

The cultivar ×*Graptopoveria* ‘Fantome’ Aubé ex Gideon F.Sm. & Bischofb. is the most commonly cultivated representative of the Crassulaceae in southern Africa

Gideon F. Smith^{1,2}, Margrit Bischofberger³ & Estrela Figueiredo^{1,2}

1. Department of Botany, P.O. Box 77000, Nelson Mandela University, Port Elizabeth, 6031 South Africa.

2. Centre for Functional Ecology, Departamento de Ciências da Vida, Universidade de Coimbra, 3001-455 Coimbra, Portugal. (email: smithgideon1@gmail.com; epnfigueiredo@gmail.com).

3. Guggenbuehlstrasse 20, 8355 Aadorf, Switzerland. (email: margrit.bischofberger@enersol.ch).

Summary: The most commonly cultivated member of the Crassulaceae in southern Africa is a hybrid between representatives of the genera *Graptopetalum* Rose and *Echeveria* DC., in the nothogenus ×*Graptopoveria* Gossot. However, to date there has been doubt as to the name that should be applied to this hybrid. Plants form distinct stems that are unable to retain the rosettes in an erect position, so becoming pendent, or creeping when grown on flat ground. The leaves of this ×*Graptopoveria* are borne in dense, apical rosettes, have an obovate-spathulate shape, and are sometimes obscurely keeled. They are light glaucous-grey and pink-infused in full sun, and the margin is a lighter, whitish blue colour. The flowers are light yellow, with the central section of the petals longitudinally light greenish infused. The combination of these characters clearly separates this hybrid from any Crassulaceae taxa indigenous to southern Africa. The parentage of the hybrid has been postulated as *E. elegans* Rose and *G. paraguayense* (N.E.Br.) E. Walther. This hybrid is exceedingly common in southern African horticulture; however, it has not become invasive after many decades of cultivation, and shows no signs of becoming problematical. The history and nomenclature applicable to the hybrid are clarified, and the cultivar name ×*Graptopoveria* ‘Fantome’ Aubé ex Gideon F.Sm. & Bischofb. is established for it.

Zusammenfassung: Das am häufigsten kultivierte Mitglied der Crassulaceae im südlichen Afrika ist eine Hybride aus Vertretern der Gattungen *Graptopetalum* Rose und *Echeveria* DC., aus der Hybridgattung ×*Graptopoveria* Gossot. Bislang bestanden jedoch Zweifel bezüglich des für diese Hybride zu verwendenden Namens. Die Pflanzen bilden ausgeprägte Stämme, die die Rosetten nicht aufrecht tragen können, so dass sie dann herabhängen oder kriechen, wenn sie auf ebenem

Grund wachsen. Die Blätter dieser ×*Graptopoveria* entspringen dichten, apikalen Rosetten, sind umgekehrt eiförmig-spatelig und manchmal dunkel gekielt. Sie sind hellblaugrau und rosa in voller Sonne, und der Rand ist heller weißlich blau gefärbt. Die Blüten sind hellgelb, wobei der mittlere Teil der Blütenblätter in Längsrichtung hellgrünlich durchzogen ist. Die Kombination dieser Merkmale unterscheidet diese Hybride deutlich von allen im südlichen Afrika einheimischen Taxa der Crassulaceae. Als Eltern der Hybride wurden *E. elegans* Rose und *G. paraguayense* (N. E. Br.) E. Walther postuliert. Diese Hybride ist in südafrikanischen Gärten weit verbreitet, jedoch auch nach vielen Jahrzehnten der Kultivierung nicht invasiv; es deutet sich auch nicht an, dass sie ein Problemfall werden könnte. Die Geschichte und die Nomenklatur der Hybride werden geklärt und die Sorte ×*Graptopoveria* ‘Fantome’ Aubé ex Gideon F.Sm. & Bischofb. benannt.

Introduction

With c. 1500 species in about three dozen genera, the Crassulaceae are one of the largest families of succulent plants globally. The family is near-cosmopolitan, with significant centres of diversity in, especially, South Africa and Mexico (Thiede & Egli, 2007). In the *Flora of Southern Africa* (FSA) region [Namibia, Botswana, Swaziland, Lesotho, South Africa] about 250 mostly indigenous Crassulaceae taxa are recognized (Tölken, 1985; Smith *et al.*, 1997). Most of these—more than 150 taxa—belong to *Crassula* L., but *Adromischus* Lem., *Cotyledon* L., *Kalanchoe* Adans., and *Tylecodon* Toelken, have also diversified extensively in the subcontinent.

Apart from the species of Crassulaceae native to southern Africa, a number of exotic representatives of the family, notably Madagascan repre-



Figure 1. The most commonly cultivated crassuloid plant in southern Africa is the intergeneric hybrid \times *Graptoveria* 'Fantome'. Photograph: Gideon F. Smith.

representatives of the genus *Kalanchoe*, have become established in the subcontinent (Crouch & Smith, 2007; Walters *et al.*, 2011; Smith & Figueiredo, 2017). Numerous other indigenous and non-invasive exotic species are very popular in waterwise amenity and domestic horticulture (Goodwin, 2000; Smith & Van Wyk, 2008; Botha & Botha, 2009; Celliers, 2012; Smit, 2015). In other parts of the world, including those with non-arid climates, species of Crassulaceae are also increasingly planted as garden subjects (Duncan, 2001).

