

A Taxonomic Revision of the Woody South African Genus *Notobubon* (Apiaceae: Apioideae)

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Abstract—A comprehensive taxonomic revision of the genus *Notobubon* (Apiaceae) is presented. Twelve woody evergreen species are recognised, all (with the exception of *N. laevigatum*) endemic to the Cape Floristic Region of South Africa. The taxonomy of these prominent, though poorly collected, species has until now been problematic. They are distinguished from one another by their habit (size and branching pattern), the overall shape, size, and colour of the ultimate leaflet segments, the inflorescence structure (peduncle length, number, and length of rays in the primary umbel), the fruit morphology (fruit size, presence or absence of wings), and the fruit anatomy (symmetry of the mericarps, presence or absence of additional rib vittae, size of commissural vittae). Species relationships are assessed in the form of a cladistic analysis of 26 morphological characters, resulting in a well-resolved phylogenetic hypothesis. A comprehensive key to the species, their correct nomenclature, and typification, together with descriptions and known geographical distribution for all the species are presented and illustrated.

Keywords—Cape Floristic Region, fruit anatomy, *Peucedanum*, phylogeny, South Africa, taxonomy.

Notobubon B.-E. van Wyk is a recently described genus of 12 species subendemic to the Cape Floristic Region of South Africa, with only one species, *N. laevigatum* (Aiton) Magee, extending along the eastern parts of South Africa into Lesotho and Swaziland (Winter et al. 2008). The genus can be distinguished from all other African peucedanoid genera by the woody frutescent or even slightly arboreal habit, permanent branches, persistent sclerophyllous leaves, small fruit (less than 9 mm long), and a unique combination of fruit anatomical characters (additional solitary rib vittae and broad commissural vittae). The taxonomy of these species has until now been problematic as they have been relatively poorly collected throughout much of their distribution range and show considerable superficial similarity in vegetative morphology. The high percentage of misidentified specimens (of some species more than others) in the herbarium record is confirmation of the difficulty in correctly identify closely related species and the urgent need for a comprehensive taxonomic revision and key to the species. The only available taxonomic treatment of the group is that of Sonder (1862), which is now very much outdated.

Several of the species of *Notobubon* are probably best known for causing severe blistering of human skin, manifesting 40–50 hr after contact with the leaves (Van Wyk et al. 2002). *Notobubon galbanum* (L.) Magee in particular, is renowned for causing photodermatitis, hence the common name blisterbush (Smith 1966). The linear furanocoumarin, xanthotoxin, was isolated by Finkelstein et al. (1993) from this species. Furanocoumarins are well known to be phototoxic, reacting with the DNA in the skin but only in the presence of sunlight (ultraviolet light).

The species of *Notobubon* have until recently been placed in the polymorphic genus *Peucedanum* L. Spalik et al. (2004), using ITS sequence data, confirmed that the Eurasian and American species of *Peucedanum* were scattered throughout the 'Angelica' clade (Downie et al. 2001). They recognised this clade together with the 'Arracacia' clade as the tribe Selineae. However, an analysis of ITS sequence data by Winter et al. (2008) showed that the African species of *Peucedanum* were clearly separate from all Eurasian species of *Peucedanum* sampled. The African species formed a clade (although without bootstrap support) together with other African endemic

genera (viz. *Lefebvrea* A. Rich., *Afroligusticum* C. Norman, *Dasispermum* Neck. ex Raf., *Sonderina* H. Wolff, and *Stenosemis* E. Mey ex Sond.) and were sister to a small group of south-west Asian species, followed by the 'Heracleum' clade, largely corresponding to the tribe Tordylieae (Plunkett and Downie 1999). As the type of the genus, *Peucedanum officinale* L. is allied to the Eurasian group, a new generic classification system was proposed for the African species (Winter et al. 2008). In this system, the African species formerly in *Peucedanum* are accommodated in six genera viz. *Afroligusticum* (13 spp.), *Afroscidium* P.J.D. Winter (18 spp.), *Cynorhiza* Eckl. & Zeyh. (3 spp.), *Lefebvrea* (10 spp.), *Nanobubon* Magee (2 spp.), and *Notobubon* (12 spp.).

In this paper, a detailed treatment of the genus *Notobubon* is presented for the first time, including a key to the species, complete nomenclature, typification, formal descriptions as well as the known geographical distribution for all the species. The arrangement of the species in the taxonomic revision follows the phylogenetic sequence of species in a cladistic analysis of morphological and anatomical characters.

MATERIALS AND METHODS

All the *Notobubon* sheets of the following herbaria, comprising 778 sheets, were studied: BM, BOL, JRAU, K, NBG (including SAM and STE), PRE, S, and THUNB-UPS (herbarium acronyms as in Holmgren et al. 1990). Digital images from NY, P, and HAL were also examined. From this material, together with information from Leistner and Morris (1976), the recorded distribution of all the species was ascertained and mapped. The specimens examined are cited under each species treatment and arranged by Country, Province and then district. Within each district the specimens are ordered according to geographical position, from west to east and north to south. Extensive field work was undertaken in order to study the taxa in situ. With the exception of two species, viz. *N. montanum* (Eckl. & Zeyh.) Magee and *N. sonderi* (M. Hiroe) Magee, all the taxa were observed in the field, providing crucial additional insight into the species studied.

For quantitative characters, the same number of measurements (at least five), were made for each of the recorded geographical populations (up to 10 for some widespread species), where possible. To represent the variation within species, box-plots showing both the minimum and maximum ranges, as well as percentile values were prepared. For the voucher list of the material measured for the quantitative inflorescence characters refer to Magee (2007).

Preserved (FAA) and herbarium materials were used to study fruit anatomy. The herbarium material was first rehydrated and then placed in FAA for a minimum of 24 h. All material was subsequently treated

according to a modification of the method of Feder and O' Brien (1968) for embedding in glycol methacrylate (GMA). This modification involves a final infiltration in GMA of five days. Staining was done according to the periodic acid Schiff/toluidine blue (PAS/TB) staining method (Feder and O' Brien 1968). A list of voucher specimens for the fruit anatomical study is given in Appendix 1.

To study the three-dimensional structure of the vittae, mature fruit were softened by soaking them in boiling water for 24 h. The exocarp was then peeled off while keeping the fruit submerged in water to prevent desiccation. A list of voucher specimens is given in Appendix 2. The terminology used to describe fruit anatomical features is shown in Fig. 6.

Character states were scored for 26 morphological characters across the 19 included taxa (Appendix 3, 4). For two characters (viz. number and length of rays in the primary umbel [all percentiles]), quantitative data were converted into discrete states that reasonably characterise the salient morphological differences, utilising intervals in percentile values. Where both states were found to co-occur in a single taxon it was coded as polymorphic. Autapomorphies were omitted from the analysis. The data set (Appendix 4) was analysed using the maximum parsimony (MP) algorithm of the software package PAUP version 4.0b10 (Swofford 2002). All characters were treated as unordered and equally weighted (Fitch parsimony, Fitch, 1971). Tree searches were performed using the branch-and-bound algorithm with furthest addition sequence, MulTrees option and multistate characters treated as polymorphisms in effect. Internal support was assessed with 1000 bootstrap replicates (Felsenstein 1985) using TBR swapping and the MULPARS option.

RESULTS AND DISCUSSION

Morphology and Anatomy—HABIT—The species of *Notobubon* range from sprawling, well-branched shrublets, less than 0.4 m tall, as in *N. striatum* (Thunb.) Magee and *N. montanum*, to large, simple or sparsely branched shrubs, or even small trees of up to 5 m tall, as in *N. gummiferum* L. The widespread species *N. laevigatum* shows tremendous plasticity with regard to habit. In dry Karoo vegetation individuals are small (0.2–0.4 m), whereas in moister areas they are often up to 1.5 m tall. Several of the larger species [*N. ferulaceum* (Thunb.) Magee, *N. laevigatum*, and *N. pearsonii* (Adamson) Magee] are multistemmed from the base with the branches usually remaining simple for most of their length, while *N. capense* (Eckl. & Zeyh.) Magee, *N. galbanum*, *N. galbaniopse* (H. Wolff) Magee, *N. gummiferum*, *N. pungens* (Sond.) Magee, *N. sonderi*, and *N. tenuifolium* (Thunb.) Magee are often single-stemmed and sparsely branched along their length. Habit proved to be a useful and obvious diagnostic character to distinguish between the species of the *N. tenuifolium* complex. Goldblatt and Manning (2000) included *N. gummiferum* and *N. sonderi* as taxonomic synonyms in a broad species concept of *N. tenuifolium*. However, *N. sonderi* is a small montane species in which the branches become decumbent and as a result the plant seldom exceeds 1 m in total height. It is quite distinct from *N. tenuifolium* and *N. gummiferum* which are both large shrubs or, in the case of the latter, even small trees up to 5 m tall.

LEAVES—In *Notobubon* the leaves are cauline, sclerophyllous and evergreen, and borne on permanent woody branches. The leaves are almost always regularly arranged along the upper parts of the branches, or rarely congested at the branch tips (*N. sonderi*). They are either bipinnate, as in *N. pearsonii*, or up to 4-pinnate, as in *N. gummiferum*. The leaves range in size from less than 20 mm long in *N. striatum* and *N. montanum*, to 420 mm in *N. gummiferum*. In the recently rediscovered species *N. pungens*, the leaves are uniquely modified to large, sharp spines.

In most cases the species of *Notobubon* can be distinguished from one another by the overall shape, size, and colour of the ultimate leaflet segments, the full range of which is illustrated in Fig. 1. The ultimate leaflet segments range from entire, as

in *N. laevigatum* (Fig. 1L) to weakly pinnatisect, as in *N. capense* (Fig. 1E) or decreasingly pinnatisect, as in *N. gummiferum*, *N. sonderi*, and *N. tenuifolium* (Figs. 1D, C, I respectively). The ultimate leaflet segments of *N. galbanum* (Fig. 1A) and *N. galbaniopse* (Fig. 1B) are distinctive. They are broadly 3-lobed to 3-partite and prominently serrate. Numerous reproductive characters show this leaflet similarity to be the result of convergence (Fig. 8). The two species can be distinguished from one another by the shape of the sinuses between the teeth, which are prominently rounded in *N. galbaniopse* and acute in *N. galbanum*. The lamina is also sometimes revolute in the former. The colour of the ultimate leaflet segments is of diagnostic value to distinguish *N. tenuifolium* from *N. gummiferum*, and *N. sonderi*. In the latter two species the leaves are discolorous, with the adaxial surface dark green and the abaxial surface silvery and glaucous (Fig. 1D), while in *N. tenuifolium* the leaves are concolorous, with both surfaces usually bright green and glabrous or rarely glaucous (Fig. 1I). The ultimate leaflet segments in *N. sonderi* (Fig. 1C) and *N. tenuifolium* (Fig. 1I), usually have more widely spaced and much narrower lobes than those of *N. gummiferum* (Fig. 1D).

The lobes may be either flat as in *N. tenuifolium* or subterete as in *N. capense* and *N. pearsonii*. This seems to be a convergent adaptation, possibly to summer drought, as it is found in other genera, such as *Nanobubon* (Magee et al. 2008b) and *Anginon* Raf. (Van Wyk et al. 1997). The relative lengths of the terminal lobe in relation to the adjacent lateral lobes are useful to distinguish *N. tenuifolium* (Fig. 1I). In this species the terminal lobe is two to three times longer than the adjacent lateral lobes, while in *N. ferulaceum* (Fig. 1J) the terminal and adjacent lateral lobes are subequal. The Northern Cape population of *N. capense* (previously considered to be a distinct species, *Peucedanum kamiesbergense* B.L.Burt) often has more reduced ultimate leaflet segments with thick and prominently longer lobes which often become ribbon-like near the apices (Fig. 1E2). When at first compared to the typical Cape Peninsula population (Fig. 1E1), this taxon may appear to be distinct. However, when compared to the few rare Northern Cape populations of this species, it became apparent that the Kamiesberg population is merely the extreme of a range of northern forms, with the leaflet possibly adapted to the harsh conditions in this seasonally arid area.

INFLORESCENCE STRUCTURE—While many African peucedanoid species exhibit either a verticillate or corymbiform inflorescence arrangement (Winter et al. 2008), in *Notobubon* the inflorescence consists of a single, dominant terminal umbel surrounded by reduced secondary umbels, or the secondary umbels even absent. In *Notobubon* the primary umbels are largely composed of hermaphroditic flowers and the lateral umbels largely of functionally male flowers. The structure of the inflorescence was found to be a taxonomically informative character, showing what appear to be numerous apomorphic trends. The length of the peduncle in relation to umbel size can be used to distinguish a group of species, namely *Notobubon capense*, *N. galbanum*, *N. gummiferum*, and *N. tenuifolium* (Figs. 2F, E). These species have a very short peduncle bearing a single, large primary umbel. The length of the peduncle is less than one and a half (rarely two) times the diameter of the primary umbel. In these species, with the exception of *N. gummiferum*, lateral umbels are almost always absent. In all other species of *Notobubon*, the peduncle is several times longer than the diameter of the primary umbel (Figs. 2 A–D). In *N. galbaniopse* and *N. pungens*, often

