

The taxonomy and nomenclature of *Kalanchoe gastonis-bonnieri* Raym.-Hamet & H.Perrier (Crassulaceae subfam. Kalanchooideae), with biographical notes on Gaston Eugène Marie Bonnier (1853–1922)

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Summary: The taxonomy and nomenclature of *Kalanchoe gastonis-bonnieri* Raym.-Hamet & H.Perrier (Crassulaceae subfam. Kalanchooideae) are reviewed. We do not recognise infraspecific taxa in *K. gastonis-bonnieri*. The name *K. adolphi-engleri* Raym.-Hamet, a synonym of *K. gastonis-bonnieri*, is here lectotypified. Biographical information is provided on Gaston Eugène Marie Bonnier (1853–1922), who is little known in succulent plant systematics. Bonnier, who for most of his professional career was attached to the Université de Paris-Sorbonne, France, was a leading French botanist in the late-1800s and early-1900s.

Zusammenfassung: Die Taxonomie und Nomenklatur von *Kalanchoe gastonis-bonnieri* Raym.-Hamet & H.Perrier (Crassulaceae subfam. Kalanchooideae) werden besprochen. Wir erkennen keine infraspezifischen Taxa von *K. gastonis-bonnieri* an. Der Name *K. adolphi-engleri* Raym.-Hamet, ein Synonym von *K. gastonis-bonnieri*, wird hier lectotypisiert. Es werden biographische Informationen über Gaston Eugène Marie Bonnier (1853–1922) präsentiert, der in der Pflanzensystematik der Sukkulenten wenig bekannt ist. Bonnier, der den größten Teil seiner beruflichen Laufbahn an der Université de Paris-Sorbonne, Frankreich, verbrachte, war in den späten 1800er und frühen 1900er Jahren ein führender französischer Botaniker.

Introduction

During the first half of the 20th century, Raymond-Hamet (25 March 1890 [Dijon, Côte D’Or, France]–2 October 1972 [Paris, France]) was the acknowledged global specialist on *Kalanchoe* Adans.

and *Sedum* L., two genera in the Crassulaceae subfam. Kalanchooideae and Crassulaceae subfam. Sempervivoideae, respectively. During this period he described or reclassified more than 60 species of *Kalanchoe* and more than double that number of *Sedum* species. Raymond-Hamet had a penchant to name the novelties he described after prominent botanists of the day (Sánchez de Lorenzo-Cáceres, 2016: 49), with the epithets of nearly 40 of his solely and jointly described novel *Kalanchoe* species alone commemorating people who were active in botanical and other sciences. Rather mysteriously, Raymond-Hamet also commemorated several women, about whom no information can be traced, in a number of new species names. In about 1912 Raymond Hamet started writing his name “Raymond-Hamet”, i.e., by hyphenating his given name and surname. His publications are here cited under either “Hamet, R.”, or “Raymond-Hamet”, depending on which version of his name he used in the publications referenced (Smith *et al.*, 2019: 37–38).

Having been of French extraction, Raymond-Hamet understandably named several species after French botanists who were active during the 19th and 20th centuries. One such species, *Kalanchoe gastonis-bonnieri* Raym.-Hamet & H.Perrier (Figures 1 & 2) was named for Gaston Eugène Marie Bonnier (Hamet & Perrier de la Bâthie, 1912). A first attempt by Raymond-Hamet (Hamet, 1907) to commemorate Bonnier with a species name in *Kalanchoe* was abortive, as he published the illegitimate later synonym, *K. bonnieri* Raym.-Hamet, for a species that Drake del Castillo (1903: 41) had earlier described as *K. linearifolia* Drake (Figures 3 & 4). This did not deter Raymond-Hamet and a few years later when he collaborated with Henri Per-



Figure 1. *Kalanchoe gastonis-bonnieri* is a rather few-leaved, glabrous, small to medium-sized succulent that generally reaches a height of up to 70cm. Photograph: Gideon F. Smith.

rier de la Bâthie on describing further novelties in the genus *Kalanchoe*, they jointly named a different Madagascan species *K. gastonis-bonnieri* (Hamet & Perrier de la Bâthie, 1912: 364). In South Africa the vernacular names ‘spookplakkie’ and ‘witplakkie’ (Afrikaans; alluding to the ghostly white colour of, especially, the young leaves and developing rosettes) and ‘life plant’ and ‘palm beachbells’ (English) are applied to *K. gastonis-bonnieri*.

