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Roxburgh's *Cynoglossum marifolium* (*Boraginaceae*) – reassessment and typification of a long forgotten name[1]

Abstract

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Cynoglossum marifolium was described and validly named in 1824, in a posthumous publication of Roxburgh. Clarke in 1885 unaccountably relegated it to the synonymy of *Heliotropium marifolium* Retz., where it has since remained, even though the original description forbids such placement. No original specimen is known to exist, but an original watercolour drawing inscribed "*Cynoglossum marifolium* R.", commissioned by Roxburgh from an unknown Indian artist, was recently offered for sale and has been acquired for the Palermo Herbarium (PAL-Gr). It is here designated as lectotype. An almost identical drawing exists at Kew. Roxburgh's plant's correct identity is *Bothriospermum marifolium* (Roxb.) DC., a species that has so far been confused with the closely related *B. zeylanicum* (J. Jacq.) Druce.

Key words: *Heliotropium marifolium*, *Bothriospermum zeylanicum*, Roxburgh, lectotypification.

Introduction

When nomenclaturally and taxonomically reassessing *Cynoglossum* sensu lato with a view to establish a complete inventory of names and taxa (Hilger & al. 2015), one of the problems that surfaced was the identity of *Cynoglossum marifolium* Roxb., a name all but unused in recent botanical literature. We found that Catalogue of Life (http://www.catalogueoflife.org/col/), in its dynamic catalogue, treats it as a synonym of *Heliotropium marifolium* Retz., member of a different subfamily if not family – a disposition that appeared to be incompatible with Roxburgh's solid botanical reputation. I decided to take a closer look at the case and, chance assisting, have been able to solve it and confirm Roxburgh's credibility. The details are the subject of the present note.

Historical digest

William Roxburgh (3 Jun 1751 to 18 Feb 1815), British botanist of Scottish origin, stands foremost among the fathers of (East) Indian botany. Aged just 15 he set out on his

[1] Dedicated to my illustrious friend Francesco Maria (Franco) Raimondo on the occasion of his seventieth birthday.

first travel to India, on a ship of the East India Company (EIC). In alternation with his studies of botany and medicine at Edinburgh University, he completed several voyages to India until he settled there in 1776, initially to work as a surgeon in Madras (Chennai) but never neglecting his botanical interests. In the early 1780s he founded and ran an experimental botanical garden at Samalkot (Samarlakota), sharing his time between botanical studies in the field and the introduction and multiplication of foreign useful plants. This qualified him for the post of naturalist in the Madras Presidency, which he obtained in 1790. Three years later he was appointed superintendent of the Royal Botanic Garden in Calcutta (Kolkata, West Bengal) and moved from the south of India to the country's north-eastern edge. Plagued by ill health, which forced him twice to take breaks for recovery in South Africa and Britain, he left India for good in 1813, spending 10 months on St. Helena Island on his way back (Beatson 1816: 295), to die in Edinburgh in February 1815, half a year after his final return home (Desmond 2004; see Desmond 1992 for additional information).

During his Indian stay of close to a lifetime, Roxburgh collected and studied assiduously the country's flora but published relatively little. His only major work were the "Plants of the coast of Coromandel", published in 3 volumes (12 parts) over a time span of 25 years (Roxburgh 1795-1820) under the care of Sir Joseph Banks, the three last parts posthumously. When Roxburgh finally left India he entrusted the manuscript of his catalogue of the Calcutta botanic Garden as well as a copy of his to-be "Flora Indica" to a friend: the Baptist missionary William Carey, who little by little managed to have them printed. The catalogue came out first, still during its author's lifetime, under the title "Hortus bengalensis" (Roxburgh 1814). One third of the Flora followed, in two volumes (Roxburgh 1820, 1824), with many added contributions by Nathaniel Wallich, botanist of Danish origin who had succeeded Roxburgh as superintendent of the Calcutta Garden. Finally, the complete "Flora Indica" (Roxburgh 1832), from which the Wallich additions had been expunged, was published in three volumes – bar the cryptogams, which had to await publication a dozen years more.

