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***Cleome* sect. *Physostemon* (Cleomaceae) in Cuba****Abstract**

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The forthcoming *Cleomaceae* treatment for the Flora de la República de Cuba will recognise three species in *Cleome* sect. *Physostemon*, one of them endemic and one with two endemic subspecies, instead of the nine species (seven endemic) that had been previously described. Four new combinations, two at subspecies level and two varietal, are made. A key for all recognised taxa is presented and their distribution is mapped.

**Introduction**

Bremer & al. (1998: 534) have recently proposed to merge the families *Capparaceae* and *Cruciferae* under the common name *Brassicaceae*. Undoubtedly, if one takes into account the new results of molecular systematics (see Kubitzki 2002 and literature there cited), it is inappropriate to maintain the two former families as they are traditionally defined. Hall & al. (2002), recognising that a family *Capparaceae* inclusive of *Cleomoideae* would be paraphyletic, recommend the recognition of smaller, monophyletic family units instead. I follow Hall & al.'s approach and will accept *Cruciferae* Adans., *Capparaceae* Adans. and *Cleomaceae* Horan. as separate families.

*Cleome*, with about 425 binomials listed in the database version of Index Kewensis (1997), is a large genus of almost cosmopolitan spread. It is the sole Cuban representative of *Cleomaceae* when *Gynandropsis* DC., rather than at generic level, is treated as its section. In the New World, the majority of *Cleome* (c. 65 species) are robust herbs, over 50 cm tall, characterised by (1-)3-13-foliolate leaves and with petals totally enveloping the stamens and pistil until anthesis ("closed aestivation" of Iltis 1958). A deviating group of c. 15 species was included by Iltis (1959) in *C.* sect. *Physostemon* (Mart. & Zucc.) Benth. & Hook. f.: these are slender plants less than 50 cm tall, with mostly simple or more rarely 1(-5)-foliolate leaves and flowers with an "open aestivation". The section is endemic to the New World, where it ranges from subtropical Mexico and the Antilles to Paraguay and northern Argentina. Iltis in his revision subdivides it into three series, of which the presumed most basal one, with the single species *C. tenuis* S. Watson, is endemic to Mexico and characterised by (still) 3-5-foliolate leaves. The two others, each

with seven and five species, respectively, are distinguished by the presence vs. absence of staminal “apophyses”: subapical, presumably nectariferous swellings of the filaments of some of the stamens, which, concomitantly, are shorter and bear reduced, probably sterile anthers.

In the present paper, which is preliminary to my *Cleomaceae* treatment for the Flora de la República de Cuba, I deal with *Cleome* sect. *Physostemon*, as it includes the single critical group of *Cleome* present in the area. No less than nine species belonging here have so far been reported from Cuba, seven of them being newly described based on Cuban material.

The non-endemic are *Cleome procumbens* Jacq. of *C.* ser. *Exapophysatae* Iltis, which from Jamaica and Hispaniola reaches the easternmost portion of Cuba, and *C. guianensis* Aubl. of *C.* ser. *Apophysatae* Iltis, a species widespread from South America through Mesoamerica to southern Mexico and Belize, from where it jumps over to the island’s opposite, western end. The Cuban population was for some time thought of as a separate, endemic species, *C. pinarensis* León, but Iltis (1959) recognised it as an undoubted synonym of *C. guianensis*.

The other six Cuban “species” of the section all belong to the “exapophysate” series, and all were originally collected in the large gap between the areas of *Cleome procumbens* and *C. guianensis*. Chronologically they start in 1868 with *C. macrorhiza* C. Wright, followed in 1907 by *C. wrightii* Urb., in 1917 by *C. obtusa* Britton and in 1925, simultaneously, by *C. arenaria* Urb., *C. gamboensis* Urb. and *C. tenuicaulis* Urb. In the Flora de Cuba (León & Alain 1951) they are all recognised at face value, but the supplement (Alain 1969) accepts Iltis’s (1959) more synthetic view.

Iltis reduces the number of Cuban “exapophysate” *Cleome* species to four, of which one (the westernmost, *C. macrorhiza*) stands somewhat apart from the three others, which from east to west are *C. procumbens*, *C. obtusa* (of which *C. gamboensis* becomes a variety with *C. tenuicaulis* in synonymy) and *C. wrightii* (syn.: *C. arenaria*).