We review the taxonomy and nomenclature of *Kalanchoe gastonis-bonnieri*; we do not recognise infraspecific taxa in the species. The name *K. adolphi-engleri* Raym.-Hamet, a synonym of *K. gastonis-bonnieri*, is lectotypified. Biographical information is provided on Gaston Bonnier. Bonnier, a devoted and enthusiastic French researcher and lecturer in botany in the late-1800s and early-1900s (Eggl & Newton, 2004: 92), remains little known in succulent plant systematics as that was not the main thrust of his scientific endeavours.

Herbarium codes follow Thiers (2019).

The life and times of Gaston Bonnier

Gaston Eugène Marie Bonnier (Figure 5) was born on 9 April 1853 in Paris, France, and died on 30 December 1922 in the same city, about three months short of his 70th birthday (Coulter, 1923;



Figure 2. Especially the young leaves of *Kalanchoe gastonis-bonnieri* are densely white-pruinose and arranged in basal rosettes. In older plants the stem elongates considerably. Photograph: Gideon F. Smith.

Molliard, 1923). [Bonnier was born in 1853, not in 1851 as stated by Boiteau & Allorge-Boiteau (1995: 116). The main reference for all existing biographies on Bonnier is Molliard (1923), with the primary information in the present biographical



Figure 3. *Kalanchoe bonnierii*, note not *K. gastonis-bonnierii*, is a synonym of *K. linearifolia* (figured here), a distinctive species with pencil-like leaves. Photograph: Gideon F. Smith.

sketch relying on this publication. The major biographical data are inventoried in Charle & Telkès (1989a). Coulter (1923) is a rare English biography, but contains only basic information.]

Bonnier's mother, Elzéarine "Zari" Ortolan, was the daughter of Joseph Elzéar Ortolan, a professor of Law at the University of Paris; Zari was the author of novels. [No indication is given from where Wikipedia (Contributeurs de Wikipédia, 2019+) derived this information, but it has been verified in the catalogue of the Bibliothèque Nationale de France.] On his father's side, the Bonniers were a famous family of industrial weavers in Lille, the present-day capital of the Hauts-de-France region in north-central France near the French border with Belgium. [Technically, the Hauts-de-France region exists only from 2016.] However, Édouard Bonnier, Gaston Bonnier's father, did not enter the family business and became a professor of Law at the University of Paris. Growing up in a residence of the Faculty of Law, surrounded by its personnel, Bonnier's only sibling, Elzéar (1848–1916), also specialized in Law. The young Gaston, on the other hand, spent much of his free time exploring the natural environment around Paris (Molliard, 1923: III). After attending the collège Rollin he enrolled at the lycée Henri IV to prepare for entry at the



Figure 4. In contrast to *Kalanchoe gastonis-bonnierii*, which has large, pendulous, predominantly yellow flowers, those of *K. linearifolia* are red, rather small, lantern-shaped, and borne erectly. Photograph: Gideon F. Smith.

École Normale Supérieure (ENS). At that time, with the outbreak of the Franco-Prussian war (19 July 1870–10 May 1871), the 17-year old Gaston was drafted into service as an artilleryman.

After the war, rather than pursuing his studies in a Parisian institution, Gaston Bonnier spent a year high up in the French Alps with his cousin, Georges de Layens (see https://commons.wikimedia.org/wiki/File:George_Layens.jpg for an image). At the time, De Layens was experimenting with beekeeping and the efficacy of different beehives. Molliard (1923: V) traces Bonnier's own interest in nectar and in the influence of a montane climate on plant morphology to this period. Later, the two cousins were to collaborate on substantial research projects. In the meantime, Bonnier's studies, which he continued privately, granted him access to the ENS, and in 1876 he completed the *aggregation*, a competitive examination for a position in public education. He was subsequently appointed at the ENS, where, in 1879, he submitted his doctoral dissertation on nectar, especially the morphology of the organs involved in, and the physiology of, nectar production (Bonnier, 1879). During his time at the ENS Bonnier developed the teaching of botany and did pioneering work to establish biology to its rightful place among the natural sciences in the French competitive exam system (*concours*) (Bournerias, 1990: 94–95). This work was complemented by his initiative to establish a new laboratory for the ENS, to accommodate the experimental

