Taxonomy and chorology of *Corbichonia* (Lophiocarpaceae s.l.) with further description of a new species from Southern Africa

ALEXANDER P. SUKHORUKOV1* & MARIA KUSHUNINA2

1 Department of Higher Plants, Biological Faculty, Lomonosov Moscow State University, 119234, Moscow, Russia; suchor@mail.ru
2 Department of Plant Physiology, Biological Faculty, Lomonosov Moscow State University, 119234, Moscow, Russia; mkushunina@gmail.com

* author for correspondence

Abstract

A re-examination of the herbarium material has allowed to describe a new species, *Corbichonia exellii*, occurring in Southern Africa (Angola, Namibia and South Africa). *C. exellii* represents the third species in the genus. Morphological differences between all three *Corbichonia* species (*C. decumbens*, *C. rubriviolacea*, and *C. exellii*) are provided. The description of the genus is defined using the newly discovered characters (reproductive features). The taxonomy of all *Corbichonia* species (synonyms included) is provided, as well as maps for all species. The lectotypes of *Orygia decumbens* (basionym of *Corbichonia decumbens*) and *O. mucronata* (synonym of *C. decumbens*) are designated on specimens preserved, respectively, at BM and K. The genus *Corbichonia*, recently placed in *Lophiocarpaceae*, is markedly different from the core genus *Lophiocarpus* on the basis of embryological, morphological and carpological characters, and deserves further investigation concerning its taxonomic status.

Key words: Africa, *Corbichonia*, distribution, Lophiocarpaceae, new species

Introduction

The genus *Corbichonia* Scopoli (1777: 264) belongs to the order Caryophyllales Juss. ex Bercht. & J. Presl, but its systematic position was unstable for a long time. Previously, *Corbichonia* was included within Aizoaceae Martinov [e.g., Pax 1889, Pax & Hoffmann 1934 (sub *Orygia* Forsskål (1775: 103)), Hauman 1951, Adamson 1958, Jeffrey 1960, Nazir 1973] or Molluginaceae Bartl. (Fenzl 1836, Harvey & Sonder 1860, Endress & Bittrich 1993, Hofmann 1973, 1994, Sivarajan 1988, Pullaiah 2003) having some morphological similarities in the reproductive characters with both families. Recently, the separate position of *Corbichonia* from Aizoaceae or Molluginaceae was discovered on the basis of molecular data, and it was placed in the so-called ‘Globular Inclusion’ clade as a sister group to *Lophiocarpus* Turczaninow (1843: 55) (Cuénoud et al. 2002). The latter genus forms its own family Lophiocarpaceae Doweld & Reveal (2008: 416), which now consists of two genera: core genus *Lophiocarpus* and *Corbichonia* automatically included in this family (Schäferhoff et al. 2009, Brockington et al. 2013).

*Corbichonia* unites glaucous, almost glabrous annual or perennial herbs, sometimes with a basally lignified stem; with alternate, shortly-petiolate leaves with broad (obovate, ovoid or oblong) blades terminating in a short tip; bracteose inflorescences; 5 green sepals and numerous petals of staminodial origin; 10–20 normally developed stamens; 5 episepalous carpels bearing a dehiscent loculicidal capsule with many seeds. Only two *Corbichonia* species are known so far. The annual or short-leaved perennial *Corbichonia decumbens* (Forsskål 1775: 103) Exell (1935: 80) has an extended distribution pattern in the tropical (mostly arid) regions of Africa, Arabia and Indian subcontinent (Nazir 1973, Ghazanfar & Fisher 1998). The second species [*C. rubriviolacea* (Friedrich in Suessenguth et al. 1953: 340) C.Jeffrey (1960: 235)] is a perennial herb that is clearly distinguished by smaller leaves (up to 2.5 cm) and flowers, with records in southwest Africa (sub *Orygia rubriviolacea* Friedrich in Suessenguth et al. 1953: 340). Specimens of *Corbichonia decumbens* that have been examined are different in some characters (especially leaf shape and seed-coat ornamentation) and require further investigation.

The main goals of the present study are (1) to examine the taxonomy and chorology of *Corbichonia*, with the
description of a new species from Southern Africa, and (2) to reveal all possible differences between *Lophiocarpus* and *Corbichonia* as genera now combined in Lophiocarpaceae.

