. *Micranthemum callitrichoides*** (Griseb.) C. Wright in Anales Acad. Ci. Med. Habana 7: 40. 1870 ≡ *Hemianthus callitrichoides* Griseb., Pl. Wright. 2: 522. 1862 ≡ *Globifera callitrichoides* (Griseb.) Kuntze, Revis. Gen. Pl. 2: 461. 1891.

= *Micranthemum adenandrum* (C. Wright ex Griseb.) C. Wright in Anales Acad. Ci. Med. Habana 7: 41. 1870 ≡ *Hemianthus adenander* C. Wright ex Griseb., Cat. Pl. Cub.: 185. 1866 ≡ *Globifera adenandra* (C. Wright ex Griseb.) Kuntze, Revis. Gen. Pl. 2: 461. 1891.

= *Micranthemum ciliolatum* C. Wright in Anales Acad. Ci. Med. Habana 7: 41. 1870 ≡ *Globifera ciliolata* (C. Wright) Kuntze, Revis. Gen. Pl. 2: 461. 1891.

= *Micranthemum elatinoides* (Griseb.) C. Wright in Anales Acad. Ci. Med. Habana 7: 40. 1870 ≡ *Hemianthus elatinoides* Griseb., Cat. Pl. Cub.: 185. 1866 ≡ *Globifera elatinoides* (Griseb.) Kuntze, Revis. Gen. Pl. 2: 461. 1891.

= *Micranthemum multiflorum* (C. Wright ex Griseb.) C. Wright in Anales Acad. Ci. Med. Habana 7: 40. 1870 ≡ *Hemianthus multiflorus* C. Wright ex Griseb., Cat. Pl. Cub.: 185. 1866.

= *Micranthemum punctatum* (C. Wright ex Griseb.) C. Wright in Anales Acad. Ci. Med. Habana 7: 40. 1870 ≡ *Hemianthus punctatus* C. Wright ex Griseb., Cat. Pl. Cub.: 184. 1866 ≡ *Globifera punctata* (C. Wright ex Griseb.) Kuntze, Revis. Gen. Pl. 2: 461. 1891.

*Distribution* — Cuba.

**4. *Micranthemum erosum*** (C. Wright ex Griseb.) Eb. Fisch., Schäferh. & Kai Müll., **comb. nov.** ≡ *Hemianthus erosus* C. Wright ex Griseb., Cat. Pl. Cub.: 184. 1866 ≡ *Globifera erosa* (C. Wright ex Griseb.) Kuntze, Revis. Gen. Pl. 2: 461. 1891.

*Distribution* — Cuba.

**5. *Micranthemum glomeratum*** (Chapm.) Shinners in Sida 1: 252. 1964 ≡ *M. nuttallii* var. *glomeratum* Chapm., Fl. South. U.S., ed. 2, Suppl. 2: 690. 1892 ≡ *Hemianthus glomeratus* (Chapm.) Pennell in Proc. Acad. Nat. Sci. Philadelphia 71: 248. 1920.

*Distribution* — U.S.A. (Florida).

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**6. *Micranthemum micranthemoides*** (Nutt.) Wettst. in Engler & Prantl, Nat. Pflanzenfam. 4(3b): 77. 1891 ≡ *Hemianthus micranthemoides* Nutt. in J. Acad. Nat. Sci. Philadelphia 1: 119. 1817 ≡ *Micranthemum nuttallii* A. Gray, Manual, ed. 5: 331. 1867, nom. illeg. ≡ *Globifera micranthemodes* (Nutt.) Kuntze, Revis. Gen. Pl. 2: 461. 1891.

*Distribution* — U.S.A., Cuba.

**7. *Micranthemum pilosum*** Ernst in Flora 57: 215. 1874.

*Distribution* — Venezuela.

**8. *Micranthemum procerorum*** L. O. Williams in Fieldiana, Bot. 34: 123. 1972.

*Distribution* — Mexico.

**9. *Micranthemum reflexum*** (C. Wright ex Griseb.) C. Wright in Anales Acad. Ci. Med. Habana 7: 42. 1870 ≡ *Hemianthus reflexus* C. Wright ex Griseb., Cat. Pl. Cub.: 186. 1866 ≡ *Globifera reflexa* (C. Wright ex Griseb.) Kuntze, Revis. Gen. Pl. 2: 461. 1891.

*Distribution* — Cuba.

**10. *Micranthemum rotundatum*** C. Wright ex Griseb., Cat. Pl. Cub.: 184. 1866 ≡ *Globifera rotundata* (C. Wright ex Griseb.) Kuntze, Revis. Gen. Pl. 2: 461. 1891.

*Distribution* — Cuba.

**11. *Micranthemum standleyi*** L. O. Williams in Fieldiana, Bot. 34: 124. 1972.

*Distribution* — Mexico.

**12. *Micranthemum tetrandrum*** C. Wright in Anales Acad. Ci. Med. Habana 7: 41. 1870 ≡ *Globifera tetrandra* (C. Wright) Kuntze, Revis. Gen. Pl. 2: 461. 1891 ≡ *Hemianthus tetrandrus* (C. Wright) Pennell in Proc. Acad. Nat. Sci. Philadelphia 75: 16. 1923.

*Distribution* — Cuba.

**13. *Micranthemum trisetosum*** (C. Wright ex Griseb.) C. Wright in Anales Acad. Ci. Med. Habana 7: 40. 1870 ≡ *Hemianthus trisetosus* C. Wright ex Griseb., Cat. Pl. Cub.: 185. 1866 ≡ *Globifera trisetosa* (C. Wright ex Griseb.) Kuntze, Revis. Gen. Pl. 2: 461. 1891.

*Distribution* — Cuba.

**14. *Micranthemum umbrosum*** (J. F. Gmel.) S. F. Blake in Rhodora 17: 131. 1915 ≡ *Globifera umbrosum* J. F. Gmel., Syst. Nat. 2: 32. 1791 ≡ *Micranthemum orbiculatum* Michx., Fl. Bor.-Amer. 1: 10. 1803, nom. illeg.

= *Micranthemum emarginatum* Elliott, Sketch Bot. S. Carolina 1: 18. 1816 ≡ *Micranthemum orbiculatum* var. *emarginatum* (Elliott) C. Mohr in Bull. Torrey Bot. Club 24: 26. 1897.

– *Anonymos umbrosus* Walter, Fl. Carol.: 63. 1788, nom. inval.

*Distribution* — SE U.S.A. to South America, Puerto Rico.

**12. *Pierranthus*** Bonati in Bull. Soc. Bot. Genève, ser. 2, 4: 254. 30 Nov 1912 ≡ *Delpya* Pierre ex Bonati in Bull. Soc. Bot. Genève, ser. 2, 4: 238. 30 Sep 1912, nom. illeg. [non *Delpya* Pierre ex Radlkofer in Notul. Syst. (Paris) 1: 304. 1910]. – Type: *P. capitatus* (Bonati) Bonati.

The genus has bothrospermous seeds, but differs from *Vandellia* in its overall morphology (capitate inflorescence, shape of leaves, bracts, calyx and corolla).

**1. *Pierranthus capitatus*** (Bonati) Bonati in Bull. Soc. Bot. Genève, ser. 2, 4: 254. 1912 ≡ *Vandellia capitata* Bonati in Bull. Soc. Bot. France 55: 514. 1908.

*Distribution* — Thailand, Cambodia, Vietnam.

