

The genus *Seddera* Hochst. (Convolvulaceae) in Madagascar

Thierry DEROIN

Muséum national d'Histoire naturelle,
Département Systématique et Évolution, UMR 7205,
case postale 39, 57 rue Cuvier, F-75231 Paris cedex 05 (France)
deroin@mnhn.fr

SEBSEBE DEMISSEW

The National Herbarium, Science Faculty, Addis Ababa University,
P.O. Box 3434, Addis Ababa (Ethiopia)
sebsebed@bio.aau.edu.et

Deroin T. & Sebsebe Demissew 2009. — The genus *Seddera* Hochst. (Convolvulaceae) in Madagascar. *Adansonia*, sér. 3, 31 (1): 207-214.

ABSTRACT

A new Malagasy species of Convolvulaceae, *Seddera madagascariensis* Deroin & Sebsebe, is described from the subarid bioclimatic region (Mahafaly and Androy). It has been confused for a long time with *Evolvulus alsinoides* (L.) L. due to its similar habit, it is clearly distinguished from the other endemic Malagasy species *S. repens* Hallier f., by its often asymmetrical leaf base, unilocular ovary included in the disk, as well as by its 1-seeded capsule. These unusual features in the genus *Seddera* are briefly discussed.

RÉSUMÉ

Le genre Seddera Hochst. (Convolvulaceae) à Madagascar.

Une nouvelle espèce malgache de Convolvulaceae, *Seddera madagascariensis* Deroin & Sebsebe, est décrite de la région bioclimatique subaride. Longtemps confondue par son port avec *Evolvulus alsinoides* (L.) L., elle se distingue bien de l'autre espèce – également endémique – *S. repens* Hallier f., par ses feuilles souvent asymétriques, son ovaire uniloculaire encastré dans le disque et sa capsule 1-séminée. Ces caractères uniques pour le genre *Seddera* sont brièvement discutés.

KEY WORDS

Convolvulaceae,
Evolvulus,
Seddera,
gynoecium,
Madagascar,
new species.

MOTS CLÉS

Convolvulaceae,
Evolvulus,
Seddera,
gynécée,
Madagascar,
espèce nouvelle.

INTRODUCTION

The genus *Seddera* Hochst. (Convolvulaceae) includes about 31 species (Sebsebe Demissew & Mill in press) and is restricted to mainland Africa, Madagascar, Arabia and the Indian subcontinent. So far only one species, *S. repens* Hallier f. has been described from Madagascar (Hallier 1898), but was for a long time known only from the type collection: *C. Rutenberg s.n.*, 12.III.1878, Nossi-Bé [Nosy Be] (not seen and possibly destroyed, formerly at BREM, perhaps transferred to CSR?). In the course of reviewing specimens at P for a revision of the genus *Seddera*, several other sheets were referred to this species, and a number of specimens of a second species were found, which is described here as new. Recent treatments of the genus *Seddera* on mainland Africa and Madagascar include Verdcourt (1963) for the *Flora of Tropical Africa*, Gonçalves (1987) for the *Flora Zambesiaca*; Sebsebe Demissew (2006a) for the *Flora of Ethiopia and Eritrea*; Sebsebe Demissew (2006b) for the *Flora of Somalia*. Deroin (2001) did not consider the genus at all in the *Flore de Madagascar et des Comores*, and listed all the specimens seen under *Evolvulus alsinoides* (L.) L., but in fact some of them belonging to *Seddera repens* and others to the new species described in this article.

SYSTEMATICS

Seddera madagascariensis

Deroin & Sebsebe, sp. nov.

(Fig. 1)

A plerisque ceteris Sedderae speciebus cognitis ovario uniloculario differt. Sedderae hallieri Engler & Pilger affinis adpressis pubescentibus foliis, differt vero laminis saepius basi asymmetricis (vs. cuneatis), pedunculis brevissimis (minus quam 1 mm longis), stylis duplo longioribus. A S. repenti Hallier f., quacum crescit habituque valde proxima, pedunculis multo brevioribus, pedicellis duplo longioribus, ovario late (necnon longe) ovoideo, pilis longissimis fere omnino praedito, leviter incluso in disco crasso, stylis duplo longioribus, capsula monosperma praecipue differt.