**Material and Methods**

The review of the material was undertaken in the herbaria B, BM, E, H, HUJ, LE, MHA, MW, P, UZH, W (acronyms follow Thierts 2014+). The specimens examined were used for the mapping of the distribution patterns of all *Corbichonia* species (see Appendix). The seed surface of genus representatives was observed using SEM (JSM-6380, JEOL Ltd., Japan) at 15 kV after critical-point drying and sputtercoating with gold-palladium. The anatomical cross-sections of the seeds were made by hand.

**Taxonomic treatment**

*Corbichonia* Scopoli (1777: 264) ≡ *Axonotechium* Fenzl (1836: 354).

**Holotype:**—*Corbichonia decumbens* (Forsskål 1775: 103) Exell (1935: 80).

**Description:**—Branched annual or perennial herbs (sometimes suffruticose) up to 70 cm, with glabrous or scarcely pubescent, angular or rounded stems; leaves alternate, exstipulate, shortly-petiolate, orbicular, obovate, ovoid or oblong, usually fleshy and glaucous or greyish; inflorescence bracteose, monochasial, branched; sepals 5, free, with whitish or lilac margins; petals (staminodial origin) 15–30, pink, lilac or rarely white; 10 to 20 normally developed stamens located in two (alternisepalous and antisepalous) whorls; stylodia 5, free and long; ovary superior, 5-locular; fruit a loculicidal capsule with the central column and accrescent septae; seeds 20–50, reniform, shiny, black, 1–1.2 mm long, with small hyaline funicular aril; seed-coat testa hard, 50–65 µm thick, with radial furrows, its outer (periclinal) cell walls convex, with obliquely oriented stalactites, with or without cylindrical outgrowths at the top, anticlinal walls warty; tegmen thin, up to 4 µm, 1–2-layered, with bar-thickening walls; embryo annular; perisperm abundant.

**Notes:**—*Corbichonia* was described by Scopoli (1777) who listed “*Orygia decumbens*” without transferring this species into the established genus, and the combination *Corbichonia decumbens* (Forsskål) Scopoli cannot be accepted (art. 35.2 of ICN, McNeill et al. 2012). The description of the genus *Orygia* Forsskål (1775: 103) is clearly based on *Orygia portulacifolia* Forsskål (1775: 103) with sepals consisting of two segments, and a three-loculicidal capsule that is peculiar to the genus *Talinum* Adanson (1763: 245). *O. portulacifolia* was later transferred to the genus *Talinum* [T. portulacifolium (Forsskål) Ascherson ex Schweinfurth (1896: 172)]. The genus *Orygia* with the lectotype *O. portulacifolia* (Exell, 1935) is thus synonymized with the genus *Talinum*.

Here the description of *Corbichonia* is improved with two details: (1) the number of staminodial petals can reach 30 (not only 20 according to all earlier descriptions), and (2) the cells of seed-coat testa have cylindrical outgrowths only in *C. decumbens* (Hassan et al. 2005), and they are absent in both *C. exellii* sp. nova and *C. rubriviolacea*.

Three species in Africa and Asia; all species are found in southwest Africa.

1. **Corbichonia decumbens** (Forsskål 1775: 103) Exell (1935: 80). (Fig. 1 A–B).


Type (lectotype designated here by A. Sukhorukov)—[no information about the locality, date and collector] (BM-000944675!, isotype C). Image of the lectotype available at https://plants.jstor.org/stable/history/10.5555/al.ap.specimen.bm000944675

1 Images of *Corbichonia* are available at: http://science.mnhn.fr/institution/mnhn/collection/p/item/search. Some of them can be identified precisely without a closer look, and have been cited in this article.

2 Images of *Corbichonia* are available at: http://www.herbarien.uzh.ch/static/database/artenliste_en.php?l=&spCoutCod=&spTaxFlg=A&spFam=&spGen=Corbichonia&spSpeEpi=&spIntEpi=&spSpeAut=&spColNam=&spCov=&spTaxFlg=&spTypFlg=%25&spHer=%25&sort=familie&Submit=Suchen. Some of them can be identified precisely without a closer look, and have been cited in this article.