#### Key for the identification of the taxa

- 1 Leave sessile, narrowly linear; stamens 6-9, heteromorphic, the 3-4 shorter ones sterile, with a reduced anther and an apical swelling (apophysis) to the filament . . . . . *C. guianensis*
- Leave shortly petiolate, narrowly to broadly lanceolate; stamens 6, homomorphic, all fertile and lacking an apophysis . . . . . 2
- 2 Petals 7-11 mm long; seeds 2.3-2.7 mm in diameter . . . . . *C. macrorhiza*
- Petals 3-8 mm long; seeds 1-1.5 mm in diameter (*C. procumbens*) . . . . . 3
- 3 Sepals ciliolate . . . . . *C. procumbens* subsp. *procumbens*
- Sepals lacking marginal cilia . . . . . 4
- 4 Stems procumbent to ascending, with densely papillose ridges . . . . .
- . . . . . *C. procumbens* subsp. *obtusa*
- Stems ascending to suberect, with smooth to scarcely and minutely papillose ridges (*C. procumbens* subsp. *wrightii*) . . . . . 5
- 5 Stems ascending; leaves small (5-8 × 1-2 mm); seeds prominently tuberculate . . . . .
- . . . . . *C. procumbens* var. *arenaria*
- Stems ± erect; leaves larger (7-11 × 2-3.5 mm); seeds moderately tuberculate . . . . .
- . . . . . *C. procumbens* var. *wrightii*

#### Taxonomic treatment

*Cleome guianensis* Aubl., Hist. Pl. Guiane: 675. 1775. – Lectotype (Iltis 1959: 154): “*Cleome guyanensis* Aubl., Guyane – ex herb. Aublet – dedit D. de Thory 1809” (P-JU 11227 [photo IDC! & MO! ex Field Museum photograph negative 34620]).

= *Cleome pinarensis* León in Contr. Ocas. Mus. Hist. Nat. Colegio “De La Salle” 9: 6. 1950. – Holotype: [Cuba, prov. Pinar del Río], “Sabanas húmedas, Sabanalamar, El Sábalo”, 22.12.1937, León 16991 (HAC!, on the same sheet as *Ekman* 2820, of the same species).

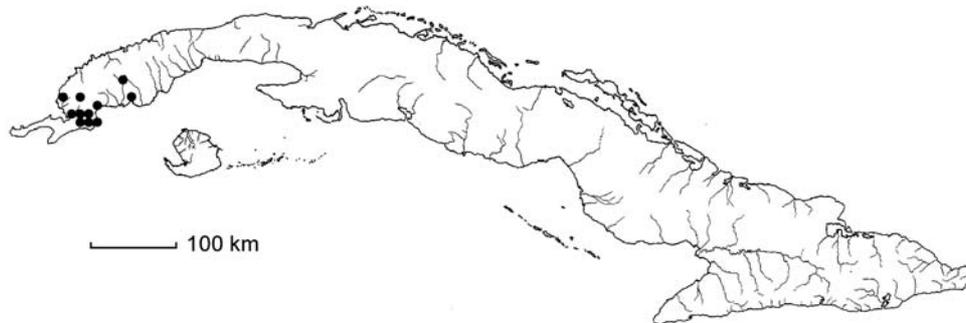


Fig. 1. Map of the Cuban distribution of *Cleome guianensis*.

*Distribution.* – From S Mexico (Baja California to Chiapas) and Belize through Mesoamerica to Colombia, British Guiana and Brazil. In westernmost Cuba it grows in pinelands on white sand (Fig. 1).

*Notes.* – In addition to the key characters, the species is characterised by largish (1.5-2 mm in diam.), strongly tuberculate to transversely ridged seeds with 0.4-0.5 mm high tubercles or ridges.

*Cleome macrorhiza* C. Wright in *Anales Acad. Ci. Méd. Habana* 5: 199. 1868. – Lectotype (designated here): “Wet pine woods Pinar del Río”, 1865, *Wright* [3495] (GH 42323!; isolectotypes?: B!, BREM!, GOET [p.p!], K!, NY 22653!, 74436!, 74437!, S [2×, one sheet mixed with *C. procumbens*]!).

*Distribution.* – Endemic in westernmost Cuba (prov. Pinar del Río), growing in pineland and grasslands on white sand (Fig. 2).

*Cleome procumbens* Jacq., *Enum. Syst. Pl.*: 26. 1760. – Neotype (designated here): [icon in] *Jacquin, Select. Stirp. Amer. Hist.*: t. 120. 1763.