TYPUS. — **Madagascar.** Province de Toliara, environs d'Ampanihy (extrême Sud), alt. 200-300 m, 30.VIII-7.IX.1928, *Humbert & Swingle 5525* (holo-, P).

PARATYPES. — **Madagascar.** Province de Toliara, lac Anony (Sud), bush sur calcaire, X.1956, *Bosser 10603* (P). — Route d'Ifotaka, s.d., *Descouings 1604* (P). — Environs d'Ambovombe (extrême Sud), alt. 1-50 m, 9.IX.1928, *Humbert & Swingle 5604* (P). — Environs de Tuléar, près de la Colline de la Table, alt. 10-150 m, 10-12.I.1947, *Humbert 19836* (P).

DESCRIPTION

Perennial branched herb up to c. 50 cm tall; stems slender radiating from a thickened tap root, c. 3 mm in diameter, erect or decumbent, densely adpressed pubescent when young later becoming glabrous with smooth grey bark with age.

Leaf-blade rather variable, ovate to lanceolate, sometimes almost linear, 4-15.5 × 1-4 mm, apex mucronate, obtuse or acute at the apex, cuneate often slightly asymmetrical at the base, sparsely adpressed pilose on both surfaces, midrib and secondary veins (4 or 5 pairs) conspicuous above. Petiole 1-3 mm long, canaliculate above. Flowers solitary, axillary or sub-terminal; peduncle very short (less than 1 mm long), bracts 2, oblong, obtuse, c. 0.8 mm long, sometimes leafy up to 3 × 0.5 mm, pedicel c. 3 mm long. Sepals slightly unequal, the outer ones oblong-lanceolate, acute, c. 4 × 1.8 mm; the inner sepals ovate or almost triangular, acuminate, with wide hyaline margins, c. 3.5 × 2.2 mm, glabrous inside except at the reflexed tips. Corolla funnel-shaped, white, 5-6 mm high, outside with long hairs at the upper part of mid-petaline areas. Stamens equal, inserted at c. 0.7 mm from the tube base, by enlarged triangular basal parts of the filaments c. 2.2 mm long; anthers broadly ellipsoidal c. 1.2 mm long. Pollen grains subglobose, with a finely granular 3-furrowed tectum, falling into two categories: smaller diameter (c. 35 µm), with a thick exine (c. 2.5 µm); and larger diameter (c. 52 µm), with a thinner exine (c. 1.5 µm). Ovary ovoid c. 1.5 mm tall, covered with stiff hairs up to 1.8 mm long at the top, shorter at the base, 1-locular, ovules 4, erect on a low placenta. Disk cup-shaped, loosely 5-lobed, c. 0.5 mm high. Styles 2, wholly separate, c. 3.5 mm long; stigmas kidney-shaped, lobulate-papillose, c. 0.7 mm in diameter. Capsule enclosed in the calyx, ellipsoid, c. 3.5 × 3 mm; pericarp thin and brittle, glabrescent except for tufts of