The first half of Roxburgh's Indian activities took place in the Madras Presidency in the south-east of the subcontinent, to which the Coromandel Coast belongs. Roxburgh soon started to write up descriptions of the native species available to him, numbering them sequentially as the work proceeded; a habit that he maintained faithfully after his move to Bengal. A Roxburgh manuscript at Kew has the descriptions arranged in their original numerical sequence, which obviously reflects chronology. These descriptions served as the basis for Roxburgh's treatment in the Flora itself (manuscript at BM), allowing for the fact that "sometimes … the published account is much abbreviated from that in the MS" (Sealey 1957).

Roxburgh did of course collect specimens of the plants he described, but seems not to have attached the same value to voucher material as other botanists. He did not apparently build a herbarium of his own, and indeed, "very few of Roxburgh's specimens are to be found in the Calcutta Garden at present" (Anonymous 1964: 2). Instead, he "distributed specimens freely, but does not appear to have kept a set for himself… Moreover, Roxburgh specimens are often poor and scrappy" (Sealey 1957; Sealy also provides information on several specimen sets known to him, with their present and former whereabouts).

The unique feature in Roxburgh's way of working is the importance he attached to the pictorial record of the plants he described. "At the same time that he wrote his description,

he nearly always had a life-size painting of the plant … made by a native artist. In all he described about 2,600 species and had paintings made of more than 2,500 of them" (Sealy 1957). He availed himself of the skilled services of an unknown number of Indian artists of cryptic identity, trained and supervised by him. The illustrations were given numbers matching those of the concomitant descriptive text. Most of these illustrations exist in two or more near identical versions, done in parallel or (more likely) copied one from the other, but in essence all are originals, as it is not possible to tell with certainty which version is the earliest. It is often assumed (e. g. by Clarke 1874; Sealey 1957; Anonymous 1962) that the set housed in Calcutta comprises the originals and other sets consist of copies, but this is an unwarranted assumption, not only in view of the above considerations but also because it is sensible to assume that the version judged to be best (which need not be the earliest) was chosen for the "original" set.

The Calcutta set is stated to comprise 2,533 plates measuring about 44 × 29 cm, bound in 35 volumes (Anonymous 1964). Clarke (1874) mentions "plants 2,542 in number" – the slight difference being perhaps due to the presence of plates on which more than one plant is represented. Presumably due to the unfavourable conditions of the Bengal climate, the Calcutta plates have deteriorated to some extent: the colour of the paper "has deteriorated considerably", having become "somewhat yellowish and often foxed"; and the colouring of the plates has also deteriorated, "having become dim or dull with age" (Anonymous 1964).

What has been considered a "duplicate set" was sent to the East India Company and is now kept at Kew. It comprises 2,512 numbered plates of drawings – only 69 less than the number of descriptions. Their inventory has been published by Sealey (1957; Sealy also refers to the fate and location of several other runs of Roxburgh plates that are known to exist). All can be admired on the apposite Website of Kew Gardens (Anonymous 2006), funded by the A. W. Mellon Foundation, which also brings much additional information on Roxburgh and his work.

Only part of the Roxburgh plates, this unique pictorial monument so eminently useful for the interpretation of Roxburgh's species (many of which were first described and named by him), has been published in print. Exactly 300 plates were included in Roxburgh's (1795-1820) "Plants of the coast of Coromandel"; about 400, re-drawn, were used to illustrate Wight's (1844-1853) "Icones"; and 201, slightly reduced in format and drawn anew from the originals, appear as colour prints in the "Icones Roxburghianae" (Anonymous 1964-1978), a serial publication that was unfortunately discontinued long before the self-set goal, to make public the illustrations of "all the species described by Roxburgh in his *Flora Indica* as new" (Santapau in Anonymous 1964), was attained. Allowing for some duplication, this corresponds to approximately one third of the total number of the known, numbered illustrations.