**13. *Schizotorenia*** T. Yamaz. in J. Jap. Bot. 53: 101. 1978 – Type: *S. finetiana* (Bonati) T. Yamaz.

The genus resembles *Torenia*, but differs in the shape of the calyx and the aulacospermous seeds.

**1. *Schizotorenia atropurpurea*** (Ridl.) T. Yamaz. in J. Jap. Bot. 53: 102. 1978 ≡ *Torenia atropurpurea* Ridl. in J. Straits Branch Roy. Asiatic Soc. 49: 24. 1907.

*Distribution* — Thailand, Peninsular Malaysia.

**2. *Schizotorenia finetiana*** (Bonati) T. Yamaz. in J. Jap. Bot. 53: 101. 1978 ≡ *Torenia finetiana* Bonati in Bull. Soc. Bot. Genève, ser. 2, 5: 312. 1914 ≡ *Artanema finetianum* (Bonati) T. Yamaz. in J. Jap. Bot. 28: 34. 1953.

= *Torenia evrardii* Bonati in Bull. Soc. Bot. France 71: 1097. 1924 ≡ *Artanema evrardii* (Bonati) T. Yamaz. in J. Jap. Bot. 28: 36. 1953.

*Distribution* — Vietnam.

**14. *Scolophyllum*** T. Yamaz. in J. Jap. Bot. 53: 98. 1978. – Type: *S. ilicfolium* (Bonati) T. Yamaz.

The genus has bothrospermous seeds and is probably closely related to *Bonnaya*.

**1. *Scolophyllum ilicifolium*** (Bonati) T. Yamaz. in J. Jap. Bot. 53: 100. 1978 ≡ *Ilysanthes ilicfolia* Bonati in Bull. Soc. Bot. France 55: 541. 1908 ≡ *Bonnaya ilicifolia* (Bonati) Bonati in Lecomte & al., Fl. Indo-Chine 4: 435. 1927 ≡ *Lindernia ilicifolia* (Bonati) Philcox in Taxon 19: 649. 1970.

*Distribution* — Thailand, Cambodia, Vietnam.

**2. *Scolophyllum longitubum*** T. Yamaz. & Chuakul in J. Jap. Bot. 74: 82. 1999.

*Distribution* — Thailand.

**3. *Scolophyllum spinifidum*** (Kerr ex Barnett) T. Yamaz., J. Jap. Bot. 53: 101. 1978 ≡ *Ilysanthes spinifida* Kerr ex Barnett in Kew Bull. 16: 489. 1963 ≡ *Lindernia spinifida* (Kerr ex Barnett) Philcox in Taxon 19: 649. 1970.

*Distribution* — Thailand.

**15. *Stemodiopsis*** Engl. in Annuario Reale Ist. Bot. Roma 7: 25. 1898. – Type: *S. rivae* Engl.

**1. *Stemodiopsis buchananii*** Skan in Oliver & al., Fl. Trop. Afr. 4(2): 315. 1906.

= *Sutera cymbalariifolia* Chiov., Res. Sci. Somalia Ital. 1: 129. 1916.

*Distribution* — Sudan, Somalia, Kenya, Tanzania, Zambia, Zimbabwe, Malawi, Mozambique.

**2. *Stemodiopsis eylesii*** S. Moore in J. Bot. 46: 71. 1908.

*Distribution* — Zimbabwe.

**3. *Stemodiopsis glandulosa*** Philcox, Fl. Zambes. 8(2): 42. 1990.

*Distribution* — Zambia.

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**4. *Stemodiopsis linearis*** S. Moore in J. Bot. 49: 157. 1911.
*Distribution* — Congo-Kinshasa.
**5. *Stemodiopsis rivae*** Engl. in Annuario Reale Ist. Bot. Roma 7: 25. 1898.
= *Stemodiopsis humilis* Skan in Oliver & al., Fl. Trop. Afr. 4(2): 316. 1906.
*Distribution* — Cameroon, Sudan, Ethiopia, Burundi, Uganda, Kenya, Tanzania, Zambia, Zimbabwe, Mozambique, South Africa.
**6. *Stemodiopsis ruandensis*** Eb. Fisch. in Bot. Jahrb. Syst. 119: 319. 1997.
*Distribution* — Rwanda.

**16. *Torenia*** L., Sp. Pl. 2: 619. 1753. – Type: *T. asiatica* L.
**1. *Torenia asiatica*** L., Sp. Pl. 2: 619. 1753.
= *Torenia glabra* Osbeck, Dagbok Ostind. Resa.: 210. 1757.
*Distribution* — India, Nepal, China; widely naturalized, e.g. in Hawaii.
**2. *Torenia benthamiana*** Hance in Ann. Sci. Nat., Bot., ser. 4, 18: 226. 1862.
= *Torenia nantoensis* Hayata, Icon. Pl. Formosan. 9: 81. 1920.
= *Torenia tonkinensis* Bonati in Lecomte & al., Fl. Indo-Chine 4: 399. 1927.
*Distribution* — China, Taiwan, Vietnam.
**3. *Torenia biniflora*** T. L. Chin & D. Y. Hong in P. C. Tsoong & H. P. Yang, Fl. Reipubl. Popularis Sin. 67(2): 399. 1979.
*Distribution* — China.
**4. *Torenia chevalieri*** Bonati in Bull. Soc. Bot. France 71: 1095. 1925.
*Distribution* — Cambodia, Vietnam.
**5. *Torenia concolor*** Lindl. in Edwards's Bot. Reg. 32: t. 62. 1846.
= *Torenia albomarginata* Bonati, Bull. Soc. Bot. France 71: 1096. 1925.
= *Torenia alboviolacea* Bonati in Bull. Soc. Bot. France 71: 1094. 1925.
= *Torenia annamitica* Bonati in Bull. Soc. Bot. France 71: 1094. 1925.
*Distribution* — China, Laos, Vietnam.
**6. *Torenia cordata*** (Griff.) N. M. Dutta, Bull. Bot. Soc. Bengal 19: 25. 1965 ≡ *Treisteria cordata* Griff., Not. Pl. Asiat. 4: 109. 1854.
*Distribution* — Myanmar.
**7. *Torenia cordifolia*** Roxb., Pl. Coromandel 2: 32. 1802.
*Distribution* — India, Nepal, Myanmar, China, Thailand.
**8. *Torenia courtallensis*** Gamble, Fl. Madras 2: 956. 1922.
*Distribution* — India.
**9. *Torenia cyrtandriflora*** B. L. Burtt in Rheedea 1: 3. 1991.
*Distribution* — Malaysia (Sarawak).
**10. *Torenia daubyi*** Eb. Fisch. & O. Lachenaud in Phytotaxa 125: 42. 2013.
*Distribution* — Gabon.
**11. *Torenia diffusa*** D. Don, Prodr. Fl. Nepal.: 86. 1825.
= *Torenia vagans* Roxb., Fl. Ind., ed. 1832, 3: 96. 1832.
*Distribution* — Nepal, Bhutan, India (Assam, Sikkim).
**12. *Torenia dinklagei*** Engl. in Bot. Jahrb. Syst. 57: 610. 1922.
*Distribution* — Sierra Leone, Liberia, Côte d'Ivoire, Ghana, Togo, Nigeria, Equatorial Guinea (Bioko), Cameroon, Gabon, Congo-Kinshasa.
**13. *Torenia flava*** Buch.-Ham. ex Benth., Scroph. Ind.: 38. 1835.
= *Torenia hokutensis* Hayata, Icon. Pl. Formosan. 9: 80. 1920.
*Distribution* — India, China, Taiwan, Thailand, Laos, Cambodia, Vietnam, Myanmar, Malaysia, Indonesia.
**14. *Torenia fordii*** Hook. f. in Bot. Mag. 111: t. 6797B. 1885.
*Distribution* — China.
**15. *Torenia fournieri*** Linden ex E. Fourn. in Ill. Hort. 23: 129. 1876.
*Distribution* — Thailand, Cambodia, Laos, Vietnam; introduced (escaped from cultivation) in Mexico, Central America and South America.
**16. *Torenia hayatae*** Bonati in Bull. Soc. Bot. France 71: 1096. 1925.
*Distribution* — Vietnam.
**17. *Torenia hirsutissima*** Bonati in Bull. Soc. Bot. France 55: 512. 1908.
*Distribution* — Thailand, Cambodia, Laos.
**18. *Torenia indica*** C. J. Saldanha in Bull. Bot. Surv. India 8: 127. 1967.
*Distribution* — India.
**19. *Torenia laotica*** Bonati in Bull. Soc. Bot. France 55: 512. 1908.
*Distribution* — Cambodia, Laos, Vietnam.
**20. *Torenia mannii*** Skan in Oliver & al., Fl. Trop. Afr. 4(2): 336. 1906.
*Distribution* — Gabon, Equatorial Guinea.
**21. *Torenia pierreana*** Bonati in Bull. Soc. Bot. France 55: 513. 1908.
= *Torenia reptans* Kerr ex Barnett in Kew Bull. 16: 487. 1963.
*Distribution* — Thailand, Cambodia.
**22. *Torenia poilanei*** Bonati in Bull. Soc. Bot. France 71: 1093. 1925.
= *Torenia rupestris* Bonati in Lecomte & al., Fl. Indo-Chine 4: 402. 1927.
*Distribution* — Cambodia, Vietnam.
**23. *Torenia ranongensis*** T. Yamaz. in J. Jap. Bot. 58: 14. 1983.
*Distribution* — Thailand.
**24. *Torenia scandens*** Bonati in Bull. Soc. Bot. France 71: 1095. 1925.
*Distribution* — Vietnam.
**25. *Torenia siamensis*** T. Yamaz. in J. Jap. Bot. 53: 103. 1978.

