BioOne COMPLETE

Variation in Polygala guantanamana (Polygalaceae), a Cuban endemic species

Author: Rodríguez, Rosa Rankin

Source: Willdenowia, 31(2) : 425-431

Published By: Botanic Garden and Botanical Museum Berlin (BGBM)

URL: https://doi.org/10.3372/wi.31.31210

BioOne Complete (complete.BioOne.org) is a full-text database of 200 subscribed and open-access titles in the biological, ecological, and environmental sciences published by nonprofit societies, associations, museums, institutions, and presses.

Your use of this PDF, the BioOne Complete website, and all posted and associated content indicates your acceptance of BioOne's Terms of Use, available at www.bioone.org/terms-of-use.

Usage of BioOne Complete content is strictly limited to personal, educational, and non - commercial use. Commercial inquiries or rights and permissions requests should be directed to the individual publisher as copyright holder.

BioOne sees sustainable scholarly publishing as an inherently collaborative enterprise connecting authors, nonprofit publishers, academic institutions, research libraries, and research funders in the common goal of maximizing access to critical research.

Downloaded From: https://bioone.org/journals/Willdenowia on 28 Mar 2024
Terms of Use: https://bioone.org/terms-of-use

Novitiae florae cubensis No. 4

ROSA RANKIN RODRÍGUEZ

Variation in *Polygala guantanamana (Polygalaceae),* a Cuban endemic species

Abstract

Rankin Rodríguez, R.: Variation in *Polygala guantanamana (Polygalaceae),* a Cuban endemic species. – Willdenowia 31: 425-431. 2001. – ISSN 0511-9618.

The forthcoming *Polygalaceae* treatment for the "Flora de la República de Cuba" will recognize four shrubby *Polygala* species instead of the eight that had been previously described. One of them is *P. guantanamana,* easily recognized by its glabrous pedicels. A broadly based revision permits to distinguish two subspecies in it. *P. guantanamana* subsp. *guantanamana* is found in coastal habitats of southeastern Cuba and in xeric vegetation, mostly on ophiolithic soils, in central and western Cuba. The newly described subsp. *alternifolia* grows in that same kind of inland habitats but is limited to eastern Cuba. *P. scabridula,* a characteristic morph which is limited to and prevalent but not exclusive in the central and western Cuban populations, is given varietal rank within subsp. *guantanamana*.

Background

This paper is preliminary to my *Polygalaceae* treatment for the "Flora de la República de Cuba". It deals with one of the Cuban representatives of the notoriously difficult, shrubby *P.* subg. *Badiera* (DC.) S. F. Blake, sometimes considered to constitute a genus of its own, *Badiera* DC.

This whole, mainly Caribbean group is extremely polymorphic in our area. Britton (1910, 1915), under *Badiera,* described or recorded seven different species from Cuba. They were all transferred to *Polygala* by Blake (1916), who later (Blake 1923) added an eighth one of his own. At the other extreme, Gillis (1975) merged at least four of the Cuban species in two subspecies placed under a widely defined *P. penaea* L. My own treatment will accept four species in Cuba, the three upheld by Bernardi (2000) in his well balanced account, plus *P. stipitata* S. F. Blake, which he merges under *P. propinqua* (Britton) S. F. Blake, both being centred in their distribution on Cuba's westernmost province, Pinar del Río.

Scattered over the whole island, but mainly from the province of La Habana to the easternmost tip, two species occur, both of which are very variable. While variation within the first, *Polygala oblongata* (Britton) S. F. Blake, appears to be chaotic and does not permit a sensible infraspecific classification, variation within the second, *P. guantanamana* S. F. Blake, follows a

Downloaded From: https://bioone.org/journals/Willdenowia on 28 Mar 2024
Terms of Use: https://bioone.org/terms-of-use

coherent geographical pattern. *P. guantanamana,* which is easily recognized by its glabrous rather than densely pubescent flowering pedicels, is the subject of the present reassessment.

My study is based on c. 350 herbarium specimens of *Polygala guantanamana,* sensu lato, from 15 herbaria (B, HAC, HAJB, HIPC, HMC, JE, and those mentioned in the acknowledgements). In addition to gross morphology, seed micromorphology has been studied under the binocular, and the cuticular morphology and anatomy of leaves (on manual cross-sections) by optical microscopy. Morpho-anatomy of the leaves had already been investigated previously by Susana Ayala (unpublished data).