Cynoglossum marifolium and its fate

In Roxburgh (1814: 13), where *Cynoglossum marifolium* first appears, it is a nomen nudum for a not yet described, diffuse annual species found by Roxburgh's son William ("Mr. W. R."; see Desmond 2004) at Chittagong (Bangladesh) and cultivated since 1801

in the Calcutta Garden. Its original description (in Roxburgh 1824: 8; repeated identically in Roxburgh 1832, 1: 457-458) runs as follows:

Annual, diffuse. *Leaves* bifarious oblong, hairy. *Flowers* solitary between the leaves; *corol* half the length of the calyx; *seed* round, rough.
A native of the eastern parts of Bengal; flowering time the cold season; soon after which the seed ripens, and the plants perish.

Root annual.—*Stem* none, but several, ramous, slender, round, hairy branches spread on the ground.—*Leaves* alternate, bifarious, subsessile, elliptic, hairy underneath; half an inch in length, and about half that in breadth.—*Flowers* axillary, or between the leaves, short-peduncled, solitary, very small, of a pale whitish blue.—*Calyx* five-leaved; leaflets lanceolate, hairy on the outside, nearly twice as large as the corol.—*Corol,* the tube very short, the *throat* contracted by five emarginate scales alternate with the stamens.—*Filaments* short; *anthers* large, half hid in the mouth of the tube of the corol.—*Style* short, clavate; *stigma* emarginate.—*Seeds* rough, round, almost hid in the calyx, affixed to a very short columnar receptacle.

Subsequent authors mentioning *Cynoglossum marifolium* found little to add. Don (1837-1838: 353), who accepted the species, used a shortened version of the original description. The Candolles (in Candolle 1846: 116), also relying entirely on Roxburgh's description, tentatively transferred the species to *Bothriospermum* Bunge as *B. marifolium* (Roxb.) DC. & A.DC. None of them, nor any later author as far as I am aware, saw an original specimen, and it is doubtful whether any ever existed.

Clarke (1885: 152) held a completely different view. He assigned *Cynoglossum marifolium,* with *Bothriospermum marifolium,* to the synonymy of *Helotropium marifolium* Retz., member of a different subfamily if not family. He did not mention the reasons for such change, nor did he claim to have examined any original Roxburgh element, but blandly asserts: "Anthers ovate with linear twisted tips (as in allied species) described by Roxburgh as 'scales' between the corolla lobes which error has misled A. DC." The authority of Clarke has since prevailed and his conclusion has not been challenged. The Catalogue of Life (Anonymous 2015) still accepts synonymy of *C. marifolium* with *H. marifolium*.

Clark's assessment left me nonplussed. After all, Clarke himself (1874: v) had professed his admiration of Roxburgh, qualifying his work as "excellent" and his species as "well conceived". He even wrote (l.c.), to shame some of Roxburgh's detractors: "many … of his species have been impertinently reduced by various hands to well-known species (themselves described by Roxburgh) on the assumption that Roxburgh had made two species out of one, the true explanation being that Roxburgh's second species was unknown to the man who reduced it as a mere synonym". So, when Clarke himself, a decade later, took very similar action he must, one supposes, have had very solid reasons. Accusing Roxburgh to have mistaken apical anther appendages for "emarginate scales alternate with the stamens" [not with the corolla lobes!], and, by implication, bracteate flower spikes with "solitary flowers, axillary, or between the leaves", is pretty harsh. The obvious assumption was that Clarke, then still based at Calcutta and familiar with the Roxburgh plates there, must have seen a Roxburgh illustration of *Cynoglossum marifolium* that in fact represented the heliotrope.

The Roxburgh watercolour

Searching for illustrations of *Cynoglossum marifolium* on the Internet, much to my surprise I came across an offer for sale of a Roxburgh original, made in the following terms: "A superb original watercolour drawing of *Cynoglossum marifolium* Roxburgh, a small delicate plant, with detailed vignette of the flower and seed, captioned in pencil; by an unnamed local Indian artist, commissioned by William Roxburgh. Single leaf, wove paper watermarked J. Whatman (sheet size: $16^{4}/_{8} \times 10^{6}/_{8}$ inches)." That sheet (Fig. 1) was purchased at my behest by the Foundation Herbarium Greuter. It has been incorporated as accession No. 62676 into the Greuter Herbarium in Palermo (PAL-Gr), to serve as the **lectotype (designated here) of the name *Cynoglossum marifolium* Roxb.** A high-resolution digital image has been placed online at the Website of the Herbarium Mediterraneum Panormitanum (http://147.163.105.223/zoomify/view_img.asp?ic=62676_GR).