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*Distribution* — Thailand.

**26. *Torenia silvicola*** A. Raynal in Adansonia, n.s., 5: 522. 1965.

*Distribution* — Cameroon, Gabon, Congo-Brazzaville.

**27. *Torenia stolonifera*** Bojer ex Benth. in Candolle, Prodr. 10: 410. 1846.

*Distribution* — Madagascar.

**28. *Torenia thailandica*** T. Yamaz. in J. Jap. Bot. 65: 265. 1990.

*Distribution* — Thailand.

**29. *Torenia thorelii*** Bonati in Bull. Soc. Bot. France 55: 514. 1908.

*Distribution* — Cambodia, Laos, Vietnam.

**30. *Torenia thouarsii*** (Cham. & Schltdl.) Kuntze, Revis. Gen. Pl. 2: 468. 1891 ≡ *Nortenia thouarsii* Cham. & Schltdl. in Linnaea 3: 18. 1828 ≡ *Torenia parviflora* Buch.-Ham. ex Benth., Scroph. Ind.: 39. 1835, nom. illeg.

= *Torenia ramosissima* Vatke in Oesterr. Bot. Z. 25: 10. 1875.

= *Torenia chamaedrys* Bonati in Bull. Soc. Bot. Genève, ser. 2, 18: 30. 1926.

= *Torenia nana* Bonati in Bull. Soc. Bot. Genève, ser. 2, 18: 32. 1926, nom. illeg. [non *Torenia nana* Benth. in Candolle, Prodr. 10: 412. 1846].

= *Torenia peduncularifformis* Bonati in Bull. Soc. Bot. Genève, ser. 2, 18: 33. 1926.

= *Torenia viguieri* Bonati in Bull. Soc. Bot. Genève, ser. 2, 18: 30. 1926.

*Distribution* — Senegal, Mali, Guinea, Sierra Leone, Liberia, Côte d'Ivoire, Ghana, Togo, Nigeria, São Tomé and Príncipe (Príncipe), Cameroon, Gabon, Congo-Brazzaville, Central African Republic, Sudan, Ethiopia, Congo-Kinshasa, Rwanda, Burundi, Uganda, Kenya, Tanzania, Angola, Zambia, Malawi, Zimbabwe, Mozambique, Botswana, South Africa, Madagascar, Mauritius, India, Myanmar; introduced in Central America and South America.

**31. *Torenia travancorica*** Gamble, Fl. Madras 2: 957. 1922.

*Distribution* — India.

**32. *Torenia vientianica*** T. Yamaz. in J. Jap. Bot. 55: 328. 1980.

*Distribution* — Vietnam.

**33. *Torenia violacea*** (Blanco) Pennell in J. Arnold Arbor. 24: 255. 1943 ≡ *Mimulus violaceus* Blanco, Fl. Filip., ed. 2: 357. 1845.

= *Torenia exappendiculata* Regel in Gartenflora 26: 34. 1877.

= *Torenia peduncularis* Benth. ex Hook. f., Fl. Brit. India 4: 276. 1884.

= *Torenia edentula* Griff. ex Benth. in Candolle, Prodr. 10: 410. 1846.

*Distribution* — Bhutan, India, China, Taiwan, Thailand, Laos, Cambodia, Vietnam, Malaysia, Philippines, Indonesia (Java).

***Torenia crustacea* group**

*Lindernia* sect. *Torenioides* (Benth.) Pennell in Acad. Nat. Sci. Philadelphia Monogr. 1: 139. 1935 ≡ *Vandellia* sect. *Torenioides* Benth. in Candolle, Prodr. 10: 413. 1846.

The following species are closely related to *Torenia crustacea* and have been assigned to *Lindernia* in most recent treatments (e.g. Philcox 1968). They are here included in *Torenia.*

**34. *Torenia blancoi*** Merr., Sp. Blancoan.: 346. 1918 ≡ *Lindernia blancoi* (Merr.) Philcox in Kew Bull. 22: 23. 1968.

*Distribution* — Philippines; introduced in Mexico.

**35. *Torenia bonatii*** Eb. Fisch., Schäferh. & Kai Müll., **nom. nov.** ≡ *Vandellia pierreana* Bonati in Bull. Soc. Bot. France 55: 538. 1908 ≡ *Lindernia pierreana* (Bonati) Bonati in Lecomte & al., Fl. Indo-Chine 4: 415. 1927 [non *Torenia pierreana* Bonati in Bull. Soc. Bot. France 55: 513. 1908].

= *Lindernia maculata* Bonati in Lecomte & al., Fl. Indo-Chine 4: 414. 1927.

= *Vandellia ligulata* T. Yamaz. in J. Jap. Bot. 28: 37. 1953 ≡ *Lindernia ligulata* (T. Yamaz.) Philcox in Taxon 19: 649. 1970.

*Distribution* — Vietnam.

A replacement name is required because the name *Torenia pierreana* already exists.

**36. *Torenia cambodgiana*** Bonati in Bull. Soc. Bot. France 55: 513. 1908 ≡ *Lindernia cerastioides* T. Yamaz. in J. Jap. Bot. 53: 97. 1978 [non *Lindernia cambodgiana* (Bonati) Philcox in Taxon 19: 649. 1970].

