



Lectotypifications and nomenclatural notes in the Boraginaceae s.str. for the Flora of Ecuador

NORBERT HOLSTEIN* & MAXIMILIAN WEIGEND

Nees-Institut für Biodiversität der Pflanzen, Rheinische Friedrich-Wilhelms Universität Bonn, Meckenheimer Allee 171, 53115 Bonn, Germany

*author for correspondence

During the preparation of a taxonomic treatment concerning Boraginaceae s.str. for the Flora of Ecuador, we found that there are eleven species currently known in that area. We herewith designate lectotypes for some of the names concerned: *Cynoglossum revolutum* and *Cynoglossum mexicanum* (both *Hackelia revoluta*), *Amsinckia hispida* and *Eritrichium mandonii* (both *Amsinckia calycina*), and *Anchusa linifolia* and *Lithospermum alpinum* (both *Plagiobothrys linifolius*). The complex history of the type material of various synonyms of *Plagiobothrys linifolius* based on material by Bonpland and Humboldt is briefly discussed.

Keywords: Bonpland, Humboldt, Kunth, Ruiz López & Pavón, South America, typification, Willdenow

Introduction

With more than 15000 species, of which more than 4100 are endemic, Ecuador is the most species-rich country (per unit area) in South America (Jørgensen & León-Yáñez 1999). In the course of the taxonomic revision of the Boraginaceae Jussieu (1789: 128) s.str. for the Flora of Ecuador (<http://www2.dpes.gu.se/project/ecuador/>), we found eleven species to occur there; four of them introduced (Holstein & Weigend in prep.) Except for *Lithospermum* Linnaeus (1753: 132, Weigend *et al.* 2010) and *Selkirkia* Hemsley (1884–1885: 48, Holstein *et al.* 2016) [based on *Cynoglossum trianaeum* Weddell (1859: 90)], none of the genera of the Boraginaceae from Ecuador has been revised (at least regionally) and retroactive type designations were rarely made.

Material and Methods

This work is based on the examination of the relevant literature and on the study of the specimens kept in the following public herbaria (acronyms according to Thiers 2016): AAU, B, BM, BR, GB, GOET, K, M, MA, MO, NY, QCA, QCNE, S, W and WU. We also examined herbarium specimens from the homepages of B, CONN, F, GH, LL, P, S, TEX, US and at the website of JSTOR Global Plants (2000–2016). For each taxon we list the type specimen citation and relevant data indicated in the protologue. Typification follows the International Code of Nomenclature for algae, fungi, and plants (McNeill *et al.* 2012).

Typifications of the names

Hackelia revoluta (Ruiz López & Pavón 1799: 6) Johnston (1923a: 45).

Basionym: *Cynoglossum revolutum* Ruiz López & Pavón (1799: 6).

Type (lectotype, designated here):—[PERU. Junín Region: Tarma Province, Huassahuasi Distr.,] Huassahuassa, *H. Ruiz López & J.A. Pavón s.n.* (MA barcode MA814809 [digital image!], isolectotypes B† [F neg. 17359!], F No. 844511 barcode F0093256F [digital image!], F No. 845247 barcode F0093232F [digital image!], MA barcode MA814810 [digital image!]).

Protologue citation:—“Passim in Huassahuassi umbrosis.”

= *Cynoglossum mexicanum* Schlechtendal & Chamisso (1830: 114).

Type (lectotype, designated here):—MEXICO. [Tabasco:] in monte Macultepec, August 1828, *C.J.W. Schiede & F. Deppe*

585 (HAL barcode HAL0095748 [digital image!], isolectotypes B†, GH barcode GH00097402 [digital image!], HAL barcode HAL0107370 [digital image!]).

Protologue citation:—“In monte Macultepec. Aug.”

Plagiobothrys linifolius (Willdenow ex Lehmann 1818: 215) Johnston (1923b: 74).

Basionym: *Anchusa linifolia* Willdenow ex Lehmann (1818: 215) [Jul–early September 1818].

—*Anchusa leucantha* Willdenow ex Candolle (1846: 122), *nom. inval.* [*pro syn.*]

Type (lectotype, designated here):—[COLOMBIA. *sine loco*, Nov.–Dec. 1801], *A. Bonpland* & *A. v. Humboldt 2166* (B-W barcode B-W 03315 [digital image!]).

Protologue citation:—“*Anchusa linifolia* et *A. leucantha* Herbarii Willdenowi. Habitat in America meridionali.”