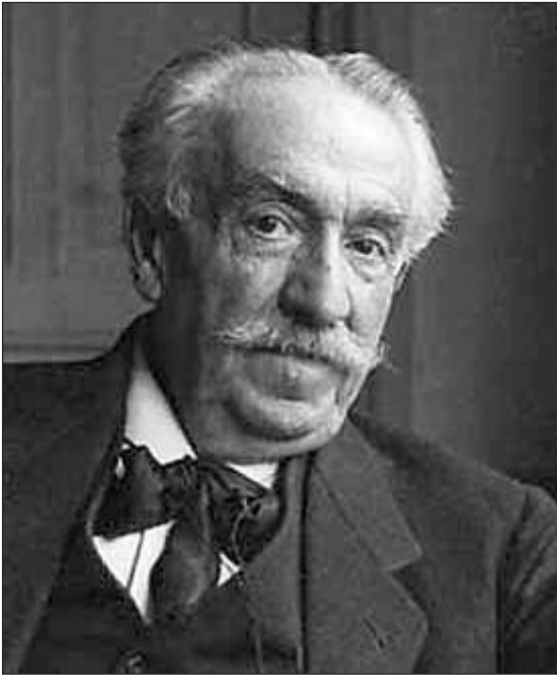


Figure 5. The French botanist Gaston Eugène Marie Bonnier (1853–1922). Photograph taken in 1921. Photographer unknown. Image in the public domain because of its age. [See: https://commons.wikimedia.org/wiki/File:Gaston_Bonnier.jpg].

research needs of botany and biology. During this period his research included work on plant respiration, the heat emission of plants, the biology of lichens, and the effect of light on plant growth (see for example Bonnier, 1883, 1884, 1889). All of these studies were considered ground-breaking and Bonnier received numerous prizes and awards.

When, in 1887, Bonnier was appointed to the chair of botany at the Sorbonne—an institutional predecessor of the recently established Sorbonne Université—he was still in his early thirties, but already enjoyed wide scholarly recognition. His most significant institutional initiative was establishing the Laboratory for Plant Biology (*Laboratoire de Biologie végétale*) at the edge of the forest of Fontainebleau, about 55km southeast of the centre of Paris (see https://www.google.com/imgres?imgurl=http://drouotstatic.zonesecure.org/images/perso/zomsrsrc/LOT/30/96802/1545295620-2.jpg&imgrefurl=http://www.drouot-morand.com/html/fiche.jsp?id%3D9839771%26np%3D1%26lng%3Dfr%26npp%3D150%26ordre%3D%26aff%3D1%26r%3D&docid=aD1fV4aTZs_WNM&tbnid=9CUxNv9ETkF1FM:&vet=1&w=1600&h=1031&itg=1&source=sh/x/im for an undated image of the *Laboratoire de Biologie végétale*). This Laboratory was officially opened in 1890 (Molliard, 1923: XVII; see Benest, 1990 for an overview of the scientific considerations

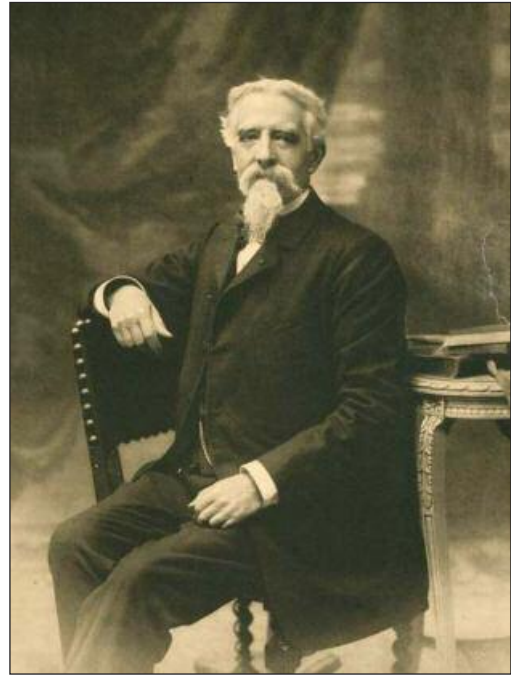


Figure 6. The French botanist Philippe Édouard Léon van Tieghem (1839–1914). Photograph taken during the 19th century. Photographer: Eugène Pirou. Muséum national d’Histoire naturelle, Paris. Image in the public domain because of its age. [See: https://upload.wikimedia.org/wikipedia/commons/0/0c/Philippe_Van_Tieghem_%281839-1914%29.jpg].

that shaped the founding and work of this institution). So significant was the work done at this institution that Molliard, Bonnier’s biographer and collaborator, claimed: “If I were to write a complete history of the work that has been carried out in this silent setting, [...] I would be obliged to talk about the progress of Botany over the past thirty years in the most varied fields, but especially in plant physiology” (Molliard, 1923: XVIII). Many French and foreign researchers worked there and the results and proceedings of completed research were generally published in the *Revue générale de Botanique*, which Bonnier established in 1889 and edited until his death in 1922.