*Distribution* — Cambodia.

**37. *Torenia crenata*** (Pennell) Pennell in J. Arnold Arbor. 24: 254. 1943 ≡ *Lindernia crenata* Pennell in J. Arnold Arbor. 20: 79. 1939.

*Distribution* — Indonesia (Sulawesi), New Guinea.

**38. *Torenia crustacea*** (L.) Cham. & Schltdl. in Linnaea 2: 570. 1827 ≡ *Capraria crustacea* L., Syst. Nat., ed. 12, 2: 419; Mant. Pl. 1: 87. 1767 ≡ *Lindernia crustacea* (L.) F. Muell., Syst. Census Austral. Pl.: 97. 1882–1883 ≡ *Vandellia crustacea* (L.) Benth., Scroph. Ind.: 35. 1835.

= *Vandellia racemosa* Bonati in Bull. Soc. Bot. France 55: 537. 1908, nom. illeg. [non *Vandellia racemosa* Spreng., Neue Entd. 1: 262. 1820].

= *Vandellia gracilis* Bonati in Bull. Soc. Bot. France 55: 539. 1908 ≡ *Lindernia gracilis* (Bonati) Bonati in Lecomte & al., Fl. Indo-Chine 4: 416. 1927.

*Distribution* — Senegal, Guinea-Bissau, Sierra Leone, Côte d'Ivoire, Ghana, Nigeria, Cameroon, Equatorial Guinea (Annobón), Central African Republic, Gabon, Congo-Brazzaville, Congo-Kinshasa, Burundi, Madagascar, India, Nepal, Sri Lanka, China, Thailand, Laos, Vietnam, Cambodia, Japan, Philippines, Australia, New Guinea, Micronesia, Polynesia; introduced in S U.S.A., Mexico, Cuba, Dominica, Grenada, Guadeloupe, Jamaica, Martinique, Puerto Rico, Saint Lucia, Trinidad and Tobago, Belize, Costa Rica, Guatemala,

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**39. *Torenia davidii*** Eb. Fisch., Schäferh. & Kai Müll., **nom. nov.** ≡ *Lindernia celebica* Philcox in Kew Bull. 22: 15. 1968 [non *Torenia celebica* T. Yamaz. in J. Jap. Bot. 65: 262. 1990].

*Distribution* — Indonesia (Sulawesi).

A replacement name is required because the name *Torenia celebica* already exists.

**40. *Torenia dictyophora*** (P. C. Tsoong) Eb. Fisch., Schäferh. & Kai Müll., **comb. nov.** ≡ *Lindernia dictyophora* P. C. Tsoong in P. C. Tsoong & H. P. Yang, Fl. Reipubl. Popularis Sin. 67(2): 397. 1979.

*Distribution* — Thailand, China (Yunnan).

**41. *Torenia grandiflora*** (Merr.) Eb. Fisch., Schäferh. & Kai Müll., **comb. nov.** ≡ *Vandellia grandiflora* Merr. in Philipp. J. Sci. 1(Suppl. 3): 237. 1906 ≡ *Lindernia grandiflora* (Merr.) Merr., Enum. Philipp. Fl. Pl. 3: 438. 1923, nom. illeg. [non *Lindernia grandiflora* Nutt., Gen. N. Amer. Pl. 2: 43. 1818] ≡ *Lindernia philippinensis* Philcox in Kew Bull. 22: 13. 1968.

*Distribution* — Philippines, New Guinea.

**42. *Torenia molluginoides*** (Benth.) Eb. Fisch., Schäferh. & Kai Müll., **comb. nov.** ≡ *Vandellia molluginoides* Benth., Scroph. Ind.: 35. 1835 ≡ *Lindernia molluginoides* (Benth.) Wettst. in Engler & Prantl, Nat. Pflanzenfam. 4(3b): 80. 1891.

*Distribution* — Thailand, Myanmar.

**43. *Torenia oblonga*** (Benth.) Steud., Nomencl. Bot., ed. 2, 2: 692. 1841 ≡ *Vandellia oblonga* Benth., Scroph. Ind.: 35. 1835 ≡ *Lindernia oblonga* (Benth.) Merr. & Chun in Sunyatsenia 5: 180. 1940.

= *Lindernia subcrenulata* (Miq.) Merr. in Sunyatsenia 1: 33. 1930 ≡ *Vandellia subcrenulata* Miq. in J. Bot. Néerl. 1: 113. 1861.

*Distribution* — S China, Vietnam.

**44. *Torenia perennans*** (T. Yamaz.) Eb. Fisch., Schäferh. & Kai Müll., **comb. nov.** ≡ *Vandellia perennans* T. Yamaz. in J. Jap. Bot. 28: 39. 1953 ≡ *Lindernia perennans* (T. Yamaz.) Philcox in Taxon 19: 649. 1970.

*Distribution* — Laos, Vietnam.

**45. *Torenia philcoxii*** Eb. Fisch., Schäferh. & Kai Müll., **nom. nov.** ≡ *Lindernia glabra* Philcox in Kew Bull. 22: 23. 1968 [non *Torenia glabra* Osbeck, Dagbok Ostind. Resa.: 210. 1757].

*Distribution* — New Guinea.

A replacement names is required because the name *Torenia glabra* already exists.

**46. *Torenia pierreanoides*** (T. Yamaz.) Eb. Fisch., Schäferh. & Kai Müll., **comb. nov.** ≡ *Lindernia pierreanoides* T. Yamaz. in J. Jap. Bot. 53: 2. 1978.

*Distribution* — Thailand, Cambodia.

**47. *Torenia pterogona*** (T. Yamaz.) Eb. Fisch., Schäferh. & Kai Müll., **comb. nov.** ≡ *Lindernia pterogona* T. Yamaz. in J. Jap. Bot. 55: 328. 1980.

*Distribution* — Laos.

**48. *Torenia spathacea*** (Bonati) Eb. Fisch., Schäferh. & Kai Müll., **comb. nov.** ≡ *Vandellia spathacea* Bonati in Notul. Syst. (Paris) 1: 333. 1911 ≡ *Lindernia spathacea* (Bonati) Bonati in Lecomte & al., Fl. Indo-Chine 4: 414. 1927.

*Distribution* — Cambodia, Laos, Vietnam.

**49. *Torenia subconnivens*** (Philcox) Eb. Fisch., Schäferh. & Kai Müll., **comb. nov.** ≡ *Lindernia subconnivens* Philcox in Kew Bull. 22: 13. 1968.

*Distribution* — Philippines.

**50. *Torenia udawnensis*** (T. Yamaz.) Eb. Fisch., Schäferh. & Kai Müll., **comb. nov.** ≡ *Lindernia udawnensis* T. Yamaz. in J. Jap. Bot. 53: 9. 1978.

*Distribution* — Thailand.

**51. *Torenia umbellata*** (T. Yamaz.) Eb. Fisch., Schäferh. & Kai Müll., **comb. nov.** ≡ *Lindernia umbellata* T. Yamaz. in J. Jap. Bot. 53: 10. 1978.

*Distribution* — Cambodia.

**17. *Vandellia*** L., Syst. Nat., ed. 12, 2: 384, 422; Mant. Pl. 1: 12. 1767. – Type: *V. diffusa* L.

= *Tittmannia* Rchb., Iconogr. Bot. Exot. 1: 26. 1824, nom. rej. [non *Tittmannia* Brongn. in Ann. Sci. Nat. (Paris) 8: 385. 1826, nom. cons., *Bruniaceae*] – Type: *T. viscosa* (Hornem.) Rchb. ≡ *Vandellia viscosa* (Hornem.) Merr.