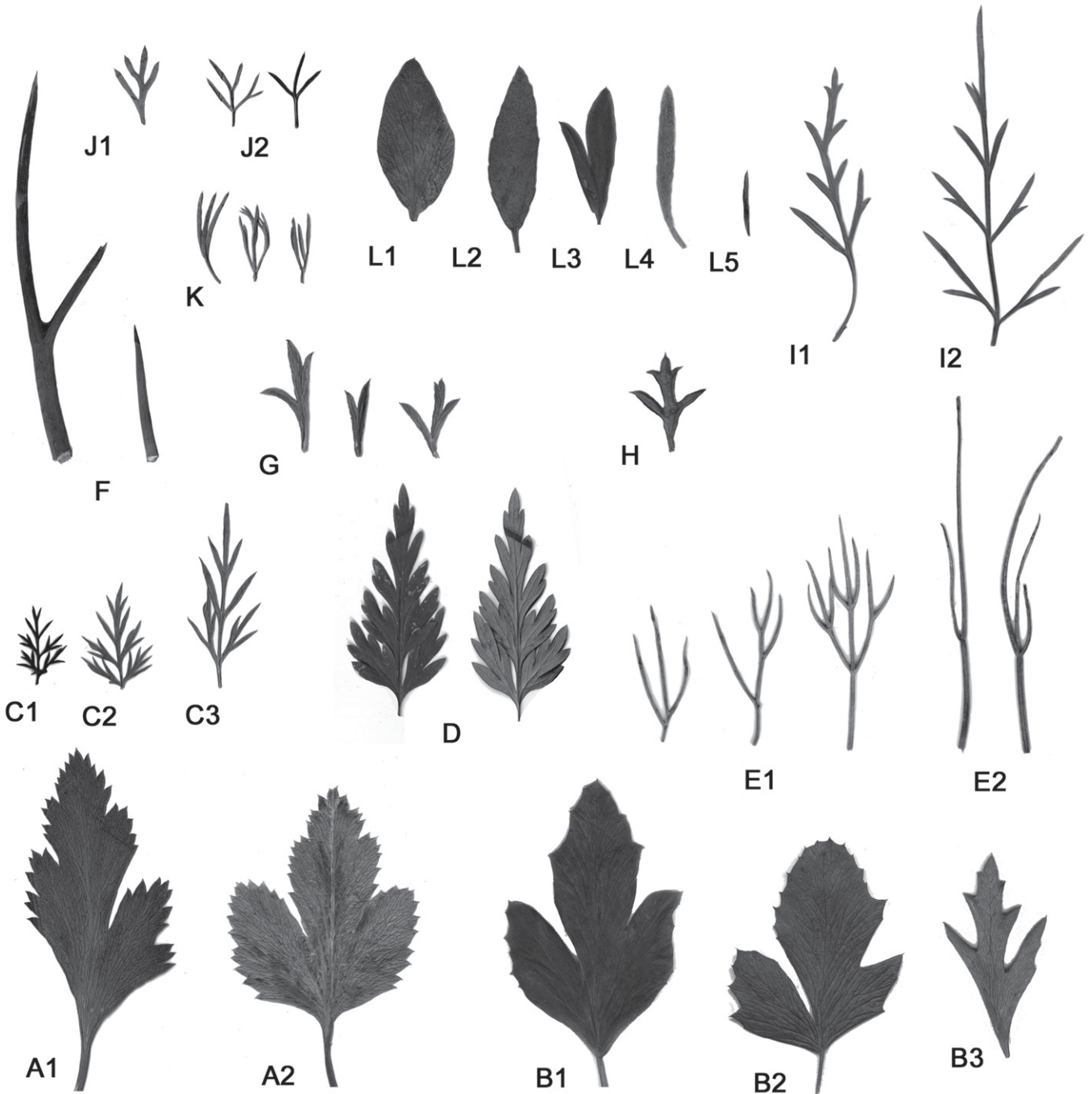


FIG. 1. Variation in shape, size and colour of the ultimate leaflet segments of *Notobubon* species. A. *N. galbanum* (A1. Magee et al. 47, JRAU. A2. Magee and Boatwright 10, JRAU). B. *N. galbaniopse* (B1. Arbothnot s.n., BOL. B2. Pillans 20061 BOL. B3. Magee et al. 55, JRAU). C. *N. sonderi* (C1. McDonald 624, PRE. C2. Esterhuysen 33754, PRE. C3. Van Wyk 3325, JRAU). D. *N. gummiferum* (Magee et al. 52, JRAU), showing dark green upper and silvery lower surfaces. E. *N. capense* (E1. Van Wyk 3571b, JRAU. E2. Magee et al. 42, JRAU). F. *N. pungens* (Magee et al. 50, JRAU). G. *N. striatum* (Magee et al. 51, JRAU). H. *N. montanum* (Zeyher 2689, PRE). I. *N. tenuifolium* (I1. Van Wyk et al. 3320, JRAU. I2. Van Wyk et al. 3515, JRAU). J. *N. ferulaceum* (J1. Acocks 21292b, PRE. J2. Van Wyk 2334, PRE). K. *N. pearsonii* (Magee et al. 42, JRAU). L. *N. laevigatum* (L1. Winter 90, JRAU. L2. Magee and Boatwright 7, JRAU. L3. Winter 123, JRAU. L4. Schmitz 6689, PRE. L5. Van Wyk and Van Wyk 188, JRAU). Scale bar: A–F and I–L = 10 mm; G, H = 5 mm.

only a single primary umbel can be seen at the beginning of the season but, if conditions are favourable, numerous lateral umbels may develop later so that they can have up to three orders present.

The shape of the primary umbel was used by Adamson (1950) in his key to the *Peucedanum* species of the Cape Peninsula. He used this character to distinguish *Peucedanum galbanum* L. (= *Notobubon galbanum*) and *P. tenuifolium* Thunb.

(= *N. tenuifolium*) by their umbrella-shaped primary umbels in contrast to the flat-topped or suborbicular umbels found in the other species. In some species of *Notobubon* (*N. ferulaceum*, *N. laevigatum*, *N. montanum*, and *N. striatum*) the primary umbels are prominently flat-topped, with the inner rays significantly shorter than the outer (Figs. 2A, B). In *N. capense*, *N. galbanum*, *N. gummiferum*, *N. sonderi*, and *N. tenuifolium*, the umbel is almost orbicular, with the outer and inner rays

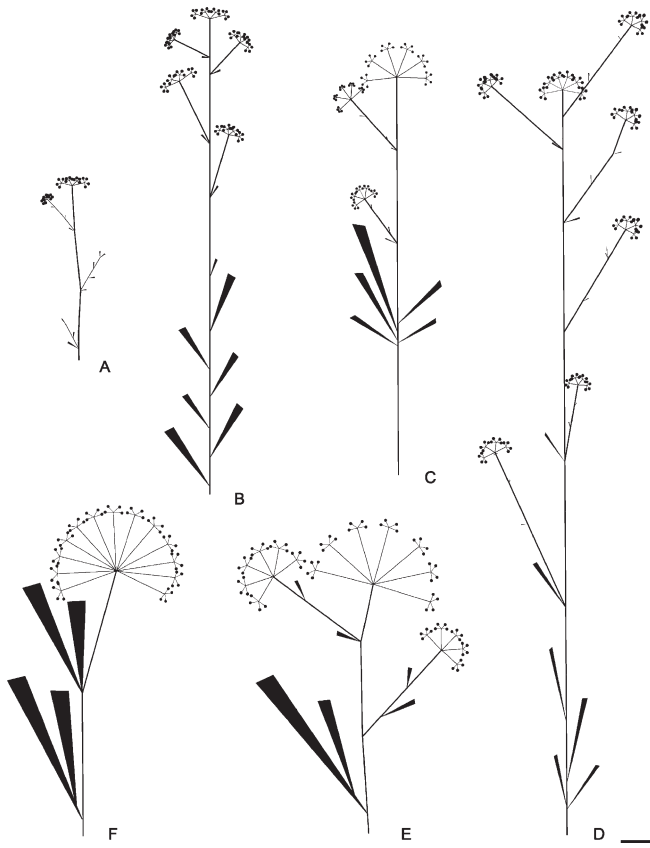


FIG. 2. Schematic drawings illustrating the variation in inflorescence structure in *Notobubon*. A and B. peduncle long, with primary umbel few-rayed and flat-topped. C. peduncle long, with primary umbel few-rayed and orbicular. D. peduncle long, with primary umbel few-rayed and sub-orbicular. E. peduncle short, with primary umbel multiradiate and orbicular and lateral umbels present. F. peduncle short, with primary umbel multiradiate and orbicular and lateral umbels absent. A. *N. striatum* (C.R.E.W. 135, NBG). B. *N. ferulaceum* (Compton 21470, NBG). C. *N. sonderi* (Kerfoot 6628, PRE). D. *N. galbaniopse* (Compton 12963, NBG). E. *N. gummiferum* (Wurts 453, NBG). F. *N. galbanum* (Hanekom 3090, NBG). Scale bar: 50 mm.

more or less equal in length (Figs. 2C, E, F). The umbels of *Notobubon galbaniopse*, *N. pearsonii*, and *N. pungens* are somewhat intermediate and suborbicular in shape, with the outer rays slightly longer than the inner ones (Fig. 2D).

Within *Notobubon* there is a wide range of variation in the size of the primary umbels. The ray length (Fig. 3) varies from usually over 45 mm (in *N. capense*, *N. galbanum*, *N. gummiferum*, *N. sonderi*, and *N. tenuifolium*) to less than 40 mm in the remaining species (with the exception of the most widespread species *N. laevigatum*, which shows much variation in ray length).

There is a trend from small, few-rayed primary umbels with less than 30 rays, to larger, more multiradiate umbels composed of more than 35 rays in some species of *Notobubon* (Fig. 4). In *N. capense*, *N. galbanum*, and *N. tenuifolium*, the primary umbel has an exceptionally large number of rays, typically 40–100, but sometimes as many as 180. However, in the arid areas of the Northern Cape, the primary umbels of *N. capense* tend to have somewhat fewer rays. *Notobubon gummiferum*, while not as multiradiate as the afore-mentioned species, appears to be intermediate between *N. sonderi* and *N. tenuifolium*. In *N. galbaniopse*, the primary umbel, while

usually relatively few-rayed (less than 28 rays), may very rarely have as many as 42 rays. *Notobubon laevigatum* (Fig. 4) deviates from this trend with both few-rayed and multiradiate populations.

Many of the other African peucedanoid species have scabrid hairs present on both the rays and raylets. Amongst the Cape peucedanoid genera only *Notobubon striatum* was found to be scabrid throughout. In both species of *Nanobubon* as well as in *Notobubon montanum*, only the raylets were covered in prominent scabrid hairs, while in all remaining Cape species they were glabrous.

FLOWER MORPHOLOGY—The flowers of *Notobubon* are typically apoid, that is they are pentamerous, with minute to relatively large sepals, elliptic to obovate petals with incurved tips, a bicarpellate gynoecium and a prominent stylopodium. The sepals are generally minute and indistinct in most species. In *Notobubon montanum* and *N. striatum* however, they are relatively large and prominent, invariably longer than or equal to 1/3 of the petal length. Similarly large sepals were also reported to occur in both species of *Nanobubon* (Magee et al. 2008b) as well as in *Annesorhiza schlechteri* H. Wolff (Tilney and Van Wyk 2001). In *Notobubon striatum* the sepals and even the petals are covered in scabrid hairs. The petals of all the species are yellow, sometimes tinged with red as in *Notobubon laevigatum* and *N. striatum*. The stylopodia are always somewhat broadly conical and relatively uniform.

FRUIT MORPHOLOGY AND ANATOMY—The fruit are dorsally compressed, with the marginal ribs expanded into wings (except in *Notobubon pearsonii*) and the commissure extending over the full width of the mericarp (i.e. to the very edge of both marginal ribs). This fruit type is often referred to as peucedanoid (Theobald 1971) and is the main character traditionally used to include these species in the polyphyletic *Peucedanum sensu lato*.

The fruit of *Notobubon* are diagnostically small – less than 9 mm long (Fig. 5 B–M). They show a trend from being relatively narrowly-winged (where each wing is almost equal to the width of the fertile portion of the mericarp – as in *N. ferulaceum*, *N. laevigatum*, and *N. montanum*), to very narrowly-winged (with each wing narrower than the width of the fertile portion of the mericarp – in all the other species). In addition to their breadth, the relative thickness of the wings is a useful diagnostic character (Fig. 6). In many other African peucedanoid genera, the wings are very thin, while in *Nanobubon* (Magee et al. 2008b) and *Notobubon* (Fig. 6) they are thick. *Notobubon pearsonii* is anomalous in having the marginal ribs not expanded into wings (Fig. 5F; Fig. 6E). This unusual absence of wings is also known to occur in the African peucedanoid species *Afrologisticum elliotii* (Engl.) C. Norman (Winter et al. 2008). In both these species the commissure extends from rib tip to rib tip, so that the absence of wings can be interpreted as a nonhomologous secondary loss. Dawson (1967) reported a similar reduction in the marginal wings of the peucedanoid genus *Gingidium* J.R. & G. Forst.

The fruit of the closely related *Notobubon capense*, *N. galbanum*, and *N. tenuifolium* are conspicuously small (particularly when considered in relation to the relatively large overall size of the plant and inflorescence), less than 6 mm long and usually rotund (Figs. 5K–M). The size and shape of the fruit of *N. tenuifolium* (Fig. 5K) and *N. gummiferum* (Fig. 5J) proved to be a particularly useful additional diagnostic character to distinguish between these two otherwise similar species. In both *N. gummiferum* and *N. sonderi* the fruit are larger

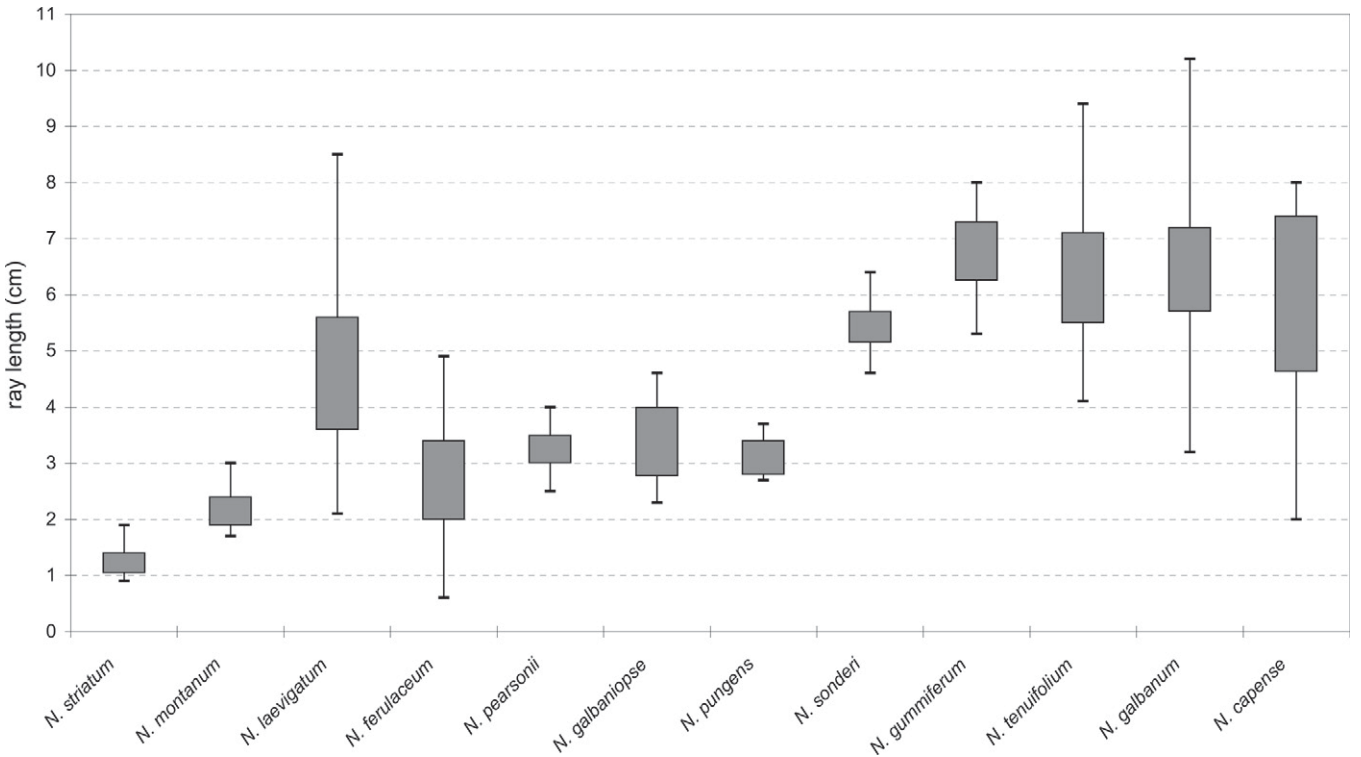


FIG. 3. Box-plots showing the minimum and maximum values, as well as percentile range (25–75%), for the variation in the length (cm) of the rays of the primary umbel for all species of *Notobubon* (including all geographical populations of each species).