Representatives of several genera of the Crassulaceae are known to be interfertile, *Echeveria* DC. and *Graptopetalum* Rose being two New World, predominantly, but not exclusively, Mexican examples of such genera (Walther, 1972: 51; Rowley, 1978: 120, figure 10.2; Van Keppel, 1980, 1981; Schulz & Kapitany, 2005: 12, 38). Hybrids created between species of the variable and heterogeneous *Echeveria* and *Graptopetalum* are necessarily very diverse, but often closely resemble true *Echeveria* species in basic vegetative morphology; however, once such plants flower there is usually no doubt about their status as hybrids and the genus parentage. The nothogenus name \times *Graptoveria* Gossot [not G.D.Rowley; see Smith *et al.*, 2018] is in use for hybrids between these genera; a partial list of known \times *Graptoveria* enti-

ties / taxa is provided at <http://www.crassulaceae.ch/de/artikel?akID=63&aaID=2>.

In southern Africa, by far the most commonly cultivated crassuloid plant (Figure 1) is such a hybrid between representatives of the genera *Echeveria* and *Graptopetalum*. The Afrikaans common names 'Kliprosie' [English: rock rose], 'Meksikaanse sneeubal' [English: Mexican snowball], 'Skaamosie' [English: shy rose], 'Vaalrosie' [English: grey rose], 'Vetrosie' [English: fat rose], and 'Woestynroos' [English: Desert rose] are applied to the hybrid, while it is also simply and rather confusingly known as '*Echeveria hybrida*' or '*E. \times hybrida*' (Pienaar & Smith, 2011). The name \times *Graptoveria* 'Africana' is also sometimes informally applied to this hybrid. It has not become invasive after many decades of cultivation, and shows no signs of becoming problematical in southern Africa.

Echeveria (c. 180 species; about 40 taxa have been described since the publication of Kimmnach, 2003: 103, where 139 species and 28 infraspecific taxa were catalogued) includes small, medium-sized, or very large species with their leaves arranged in terminal rosettes, with some species being subshrubs. The flowers are usually colourful (orange, red), and urn-, cup-, bell-, or bowl-shaped (Walther, 1972: 43; Pilbeam, 2008: 11) (Figures 2



Figure 2. Close-up of the urceolate, uniformly pink flowers of *Echeveria lilacina* Kimnach & Moran. Photograph: Gideon F. Smith.



Figure 3. Close up of the basally rather globose, yellow and pink flowers of *Echeveria purpusorum* A.Berger. Photograph: Gideon F. Smith.



Figure 4. *Graptopetalum paraguayense* is a small to medium-sized, stem-forming species, with the stems soon becoming pendent. Note that the leaf margins are a lighter shade of bluish grey. Photograph: Gideon F. Smith.



Figure 5. *Graptopetalum paraguayense* is popular in cultivation, even in areas with a continental-type climate, such as central Europe. In such conditions material is kept under glass. Photograph: Margrit Bischofberger.

and 3). *Graptopetalum* (c. 16 species; see Thiede, 2003: 128) includes small to medium-sized, stem-forming species (Figures 4 and 5) as well as small almost stemless ones that also have their leaves arranged in rosettes (Acevedo-Rosas *et al.*, 2004). The flowers are flexed open at anthesis making them appear star-shaped, and the petals are often adorned with reddish to brownish blotches on a white or pastel (yellowish to greenish) background (Figure 6).

To date there has been doubt as to the name that should be applied to the \times *Graptoveria* hybrid with its bluish leaves arranged in tidy rosettes at the ends of short, initially erect, but later creeping to pendent stems that is cultivated in southern Africa. We here discuss aspects of the history of the hybrid and clarify its nomenclature; the name \times *Graptoveria* 'Fantome' Aubé ex Gideon F.Sm. & Bischoff. is established for it.

Background

Some of the earliest references we could trace to material today referable to the hybrid genus \times *Graptoveria* were published in the 1930s, some 80 years ago, by Pierre Gossot of Corbeil in north-central France, just south of Paris. He described a number of interspecific and -generic crassuloid hybrids from his collection in a little known journal called *Notre Vallée*, a name that translates as ‘Our Valley’. Note that ‘*Notre Vallée*’ was a popular journal title at the time, and several journals had this name.

Shortly before World War II broke out, Gossot (1938) invalidly published the name “*Echeveria caerulescens*” from material he had in cultivation at Corbeil. In the text under this name he noted that “...(parents inconnus. Mais comprenant probablement l’*Echeveria Weinbergii* Rose...)”. Although he did not explicitly use the multiplication sign, ‘ \times ’, or an equivalent, in the name to indicate the hybrid origin of the material, he clearly regarded this entity as an intraspecific *Echeveria* hybrid given that he referred to its possible parentage. However, he published this name without a Latin description or diagnosis, at the time a requirement of the *International rules of botanical nomenclature* (Briquet, 1935: 11, Article 38) for nothotaxa, which is now covered by McNeill *et al.*, 2012: 85, Article 39.1., and 150, Article H.10.1., in today’s equivalent rules (see also Brickell *et al.*, 2016 for the nomenclature of cultivated plants in general). Interestingly, the second time this name was published (in Marnier-Lapostolle, 1949: 24) the designation ‘*Echeveria caerulescens*’ was not furnished with an authority and therefore not ascribed to Gossot. Gossot assisted with compiling the Crassulaceae included in Marnier-Lapostolle (1949) and the names of other entities that he had earlier described in the family were mostly followed by “Gos.”, so indicating him as the author (see Smith *et al.*, 2018).