Additional specimens examined:—[*Ibid.*?], [*sine loco*], (syntype: B-W barcode B-W 03316 [digital image!]);—[*Ibid.*?], [*sine loco*], isolecto- or isosyntypes P barcode P00606779 [digital image!], P barcode P00606780 [digital image!], P barcode P00606781 [digital image!], P barcode P00670728 [digital image!]).

= *Anchusa oppositifolia* Kunth in Humboldt *et al.* (1818: 91, pl. 200) [late September 1818].

Type:—{COLOMBIA. Nariño: On hillside near Teindala and Jaguanquer, between the cities of Pasto and Tulcan, alt. 1400 hex. [hexapeda, ~2650 m] (Andibus Quiduensium)} [*sine loco*], [Nov.–Dec. 1801], *A. Bonpland* & *A. v. Humboldt 2166* (holotype P barcode P00670728 [digital image!], isotypes P barcode P00606779 [digital image!], P barcode P00606780 [digital image!], B-W barcode B-W 03315 [digital image!], B-W barcode B-W 03316 [digital image!]).

Protologue citation:—“Crescit in crepidinibus prope Teindala et Jaguanquer, inter urbem Pasto et Tulcan, alt. 1400 hex. [hexapeda, ~2650 m] (Andibus Quiduensium).”

= *Anchusa pygmaea* Kunth in Humboldt *et al.* (1818: 92) [late September 1818].

Type:—[ECUADOR. Pichincha/Napo:] Antisana, [1802], *A. Bonpland* & *A. v. Humboldt 2260* (holotype P barcode P00670729 [digital image!]; isotypes P barcode P00606771 [digital image!], P barcode P00606772 [digital image!], B-W barcode B-W 03300 [digital image!], HAL barcode HAL0115300 [digital image!]).

Protologue citation:—“In summo monte Antisanæ, qua parte Chusolongum spectat, alt. 2104 h. [hexapeda, ~4000 m], (Regno Quitensi).”

= *Lithospermum alpinum* Willdenow in Roemer & Schultes (1819: 742).

Type (lectotype, designated here):—[ECUADOR. Pichincha/Napo:] Antisana, [1802], *A. Bonpland* & *A. v. Humboldt 2260* (B-W barcode B-W 03300 [digital image!], isolectotypes HAL barcode HAL0115300 [digital image!], P barcode P00670729 [digital image!], P barcode P00606771 [digital image!], P barcode P00606772 [digital image!]).

Protologue citation:—“Herb. Willd. MSS. [...] In Antisana.”

Notes:—*Plagiobothrys linifolius* is quite variable and ontogenetically plastic. Plants can range from strongly reduced cushion-like plants, with more narrow leaves/bracts and supposedly smaller flowers, to creeping with long, procumbent lateral shoots. While the former habit is mainly found under dry conditions, all transitional forms to “true” *P. linifolius* are found in wetter conditions.

The Humboldt and Bonpland material was separated into different sets, and the two different sets were the basis of the independent description of different species based on the same collections, something that is fairly common in several families of Humboldt and Bonpland’s collection (McVaugh 1955). Each of the two extreme forms of *Plagiobothrys linifolius* thus was the basis for two names, resulting in total in four names for the same species. Alexander von Humboldt sent a large amount of specimens to his mentor and friend Willdenow in Berlin with the request not to publish any names (or only a few selected ones; Moheit 1993: 125). Willdenow had Humboldt’s material and his itinerary at hand, but not Bonpland’s *Journal botanique* (= his field book), therefore his descriptions would have been fragmentary anyway (Lack 2003, 2004). In 1810, Humboldt asked Willdenow to start working on the botanical collections since Bonpland did not find the time, but apart from a short visit to Paris in 1810 and 1811, Willdenow only had his Berlin material at his disposal (Hiepko 2006). Willdenow had two names in mind for the elongated, creeping form of *Plagiobothrys linifolius*: *Anchusa linifolia* and *A. leucantha*, annotated on the different specimens in his collection. Willdenow largely kept his promise not to publish the species on his own behalf, but when he died in 1812, D.F.C. Schlechtendal made Humboldt’s material available to selected botanists (McVaugh 1955, Lack 2003, Hiepko 2006). Lehmann surveyed the Boraginaceae material and regarded Willdenow’s two names as referring to a single species that Lehmann published as *Anchusa linifolia* (1818: 215). Whether these two plants truly come from the same gathering is unknown (they bear the same reference number 2166), but since both names are cited