The leaf is one of a set of 75, kept disbound in a modern clamshell case. The set was auctioned by Christie's London on 31 Oct 1991, as lot 226, and acquired by W. G. Arader of New York. Some of the plates have the red ink library stamp of the East India Company on the verso. The present one shows traces of an erased such stamp, with its oval red outline still visible. It is therefore a safe assumption that the set consists of plates that had at one time been considered as surplus duplicates by the East India Company (or their successors) and, by consequence, placed on sale. The J. Whatman watermark is incomplete and does not show the date (if it ever had one), but there is no reason to doubt that the plate was part of the original consignment sent by Roxburgh to London, presumably in 1803 (see below). The techniques and materials used by the artists working for Roxburgh are described in Anonymous (2006), in the chapter "The Roxburgh artists".

The PAL-Gr plate is captioned "*Cynoglossum marifolium* R." in pencil, in Roxburgh's handwriting (see, for comparison, Van-Steenis Kruseman 1950: CLI, and Steinberg 1977: 14). It does not bear the sequential number [1348] of the description to which it belongs, but instead a small, pencilled number (100 or 10a) in a different hand, the signification of which is unknown. One of several decumbent stems is shown, connected to the root and with the remaining stems and lower branches cut off, the whole in life-size, as is normal for Roxburgh's plates. The details however are enlarged (contrary the general rule for "dissections", if Sealey 1957: 301 is correct): the fruiting calyx enclosing the base of the globular fruit, with its four mericarps, about 2×; the opened flowering calyx, showing the pistil, and on its right the flattened-out corolla from within, both about 5×.

The Kew set of Roxburghian drawings includes an exact match of the Palermo plate. It is captioned in ink, at the right margin, "1348 *Cynoglossum marifolium* R.", also in Roxburgh's handwriting but in a neater script. As to the drawing itself the two versions are almost indistinguishable. Their date of origin can be placed between 1801 (year of introduction into the Calcutta Botanic Garden, according to Roxburgh 1814: 13) and 1803[-1804], when drawing No. 1463 was sent to London (Sealey 1957: 300, footnote).