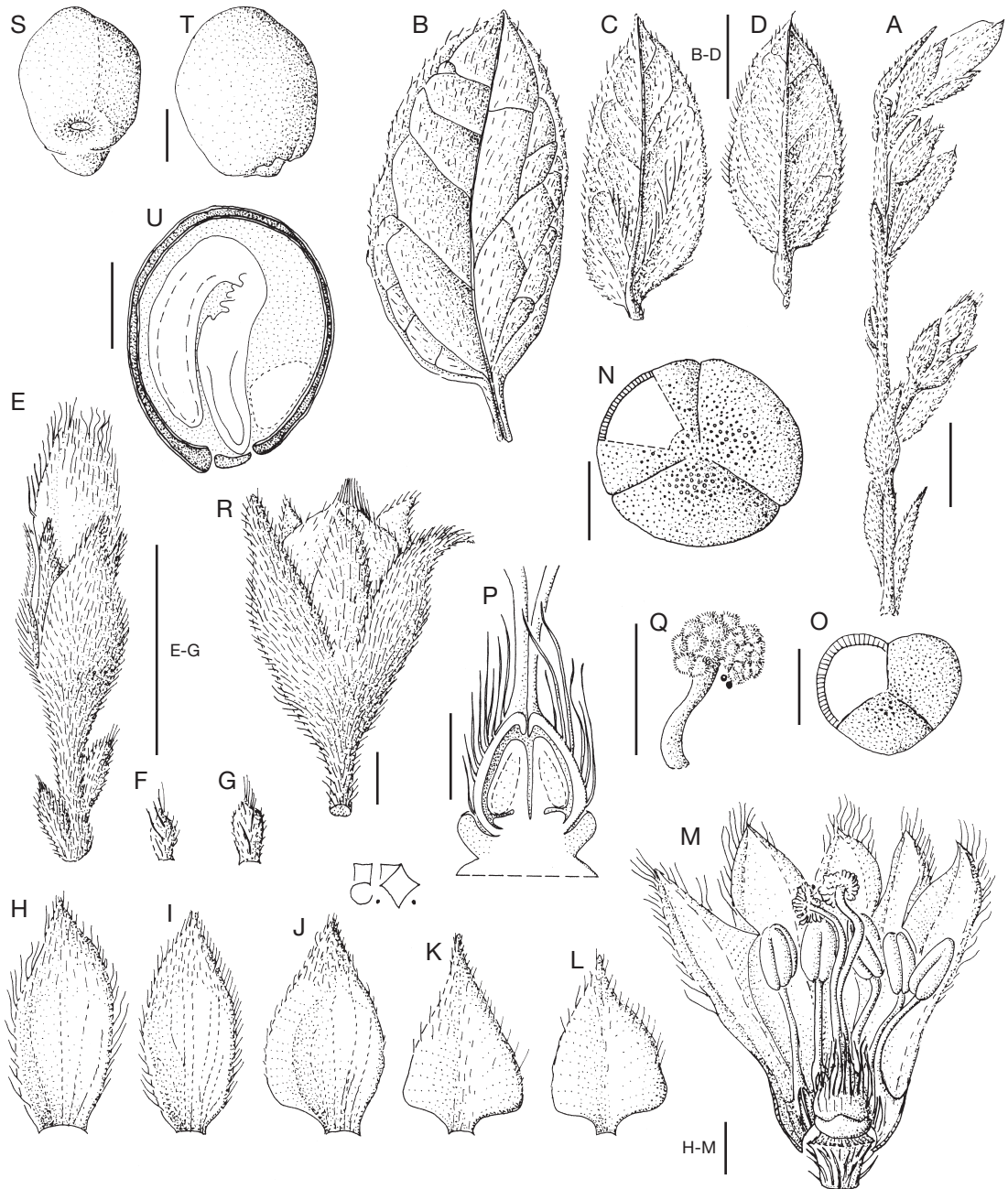


FIG. 1. — *Seddera madagascariensis* Deroin & Sebsebe, sp. nov.: **A**, tip of a flowering bud; **B-D**, different leaf shapes; **E**, floral bud; **F, G**, bracts; **H-L**, sepals (from outside to the centre); **M**, opened corolla showing androecium and gynoecium; **N, O**, pollen grains; **P**, ovary (lengthwise section); **Q**, stigma; **R**, capsule surrounded by the calyx; **S-U**, seed (adaxial and lateral sides, longitudinal section respectively). **A, E-Q**, *Humbert & Swingle 5525*; **B, R-U**, *Humbert & Swingle 5604*; **C, D**, *Humbert 18336*. Drawn by Thierry Deroin. Scale bars: **A-G**, 5 mm; **H-M, P-U**, 1 mm; **N, O**, 20 µm.

TABLE 1. — List of characters for *Seddera madagascariensis* Deroin & Sebsebe, *S. arabica* (Forssk.) Choisy, *S. fastigiata* Balf.f., *S. hallieri* Engl. & Pilg., *S. repens* Hallier f. and *S. virgata* Hochst. & Steud.