3 The possible location of the authentic specimens is in “Musa” (Forsskål 1775: 103), West Yemen, probably Ta`izz governorate, near Mocha [“Taaes, Musa vicus Mochhae proximus” (Forsskål 1775: 90)].
Bas.: Glinus trianthesoides B. Heyne in Roth (1821: 231).
Type: not designated.

= Telephium laxiflorum Candolle (1828: 366).
Type: “Catalogus geographicus plantarum Africæ australis extratropicae”, Portulaca, Burchell 205A (holotype, G-DC-G00488203!) (Fig. 2).

Type (lectotype designated here by Sukhorukov):—MOZAMBIQUE. [Tete province]: Rios de Sena (Tette) [Tete], Dr. Peters 8 (K-000232039!). Image of the lectotype available at http://www.kew.org/herbcatimg/37563.jpg

Typification of Orygia mucronata:—The specimen cited is certainly part of the original Peters’ collection. The authentic material at B has been missing, perhaps, since the mid-1940s (Robert Vogt, pers. comm.). The specimen at K bears a perennial herb or a subshrub collected in the early reproductive stage with two unripe fruits and many flowers. Despite this, the seeds distinctly possess the papillae-like outgrowths on the seed surface like in C. decumbens. Klotzsch (in Peters 1862–1864) distinguished O. mucronata from O. decumbens s. str. in several characters (suffruticose habit, absence of the petals, and different number of stamens). The restricted number of flowers on the authentic specimen or lack of additional material does not allow a precise confirmation of Klotzsch’s conclusion about the total absence of petaloid staminodia in all perennial individuals of Corbichonia from East Africa. Further field investigations need to clarify whether perennial forms of C. decumbens from Eastern Tropical Africa (Ethiopia, Kenya, Tanzania, and Mozambique) are distant from annual Corbichonia, or whether C. decumbens can form both annual and perennial life forms. However, such suffruticose individuals are seen on the specimens from diverse African or Asian locations. The synonymization of Corbichonia decumbens with Orygia mucronata can still be accepted, but with some doubt.

FIGURE 1. Images of Corbichonia decumbens (photo by B. Wursten) and C. rubriviolacea (photos by S. Rügheimer et al.). A) C. decumbens, general view (ZIMBABWE. Masvingo province: Malilangwe Wildlife Reserve, 21°6'S 31°52'E, 360 m), B) C. decumbens, flower (MOZAMBIQUE. Sofala province: Chitengo Camp, Gorongosa National Park, 18°58'47" S 34°21'8" E, 37 m, 29 January 2007), C) C. rubriviolacea, general view (SW Africa, without precise location), D) C. rubriviolacea, flowers (SW Africa, without precise location).

4 Described from East India without precise location: the type specimens of G. trianthesoides are not known, but determinations of B. Heyne were seen at Kew herbarium.
2. Corbichonia rubriviolacea (Friedrich in Suessenguth et al. 1953: 340) C. Jeffrey (1960: 235). (Fig. 1 C–D).

Bas.: Orygia rubriviolacea Friedrich (1953: 340).


Notes:—The specimens matching C. rubriviolacea were earlier observed by Dinter (1924) who pointed out that the flowers are relatively small (approximately 15 mm in diameter). He was not able to provide more details on the taxonomy of these specimens due to the lack of other reproductive characters for comparison purposes.

3. Corbichonia exellii Sukhor. sp. nov.

Type:—ANGOLA. Mossamedes [Namibe province]: 74 km from Mossamedes, Montemor, dry scrub, ca. 500 m, 19 May 1937, Exell & Mendonça 2186 (holotype, BM-001122713!) (Fig. 3).

Description:—Plants up to 50 cm, very branched from the base; insignificantly lignified white perennial stems bearing angular, upright or ascending annual shoots (Fig. 4A) that are glabrous or sometimes can be covered with solitary simple and short-stalked glandular hairs; all leaves fleshy, glaucous, cuneate, apex shortly mucronate; lowermost leaves obovate, 3.0–7.0 × 1.5–3.0 cm, middle and upper leaves oblong or ovoid (Fig. 4B), with shortened vegetative shoots in their axils; inflorescences monochasial looking umbel-like (Fig. 4C); sepals approximately 4 mm, slightly accrescent (to 6 mm) in fruit; 20–30 petal-like staminodia (Fig. 4D), mauve or pink; stamens 20 or more, anthers white; capsule orbicular, 6–7 mm in diameter, papery; seeds numerous, 1.0–1.2 mm, reniform; testa cells without papilla-like elongations (Fig. 5 G, H, I).

