IPOMOEA SEAANIA, A NEW SPECIES OF CONVOLVULACEAE FROM SONORA, MEXICO

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ABSTRACT

Ipomoea seaania is described as a new species from the vicinity of Guaymas, Sonora. These plants are confined to the Sierra El Aguaje, although they perhaps grow in other nearby unexplored mountains. The relationships of this species to the other members of *Ipomoea* series *Arborescentes* are discussed, and all taxa in the group are listed and ranges given. *Ipomoea seaania* brings the total number of taxa in the series to 13 species, with *I. arborescens* having two varieties and *I. pauciflora* and *I. wolcottiana* each having two disjunct subspecies.

RESUMEN

Se describe **Ipomoea seaania** de las cercanías de Guaymas, Sonora, como una especie nueva. Estas plantas se encuentran restringidas a la Sierra El Aguaje, aunque quizás se encuentren en otras sierras cercanas sin explorar. Se discuten las relaciones de esta especie con otros miembros de *Ipomoea* serie *Arborescentes*; del mismo modo se listan todos los taxa del grupo y se proporcionan sus rangos de distribución. Con el reconocimiento de *Ipomoea seaania* como nueva especie, se reconocen un total de 13 especies en el grupo, de las cuales *Ipomoea arborescens* presenta dos variedades e *I. pauciflora* e *I. wolcottiana* dos subespecies.

When Old World botanists began discovering morning glories in the New World, most species they found had life forms like the twiners *Calystegia*, *Convolvulus*, and *Cuscuta* they knew at home. Their concept of the family was somewhat broadened when they found erect and sprawling herbs in the Americas, and they were amazed when they found morning glory trees (Austin 2004). In 1809, Humboldt, Bonpland and Willdenow called the first known tree species *Convolvulus arborescens*, the distinctions between *Convolvulus* and *Ipomoea* being unclear at the time. These trees still are considered "odd" or "unusual" in the family, and the only other genus in the family that achieves tree stature is the Malagasian *Humbertia* (cf. Pichon 1947; Deroin 1992). Anatomically, these American trees are distinct from other shrubby and woody members of the family (Austin 1971; Carlquist & Hanson 1991; McDonald 1992; Deroin 2001).

The arborescent species of *Ipomoea* in the New World have long been of interest to the people who lived with them. Indigenous people use several species (Hersch-M. 1995; Yetman & Felger 2002; Yetman & Van Devender 2001), and the chemistry of the group is somewhat distinctive (Pérez-A. et al. 1982, 1983, 1992a, b). Three of these alkaloids (3a-(4-hydroxybenzoyloxy)tropane, 3a-

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(4-methoxybenzoyloxy)nortropane, phyllalbine) are considered rare constituents, especially in the genus *Ipomoea* (E. Eich, pers. comm., 26 Jul. 2004). Of additional interest was the discovery that nectar-feeding bats are at least seasonal flower-visitors and pollinators in some species (Butanda-C. et al. 1978; Carranza-G. et al. 1998; Casas et al. 1999; Fleming et al. 1998; Hevly 1979; Moreno-V. et al. 2000; Nassar et al. 1997; Newton et al. 2003; Quesada et al. 2003; Stoner et al. 2003; Turner et al. 1995; Valiente-B. et al. 1997; Wilkinson et al. 1996). These bats are *Choeronycteris mexicana, Glossophaga soricina*, and *Leptonycteris curasoae* (= *L. sanborni, L. yerbabuenae*). The *Leptonycteris* has been listed as endangered in the United States (Reid 1997; U.S. Fish and Wildlife Service 1997) since 30 September 1988. (See accompanying paper by Austin, Felger & Van Devender p. 1283–1292 for discussion.)

As summarized in Table 1, there are 13 species in the American series *Arborescentes* (Austin & Huaman 1996; McDonald 1991; McPherson 1981; Murguía-S. et al. 1995; Carranza-G. & McDonald 2004). Most of the species are confined to Mexico and nearby Mesoamerica (Austin 2001; Austin & Huaman 1996, Austin et al. in preparation), but there are two with disjunct subspecies in western South America (Austin 1982; McPherson 1981).

The first author found *I. seaania* in Sonora during 1980 and again in 1985 and located additional herbarium specimens. Although we talked about the plants in 1989, neither of us had the opportunity to pursue them further. Finally, we have been able to compare the known taxa with these plants.