From the descriptions of the hybrids that Gossot published in *Notre Vallée* in the 1930s it is clear that he had a good knowledge of the crassuloid genera recognised at the time he conducted his hybridising work in France; at least representatives of *Echeveria*, *Urbinia* Rose (Britton & Rose, 1903: 11) [nowadays included in the synonymy of *Echeveria*], and *Pachyphytum* Link, Klotzsch & Otto (Klotzsch, 1841: 9) were in cultivation in his collection. In contrast, members of the genus *Graptopetalum* Rose (1911: 96) are not mentioned in Gossot’s publications, and we were unable to trace any reference to this genus in his work. We believe that the reason for this apparent omission is that the species today known as *G. paraguayense* (N.E.Br.) E. Walther at that time was widely referred to as ‘*Echeveria weinbergii*’,

with “[J.N.] Rose” sometimes given as the author of the name (see for example Gossot, 1938: 36). However, as far as we could establish this ‘name’ in fact was not published by Rose. The annotation ‘*Echeveria weinbergii*’ was used in horticulture in the first few decades of the 20th Century, and is generally considered to have been validly published in 1912 by “T.B. Shepherd” in a catalogue issued by the Theodosia B. Shepherd Company. For instance, The International Plant Name Index (IPNI) cites the name as “*Echeveria weinbergii* hort. ex T.B. Shepherd, Descript. Cat. 37 (1912)”. However, Theodosia Burr Shepherd (born 1845), a nurserywoman from Ventura-by-the-Sea, California, USA, died on 06 September 1906, six years before this name appeared in print (see e.g. in Biographies at Smithsonian Libraries. <http://www.sil.si.edu/SILPublications/seeds/shepherdtheodosia-b.html>; <https://www.vencolibrary.org/news/theodosia-burr-shepherd>). Shepherd could therefore not have been the author who validated the name. The literature reference in IPNI corresponds to “*Mrs. Theodosia B. Shepherd’s descriptive catalogue*” that was issued for many years, both during her life and after she died. Furthermore, Bullock (1937: 276), when publishing the combination *Sedum paraguayense* (N.E.Br.) Bullock, stated that the name *Echeveria weinbergii* had not been validly published in that descriptive catalogue (of 1912) since the description provided there simply stated “*weinbergii* (New). Very handsome of bluish gray color, 25 cents and 50 cents.”. Bullock therefore considered *Echeveria weinbergii* to have been a nomen nudum. It has also been argued (Kimmach & Moran, 1986) that in the Shepherd catalogue the name was “‘mentioned incidentally’ in the sense of the ICBN” [of 1983]. Although this diagnostic / descriptive statement might seem too cryptic and inadequate to satisfy the requirements for valid description, the Nomenclature Committee for Vascular Plants, when applying the present *International Code of nomenclature for algae, fungi, and plants* (ICN) (McNeill *et al.*, 2012), has recently tended to regard very brief, comparative statements as adequate for the valid publication of a name (see for example Smith, 2015, 2017 on the name *A. gustaviana* J.N. Haage & E. Schmidt). Therefore, even though the diagnosis associated with the name *Echeveria weinbergii* in Theodosia B. Shepherd Company (1912: 37) might appear to be insufficient to render the name validly published, we here follow the IPNI citation, noting though that Theodosia B. Shepherd (as T.B. Shepherd), who was deceased by 1912, could not have been the author who validated the name.

A cross such as “*Echeveria caerulescens*” between ‘*Echeveria weinbergii* Rose’ and a true



Figure 6. Close up of the open, star-shaped flowers of *Graptopetalum paraguayense*. The petals are white with scattered red or brownish spots. Note the outwardly curved stamens.
 Photograph: Gideon F. Smith.



Figure 7. Material of *xGraptopetaria* 'Fantome' in cultivation in southern Africa sometimes form long, thin branches higher up in the leaf axils
 Photograph: Gideon F. Smith.



Figure 8. *Echeveria elegans* in cultivation in Europe. Plants are stemless, and the rosettes are arranged in tidy, sturdy clusters.
 Photograph: Margrit Bischofberger.

Echeveria species, for Gossot, was simply an interspecific *Echeveria* hybrid and not a *xGraptopetaria*. Significantly though, from Gossot's description of 'E. weinbergii Rose' (stellate, white flowers with some red dots) it is clear that he was indeed dealing with *G. paraguayense*, and not with an *Echeveria* species. Rose (1922) published a new genus, *Byrnesia* Rose, based on *Echeveria weinbergii* Hort. ex T.B.Shepherd. *Byrnesia* was described as being close to the genus *Graptopetalum* (that Rose had described 11 years earlier), but resembling *Echeveria* in habit and leaves



Figure 9. *xGraptopetaria* 'Fantome' quite rapidly form short stems that are too weak to remain erect.
 Photograph: Gideon F. Smith.