Habitat:—Scrubs, limestone, deserts and ruderal sites; 0–700 m a.s.l. (upper extent of the altitude is not precisely known).

Phenology:—Flowering December–June; fruiting February–July.

Conservation status:—The appropriate data on abundance and/or distribution of the taxon is lacking. It can be included in the Not Evaluated (NE) category of IUCN Red List categories (IUCN 2014) as there is inadequate information to make a direct or indirect assessment of its risk of extinction based on its distribution and/or population status.


Etymology:—The species is named after A.W. Exell (1901–1993), an expert in South African flora.

Comments:—The new species was previously identified as C. decumbens, e.g. the above mentioned Angolan specimens (by Conçalves 1970). From both C. decumbens and C. rubriviolacea, the new species differs by narrower (oblong or ovoid) leaves and more compact (umbel-like) inflorescence. From morphologically similar C. decumbens, the new species is also distinguished by the seeds with the absence of cylindrical elongations of the testa cells, and both C. exellii and C. rubriviolacea share the similar seed ultrasculpture (Fig. 5; see also the Table 1). The distribution area of C. exellii is restricted to Southern Africa (Fig. 6), with the majority of locations from Angola and Namibia.
FIGURE 2. Holotype of Telephium laxiflorum (G-DC-G004882031).
FIGURE 3. Holotype of Corbichonia exelli (BM-001122713!).
### TABLE 1. Morphological differences and distribution pattern of *Corbichonia* species

<table>
<thead>
<tr>
<th></th>
<th><em>C. decumbens</em></th>
<th><em>C. exellii</em></th>
<th><em>C. rubriviolacea</em></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Life history</strong></td>
<td>annual or perennial herb, sometimes dwarf subshrub</td>
<td>subshrub with many obliquely directed or ascending shoots</td>
<td>perennial herb with several or many prostrate stems</td>
</tr>
<tr>
<td><strong>Leaves</strong></td>
<td>short-petiolate (petioles to 1.5 cm), cuneate, 2.0–6.0 × 1.0–3.5 cm, lower leaves obovate, stem leaves obovate or ovate</td>
<td>short-petiolate (petioles to 1.5 cm), cuneate, 3.0–7.0 × 1.5–3.0 cm, lowermost leaves obovate, median and upper leaves ovoid or oblong</td>
<td>subshrub (petioles to 0.3 cm), to 3 cm, truncate, all leaves orbicular or near so</td>
</tr>
<tr>
<td><strong>Sepals (mm)</strong></td>
<td>3.5–5.0</td>
<td>4.0–6.0</td>
<td>2.5–4.0</td>
</tr>
<tr>
<td><strong>Number of petals</strong></td>
<td>ca. 20</td>
<td>approximately 30</td>
<td>approximately 30</td>
</tr>
<tr>
<td><strong>Sepal/petal ratio</strong></td>
<td>ca. 1:2</td>
<td>more than 1:2</td>
<td>not reported</td>
</tr>
<tr>
<td><strong>Outgrowths of the seed-coat testa (Fig. 5)</strong></td>
<td>present (except some Indian and Pakistani specimens), of cylindrical shape</td>
<td>absent</td>
<td>absent</td>
</tr>
<tr>
<td><strong>Distribution pattern (Fig. 6)</strong></td>
<td>Tropical parts of Asia (India, Pakistan, Arabia), Eastern, Sub-Saharan and Southern Africa</td>
<td>SW Africa (Angola, Namibia, South Africa)</td>
<td>SW Africa (Namibia)</td>
</tr>
</tbody>
</table>