Experimental morphology was an early major area of Bonnier’s botanical investigations. He inter alia studied the effect of, and relationship between, montane climates and plant morphology by comparing species common to the French Alps and arctic islands; in a parallel project he compared representatives of species from non-Mediterranean France to those of the same species growing further south, in the European Mediterranean region (Molliard, 1923: XVIII–XXI). On the basis of these findings he contributed to plant evolutionary theory, in

which he leaned towards Lamarckism (Molliard, 1923: XXI; Delange, 2013: 211–219). In the early 1800s Jean-Baptiste Pierre Antoine de Monet, chevalier de Lamarck (1 August 1744–18 December 1829) was a proponent, although not the originator, of inter alia the theory of inheritance of acquired characteristics, which in some ways conflicted with Darwin's views on natural selection (Jordanova, 1984).

Bonnier and his cousin De Layens also wrote floristic manuals—accessible to a broader public of amateur botanists and natural historians—for the identification of the most common plants in the regions of Paris, and of northern France and Belgium, and finally of the whole of France. These popular scientific publications were highly regarded and have been qualified as “a real revolution in the art of plant identification” (Bournerias, 1990: 96). The two cousins also teamed up twice for scientific monographs on beekeeping. Certainly the most ambitious project of Bonnier was the monumental *Flore complète, illustrée en couleur, de France, Belgique et Suisse*. At completion in 1935 it comprised 12 volumes as well as an index volume. Bonnier saw only the first five volumes appear in print before his death, but most of the material had been collected by that time (Bournerias, 1990: 98). Robert Douin eventually completed the project. This work has since been updated and republished with the most recent version dating from 1999.

An important aspect of Bonnier's life and work is the significant networks of scientists to which he was connected and that he no doubt deliberately cultivated. On the one hand, there was the family network. Even before his marriage in 1881, Bonnier conducted research with his future father-in-law, the French botanist Philippe Édouard Léon van Tieghem (1839–1914) (Figure 5). [We follow Charle & Telkès (1989a) because they cite the act of marriage between Bonnier and Van Tieghem's daughter, Marie, as proof of the wedding having taken place in 1881. Molliard (1923), however, gives the date as 1880.] Philippe van Tieghem's *Traité de botanique* (1884) was long considered an authoritative reference (Delange 2013: 200). Some of Van Tieghem's academic relationships, notably with Bonnier and Flahault (see below), are documented in section VI of Grison (2001: 136–150). [After a career as professor of chemistry and researcher at the French Commissariat à l'énergie atomique Grison (1919–2015), the author last cited, was, at retirement, director of teaching and research at the École Polytechnique. He was a grandson-in-law of Mathieu Leclerc du Sablon (see below).] Van Tieghem's daughter, Marie van Tieghem and Gaston Bonnier had one child, Marguerite, who married Raoul Combes (1883–1964) (Delange 2013: 201; Charle & Telkès 1989b: 81). Combes himself was an accomplished botanist and

later successor of Molliard at the Sorbonne, and eventually director of the Laboratory at Fontainebleau. Two other daughters of Philippe van Tieghem also married botanists: Julien-Noël Costantin (1857–1936), who was, amongst other things, a lecturer in botany at the ENS and successor of Van Tieghem as chair of botany at the *Muséum national d'Histoire naturelle* (Paris); and Mathieu Leclerc du Sablon (1859–1944), who was professor of botany at the faculty of sciences in Toulouse and co-author with Gaston Bonnier of a *Cours de botanique*. [A photograph of Leclerc du Sablon accredited to Bill's Photo C°. Hargous Frères Directeurs is held at and copyright of Archives de l'Institut de France, and Archives de l'Académie des Sciences.] All five of these botanists were members of the French academy of sciences. One of the present authors (LT) is a fifth generation descendent of Leclerc du Sablon and a sixth generation descendent of Van Tieghem. Raymond-Hamet, who described *Kalanchoe gastonis-bonnieri*, the subject of this paper, also published the names *K. vantieghemii* Raym.-Hamet, as '*Van Tieghemii*' and *K. costantini* Raym.-Hamet, as '*costantini*' for what he regarded as novel Madagascan kalanchoes. *Kalanchoe costantini* (Hamet, 1907: 889) is nowadays included in the synonymy of *K. beauverdii*, while *K. vantieghemii* (Hamet, 1906: 110) is regarded as a synonym of *K. beharensis* Drake. The latter (*K. vantieghemii*) was the first species of *Kalanchoe* that Raymond-Hamet described when he was only 16 years old. Incidentally, after realising that his *K. vantieghemii* was a synonym of *K. beharensis*, Raymond-Hamet again commemorated Van Tieghem in the name of a *Kalanchoe* species, but this time as *K. tieghemii* Raym.-Hamet, which in time also proved to be a synonym, this time of *K. laxiflora* Baker (Raymond-Hamet & Perrier de la Bâthie, 1914: 143).