= *Geoffraya* Bonati in Notul. Syst. (Paris) 1: 334. 1911. – Type (designated by Yamazaki in Leroy, Fl. Cambodge, Laos Viêt-nam 21: 117. 1985): *G. junciformis* Bonati ≡ *Vandellia junciformis* (Bonati) Eb. Fisch., Schäferh. & Kai Müll.

= *Trichotaenia* T. Yamaz. in J. Jap. Bot. 28: 40. 1953 – Type (designated by Yamazaki in Leroy, Fl. Cambodge, Laos Viêt-nam 21: 118. 1985): *Trichotaenia saginiformis* (Bonati) T. Yamaz. ≡ *Vandellia saginiformis* Bonati.

**=** *Lindernia* subg. *Didymadenia* W. R. Barker in J. Adelaide Bot. Gard. 13: 79. 1990. – Type: *L. chrysoplectra* W. R. Barker ≡ *Vandellia chrysoplectra* (W. R. Barker) Eb. Fisch., Schäferh. & Kai Müll.

**1. *Vandellia anagallis*** (Burm. f.) T. Yamaz. in J. Jap. Bot. 30: 176. 1955 ≡ *Ruellia anagallis* Burm. f., Fl. Indica: 135. 1768 ≡ *Lindernia anagallis* (Burm. f.) Pennell in J. Arnold Arbor. 24: 252. 1943.

= *Gratiola cordifolia* Colsm., Prodr. Descr. Gratiol.: 15. 1793 ≡ *Lindernia cordifolia* (Colsm.) Merr., Bibl. Enum. Born. Pl.: 524. 1921.

= *Vandellia pedunculata* Benth., Scroph. Ind.: 37. 1835 ≡ *Lindernia pedunculata* (Benth.) Wettst. in Engler & Prantl, Nat. Pflanzenfam 4(3b): 79. 1891.

= *Vandellia laotica* T. Yamaz. in J. Jap. Bot. 37: 268. 1962, nom. illeg. [non *Vandellia laotica* Bonati, Bull. Soc. Bot. Genève, ser. 2, 5: 140. 1913].

= *Vandellia emarginata* T. Yamaz. in Bull. Natl. Sci. Mus., Tokyo, n.s., 6: 370. 1963 ≡ *Lindernia emarginata* (T. Yamaz.) Philcox in Taxon 19: 649. 1970.

*Distribution* — Madagascar, India, S China, Thailand, Laos, Vietnam, Malaysia, Australia, Philippines, New Guinea.

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**2.** ***Vandellia annamensis*** (T. Yamaz.) Eb. Fisch., Schäferh. & Kai Müll., **comb. nov.** ≡ *Lindernia annamensis* T. Yamaz. in J. Fac. Sci. Univ. Tokyo, Sect. 3, Bot. 13: 48. 1981.

*Distribution* — Vietnam.

**3.** ***Vandellia aplectra*** (W. R. Barker) Eb. Fisch., Schäferh. & Kai Müll., **comb. nov.** ≡ *Lindernia aplectra* W. R. Barker in J. Adelaide Bot. Gard. 13: 80. 1990.

*Distribution* — Australia.

**4.** ***Vandellia brevipedunculata*** (Migo) T. Yamaz. in J. Jap. Bot. 30: 175. 1955 ≡ *Lindernia brevipedunculata* Migo in J. Shanghai Sci. Inst., Sect. 3, 4: 160. 1939.

*Distribution* — China.

**5.** ***Vandellia brucei*** (R. A. Howard) Eb. Fisch., Schäferh. & Kai Müll., **comb. nov.** ≡ *Lindernia brucei* R. A. Howard in J. Arnold Arbor. 56: 454. 1975.

*Distribution* — Saint Vincent and the Grenadines (Saint Vincent).

**6.** ***Vandellia cambodgiana*** (Bonati) Eb. Fisch., Schäferh. & Kai Müll., **comb. nov.** ≡ *Ilysanthes cambodgiana* Bonati in Bull. Soc. Bot. France 55: 542. 1908 ≡ *Lindernia cambodgiana* (Bonati) Philcox in Taxon 19: 649. 1970.

*Distribution* — Thailand, Cambodia, Laos, Vietnam.

**7.** ***Vandellia chrysoplectra*** (W. R. Barker) Eb. Fisch., Schäferh. & Kai Müll., **comb. nov.** ≡ *Lindernia chrysoplectra* W. R. Barker in J. Adelaide Bot. Gard. 13: 81. 1990.

*Distribution* — Australia.

**8.** ***Vandellia cleistandra*** (W. R. Barker) Eb. Fisch., Schäferh. & Kai Müll., **comb. nov.** ≡ *Lindernia cleistandra* W. R. Barker in J. Adelaide Bot. Gard. 13: 82. 1990.

*Distribution* — Australia.

**9.** ***Vandellia cowiei*** (W. R. Barker) Eb. Fisch., Schäferh. & Kai Müll., **comb. nov.** ≡ *Lindernia cowiei* W. R. Barker in J. Adelaide Bot. Gard. 18: 162. 1998.

*Distribution* — Australia.

**10.** ***Vandellia delicatula*** (P. C. Tsoong & T. C. Ku) Eb. Fisch., Schäferh. & Kai Müll., **comb. nov.** ≡ *Lindernia delicatula* P. C. Tsoong & T. C. Ku in P. C. Tsoong & H. P. Yang, Fl. Reipubl. Popularis Sin. 67(2): 398. 1979.

*Distribution* — China.

**11.** ***Vandellia diffusa*** L., Syst. Nat., ed. 12, 2: 422; Mant. Pl. 1: 89. 1767 ≡ *Lindernia diffusa* (L.) Wettst. in Engler & Prantl, Nat. Pflanzenfam. 4(3b): 79. 1891 ≡ *Pyxidaria diffusa* (L.) Kuntze, Revis. Gen. Pl. 2: 464. 1891.

*Distribution* — Senegal, Sierra Leone, Liberia, Côte d'Ivoire, Burkina Faso, Ghana, Togo, Nigeria, Cameroon, Equatorial Guinea (Annobón, Bioko), São Tomé and Príncipe, Gabon, Central African Republic, Congo-Brazzaville, Congo-Kinshasa, Burundi, Uganda, Tanzania, Madagascar; introduced in Mexico, Belize, Costa Rica, Guatemala, Honduras, Panama, Cuba, Dominica, Dominican Republic, Grenada, Guadeloupe, Jamaica, Martinique, Puerto Rico, Saint Vincent and the Grenadines, Trinidad and Tobago, Bolivia, Brazil, Colombia, Ecuador, Guyana, Peru, Suriname and Venezuela.

**12.** ***Vandellia eberhardtii*** (Bonati) Eb. Fisch., Schäferh. & Kai Müll., **comb. nov.** ≡ *Lindernia eberhardtii* Bonati in Bull. Soc. Bot. Genève, ser. 2, 15: 111. 1924.

*Distribution* — Vietnam.

**13.** ***Vandellia elata*** Benth., Scroph. Ind.: 36. 1835 ≡ *Lindernia elata* (Benth.) Wettst. in Engler & Prantl, Nat. Pflanzenfam. 4(3b): 79. 1891.