(Rose, 1922: 38). *Byrnesia* is now considered a synonym of *Graptopetalum* (but see Heath, 1994: 132).

Graptopetalum paraguayense has a chequered nomenclatural history, and was also at one time treated as a species of *Sedum* L., as *Sedum weinbergii* (see Berger, 1930: 446).

It is not known what eventually happened to Pierre Gossot, and the ultimate fate of his plants kept at Corbeil remains unknown. However, it can be safely assumed that in the occupied northern part of France his plants did not survive World War II. Given that several of the names that he used for hybrids he created in the Crassulaceae appear in Marnier-Lapostolle (1949), he obviously furnished at least Les Cèdres in Mediterranean France (see Smith & Figueiredo, 2013) with some

of the plants he cultivated and propagated. It is not known to whom else, and to how many people, he sent material.

Gossot's name is mentioned in Marnier-Lapostolle (1949), but whether Gossot ever worked as Curator at Julien Marnier-Lapostolle's garden, Jardin Exotique 'Les Cèdres', in St.-Jean-Cap-Ferrat, as suggested by Van Keppel (1980: 28), could not be substantiated. Mr Marc Teissier (personal communication) informed us that Gossot indeed probably worked at Les Cèdres after World War II, from around 1946 / 1949 until 1955 or 1956, and that he perhaps held a position as Head Gardener. However, information about the staffing structure at Les Cèdres at that time is scant. Gossot's major contribution to horticulture remains his work on creating interspecific and -generic hybrids in the Crassulaceae.

History and possible parentage of *×Graptoveria* 'Fantome'

The *×Graptoveria* material grown in southern Africa corresponds more or less with 'Echeveria caerulescens' (Gossot, 1938: 36). However, our hybrid differs in some respects from this entity. Most importantly, the flowers of the representative of *×Graptoveria* grown in southern Africa often do not open, with the petals apparently remaining 'fused' along the margins from bud through to wilted flower stage. Flowers that generally do not open is such a distinctive character that Gossot, who originally published the designation 'Echeveria caerulescens', would not have overlooked it if it had been true for his [Gossot's] hybrid, but significantly, he did not mention this feature.

On the other hand the southern African hybrid corresponds fairly well to a plant J.C. (Joop) van Keppel (1964) described and which he called *×Graptoveria* 'Caerulescens' because he erroneously assumed that it was identical with Pierre Gossot's hybrid. Discrepancies that exist between Gossot's 'Echeveria caerulescens' and Van Keppel's *×Graptoveria* 'Caerulescens' include:

Gossot: Rosette généralement unique [English: Rosette generally single].

Van Keppel: Offsetting in the leaf axils with a long stalk.

Gossot: Feuilles aiguës mais non aristées [English: Leaves acute but not aristate].

Van Keppel: Leaves with apical mucro.

Gossot: Hampes florales simples [English: Inflorescences simple].

Van Keppel: Inflorescence a single or forked cincinnus.

In the introductory text to the entity that Van Keppel (1980: 29) regarded as *×Graptoveria* 'Caerulescens' he noted that plants "...form[ing] a stem with offshoots higher up...", and confirmed this in the description as "...offsetting in the leaf axils with a long stalk". In some instances this is true for material found in cultivation in southern Africa (Figure 7), but in our view it is not a character of any diagnostic value.

It is therefore clear that the way in which the designation 'Echeveria caerulescens' was applied by Van Keppel (1964, 1980) is incorrect. The plant described by Van Keppel is evidently not identical to Gossot's 'E. caerulescens', which may no longer exist in cultivation. Notwithstanding the fact that Gossot's name has not been validly published, the cultivar name *×Graptoveria* 'Caerulescens' cannot be applied to the material described by Van Keppel, nor to the southern African material that to date lacks a name. We here establish the cultivar name *×Graptoveria* 'Fantome' for it. This name was proposed by Ms Emmanuelle Aubé, with 'Fantome' spelled 'Fantôme' [English: Ghost]. We adopt this name, but with the "ô" replaced by "o", for ease of transcription. This is an appropriate cultivar name to establish given the ghost-like, bluish grey colour of the leaves of the cultivar. Incidentally, one of its possible parents, *Graptopetalum paraguayense*, is also commonly and widely known as 'Ghost Plant' (Kimmach & Moran, 1986).

While the hybrid from southern Africa is undoubtedly the result of a crossing event between representatives of *Echeveria* and *Graptopetalum*, it is not certain which species of these genera are involved. While Gossot believed that the *Graptopetalum* parent was probably *Graptopetalum paraguayense* (as 'Echeveria weinbergii') and that the *Echeveria* parent was completely unknown, Van Keppel had no doubt regarding the *Graptopetalum* being *G. paraguayense* (Figures 4–6) and postulated that the *Echeveria* parent had been *E. elegans* Rose (Figure 8) (Van Keppel, 1964: 180). The existence of a hybrid between these two species was also reported by Knobloch (1972: 100). Selected characters of these two species and *×Graptoveria* 'Fantome' are compared in Table 1.