Regarding morphology and range, this is a markedly distinct species (Table 1). Using the key in McPherson (1981) these plants come out at *I. chilopsidis*. Leaves on the two are the most obvious distinction on herbarium specimens. Both have narrow leaves, often less than one cm wide, but they are 10–20 cm long in *I. chilopsidis* and only 4–8 cm in *I. seaania*. Flowers are large (8–9.5 cm long) in *I. chilopsidis*, but only 4–6 cm in *I. seaania*. Furthermore, the overall architecture of the plants is profoundly different.

Ranges and altitudinal differences also are pronounced. *Ipomoea chilopsidis* is a plant of "high and arid craigs" (*Gentry 2391*, ARIZ) of the Sierra Madre Occidental, ranging from the eastern border of southeastern Sonora through about half of the southern end of Chihuahua. Near the border between Chihuahua and Sonora *I. chilopsidis* grows at 1100–1800 m in oak and pine-oak forest (Gentry 1942, Martin et al. 1998). On the other hand, *I. seaania* is known only from the vicinity of Guaymas in west-central Sonora where it grows near the southern margin of the desert on rocky slopes near the Gulf of California. The Guaymas region uplands are more than 1,000 m lower than those of Chihuahua.

All records for *I. seaania* are from essentially the same locality, below ca. 20 m elevation and near a road, except one collection (*Felger 80-36 et al.*) which is from a nearby canyon probably one kilometer eastward. The rugged slopes immediately above this area have yet to be explored. The canyons where the

TABLE 1. Taxa in series *Ipomoea* series *Arborescentes* and their geographic distributions.

Ipomoea arborescens (Humb. & Bonpl. ex Willd.) G. Don var. *arborescens*	Mexico (Chiapas, Colima, Durango, Guerrero, Jalisco, México, Michoacán, Morelos, Nayarit, Oaxaca, Puebla, Querétaro, Sinaloa, Sonora)
Ipomoea arborescens var. *pachylutea* Gentry	Mexico (Chihuahua, Sonora)
Ipomoea chilopsidis Standley	Mexico (Chihuahua, Sonora)
Ipomoea cuprinacoma E. Carranza & J.A. McDonald	Mexico (Guerrero, Jalisco, Michoacán)
Ipomoea intrapilosa Rose	Mexico (Jalisco, Nayarit, Sinaloa, Zacatecas)
Ipomoea murucoides Roemer & Schultes	Mexico (Aguascalientes, Chiapas, Distrito Federal, Distrito Federal, Durango, Guanajuato, Jalisco, Edo. México, Michoacán, Morelos, Nayarit, Oaxaca, Puebla, Queretaro, Zacatecas), Guatemala
Ipomoea pauciflora Martens & Galeotti ssp. *pauciflora*	Mexico (Guerrero, Edo. México, Michoacán, Morelos, Oaxaca, Pubela, Veracruz), Guatemala, Honduras, Nicaragua
Ipomoea pauciflora ssp. *vargasiana* (O'Donell) McPherson	Ecuador (Loja), Peru (Apurimac, Ayacucho, Cuzco), Bolivia?
Ipomoea populina House	Mexico (Chiapas, Guerrero, Oaxaca), Guatemala, Honduras, Nicaragua
Ipomoea praecana House	Mexico (Chiapas, Colima, Guerrero, Edo. México, Michoacán, Morelos, Oaxaca), Guatemala, Honduras, Nicaragua
Ipomoea pulcherrima van *ooststrstroom* (perhaps not a member of series Arborescentes)	Peru (Apurimac)
Ipomoea rzedowskii Carranza, Zamudio & Murguía	Mexico (Guanajuato, Hidalgo, Querétaro)
Ipomoea seaania Felger & D.F. Austin	Mexico (Sonora)
Ipomoea teotitlanica McPherson	Mexico (Oaxaca)
Ipomoea wolcottiana Rose var. *wolcottiana*	Mexico (Chiapas, Colima, Guerrero, Hidalgo, Jalisco, Michoacán, Morelos, Oaxaca, Puebla, Sinaloa, Tabasco, Veracruz), Guatemala, El Salvador, Honduras
Ipomoea wolcottiana ssp. *calodendron* (O'Donell) McPherson	Peru (Piura, Tumbez)

new species occurs are at the lower, southwestern flanks of the extremely rugged Sierra El Aguaje (Gentry 1949 called it the Guaymas Monadnoc, see Felger 1999). Although there has been extensive botanical exploration in the region (e.g., Felger 1999; Felger et al. 2001; Gentry 1949), the higher elevations are difficult to access and remain nearly unexplored botanically. These higher elevations, as well as the nearby and vegetationally similar Sierra Libre and Sierra El Bacatete, contain extensive areas of non-desert vegetation resembling tropical deciduous forest (Búrquez et al. 1999; Felger & Lowe 1976).