in the protologue, the specimens have to be considered as syntypes. After Willdenow's death, Humboldt asked Kunth to continue his work in Paris. Unaware of Willdenow's work, and even refused access to Willdenow's collections (Kunth 1822, Hiepko 2006), Kunth used the duplicate of 2166 in Bonpland's herbarium for describing the name *Anchusa oppositifolia*. The description of *A. oppositifolia* was based on Bonpland's *Journal botanique*, although Kunth did not explicitly mention any contribution by Bonpland. The specimen P00670728 is certainly the holotype of *A. oppositifolia* as it is i) from the Paris main set (*Herbier Bonpland*) according to the printed label (Hiepko 2006), ii) has Kunth's handwriting on the label, and iii) the plant is the basis for pl. 200 that accompanies the protologue. The specimens P00606779 and P00606780 are not from the Paris main set, which remained in Paris after Bonpland left for South America again in 1816. Instead, they belonged to the set Bonpland took to Argentina, and that was ultimately returned to Paris in 1832 (Lack 2003, Hiepko 2006, Stauffer *et al.* 2012: Fig. 7). They do not bear Kunth's annotation, therefore they were most likely not seen by Kunth. The specimen P00606781 bears notes by Willdenow as they contain his unpublished name "*A. leucantha*" and the short descriptions from the folder of B-W 03315. The specimen does not bear any notes by Kunth, but arrived in Paris via Drake del Castillo's collection from a different source.

The story is somewhat simpler for the more congested plants. They were collected at the Antisana volcano, which Humboldt and Bonpland visited three times (Humboldt 1801–1802). Although Humboldt and Bonpland's reference numbers are not true collecting numbers (Rankin Rodríguez & Greuter 2001) specimens bearing the same numbers may be considered duplicates. The specimen P00670729 was part of the Paris main set (*Herbier Bonpland*) according to the printed label (Hiepko 2006), while the specimens P00606771 and P00606772 were taken by Bonpland to Argentina in 1816 and returned to Paris in 1832 (Lack 2003, Stauffer *et al.* 2012: Fig. 7). P00670729 is therefore to be considered the holotype.

As for *Anchusa linifolia*, the Berlin duplicate material is also to be lectotypified, because at the time of the description of the name *Lithospermum alpinum*, Willdenow had two specimens at his disposal. One still remains in B-W and is hence chosen to be lectotype, and the other one is now housed in HAL, which was brought there in 1833 by D.F.L. von Schlechtendal (Lack 2003, Stauffer *et al.* 2012: Fig. 7).

Amsinckia calycina (Moris 1831: 21) Chater in Heywood (1971: 380).

Basionym: *Lithospermum calycinum* Moris (1831: 21).

= *Amsinckia hispida* Johnston (1924: 75). — *Lithospermum hispidum* Ruiz López & Pavón (1799: 5), nom. illeg., non Forsskål (1775: 38). — *Benthamia hispida* (Johnston 1924: 75) Druce (1928: 80).

Type (lectotype, designated here):—PERU. In Peruviae saxosis versus Cheuchin Provinciae, Caxatambo vicum, 1778–1788, *H. Ruiz López & J. Pavón s.n.* (MA! barcode MA814756, isolectotypes MA! barcode MA814755, isotype F [digital image!]).

Protologue citation:—"The type of *A. hispida* was collected in the arid belt to the north of Lima, Peru."

= *Eritrichium mandonii* Ball (1885: 51).

Type (lectotype, designated here):—PERU. Lima: Huarochirí Province, ex rupestribus Andium Peruviae juxta pagum Chicla, 12000–13000 ft., 21–23 April 1882, *J. Ball s.n.* (K!, isolectotype NY barcode NY01240208 [digital image!]).

Protologue citation:—"Chicla!", "[...]My specimens, from which the description is taken, agree with No. 378 of Mandon's 'Plants of Bolivia'"

Additional specimens examined:—BOLIVIA. [La Paz:] Prov[inci]a Larecaja, viciniis Sorata, Calavayae, colle ullontiji [...] in veroactis, reg[ione] temp[er]at[ur]ae, 2700–2900 m, February–June 1860, *G. Mandon Plantae Andium Bolivensium* 378 (isosyntypes B† [F neg. 17356!], BR! barcode BR0000006961688, GH barcode GH00094272 [digital image!], MPU barcode MPU019676 [digital image!], S No. S12-25333 [digital image!], US barcode US00110946 [digital image!], W! No. W1889-223058, W! No. W0012969).

Notes:—*Amsinckia hispida* is often regarded as a new combination, but the name on which it is based on, *L. hispidum* Ruiz & Pav., is illegitimate due to an earlier Forsskål name. It is to be treated as a new name by the author of the legitimate name (art. 58, McNeill *et al.* 2012). Since Johnston only referred to Ruiz López & Pavón, lectotypification with their original material seems appropriate.