Taxonomic treatment

Polygala guantanamana S. F. Blake in Contr. Gray Herb. 47: 12. 1916 ≡ *Badiera virgata* Britton in Bull. Torrey Bot. Club 37: 361. 1910 [non *Polygala virgata* Thunb. (1800)] ≡ *Polygala penaea* subsp. *guantanamana* (S. F. Blake) Gillis in Phytologia 32: 38. 1975. – Holotype: "Cuba, Oriente, Guantanamo Bay, United States Naval Station", 17.-30.3.1909, *Britton 2086* (NY 74516!).

Shrub, 1-2.5 m tall. *Branches* and twigs with a longitudinally fissured bark, the twigs with simple, unicellular, strigose or strigillose, acroscopically appressed trichomes. *Leaves* subcoriaceous, fasciculate in brachyblasts or alternate along the twigs; petiole 2 mm long, strigose; lamina obovate-spatulate, 1-2 cm long and 0.5-1 cm broad; tip rounded to retuse, sometimes bluntly mucronulate; base broadly cuneate; margin entire, ± thickened, slightly to conspicuously revolute; costa invisible above, prominent to scarcely visible underneath; hairs strigose or strigillose, acroscopically appressed and slightly to conspicuously sunk. *Flowers* 1-3 in pedunculate axillary fascicles; *peduncle* strigose; *pedicels* glabrous, 1.8-2 mm long, with three strigose bracteoles at their base. *Calyx* persistent; sepals ciliolate, the three outer 1-1.2 mm long, the two inner (wings) petaloid, 1.5 mm long. *Corolla* with a curved, unguiculate keel, which in its median part, on both sides, bears appressed trichomes directed toward the margin; lateral petals 2.9-3 mm long, hairy inside in the proximal half. *Staminal tube* basally fused to the lateral petals, ciliate along the margins especially below; anthers basifix, obovoid, 0.2 mm long, with introrse dehiscence by an apical slit. *Ovary* borne on a 0.1-0.4 mm long gynophore, compressed-ellipsoidal, bicarpellate and bilocular (sometimes unicarpellate by abortion); style geniculate at the tip, 1.4-2.3 mm long; stigma apical, papillose. *Capsule* subcoriaceous, compressed, emarginate, ciliate at the margin, glabrous or hairy on the faces, with loculicidal dehiscence, 5-6 mm long, 5-8 mm wide when fully developed. *Seeds* compressed, 4-6 mm long and 2-3 mm wide, glabrescent, hairy mainly along the margins and in their lower part; aril a vivid orange elaiosome with irregular margins. *Pollination* cleistogamous, the staminal tube enclosing the ovary within the keel.

Distribution and habitat. – Endemic to Cuba, where it is widespread on the main island (but absent from Isla de la Juventud and the offshore islets), being found in all provinces except La Habana (Fig. 1; details under the subspecies). Specimens are cited in the journal's electronic supplement (http://www.bgbm.fu-berlin.de/bgbm/library/publikat/willd31/rankin.htm).

Polygala guantanamana S. F. Blake subsp. ***guantanamana***

Most *leaves* fasciculate on brachyblasts, persistent or falling off in the herbarium. Leaf lamina obovate, 7-25 mm long and 4-13 mm broad; margin slightly or strongly revolute all along; hairs strigose, slightly sunk, conspicuous; no pattern of dark areas and whitish-punctulate zones is visible beneath, nor are the stomata projecting; adaxial and abaxial epidermis cells with thin and sinuate anticlinal walls. *Capsule* glabrous or hairy on the faces. *Seeds* black or brownish.

Distribution and habitat. – This subspecies occurs almost throughout the main island, having been collected in all provinces except La Habana and Holguín. It grows, between sea level and

Downloaded From: https://bioone.org/journals/Willdenowia on 28 Mar 2024
Terms of Use: https://bioone.org/terms-of-use