Characters	<i>S. madagascariensis</i>	<i>S. arabica</i>	<i>S. fastigiata</i>	<i>S. hallieri</i>	<i>S. repens</i>	<i>S. virgata</i>
Leaf						
Apex	Obtuse or acute, and mucronate	Obtuse and mucronulate	Acute	Acute and apiculate	Retuse, or acute, and mucronulate	Acute
Base	Asymmetric	Rounded	Shortly cuneate	Cuneate	Rounded to subcuneate	Cuneate
Peduncle length (mm)	< 1	3-30	0	Up to 6	Up to 5 (-17)	Up to 4
Pedicel length (mm)	c. 3	2-5.5	0	1-3	1-1.5	1-3
Ovary locule number	1	2	2	2	2	2
Style length (mm)	3	c. 6	4	5.5-6	c. 3	3-4
Stigma shape	Kidney-shaped	Bi-lobed	Obovoid	Bi-lobed	Capitate	Bi-globose
Capsule indumentum	Glabrescent except tuft of hairs above	Glabrous except for tufts of hairs at apex	Glabrous	Pubescent	Pubescent	Glabrous except for tufts of hairs at apex
Seed size (mm)	3 × 2.6	2.3-2.5 × 1-1.2	Not seen	2.2 × 1.2-1.5	1.5-2	2.3-2.5 × 1.5-2
Distribution	SW Madagascar	N, NE and E Africa and Arabia	Endemic to Yemen in Socotra	NE Africa	SW and W Madagascar	NE Africa and Arabia

hairs at the acute apex. Seed 1, ellipsoidal, loosely trigonous, *c.* 3 × 2.6 mm, with a black glabrous testa and a copious endosperm. Hilum narrow, transversely elliptical.

NOTES

The new species differs from all other known species of the genus *Seddera* which are normally 2-locular, in having a unilocular ovary. It resembles *S. hallieri* Engler & Pilger from mainland Africa with its adpressed pubescent leaves, but differs from it by its often asymmetrical leaf base (not cuneate), peduncle <1 (not up to 6) mm long, style *c.* 3 (not 5.5-6) mm long. It also differs from *S. repens* (Fig. 2), with which it is largely sympatric, by the peduncle <1 (not up to 6.5 (-17)) mm long, pedicel *c.* 3 (not 1-1.5) mm long, by the gynoeceal morphology (ovary widely ovoid and somewhat included in the disk, almost wholly covered by longer hairs, styles twice longer), and by the 1-seeded capsule.

In Table 1, the differences between the two Malagasy species and four other species that have morphological resemblance from mainland Africa and Arabia (*S. arabica* (Forssk.) Choisy, *S. fastigata* Balf.f.,

S. hallieri Engl. & Pilg., and *S. virgata* Hochst. & Steud.) are shown.

ECOLOGY

Xerophyllous bush at 10-300 m.

DISTRIBUTION (Fig. 3)

Known only from Madagascar, in the Mahafaly and Androy territories, evidently linked to carbonated soils (on limestone, dolomite, sand or cipolin in the extreme south). Its distribution coincides strikingly with that of *Ipomoea keraudreniae* Deroin (1993), which is growing on the same carbonated soils.

CONSERVATION STATUS

With an Extent of Occurrence (EOO) of 31 350 km², a fragmented and overestimated Area of Occupancy (AOO) of 4465 km², and unprotected subpopulations, *Seddera madagascariensis* is assigned a preliminary status of Near Threatened (NT) using the IUCN Red List threat criteria (IUCN 2001). As it much resembles *Evolvulus alsinoides* (L.) L., a pantropical annual, weedy species, *Seddera madagascariensis* has probably often been overlooked by field botanists.

FLOWERING TIME

Recorded in flower in August, September and January, based on the few available specimens. However it is very likely that flowers and fruits are borne throughout much of the year. The thick, and probably rather long tap root may ensure a good water supply during the severe dry season of the southwestern Madagascar.

Seddera repens Hallier f.

(Fig. 2)

Bulletin de l'Herbier Boissier 6: 530 (1898).