*Note.* – There is no evidence that Jacquin had the plates, published in 1763, at his disposal before he published his 1760 “Enumeratio”. The original artwork on which the plates were based must logically be assumed to have been used by him, but according to information kindly provided by Prof. H. W. Lack, Berlin, only fragments appear to have survived. Iltis (1959: 141) gives the type of *Cleome procumbens* as “*Jacquin s.n.*” but does not claim to have seen the corresponding specimen, which is not known to exist.

*Cleome procumbens* Jacq. subsp. *procumbens*

*Distribution.* – Jamaica, Hispaniola and southeastern Cuba, where it is frequent on coastal rocks (Fig. 2).

*Cleome procumbens* subsp. *obtusata* (Urb.) R. Rankin, **comb. & stat. nov.** ≡ *Cleome obtusata* Britton in *Bull. Torrey Bot. Club* 44: 2. 1917 ≡ *Cleome obtusata* var. *obtusata* (Urb.) Iltis in *Brittonia* 11: 147. 1959. – Holotype: [Cuba], “Province of Camaguey, savannas near Camaguey, rocky soil”, 2.4.1912, *Britton & al.* 13165 (NY 74438!).

= *Cleome gamboensis* Urb. in *Repert. Spec. Nov. Regni Veg.* 22: 36. 1925 ≡ *Cleome obtusata* var. *gamboensis* (Urb.) Iltis in *Brittonia* 11: 147. 1959. – Holotype: [Cuba, prov. Las Tunas], “Oriente prope Gamboa in savannas, generally in bare spots in somewhat alkaline places”, 26.8.1922, *Ekman* 14937 (B!; isotypes: K!, S [3×]!).

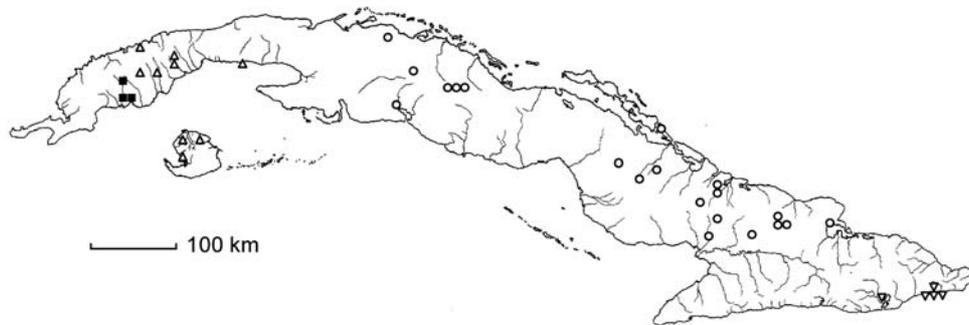


Fig. 2. Map of the Cuban distribution of *Cleome macrorhiza* (■), *C. procumbens* subsp. *procumbens* (▽), subsp. *obtusa* (○), and subsp. *wrightii* (△).

= *Cleome tenuicaulis* Urb. in Repert. Spec. Nov. Regni Veg. 22: 37. 1925. – Holotype: [Cuba, prov. Camagüey], “Oriente (ad limitem prov. Camagüey) prope Galbis in savannis locis uliginosis”, 16.8.1916, *Ekman* 7458 (B!; isotype: S!).

*Distribution.* – Endemic to central Cuba (prov. Villa Clara, Camagüey, Las Tunas and Holguín), where it is common on serpentine or non-ophiolithic soils, in sandy or waterlogged grassland (Fig. 2).

*Cleome procumbens* subsp. *wrightii* (Urb.) R. Rankin, **comb. & stat. nov.** ≡ *Cleome wrightii* Urb., Symb. Antill. 5: 346. 1907. – Holotype: “*Cleome procumbens* Jacq.”, [Cuba], *Wright* 1868 (B ex herb. Krug & Urban!; isotypes?: BM 629052!, BREM!, F 163539 [negative 51631]!, GH 42325!, K!, MA 608769!, NY 22654!, 74440!, S!). – Fig. 2.

*Cleome procumbens* (subsp. *wrightii*) var. *wrightii* (Urb.) R. Rankin, **comb. & stat. nov.**

*Distribution.* – Endemic to western Cuba (prov. Pinar del Río, South of prov. La Habana), in moist grassland and sandy places.

