

BOOK REVIEW

Casper, S. Jost. 2019. The Insectivorous Genus *Pinguicula* (Lentibulariaceae) in the Greater Antilles. Softcover: Dimensions: 17.6 × 25 cm (B5), 126 pages, 60 color or black/white plates, 11 distribution maps. Botanic Garden and Botanical Museum Berlin, Freie Universität, Berlin. (February 6, 2019). ISBN 978-3-946292-30-2

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Among the great diversity of *Pinguicula* species, the Greater Antillean taxa (Cuba and Dominican Republic) are among the less studied ones; therefore, the new work by S. J. Casper is a necessary contribution eagerly awaited by many readers. Over the last six decades, the author has devoted himself to the study of the genus *Pinguicula* and since the last formal revision of the genus (Casper 1966); several new species have been described, many of them by the author himself especially for the Caribbean region. In the new publication, Casper reviews and discusses his previous works as well as other related literature such as a recent work by Lampard *et al.* (2016), that focused on Latin American taxa and made changes on the circumscription of certain species. This new book therefore is a most welcome concise study of the insectivorous genus *Pinguicula* in the Greater Antilles carried out by the author over a long period of time and, at the same time it will be the formal treatment of the genus *Pinguicula* for the new *Flora de la República de Cuba*.

The new book consists of two main sections: “The species” and “General aspects” besides the summary, a list of abbreviations, acknowledgements, the introduction and the list of references cited on the text. The first section begins with a taxonomic key for 15 species treated in the text; meanwhile, the second section deals with general aspects of the genus *Pinguicula* such as morphological characters, distribution and palaeogeographical data, species differentiation, relationships among Caribbean species and other taxa, and a brief summary of molecular systematics studies that are being carried out in collaboration with other researchers. In spite of being a purely scientific work, it will be of interest not only to researchers working on this topic, but also to collectionists, growers, and enthusiasts of the genus *Pinguicula* since it gathers, in a single publication, a wealth of data otherwise accessible only with difficulty for many readers. The book is nicely printed full of plates and maps that are generally well reproduced and clear, although, some pictures are dubious and should be interpreted with caution regarding the identity of certain species that do not match the taxonomic key or the given species description.

A taxonomic key based on morphological characters is always welcome and very useful; not only for botanists, but also for the general public interested in identifying the species that in the particular case of *Pinguicula* can be a difficult task. Moreover, the presented key is an accurate hit of the author due to the lack of this kind of material in recent works especially for the Greater Antillean species. The key is dichotomous, non-indented, and although it includes some microscopic characters it is easy to use without the need of a microscope. However, it is a pity that the species that causes the greatest confusion among Cuban species (*Pinguicula benedicta* Barnhart) has been not included in the key.

The first section continues with 16 subsections, each one dedicated to each taxon arranged in alphabetical order. In the account of each species the author follows a nice sequence of topics starting with comments on historical, taxonomic, and nomenclatural facts which I found very useful to understand the species’ circumscription adopted by the author for the delimitation of certain taxa. After that, a detailed morphological description, richly illustrated, gives the reader a clear picture of

each species; even though some pictures are ambiguous or do not clearly represent the description given in the text (e.g. Plates 17 and 56 that represent the former *Pinguicula toldensis* Casper). Examined specimens and photographs are also cited as well as information on distribution and habitat, and finally a discussion including comparisons between the treated species and other species with which it has been or can be confused. The final discussion for each species also provides readers with relevant details to clearly discriminate species that have been considered conspecific, such as *Pinguicula jaraguana* Casper and *Pinguicula lithophytica* Panfet & P.Temple.

Taxonomic novelties include three new species from eastern Cuba: *Pinguicula baezensis* Casper, *Pinguicula moaensis* Casper, and *Pinguicula orthoceras* Casper and the synonymization of *Pinguicula toldensis* with *Pinguicula caryophyllacea* Casper. I confess that when I had knowledge of the three new species I thought that they would be merely variations of the doubtful *Pinguicula benedicta* but, at the moment, after reading the text and analyzing the data I accept the author's view until the "*Pinguicula benedicta* puzzle" be properly studied and solved.