It seems quite plausible that *G. paraguayense* is one parent, given the shared stem-forming habit of the hybrid (Figures 7 and 9), star-shaped flowers (Figure 10), bluish white leaf colour (Figure 11), and lighter leaf margins (Figure 11). However, if *E. elegans* is indeed the other parent, the pink colour evident in the lower ¼ of the petals of this species has been largely lost in the hybrid. It is common for flower colour in *×Graptoveria* hybrids to not exactly reflect the colour of

Table 1. Comparison of selected characters of *Echeveria elegans* and *Graptopetalum paraguayense*, and the usually intermediate status of these characters in *×Graptoveria* ‘Fantome’.

| # | Character | <i>Echeveria elegans</i> | <i>×Graptoveria</i> ‘Fantome’ | <i>Graptopetalum paraguayense</i> |
|---|-----------|-------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------|
| 1 | Habit | Rosettes stemless | Rosettes at ends of decumbent or pendent stems | Rosettes at ends of decumbent or pendent stems |
| 2 | Corolla | Urceolate | Intermediate* | Rotate |
| 3 | Petals | Always bicoloured (pinkish red, with greenish or yellowish at the tips) | Light yellow, central section longitudinally light greenish infused, sometimes pinkish outside** unspotted | White with a few mostly scattered red dots |
| 4 | Stamens | Included in flower | Positioned between and against petals the ante-sepalous stamens curved outwards at anthesis | Positioned between and against petals curved outwards at anthesis |

*Note that flowers of *×Graptoveria* ‘Fantome’ often open imperfectly (Figure 12). In instances where they do open (Figure 13), the flowers are morphologically intermediate between those of *Echeveria* and *Graptopetalum*.

**The pinkish colour on the outside of the petals is not consistently observed in material in southern Africa.

the *Echeveria* parent, which complicates postulating that parent. The flowers of *Graptopetalum* species are mostly white (sometimes yellowish or greenish), with no to numerous scattered or aligned red or reddish brown dots. The influence of the *Echeveria* parent is at most only manifest in tingeing the white to yellow, or other mostly pastel shades.

Plants very similar in vegetative and reproductive morphology to *×Graptoveria* ‘Fantome’ are also in cultivation in other parts of the world. However, it is worth noting that the origin of the hybrid grown in southern African is not necessarily the same as that of clones with a similar appearance—likely even of the same parentage—present in, for example, the northern hemisphere. Either deliberate or coincidental hybridisation events of *Echeveria elegans* and *Graptopetalum paraguayense* may well have occurred in several places worldwide, and at different times and with different parental clones of the same species involved. Such crossing events necessarily would have resulted in hybrid progeny with somewhat different appearances.

Nomenclature of *×Graptoveria* ‘Fantome’

×Graptoveria ‘Fantome’ Aubé ex Gideon F.Sm. & Bischoff. **cult. nov.**

Parentage:

Graptopetalum species [likely *G. paraguayense* (N.E.Br.) E.Walther]

Echeveria species [possibly *E. elegans* Rose]

Note:

For a discussion of the nomenclature of the nothogenus name *×Graptoveria* Gossot, as well as

the names *×Graptophytum* Gossot and *×Pachyveria* Haage & Schmidt, see Smith *et al.* (2018).

Description of *×Graptoveria* ‘Fantome’

The following description is based on material grown in Pretoria, South Africa.

Perennial, solitary or sparsely branched, stem-forming succulent herb. *Stem* 10–50cm long, 8–15mm in diameter, light greyish brown, lacking leaves lower down, scars of abscised leaves distinctly darker brown, erect at first, later creeping to pendent, too weak to support rosette in erect position unless staked, developing short, brown aerial roots. *Branches* 10–15cm long, usually developing higher up on stem, ultimately pendent, light grey. *Leaves* 35–40 × (20)25–30mm, densely rosulate, obovate-spathulate, adaxially concave, abaxially convex and sometimes obscurely keeled, spirally arranged, restricted to terminal 1/3–1/4 of stems and branches, shed lower down, exposing the stem, thickly succulent, light glaucous-grey, pink-infused in full sun, old leaves drying pinkish, papery; *margin* lighter whitish blue; *tips* acutely pointed, mucronate. *Inflorescence* a lateral, occasionally branched cincinnus, sometimes several carried simultaneously or successively, with terminal part recurved when young, ultimately straightening to a horizontal or somewhat erect disposition; *peduncle* bracteate, pinkish green; *bracts* small to very small, light pinkish green, drying and abscising early on. *Flowers* 9–12mm long, nectariferous, somewhat campanulate, upper parts flared open at anthesis, sometimes opening imperfectly or not at all, prominently pedicellate; *pedicels* 6–7mm long,



Figure 10. Close up of the open, star-shaped flowers of *×Graptopetala* 'Fantome'. The petals are light yellow, with the central section longitudinally light greenish infused, and the margins light pink infused. Photograph: Gideon F. Smith.