Acknowledgments

Thanks are given to Juliana Chacón for communicating material from COL and Federico Luebert for material from MA, and the curatorial staff of the herbaria for permission to examine their collections. We are grateful to Laurence J. Dorr and the anonymous reviewers for helpful comments on the manuscript.

References

- Ball, J. (1885) Contributions to the flora of the Peruvian Andes, with remarks on the history and origin of the Andean Flora. *Journal of the Linnean Society, Botany* 22: 1–64.
- Candolle, A.P. de (1846) *Prodromus systematis naturalis regni vegetabilis*. 10. Victoris Masson, Paris, 369 pp. Available from: <http://bibdigital.rjb.csic.es/ing/Libro.php?Libro=6161&Pagina=1> (1 October 2016)
- Druce, G.C. (1928) *List of British Plants*. T. Buncle & Company, Arbroath, 148 pp.
- Forsskål, P. (1775) *Flora Ægyptiaco-Arabica sive descriptiones plantarum quas per Ægyptum Inferiorem et Arabiam felicem detexit*. Möller, Hauniæ [Copenhagen], Denmark, CXXVI, 220 pp.
<http://dx.doi.org/10.5962/bhl.title.41>
- Hemslay, W.B. (1884–1885) *Report on the scientific results of the voyage of H.M.S. Challenger during the years 1873-1876*. *Botany* 1 (3). London, Edinburgh, Dublin, 95 pp.
- Heywood, V.H. (1971) Flora Europaea: Notulae Systematicae ad Floram Europaeam spectantes: No. 11. *Botanical Journal of the Linnean Society* 64: 353–381.
<http://dx.doi.org/10.1111/j.1095-8339.1971.tb02152.x>
- Hiepmo, P. (2006) Humboldt, his botanical mentor Willdenow, and the fate of the collections of Humboldt & Bonpland. *Botanische Jahrbücher für Systematik, Pflanzengeschichte und Pflanzengeographie* 126: 509–516.
<http://www.dx.doi.org/10.1127/0006-8152/2006/0126-0509>
- Holstein, N., Chacón, J., Hilger, H.H. & Weigend, M. (2016) No longer shipwrecked—*Selkirkia* (Boraginaceae) back on the mainland with generic rearrangements in South American “*Omphalodes*” based on molecular data. *Phytotaxa* 270 (4): 231–251.
<http://dx.doi.org/10.11646/phytotaxa.270.4.1>
- Humboldt, F.W.H.A. von (1801–1802) *Quito (Pichincha, Cotopaxi, Tungurahua, p. 40. Chimborazo, Altar) – Alausi – Assuai – Cuenca – Loxa – Amazone – Caxamarca – Lima – (Quindiu [gestrichen] – Ibaguè à Carthago n. 4°.) Popayan – Almager. Pasto – Quito (Los Pastos, Cumbal) Roches envoyées à Madrid, p. 5–8. Voyage a Almaguer: Quinquina Malacates Lexa p. 68–72) Truxillo p. 16! Lima – 61. Potosi p. 16 Proces [?] 27.56 etc.* Staatsbibliothek zu Berlin Preußischer Kulturbesitz, Nachl. Alexander von Humboldt (Tagebücher) VII bb/c. Folio-Format, Ledereinband. Available from: <http://resolver.staatsbibliothek-berlin.de/SBB000152B400000000> (accessed 6 June 2016)
- Humboldt, F.W.H.A. von, Bonpland, A.J.A. & Kunth, C.S. (1818) *Nova genera et species plantarum quas in peregrinatione [in quarto ed.: in plagam aequinoctalem] orbis novi collegerunt, descripserunt, partim adumbraverunt Amat* 3(part 9). Sumptibus librariae graeco-latini-germanicae, Paris, pp. 1–96.
- Johnston, I.M. (1923a) Studies in the Boraginaceae. 1. Restoration of the genus *Hackelia*. *Contributions from the Gray Herbarium of Harvard University* 68: 43–48.
- Johnston, I.M. (1923b) A synopsis and new combinations in the genus *Cryptantha*. *Contributions from the Gray Herbarium of Harvard University* 68: 57–80.
- Johnston, I.M. (1924) Studies in the Boraginaceae. III. *Contributions from the Gray Herbarium of Harvard University* 73: 42–78.
- Jørgensen, P.M. & León-Yáñez, S. (Eds.) (1999) Catalogue of the vascular plants of Ecuador. *Monographs in Systematic Botany from the Missouri Botanical Garden* 75: 1182.
- JSTOR Global Plants (2000–2016) JSTOR Global Plants, ITHAKA, New York. Available from: <http://plants.jstor.org> (accessed 9 June 2016)
- Jussieu, A.L. de (1789) *Genera plantarum*. Herissant & T. Barrois, Paris, 498 pp.
<http://dx.doi.org/10.5962/bhl.title.284>
- Kunth, C.S. (1822) *Synopsis plantarum quas in itinere ad plagam aequinoctialem orbis novi collegerunt Al. de Humboldt et Am. Bonpland* 1. F.G. Levrault, Paris, 491 pp.
- Lack, H.W. (2003) Alexander von Humboldt und die botanischen Sammlungen in Berlin. In: Hamel, J., Knobloch, E. & Pieper, H. (Eds.) *Alexander von Humboldt in Berlin [Algorismus 41]*, ERV Dr. Erwin Rauner Verlag, Augsburg, pp. 107–132.
- Lack, H.W. (2004) The botanical field notes prepared by Humboldt and Bonpland in tropical America. *Taxon* 53: 501–510.
- Lehmann, F.C. (1818) *Plantae e familiae Asperifoliarum nuciferae*. 1. F. Dümmler, Berlin, 250 pp. Available from: <http://www.mdz-nbn-resolving.de/urn/resolver.pl?urn=urn:nbn:de:bvb:12-bsb10229802-3> (Accessed 5 Oct. 2016)