I have detected some problems regarding the incorrect citation of certain type specimens that must be corrected. That is the case of *Pinguicula jackii* Barnhart for which the author cited the holotype as kept at the herbarium of The New York Botanical Garden (NY). The only specimen I have found that match the type of *P. jackii* (*J.G. Jack 6794*) as indicated by Barnhart (1930) is housed at the Smithsonian Institution herbarium (US) along with other original materials (paratypes: *J.G. Jack 7886, 7942* and *L.H. Bailey 12443*), one of them with duplicates at the Cornell University herbarium (BH) and The New York Botanical Garden herbarium (paratype: *L.H. Bailey 12443*). The other case is more serious since it comprises the type specimens of *Pinguicula benedicta* and *Pinguicula lignicola* Barnhart. Along the text and in previous works (Casper 1966, 2003, 2004, 2007), the author claims that such specimens were in loan at the herbarium of the Botanical Museum Berlin-Dahlem (B) when Ernst was preparing his review on *Pinguicula* (Ernst 1961) and they were destroyed in a bombing raid during World War II; however, I have not found any evidence that these materials were ever at B. On the other hand, when the author discusses the taxonomic status of *P. benedicta*, he recognizes that Ernst did not cite any examined material (footnote 47, p. 103); therefore, I wonder how the author concluded that at some point these materials were in Berlin. Since the beginning of his studies, the greatest difficulty the author has had regarding *P. benedicta* has been that he has never examined the type specimen or any original material and has adopted Ernst's view (Casper 1966) but, where is the original material (holotype?)! I strongly believe that a set of specimens housed at the Arnold Arboretum Herbarium of the Harvard University, which are identified as types (*P. benedicta* barcode 00093357 and *P. lignicola* barcode 00093359) and syntype (*P. lignicola* barcode 00093358), represent the "lost holotypes" and a paratype of *P. benedicta* and *P. lignicola* since they match exactly with the information given by Barnhart (in Britton 1920) in the protologues. I have examined images of these specimens (see also Schlauer 2019) and I believe that a deeper study of the *P. benedicta*'s specimen can shed light on the identity of this species and the so-called *P. benedicta* species group.

At the end of the species' section the author discusses "The '*Pinguicula benedicta* puzzle': the dubious taxon *P. benedicta* and the *P. benedicta* species group" but once again he could not clarify the situation and states that "no specimens have been found that can without doubt be unequivocally attributed to Barnhart's taxon". Moreover, the author says that "if we want to perfectly solve the problem, we should reject Barnhart's name" what seems to me totally inadequate, although understandable, because apparently, he does not know about the existence of these original materials.

The second section is just over one tenth of the book (13 pages) and it opens with a general discussion of selected morphological characters typical of the genus and the particularities of them

in the Antillean species. Some of these characters have been already illustrated and discussed in the first section; whilst, others like the chromosome numbers are now discussed in comparison with other species, and pollen and seed characters are only briefly presented due to the lack of more specific studies. Flower shape is also illustrated in comparison with selected Mexican taxa although the author only refers these figures in other topics later in this section.

It is always a pleasure for me to read the author's biogeographical insights and this passion began when I first read his work on the Andean species (Casper 1984) which I found exquisitely detailed. In the present work the discussion of palaeogeographical aspects of the Antillean species are also well presented and, although it is mostly theoretical and did not present any experimental data, it is really worth reading. Nonetheless, I question the speculation that the ancestors of the modern Caribbean *Pinguicula* reached its current distribution around the Upper Miocene and Pliocene (9-3.7 mya). Without direct proofs like palaeobotanical data and/or time-calibrated phylogenies it is risky to propose such hypothesis just based in the background data cited by the author.

Regarding the patterns of differentiation of *Pinguicula* in the West Indies, the author presents five groups of species using different combinations of floral characters (i.e. corolla color and morphology) as grouping pattern. Moreover, other floral characters (e.g. flower shape and presence/absence of a palate-like structure in the corolla) and chromosome numbers are used to discuss possible relationships of the treated species with other species or species groups although, it is inconclusive and suggests the necessity of further studies regarding the infrageneric classification of *Pinguicula*.

Finally, the author slightly explores new insights on the relationships of Caribbean *Pinguicula* species based on preliminary results of molecular phylogenetics analyses that are mostly incongruent with the morphological characters formerly exposed. Since the author's own studies are still being carried out and have not been published, preliminary results are discussed in comparison with previous studies. Nevertheless, I would have liked to see a phylogenetic tree which should help to interpret the text for those readers that have not a clear understanding on evolutionary processes and phylogenetic analyses. This topic ends with a summary of the overall results obtained for the study group using classical and modern techniques; hence, we should expect changes in the infrageneric classification in the near future.

In conclusion I would have welcomed a more careful editing; including the deletion of some passages in German that are also presented translated to English which would have make the book more readable. I also would have liked to see a solution for the *P. benedicta* species group. These critical points should however not detract from the fact that the author, with this work, has provided us with an unusually detailed and useful account of the genus in the Greater Antilles. Just a few groups in the genus have been treated in such detail and this book will therefore be useful not only to those interested in the Caribbean species, but to everyone interested in *Pinguicula* as a whole and carnivorous plants overall.

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