

A NEW SPECIES OF *CREMOSPERMA* (GESNERIACEAE)  
FROM NORTHEASTERN PERU

Brian R. Keener

Department of Biological  
& Environmental Sciences  
The University of West Alabama  
Livingston, Alabama 35470, U.S.A.  
BKeener@uwa.edu

John L. Clark

Department of Biological Sciences  
Box 870345  
The University of Alabama  
Tuscaloosa, Alabama 35487, U.S.A.

ABSTRACT

Recent fieldwork and investigations of herbarium specimens during a preliminary revision of *Cremosperma* (Gesneriaceae) have resulted in the discovery of a new species. The new species, ***Cremosperma inversum*** B.R. Keener & J.L. Clark, is distinguished from other species in the genus by a suite of characters including orbicular leaves, stoloniferous habit, and tomentose-wooly indument on the upper leaf surface. The distribution of trichomes on the adaxial leaf surface is clustered in the center of the bullae and away from the more or less glabrous veins and glabrous on the abaxial leaf surface away from the more densely pubescent veins. This species is endemic to sandstone outcrops in the Department of Amazonas in northwestern Peru.

RESUMEN

Expediciones recientes al noroccidente de Perú, y el estudio de las colecciones de herbario como parte de la revisión preliminar del género *Cremosperma* (Gesneriaceae), han dado como resultado el descubrimiento de una nueva especie. La nueva especie, ***Cremosperma inversum*** B.R. Keener & J.L. Clark, se distingue de las otras especies del género por un conjunto de caracteres que incluye: hojas orbiculares, hábito estolonífero e indumento tomentoso-lanoso en el haz de la lámina. Los tricomas en la superficie adaxial de la lámina están agrupados entre las venas, las cuales son más o menos glabras, mientras que, en la superficie abaxial las venas son pubescentes y el resto de la superficie es más o menos glabra. Esta especie es endémica de los afloramientos rocosos en el departamento de Amazonas, noroccidente peruano.

KEY WORDS: *Cremosperma*, Gesneriaceae, Taxonomy, Flora of Peru, Amazonas Department, Sandstone

INTRODUCTION

*Cremosperma* is a genus of terrestrial or saxicolous herbs ranging from Costa Rica to Peru. The genus is a strongly supported monophyletic lineage in the New World tribe Beslerieae (Clark et al. 2010; Roalson & Clark 2006; Smith 2000). Taxonomic and phylogenetic information for *Cremosperma* were recently summarized in Clark and Skog (2011). Until now, the only other known *Cremosperma* located south of Ecuador was the endemic Peruvian species *Cremosperma peruvianum* L.E. Skog (Skog 1982).

Kvist and Skog (1988) provided a traditional monograph of the Ecuadorian species and included 14 taxa, several of which also occur in Colombia and estimated the total diversity of *Cremosperma* to be 23 species. The following three *Cremosperma* species have been described since Kvist and Skog (1988): *Cremosperma micropecten* Fern. Alonso from Colombia (Fernández-Alonso 2006); *Cremosperma anisophyllum* J.L. Clark & L.E. Skog from Ecuador (Clark & Skog 2011); and *Cremosperma verticillatum* J.L. Clark & B.R. Keener from Ecuador (Clark & Keener 2011). Recent fieldwork in Ecuador, Panama, and Colombia has resulted in the discovery of additional *Cremosperma* species that will be described in the near future. The description of *Cremosperma inversum* brings the total published diversity of the genus to 27 species and the second species from Peru.

TAXONOMIC TREATMENT

***Cremosperma inversum*** B.R. Keener & J.L. Clark, sp. nov. (**Fig. 1**). TYPE: PERU. AMAZONAS: Bagua district, Cerro Tayu, ca. 1 hour from Chiriaco, 05°15'56"S, 78°22'07"W, 800 m, 19 Mar 2001, H. van der Werff, R. Vasquez & B. Gray 16240 (HOLOTYPE: US; ISOTYPES: F, MO, NY).

Differs from *Cremosperma peruvianum* by the presence of orbicular leaves (vs. oblong) and tomentose-wooly indument on upper leaf surface (vs. sparsely villous indument).