(5.0–8.5 mm long) and more elliptic in shape (Figs. 5I, J) than in *N. tenuifolium*.

The fruit of *Notobubon galbaniopse* are unusual in that the two mericarps are heteromorphic (Fig. 6G). In one mericarp

the median rib is more prominent than the two lateral ribs, while in the other mericarp the lateral ribs are more prominent than the median rib. This can be clearly seen even in sections of very immature fruit. While heteromorphic fruit have been

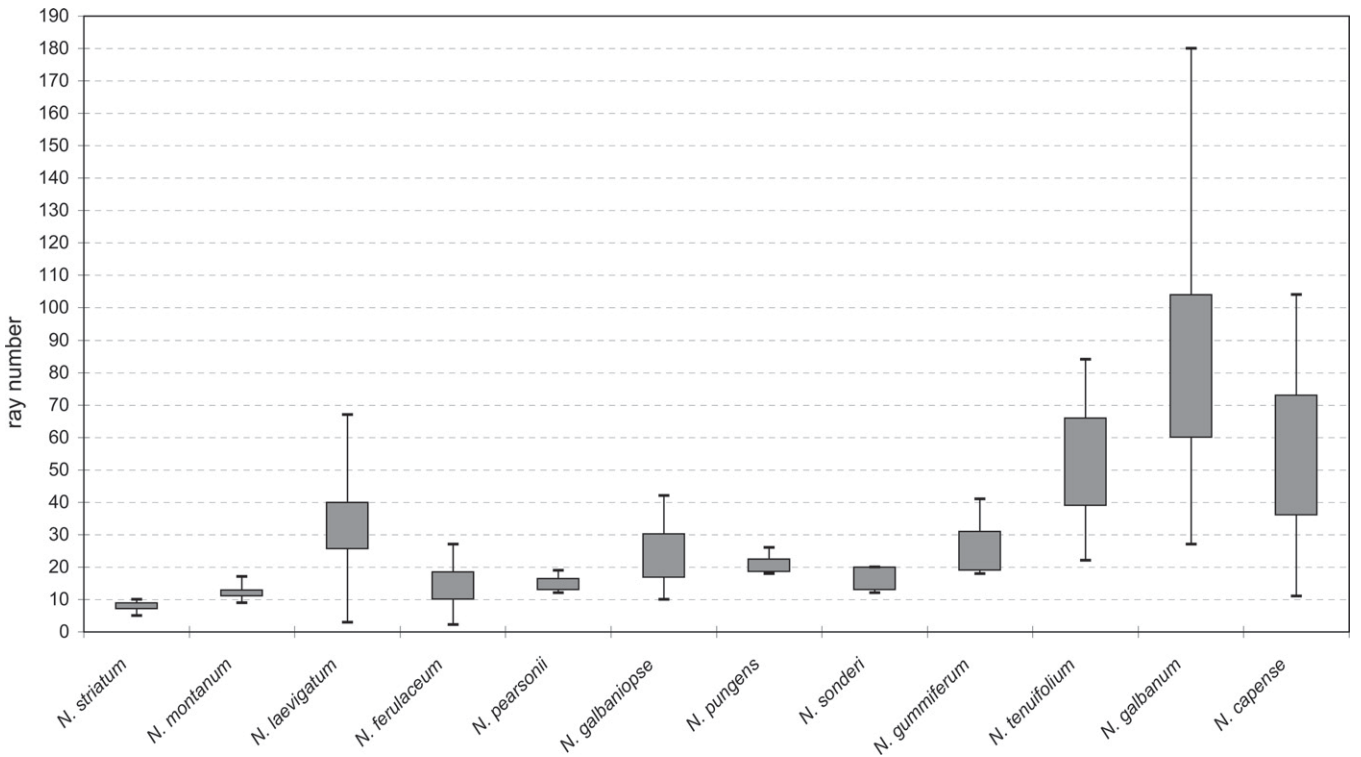


FIG. 4. Box-plots showing the minimum and maximum values, as well as percentile range (25–75%), for the variation in the number of rays of the primary umbel for all species of *Notobubon* (including all geographical populations of each species).

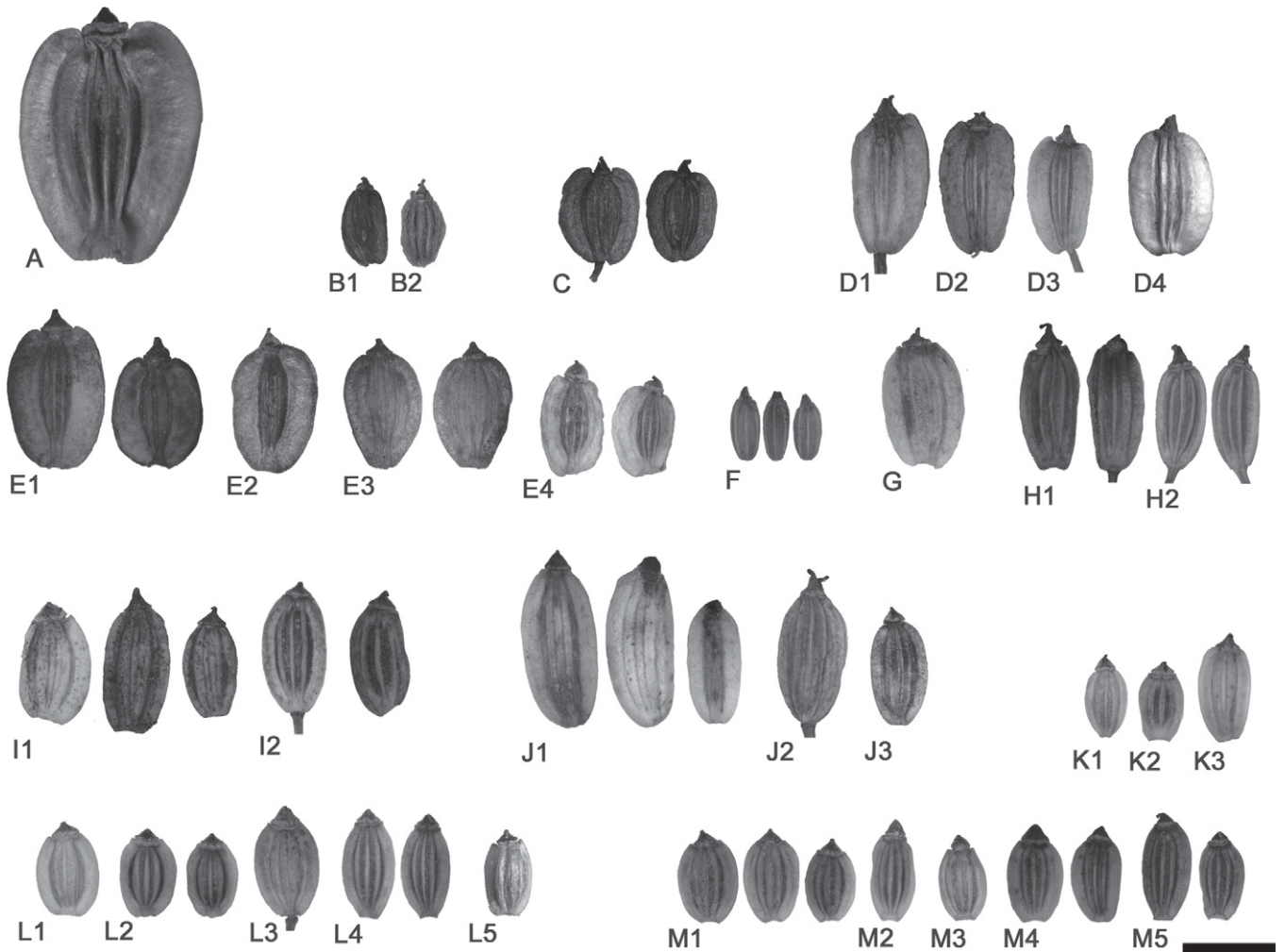


FIG. 5. The fruit of *Notobubon* (B–M) differ from those of *Nanobubon* (A) in that they are much smaller (less than 9 mm long). A. *Nanobubon capillaceum* (Leighton 1563, BOL). B. *Notobubon striatum* (B1. Muir 4783, PRE. B2. O' Callaghan 443, NBG). C. *N. montanum* (Zeyher 2689, K, two fruit). D. *N. laevigatum* (D1. Barker 7926, NBG. D2. Fourcade 633, BOL. D3. Magee and Boatwright 7, JRAU. D4. Bolus 582, BOL). E. *N. ferulaceum* (E1. Winter 158, JRAU, two fruit. E2. Van Wijk 813, PRE. E3. Pillans 2433, PRE, two fruit. E4. Acocks 21292, PRE, two fruit). F. *N. pearsonii* (Esterhuysen 35464, BOL, three fruit). G. *N. pungens* (Helme 1942, NBG). H. *N. galbaniopse* (H1. Pillans 20061, BOL, two fruit. H2. Taylor 7647 NBG, two fruit). I. *N. sonderi* (I1. Esterhuysen 27740, PRE, three fruit. I2. Taylor 10290, NBG, two fruit). J. *N. gummiiferum* (J1. Magee 61, JRAU, three fruit. J2. Thode A850, PRE. J3. Magee 62, JRAU). K. *N. tenuifolium* (K1. Compton 8617, NBG. K2. Esterhuysen 2243b, BOL. K3. Esterhuysen 2529, BOL). L. *N. capense* (L1. Compton 21896, NBG. L2. Esterhuysen 24311, BOL, two fruit. L3. Compton 10353, NBG. L4. Esterhuysen 15220, BOL, two fruit. L5. Rourke 1979, NBG). M. *N. galbanum* (M1. Winter 104, JRAU. M2. Thode A2245 PRE. M3. Rodin 3063, PRE. M4. Esterhuysen 21082, BOL. M5. Compton 15595, NBG). Scale bar: 5 mm.

recorded in the basal lineages of the family (viz. *Heteromorpha* Cham. & Schlecht., *Annesorhiza* Cham. & Schlecht., *Molopospermum* W.D.J.Koch, and *Polemanniopsis* B.L.Burtt), the character is very rare within the main Apioideae clade. It is known to occur sporadically only in *Dasispermum* and *Heptaptera* Margot & Reut., where the wing configuration is extremely variable (Tilney and Van Wyk 1995; Liu et al. 2006). This unique (apomorphic) character for *N. galbaniopse* is constant and almost certainly derived.

The epidermal surface of the mericarps is either smooth or minutely papillate. Trichomes are absent. The endocarp consists of one layer of parenchymatous cells. In all species the mesocarp is only partially lignified in the ribs and not heavily lignified as is typical for members of the *Heracleum* clade (Liu et al. 2006). Hypodermal collenchyma is present in all the species of *Notobubon*. These observations correspond to those of Ostroumova and Pimenov (1997a, b) who reported the presence of hypodermal collenchyma also in *Peucedanum caffrum* (Meisn.) E.Phillips [= *Afroscidium caffrum* (Meisn.) P.J.D.Winter], *P. cordatum* Balf. and *P. magalismsontanum* Sond.

[= *Afroscidium magalismsontanum* (Sond.) P.J.D.Winter] but in no other species sampled by them.

The fruit of most members of the subfamily Apioideae have secretory canals referred to as vittae, found either in the furrows between the ribs, then known as vallecular vittae (Figs. 6G, 7), or in the commissural area, then known as commissural vittae (Liu et al. 2006). These are different from rib oil ducts which are always associated with, and run contiguously with, the vascular bundles in the ribs (Fig. 7G). The fruit anatomy of many species of *Notobubon* is unusual in the combination of additional solitary vittae below the vascular bundle of each rib (Fig. 6D, F–M; Fig. 7B1, C1) and broad commissural vittae (Fig. 6D, E, G–M; Fig. 7B2, C2). The vittae under the ribs were initially thought to be internal rib oil ducts (Liu et al. 2006) but, after studying them in dorsal view, their structure was seen to be similar to that of vallecular vittae (pers. obs.). They taper prominently at both ends and are not continuous with the vascular bundles, as is typical of rib oil ducts (Fig. 7G). Additional "rib vittae" occur in all species of *Notobubon* except *N. laevigatum*, *N. montanum*,

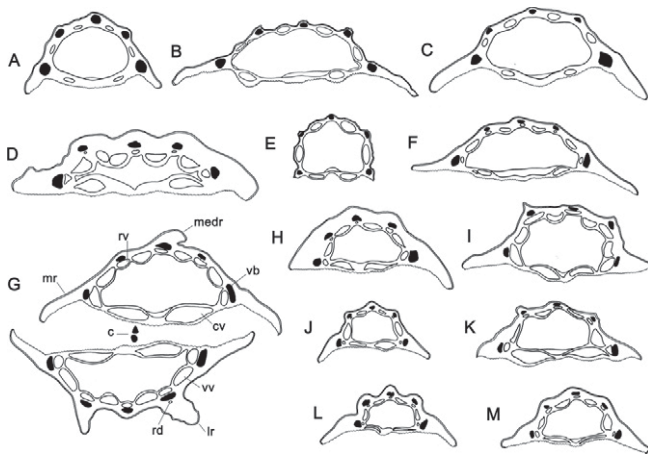


FIG. 6. Transverse sections through one or both mericarps of *Notobubon* species. A. *N. striatum* (Muir 1964). B. *N. montanum* (Anon. s.n.). C. *N. laevigatum* (Drège s.n.). D. *N. pungens* (Helme 1865). E. *N. pearsonii* (Esterhuysen 35464). F. *N. ferulaceum* (Marloth 7314). G. *N. galbaniopse* (Pillans 2006). H. *N. sonderi* (Taylor 10290). I. *N. gummiferum* (Thode A850). J. *N. tenuifolium* (Esterhuysen 2689). K & L. *N. capense*: (K. Rourke 1979. L. Marloth 10054). M. *N. galbanum* (Winter 104). (mr) marginal rib, (medr) median rib, (lr) lateral rib, (vb) vascular bundle, (vv) vallecular vitta, (cv) commissural vitta, (rd) rib oil duct. Scale bar: 1 mm.