Figure 12. The flowers of *×Graptopetala* 'Fantome' often open imperfectly. Photograph: Gideon F. Smith.

light pink; *buds* ± tear drop-shaped; *sepals* five, 4.5–6.0mm long, basally fused for ± 1mm, elongated-deltoid, slightly flared open in bud stage, uniformly light glaucous green to pink infused, lighter towards margins; *petals* five, 8–10 × 3.5–4.5mm long, slightly united at the base, free for the rest of their lengths, light yellow, central section longitudinally light greenish infused, light pink infused along margins, at anthesis erect to distinctly curved outwards towards the apices, apiculate; *stamens* 10, inserted at ± lower 1/3 of petal or at that level between petals, 5 of the 10 strongly curved outwards and distinctly exerted between free petals, other 5 closely adpressed to petals; *filaments* 4–6mm long, flattened, whitish, glabrous; *anthers* somewhat ovoid, black; *pistil* consisting of 5 carpels; *carpels* 4–5mm long, basally light yellowish; *styles* 2mm long, stout,



Figure 11. Especially when grown in dappled or deep shade, the leaves of *×Graptopetala* 'Fantome' are a distinctive light bluish colour. Note the lighter coloured leaf margins. Photograph: Gideon F. Smith.



Figure 13. Although the flowers of *×Graptopetala* 'Fantome' often do not open fully, those that do open are star-shaped, as in the flowers of *Graptopetalum paraguayense*. Photograph: Gideon F. Smith.

pink, more intensely so than base of carpels; *stigma* minute; *scales* ± 1 × 1mm long, square to slightly transversely oblong, indented above, tooth-like, light yellowish green. *Follicles* unevenly produced, light green, enveloped in dry, light pinkish brown remains of corolla, brittle and grass spikelet-like when dry, 6–7mm long. *Seeds* 0.2–0.5mm long, light brown, viability in doubt. *Chromosome number*: unknown.

Flowering time

Plants flower in spring and early summer (southern hemisphere).



Figure 14. In full sun the bluish white leaves of ×*Graptopetalia* ‘Fantome’ take on a pinkish to orange hue. Photograph: Gideon F. Smith.



Figure 16. Detached leaves of *Graptopetalum paraguayense* easily strike root (purplish pink, thread-like structures) and develop small rosettes. ×*Graptopetalia* ‘Fantome’ shares this character. Photograph: Gideon F. Smith.

Voucher specimen

SOUTH AFRICA. GAUTENG PROVINCE.— 2528 (Pretoria): suburb Weavind Park in Pretoria, (–CB), 25°44′01.04″S 28°16′09.74″E, 30 September 2017, *G.F. Smith & E. Figueiredo* 46 (PRU).

Cultivation and propagation of ×*Graptopetalia* ‘Fantome’

Plants of ×*Graptopetalia* ‘Fantome’ are exceedingly easy to cultivate. Plants do well in full or partial shade (Figure 11), as well as in full sun (Figure 14). They will grow in thin layers of virtually any soil type, and flourish in open beds, free-standing containers (Figure 15), or hanging baskets. They do well in both winter- and summer-rainfall regions; they can tolerate very low



Figure 15. A group of ×*Graptopetalia* ‘Fantome’ plants cultivated in a blue-painted, flat, saucer-like, fibre cement container that does not receive irrigation. The Madagascan *Euphorbia milii* Des Moul., commonly known as Crown of Thorns, grows around the container.

Photograph: Gideon F. Smith.

temperatures of well below 0°C, and very high temperatures of over 40°C. In time plants form stems that are devoid of leaves lower down, and will eventually creep along the ground. This can make specimens appear unsightly, but by simply cutting off the rosettes and re-establishing them in the spot where they are intended to grow, a fresh crop of healthy rosettes can be easily obtained.

Propagation of ×*Graptopetalia* ‘Fantome’ is by removing rosettes and re-establishing them directly in the place where they are intended to grow. A further easy method to multiply plants is to place detached leaves on top of the soil; the leaves will soon develop roots basally, and small, but rapidly developing rosettes that can be grown on. Firm, detached leaves of *Graptopetalum paraguayense* will similarly strike root very easily where they are placed on a growing medium (Figure 16). The leaves of *Graptopetalum paraguayense* are very weakly attached to the stem and often break off from slight disturbance. The leaves of ×*Graptopetalia* ‘Fantome’ are fortunately more firmly attached to the stems.

Harvested leaves of ×*Graptopetalia* ‘Fantome’ that are to be used for propagation purposes should ideally not be placed *in* the soil as the leaves are then prone to rotting; placing them flat on the soil is a safer and easier way of ensuring the development of healthy plantlets.

Seed production has been observed in some clones of ×*Graptopetalia* ‘Fantome’. However, most seeds appear to be unviable.

A number of named ×*Graptopetalia* cultivars have become very popular in domestic horticul-

ture in several mild-climate parts of the world (Hewitt, 1993: 125; Anderson, 1998: 171; Stockwell, 2017: 229–230). The long-known \times *Graptoveria* ‘Fantome’, which is here finally formally established as a cultivar, is an excellent addition to the growing list of \times *Graptoveria* cultivars that can serve as a groundcover, specimen plant, or subject for hanging baskets in waterwise and other gardens.

Acknowledgements

Mr Marc Teissier of the Jardin Exotique ‘Les Cèdres’, in St.-Jean-Cap-Ferrat, France, is thanked for kindly checking the employment records of the Jardin for information on Mr Pierre Gossot. Messrs Michael Greulich (Germany), Anton Hofer (Switzerland), Roy Mottram (United Kingdom), and Chuck Staples (USA) are thanked for kindly checking for, and providing, hard-to-find literature from their personal botanical libraries and archives.