Apart from his network with close family members, Bonnier, an inspiring professor and stimulating colleague, also drew many other talented people to him. These included the zoologists Alfred Giard (1846–1908), chair in theory of evolution at the faculty of sciences of the Paris University, and Frédéric Houssay (1860–1920), who was Giard's student and with whom Bonnier co-authored a number of scientific papers (Delange, 2013: 202–206). Among the botanists and other specialists were the mycologist Louis Matruchot (1863–1921), also from the ENS and chair of botany at the University of Paris, and Charles Flahault (1852–1935; see: http://www.accac.eu/la_foret_domaniale_de_l_aigoual/Charles-Henri-Marie-Flahault.htm for a photograph taken in 1921 by L. Cairol. The image is held at and copyright of Pôle Patrimoine scientifique de l'Université Montpellier 2). In 1890 Flahault was the founder of the Botanical Institute of Montpellier. Early in his career Bonnier undertook

Scandinavian expeditions with Flahault (Bonnier & Flahault, 1879a, b) and they coauthored *Observations sur les modifications des végétaux suivant les conditions physiques du milieu*.

Noteworthy students whose doctoral research was supervised by Bonnier are Albert Maige (1872–1943), later founder of the chair for plant biology at the University of Alger, Georges Colomb (1856–1945), lecturer at the Sorbonne, and Léon-Marie Dufour (1862–1942), who published important work on fungi with Costantin, Bonnier's brother-in-law. Prominent visiting scholars at the Fontainebleau laboratory included the Romanian E.-C. Teodoresco and W. Lubimenko of Russia (Delange, 2013: 202–206). To this list should be added the more than one hundred researchers who collaborated with Bonnier on his project *Flore complète, illustrée en couleur, de France, Belgique et Suisse* (Bournerias, 1990: 98).

Through groundbreaking research, inspirational teaching, and institutional strengthening and development, as well as his talent for disseminating science through popular scientific publications, all of which benefitted from considerable institutional support and scientific networks, Bonnier was firmly established as one of the most influential French botanists of the late-19th and early-20th centuries.

Gaston Bonnier is commemorated in the genus name *Bonniera* Cordem., which was described in the Orchidaceae by Cordemov (1899: 416).

Taxonomy of *Kalanchoe gastonis-bonnierii*

In one of the earliest publications in which Raymond-Hamet (still as “Hamet”) and Henri Perrier de la Bâthie collaborated (Hamet & Perrier de la Bâthie, 1912), they described six new species of *Kalanchoe* from Madagascar. Three of these six species, *K. gastonis-bonnierii*; *K. mangini* Raym.-Hamet & H.Perrier (the epithet to be corrected to ‘*manginii*’); and *K. millotii* Raym.-Hamet & H.Perrier (the epithet to be corrected to ‘*millotii*’), became exceptionally popular in global horticulture. In addition, both *K. manginii* and *K. millotii* have been used as parental stock of widely grown cultivars and hybrids: *K. manginii* of *K.* ‘Tessa’ (Smith *et al.*, 2018), and *K. millotii* of *K.* ‘Fern Leaf’ (Smith & Figueiredo, 2019).

Kalanchoe gastonis-bonnierii had been known for some 15 years by the time that Berger (1930: 408–412) published his influential work on Crasulaceae subfam. Kalanchooideae. In this synoptic treatment Berger recognised *Kalanchoe* sensu stricto, *Bryophyllum* Salisb., and *Kitchingia* Baker as three independent genera. However, he did not publish a combination for *Kalanchoe gastonis-bonnierii* in *Bryophyllum*. *Kalanchoe gastonis-bonnierii* clearly belongs in *Bryophyllum*, which is better treated at the rank of subgenus, as *K. subg.*

Bryophyllum (Salisb.) Koord. (Smith & Figueiredo, 2018).