MATERIAL EXAMINED. — **Madagascar.** Province de Toliara, environs de Tuléar, delta du Fiherenana, alt. 2-10 m, 14-26.IX.1924, *Humbert & Perrier de la Bâthie* 2447 (G, P). — Delta de la Linta (côte sud-ouest), alt. 1-10 m, 24-28.VIII.1928, *Humbert & Swingle* 5481 (P). — Bassin de la Malio (affluent du Mangoky), près d'Ambalabe, alt. 400-500 m, 23-27.XI.1946, *Humbert* 19334 (P). — D'Ampanihy à l'embouchure de la Menarandra (extrême sud), alt. 1-200 m, 10-11.III.1955, *Humbert & Capuron* 29352 (P). — 5 km au N de Befotaka [most probably Ifotaka] (Mandrare), IV.1960, *Keraudren* 1005 (P). — SW of Ifotaka, 17.XI. 1938, *Lam & Meeuse* 5426 (K). — Sud-Est, entre Imonty et Amboasary, 7.XII.1960, *Leandri* 4344 (P). — Route nationale 27, km 40 [35 km SSE from Ihosy], 21.XII.1965, *Peltier* 5577 (P). — Bassin de l'Onilahy, III.1910, *Perrier de la Bâthie* 9129 (P). — Sud-Ouest, Manampetsa [Lake Tsimanampetsotsa], IV.1933, *Perrier de la Bâthie* 19053 (P). — Beza Mahafaly Reserve, near Betioky, Parcelle 2, 6.I.1988, *Phillipson* 2816 (K, MO). — Province de Mahajanga, env. de Majunga, alt. 2-15 m, 28-30.XII.1924, *Humbert* 4058 (G, K, P). — Nosy Be, 12.III.1878, *Rutenberg* s.n. (holo-, CSR, not seen).

DESCRIPTION

Shrublet 15-30 cm high. Branches thin and slender, pubescent. Leaves subsessile; lamina elliptic to suborbicular, 4-11 × 3-7 mm; retuse, acute and mucronulate at the apex, rounded to subcuneate at the base, hirsute; petiole 1-2.5 mm long. Inflorescence axillary, solitary, with 1 or 2-3 flowers; peduncle absent to 1-5 (-17) mm long; pedicel 1-1.5 mm long; bracts linear 1-1.5 mm long. Sepals 5, unequal; 3 outer ones elliptic 5-6 × 1.5-2 mm, 2 inner ones ovate-lanceolate, broader at the base 4.5 × 1-1.5 mm, all acute at the apex. Corolla

white, occasionally blue (*Phillipson* 2816), 5-6 mm long, pubescent on mid-petaline areas. Stamens 5, ± equal with filaments 3-3.3 mm long; anthers 0.7 mm long. Ovary pubescent in the upper half, long ovoid; styles 2, 3-3.2 mm long, with capitate stigma. Fruit 4-valved, 4-seeded, c. 2.5-3 mm long, hairy at the apex. Seeds black, 1.5-2 mm long.

ECOLOGY

Xerophyllous bush at low altitudes.

DISTRIBUTION (Fig. 3)

Known only from Madagascar, in the Mahafaly and Androy territories, like *S. madagascariensis*, but also in Isalo (Malio basin), near Ihosy, and in the west (Majunga basin) and north (Nosy Be island), equally on siliceous or carbonated soils. It is hardly conceivable the distribution is so scattered, more collections in the future of this relatively neglected species may fill the gaps between the known localities.

CONSERVATION STATUS

Restricted to the western part of Madagascar, *Seddera repens* has an EOO of c. 225 000 km², an AOO of 1100 km², and c. 11 subpopulations now recognized, two of which are encompassed within protected areas (Tsimanampetsotsa, Beza Mahafaly Reserve). Using the IUCN Red List threat criteria (IUCN 2001), it might be assigned a preliminary status of Least Concern (LC).

FLOWERING TIME

Flowering has been recorded from September to April. Phenology is very like that of *S. madagascariensis*, no flowering collections are known from May to August, the peak of the dry season.

MORPHOLOGICAL REMARKS
AND CONCLUSIONS

The two species are similar to each other, as the main differences are in the relative proportions of reproductive parts. The restricted distribution of *Seddera madagascariensis* suggests a speciation from *S. repens* on limestone soils, and under more severe dry conditions. Field observations are needed to