= *Vandellia urticifolia* Hance in J. Bot. 6: 301. 1868 ≡ *Lindernia urticifolia* (Hance) Bonati in Lecomte & al., Fl. Indo-Chine 4: 421. 1927.

= *Lindernia noei* Kerr ex Barnett in Kew Bull. 16: 488. 1963.

*Distribution* — Myanmar, S China, Thailand, Cambodia, Vietnam, Malaysia.

**14.** ***Vandellia eremophiloides*** (W. R. Barker) Eb. Fisch., Schäferh. & Kai Müll., **comb. nov.** ≡ *Lindernia eremophiloides* W. R. Barker in J. Adelaide Bot. Gard. 13: 84. 1990.

*Distribution* — Australia.

**15.** ***Vandellia harmandii*** (Bonati) Eb. Fisch., Schäferh. & Kai Müll., **comb. nov.** ≡ *Vandellia elata* var. *harmandii* Bonati in Bull. Soc. Bot. France 55: 539. 1908 ≡ *Lindernia elata* var. *harmandii* (Bonati) Bonati in Lecomte & al., Fl. Indo-Chine 4: 418. 1927 ≡ *Lindernia harmandii* (Bonati) T. Yamaz. in J. Fac. Sci. Univ. Tokyo, Sect. 3, Bot. 13: 21. 1981.

*Distribution* — Cambodia, Vietnam.

**16.** ***Vandellia hookeri*** C. B. Clarke ex Hook. f., Fl. Brit. India 4: 280. 1884 ≡ *Lindernia hookeri* (C. B. Clarke ex Hook.f.) Wettst. in Engler & Prantl, Nat. Pflanzenfam. 4(3b): 80. 1891.

*Distribution* — India, Nepal, Myanmar, China, Thailand, Vietnam.

**17.** ***Vandellia humilis*** (Bonati) Eb. Fisch., Schäferh. & Kai Müll., **comb. nov.** ≡ *Lindernia humilis* Bonati in Bull. Soc. Bot. Genève, ser. 2, 15: 100. 1924.

= *Lindernia subreniformis* Philcox in Bol. Soc. Brot., ser. 2, 60: 268. 1987.

*Distribution* — Kenya, Tanzania (including Zanzibar), Mozambique, Madagascar.

**18.** ***Vandellia hypandra*** (W. R. Barker) Eb. Fisch., Schäferh. & Kai Müll., **comb. nov.** ≡ *Lindernia hypandra* W. R. Barker in J. Adelaide Bot. Gard. 13: 85. 1990.

*Distribution* — Australia.

**18.** ***Vandellia junciformis*** (Bonati) Eb. Fisch., Schäferh. & Kai Müll., **comb. nov.** ≡ *Geoffraya junciformis* Bonati in Notul. Syst. (Paris) 1: 334. 1911 ≡ *Lindernia junciformis* (Bonati) T. Yamaz. in J. Jap. Bot. 53: 97. 1978.

= *Geoffraya cuspidata* Bonati in Notul. Syst. (Paris) 1: 334. 1911.

*Distribution* — Thailand, Vietnam.

**19.** ***Vandellia khaoyaiensis*** (T. Yamaz.) Eb. Fisch., Schäferh. & Kai Müll., **comb. nov.** ≡ *Lindernia khaoyaiensis* T. Yamaz. in J. Jap. Bot. 55: 331. 1980.

*Distribution* — Thailand.

**20.** ***Vandellia kiangsiensis*** (P. C. Tsoong) Eb. Fisch., Schäferh. & Kai Müll., **comb. nov.** ≡ *Lindernia kiang-*

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*siensis* P. C. Tsoong in P. C. Tsoong & H. P. Yang, Fl. Reipubl. Popularis Sin. 67(2): 396. 1979.

*Distribution* — China.

**21. *Vandellia laotica*** Bonati in Bull. Soc. Bot. Genève, ser. 2, 5: 140. 1913 ≡ *Lindernia laotica* (Bonati) Bonati in Lecomte & al., Fl. Indo-Chine 4: 423. 1927.

*Distribution* — Thailand, Laos.

**22. *Vandellia latifolia*** (Blume) Benth. in Candolle, Prodr. 10: 415. 1846 ≡ *Diceros latifolius* Blume, Bijdr. Fl. Ned. Ind. 14: 752. 1826 ≡ *Lindernia latifolia* (Blume) Koord., Exkurs.-Fl. Java 3: 179. 1912.

= *Vandellia foliosa* Bonati in Bull. Soc. Bot. France 56: 468. 1909 ≡ *Lindernia foliosa* (Bonati) Bonati in Lecomte & al., Fl. Indo-Chine 4: 418. 1927.

*Distribution* — Myanmar, Thailand, Laos, Vietnam, Indonesia (Java, Sumatra), Borneo.

**23. *Vandellia longituba*** T. Yamaz. in Bull. Natl. Sci. Mus., Tokyo, n.s., 6: 370. 1963 ≡ *Lindernia longituba* (T. Yamaz.) Philcox in Taxon 19: 649. 1970.

*Distribution* — Vietnam.

**24. *Vandellia macrobotrys*** (P. C. Tsoong) Eb. Fisch., Schäferh. & Kai Müll., **comb. nov.** ≡ *Lindernia macrobotrys* P. C. Tsoong in P. C. Tsoong & H. P. Yang, Fl. Reipubl. Popularis Sin. 67(2): 396. 1979.

*Distribution* — China.

**25. *Vandellia macrosiphonia*** (F. Muell.) Eb. Fisch., Schäferh. & Kai Müll., **comb. nov.** ≡ *Rhamphicarpa macrosiphonia* F. Muell. in Proc. Linn. Soc. New South Wales, ser. 2, 6: 473. 1892 ≡ *Lindernia macrosiphonia* (F. Muell.) W. R. Barker in J. Adelaide Bot. Gard. 13: 86. 1990.

*Distribution* — Australia.

**26. *Vandellia maxwellii*** (T. Yamaz.) Eb. Fisch., Schäferh. & Kai Müll., **comb. nov.** ≡ *Lindernia maxwellii* T. Yamaz. in J. Jap. Bot. 53: 2. 1978.

*Distribution* — Thailand.

**27. *Vandellia megaphylla*** (P. C. Tsoong) Eb. Fisch., Schäferh. & Kai Müll., **comb. nov.** ≡ *Lindernia megaphylla* P. C. Tsoong in Nordic J. Bot. 26: 41. 2008.

*Distribution* — China.

**28. *Vandellia micrantha*** (D. Don) Eb. Fisch., Schäferh. & Kai Müll., **comb. nov.** ≡ *Lindernia micrantha* D. Don, Prodr. Fl. Nepal.: 85. 1825.

= *Vandellia angustifolia* Benth., Scroph. Ind.: 37. 1835 ≡ *Lindernia angustifolia* (Benth.) Wettst. in Engler & Prantl, Nat. Pflanzenfam. 4(3b): 79. 1891.

*Distribution* — Sri Lanka, India, Nepal, Myanmar, China, Japan, Cambodia, Laos, Vietnam, Malaysia, New Guinea.

**29. *Vandellia montana*** (Blume) Benth. in Candolle, Prodr. 10: 415. 1846 ≡ *Diceros montanus* Blume, Bijdr. Fl. Ned. Ind. 14: 752. 1826 ≡ *Lindernia montana* (Blume) Koord., Exkurs.-Fl. Java 3: 178. 1912, nom. illeg. [non *Lindernia montana* Hiern, Cat. Afr. Pl. 1: 764. 1898].