Anonymous referees are thanked for comments on the manuscript.

Literature cited

- ACEVEDO-ROSAS, R., CAMERON, K., SOSA, V. & PELL, S. (2004). A molecular phylogenetic study of *Graptopetalum* (Crassulaceae) based on ETS, ITS, *RPL16*, and *TRNL-F* nucleotide sequences. *American Journal of Botany* **91**: 1099–1104.
- ANDERSON, M. (1998). *The ultimate book of cacti and succulents*. Lorenz Books, an imprint of Anness Publishing Limited, London.
- BERGER, A. (1930). Crassulaceae. In: A. ENGLER & K. PRANTL (EDS), *Die Natürlichen Pflanzenfamilien*. ed. 2, **18a**: 402–412.
- BOTHA, C. & BOTHA, J. (2009). *Cotyledon*. Much prettier than pigs’ ears. *Village Life* **34** [Autumn 2009]: 12–16.
- BRICKELL C.D., ALEXANDER, C., CUBEY, J.J., DAVID, J.C., HOFFMAN, M.H.A., LESLIE, A.C., MALÉCOT, V. & XIAOBAL, JIN. ([June] 2016). *International code of nomenclature for cultivated plants (ICNCP or Cultivated Plant Code), incorporating the Rules and Recommendations for naming plants in cultivation adopted by the International Union of Biological Sciences and the International Commission for the Nomenclature of Cultivated Plants*. 9th Edition. International Society for Horticultural Science (ISHS), Leuven, Belgium. *Scripta Horticulturae* Number 18.
- BRIQUET, J. (1935). *International rules of botanical nomenclature adopted by the International Botanical Congresses of Vienna, 1905, and Brussels, 1910, revised by the International Botanical Congress of Cambridge, 1930*. 3rd edition. Gustav Fischer, Jena.
- BRITTON, N.L. & ROSE, J.N. (1903). New or noteworthy North American Crassulaceae. [Issued separately, September 12, 1903]. *Bulletin of the New York Botanical Garden* **3**: 1–45. [see: <https://www.biodiversitylibrary.org/item/97293#page/27/mode/1up>].
- BULLOCK, A.A. (1937). *Sedum paraguayense* (N.E.Br.) Bullock comb. nov. *Bulletin of Miscellaneous Information, Royal Botanic Gardens, Kew* **4**: 276.
- CELLIERS, A. (2012). Tuinlewe. Echeverias is bobaas. *Die Burger. Naweek. Saterdag 06 Oktober 2012*: 10.
- CROUCH, N.R. & SMITH, G.F. (2007). Crassulaceae. *Bryophyllum proliferum* naturalised in Kwa-Zulu-Natal, South Africa. *Bothalia* **37**: 206–208.
- DUNCAN, V. (2001). Plant of the month. Spotlight on sedums. *Your Garden* **October 2001**: 10–13.
- GOODWIN, D. (2000). Gardening essentials. Rewarding indoor beauties. *SA Gardening* **June 2000**: 78–81.
- GOSSOT, P. (1938). Nouveaux hybrides. *Notre Vallée. Bulletin du Cercle des naturalistes Corbellois*. No. **24–25 (July–December)**: 33–38.
- HEATH, P.V. (1994). The history of *Byrnesia weinbergii* (Shepherd) Rose. *Calyx* **4(4)**: 131–133.
- HEWITT, T. (1993). *The complete book of cacti & succulents*. Dorling Kindersley Limited, London.
- KIMNACH, M. (2003). *Echeveria*. In: U. EGGLI, (ED.), *Illustrated handbook of succulent plants: Crassulaceae*: 103–128. Springer Verlag, Berlin.
- KIMNACH, M. & MORAN, R. (1986). *Graptopetalum paraguayense*: a history and a new subspecies. *Cactus & Succulent Journal of America* **58**: 48–56.
- KLOTZSCH, J.F. (1841). Beschreibung einer neuen mexicanischen Pflanze. *Pachyphytum bracteosum*. In: C.F. OTTO & A.G. DIETRICH, *Allgemeine Gartenzeitung (Otto & Dietrich)* **9(2)**: 9–11. [see: <http://www.biodiversitylibrary.org/item/51984#page/10/mode/1up>].
- KNOBLOCH, I.W. (1972). Intergeneric hybridization in flowering plants. *Taxon* **21**: 97–103.
- MARNIER-LAPOSTOLLE, J. ([November] 1949). *Liste des Plantes Grasses sauf Cactées du Jardin Botanique des Cèdres*. St.-Jean-Cap-Ferrat (Alpes-Maritimes). Liste établie par J. MARNIER-LAPOSTOLLE, France.
- MCNEILL, J., BARRIE, F.R., BUCK, W.R., DEMOULIN, V., GREUTER, W., HAWKSWORTH, D.L., HERENDEEN, P.S., KNAPP, S., MARHOLD, K., PRADO, J., PRUD’HOMME VAN REINE, W.F., SMITH, G.F., WIERSEMA, J.H. & TURLAND, N.J. (EDS). (2012). *International Code of Nomenclature for algae,*