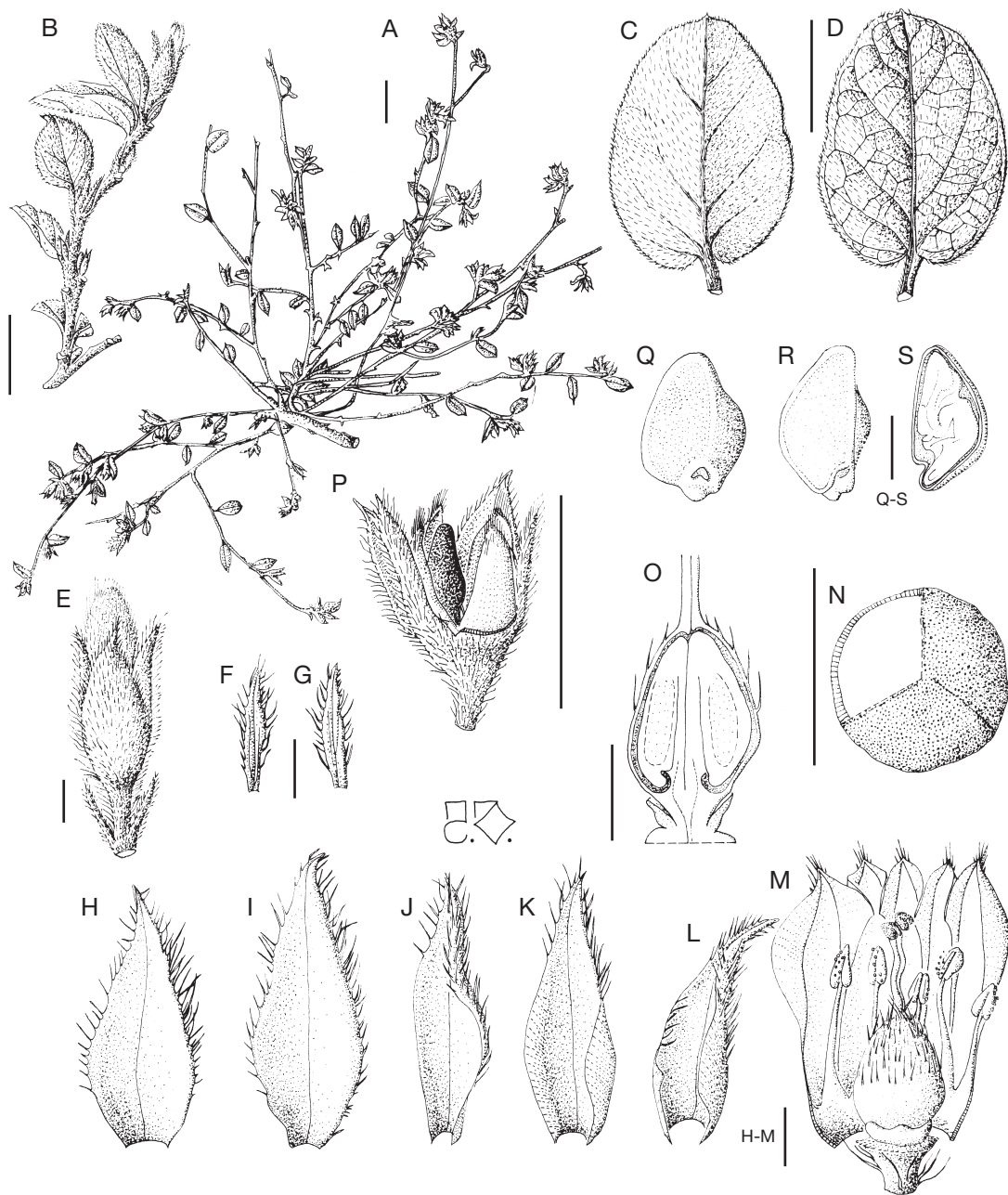


FIG. 2. — *Seddera repens* Hallier f.: **A**, habit with rosette base; **B**, flowering branchlet; **C**, **D**, leaf (abaxial and adaxial sides respectively); **E**, floral bud; **F**, **G**, bracts; **H**–**L**, sepals (from outside to centre); **M**, corolla opened showing androecium and gynoecium; **N**, pollen grain; **O**, ovary (lengthwise section); **P**, dehiscent capsule surrounded by the calyx; **Q**–**S**, seed (adaxial and lateral sides, lengthwise section). *Humbert & Swingle 5481*. Drawn by Thierry Deroin. Scale bars: **A**, 1 cm; **B**–**D**, **P**, 5 mm; **E**–**M**, **O**, **Q**–**S**, 1 mm; **N**, 50 μm.