= *Vandellia mollis* Benth., Scroph. Ind.: 37. 1835 ≡ *Lindernia mollis* (Benth.) Wettst. in Engler & Prantl, Nat. Pflanzenfam. 4(3b): 79. 1891.

= *Vandellia sericea* Bonati in Bull. Soc. Bot. France 55: 540. 1908.

= *Vandellia nutans* T. Yamaz. in J. Jap. Bot. 28: 36. 1953 ≡ *Lindernia nutans* (T. Yamaz.) Philcox in Taxon 19: 649. 1970.

*Distribution* — Pakistan, India, Myanmar, S China, Cambodia, Laos, Vietnam, Malaysia, Indonesia (Java, Sumatra).

**30. *Vandellia multiflora*** (Roxb.) G. Don, Gen. Hist. 4: 549. 1837–1838 ≡ *Torenia multiflora* Roxb., Fl. Ind., ed. 1832, 3: 96. 1832 ≡ *Pyxidaria trichotoma* Kuntze, Revis. Gen. Pl. 2: 464. 1891, nom. illeg. ≡ *Lindernia trichotoma* Schltr. in Bot. Jahrb. Syst. 59: 107. 1924, nom. illeg. ≡ *Lindernia multiflora* (Roxb.) Mukerjee in J. Ind. Bot. Soc. 24: 131. 1945.

= *Lindernia papuana* Pennell in J. Arnold Arbor. 24: 251. 1943.

– *Tittmannia trichotoma* Benth. in Wallich, Numer. List: no. 3943. 1831, nom. nud.

*Distribution* — India, Malaysia, Indonesia (Java, Moluccas), Philippines, New Guinea.

**31. *Vandellia purpurea*** (Kerr ex Barnett) Eb. Fisch., Schäferh. & Kai Müll., **comb. nov.** ≡ *Geoffraya purpurea* Kerr ex Barnett in Kew Bull. 16: 486. 1963 ≡ *Lindernia kerrii* T. Yamaz. in J. Jap. Bot. 53: 98. 1978 [non *Lindernia purpurea* (Lebrun & L. Touss.) R. Germ. in Bull. Jard. Bot. État Bruxelles 22: 75. 1952].

*Distribution* — Thailand, Laos.

**32. *Vandellia pusilla*** (Willd.) Merr. in Philipp. J. Sci., C 7: 246. 1912 ≡ *Gratiola pusilla* Willd., Sp. Pl. 1: 105. 1797 ≡ *Lindernia pusilla* (Willd.) Bold., Zakfl. Java: 165. 1916.

= *Diceros caespitosus* Blume, Bijdr. Fl. Ned. Ind. 14: 753. 1826 ≡ *Lindernia caespitosa* (Blume) Panigrahi in Taxon 33: 320. 1984.

= *Torenia hirta* Cham. & Schtdl. in Linnaea 2: 571. 1827.

= *Vandellia scabra* Benth., Scroph. Ind.: 36. 1835 ≡ *Lindernia scabra* (Benth.) Wettst. in Engler & Prantl, Nat. Pflanzenfam. 4(3b): 79. 1891.

= *Lindernia stellariifolia* Hayata, Icon. Pl. Formosan. 9: 77. 1920.

*Distribution* — Sri Lanka, India, Myanmar, S China, Taiwan, Thailand, Cambodia, Laos, Philippines, New Guinea.

**33. *Vandellia rivularis*** (Kerr ex Barnett) Eb. Fisch., Schäferh. & Kai Müll., **comb. nov.** ≡ *Lindernia rivularis* Kerr ex Barnett in Kew Bull. 16: 488. 1963.

*Distribution* — Thailand.

**34. *Vandellia saginiformis*** Bonati in Bull. Soc. Bot. Genève, ser. 2, 4: 240. 1912 ≡ *Lindernia saginiformis* (Bonati) Bonati in Lecomte & al., Fl. Indo-Chine 4: 412. 1927 ≡ *Trichotaenia saginiformis* (Bonati) T. Yamaz. in J. Jap. Bot. 28: 41. 1953.

= *Lindernia fasciculata* Bonati in Bull. Soc. Bot. Genève, ser. 2, 15: 112. 1924 ≡ *Trichotaenia fasciculata* (Bonati) T. Yamaz. in J. Jap. Bot. 28: 42. 1953.

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*Distribution* — Cambodia, Vietnam.

**35.** ***Vandellia satakei*** (T. Yamaz.) Eb. Fisch., Schäferh. & Kai Müll., **comb. nov.** ≡ *Lindernia satakei* T. Yamaz. in J. Jap. Bot. 55: 331. 1980.

*Distribution* — Thailand.

**36.** ***Vandellia scapigera*** (R. Br.) Benth. in Candolle, Prodr. 10: 415. 1846 ≡ *Lindernia scapigera* R. Br., Prodr.: 441. 1810.

*Distribution* — New Guinea, Australia.

**37.** ***Vandellia scutellariiformis*** (T. Yamaz.) T. Yamaz. in J. Jap. Bot. 30: 174. 1955 ≡ *Lindernia scutellariiformis* T. Yamaz. in J. Jap. Bot. 27: 67. 1952.

*Distribution* — Taiwan.

**38.** ***Vandellia senegalensis*** Benth. in Candolle, Prodr. 10: 416. 1846 ≡ *Lindernia senegalensis* (Benth.) Hiern, Cat. Afr. Pl. 1: 763. 1898 ≡ *Pyxidaria senegalensis* (Benth.) Kuntze, Revis. Gen. Pl. 2: 465. 1891.

*Distribution* — Senegal, Guinea-Bissau, Sierra Leone, Liberia, Côte d'Ivoire, Ghana, Nigeria, Cameroon, Gabon, Central African Republic, Congo-Kinshasa.

**39.** ***Vandellia setulosa*** (Maxim.) T. Yamaz. in J. Jap. Bot. 30: 174. 1955 ≡ *Torenia setulosa* Maxim. in Bull. Acad. Imp. Sci. Saint-Pétersbourg 31: 72. 1887 ≡ *Lindernia setulosa* (Maxim.) Tuyama ex H. Hara in J. Jap. Bot. 19: 207. 1943.

= *Vandellia cavaleriei* H. Lév. in Bull. Soc. Agric. Sarthe, ser. 2, 31: 324. 1904.

*Distribution* — China, Japan.

**40.** ***Vandellia stemodioides*** Miq., Fl. Ned. Ind., Eerste Bijv. 3: 563. 1861 ≡ *Lindernia stemodioides* (Miq.) Kerr in Craib, Fl. Siam. 3(2): 79. 1954.

*Distribution* — Indonesia (Bangka, Sulawesi).

**41.** ***Vandellia stictantha*** (Hiern) Eb. Fisch., Schäferh. & Kai Müll., **comb. nov.** ≡ *Ilysanthes stictantha* Hiern, Cat. Afr. Pl. 1: 765. 1898 ≡ *Lindernia stictantha* (Hiern) Skan in Oliver & al., Fl. Trop. Afr. 4(2): 339. 1906.

*Distribution* — São Tomé and Príncipe (São Tomé), Zambia, Malawi, Angola.

**42.** ***Vandellia stolonifera*** (T. Yamaz.) Eb. Fisch., Schäferh. & Kai Müll., **comb. nov.** ≡ *Lindernia stolonifera* T. Yamaz. in J. Jap. Bot. 53: 6. 1978.