*Cleome procumbens* (subsp. *wrightii*) var. *arenaria* (Urb.) R. Rankin, **comb. & stat. nov.** ≡ *Cleome arenaria* Urb. in Repert. Spec. Nov. Regni Veg. 22: 36. 1925. – Holotype: [Cuba, Isla de la Juventud], “Isla de Pinos prope Santa Bárbara in alkali flats in arena albida”, 3.11.1920, *Ekman* 12064 (B!; isotypes: S! [2×]).

*Distribution.* – Endemic to western Cuba (Isla de la Juventud), in sandy places.

## Discussion

In his revision, Iltis (1959: 146) already expressed considerable uncertainty, not to say puzzlement, as to the appropriate taxonomic classification of the *Cleome procumbens* complex. He wrote: “Of all the species treated in this study, the group centring about *C. wrightii* caused the most difficulties. Although *C. procumbens*, *C. wrightii*, and *C. obtusa* are here treated as species, the temptation was great to treat all as subspecies of *C. procumbens*. Many of my earlier annotations were to that effect, and further work may bring other workers to this, for the present rejected, solution.”

Looking at the treatment above you will find that Iltis’s remark was exactly prophetic, which is why I could not withstand the temptation to quote it in full. The fact is that with increasing material at hand the boundaries between the species recognised, albeit reluctantly, by Iltis tended to blur. In particular, it was increasingly hard to make an objective distinction between the nar-

row-fruited *C. wrightii* and the taxa bordering the area of *C. obtusa* to the east, which Urban had distinguished as *C. gamboensis* and *C. tenuicaulis*. Were it not for the additional character of stem papillosoity, which appears to offer a fairly safe means to distinguish between the western and central Cuban plants, I might well have given up in despair.

Whereas stem indumentum at least enables a reasonably secure way to tell apart *C. procumbens* subsp. *wrightii* and subsp. *obtusa*, other characters advocated by previous authors to discriminate between subsp. *obtusa* and “*C. gamboensis*” and/or “*C. tenuicaulis*”, at any level, just do not work out. True, in the fragmented central Cuban area of subsp. *obtusa* just about every discrete population tends to have its own peculiar look and combination of quantitative features, but it is certainly neither practical nor in any way useful to give formal recognition to individual local populations. Furthermore, it is easy to foretell that minute quantitative differences that appear to be tangible when a small number of individuals gathered simultaneously in a single spot are considered will not hold when additional collections from the same place but made independently at some other moment become available. I therefore refrain from recognising any such variant, even at varietal level.

The situation is slightly different in the west, where plants from the Isla de la Juventud, formerly “Isle of Pines”, stand out by their small leaves and low-growing habit against the mainland representatives of *Cleome procumbens* subsp. *wrightii*. This did not escape Iltis’s notice, who conceded that the type gathering of “*C. arenaria*” as well as a second collection he saw from the same island differed by their “somewhat smaller and narrower leaves ... and more strongly tubercled seeds”. But then, he goes on, “The third collection from the Isla de Pinos (*Blain 49*) agrees in every respect with Cuban collections.” He was right, as usual, yet his conclusion I believe is wrong. What I doubt is not the (slight) difference of the plants from the Isla with respect to those from the Cuban mainland, but much rather, the stated provenance of the *Blain 49* specimen. As Millspaugh (1900) made clear, José Blain did collect on the Isle of Pines, and a parcel with duplicates of his collections was sent by Sauvalle to Charles Wright, to end up, some time after the latter’s death, at the Field Museum in Chicago. There are no labels associated with these collections and the numbering obviously was Sauvalle’s [who, as it happens, was Blain’s brother-in-law – H. Manitz, pers. comm.]. In Sauvalle’s own herbarium, now at HAC, there are no *Cleome* specimens from the Isla de la Juventud, but at least two sheets of Wright’s type collection of *Cleome wrightii* from Pinar del Río (*Wright 1868*, numbered “48” by Sauvalle), which are indeed identical in every detail with “*Blain 49*” at F. It is therefore most likely that, some way or other, non-Blain material from the Sauvalle herbarium, including a duplicate of *Wright 1868*, got mingled with the Blain collections in the parcel that Sauvalle sent to Wright.

The bottom line is that the plants from the Isla de la Juventud are, if feebly, distinct from genuine *Cleome procumbens* subsp. *wrightii* of the main island of Cuba, which prompted me to accept “*Cleome arenaria*” as a separate variety within that subspecies.

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