In general appearance, *I. seaania* is most similar to *I. wolcottiana* and *I. intrapilosa*, even though the latter two species are trees and *I. seaania* is a multi-stemmed shrub to 4 m. *Ipomoea wolcottiana* grows to 13 m tall, and ranges from Jalisco to El Salvador, whereas *Ipomoea intrapilosa* reaches 10 m tall, and grows from southern Sinaloa to Jalisco. McPherson (1981) pointed out that *I. wolcottiana*, *I. pauciflora*, and *I. populina* have unusual cylindrical stigmas. Murguía-S. (1995) confirmed only the presence of cylindrical stigmas (longer than wide) in only *I. pauciflora* and *I. populina*. Instead of having two appressed lobes that create an elongate stigma like the other two species, *I. wolcottiana* has lobes that are elongated laterally. Thus, while technically "cylindrical," it is wider than long. *Ipomoea seaania* exhibits two globose stigmatic lobes, which is typical of the genus, and other members of series *Arborescentes*. The cylindrical stigmas of *I. wolcottiana* and *I. pauciflora* seem to indicate a more distant relationship.

As Búrquez et al. (1999) and Felger (1999) have pointed out, the Sierra El Aguaje is notable for containing endemic species largely allied with, and presumably derived from, taxa farther south. Climatic variations and isolation were probably the driving forces behind divergence of those numerous endemic species. In addition, many species in the Sierra El Aguaje region are otherwise known only from the Baja California peninsula (Felger 1999). However, no arborescent *Ipomoea* are known from Baja California.

There are four taxa of arborescent *Ipomoea* in the state of Sonora (Table 1), which is the northernmost extension of the series (Búrquez et al. 1999; Felger 1999; Felger et al. 2001; Felger & Lowe 1976; Gentry 1949). *Ipomoea seaania* and *I. arborescens* are the only two taxa growing in the Sonoran Desert, primarily at the southern and southeastern "subtropical" margin of the desert.

Ipomoea seaania Felger & Austin, sp. nov. (**Fig. 1**). TYPE: MEXICO. SONORA: Municipio de Guaymas, broad canyon, ca. 1 km N of Bahía San Carlos on old road to Bahía Algodones; 27°57'32"N, 111°03'45"W, rhyolitic hillside, ca. 5 m above canyon bottom with riparian vegetation; shrub 2 to 3 m tall; in full flower, corollas white; locally common on steep rock hillsides, 27 Feb 1985, *Felger with Robert S. Devine 85-301* (HOLOTYPE: UA; ISOTYPES: ARIZ, ASU, BRIT, CAS, HCIB, IEB, K, MEXU, MO, NY, RSA, SD, TEX, UC, US, USON).

Frutex ad 4 m altus, ramulis dense vel sparsim breve-pilosis vel glabris. Folia ovato-lanceolata vel ovata, 2–8 cm longa, 1.5–2 cm lata, basi obtusa vel subtruncata, apice obtusa vel emarginata, margine integra, glabra. Inflorescentiae a brachyblastis lateralis productae, uniflorae rarus biflorae vel triflorae, pedunculis ad 5 mm longis, pedicellis florum 8–22 mm longis. Sepalis 12–17 mm longis, 6–8 mm latis. Corolla alba, infundibiliformis, glabra, 4–6(–7) cm longa, 7–8 cm diametro; stamina 5, antheris oblongis, sagittiformibus, 6–7 mm longis; stylus glaber, 3.6–4 cm longus, stigma biglobosum.

Openly-branched **shrubs** 1–4 m tall, with many woody stems branching from the base, the upper twigs sometimes sinuous or moderately spiraling, sometimes becoming extremely slender. Herbage largely glabrous or glabrate except newest growth densely to sparsely short-pilose, the trichomes mostly spreading.

FIG. 1. *Ipomoea seaania.* **A.** Distal branch. **B.** A spur-branch leaf. The usual long-shoot leaves, lower on the stems and present during the summer rainy season, are usually broader, more ovate rather than lanceolate. **C.** Detail of spur-branch. **D.** Flowering branch. **E.** Detail of bud on spur-branch. **F.** Detail of open flower on spur-branch. **G.** Open corolla. **H.** Detail of stamen. **I.** Details of gynoecium. **J.** Young fruit. Drawn from the Holotype (*Felger with Robert S. Devine 85-301*).