N. pearsonii, and *N. striatum*. They are regular in their arrangement (one under each rib) and are unlikely to be homologous to the irregular (branched?) rib ducts that are found in some other peucedanoid species [such as *Afroligusticum thodei* (T.H.Arnold) P.J.D.Winter, Fig. 7F].

The commissural vittae of many *Notobubon* species are furthermore exceptionally broad, in total extending over more than 40% of the total mericarp width (excluding the wings). These unusually broad commissural vittae occur in all except four species, viz. *N. ferulaceum*, *N. laevigatum*, *N. montanum*, and *N. striatum* (Fig. 6). There appears to be a trend of increasing breadth of the commissural vittae, with the presumably more derived species viz. *N. capense*, *N. galbanum*, and *N. tenuifolium* having these vittae extending over more than 80% of the total mericarp width (excluding the wings) (Fig. 6J–M). The commissural vittae are septate in all the species (clearly visible in Fig. 7C2). The cells are usually transversely oblong (Fig. 7C2). However, in *N. laevigatum*, *N. montanum*, and *N. striatum*, these cells are longitudinally oblong.

Notobubon corresponds more or less to the '*P. galbanum*' carpological group of Ostroumova and Pimenov (1997a), if *Afroligusticum thodei* is excluded. Ostroumova and Pimenov (1997a, b) analysed the fruit structure of 27 southern African and 43 tropical African species and divided the fruit into several carpological groups. Of these groups only the '*P. galbanum*' group was found to have additional rib vittae. This group was considered by them to be the "first candidate for separation". Additional rib vittae are a very rare character in the family, seemingly found only in *Peucedanum oreoselinum* (L.) Moench (Ostroumova and Pimenov 1997a), possibly *Elaeoselinum asclepium* Bertol. (Liu et al. 2006), and in *Lefeborea atropurpurea* (Hochst. ex A.Rich.) P.J.D.Winter (Townsend 1989). It is essential that the fruit be studied in both transverse section and in dorsal view (as shown in Fig. 7) because what appear to be rib vittae in transverse section are often multiple or irregularly branching vittae. In these cases, depending on the exact position at which the fruit is sectioned, the vittae

may coincidentally lie internal to the vascular bundle in the ribs. As a result of our investigations this was indeed shown to be the case in *Afroligusticum thodei* (Fig. 7F) where the vittae sporadically have short branches (labelled as bv, Fig. 7F). The fruit of *Notobubon* all have very thin rib oil ducts situated external to the vascular bundles in the ribs. These are not always visible in mature fruits.

WOOD ANATOMY—The wood anatomy of the genus was studied by Magee et al. (in prep.). These authors found that most of the species (*N. ferulaceum*, *N. galbaniopse*, *N. laevigatum*, *N. montanum*, *N. pearsonii*, *N. pungens*, and *N. striatum*) have helical thickenings present in the vessel elements. Within the subfamily Apioideae, this has been reported only in members of the early diverging tribe Heteromorphae (Oskolski and Van Wyk, in press). Surprisingly, helical thickenings are absent in the vessel elements of those species with thick, woody stems (*N. galbanum*, *N. gummiferum*, and *N. tenuifolium*). The character was therefore incorporated into the morphological phylogenetic analysis.

Phylogenetic Relationships—**MORPHOLOGICAL DATA**—In order to reconstruct a phylogeny of the 12 species of *Notobubon*, 26 characters were scored (Appendix 3, 4) using *Lefeborea abyssinica* as the outgroup due to its early diverging position within the African clade (Winter et al. 2008). In addition to all 12 species of *Notobubon*, two other closely related Cape peucedanoid genera (viz. *Cynorrhiza* and *Nanobubon*) and a single representative of the largely tropical African peucedanoid genus *Afroligusticum* [viz. *A. classensii* (C.Norman) P.J.D.Winter] were included as ingroup taxa in the analysis. A single tree was obtained with a length of 48 steps, a consistency index (CI) of 0.77 and a retention index (RI) of 0.90 (Fig. 8). This result is presented here as a first hypothesis of relationships within the genus *Notobubon*. The sequence of species in the cladogram was therefore followed in the taxonomic treatment.

The three Cape peucedanoid genera (viz. *Cynorrhiza* with BP 61, *Nanobubon* with BP 92 and *Notobubon* with BP 86) were all weakly to strongly supported as monophyletic. A sister relationship between *Nanobubon* and *Notobubon* was very strongly supported, with a BP of 88. There are four synapomorphies supporting this relationship, viz. the permanent, evergreen leaves, the sclerophyllous leaves, the thickly winged fruit, and the lignified cells in the wings of the fruit not prominently elongated.

The monophyly of *Notobubon* is supported by five synapomorphies viz. the permanent woody stems, the cauline leaves, the small fruit of less than 9 mm long, the narrow marginal wings of the fruit, and the presence of helical thickenings in the vessels of the wood. The most derived lineage (BP 96) was seen to comprise those species (*N. capense*, *N. galbanum*, and *N. tenuifolium*) with extremely multiradiate primary umbels with the inflorescence lacking secondary umbels and the fruit with very broad commissural vittae comprising more than 80% of the fertile portion of the mericarp. Sister to this lineage was *N. gummiferum*, with the combined clade (BP 76) sharing reduced (short) peduncles (less than 1.5 (2) times as long as the diameter of the primary umbel). Successively sister was *N. sonderi* (BP 89), supported by the presence of orbicular primary umbels, long primary umbel rays, and wood vessels without helical thickenings (interpreted as a reversal). Together with *N. pungens* and *N. galbaniopse*, this larger clade (BP 71) is supported by the growth habit (main stem very sparingly branched).

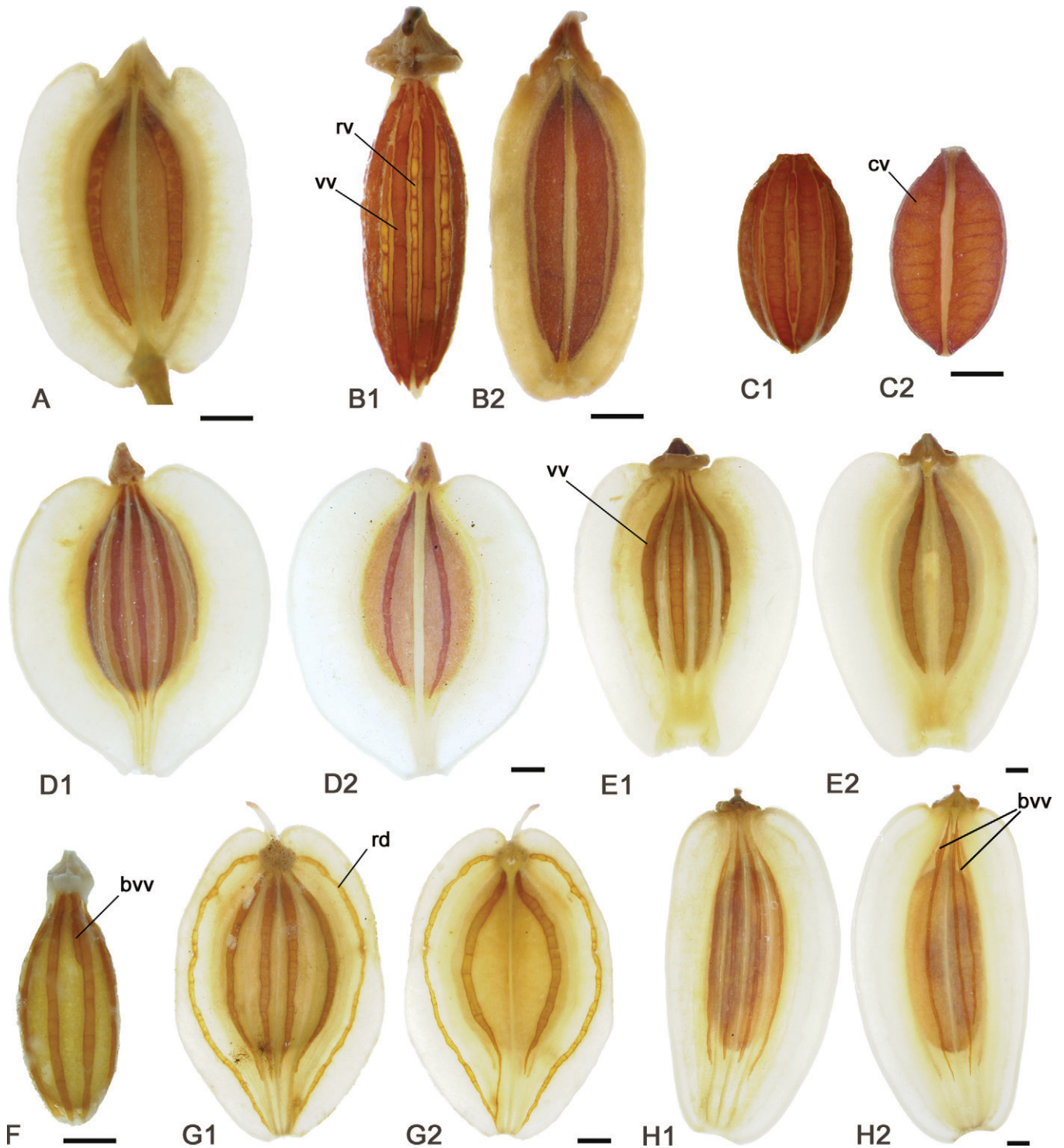


FIG. 7. Three-dimensional structure of the vittae and rib oil ducts in the fruit of *Notobubon* (A–C) and other African peucedanoid species (D–H). A. *Notobubon laevigatum* (Bond 254, commissural view). B. *Notobubon galbaniopse* (B1. dorsal view. B2. commissural view. Pillans 20061). C. *Notobubon capense* (C1. dorsal view. C2. commissural view. Compton 21896). D. *Cynorhiza typica* (D1. dorsal view. D2. commissural view. Ecklon and Zeyher 2244). E. *Nanobubon capillaceum* (E1. dorsal view. E2. commissural view. Leighton 1563). F. *Afroligusticum thodei* (Hoener 2214, dorsal view). G. *Lefeborea grantii* (G1. dorsal view. G2. commissural view. Dinter 7359). H. *Afrosiciadium magalimontanum* (H1. dorsal view. H2. commissural view. Verdoorn 136). (vv) vallecular vitta, (bv) branched vallecular vitta, (cv) commissural vitta, (rv) rib vitta, (rd) rib oil duct. Scale bar: 1 mm.

A moderately supported clade (BP 79) comprising *N. ferulaceum* – *N. tenuifolium* consists of large shrubs more than 0.5 m tall, with commissural vittae having transversely oblong cells, as well as internal rib vittae. Internal rib vittae are absent in *N. pearsonii*, suggesting that this character is

either lost in this species or convergent between *N. ferulaceum* and the clade comprising *N. pungens* – *N. tenuifolium*. The sister species *N. striatum* and *N. montanum* (BP 94) were found to form the earliest diverging lineage within *Notobubon*.

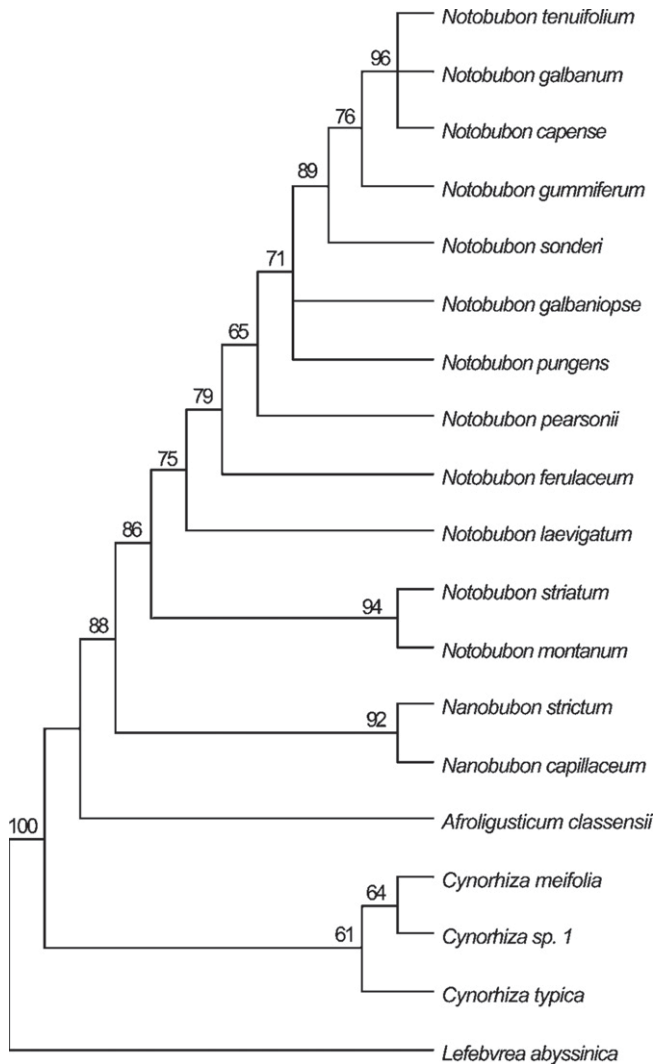


FIG. 8. Single most parsimonious tree obtained from a maximum parsimony analysis of the morphological data in Appendix 3 and 4. Bootstrap percentages are given above the branches. TL= 48. CI= 0.77. RI= 0.90.

ITS DATA—A comprehensive sampling of *Notobubon* (including 10 of the 12 species) was included in a broad level molecular analysis by Winter et al. (2008) using nrITS sequence data. The sampling and analysis was aimed at showing the nonmonophyly of *Peucedanum* and not to explore species relationships within the African peucedanoids. Despite the low sequence divergence and incomplete sampling, a clade comprising almost all species of *Notobubon* was retrieved (although without bootstrap support). The morphologically similar *Notobubon pearsonii*, however, was not included in this clade but rather formed a separate branch of a large polytomy, including several other African genera. Although resolution was unsatisfactory, the clear separation between the most derived *N. galbanum* clade (*N. capense*, *N. galbanum*, *N. tenuifolium*, *N. gummiferum*), and in particular the superficially similar *N. galbaniopsis*, is congruent with the results of the morphological analysis. Combined analyses of morphological and molecular datasets for the African clade (Magee et al. in press.) recovered increased resolution and support for the monophyly of both *Nanobubon* and *Notobubon*.

TAXONOMIC TREATMENT

NOTOBUBON B.-E. van Wyk in Winter et al. in *Taxon* 57(2): 355. 2008.—Type: *Notobubon galbanum* (L.) Magee.

Bubon auct. non. L., sensu stricto: Koch in *Nov. Acta Leopold.* 12(1): 95. 1824; DC., *Prodr.* IV. 184–185. 1825; Endl., *Gen.* Pl. 2. 780. 1839; Sond. in *Harv. and Sond., Fl. Cap.* 2. 559–560. 1862.