**Terrestrial herb**; stems 5–25 cm long, creeping to stoloniferous proximally, rooting at nodes, ascending to erect distally, rarely branched, slightly angled to sulcate, tomentose with septate, uniseriate trichomes, also with small amber colored glandular protuberances. **Leaves** opposite, isomorphic, petiolate; petioles terete, 4–15 mm long, tomentose; blades widely elliptic to orbicular, 1.0–3.8 × 0.9–3.5 cm, base symmetrical to slightly oblique, rounded to slightly cordate, apex rounded, margin crenate with broad shallow teeth, bullate when fresh, membranaceous and flat when dry, abaxially dark green, tomentose on veins, with glandular protuberances in area between lateral veins, adaxially dark green, densely tomentose in area between veins, slightly tomentose on veins. **Inflorescence** a reduced pair-flowered cyme, appearing clustered and pseudo-umbellate, in upper leaf axils, peduncle 2–3 cm long, (1–)2–5 mature flowers/inflorescence, often with remnant pedicel scars appearing gland-like; bracts absent. **Flowers** pedicellate, pedicels 2–5 mm long, pilose; calyx 3.5–4.5 mm long, lobes 5, fused for 1/2–3/4 of their length, equal, lobes erect during anthesis, persistent and spreading in fruit to form a splash cup, apex rounded to obtuse, uniformly green, outside pilose, inside glabrous; corolla 10–11 mm long, tubular, slightly to strongly curved in lower 1/3, base to mid-region 1.5 mm in diameter, throat 2.5 mm wide at apex, white with yellowish upper region of throat, outer surface of tube glabrous proximally, pilose distally, throat and corolla lobes abaxially pilose, inner surface of tube glabrous, throat and base of corolla lobes pilose, corolla lobes glabrous distally, limb bilaterally symmetrical, lobes reflexed and unequal, oblanceolate to spatulate, lower three lobes ca. 3.1 × 3.0 mm, upper two lobes 2.1 × 2.1 mm, margins entire to slightly crenulate, slightly undulate; stamens 4, didynamous, included; filaments adnate to corolla tube, abaxial filaments free for 1.5 mm, adaxial filaments free for 0.8 mm, glabrous; anthers broader than long, ca. 0.5 × 1.0 mm; staminode absent; nectary enclosing the ovary on one side, glabrous, ca. 1.1 mm long; ovary superior, glabrous, ca. 1.1 × 1.5 mm, style and stigma glabrous. **Fruit** a dry bivalved capsule that dehisces laterally as it matures and appears 4-valved, globose, ca. 2.0 mm in diameter; seeds numerous, irregularly elliptic to ovoid, often slightly arched, ca. 0.5 × 0.2 mm, reddish brown, surface shallowly alveolate, cavities usually longer than wide.

*Cremosperma inversum* is differentiated from other congeners by the small diminutive habit (to 10 cm tall). Other small *Cremosperma* species include *C. muscicola* L.P. Kvist & L.E. Skog, *C. pusillulum* C.V. Morton, and *C. veraguanum* Wiehler. The isophyllous leaves in *C. inversum* differentiate it from the anisophyllous leaves of *C. veraguanum* and *C. muscicola*. The orbicular leaves in *C. inversum* readily differentiate it from congeners with oblong leaves. The only other known species of *Cremosperma* from Peru is *C. peruvianum*. The leaves in *C. peruvianum* are oblong in contrast to the orbicular leaves in *C. inversum*. These two species are geographically separated by 600+ km with *C. peruvianum* in the southern department of Huanuco and *C. inversum* in the northern province of Amazonas. The leaves in *C. inversum* are tomentose-wooly on the adaxial leaf surface with clustered trichomes in the center of the bullae and away from the more or less glabrous veins and glabrous on the abaxial leaf surface away from the more densely pubescent veins (Fig. 1A, B).

**Distribution and habitat.**—*Cremosperma inversum* is endemic to the Bagua district in the Department of Amazonas of northwest Peru. All of the currently known collections are from sandstone outcrops in a small area (less than 10 km) in mature lowland rainforest (400–800 m).

**Etymology.**—The new species name “*inversum*” is in reference to the seemingly inverse pubescence pattern on the abaxial and adaxial leaf surfaces. Adaxial surfaces are mostly glabrous along the veins and pubescence between veins. Abaxial surfaces are mostly pubescent only along the veins and glabrous between the veins (Fig. 1A, B).