*FIGURE 4. Images of *Corbichonia exellii* (NAMIBIA. Hardap region: Maltahöhe district, Kyffhäuser Farm, 24°28'46"S, 16°20'07"E, photographer A. Dreyer). A) General view of the plant in early blooming stage, B) fragment of the annual shoot showing the leaves from abaxial side, C) inflorescence supported by upper leaves, D) flower with petals (of staminodial origin).*

Discussion

Notes on the composition of Lophiocarpaceae family

The reproductive features (especially the flower and fruit characters) are of special importance to understand the higher-level systematics based on molecular phylogeny (Endress & Matthews 2012). In the last decade many species of Caryophyllales have been intensively studied in relation to their reproductive structures, as well as flower and fruit evolution, with a view to improving the morphological delimitation of the higher-level taxa within the Caryophyllales (Brockington et al. 2009, 2013, Ronse de Craene 2007, 2013, Kadereit et al. 2010, Greenberg & Donoghue 2011, Sukhorukov & Zhang 2013, Sukhorukov et al. 2015). It seems that some genera previously merged together as relatives [Macarthuria Hügel ex Endlicher (1837: 11) and Corbichonia (see for more: Pax & Hoffmann 1934), or many Molluginaceae in extended circumscription (Endress & Bittrich 1993)] show many similar carpological characters (capsule as fruit type, black and shiny seeds, hard seed-coat testa, occurrence of funicular seed aril, etc.), but an exact comparison of the carpological traits in many-seeded fruits in the taxa of ‘Globular Inclusion’ clade still needs to be conducted (Sukhorukov et al., in prep.). However, the results of morphogenetic studies (in extended Molluginaceae) suggested that Corbichonia is set apart from other family members (Hoffmann 1973). The differences between Corbichonia and Lophiocarpus, which contradict the recent, highly unexpected placement of Corbichonia into Lophiocarpaceae based on the molecular phylogeny, are presented in Table 2.

The circumscription of the small family Lophiocarpaceae (Lophiocarpus with approximately six species and Corbichonia, with three species) with the distribution pattern in Southern Africa (except C. decumbens with extended
range in the Old World Tropics) still needs further re-evaluation due to (1) the lack of comprehensive molecular studies so far, and (2) highly divergent characteristics of both genera in embryology, morphology, fruit and seed anatomy (Table 2). Regarding the large number of differences between *Lophiocarpus* and *Corbichonia*, the relationship of the latter genus to Lophiocarpaceae must be checked.

**FIGURE 6.** Distribution patterns of *Corbichonia exellii* (asterisks), *C. decumbens* (dots) and *C. rubriviolacea* (squares).

**TABLE 2.** Morphological differences between the genera *Lophiocarpus* and *Corbichonia*.

<table>
<thead>
<tr>
<th></th>
<th><em>Corbichonia</em></th>
<th><em>Lophiocarpus</em></th>
</tr>
</thead>
<tbody>
<tr>
<td>Leaf shape</td>
<td>obovate, oblong or ovoid</td>
<td>linear</td>
</tr>
<tr>
<td>Inflorescence</td>
<td>monochasium (Endress &amp; Bittrich 1993, present article) or dichasium (Brockington <em>et al.</em> 2013)</td>
<td>thyrsoid consisting of lateral dichasia (Eckardt 1974)</td>
</tr>
<tr>
<td>Flower morphology</td>
<td>sepals (5) and dark pink or violet (rarely white) coloured petals (10–30) of staminodial origin; stigmas 5 (Ronse de Craene 2007; Brockington <em>et al.</em> 2013)</td>
<td>perianth consisting of 4–5 green tepals, 4 stamens and 3–4 stigmas (Eckardt 1974; Stannard 1988)</td>
</tr>
<tr>
<td>Type of embryo development</td>
<td>Solanad-type (Hakki 2013)</td>
<td>Caryophyllad-type (Johansen 1950)</td>
</tr>
<tr>
<td>Fruit</td>
<td>5-valved loculicidal capsule with numerous seeds</td>
<td>one-seeded, indehiscent</td>
</tr>
<tr>
<td>Pericarp</td>
<td>smooth, outer cells with lignified walls, the innermost cells without lignification; layers 4 to 8 (Sukhorukov <em>et al.</em> 2015)</td>
<td>verrucose, rarely ribbed, completely or partially with un lignified cells, layers 4 to 10 in inflated parts or ribs (Sukhorukov <em>et al.</em> 2015)</td>
</tr>
<tr>
<td>Seed arillus</td>
<td>+ (strophiole)</td>
<td>absent</td>
</tr>
</tbody>
</table>