Eventually Lauzac-Marchal (1974: 2508) transferred *Kalanchoe gastonis-bonnierii* to the genus *Bryophyllum*, but Rauh (1992, 1995) and Descoings (2003: 156) again treated it as a species of *Kalanchoe*, a view with which we agree (Smith *et al.*, 2019: 259–262). We therefore treat *Bryophyllum gastonis-bonnierii* (Raym.-Hamet & H.Perrier) Lauz.-March. as a synonym of *K. gastonis-bonnierii*.

Kalanchoe gastonis-bonnierii can be easily identified based on its often nearly white leaf colour, especially in young plants (Figure 2), elongated-deltoid leaves that can be heavily white-waxy, and the early, basally-rosulate arrangement of the leaves. The leaves are variously adorned with skeleton- or zebra stripe-like, purplish, greenish, or brownish markings (Figure 7). The calyces vary from almost globular to slightly ovoid, are light yellow, often with short, longitudinally-arranged, red lines. The corollas are quite large, light yellow, and infused with red, especially along the box-like corolla tube margins (Figure 8).

In the infrageneric classification of Smith & Figueiredo (2018), *Kalanchoe gastonis-bonnierii* clearly belongs in *K.* subg. *Bryophyllum*.

Taxonomy and nomenclature of *Kalanchoe gastonis-bonnierii*

Kalanchoe gastonis-bonnierii Raym.-Hamet & H.Perrier in *Ann. Sci. Nat. Bot.*, sér. 9, 16: 364 (1912). Raymond-Hamet & Marnier-Lapostolle: 47; Plate XV, Figures 41 & 42 (1964); Jacobsen: 285 (1970); Jacobsen: 614, Figure 857 (1986); Rauh: Plate 2051 (1992); Sajeva & Costanzo: 152 (1994); Boiteau & Allorge-Boiteau: 116, plate on p. 117 (1995); Rauh: 92, 116, 331, Figures 999 and 1000, 332, Figures 1001–1005 (1995); Sajeva & Costanzo: 173 (2000); Descoings: 156 (2003); Smith *et al.*: 259, Figures 12.21.1–12.21.5 (2019). **Type:** Madagascar, Tampoketsa, Bemarivo, August 1905, *J.M.H.A. Perrier de la Bâthie 11831* (P P00374106 lecto-). Designated as “TYPE [...] Lecto- P” by Boiteau & Allorge-Boiteau: 116 (1995).

Nomenclatural notes on *Kalanchoe gastonis-bonnierii*:

In the protologue of *Kalanchoe gastonis-bonnierii* (Hamet & Perrier de la Bâthie, 1912: 366), two specimens that were collected by Perrier de la Bâthie are cited, as follows: “M. Perrier de la Bâthie en a récolté deux échantillons, le premier, en août 1905, sur les gneiss découverts de Tampoketsa, dans la vallée du Bemarivo, le second, en août 1906, sur les gneiss des rives de l’Ampasimentera.” [English: “M. Perrier de la Bâthie collected two specimens, the first, in August 1905, from the gneiss discovered at Tampoketsa, in the Bemarivo Valley, the second, in August 1906, on the gneiss of the



Figure 7. Leaf margins of *Kalanchoe gastonis-bonniieri* are crenate and the leaf surfaces patterned with brownish green to purplish brown markings (see also Figures 1 & 2).

Photograph: Gideon F. Smith.

banks of the Ampasimentera.”]. Neither of these specimens was furnished with Perrier de la Bâthie collecting numbers in the protologue (Hamet & Perrier de la Bâthie, 1912: 366). The two specimens correspond to *J.M.H.A. Perrier de la Bâthie 11831* (P) [<https://science.mnhn.fr/institution/mnhn/collection/p/item/p00374106?listIndex=1&listCount=13>] and *J.M.H.A. Perrier de la Bâthie 11796* (P) [<http://mediaphoto.mnhn.fr/media/1441356373050mIm8xPGY1V8eStri>], respectively. These specimens are syntypes. Boiteau & Allorge-Boiteau (1995) effectively designated one of these specimens, *J.M.H.A. Perrier de la Bâthie 11831* (P), as lectotype when they referred to that specimen as “TYPE [...] Lecto- P”.