*Distribution* — Vietnam.

**43.** ***Vandellia stricta*** (P. C. Tsoong & T. C. Ku) Eb. Fisch., Schäferh. & Kai Müll., **comb. nov.** ≡ *Lindernia stricta* P. C. Tsoong & T. C. Ku in P. C. Tsoong & H. P. Yang, Fl. Reipubl. Popularis Sin. 67(2): 397. 1979.

*Distribution* — China.

**44.** ***Vandellia subracemosa*** (De Wild.) Eb. Fisch., Schäferh. & Kai Müll., **comb. nov.** ≡ *Lindernia subracemosa* De Wild., Pl. Bequaert. 5: 425. 1932.

*Distribution* — Ethiopia, Congo-Kinshasa, Rwanda, Burundi, Uganda, Tanzania.

**45.** ***Vandellia subulata*** (R. Br.) Benth. in Candolle, Prodr. 10: 415. 1846 ≡ *Lindernia subulata* R. Br., Prodr.: 441. 1810.

*Distribution* — New Guinea, Australia.

**46.** ***Vandellia taishanensis*** (F. Z. Li) Eb. Fisch., Schäferh. & Kai Müll., **comb. nov.** ≡ *Lindernia taishanensis* F. Z. Li in Bull. Bot. Res., Harbin. 6(1): 169. 1986.

*Distribution* — China.

**47.** ***Vandellia tectanthera*** (W. R. Barker) Eb. Fisch., Schäferh. & Kai Müll., **comb. nov.** ≡ *Lindernia tectanthera* W. R. Barker in J. Adelaide Bot. Gard. 13: 86. 1990.

*Distribution* — Australia.

**48.** ***Vandellia thorelii*** Bonati in Bull. Soc. Bot. France 55: 539. 1908 ≡ *Lindernia thorelii* (Bonati) Bonati in Lecomte & al., Fl. Indo-Chine 4: 423. 1927.

*Distribution* — Thailand, Laos, Vietnam.

**49.** ***Vandellia tonkinensis*** Bonati in Bull. Soc. Bot. France 55: 540. 1908 ≡ *Lindernia tonkinensis* (Bonati) Bonati in Lecomte & al., Fl. Indo-Chine 4: 422. 1927.

*Distribution* — Vietnam.

**50.** ***Vandellia viscosa*** (Hornem.) Merr. in Philipp. J. Sci., C 7: 246. 1912 ≡ *Gratiola viscosa* Hornem., Enum. Pl. Hort. Hafn., rev. ed.: 19. 1807 ≡ *Hornemannia viscosa* (Hornem.) Willd., Enum. Pl. 2: 654. 1809 ≡ *Tittmannia viscosa* (Hornem.) Rchb., Iconogr. Bot. Exot. 1: 26. 1824 ≡ *Lindernia viscosa* (Hornem.) Bold., Zakfl. Java: 165. 1916 ≡ *Vandellia hirsuta* Buch.-Ham. ex Benth., Scroph. Ind.: 36. 1835, nom. illeg. ≡ *Lindernia hirsuta* Wettst. in Engler & Prantl, Nat. Pflanzenfam., 4(3b): 79. 1891, nom. illeg.

= *Lindernia elata* var. *floribunda* Bonati in Lecomte & al., Fl. Indo-Chine 4: 419. 1927.

= *Lindernia aprica* Kerr ex Barnett in Kew Bull. 16: 487. 1963.

*Distribution* — India, Nepal, Myanmar, S China, Thailand, Cambodia, Laos, Vietnam, Malaysia, Philippines; introduced in Brazil.

**51.** ***Vandellia vogelii*** (Skan) Eb. Fisch., Schäferh. & Kai Müll., **comb. nov.** ≡ *Lindernia vogelii* Skan in Oliver & al., Fl. Trop. Afr. 4(2): 339. 1906.

*Distribution* — Côte d'Ivoire, Nigeria, Equatorial Guinea (Bioko), Gabon.

**52.** ***Vandellia yaoshanensis*** (P. C. Tsoong) Eb. Fisch., Schäferh. & Kai Müll., **comb. nov.** ≡ *Lindernia yaoshanensis* P. C. Tsoong in P. C. Tsoong & H. P. Yang, Fl. Reipubl. Popularis Sin. 67(2): 396. 1979.

*Distribution* — China.

## Excluded or unassigned species

Several names described in, or transferred to, *Lindernia* have to be excluded from this genus or could not be assigned to one of the genera listed above:

*Bonnaya quinqueloba* Blatt. & Hallb. in J. Bombay Nat. Hist. Soc. 25: 417. 1918 ≡ *Lindernia quinqueloba* (Blatt. & Hallb.) Mukerjee in J. Ind. Bot. Soc. 24: 133. 1945. – According to Sivarajan & Mathew (1983), this taxon is probably an aberrant form of *L. bracteoides* (Blatt. & Hallb.) Mukerjee (= *Bonnaya ciliata*

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(Colsm.) Spreng. subsp. *ciliata*). However, more material is needed to evaluate the taxon.

*Conobea vandellioides* Benth. in Candolle, Prodr. 10: 391. 1846 ≡ *Lindernia vandellioides* (Benth.) Pennell ex G. M. Barroso in Rodriguésia 27: 44. 1952 ≡ *Stemodia vandellioides* (Benth.) V. C. Souza, Fl. Fanerog. Estado São Paulo 3: 316. 2003. – Originally described from Brazil, it was transferred to *Lindernia* by Barroso (1952), who compared it to *L. diffusa*. The generic description of *Conobea* in Bentham (1846) states "Semina numerosa ovoidea striata", indicating that the endosperm is probably not alveolate, and the species may therefore represent a member of *Lindernia* s.str.

*Ellobum montanum* Blume, Bijdr. Fl. Ned. Ind. 14: 747. 1826 ≡ *Vandellia ellobum* Benth. in Candolle, Prodr. 10: 417. 1846 [non *Vandellia montana* (Blume) Benth., l.c.: 415. 1846] ≡ *Lindernia ellobum* (Benth.) Koord., Exkurs.-Fl. Java 3: 179. 1912 [non *Lindernia montana* Hiern, Cat. Afr. Pl. 1: 764. 1898, nec *Lindernia montana* (Blume) Koord., l.c.: 178. 1912, nom. illeg.] ≡ ***Didissandra elongata*** subsp. ***montana*** (Blume) A. Weber & B. L. Burtt in Beitr. Biol. Pflanzen 70: 213. 1998 [*Gesneriaceae*].

*Lindernia dianthera* Sw., Prodr.: 92. 1788 ≡ ***Mecardonia dianthera*** (Sw.) Pennell in Proc. Acad. Nat. Sci. Philadelphia 98: 87. 1946 [*Plantaginaceae*].

*Lindernia grossidentata* O. Schwarz in Repert. Spec. Nov. Regni Veg. 24: 95. 1927.

*Lindernia montevidensis* Spreng., Syst. Veg. 2: 769. 1825.

*Lindernia neocaledonica* S. Moore in J. Linn. Soc., Bot. 45: 372. 1921. – The holotype specimen (New Caledonia, Tonine, 30 Sep 1914, *R. H. Compton 1932*, BM), although very scanty, very much resembles *L. dubia*, and it seems quite reasonable to tentatively place *L. neocaledonica* as a synonym of that species. It was probably introduced to New Caledonia as a neophytic weed.

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