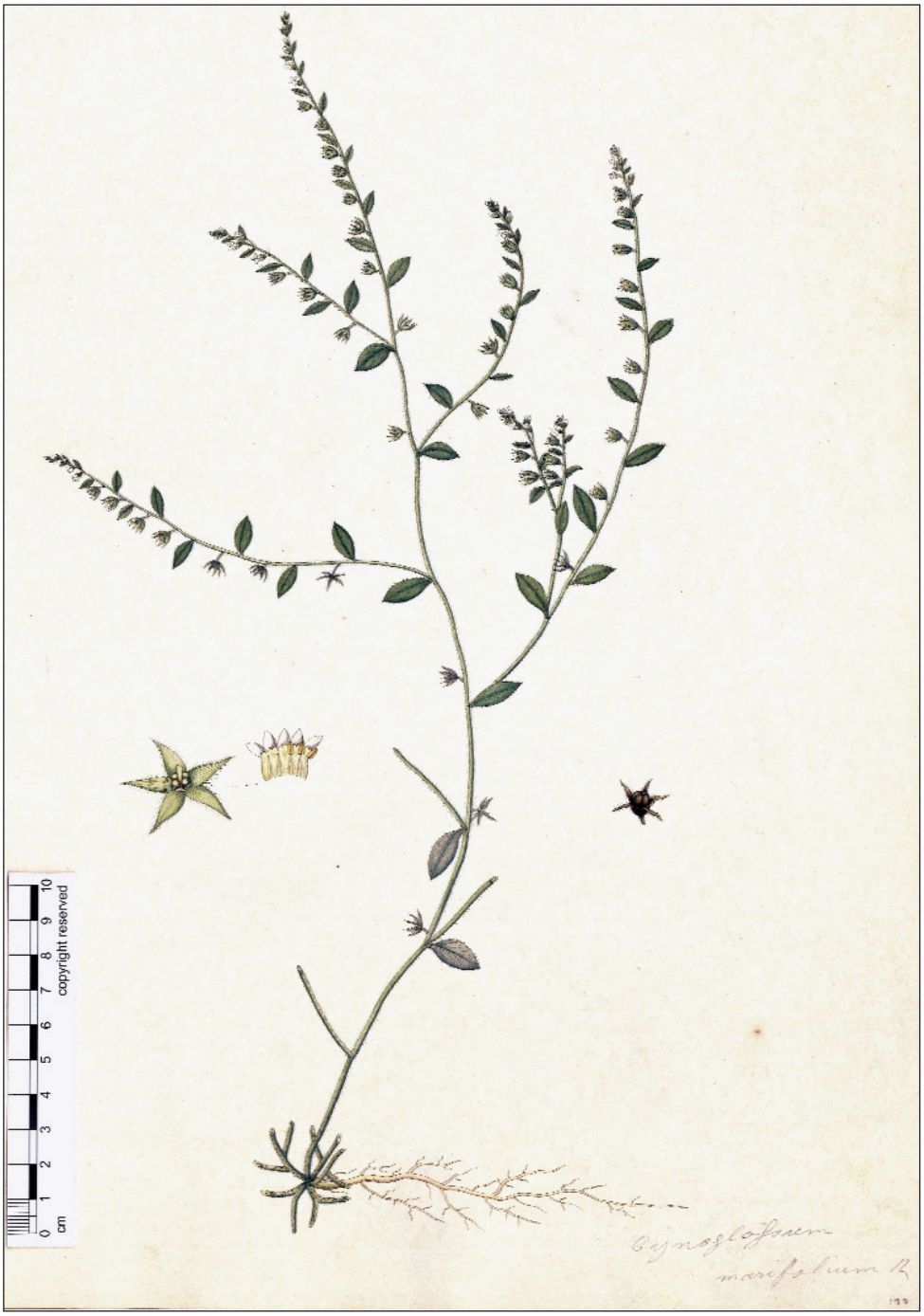

Fig. 1. Lectotype of *Cynoglossum marifolium* Roxb. (PAL-Gr No. 62676). Scanned from the original by R. Rankin Rodríguez.

The taxonomic identity of *Cynoglossum marifolium*

The plate is in good agreement with Roxburgh's original description of the species. In particular it shows single flowers spaced along the branches, alternating with or ± opposite to the leaves (none is axillary); and emarginate scales alternating with the stamens in the throat of the corolla (Fig. 2a). How Clarke came to attribute the features of *Heliotropium marifolium* (Fig. 2c) to this plant remains a mystery: the blame he placed on Roxburgh and the younger Candolle falls back on himself.

The described and depicted features leave no doubt as to generic affiliation. The Candolles (in Candolle 1846) were correct in placing *Cynoglossum marifolium* in *Bothriospermum.* At this point, however, certainty ends: Roxburgh (1824) described two *Cynoglossum* species, *C. marifolium* and *C. diffusum* Roxb., both of which belong in *Bothriospermum;* but only one species of that genus is currently believed to occur on the Indian subcontinent: *B. zeylanicum* (J. Jacq.) Druce, of which the more widely used *B. tenellum* (Hornem.) Fisch. & C. A. Mey. is a synonym. The Candolles already considered *C. diffusum* a synonym of *B. tenellum* (i.e., *B. zeylanicum*), and they are probably correct. Where, then, is *B. marifolium* to be placed?