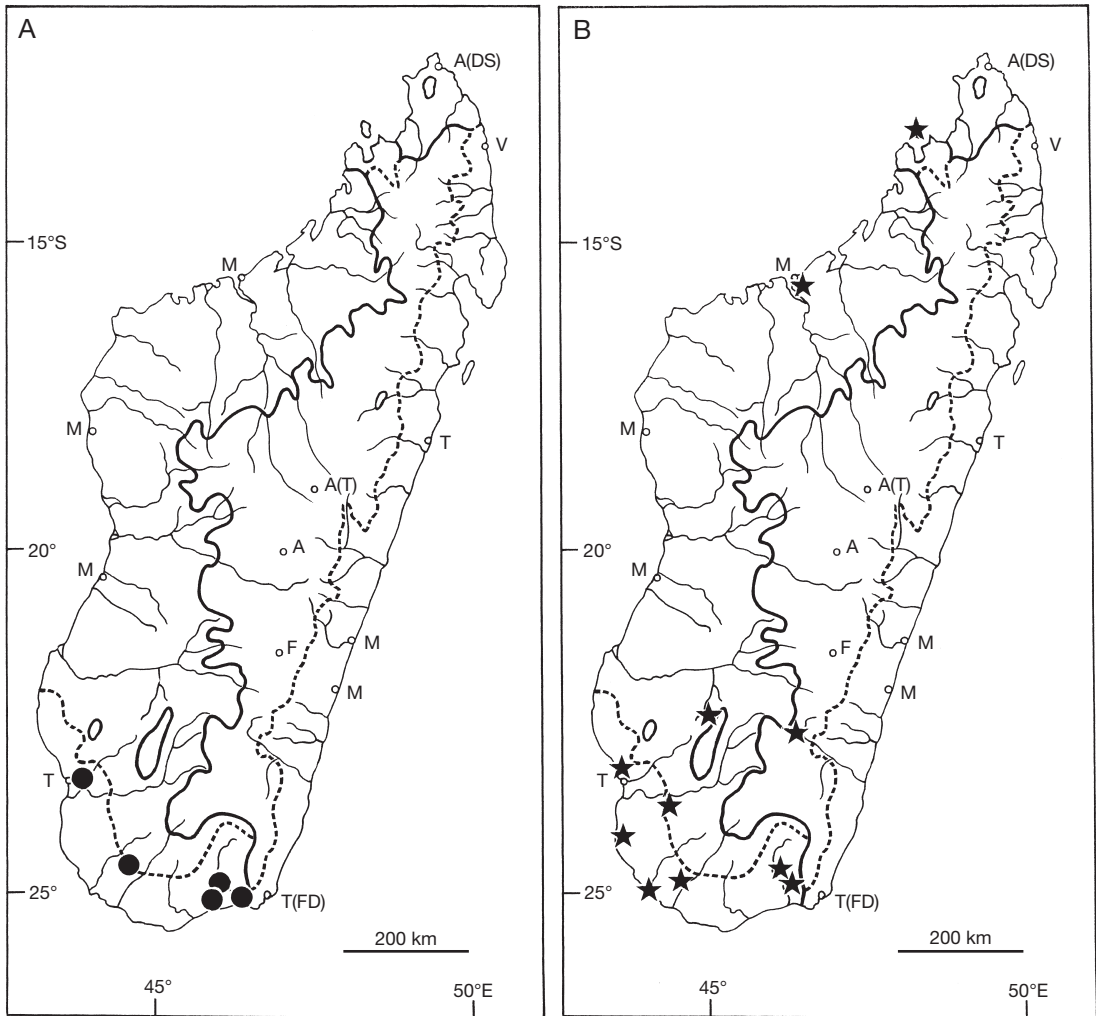


FIG. 3. — Distribution of Malagasy *Seddera* species: **A**, *S. madagascariensis* Deroin & Sebsebe; **B**, *S. repens* Hallier f. (phytogeographical frame after Humbert 1955).

ascertain whether or not the two species may hybridize in the Mahafaly and Androy territories.

The most distinctive feature of *S. madagascariensis* is the unilocular ovary, until now unknown in *Seddera*. This situation shows a striking similarity with that in another Convolvulaceae of Madagascar, *Bonamia ankaraniensis* Deroin (2004), in which the ovary is bilocular in the youngest ontogenetical stages, but the septum vanishes at anthesis, and the mature fruit is 1-seeded. In the genus *Bonamia*, styles

are usually separate too. As we also failed to see a septum in *S. repens* (Fig. 20) – Hallier (1898) describing only a “*saepto pellucido membranaceo*” in the dehiscing capsule – it is most probable that, unlike *Seddera* in mainland Africa, Malagasy species have reduced or resorbed ovarian septa at the anthesis, with a trend to monospermy. Such an ontogenetical acceleration in the gynoecium morphogenesis has already been recognized in the family, especially in Ipomoeae (Deroin 1999).