Synonyms:

Bryophyllum gastonis-bonniieri (Raym.-Hamet & H.Perrier) Lauz.-March. in *Comptes R. Hebd. Séances Acad. Sci., D (Paris)* **278(20)**: 2508 (1974). Walters *et al.*: 254, 255, Figure 291, 256, Figures 292 & 293 (2011). **Type:** as for *Kalanchoe gastonis-bonniieri*.

Kalanchoe adolphi-engleri Raym.-Hamet in *Bull. Soc. Bot. France* **102**: 239 (1955). **Type:** MADAGASCAR. Southeastern Madagascar, *Anonymous s.n.*, no date, B, Barcode: B 10 0153743 (lectotypus), **here designated**. Stable identifier for specimen citation: <http://herbarium.bgbm.org/object/B100153743>. (See Curators Herbarium B, 2000+.)

Nomenclatural notes on *Kalanchoe adolphi-engleri*:

No collections were cited in the protologue of the name *Kalanchoe adolphi-engleri*, which only mentions that material on which the name is based was collected in southeastern Madagascar (Raymond-



Figure 8. Apically dense, many-flowered inflorescences of *Kalanchoe gastonis-bonniieri* are carried erectly. The pendulous flowers are yellow to yellowish green and longitudinally infused with reddish purple veins. Photograph: Neil R. Crouch.

Hamet, 1955: 239).

However, a specimen, *Anonymous s.n.*, no date, kept at Herb. B, that has a printed label completed in typescript affixed to it, states: “Bearbeitet für das “Pflanzenreich” *Kalanchoe Adolphi-Engleri* RAYMOND-HAMET Original der Art det: Raymond-Hamet”. Under Turland *et al.* (2018: 21, Article 9.3) this specimen is here designated as lectotype. There is no evidence that it was “...the one specimen [...] used by the author(s) when no type was indicated...” (Turland *et al.*, 2018: 19–20, Article 9.1), as Raymond-Hamet may have had additional material that was destroyed during the bombing of Berlin during World War II at his disposal when publishing the species name. The name *Kalanchoe adolphi-engleri* Raym.-Hamet therefore does not have a holotype and is here lectotypified (see: <https://ww2.bgbm.org/Herbarium/specimen.cfm?Barcode=B100153743>).

Raymond-Hamet (1955: 239) noted the close relationship of *Kalanchoe adolphi-engleri* to *K. gastonis-bonniieri*, but differentiated between the two species as follows: “Il s’en distingue cependant par ses feuilles sessiles, nettement dilatées dans leur partie inférieure, qui, de plus, paraissent être dépourvues de l’enduit farineux blanchâtre qui recouvre celles du *Kalanchoe Gastonis-Bonniieri*.” [**English:** “However, it (*Kalanchoe adolphi-engleri*) is distinguished by its sessile leaves that are clearly dilated in their lower part, which, moreover, appear to be devoid of the floury coating that covers those of *Kalanchoe gastonis-bonniieri*.”] We treat the variability noted by Raymond-Hamet as falling within the variation found in *K. gastonis-bonniieri* and include the name *K. adolphi-engleri* in the synonymy of *K. gastonis-bonniieri*.



Figure 9. Plantlets developing at the leaf tips of *Kalanchoe gastonis-bonnierei*. Note that the cut end of the petiole is also developing roots.

Photograph: Gideon F. Smith.

Kalanchoe gastonis-bonnierei var. *ankaizinensis* Boiteau ex L.Allorge, in Boiteau & Allorge-Boiteau, *Kalanchoe de Madagascar*: 119 (1995). **Type:** “Boiteau s. n°. (Dufournet coll.) matériel en alcool, P, (photos)”, not seen (fide Boiteau & Allorge-Boiteau 1995: 119).

Nomenclatural notes on *Kalanchoe gastonis-bonnierei* var. *ankaizinensis*:

Boiteau & Allorge-Boiteau (1995: 119) noted that: “Cette variété est en fait séparée dans l’herbier sous le nom de *K. ankaizinensis* Boiteau et est cultivée à Tsimbazaza (photos, Allorge 1994)”, i.e., that the variety *Kalanchoe gastonis-bonnierei* var. *ankaizinensis* was filed in the herbarium, presumably Herb. P, under the name *K. ankaizinensis* Boiteau, based on material cultivated in Tsimbazaza. This does not constitute valid publication of the designation ‘*Kalanchoe ankaizinensis*’. As far as we could ascertain, “Allorge 1994” is not a literature reference, but rather an indication of the date that photographs were taken by Lucile Allorge, either of plants in cultivation or of type material preserved in alcohol. The variety, *Kalanchoe gastonis-bonnierei* var. *ankaizinensis*, was validly published though.