Dregea Eckl. & Zeyh., *Enum. Pl. Afric. Austral.* 350. 1837, nom. rejic. – non E. Mey (1838), nom. cons.

Sciothamnus Endl., *Gen. Pl.* 780. 1839, nom illegit. [Note: *Dregea* Eckl. & Zeyh. was renamed by Endlicher as *Sciothamnus* but this name is now considered illegitimate as it was published long before the conservation of *Dregea* E. Mey. (Burt 1991).]

Ifdregea Steud., *Nomencl. Bot.* [ed. 1] 801. 1840, nom. illegit. [Note: *Dregea* Eckl. & Zeyh. was renamed by Steudel to *Ifdregea*. As this name was published long before the conservation of *Dregea* E. Mey., it is now considered illegitimate (Burt 1991).]

Slender to robust shrubs or small trees, 0.2–5.0 m tall (excluding the inflorescence); evergreen. *Stem* woody, sparsely to well branched at or above ground level; branches woody, permanent, glabrous or slightly scabrous in *N. striatum* often covered with fibrous remnant leaf sheaths. *Leaves* cauline, regularly arranged or congested along the upper parts of the branches; permanent, sclerophyllous, 2–4-pinnate. *Ultimate leaflet segments* entire, 2- or 3-lobed to pinnatisect or in *N. pungens* reduced to rigid spine-tipped pinnules; base narrow to broad and cuneate; venation pinnate to clearly reticulate or obscure, flush with or sunken below the lamina (or prominently raised above the lamina in *N. striatum*); concolorous or discolorous, green or glaucous; lobes flat or subterete, margins entire, slightly to prominently revolute (folded over to a width of 0.5–1.0 mm) in *N. montanum* and *N. galbaniopse*. *Petioles* terete, sheathing along their entire length or at the base only. *Inflorescence* long (more than two times longer than the diameter of the primary umbel) to short [less than 1.5 times as long as the diameter of the primary umbel], peduncle striate, usually with a large terminal umbel and 0–6 (8) smaller lateral umbels; umbels compound. *Primary umbel* with 4–120 (180) rays, flat-topped to orbicular; involucre present; bracts numerous, linear to lanceolate, apex acute to acuminate, glabrous (or scabrous in *N. striatum*); rays 8–82 (102) mm long, unequal to subequal, glabrous or scabrous; involucre present; bracteoles numerous, linear to lanceolate, apex acute to acuminate, glabrous or occasionally scabrous, usually shorter than raylets; raylets glabrous or occasionally scabrous; umbellule many-flowered. *Flowers* pentamerous, predominantly hermaphroditic, those in the lateral umbels often entirely or in part functionally male; sepals minute to relatively large, apex truncate to acuminate, glabrous or scabrous; petals yellow, elliptic to obovate, acuminate, with inflexed tips, glabrous or occasionally slightly scabrous, secretory ducts branched; stamens with tips inflexed; stylopodium broadly conical; styles 2, short, elongated and often becoming reflexed in young fruit; ovary bilocular. *Fruit* dorsally compressed, elliptic to rotund, 3.0–8.5 mm × 1.5–6.0 mm, glabrous; mericarps homomorphic (or heteromorphic in *N. galbaniopse*); median and lateral ribs obsolete to very slightly prominent, or in heteromorphic fruit then with median rib in one mericarp more prominent than lateral ribs, lateral ribs in other mericarp

more prominent than median rib; marginal ribs narrowly or relatively broadly-winged (except in *N. pearsonii*), thick; commissural vittae 2, narrow [in total 20–25% of actual fruit width (excluding the marginal wings)] or very broad [in total 40–90% of actual fruit width (excluding the marginal wings)]; vallecular vittae 3, solitary, narrow to broad; additional vittae under vascular bundles in ribs present or absent, solitary, smaller than or equal to vallecular vittae; commissure very broad, 100% of mericarp width; carpophore bipartite.

Diagnostic Characters—The species are small to large shrubs or small trees with woody, permanent branches and cauline sclerophyllous leaves. They are easily distinguished from all Eurasian species of *Peucedanum* and other African species formerly included in *Peucedanum*, which in contrast are either herbs, or suffrutices with woody underground rhizomes, and radicle leaves or if also cauline then born on deciduous branches. As in *Nanobubon*, the leaves are permanent and sclerophyllous. Some of the species have a large orbicular

and multiradiate primary umbel borne on a short peduncle. The fruit also differ from other African peucedanoid genera in that they are small (less than 9 mm long) with thick, narrow marginal wings. The fruit anatomy is unusual in that there are usually 11 vittae in each mericarp: four solitary vallecular vittae, two commissural vittae that are usually very broad, and five additional solitary vittae interior to the vascular bundle in each rib.

Distribution and Habitat—The species are subendemic to the Cape Floristic Region, with only one species (*N. laevigatum*) extending into the eastern parts of South Africa, as well as Lesotho and Swaziland.

Phenology—The plants are evergreen. Flowering generally begins in spring, from October through to February. *Notobubon sonderi* tends to flower somewhat later, starting around January, while other more widespread species such as *N. laevigatum* may flower throughout the year depending on rainfall. Mature fruits are typically borne from January through to April.

KEY TO THE SPECIES OF NOTOBUBON

1. Fruit without additional vittae under the ribs and commissural vittae narrow (marginal wings present); shrubs small, 0.2–0.4 m tall (excluding the inflorescence) or if more than 0.5 m tall then with ultimate leaflet segments entire. 2
2. Leaves more than 20 mm long; ultimate leaflet segments not cleft or lobed; sepals minute, less than 0.2 mm long. 3. *N. laevigatum*
2. Leaves less than 20 mm long; ultimate leaflet segments 2- or 3-cleft or 2-lobed; sepals relatively large, more than 0.40 mm long. 3
3. Ultimate leaflet segments with the lamina prominently revolute at the margins; only involucel and raylets scabrous; restricted to the Uitenhage district in the Eastern Cape Province. 1. *N. montanum*
3. Ultimate leaflet segments with the lamina not prominently revolute at the margins; all parts of the compound umbel densely scabrous, including the sepals and to a lesser extent the petals; restricted to renosterveld around Swellendam in the Western Cape Province. 2. *N. striatum*
1. Fruit with additional vittae under the ribs and/or broad commissural vittae (if additional vittae under the ribs absent [*N. pearsonii*] then with marginal wings also absent); shrubs relatively large, 0.5–5.0 m tall (excluding the inflorescence); ultimate leaflet segments 3-lobed to pinnatisect or reduced to rigid spine-tipped pinnules. 4
4. Leaves with ultimate leaflet segments reduced to rigid, spine-tipped pinnules. 7. *N. pungens*
4. Leaves with ultimate leaflet segments not reduced to rigid, spine-tipped pinnules. 5
5. Ultimate leaflet segments 3-lobed to 3-partite with the lobes broad, more than 3 mm wide, margins toothed, venation clearly reticulate. 6
6. Peduncle long, more than two times longer than the diameter of the primary umbel; primary umbel with less than 28 (–42) rays; fruit heteromorphic, one mericarp with a prominent median rib, the other with prominent lateral ribs; ultimate leaflet segments irregularly toothed, the teeth much shorter than the space between them, the sinuses markedly rounded; lamina usually prominently revolute along the margins. 6. *N. galbaniopse*
6. Peduncle short, less than 1.5 times as long as the diameter of the primary umbel; primary umbel with more than (30–) 52 rays; fruit homomorphic, both mericarps with 3 obsolete or slightly prominent dorsal ribs; ultimate leaflet segments regularly toothed, the teeth at least as tall as the space between them, the sinuses acute; lamina never revolute along the margins. 11. *N. galbanum*
5. Ultimate leaflet segments pinnatisect or if 3-sect then with the lobes narrow (less than 1 mm wide) or subterete, margins entire, venation pinnate. 7
7. Peduncle long, more than two times longer than the diameter of the primary umbel; primary umbel with less than 20 (–27) rays; small, multistemmed shrubs less than 1.0 m tall (excluding the inflorescence). 8
8. Leaves bipinnate; ultimate leaflet segments with subterete lobes; plants restricted to the Northern Cape Province. 9
9. Leaves less than 50 mm long; ultimate leaflet segments with lobes less than 15 mm long; fruit elliptic, marginal ribs not winged. 5. *N. pearsonii*
9. Leaves more than 90 mm long; ultimate leaflet segments with lobes more than 15 mm long; fruit rotund, marginal ribs narrowly-winged. 12. *N. capense*
8. Leaves tripinnate; ultimate leaflet segments with flat or sometimes subterete lobes; plant restricted to the Western and Eastern Cape Provinces. 10
10. Leaves discolorous (adaxial surface deep-green and glabrous; abaxial surface silvery and glaucous); ultimate leaflet segments prominently pinnatisect; fruit with marginal wings narrow; leaves more than (90–) 110 mm long, often congested near the base of the peduncle. 8. *N. sonderi*
10. Leaves concolorous (adaxial and abaxial surfaces green, rarely glaucous); ultimate leaflet segments weakly pinnatisect or 2- or 3-sect; fruit with marginal wings relatively broad; leaves less than 120 (–160) mm long, densely and regularly arranged along the upper parts of the branches. 4. *N. ferulaceum*
7. Peduncle short, less than 1.5 (–2) times as long as the diameter of the primary umbel; primary umbel with more than 20 rays; large, sparsely branched shrubs or trees, 1.5–5.0 m tall. 11
11. Ultimate leaflet segments weakly pinnatisect or 3-sect, with subterete and needle-like lobes; leaves concolorous and glaucous. 12. *N. capense*
11. Ultimate leaflet segments prominently pinnatisect, with flat laminate lobes; leaves concolorous and bright green or discolorous with the abaxial surface silvery and glaucous. 12
12. Leaves discolorous, adaxial surface dark green; abaxial surface silvery and glaucous; fruit elliptic, 5.5–8.5 mm long; small trees up to 5 m tall. 9. *N. gummiferum*
12. Leaves concolorous, usually bright green, less often slightly glaucous; fruit rotund (rarely elliptic), 3.0–4.5 (–5.0) mm long; shrubs occasionally up to 3 m tall. 10. *N. tenuifolium*

1. *NOTOBUBON MONTANUM* (Eckl. & Zeyh.) Magee in Winter et al. in *Taxon* 57(2): 356. 2008. *Dregea montana* Eckl. & Zeyh., *Enum. Pl. Afric. Austral.* 351. 1837. *Ifdregea montana* (Eckl. & Zeyh.) Steud., *Nomencl. Bot.* [ed. 1] 801. 1840. *Peucedanum dregeanum* D.Dietr., *Syn. Pl.* 2. 969. 1840; Steud., *Nomencl. Bot.* ed. 2. 311. 1841; B.L. Burtt in *Edinb. J. Bot.* 48(2): 230. 1991; Goldblatt and Manning, *Cape Pl.* 278. 2000. *Peucedanum ecklonianum* Sond. in *Harv. and Sond., Fl. Cap.* 2. 555. 1862, nom. illegit. *Peucedanum montanum* (Eckl. & Zeyh.) Druce in *Rep. B.E.C. Brit. Isl.* 4. 639. 1917, nom. illegit. non Koch.—TYPE: SOUTH AFRICA. Port Elizabeth district: Winterhoeksberge near Elands River, *Ecklon and Zeyher* 2242 (lectotype: S!, here designated; isolectotypes: P!, SAM!). See note 1.

Shrubs, 0.2–0.4 m tall. *Stem* repeatedly branched, branches glabrous. *Leaves* regularly arranged along the upper parts of the branches, 10–18 mm × 10–15 mm; blade broadly ovate, 2-pinnate. *Ultimate leaflet segments* elliptic or obovate to broadly obovate, 5–13 mm × 3–7 mm, 2- or 3-cleft or 2 lobed; base attenuate; venation pinnate; concolorous, green; lobes very narrowly elliptic, flat, 2–5 mm × 1–2 mm, margins entire, prominently revolute (folded over to a width of 0.5 mm). *Petioles* to 2 mm long, sheathing along their entire length. *Inflorescence* long (more than two times longer than the diameter of the primary umbel), with 0–3 smaller lateral umbels. *Primary umbel* with 7–8 rays, flat-topped; bracts lanceolate, apex acute to slightly acuminate, glabrous; rays 5–8 mm long, unequal, glabrous; bracteoles lanceolate, apex acute to slightly acuminate, slightly scabrous, usually shorter than raylets; raylets scabrous. *Flowers* with sepals relatively large, 0.4–0.7 mm, apex obtuse to acute, glabrous; petals unknown. *Fruit* broadly elliptic to rotund, 5 mm × 4 mm; mericarps homomorphic; median and lateral ribs obsolete or very slightly prominent; marginal ribs relatively broadly-winged; commissural vittae narrow; vallicular vittae narrow.

Notes—1. The specimen *Ecklon and Zeyher* 2242, housed in S is chosen here as the lectotype of *Dregea montana* as it closely matches the original description and bears their Enumeratio label.

Diagnostic Characters—*Notobubon montanum*, like *N. striatum* and sometimes *N. laevigatum*, can be distinguished from other species of *Notobubon* by their diminutive habit (shrubs less than 0.4 m tall). *Notobubon montanum* differs from *N. laevigatum* in the smaller leaves (less than 20 mm long) and the usually large and prominent sepals (more than 0.4 mm long). It is most similar to *N. striatum* but the lobes of the ultimate leaflet segments have prominently revolute margins, the veins on the adaxial surface are prominently sunken and only the raylets and involucre are covered in scabrid hairs. *Notobubon montanum* is furthermore geographically isolated from *N. striatum*.

Distribution and Habitat—*Notobubon montanum* is known only from the Winterhoeks Mountains where it was collected near to the Elands River (Fig. 9). The species is known from only a few very old collections. It appears to be highly localized and endemic to Kouga grassy sandstone fynbos, a bioregion considered “least threatened” by Mucina and Rutherford (2006).

Additional Specimens Examined—SOUTH AFRICA. Eastern Cape Province: Port Elizabeth district: Winterhoeks Mountains near to Elands River, *Zeyher* 934 (BM, K 1 and 2, SAM), *Zeyher* 2689 (K, P, PRE 1 and 2). Doubtful locality: Plains near Swellendam, *Bowie s.n.* (BM).