- Linnaeus, C. (1753) *Species plantarum* 1. Laurentius Salvius, Holmiae [Stockholm], 560 pp.
<http://dx.doi.org/10.5962/bhl.title.669>
- McNeill, J., Barrie, F.R., Buck, W.R., Demoulin, V., Greuter, W., Hawksworth, D.L., Herendeen, P.S., Knapp, S., Marhold, K., Prado, J., Prud'homme van Reine, W.F., Smith, G.F., Wiersema, J.H. & Turland, N.J. (Eds.) (2012) International Code of Nomenclature for algae, fungi, and plants (Melbourne Code) *Regnum Vegetabile* 154: 1–240.
- McVaugh, R. (1955) The American collections of Humboldt and Bonpland, as described in the Systema Vegetabilium of Romer and Schultes. *Taxon* 4: 78–86.
- Moheit, U. (Ed.) (1993) *Alexander von Humboldt – Briefe aus Amerika 1799–1804*. Akademie-Verlag, Berlin, 378 pp. [*Beiträge zur Alexander-von-Humboldt-Forschung* 16]
- Moris, G.G.J.H. (1831) *Enumeratio Seminum Horti Regii Botanici Taurinensis*. Ex typis regiis, Torino, 34 pp.
- Rankin Rodríguez, R. & Greuter, W. (2002) Humboldt, Willdenow, and *Polygala* (Polygalaceae) *Taxon* 50: 1231–1247.
- Roemer, J.J. & Schultes, J.A. (1819) *Systema vegetabilium*. 4. J.G. Cotta, Stuttgart, 888 pp.
<http://dx.doi.org/10.5962/bhl.title.825>
- Ruiz López, H. & Pavón, J.A. (1799) *Flora peruviana et chilensis* 2. Gabrielis de Sancha, Madrid, 76 pp.
<http://dx.doi.org/10.5962/bhl.title.814>
- Schlechtendal, D.F.L. von & Chamisso, L.A. von (1830) Plantarum mexicanarum a cel. viris Schiede et Deppe collectarum recensio brevis. *Linnaea* 5: 72–174.
- Stauffer, F.W., Stauffer, J. & Dorr, L.J. (2012) Bonpland and Humboldt specimens, field notes, and herbaria; new insights from a study of the monocotyledons collected in Venezuela. *Candollea* 67: 75–130.
<http://dx.doi.org/10.15553/c2012v671a10>
- Thiers, B. (2016) Index Herbariorum: A global directory of public herbaria and associated staff. New York Botanical Garden's Virtual Herbarium. Available from: <http://sweetgum.nybg.org/science/ih/> (accessed 20 June 2016)
- Weddell, H.A. (1859) *Chloris andina* 2 (11). P. Bertrand, Paris, 31 pp.
<http://dx.doi.org/10.5962/bhl.title.217>
- Weigend, M., Gottschling, M., Hilger, H.H. & Nürk, N.M. (2010) Five new species of *Lithospermum* L. (Boraginaceae tribe Lithospermeae) in Andean South America: Another radiation in the Amotape-Huancabamba Zone. *Taxon* 59: 1161–1179.