The specimen, “Dufournet coll.”, and photographs cited as constituting the type of *Kalanchoe gastonis-bonnierei* var. *ankaizinensis* Boiteau ex L.Allorge are not listed in the online catalogue of the Paris Herbarium.

In the key to the taxa included in the unranked “Groupe IX Proliferae” recognised by Boiteau & Allorge-Boiteau (1995: 116) they differentiated *Kalanchoe gastonis-bonnierei* var. *ankaizinensis* from *K. gastonis-bonnierei* var. *gastonis-bonnierei* as follows: “à calice charnu ouvert à sinus pourpres” [**English:** “with calyx fleshy, open, with purple

lines”]. In contrast, *K. gastonis-bonnierei* var. *gastonis-bonnierei* was noted as having: “à calice fermé avant l’éclosion” [**English:** “with calyx closed before anthesis”]. However, we regard this variation as inadequate for recognising *K. gastonis-bonnierei* var. *ankaizinensis*.

Amplified description of *Kalanchoe gastonis-bonnierei*: Perennial, sometimes biennial and monocarpic, comparatively few-leaved, few-branched, glabrous, small to medium-sized, terrestrial, succulent, to 70cm tall, forming dense groups. *Stems* short, eventually elongating when approaching flowering, white-pruinose, sometimes branched low down, erect. *Leaves* basally laxly rotate to subrotate, opposite-decussate, petiolate, white-pruinose especially above, green or bluish green with irregular, zebra stripe-like, brownish green to purplish brown markings, succulent, spreading to erectly spreading to variously gracefully recurved; *petioles* short and sometimes not very distinct or prominent, broad; *blade* 12–55 × 5–10cm, ovate-lanceolate, flat or folded lengthwise; *base* cuneate; *apex* harmlessly acute, forming plantlets, these developing roots while still attached to the leaf apex; *margins* sinuate to coarsely crenate. *Inflorescence* 40–55 × 30–60cm, erect, apically dense, many-flowered, lax cyme, corymbose; *pedicels* 5–15 mm long, slender. *Flowers* pendulous to slightly spreading, yellow to yellowish green, infused with reddish purple veins especially along box-like margins of corolla, glabrous; *calyx* 20–25 mm long, slightly globular to most often tubular, urceolate, prominent, yellowish to pale green with longitudinal reddish purple veins; *sepals* fused for ¾ of their length, lobes 5–6 × 4–5mm, ± deltoid, acute, yellowish to greenish white-pruinose, glabrous; *corolla* 4–5 cm long; *tube* 3.0–4.0cm long, cylindrical, yellowish green infused with reddish purple veins; *lobes* ± 10 × ± 6mm, spreading to slightly recurved, triangular-ovate, apically acuminate. *Stamens* inserted below the middle of the corolla tube, included; *filaments* short; *anthers* ± 3mm long, reniform. *Pistil* consisting of 4 carpels; *carpels* 8–11 mm long; *styles* prominent; *stigmas* capitate; *scales* half-round to square. *Follicles* not seen. *Seeds* not seen. *Chromosome number:* 2n = 34 (Baldwin 1938: 576).

Flowering time: *Kalanchoe gastonis-bonnierei* flowers from mid- to late-winter (southern hemisphere).

Representative herbarium specimen:

SOUTH AFRICA. GAUTENG PROVINCE.—2528(–CB) (Pretoria): specimen prepared from cultivated material, 4 December 2019, G.F. Smith 1098 (PRU).

Cultivation

Kalanchoe gastonis-bonnieri is very easy in cultivation and rapidly becomes weedy through, especially, the production of numerous plantlets at the leaf tips (Figure 9). In mild-climate areas the species should therefore be cultivated with great care, as irresponsibly discarded surplus material can become established in natural vegetation (Walters *et al.*, 2011: 254).

Acknowledgements

Prof. Neil R. Crouch, Biodiversity Research, Assessment and Monitoring, South African National Biodiversity Institute, Durban, is thanked for granting permission to use his photograph of *Kalanchoe gastonis-bonnieri*, which is here reproduced as Figure 8.

Anonymous reviewers are thanked for comments on the manuscript.

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