...continue on the next page
TABLE 2. (Continued)

<table>
<thead>
<tr>
<th></th>
<th>Corbichonia</th>
<th>Lophiocarpus</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seed-coat testa</td>
<td>sinus-like, triangular in cross-sections, 50–65 µm, warty in upper part, with obliquely oriented stalactites (Sukhorukov et al. 2015)</td>
<td>alveolate, in most species 20–50 µm (ca. 80 µm in <em>L. latifolius</em>), with almost straight stalactites (Sukhorukov et al. 2015)</td>
</tr>
<tr>
<td>Ovary obturator</td>
<td>placental (Hakki 2013)</td>
<td>funicular (Hakki 2013)</td>
</tr>
</tbody>
</table>

Acknowledgements

We cordially thank Alex Dreyer (Namibia), Bart Wursten (principle author, editor and photographer of Online Zimbabwe Flora Project) and the SASSCAL IT team (Hamburg, Germany) for providing magnificent images of *Corbichonia exellii*, *C. decumbens* and *C. rubriviolacea*, respectively, as well as Duilio Iamonico (editor of the Caryophyllales section of “Phytotaxa”), Ernst Vitek, Johannes Walter (both, NHM Vienna, Austria), Robert Vogt (Berlin), Jacek Wajer (London), Irina Belyaeva (London) for their kind help in the preparation of the article. The investigation is supported by the Russian Fond for Fundamental Research (project 14-04-00136-a: revision of the material in different herbaria) and Russian Scientific Foundation (project 14-50-00029: carpological research).

References


http://dx.doi.org/10.1007/978-3-662-02899-5_49


http://dx.doi.org/10.1007/s00606-011-0576-2


http://dx.doi.org/10.3732/ajb.1000169


http://dx.doi.org/10.1093/aob/mcm076


http://dx.doi.org/10.1007/s00606-011-0576-2
Appendix. Specimens used for the mapping of the distribution of *Corbichonia decumbens* and *C. rubriviolacea* (the records of *C. exellii* are cited in the main text). Records of *C. decumbens* from Tropical America (Jeffrey 1961) are not included due to the absence of the specimens from this region in the herbaria visited. Specimens marked with an asterisk (*) after herbarium acronym were used for the carpological investigations. Specimens of *C. decumbens* marked with a double asterisk (**) after herbarium acronym have seeds without papilla-like outgrowths on the seed-coat testa.

**Corbichonia decumbens** (Fig. 6)

**INDIA. Telangana state:** Hyderabad, October 1798, *Klein s.n.* (B-W, E); [Tamil Nadu state], Coimbatore, April 1870, *Clarke s.n.* (BM); **Rajasthan state:** Jaisalmer, 24 August 1964, *Wadhwa 4975* (LE); **Karnataka state:** Mysore, [without date], *Thomsnon s.n.* (K)**; **PAKISTAN. Sindh province:** Jamidar Ka Anda, near Kuruchhee [Karachi], 1851, *Stocks s.n.* (K); Karachi, July 1956, *Jafri 1496 (E)*; Karachi, 15 July 1956, *Jafri 1496 (LE)*; 10–15 km S Sehwan, 26°26′ N, 67°52′ E, May 1965, *Rechinger 28727* (W-1969-0000740); **Punjab province:** Shahkot, [without date], *Edgeworth s.n.* (K); Sakesar, Kiri Golewala, September 1902, *Kabir 14506 (K)*; Sangla hill, March 1917, *Stewart 1404 (K)*; **Khyber Pakhtunkhwa province:** Peshawar distr., August 1958, *Burtt 1055 (E)*; Peshawar to Torkham, May 1965, *Lamond 1593 (E)*; Wazistan, Darzinda [Darazinda], April 1968, *Khan 4579 (K)**; near Thal, Mount Tor-ghar, 2000 ft, 1880, *Atkinson 528* (BM, E, K, LE); Inter Saidu Sharift Malakand, ca. 34°35′N, 71°20′ E, 24 August 1962, *Rechinger 19613* (W-1969-00005164); Dera Ismail Khan: Montes Sulaiman, 100 km E Port Sandeman, 31°21′N, 69°31′E, Inter Mughal Kot et Darabun, 31°44′N, 70°22′E, 900–700 m, 21 May 1965, *Rechinger 29976* (W-1969-0000717); South Malakand, 34°30′ N, 71°54′ E, 7 June 1965, *Rechinger 30873* (W-1969-0000739); **Federally Administered Tribal Areas:** Peshawar, Landi Kotal (Khyber Passa) range, 34°07′N, 71°15′E, 700–1000 m, 29 May 1965, *Rechinger 30290* (W-1969-0000711); **Balochistan province:** Uthal, 25°48′N, 66°40′E, 8 April 1965, *Rechinger 27573* (W-
Phytotaxa 218 (3) © 2015 Magnolia Press • 239