**Conservation and IUCN Red List category.**—*Cremosperma inversum* is geographically limited to a small area in northwestern Peru. According to the IUCN Red List criteria (IUCN 2001) the limited geographic range (B2a, less than 10 km<sup>2</sup> and known to exist at only a single location) qualify *Cremosperma verticillatum* for being listed in the category CR (Critically Endangered).

Additional specimens studied: **PERU. AMAZONAS:** Bagua district, Quebrado El Almendro, 05°14'40"S, 78°21'24"W, 430 m, 9 Mar 1998, *H. van der Werff et al 14567* (US); Imaza, Tayu Mujaji, comunidad de Wawas, 05°15'25"S, 78°21'41"W, 800 m, 23 Oct 1997, *R. Rojas et al 428* (US); Tayu Mujaji, 05°15'56"S, 78°22'07"W, 800 m, 16 Feb 2002, *R. Vásquez 27590* (US).

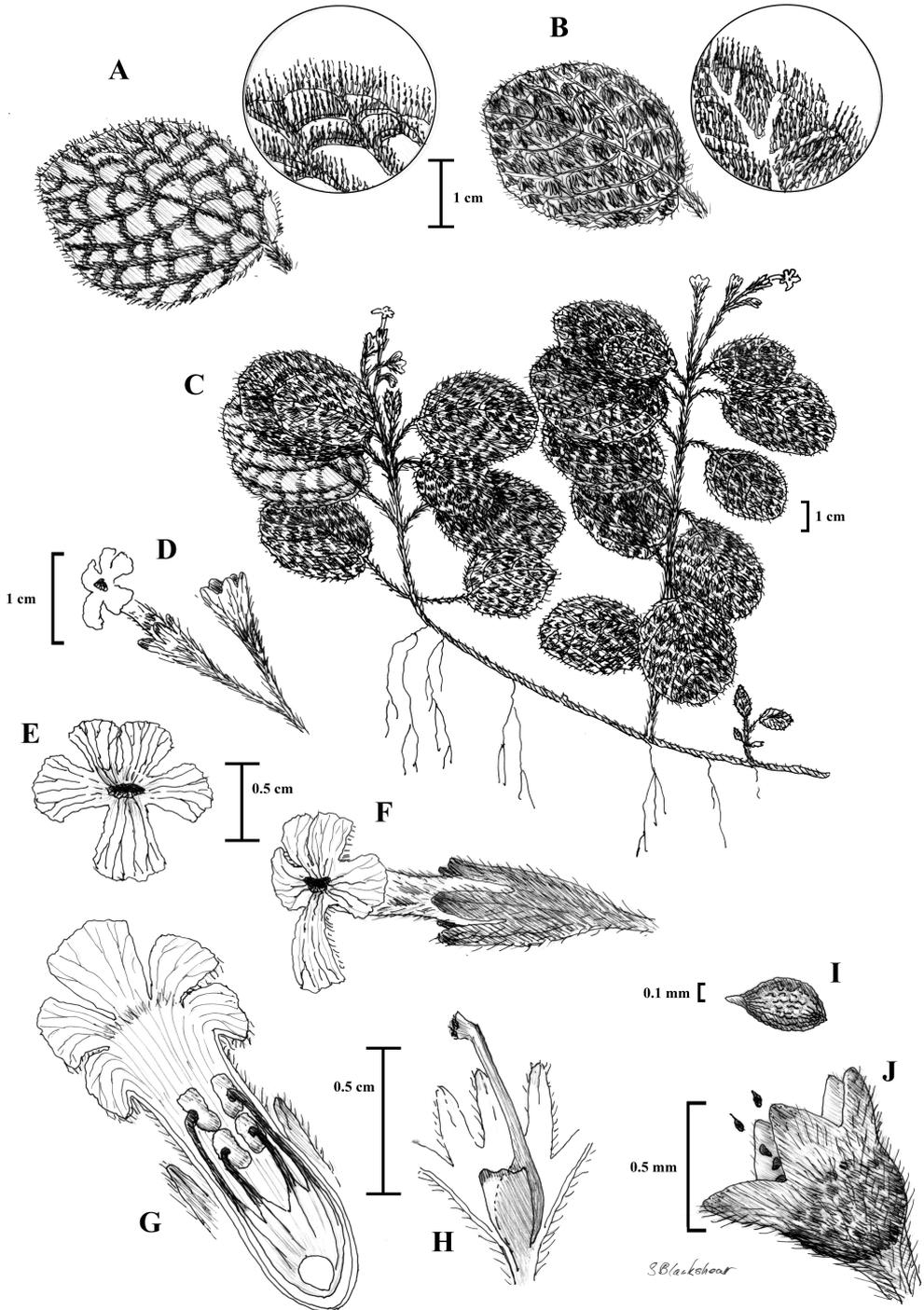


FIG. 1. Illustration of *Cremosperma inversum*. **A**. Abaxial leaf surface showing dense pubescence on veins and glabrous between veins. **B**. Adaxial leaf surface showing glabrous veins and tomentose between veins. **C**. Habit showing stolon. **D**. Inflorescence. **E**. Front view of corolla. **F**. Lateral view of flower. **G**. Lateral view of open flower showing androecium. **H**. Calyx showing truncate scale-like gland. **I**. Seed. **J**. Mature fruit with persistent calyx. (A–J from the holotype, *H. van der Werff et al.* 16240 (US)).

## ACKNOWLEDGMENTS

This study was supported by funds from the National Science Foundation (DEB-841958 and DEB-0949169) to J.L.C. Additional support for the first author was provided the National Science Foundation Research Opportunity Award (NSF-ROA 1112630). We thank the herbaria F, K, MO, NY, Q, QAP, QCA, QCNE, SEL, and US for access to their collections. We thank Laura Clavijo for providing the Spanish translation of the abstract. Laurence E. Skog and Christian Feuillet are gratefully acknowledged for providing helpful reviews. We also thank Steve Ginzburg (UNA) for facilitating loans and Sue Blackshear for preparing the illustration.