2. *NOTOBUBON STRIATUM* (Thunb.) Magee in Winter et al. in *Taxon* 57(2): 356. 2008. *Seseli striatum* Thunb., *Prodr. Fl.*

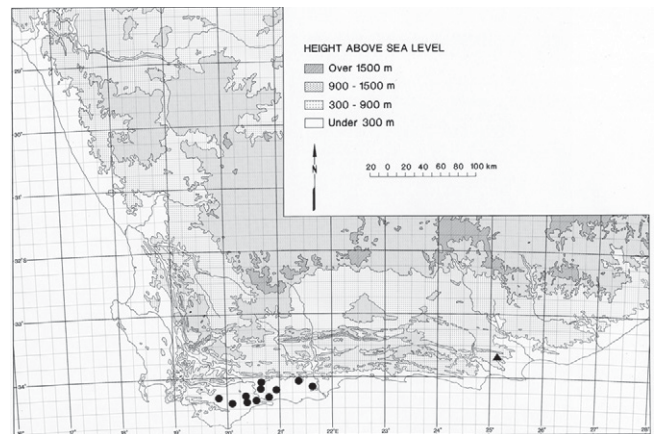


FIG. 9. The known geographical distributions of *Notobubon montanum* (triangle) and *N. striatum* (circles).

Cap. 51. 1794; Spreng. in *Roem. and Schultes, Syst. Veg.* 6. 402–403. 1820; Thunb., *Fl. Cap.* 259. 1823; D. Dietr., *Syn. Pl.* 2. 956. 1840. *Peucedanum striatum* (Thunb.) Sond. in *Harv. and Sond., Fl. Cap.* 2. 555. 1862; B.L. Burtt in *Edinb. J. Bot.* 48(2): 237. 1991; Goldblatt and Manning, *Cape Pl.* 279. 2000. *Annesorhiza striata* (Thunb.) Koso-Pol. in *Bull. Soc. Nat. Mosc.* 30: 280. 1917.—TYPE: SOUTH AFRICA. Cape, *Thunberg s.n.* sub THUNB-UPS 7212 (lectotype: UPS!, here designated). See note 1.

Dregea collina Eckl. & Zeyh., *Enum. Pl. Afric. Austral.* 351. 1837. *Ifdregea collina* (Eckl. & Zeyh.) Steud., *Nomencl. Bot.* [ed. 1] 801. 1840. *Peucedanum collinum* (Eckl. & Zeyh.) D.Dietr., *Syn. Pl.* 2. 969. 1840; Steud., *Nomencl. Bot.* ed. 2. 311. 1841.—TYPE: SOUTH AFRICA. Swellendam district: Duivenhokrivier, *Ecklon and Zeyher* 2243 (lectotype: S!, here designated; isolectotype: SAM!). See note 2.

Shrubs, 0.2–0.4 m tall. *Stem* repeatedly branched, branches slightly scabrous. *Leaves* regularly arranged along the upper parts of the branches, (6) 10–20 mm × (5) 8–15 mm; blade narrowly ovate to broadly ovate or broadly elliptic; 2-pinnate. *Ultimate leaflet segments* oblanceolate to obovate, 2–10 mm × 3–7 mm, 2- or 3-cleft or 2-lobed rarely entire; base attenuate; venation pinnate, prominently raised above the lamina; concolorous, green; lobes very narrowly elliptic to oblanceolate, flat, 2–8 mm × 1–2 mm, margins entire. *Petioles* up to 5 mm long, sheathing along their entire length. *Inflorescence* long (more than two times longer than the diameter of the primary umbel), with 0–3 smaller lateral umbels. *Primary umbel* with 5–10 rays, flat-topped; bracts lanceolate, apex acute to acuminate, densely scabrous; rays 8–30 mm long, unequal, densely scabrous; bracteoles lanceolate, apex acute, densely scabrous, usually shorter than raylets; raylets densely scabrous. *Flowers* with sepals relatively large, (0.4) 0.5–0.9 mm long, apex obtuse to acuminate, slightly scabrous; petals slightly scabrous. *Fruit* broadly elliptic, 3.5–4.0 mm × 2.5 mm; mericarps homomorphic; median and lateral ribs obsolete or very slightly prominent; marginal ribs narrowly-winged; commissural vittae narrow; vallicular vittae narrow.

Notes—1. This is the only specimen in Thunberg’s herbarium at UPS, bearing his handwriting on the reverse of the sheet and is therefore selected as lectotype of *Seseli striatum*.

2. The S specimen of *Ecklon and Zeyher* 2243 is designated here as the lectotype of *Dregea collina* as the sheet has immature fruit, bears Ecklon's handwriting as well as the distinctive Enumeratio label.

Diagnostic Characters—*Notobubon striatum* is most similar to *N. montanum* (see notes earlier on *N. montanum*) but differs in that the lobes of the ultimate leaflet segments do not have revolute margins, the veins are prominently raised above the lamina on both surfaces, and all parts of the compound umbel are covered in scabrid hairs (including the sepals and to a lesser extent the petals).

Distribution and Habitat—*Notobubon striatum* occurs from Bredasdorp to Albertinia in the Western Cape Province (Fig. 9). It is a resprouting shrub growing in renosterveld vegetation on well-drained clay soils developed over shale, at altitudes below 300 m.

Additional Specimens Examined—SOUTH AFRICA. **Western Cape Province:** Caledon district: Rietkuil, *Ecklon and Zeyher* 2684 (K, SAM); Rietpoel, Ruens, *Taylor* 3752 (NBG). Bredasdorp district: Adoonskop, *C.R.E.W.* 124 (NBG); Rooivlei, *C.R.E.W.* 135 (NBG); Goereesoe, *Taylor* 3834 (NBG, PRE); Rooikop, *C.R.E.W.* 236 (NBG); Hartebeeste River 278, *Helme* 2280 (NBG); Koppies Farm, *C.R.E.W.* 151 (NBG); 1 km N.W. of Potberg houses, *Burgers* 1995 (NBG, PRE); 300 m from entrance to Potberg, *Magee et al.* 51 (JRAU); N side of Potberg, *Acocks* 22500 (K), *Taylor* 3654 (K 1 and 2, NBG); Breede River, *O'Callaghan* 443 (NBG). Riversdale district: Soet4e Melks River station, *Burchell* 6785 (K); Botteliersfontein, *Muir* 1964 (PRE).

3. NOTOBUBON LAEVIGATUM (Aiton) Magee in Winter et al. in *Taxon* 57(2): 356. 2008. *Bubon laevigatum* Aiton, *Hort. Kew.* 1. 352. 1789; *W. T. Aiton, Hort. Kew.* 2. 146–147. 1811; DC., *Prodr.* IV. 185. 1825; *Ecklon and Zeyh.*, *Enum. Pl. Afric. Austral.* 353. 1837; *D. Dietr.*, *Syn. Pl.* 2. 969. 1840; *Sond.* in *Harv. and Sond.*, *Fl. Cap.* 2. 561. 1862. *Ferula laevigata* (Aiton) *Spreng.*, *Umb. Spec.* 88. 1818; *Spreng.* in *Roem. and Schultes*, *Syst. Veg.* 6: 598. 1820. *Peucedanum laevigatum* (Aiton) *H. Wolff* in *Bot. Jahrb.* 57: 282. 1921; *Engl.*, *Pflanzenwelt Afrikas* 3(2): 828. 1921, nom. illegit. non *Torr. & Gray* (1840).—TYPE: *Hort. Kew.* (lectotype: BM!, specimen labelled 2, here designated). See note 1.

Laserpitium capense *Thunb.*, *Prodr. Fl. Cap.* 50. 1794 and *Fl. Cap.* 256–257. 1823; *D. Dietr.*, *Syn. Pl.* 2. 976. 1840. *Dregea capensis* (Thunb.) *Eckl. & Zeyh.*, *Enum. Pl. Afric. Austral.* 351. 1837. *Ifdregea capensis* (Thunb.) *Steud.*, *Nomencl. Bot.* [ed. 1] 801. 1840. *Peucedanum capense* (Thunb.) *Sond.* in *Harv. and Sond.*, *Fl. Cap.* 2. 554–555. 1862; *B.L. Burtt* in *Edinb. J. Bot.* 48(2): 228. 1991; *Goldblatt and Manning*, *Cape Pl.* 278. 2000, nom. conserv. *Peucedanum capense* (Thunb.) *Sond.* var. *latifolium* *Sond.* in *Harv. and Sond.*, *Fl. Cap.* 2. 554. 1862, nom. illegit. (= var. *capense*).—TYPE: SOUTH AFRICA. Cape, *Thunberg s.n.* sub THUNB-UPS 6950 (lectotype: UPS!, here designated). See note 2.

Dregea capensis var. *angustifolia* *Eckl. & Zeyh.*, *Enum. Pl. Afric. Austral.* 351. 1837.—TYPE: SOUTH AFRICA. Fort Beaufort district: Katriviersberge, *Ecklon and Zeyher s.n.* (lectotype: S!, here designated; isolectotype: SAM!). See note 3.

Peucedanum virgatum *Cham. & Schltdl.* in *Linnaea* 1. 392–393. 1826; DC., *Prodr.* IV. 178. 1825; *D. Dietr.*, *Syn. Pl.* 2. 965. 1840; *Meisn.* in *J. D. Hook.*, *Lond. J. Bot.* 2: 535–536. 1843; *Adamson and Salter*, *Fl. Cape Penins.* 624. 1950. *Dregea virgata* (Cham. & Schltdl.) *Eckl. & Zeyh.*, *Enum. Pl. Afric. Austral.* 351. 1837. *Ifdregea virgata* (Cham. & Schltdl.) *Steud.*, *Nomencl. Bot.* [ed. 1] 801. 1840.—TYPE: SOUTH

AFRICA. Montagu district: Tradouw Mountains, *Mund and Maire s.n.* sub HAL 97781 (lectotype: HAL!, sheet A, here designated; isolectotype: HAL! sheet B). See note 4.

Peucedanum capense var. *lanceolatum* *Sond.* in *Harv. and Sond.*, *Fl. Cap.* 2. 555. 1862; *B.L. Burtt* in *Edinb. J. Bot.* 48(2): 228. 1991, synonym. nov.—TYPE: SOUTH AFRICA. *Ecklon and Zeyher* 2241 (lectotype: SAM! specimen on the far left, here designated). See note 5.

Peucedanum camdebooense *B.L. Burtt* in *Edinb. J. Bot.* 48(2): 228. 1991. *Peucedanum abbreviatum* *E. Mey. ex Sond.* in *Harv. and Sond.*, *Fl. Cap.* 2. 555. 1862, nom. illegit., non *Meisn.* (1843).—TYPE: SOUTH AFRICA. Rietbron district: Kamdebooberg, *Drège s.n.* (lectotype: S!, here designated; isolectotypes: K!, P!). See note 6.

Slender shrub, 0.2–1.5 m tall. *Stem* branched at ground level, branches usually remaining simple-stemmed or sparsely branched, glabrous. *Leaves* regularly arranged along the upper parts of the branches, (20) 40–170 mm × (5) 25–130 mm; blade narrowly ovate to broadly ovate, 2-pinnate. *Ultimate leaflet segments* very narrowly elliptic to elliptic or very narrowly lanceolate to ovate, 4–45 mm × 1–15 mm, entire though some leaves may be 2- or 3-lobed; base acute to attenuate; apex acute to obtuse, mucronulate; margins entire or very slightly crenate; venation pinnate; concolorous, green or occasionally glaucous. *Petioles* up to 35 mm long, sheathing usually along their entire length or less often at the base only. *Inflorescence* long (more than two times longer than the diameter of the primary umbel) or rarely short (less than 1.5 times as long as the diameter of the primary umbel), with 0–5 smaller lateral umbels. *Primary umbel* with 5–67 rays, flat-topped; bracts linear to lanceolate, apex acuminate, glabrous; rays 21–85 mm long, unequal, glabrous; bracteoles linear to lanceolate, apex acuminate, glabrous or sometimes sparsely scabrous, usually shorter than raylets; raylets glabrous. *Flowers* with sepals minute, 0.1–0.2 mm long, apex obtuse to acute, glabrous; petals glabrous. *Fruit* elliptic to broadly elliptic, 4.0–7.0 mm × 3.0–4.5 mm; mericarps homomorphic; median and lateral ribs very slightly prominent to prominent; marginal ribs relatively broadly-winged; commissural vittae narrow; vallicular vittae narrow.

Notes—1. As Aiton's specimens are known to be housed in BM (Stafleu and Cowan 1976) and there is a specimen housed here labeled 2 from the plant cultivated in the Hortus Kewensis, this specimen is chosen as the lectotype of *Bubon laevigatum*.

2. This is the only specimen in Thunberg's herbarium, it is annotated on the reverse by him and so is here designated as lectotype of *Laserpitium capense*.

3. This, the second specimen from this collection (the other specimen is housed in SAM), was found in the general collection in S. As the specimen in SAM appears to be a mixed one, the specimen in S was selected as lectotype of *Dregea capensis* var. *angustifolia* as it bears Ecklon's handwriting, the original Enumeratio label, and consists of a single element that closely matches the protologue.

4. When describing *Peucedanum virgatum*, Chamisso and Schlechtendal cited the collection of Mund & Maire. This collection is housed in HAL and consists of two sheets. The sheet labelled A is the only sheet with fruit material and is therefore selected as lectotype here.

5. Sonder cited two specimens (*Ecklon & Zeyher* 2241 and *Zeyher* 2691) when describing *Peucedanum capense* var.

lanceolatum. However, he indicates having seen only *Ecklon & Zeyher* 2241. Since there are no isosyntypes in S (or K), we here choose the SAM isosyntype, which bears the Enumeratio label of Ecklon and Zeyher, as lectotype.

6. The specimen in S is the only one cited by Sonder (1862) and later also by Burtt (1991).

Diagnostic Characters—*Notobubon laevigatum*, together with *N. montanum* and *N. striatum*, lacks the combination of fruit vittae characters distinctive of all the remaining *Notobubon* species (i.e. additional vittae below the ribs and/or broad commissural vittae). *N. laevigatum* is a distinctive species with entire ultimate leaflet segments that are narrowly elliptic to elliptic or very narrowly lanceolate to ovate (some ultimate leaflet segments on a plant may be two- or three-lobed). This species exhibits a wide range of variation. The plants are usually much larger shrubs (up to 1.5 m tall) than in *N. montanum* and *N. striatum*, but may remain much smaller when growing in drier habitats. It can then be distinguished from these species by the larger leaves (more than 20 mm long), the entire ultimate leaflet segments and the small, inconspicuous sepals (less than 0.2 mm long).

Distribution and Habitat—*Notobubon laevigatum* is the most widely distributed species, recorded from Heidelberg in the Western Cape Province extending along the east coast to Swaziland and Mpumalanga and more inland into Lesotho and the Free State (Fig. 10). *Notobubon laevigatum* grows in fynbos, coastal shrubland, grassland, riverine or karroid vegetation where it occurs on sand, clay or loam soils in shale, limestone, sandstone or dolerite.