Exell et al. 473 (BM)*; Lourenço Marques, Matola, April 1967, Marques 1955 (E); Zambezia province: Morrumbala Mt., December 1971, Pope & Mueller 607 (K); Sofala province: Chitengo Camp, Gorongosa National Park, 18°58′47″ S 34°21′8″ E, 37 m, 29 January 2007, Ballings & Wursten PB-388 (LMU; see also Fig. 1). BOTSWANA. Kgatleng district: Mochudi, March 1967, Mitchison 45 (K); Kgalagadi district: Southern Kalahari, Mobuasehube Game Reserve, March 1976, Potsan & Stee 2422 (K). MALAWI. Southern Region, Chikwawa distr., April 1970, Brummitt 10017 (K), and other collections from the same location (K). SWAZILAND. Shiselweni district: Hlatikulu, November 1959, Dlamini s.n. (K). SOUTH AFRICA. Cape of Good Hope, 1826, Drége s.n. (LE—HAL—photo! sub Senebiera aizoides E. Mey. in herb.); Northern Cape province: Cape prov., Prieska distr., May 1961, Schlieben 8786 (K); [Eastern Cape province, without precise location], 2700 ft., Bolus 426 (UZH-00037300, photo!); Mpumalanga province: Transvaal, Barberton distr., January 1966, Hilliard & Burtt 3605 (E); Mpumalanga, Banks of Crocodile River next to Crocodile Bridge, 25°38′S 31°9′E, May 2004, Venter 10381 (W 2012-0009117); KwaZulu-Natal province: Natal, Pongola plain, February 1969, Pooley 360 (E); Natal Region, Pietermaritzburg, March 1972, Strey 2393a (K); Natal Region, Louwsburg distr., December 1975, Brown & Shapiro 2731 (K); Natal, Kwazulu, Umvoti distr., January 1990, Balkwill et al. 5341 (E); KwaZulu-Natal [without date], Gerrard 1489 (W 1889-0161913).

**C. rubriviolacea** (Fig. 6)

NAMIBIA. Karas region: Friedenfelde, Blinkoog, 1953, E. Walter & H. Walter 2366 (M-0107807—holotype of Orygia rubriviolacea); Karas region, near Ham river, going south of road 202, 27°43′ S 18°25′ E, 1177 m, 25 March 2000, Mannheimer & Curtis CM930 (K)*; Erongo region: 34 miles E from Walvisbays [Walvis Bay], 16 February 1963, Giess et al. 5124 (E); Swakopmund district, 34 miles E from Walvisbays [Walvis Bay], way to Damsberg, 16 February 1963, Giess, Folk & Bleissner 5124 (K)*; Hardap region: Maltahöhe district, Kyffhäuser Farm, 24°28′46″S, 16°20′07″E (image), photographer A. Dreyer.

After acceptance of the article we have received other images of Corbichonia, and the photos from Zimbabwe (At foot of hills just outside of Zvishavane on road to Mbalabala, photographer Bart Wursten) obviously depict *C. rubriviolacea*. This record is more than 700 km to the east from the records listed above (Namibia). The photo is available at: http://www.zimbabweflora.co.zw/speciesdata/utilities/utility-display-all-images-by-genus.php?genus_id=555