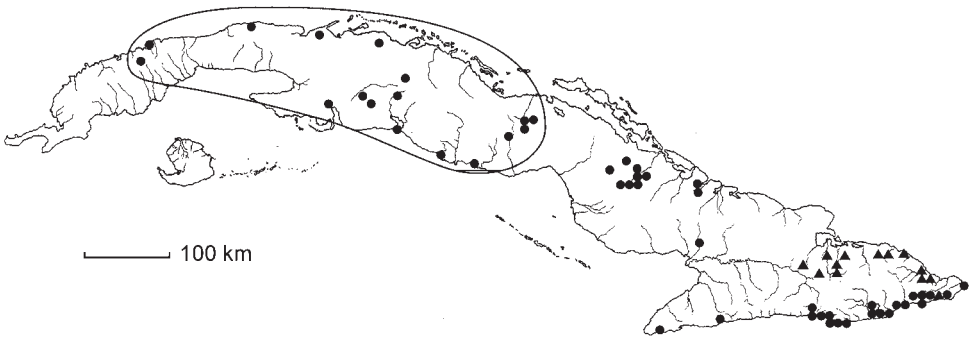


Fig. 1. Map of the total distribution of *Polygala guantanamana* and its infraspecific taxa. – Dots: subsp. *guantanamana;* triangles: subsp. *alternifolia;* the line encircles the area in which plants showing the characters of var. *scabridula* predominate.

an altitude of 250 m, in two distinct but ecologically similar habitat types. Along the southern coast, in scattered localities of the provinces of Matanzas, Cienfuegos, Sancti Spíritus and throughout the eastern ones, it is found on limestone substrate, in littoral xeromorphic scrub or woodland (the "matorral xeromorfo costero y subcostero" and "bosque siempreverde micrófilo" of Capote & Berazaín 1984). In inland localities of central and western Cuba (provinces of Pinar del Río, Ciudad de La Habana, Matanzas, Villa Clara, Cienfuegos, Sancti Spíritus, Ciego de Ávila, Camagüey and Las Tunas), however, it is confined to ophiolithic soils as a member of the characteristic, more or less spiny dry serpentinophyte scrub (the "matorral xeromorfo espinoso y subespinoso"). It flowers from February to November and bears fruit from November to July.

Polygala guantanamana S. F. Blake [subsp. ***guantanamana***] var. ***guantanamana***

Leaves falling off in the herbarium; lamina elliptic-obovate, 7-12 mm long and 4-7 mm broad; tip never mucronulate; margin scarcely thickened, strongly revolute; costa scarcely visible underneath. *Capsule* glabrous on the faces. *Seeds* black.

Distribution and habitat. – This is the only variant of subsp. *guantanamana* present in the eastern portion of the subspecies' range (East Cuba and the eastern half of Central Cuba, to the Camagüey province inclusive), showing but little variation in spite of its occurrence in two distinct habitat types. Further west, it is largely but not completely replaced by var. *scabridula* (see below) or forms approaching that variety, again irrespective of habitat. However, typical var. *guantanamana* turns up well within the area of the other variety, e.g. near the very locus classicus of var. *scabridula,* in the Villa Clara province.

Polygala guantanamana [subsp. ***guantanamana***] var. ***scabridula*** (S. F. Blake) R. Rankin, **comb. & stat. nov.** ≡ *Polygala scabridula* S. F. Blake in Bull. Torrey Bot. Club 50: 39. 1923. – Holotype: [Cuba], "Santa Clara, Sabana de Motembo", 9.-10.8.1920, *León & Loustalot 9333* (NY 74497!; isotypes: GH 25982!, HAC!, NY 74498!, US 2515177! & 109023 [fragm.]!).

Leaves persistent in the herbarium; lamina obovate-spatulate, 10-25 mm long and 7-13 mm broad; tip sometimes bluntly mucronulate; margin thickened, slightly revolute or almost flat; costa prominent underneath in the basal two thirds. *Capsule* hairy on the faces. *Seeds* blackish brown.

Distribution and habitat. – This variety occurs in both inland serpentine and littoral limestone habitats, being confined to West and western Central Cuba: the provinces of Pinar del Río (Cajálbana, Las Pozas), Ciudad de La Habana (Loma de la Coca), Matanzas, Villa Clara, Cienfuegos, Sancti Spíritus and Ciego de Ávila. While it predominates in this territory, it is not

Downloaded From: https://bioone.org/journals/Willdenowia on 28 Mar 2024
Terms of Use: https://bioone.org/terms-of-use

exclusive there (typical var. *guantanamana* coexists sporadically with it), nor is it easily delimited from the latter variety, as the differences are small and intermediate morphs occur.

Polygala guantanamana subsp. ***alternifolia*** R. Rankin, **subsp. nova** [et var. ***alternifolia*** R. Rankin, **var. nova**]. – Holotype: "Cuba, Holguín, Moa: Charrasco al oeste de Yamanigüey, suelo serpentinoso-rocoso", 50 m, 7.5.1980, *A. Álvarez, J. Bisse, J. Gutiérrez & F. K. Meyer PFC 42965* (HAJB!; isotypes: B!, JE!). – Fig. 2.