Additional Specimens Examined—SOUTH AFRICA. **Mpumalanga Province:** Lydenburg district: Vertroosting Nature Reserve 12 km S of Sabie, *Muller* 2403 (PRE); Kaapsche Hoop road 2 km above Stella Mine, *Buitendag* 1245 (PRE); 5 km E of Kaapsche Hoop, Nelspruit, *Winter* 123 (JRAU); Nelshoogte, *Strey* 4079 (K, PRE). Komatipoort district: Paffadors, SE of Uitkyk road, *Onderstall* 1339 (PRE). **Free State Province:** Brandfont district: Thaba Nchu Mountain, *Roberts* 1800 (PRE). Senekal district: Roma, *Schmitz* 6689 (PRE); Franshoek, *Ficksburg*, *Ferreira* F198 (K, PRE). **KwaZulu Natal Province:** Harrismith district: Umlambonja Valley, *Marriott* 22626 (PRE). Dundee district: Qudeni, *Gerstner* 6810 (K, PRE); Nsuze River Valley, *Van Wyk* 7290 (PRE). Nkandla district: Hluhluwe Game Reserve, *Hutchings* 750 (PRE); Homewith, *Mogg* 4376 (PRE). Mtubatuba district: Palm Ridge Farm, *Harrison* 397 (PRE). Pietermaritzburg district: Lidgetton, *Mogg* 6895 (PRE); 21 miles from Howick on road to Mount Alida, Karkloof Range, *Ross* 2083 (PRE, K); Ismont, *Strey* 9889 (K, PRE). Port Shepstone district:

Oribi Plains, *Ward* 4712 (PRE); Umtamvuna Nature Reserve, *Edwards* 101 (K), *Hilliard and Burtt* 10269 (K), *Strey* 7447 (K, PRE). Port Edward district: Beacon Hill, *Strey* 6501 (K, PRE). **Northern Cape Province:** Loxton district: Wagenaarskraal, *Acocks* 16353 (K, PRE). **Western Cape Province:** Beaufort West district: Karoo National Park, Mountain View, *Russell et al.* 72 (NBG), *Russell et al.* 236 (PRE), *Shearing* 1392 (NBG 1 and 2), *Shearing* 930 (PRE). Montagu district: Rietvleikloof, Laingsburg, *Bond* 254 (NBG). Ladismith district: Ladismith, *Marloth* 4001, 1905 (PRE); Valley between Seweweekspoort and Laingsburg, *Lewis s.n.* (SAM). Oudtshoorn district: Cango valley, Oudtshoorn, *Bond* 10654 (NBG), *Hugo* 183 (NBG, PRE), *Moffett* 594 (PRE 1, 2 and 3); George, *Schlechter* 5859 (BM, BOL, K, NBG, PRE, SAM); Kammanassie, *Esterhuysen* 4715 (PRE), *Compton* 939 (NBG); near Rondevlei, *Bayliss* 1103 (PRE); Wilderness, *Compton* 15554 (NBG), *Esterhuysen* 215 (PRE), *Leyns* 772 (BOL), *Magee and Boatwright* 7 (JRAU), *Magee et al.* 35 (JRAU); Homtini Pass, *Leyns* 10305 (BOL). Willowmore district: Uniondale Hot Springs, *Esterhuysen* 6267 (PRE 1 and 2); 13.5 miles NW of Plettenberg Bay, *Barclay and Acocks* 939 (PRE); Witte Els Bosch, *Fourcade* 946 (BOL), *Fourcade* 1127 (NBG). Riversdale district: Plattekloof, *Muir* 432 (PRE); Grootfontein near Stil Bay, *Muir* 110 (PRE). Mossel Bay district: Mossel Bay, *Rodin* 1335A (K). Knysna district: Knysna Heads, *Peter* 50660 (K); between the Heads and Spaarenbosch, *Leyns* 7863 (BOL); Knysna, *Rogers* 22671 (PRE); Keurbooms River, *Compton* 21678 (NBG); road between Keurboomsrivier and Plettenberg Bay, *Bredenkamp* 129 (PRE); between Plettenberg Bay and Humansdorp, *Werdermann and Oberdieck* 1006 (K, PRE); Flats east of Keurbooms River, *Fourcade* 633 (BOL); Keurboomstrand, *Theron* 1762 (K, PRE); near Plettenberg Bay, *Leipoldt* 17099 (BOL), *Winter* 90 (JRAU). **Eastern Cape Province:** Aliwal North district: Elandshoek, *Strey* 2077 (PRE). Steynsburg district: Steynsburg, *Botha* 3547 (PRE). Port St Johns district: Mkambati, *Van Wyk* 1550 (PRE); Mout Thesiger, *Bean et al.* 2164 (BOL); Port St Johns, *Pillans* 6664 (BOL, K). Graaff-Reinet district: Graaff-Reinet, *Bolus* 582 (BM, K); Graaff-Reinet to Jansenville, *Nienaber* EN 578 (PRE). Somerset East district: Top of Zwagershoek Pass, *Acocks* 15702 (K, PRE); Boschberg, *Bolus* 332 (BOL, K). Fort Beaufort district: Behind Amatole Mountains, *Phillipson* 581 (PRE); Amatole Mountains, Elandsberg; Hogsback Forest Reserve along border path, *Dahlstrand* 1818 (NBG); Hogsback State Forest, *Acocks* 11017 (PRE), *Dahlstrand* 2647 (NBG); Hogsback, Little Tuinhuis, *Hilliard and Burtt* 10907 (K). Stutterheim district: Cathcart, *Strey* 387 (PRE); Rabula, Amatola Mountains, *Leighton s.n.* (BOL); King Williams Town, *Tyson* 994 (SAM); near Amabele, *Acocks* 9062 (PRE); Grassy valleys near Komgha, *Flanagan* 130 (PRE, SAM); Nahoon Dam, *Immelman* 367 (PRE). Butterworth district: Mazeppa Bay, *Sidey* 678 (PRE); Kentani, *Pegler* 12 (BM, K, PRE); Gonubie, *Bokelmann* 2-PI55 (NBG), *Compton* 17024 (NBG). Steytlerville district: Cambria, *Barker* 7926 (NBG); between Cambria and Combrinck, *Lewis s.n.* (SAM); station between Cambria and Combrinck, 45.5 miles from Humansdorp, *Fourcade* 5194 (BOL). Port Elizabeth district: near Kommadagga, *Bayliss* 6085 (PRE); Suurberg, *Compton* 20272 (NBG), *Long* 739 (PRE); Suurberg Inn, *Dahlstrand* 934 (PRE), *Johnson* 721 (K, PRE); Suurberg National Park, Lot 16 along Brandrug, *Van Wyk and Van Wyk* 20, 42, 188 (JRAU); Suurberg National Park, Break Neck, *Van Wyk and Van Wyk* 407, 410, 453 (JRAU); Suurberg Pass, *Bayliss* 469 (K, PRE), *Hilliard* 5488 (K); Suurberg Mountains, near Woodfield's Krantz, *Fries et al.* 563 (BM, PRE); Van Stadens Mountains, *Zeyher* 2691 (PRE); Bethelsdorp, *Paterson* 3354 (PRE); Port Elizabeth Valley, *Paterson* 22109 (PRE); Swartkops River, *Zeyher* 588 (SAM). Grahamstown district: 13 km N of Grahamstown, *Galpin* 13242 (K, PRE); Faraway, portion 3 of Coldsprings, *Guillarmod* 9373 (PRE); Grahamstown, *Barker* 627 (NBG), *Brink* 694 (PRE), *Ecklon and Zeyher s.n.* (PRE), *Guillarmod* 8974 (PRE). Humansdorp district: Klipdrift, *Thode* A2472 (K, PRE); Humansdorp, *Horn s.n.* (PRE). Precise locality unknown: *Bowie s.n.* (BM); *Zeyher* 743 (K). Swaziland—Mbabane district: Mbabane, *Compton* 32257 (NBG, PRE); about 5 km S of Oshoek, Mbabane road, *McCallum* 505 (PRE); Bremersdorp Hills, *Compton* 25448 (K, NBG, PRE). Underberg district: Cathkin Park, *Galpin* 11873 (BOL, PRE). Lesotho—Lady Grey district: Leloaleng, *Dieterlen* 1188 (K, PRE).

4. NOTOBUBON FERULACEUM (Thunb.) Magee in Winter et al. in Taxon 57(2): 356. 2008. *Oenanthe ferulacea* Thunb., Prodr. Fl. Cap. 50. 1794; Spreng. in Roem. and Schultes, Syst. Veg. 6. 427. 1820; Thunb., Fl. Cap. 253. 1823. *Peucedanum ferulaceum* (Thunb.) Eckl. & Zeyh., Enum. Pl. Afric. Austral. 349. 1837; Walp., Repert. Bot. Syst. 2. 410. 1843; quoad syn. tantum: Sond. in Harv. and Sond., Fl. Cap. 2. 556. 1862; Adamson and Salter, Fl. Cape Penins. 624. 1950; B.L. Burtt in Edinb. J. Bot. 48(2): 230–231. 1991; Goldblatt and Manning, Cape Pl. 279. 2000.—TYPE: SOUTH AFRICA.

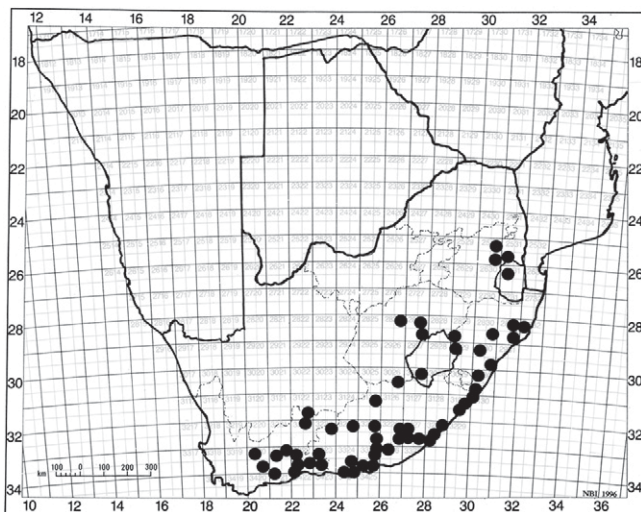


FIG. 10. The known geographical distribution of *Notobubon laevigatum*.

Cape of Good Hope, *Thunberg s.n. sub THUNB-UPS 7089* (lectotype: UPS!, here designated). See note 1.

Peucedanum stadense Eckl. & Zeyh., Enum. Pl. Afric. Austral. 349. 1837; D. Dietr., Syn. Pl. 2. 966. 1840; Walp., Repert. Bot. Syst. 2. 409–410. 1843. *Peucedanum ferulaceum* var. *stadense* (Eckl. & Zeyh.) Sond. in Harv. and Sond., Fl. Cap. 2. 556. 1862; B.L. Burtt in Edinb. J. Bot. 48(2): 231. 1991, synonym. nov.—TYPE: SOUTH AFRICA. Uitenhage district: Van Stadens Mountains, *Ecklon and Zeyher 2232* (lectotype: S!, sheet 91, photo in K!, here designated; isolectotype: S!, sheet 88, SAM!, 2 sheets). See note 2.

Peucedanum elongatum E.Mey. ex Meisn. in J. D. Hook., Lond. J. Bot. 2: 535. 1843.—TYPE: SOUTH AFRICA. Cape Town district: Tygerberg, *Krauss 1181* (lectotype: NY!, photo K!, here designated). See note 3.

Oenanthe seseloides K.Presl, Abh. Boehm. Ges. ser. v, 3. 504. 1845, (reimp.) Bot. Bemerk. 74. 1846. — TYPE: *Sieber*, Fl. Cap. no. 222 (K!, S!).

Slender shrub, 0.5–1.0 m tall. *Stem* branched at ground level, branches usually remaining simple-stemmed, glabrous. *Leaves* densely and regularly arranged along the upper parts of the branches, 40–120 (160) mm × 30–80 mm; blade narrowly ovate to broadly ovate, 3-pinnate. *Ultimate leaflet segments* ovate to obovate, 9–25 (35) mm × 4–12 mm, weakly pinnatisect or 2- to 3-sect; base attenuate; venation pinnate; concolorous, green or rarely glaucous; lobes linear, flat or subterete, 4–10 (15) mm × 0.5–1 mm, margins entire; terminal lobes subequal to adjacent lateral lobes. *Petioles* up to 25 (40) mm long, sheathing usually along almost their entire length or less often at the base only. *Inflorescence* long (more than two times longer than the diameter of the primary umbel), with 0–4 smaller lateral umbels. *Primary umbel* with 5–20 (27) rays, flat-topped; bracts linear to lanceolate, apex acuminate, glabrous; rays 6–37 (49) mm long, unequal, glabrous; bracteoles linear to lanceolate, apex acuminate, glabrous or sometimes slightly scabrous, usually shorter than raylets; raylets glabrous. *Flowers* with sepals minute, 0.1–0.3 (0.4) mm long, apex obtuse to acute, glabrous; petals glabrous. *Fruit* broadly elliptic to rotund, (4.5) 6.0–7.0 mm × 3.5–6.0 mm; mericarps homomorphic; median and lateral ribs obsolete or very slightly prominent; marginal ribs relatively broadly-winged; commissural vittae narrow; vallecular vittae broad; additional vittae under vascular bundles in ribs, smaller than vallecular vittae.

Notes—1. This is the only specimen in Thunberg's herbarium, it is annotated on the reverse by him and so is here designated.

2. There are two sheets in S. The sheet labelled 91 is here selected as it bears the Enumeratio label as well the original collection label.

3. The specimen in NY closely matches the original protologue and is therefore selected here as lectotype.

Diagnostic Characters—Vegetatively this species is superficially similar to *N. pearsonii*, but it has larger fruit with the marginal ribs quite broadly winged (in *N. pearsonii* the fruit are less than 3 mm long and the marginal ribs are not winged). *Notobubon ferulaceum* is most often confused with *N. capense* and *N. tenuifolium*. It differs from both these species in the long-pedunculate, few-rayed, compound umbels (usually less than 20 rays) and the larger, more broadly-winged fruit (6–7 mm long). Together with the previously mentioned characters, it can be readily distinguished from *N. tenuifolium*

by the ultimate leaflet segments in which the terminal lobes are subequal to the adjacent lateral lobes. *Notobubon ferulaceum* differs from *N. sonderi* in that the adaxial and abaxial leaf surfaces are the same colour, the leaves are usually much smaller (less than 120 mm long), the stems are densely and more regularly covered with leaves and remain erect (never becoming decumbent as in *N. sonderi*). The fruit anatomy of this species is unusual in that it combines the additional vittae below the vascular bundles in the ribs (as found in most of the species) with narrow commissural vittae (as found in *N. laevigatum*, *N. montanum* and *N. striatum*). Hybrids between this species and *N. galbanum* [Marloth 7687 (PRE), Winter 103 (JRAU)] as well as *N. galbaniopse* [Pillans 20064 (K)] are known from Camps Bay and Kirstenbosch respectively (Magee et al. unpubl. data).

