

## Untangling three Kunth's species of *Asemeia* (Polygalaceae) collected by Humboldt and Bonpland

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The genus *Asemeia*, distributed throughout the Americas, from the United States to Argentina, comprises 28 species and one variety (Pastore & Abbott 2012). Its species are herbs, sub-shrubs, or, rarely, lianas, characterized morphologically by 2 connate outer sepals and an uncrested keel petal (Pastore & Abbott 2012). The genus is divided into two subgenera, the typical *Asemeia*, and the subg. *Apopetala* (S.F.Blake) J.F.B.Pastore & J.R.Abbott. *Asemeia* used to be recognized as *Polygala* sect. *Hebeclada* (Chodat 1893) or as *Polygala* subgenus *Hebeclada* (Blake 1924) but has been recently segregated (Pastore & Abbott 2012).

Among several names under investigation in my PhD study there are three, described by Kunth and with the type specimens collected by Humboldt and Bonpland, that are known for a long history of taxonomic debate among researchers and that are likely still erroneously applied: *Asemeia monticola* (Kunth) J.F.B.Pastore & J.R.Abbott (= *Polygala monticola* Kunth), *A. mollis* (Kunth) J.F.B.Pastore & J.R.Abbott (= *P. mollis* Kunth), and *A. monninoides* (Kunth) J.F.B.Pastore & J.R.Abbott (= *P. monninoides* Kunth). Although historically widely applied to herbaria specimens, they have differing delimitations and application.

Chodat (1893), Marques (1995, 1997), and Bernardi (2000) have all different interpretations of the delimitation of these three species: Chodat (1893) used the name *Polygala mollis* (= *Asemeia mollis*) to delimit those species that are currently treated as *A. ovata*, while for Marques (1995, 1997) and Bernardi (2000), it included at least 5 to 7 species of *Asemeia* using a wider species concept for *P. mollis*.

Probably due to a poor condition of the type specimen of *A. monticola* (Bonpland & Humboldt 308; see <http://coldb.mnhn.fr/catalognumber/mnhn/p/p00221201>), of just a few flowers and leaves, with the latter described as 'utrinque hirta-pubescentia' (both sides hirsute-pubescent), this name had often been misapplied for specimens that I consider to be *A. mollis*, *A. ovata*, and a likely new species. *A. monticola* ranges from southern Mexico to southeastern Brazil, but many of its specimens in herbarium collections have been misidentified: the ones from northern Panama are actually *A. ovata*, whereas those from southeastern Brazil are of *A. mollis* or *A. hirsuta*.

In the case of *A. monninoides*, it is difficulty in interpreting the nomenclatural type (Humboldt & Bonpland s.n.; see <http://coldb.mnhn.fr/catalognumber/mnhn/p/p00679149>), limited to only one flower bud. *A. monninoides* was revised by Pastore (2009), where the name was applied to a widely distributed species. Our taxonomic review indicates that its delimitation needs further revision.

The type localities and dates of all three species were gathered from the original type labels and using Alexander von Humboldt's chronology of Schwarz (2019). It became clear that the type of *A. monticola* was collected in Venezuela, on the montaintop of Turumiquiri, near Cumanacoa, the capital of the Montes Municipality in the state of Sucre, on 13 September 1799, whereas *A. mollis* was originally found in Carichana, an island in the Orinoco River in the state of Bolivar, Venezuela on 11-12 April 1800, and *A. monninoides* was collected near the Santana mine in San Sebastián de Mariquita, in the department of Tolima, Colombia on 17-18 June 1801.

In order to establish an exact application of the names *A. monticola*, *A. mollis* and *A. monninooides*, new specimens from their original localities need to be recollected for morphological and molecular studies.

### **Objectives**

(i) Collect topotypes of *A. monticola* (Turumiquiri mountain-Sucre-VEN), *A. mollis* (Carichana Island-Bolivar-VEN), and *A. monninooides* (Santana mine-San Sebastián de Mariquita-Tolima-COL); (ii) collect leaf samples for later extraction and molecular analysis; (iii) visit herbariums in Venezuela (VEN and CAR) and Colombia (COL and BOG), searching for specimens of the three species.

### **Material e methods**

#### *Collection of specimens*

The toponyms cited by Alexander von Humboldt's chronology of Schwarz (2019) and the in the type specimens labels will be investigated to design the itinerary. The expedition will covers a month were all the species be in a fertile moment, these specimens, when collected, will be herborized in the field . If possible, a minimum of five exsiccates will be made for each collection

The collection expeditions will count on the help of Dr. Gerardo Aymard, a botanist at UNELLEZ in Bogotá-Colombia.

General notes, geographical coordinates (GPS device), and photographs will be recorded in loco. Leaves samples will be dehydrated and preserved in silica for future phylogenetic studies The collected specimens will be included in the CTBS and FLOR herbaria.

#### *Typification*

The protologues of the names will be checked against the historical collections in several herbaria. The typification decisions will be taken in accordance with the International Code of Nomenclature for algae, fungi and plants (Turland et al. 2018).

#### *Phylogenetic analysis*

For Sanger sequencing, silica-dried leaves will be processed using the CTBA extraction protocol of Doyle & Doyle (1987), adapted by Pastore et al. (2011). The primers and sequencing methods will follow Pastore et al. (2019) and Lyskov et al. (2019).

### **Budget**

My monthly stipend, funded by a CAPES (Coordenação de Aperfeiçoamento de Pessoal do Nível Superior) scholarship, is US\$ 526 (=R\$ 2,200). I've used part of it to finance collecting expeditions.

The overall budget for this IAPT proposal is as follows:

Transportation Curitiba-BR/Caracas-VEN: estimated round trip cost: US\$ 1,115 (R\$ 4,666)

Transportation within Venezuela and Colombia (Cumanacoa-VEN to San Sebastián de Mariquita-COL) US\$ 514 (R\$ 2,150)

**Total US\$ 1.629 (R\$ 6,811).**

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