Leaves drought deciduous, lanceolate to ovate, long-shoot leaves often 2–8 cm long, the blades lanceolate to ovate, 1.5–2 cm wide, with 6–8(–10) lateral pairs of primary veins, the base obtuse to subtruncate, the apex obtuse to emarginate, the midrib often ending in a short mucrone, blade glabrous; petioles 8–15(–20) mm long, with a pair of glands, usually conspicuous, at junction of petiole and blade on the lower leaf surface. Spur-branch leaves linear to linear lanceolate, often 4–8 cm long, to 4–11 mm wide, with 6–10 lateral pairs of primary veins, base obtuse to subtruncate, the apex obtuse or blunt, or sometimes shallowly emarginate, the midrid often ending as a short mucrone, the petioles to 2–9(–13.5) mm long. **Inflorescences** of 1–2(–3) flowers, appearing solitary but cymose on short-shoots 2–5 mm long, these sometimes with a few small leaves; bracts 5–8 mm long, quickly deciduous, broadly oblong with an obtuse tip; peduncles very short, to 5 mm, the pedicel 8–22 mm long. **Sepals** 12–17 mm long, 6–8 mm wide, broadly lanceolate to mostly ovate, puberulous to villous, the inner surfaces generally more densely hairy than the outer surfaces, the trichomes white, appressed to mostly ascending, and curly to straight. Inner (adaxial) sepals obtuse, the surfaces with trichomes 0.15–0.6 mm long; outer (abaxial) 2 sepals acute, slightly narrower and more sparsely pubescent than the inner 3, the trichomes 0.1–0.5 mm long, the sepal margins scarious and glabrous or glabrate. **Corollas** showy, funnelform, glabrous, 4–6 cm long and 7–8 cm wide, white with yellowish interplicae and a maroon band at inside base of the tube. **Stamens** 5, with 4 filaments 25–26 mm long, the fifth stamen 23–24 mm long, basal 4 mm of filaments pubescent, anthers oblong, sagittitate, 6–7 mm long, pollen spheroidal, spinulose. **Ovary** glabrous, 3 mm long, the style glabrous, 37–38 mm long, the stigma 2-globose. Flowering January–March.

Other specimens examined: **Municipio de Guaymas:** Along partially paved road between San Carlos Bay and Catch-22 airstrip NW of Guaymas, desert scrub with *Stenocereus, Bursera, Pachycereus, Jatropha*, and *Acacia*, elevation near sea level, shrub to 3 m, corolla white, infrequent, 5 Jan 1983, *T.F. Daniel 2360* (ASU 128321); on road outside Bahía San Carlos, open shrub, 1–1.5 m tall, cliff base in hardened volcanic soil, NW slope in association with *Euphorbia ceroderma, Mascagnia macroptera, Acacia willardiana*, elevation 10 m, 21 Feb 1977, *Ames 77-60* (ARIZ 211499); 0.1 mi N of north end of San Carlos Bay, west-facing slopes above bay, elevation 15 m, 27°57'N, 111°03'W, Sonoran Desertscrub, shrub 2–3 m tall, 10 Oct 1985, *Felger 85-1232, with Frank W. Reichenbacher* (ARIZ 332087); San Carlos Bay, W of Guaymas; a canyon one mi N of the bay near Cerro Los Algodones, along the road to Rancho La Manga, near 27°58'N, 111°04'W, rocky volcanic ridge and adjacent stony canyon bottom, associated with *Bursera, Prosopis, Jatropha, Croton sonorae, Acacia willardiana*, etc., scarce large shrub about 12 ft high with many stems from base, on floor of canyon above wash, fls white with yellowish star pattern and maroon band in throat, ± 300 ft, 22 Mar 1983, *A.C. Sanders 3616* (ARIZ 245472, TEX); canyon, ca. 4 km NW of Bahía San Carlos, steep rocky canyon with dense desertscrub, shrub 1.8 m tall, scattered, not common, 6 Sep 1980, *Felger 80-36, with L. Findley, S. Findley* (ARIZ 200443); road between San Carlos Bay and Catch-22 airstrip, collected in desertscrub with *Stenocereus, Bursera, Pachycereus, Jatropha, Acacia, Fouquieria, Opuntia, Ferocactus*; elevation near sea level, small tree to 3 m, corolla white, rare, 8 Mar 1985, *Daniel 3986* (CAS).