Due to the new information generated, it is important to amend the generic key (in French) previously published in the *Flore de Madagascar et des Comores* (Deroin 2001: 16) as follows:

6. Sous-arbrisseau prostré A
 A. Inflorescences pauciflores, étamines et stigmates exserts 13. *Cressa*
 A'. Fleurs souvent solitaires, étamines et styles inclus 13'. *Seddera*

For the key to the species, the following is provided:

1. Limbe à base souvent asymétrique, pédoncule bien plus court que le pédicelle, ovaire enclavé par le disque, capsule à 1 graine 1. *S. madagascariensis*
 1'. Limbe à base arrondie ou en coin, pédoncule aussi long ou plus long que le pédicelle, ovaire au-dessus du disque, capsule à 4 graines 2. *S. repens*

Acknowledgements

SD would like to acknowledge support from the NUFU (Norwegian University-University Cooperation) for enabling him to make study visit to the Royal Botanic Gardens, Kew, UK. We would like also to thank the keepers and directors of K, MO and P, for availing the material for this work.

The two authors thank Dr Bernard Verdcourt (K), and Dr Pete Phillipson (MO) whose comments improved significantly the manuscript.

REFERENCES

- DEROIN T. 1993. — Espèces nouvelles de Convolvulaceae du Sud de Madagascar. *Bulletin du Muséum national d'Histoire naturelle*, Paris, 4^e sér., sect. B, *Adansonia* 14 (3-4): 335-346 (dated 1992, published 1993).
 DEROIN T. 1999. — Ontogeny and phylogeny in Convolvulaceae-Ipomoeae: preliminary comparative remarks on ovary morphology. *Systematics and Geography of Plants* 68: 225-232.
 DEROIN T. 2001. — Convolvulacées, 171^e fam., in MORAT P. (ed.), *Flore de Madagascar et des Comores*, Muséum national d'Histoire naturelle, Paris: 11-287.
 DEROIN T. 2004. — Un *Bonamia* (Convolvulaceae) nouveau du nord de Madagascar. *Adansonia*, sér. 3, 26 (2): 143-147.
 GONÇALVES M. L. 1987. — Convolvulaceae, in LAUNERT E. (ed.), *Flora Zambesiaca* 8 (1). Flora Zambesiaca Managing Committee, London: 9-129.
 HALLIER H. 1898. — Convolvulaceae, in SCHINZ H., Beiträge zur Kenntnis der afrikanischen Flora. *Bulletin de l'Herbier Boissier* 6: 529-548.
 HUMBERT H. 1955. — Les territoires phytogéographiques de Madagascar. Leur cartographie. *Année biologique*, 3^e sér., 31: 439-448 + 1 map.
 IUCN 2001. — *IUCN Red List Categories and Criteria*. Version 3.1. IUCN Species Survival Commission, Gland, Switzerland; Cambridge, UK, ii + 30 p.
 SEBSEBE DEMISSEW 2006a. — *Seddera*, in HEDBERG L., ENSERMU KELBESSA, EDWARDS S., SEBSEBE DEMISSEW & PERSSON E. (eds), *Flora of Ethiopia and Eritrea* 5. The National Herbarium, Addis Ababa; Uppsala: 174-179.
 SEBSEBE DEMISSEW 2006b. — *Seddera*, in THULIN M. (ed.), *Flora of Somalia* 3. Royal Botanic Gardens, Kew: 228-231.
 SEBSEBE DEMISSEW & MILL R. M. in press. — Revision of the genus *Seddera* (Convolvulaceae). *Kew Bulletin*.
 VERDCOURT B. 1963. — *Seddera*, in HUBBARD C. E. & MILNE-REDHEAD E. *Flora of East Tropical Africa* 126. Crown Agents for Oversea Governments and Administrations, London: 24-29.

Submitted on 16 May 2008;
 accepted on 16 January 2009.