- fungi, and plants (Melbourne Code) adopted by the Eighteenth International Botanical Congress Melbourne, Australia, July 2011.* Koltz Scientific Books, Königstein. [Regnum Vegetabile 154].
- PIENAAR, K. & SMITH, G.F. (2011). *The southern African what flower is that?* Random House Struik, Cape Town.
- PILBEAM, J. (2008). *The genus Echeveria.* The British Cactus & Succulent Society, Hornchurch, Essex, United Kingdom.
- ROSE, J.N. (1911). Studies of Mexican and Central American plants—No. 7. Crassulaceae. *Graptopetalum*, a new genus. *Contributions from the United States National Herbarium. Smithsonian Institution* 13: 296. Plate 52, Figure 55. [see: <http://www.biodiversitylibrary.org/page/368315#page/414/mode/1up>].
- ROSE, J.N. (1922). *Byrnesia weinbergii*. Weinberg's Stonecrop. Native country unknown. Family Crassulaceae. Orpine Family. *Addisonia* 7: 37–38, Plate 243. [see: <https://www.biodiversitylibrary.org/item/24650#page/85/mode/1up>].
- ROWLEY, G.D. (1978). *The illustrated encyclopedia of succulents. A guide to the natural history and cultivation of cacti and cactus-like plants.* A Salamander Book, published by Leisure Books, place of publication not stated.
- SCHULZ, L. & KAPITANY, A. (2005). *Echeveria cultivars.* Schulz Publishing, Teesdale, Victoria, Australia.
- SMIT, C. (2015). Plakkie planne. *Rooi Rose Mei* [May] 2015, 73(5): 154–156.
- SMITH, G.F. (2015). (27) Request for a binding decision on the descriptive statement associated with *Agave gustaviana*. *Taxon* 64: 857.
- SMITH, G.F. (2017). (2544) Proposal to conserve the name *Agave maximiliana* against *A. gustaviana* (Asparagaceae: Agavoideae). *Taxon* 66: 986.
- SMITH, G.F. & FIGUEIREDO, E. (2013). *Succulent paradise. Twelve great gardens of the world.* Struik Lifestyle, an imprint of Random House Struik, Cape Town.
- SMITH, G.F. & FIGUEIREDO, E. (2017). *Kalanchoe fedtschenkoi* Raym.-Hamet & H.Perrier (Crassulaceae) is spreading in South Africa's Klein Karoo. *Bradleya* 35: 80–86.
- SMITH, G.F., FIGUEIREDO, E., BISCHOFBERGER, M. & EGGLI, U. (2018). Nomenclature of the nothogenus names *×Graptophytum* Gossot, *×Graptoveria* Gossot, and *×Pachyveria* Haage & Schmidt (Crassulaceae). *Bradleya* 36: 33–41.
- SMITH, G.F., VAN JAARVELD, E.J., ARNOLD, T.H., STEFFENS, F.E., DIXON, R.D. & RETIEF, J.A. (EDS). (1997). *List of southern African succulent plants.* Umdaus Press, Pretoria.
- SMITH, G.F. & VAN WYK, B-E. (2008). *Guide to garden succulents.* Briza Publications, Arcadia, Pretoria.
- STOCKWELL, R. (2017). *Succulents. The ultimate guide to choosing, designing, and growing 200 easy-care plants.* Oxmoor House, an imprint of Times Inc. Books, New York.
- THEODOSIA B. SHEPHERD COMPANY. (1912). *Mrs. Theodosia B. Shepherd's descriptive catalogue.* Ventura-by-the-Sea, U.S.A.
- THIEDE, J. (2003). *Graptopetalum*. In: U. EGGLI (ED.), *Illustrated handbook of succulent plants: Crassulaceae:* 128–134. Springer Verlag, Berlin.
- THIEDE, J. & EGGLI, U. (2007). Crassulaceae. In: K. KUBITZKI (ED.), *The families and genera of vascular plants. IX. Flowering Plants. Eudicots.* Pp. 83–118. Springer-Verlag, Berlin.
- TÖLKEN, H.R. (1985). Crassulaceae. In: O.A. LEISTNER (ED.), *Flora of southern Africa* 14: 1–244. Department of Agriculture and Water Supply, Botanical Research Institute, Pretoria.
- VAN KEPPEL, J.C. (1964). *×Graptoveria* cv. 'Caerulescens' (Gossot). *Succulenta* 43: 180–181.
- VAN KEPPEL, J.C. (1980). An account of the hybrid genus *×Graptoveria* (*Graptopetalum* Rose *× Echeveria* DC) Part 1. *The National Cactus & Succulent Journal* 35(2): 28–31.
- VAN KEPPEL, J.C. (1981). An account of the hybrid genus *×Graptoveria* (*Graptopetalum* Rose *× Echeveria* DC) Part 2. *The National Cactus & Succulent Journal* 36(1): 13–17.
- WALTERS, M., FIGUEIREDO, E., CROUCH, N.R., WINTER, P.J.D., SMITH, G.F., ZIMMERMANN, H.G. & MASHOPE, B.K. (2011). *Naturalised and invasive succulents of southern Africa.* ABC Taxa 11. The Belgian Development Cooperation, Brussels.
- WALTHER, E. (1972). *Echeveria.* California Academy of Sciences, San Francisco.