Folia haud in brachyblastis fasciculata sed secus ramos alternatim disposita. Lamina foliorum obovato-spatulata, 14-27 mm longa et 8-12 mm lata, margine leviter revoluto vel fere plano, pilis strigillosis paene conspicuis nam distincte in facie immersis obsita, subtus circa basin trichomatum areolis atrioribus adspersa quae separantur fasciis punctulorum pallidiorum stomata prominula exhibentium; cellulae epidermales utriusque faciei parietibus anticlinalibus rectis incrassatis sejunctae. *Capsula* faciebus glabra. *Semina* brunnescentia.

Leaves not on brachyblasts, alternate along the twigs, persistent in the herbarium. Leaf lamina obovate-spatulate, 14-27 mm long and 8-12 mm broad; margin slightly revolute or almost flat; hairs strigillose, conspicuously sunk, barely visible; abaxial surface with dark areas around the trichome bases, separated by whitish-punctulate zones, each point corresponding to a projecting stoma; adaxial and abaxial epidermis cells with thick and straight anticlinal walls. *Capsule* glabrous on the faces. *Seeds* brownish. (Capsule and seed data taken from the specimen *Bisse & Lippold 17835,* JE, from near the locus classicus).

Distribution and habitat. – It replaces the typical subspecies in inland localities of eastern Cuba (provinces of Holguín, Santiago de Cuba and Guantánamo), at altitudes of 50-600 m, growing exclusively on ophiolithic soils in spiny, dry serpentinophyte scrub ("matorral xeromorfo subespinoso"). At one point, near Maisí in Guantánamo province, it almost reaches the southern coast (where the type subspecies is abundant on limestone), but it is always confined to its characteristic soil and habitat. It flowers from May to September; fruits have been collected in August.

Discussion

The above treatment addresses three questions: the status of *Polygala guantanamana* with respect to its relatives in *P.* subg. *Badiera;* the status of *P. scabridula* with respect to *P. guantanamana;* and the status of a so far unnamed, distinctive "morphotype" from inland serpentine habitats of East Cuba with respect to the two other taxa.

Polygala guantanamana has been accepted as an independent species by most authors, including Bernardi (2000), but, together with *P. oblongata,* was reduced to subspecific rank under *P. penaea* by Gillis (1975). By inference, both were considered as plain synonyms of the latter by Alain (1988), who included Cuba as well as the Bahamas (the home of *P. oblongata*) in its distributional range. There are good reasons, however, to keep these species apart. *P. penaea,* the plant of Hispaniola, is characterized among others by its very robust, broadly conical trichomes, very rough to the touch. *P. oblongata* and *P. guantanamana* coexist in more or less the same general area (most of Cuba) without any sign of introgression, and in spite of the extreme variability of both, especially the former, pedicel indumentum offers a constant and easy means to tell them apart.

Polygala scabridula is a different case. It, too, was treated differently by different authors. Alain (1953) accepted it as distinct, Gillis (1775) did not mention it explicitly but, according to his herbarium determinations, confused it at least occasionally with *P.* (*penaea* subsp.) *oblongata,* and Bernardi (2000) plainly sank it in synonymy under *P. guantanamana*. With abundant and partly new material at hand, I can easily dismiss the assumption of a close relationship of *P. scabridula* with *P. oblongata*. I have to agree that plants matching *P. scabridula* have a distinctive aspect and that they are restricted to only a part of the total area of *P. guantanamana*

Downloaded From: https://bioone.org/journals/Willdenowia on 28 Mar 2024
Terms of Use: https://bioone.org/terms-of-use



Fig. 2. Isotype specimen of *Polygala guantanamana* subsp. *alternifolia* (*PFC 42965*, B).

Downloaded From: https://bioone.org/journals/Willdenowia on 28 Mar 2024
Terms of Use: https://bioone.org/terms-of-use

(roughly its western half). But then, the distinctive characters are weak and not very stable, several plants tend to approach typical eastern *P. guantanamana,* and plants that cannot on any account be told apart from the latter turn up occasionally far to the west, where one would expect only *P. scabridula*. Curiously, ecology contributes nothing in this case to a sharper taxonomic definition. Plants matching *P. scabridula* are found, in the same general area, both in coastal limestone and inland serpentine habitats. The same applies in the case of *P. guantanamana* proper, with one striking difference: the coastal limestone populations are restricted to East Cuba and the inland serpentine ones to Central Cuba. While I unhesitatingly opt for varietal rank to designate the *P. scabridula*-like plants of the western part of the species range, I will consider the case of the third taxon involved separately and on its own merits.