## REFERENCES

- CLARK, J.L. & L.E. SKOG. 2011. Novae Gesneriaceae Neotropicarum XVI: *Cremosperma anisophyllum*, a new species of Gesneriaceae from the Chocó region of northern Ecuador and southern Colombia. *Brittonia* 63:133–138.
- CLARK, J.L. & B.R. KEENER. 2011. *Cremosperma verticillatum* (Gesneriaceae), a new species from northwestern Ecuador. *J. Bot. Res. Inst. Texas* 5:499–504.
- CLARK, J.L., D.A. NEILL, J.A. GRUHN, A. WEBER, & T. KATAN. 2010. *Shuaria* (Gesneriaceae), an arborescent new genus from the Cordillera del Cóndor and Amazonian Ecuador. *Syst. Bot.* 35:662–674.
- FERNÁNDEZ-ALONSO, J.L. 2006. Novedades taxonomicas y nomenclaturales en *Cremosperma* y *Resia* (Gesneriaceae) de Colombia. *Rev. Acad. Colomb. Ci. Exact. Fís. Nat.* 30:171–180.
- IUCN. 2001. IUCN Red List Categories and Criteria, Version 3.1. Prepared by the IUCN Species Survival Commission. Gland, Switzerland and Cambridge, UK. International Union for Conservation of Nature and Natural Resources.
- KVIST, L.P. & L.E. SKOG. 1988. The genus *Cremosperma* (Gesneriaceae) in Ecuador. *Nordic J. Bot.* 8:259–269.
- ROALSON, E.H. & J.L. CLARK. 2006. Phylogenetic patterns of diversification in the Beslerieae (Gesneriaceae). In: *Plant genome: Biodiversity and evolution, Phanerogams 1C*. A.K. Sharma & A. Sharma, eds. Science Publishers, Enfield, New Hampshire, USA. Pp. 251–268.
- SKOG, L.E. 1982. New Gesneriaceae from Peru and Ecuador. *Selbyana* 7:94–99.
- SMITH, J.F. 2000. A phylogenetic analysis of tribes Beslerieae and Napeantheae (Gesneriaceae) and evolution of fruit types: parsimony and maximum likelihood analyses of *ndhF* sequences. *Syst. Bot.* 25:72–81.