The plants are locally common on rugged, lower slopes of the Sierra El Aguaje just North of Bahía San Carlos; on rocky volcanic ridges, steep colluvium, and rhyolite slopes of canyon sides and cliff bases. The San Carlos region is undergoing rapid tourist development and extensive areas of natural vegetation are being destroyed. The canyon bottom immediately below the *Ipomoea seaania* population once supported a dense stand of subtropical riparian vegetation; this was destroyed several decades ago to build a road to the site for the filming of "Catch 22." There are no other records for this unusual shrub.

These plants grow in dense desertscrub with ca. 60% cover of perennials. Species associated with the type collections include *Abutilon incanum, Acacia willardiana, Agave angustifolia, Antigonon leptopus, Ayenia jaliscana, Bursera laxiflora, B. microphylla, Cardiospermum corindum, Colubrina viridis, Cordia parvifolia, Coursetia glandulosa, Croton sonorae, Cylindropuntia versicolor, Desmanthus covillei, Diphysa occidentalis, Euphorbia ceroderma, Ferocactus emoryi, Fouquieria diguetii, Haematoxylon brasiletto, Hechtia montana, Holographis virgata, Ibervillea sonorae, Jatropha cuneata, Krameria sonorae, Lantana velutina, Lippia palmeri, Mammillaria johnstonii, M. swinglei, Manihot* sp., *Melochia tomentosa, Mimosa distachya, Nissolia schottii, Opuntia gossiliniana, Randia thurberi, Ruellia californica, Sebastiania bilocularis, Stenocereus thurberi,* and *Trixis californicus.*

Ipomoea seaania plants are generally leafy and produce vegetative growth only during the brief summer-early fall monsoonal rainy season, when sporadic thunderstorms occur. Occasional late summer and fall hurricane-fringe storms extend the growing season. Otherwise the plants are leafless or nearly so. As with *I. arborescens* in the Sonoran Desert, flowering occurs when the plants are essentially leafless. Other species in the series typically retain their leaves while flowering.

Summer monsoon rains and occasional hurricane-fringe rains at the end of summer and early fall come at a time of hot weather, but these hot-weather rains are highly variable. It is during the monsoon season when most long-shoot growth occurs, and leaves on the long-shoots are the largest, broadest, and have the longest petioles (even relative lengths). Other arborescent *Ipomoea* in Sonora likewise do not flower during this season (Table 1). Also during the wet season, abundant leaf production of *I. seaania* occurs on numerous short-shoots, and these leaves are smaller, narrower, and with shorter petioles in comparison to leaves on long-shoot branches.

Winter-spring rains are unpredictable, and if they occur when the weather is warm enough, short-shoots and leaves and some long-shoot development may occur. However, these long-shoots are generally small in comparison to those of monsoon-season growth. Flowering may occur from fall (October and November) through spring (late March, perhaps April).

Although minor frosts may occur in the region, the habitat on the rocky slopes where *I. seaania* grows is undoubtedly frost free. The weather is very hot during the long summer, and very mild even in winter, and warm to even hot during the rest of the year. Mean annual rainfall for the nearby city of Guaymas is around 275 mm, based on data taken from September 1968 to February 1987. However, as is usual in deserts, there is considerable variation in annual rainfall. Maximum temperature occurs in August (mean 40°C) and minimum temperature is in January (mean 7°C, with absolute minima of 1°C in 1973 and 1987) (Comisión Nacional de Agua, Hermosillo).

Some herbarium curators have the view that non-flowering specimens lack value. For the general user, perhaps the curators are correct, but for the specialist, sterile specimens often provide data that otherwise are available only on living plants at specific seasons. Without preserved examples of these temporal variations the data derived from fertile herbarium specimens is often limited at best. We lament the general lack of good vegetative specimens of arborescent morning glories.

The new species occurs at the northern boundary of the original homelands of the Yoeme (Yaqui) people. The species name derives from *Sea Ania*, the Yoeme concept of the Flower World, the place where life begins. *Sea Ania* was created after *Yo Ania* (the Enchanted World) and after people. *Sea Ania* is in all life, in all creatures, overseeing nature, including the rivers, the wind, the clouds, ocean, rain, sun, moon, sky, and stars. *Sea Ania* is *Huya Ania* (Wilderness World) in flower. The Flower World is the living beauty of this world, the natural world. *Sea Ania* is the final resting place of the Yoemen (Yaqui people). Yoeme artists use flowers in their artwork to represent *Sea Ania* (Evers & Molina 1987).

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