Roxburgh recognised two species and saw both alive, growing side by side in the Cacutta Garden. He distinguished them as follows: *Cynoglossum diffusum* has petiolate lower leaves; small, white flowers with a tinge in the throat; stamens hidden in the "gibbous" [inflated] corolla tube; and obovate mericarps affixed "by the base, and on the inside to the stigma"; whereas *C. marifolium* has [all] leaves subsessile; pale whitish blue flowers; stamens alternating with the scales and large anthers hidden only for one half in the mouth of the corolla tube; and round mericarps partly hidden in the calyx and affixed to a very short columnar receptacle.

Of these alleged differences I discount flower colour, because it is contradicted by the illustrations: in both versions of the *Cynoglossum marifolium* plate (1348) the corolla is shown as white with a yellowish throat, whereas in the Kew image of the *C. diffusum* plate (1211; see Anonymous 2006) the corolla is whitish blue. Whether this is due to variability of the character or to colour being accidentally switched between the descriptions I cannot tell. The difference in the lower leaves is borne out by the plates but may well lie with-

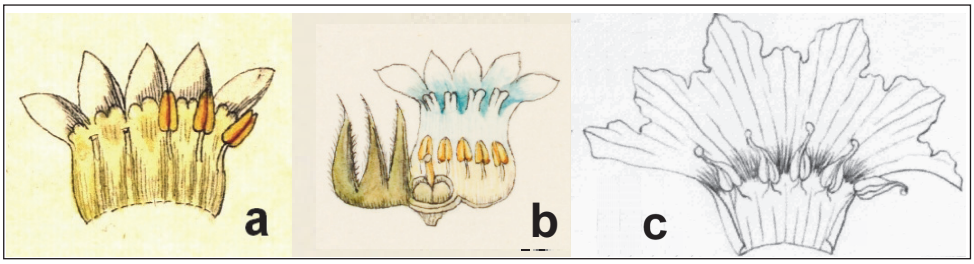

Fig. 2. Details showing flattened-out corollas from the inside (not to scale). – **a,** *Cynoglossum marifolium* (from the lectotype); **b,** *Cynoglossum diffusum* (from the Roxburgh plate No. 1211, K: Anonymous 2006 [© Copyright The Board of Trustees of the Royal Botanic Gardens, Kew]), including pistil and part of calyx; **c,** *Heliotropium marifolium* (reproduced from Wight 1844-1853: pl. 1390. 1848).

in the range of variation of a single species. Mericarp attachment is an important character but is not described in clear, comparable terms and cannot be observed on the illustrations, where the main difference shown is the enclosure of the proximal half of the fruit in the calyx, in *C. marifolium.*

The difference of size, insertion and position of the stamens, however, is quite clear (Fig. 2a and 2b). *Cynoglossum diffusum* has filaments inserted near the base of the corolla tube, with anthers half the size of those of *C. marifolium,* situated halfway up the obese tube and not reaching the base of the scales; whereas the anthers in *C. marifolium,* sitting on longer filaments inserted toward the middle of the cylindrical tube, are placed at the same level as the scales which they exceed by their tips, becoming part exserted. The latter situation conflicts with the published generic and species descriptions of *Bothriospermum* as a whole and, if found to be constant within populations, would well justify acceptance of two species in Bengal.

Bothriospermum is currently believed to consist of one widespread species, *B. zeylanicum,* plus half a dozen narrow endemics of China and Korea (Zhu & al. 1995, Anonymous 2014). *B. zeylanicum* itself is extremely polymorphic, and a critical revision will probably result in the recognition of several discrete taxa. As a first step, I would like to encourage Bangladesh botanists to reassess the taxonomy of the Bangladesh populations of *Bothriospermum,* bearing Roxburgh's two-centuries-old observations in mind. In the most recent floristic digest of their flora, Khatun (2008) describes a single species under the name *B. tenellum,* in terms that are compatible with Roxburgh's *Cynoglossum diffusum* (and with *B. zeylanicum*), with a colour photograph showing two quite different plants of which only the left one corresponds to the taxon described.

Meanwhile, I propose that *Bothriospermum marifolium* (Roxb.) DC. & A. DC. be considered as the correct name of an insufficiently known and documented species endemic to Bangladesh.

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