This last-named taxon resembles the two foregoing ones in a general way and was consistently identified as *Polygala guantamana* (or its synonym *Badiera virgata*) by previous workers, including I. Urban and R. Chodat. It has, however, its own characteristic habit (due to the fact that its leaves are mostly scattered on long-shoots rather than fasciculate on brachyblasts), a uniform ecology and inhabits a coherent distributional area. It occupies the inland serpentine niche in East Cuba, that portion of Cuba where genuine *P. guantanamana* is restricted to coastal limestone locations. Furthermore, its leaf epidermis exhibits some special morpho-anatomical features such as prominent stomata, straight and thick cell walls (Díaz & Rankin 1998: fig. 4a-b) and marked cuticular thickenings (Díaz & Rankin 1998: fig. 4c-d). Summing up all the evidence, I must conclude that subspecific rank within *P. guantanamana* is amply justified for this so far unnamed taxon, described above as subsp. *alternifolia*.

Acknowledgements

Thanks are due to the persons in charge of the herbaria visited, in particular to Dr H. Manitz, Jena, for the help he provided during my studies at JE, and to the director and staff of the Botanical Museum Berlin-Dahlem for their hospitality and the facilities provided by the herbarium, library, computing department and photographic laboratory. I am grateful to the curators of the following herbaria, who sent their specimens on loan to B for me to study: BM, BREM, F, G, GH, GOET, K, NY, S and US. Susana Ayala, La Habana, has kindly allowed me to use the data of her unpublished diploma thesis (on leaf morpho-anatomy of shrubby Cuban *Polygala* species; 1996). Financial support of my travels to Germany in 1999 and 2001 by the Botanic Garden and Botanical Museum Berlin-Dahlem and the Association of Friends of that same institution is gratefully acknowledged. Last but not least, I thank Professor W. Greuter, Berlin, for revising the present manuscript and supervising the translation of the Latin diagnosis.

References

Alain [Bro.] 1953: Flora de Cuba, 3. Dicotiledóneas: *Malpighiaceae* a *Myrtaceae*. – Contr. Ocas. Mus. Hist. Nat. Colegio "De La Salle" **13.**

— [as "Liogier, A. H."] 1988: Descriptive flora of Puerto Rico and adjacent islands. *Spermatophyta* **2.** – Rio Piedras (Puerto Rico).

Bernardi, L. 2000: Consideraciones taxonómicas y fitogeográficas acerca de 101 *Polygalae* Americanas. – Cavanillesia Alt. **1.**

Blake, S. F. 1916: A revision of the genus *Polygala* in Mexico, Central America and the West Indies. – Contr. Gray Herb. **47.**

— 1923: Studies in West Indian plants XI. – Bull. Torrey Bot. Club **50:** 35-65.

Britton, N. L. 1910: Studies on West Indian plants III. – Bull. Torrey Bot. Club **37:** 345-363.

— 1915: Studies on West Indian plants VII. – Bull. Torrey Bot. Club **42:** 487-517.

Capote, R. P. & Berazaín, R. 1984: Clasificación de las formaciones vegetales de Cuba. – Revista Jard. Bot. Nac. Univ. Habana **5(2):** 27-75.

Downloaded From: https://bioone.org/journals/Willdenowia on 28 Mar 2024
Terms of Use: https://bioone.org/terms-of-use

Díaz, M. A. & Rankin, R. 1998: Modificaciones anatómicas en plantas que crecen sobre suelos de serpentina. – Revista Jard. Bot. Nac. Univ. Habana **19:** 61-65.

Gillis, W. T. 1975: Bahama *Polygalaceae* and their Greater Antillean affinities – a preliminary treatment. – Phytologia **32:** 35-44.

Address of the author:
Dr Rosa Rankin Rodríguez, Jardín Botánico Nacional, Carretera del Rocío km 3½, Calabazar, La Habana, Cuba.

Downloaded From: https://bioone.org/journals/Willdenowia on 28 Mar 2024
Terms of Use: https://bioone.org/terms-of-use