Distribution and Habitat—*Notobubon ferulaceum* is widely distributed from Ceres to the Cape Peninsula in the Western Cape Province and east to Van Stadens in the Eastern Cape Province (Fig. 11). It occurs on moist slopes in sandy or clay soils in fynbos, false fynbos or rarely karoo vegetation. It resprouts and flowers profusely after fire.

Additional Specimens Examined—SOUTH AFRICA. **Western Cape Province:** Cape Town district: Camps Bay, *Marloth 1915* (PRE); Devils Peak, *Bolus 4755*, *Kuntze s.n.* (K), *Pappe s.n.* (K), *Wolley Dod 2016* (BOL); Disa Gorge, *Compton 21470* (NBG); Kasteelspoort, *Marloth 7314* (PRE 1 and 2, NBG), *Marloth 7384* (PRE); Kirstenbosch, *Compton s.n.* (BOL), *Esterhuysen s.n.*, 26 (BOL); *Norman 280* (BM), *Page s.n.* (BOL), *Pillans 20062* (BM), *Salter 9797* (BM, SAM); Kirstenbosch Ridge, *Pillans 20065* (BM, BOL), *Pillans s.n.* (BOL); Orange Kloof, Table Mountain, *Adamson 883* (BOL); Table Mountain, *Flanagan 1895* (PRE), *Pillans 2433* (PRE); Table Mountain, contour path, *Norman 282* (BM); Table Mountain, Pipe Track, *Magee 59* (JRAU), *Winter 102* (JRAU); Table Mountain, E slopes, *Mitchell s.n.* (BOL). Worcester district: Waaihoek Peak, *Esterhuysen 22634* (BOL); Baviaansberg, *Compton 12845* (NBG); Mowers Station, *Van Breda and Joubert 1822* (PRE); Koo Valley, Farm Hildebrand, *Boucher 6915* (NBG). Montagu district: Farm Doringkloof, southern foothills of Voetpadsberg, *Van Wyk 2334* (NBG); Lemoenshoek Mountains near Heidelberg, *Stokoe 65120* (SAM). Ladismith district: Garcia Forest Station, *Esterhuysen 17251* (BOL); Gysmanshoek Pass, valley between Kanetberg and Perdeberg, *Hugo 1087* (K, NBG, PRE). Oudtshoorn district: Saffraansrivier W of Zebraskop, *Hugo 166* (NBG, PRE); George, Doringrivier West, *Van Wijk 813* (PRE). Simonstown district: Boyles Drive, St James, *Goldblatt 6750* (PRE); Chapman's Peak, *Compton 15447* (NBG); Constantiaberg, *Compton 20379* (NBG); Wynberg Hill, *Salter 9786* (BM, SAM). Caledon district: Riviersondereinde Mountains near Greyton, *Esterhuysen 21095* (NBG); Danger Point Mountain, *Leighton 1564* (BOL); Soetanyberg, *Fellingham 358* (NBG, PRE); Soetanyberg on the farm Bergplaas, *Paterson-Jones 175* (NBG). Bredasdorp district: Potberg, Rietkloof, *Burgers 1669* (PRE); Potberg, *Compton 20396* (NBG); S part of Potberg, *Adamson 3911* (PRE). Riversdale district: Corente River, Helderberg road, *Thompson 708* (K, NBG, PRE); Ystervarkpunt, *Williams 169* (NBG). Mossel Bay district: Belvidere, *Knysna, Duthie 1208* (BOL). Knysna district: Concordia, *Keet 955* (PRE); Knysna, *Breyer 23624* (PRE); above Storms River mouth, *Acocks 21292* (BOL, K, PRE). **Eastern Cape Province:** Willowmore district: Avontuur Poort, *Fourcade 3581a* (BOL, NBG); Plettenberg Bay, Perdekop, *Winter 158* (JRAU); flats at Witte Els Bosch, *Fourcade 1209* (BOL, K, PRE), *Fourcade 2645* (BOL); Marine Drive, Bloukrans State Forest, *Taylor 9938* (PRE); Die Hoek, *Esterhuysen 21249* (BOL, NBG); N side of Tsitsikama Mountains near Joubertina, *Esterhuysen 22815* (BOL). Steytlerville district: Baviaanskloof, Enkeldoorn track, *Bond 930* (NBG, PRE); Kareedouw Pass, *Fourcade 6057* (BOL). Port Elizabeth district: Van Stadens Mountains, *Long 576* (K, PRE), *Meyer s.n.* (PRE), *Zeyher 822* (S, SAM). Humansdorp district: Humansdorp, *Thode A851* (K, PRE). Precise locality unknown: Cape Peninsula, *Adamson s.n.* (PRE); Swellendam district, *Bowie s.n.* (BM); Vogel Vlei, *Schlechter 621* (BM, K, PRE); Western Cape, *Sidey 4164* (PRE); *Bolus s.n. sub BOL 127089* (BOL); *Britten 1193* (PRE); *Ecklon and Zeyher 2231* (SAM).

5. **NOTOBUBON PEARSONII** (Adamson) Magee in Winter et al. in Taxon 57(2): 356. 2008. *Peucedanum pearsonii* Adamson in J. Bot. 76: 345. 1938; B.L. Burtt in Edinb. J. Bot. 48(2): 235. 1991.—TYPE: SOUTH AFRICA. Kamiesberg district: Namaqualand, Leliefonteinberg, *Adamson 1438* (holotype: BOL!, photo K!; isotype: BOL!).

Slender shrub, 0.5–1.0 m tall. *Stem* well branched at ground level, branches remaining simple-stemmed, glabrous. *Leaves* densely and regularly arranged along the upper parts of the branches; flat-topped in outline, 20–50 mm × 15–40 mm; blade narrowly ovate to broadly ovate, 2-pinnate. *Ultimate leaflet segments* ovate to obovate, 8–20 mm × 4–10 mm, weakly pinnatisect or 2- to 3-sect; base attenuate, venation not visible; concolorous, green to glaucous; lobes linear, subterete, 4–15 mm × 0.5–1.0 mm, margins entire; terminal lobes subequal to adjacent lateral lobes. *Petioles* up to 5 mm long, sheathing along their entire length. *Inflorescence* long (more than two times longer than the diameter of the primary umbel), peduncle persistent, with 0–3 lateral umbels. *Primary umbel* with (6) 9–14 (19) rays, slightly orbicular; bracts linear to lanceolate, apex acuminate, glabrous; rays 25–40 mm long, unequal to subequal, glabrous; bracteoles linear to lanceolate, apex acuminate, glabrous, shorter than raylets; raylets glabrous. *Flowers* with sepals minute, 0.1 mm long, apex obtuse to acute, glabrous; petals glabrous. *Fruit* elliptic, 3.0–3.5 mm × 1.5 mm; mericarps homomorphic; median and lateral ribs slightly prominent; marginal ribs not winged; commissural vittae broad; vallecular vittae broad.

Diagnostic Characters—*Notobubon pearsonii* may be confused only with *N. ferulaceum* (the two species are geographically isolated), from which it differs in the smaller, bipinnate leaves (less than 50 mm long), the umbels that are flat-topped in outline, with the previous year's peduncles often still visible on the plant and in the much smaller fruit (3.0–3.5 mm long). Furthermore, this species is unique in lacking not only marginal wings (present in all other species) but also the additional vittae under the vascular bundles in the ribs. It does, however, share the broad commissural vittae found in most other species of *Notobubon*.

Distribution and Habitat—*Notobubon pearsonii* is endemic to the Kamiesberg mountains in the Northern Cape Province (Fig. 11) where it occurs in mountain renosterveld on middle to lower slopes.

Additional Specimens Examined—SOUTH AFRICA. **Northern Cape Province:** Hondeklipbaai district: Khamieskroon, *Esterhuysen* 23603 (BOL 1 and 2, K); W slopes of Sneekop, *Bremer* 387 (PRE); lower middle slopes of Sneekop, *Pearson* 5782 (BM, BOL 1 and 2, K, NBG). Kamiesberg district: 1 km N of Windpoort, *Magee et al.* 42 (JRAU); Eselkop Mountain, *Le Roux and Ramsey* 757 (NBG); Kamiesberg Pass, *Van Wyk* 3109 (JRAU); rocky hill SE of Leliefontein, *Esterhuysen* 35464 (BOL 1 and 2).

6. NOTOBUBON GALBANIOPSE (H. Wolff) Magee in Winter et al. in *Taxon* 57(2): 356. 2008. *Peucedanum galbaniopse*

H. Wolff in *Bot. Jahrb.* 57: 232–233. 1921; Adamson and Salter, *Fl. Cape Penins.* 625. 1950; B.L. Burt in *Edinb. J. Bot.* 48(2): 231. 1991; Goldblatt and Manning, *Cape Pl.* 278. 2000.—TYPE: SOUTH AFRICA. Simonstown district: Sir Lowry's Pass, *Schlechter* 7213 (lectotype: K!, here designated; isolectotypes: BM!, K!, PRE!). See note 1.

Slender shrub, 0.5–1.5 m tall. *Stem* sparsely branched, mainly at ground level, branches glabrous. *Leaves* regularly arranged along the upper parts of the branches, 90–270 mm × 50–160 mm; blade ovate to broadly ovate, 2-pinnate. *Ultimate leaflet segments* rhomboid to obovate, becoming narrowly ovate on leaves near the base of the peduncle, 20–50 mm × 15–35 mm, 3-lobed to 3-partite, usually irregularly toothed over upper half or two thirds; teeth prominent near the base but often becoming less conspicuous near the apex; margins irregularly serrate or less often lacerate, the sinuses markedly rounded; base cuneate to obtuse, often asymmetrical; sometimes revolute (folded over to a width of 0.5–1.0 mm); venation clearly reticulate; discolorous, adaxial surface green; abaxial surface glaucous. *Petioles* up to 60 (100) mm long, sheathing at the base only. *Inflorescence* long (more than two times longer than the diameter of the primary umbel), with (0) 2–6 (8) lateral umbels. *Primary umbel* with (10) 17–28 (42) rays, slightly orbicular; bracts linear to lanceolate, apex acuminate, glabrous; rays (23) 30–44 (46) mm long, unequal or subequal, glabrous; bracteoles linear to lanceolate, apex acuminate, glabrous or sometimes slightly scabrous, usually shorter than raylets; raylets glabrous. *Flowers* with sepals minute, 0.1–0.2 mm long, apex obtuse to acute, glabrous; petals glabrous. *Fruit* elliptic, 5.5–6.5 mm × 3.0 mm; mericarps heteromorphic; median rib in one mericarp more prominent than lateral ribs, lateral ribs in other mericarp more prominent than median rib; marginal ribs narrowly-winged; commissural vittae broad; vallecular vittae broad; additional vittae under vascular bundles in ribs, smaller than vallecular vittae.

Notes—1. Since a large number of Schlechter's African collection is housed at K (Stafleu and Cowan 1976), we select the K isosytype as lectotype.

Diagnostic Characters—*Notobubon galbaniopse* is most easily distinguished from *N. galbanum* by the long pedunculate inflorescence which is often well-branched, the fewer-rayed primary compound umbel, usually with less than 28 (–48) rays and the heteromorphic fruit. The ultimate leaflet segments are often distinguishable from those of *N. galbanum* in being irregularly-toothed, so that the lamina between the teeth appears concave and the lamina is often prominently revolute along the margins. Hybrids with *N. ferulaceum* (Magee et al. unpublished data) are known from around Kirstenbosch [*Pillans* 20064 (K)].

Distribution and Habitat—*Notobubon galbaniopse* has a narrow distribution range from the Cape Peninsula to Paarl in the Western Cape Province (Fig. 12). It occurs in fynbos, often on moist protected slopes or kloofs.

Additional Specimens Examined—SOUTH AFRICA. **Western Cape Province:** Cape Town district: Kirstenbosch, *Compton s.n.* (BOL), *Compton* 20060 (BM), *Pillans* 4321 (K), *Salter* 9547 (BM 1 and 2); Kirstenbosch Ridge, *Compton* 20060 (BOL), *Pillans* 20061 (BOL 1 and 2); Kirstenbosch Silver Trees, *Compton* 10321 (PRE); between Kirstenbosch and Cecilia, *Bolus* 17067 (BOL); between Constantia and Kirstenbosch, *Norman* 276 (BM); Tygerberg Nature Reserve, *Laubscher* 3432 (NBG); Banhoek, *Compton* 10382 (NBG); Jonkershoek, *Adamson* 3864 (BOL), *Kerfoot* 5696 (NBG), *Taylor* 3325 (NBG); Jakkalsvlei, Jonkershoek, *Taylor* 4595, 5668 (PRE). Worcester district: Du Toits Kloof, *Drège s.n.* (BM, K), *Tyron* PP5 (NBG); 12 km from

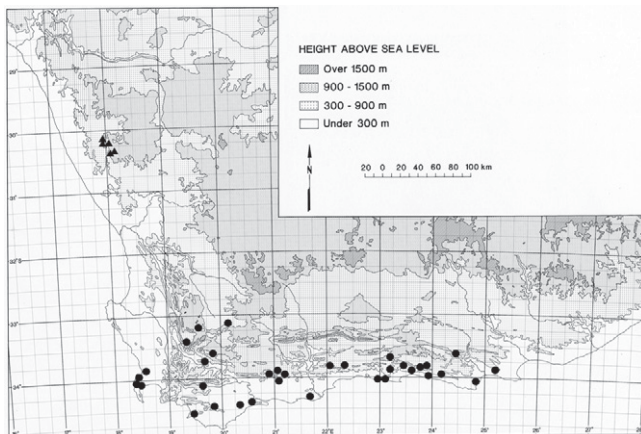


FIG. 11. The known geographical distributions of *Notobubon ferulaceum* (circles) and *N. pearsonii* (triangles).

Paarl to Worcester on old Du Toits Kloof Pass, *Magee and Boatwright* 17 (JRAU), *Magee et al.* 55 (JRAU); Franschhoek, *Anon. s.n.* (PRE); Franschhoek Pass, *Compton* 12963 (NBG), *Leighton* 183 (BOL); Wemmershoek Valley, *Esterhuysen s.n.* (BOL). Simonstown district: Constantia Nek, *Wolley Dod* 2367 (BOL); Karbonkelberg, *Esterhuysen* 20200 (BOL); slopes above Noordhoek, *Mitchell s.n.* (BOL); Orangekloof, Table Mountain, *Bolus* 15719 (BOL), *Marloth* 8322 (PRE); Tokai, *Arbutnot s.n.* (BOL); Somerset West, *Salter* 4237 (BOL); Uitkyk, Stellenbosch, *Gillett* 548 (BOL, NBG); Buffelsrivier Damsite, foothills of Kogelberg above Pringle Bay, *Taylor* 7647 (PRE); Harold Porter Botanical Garden, Disa Kloof, *Magee et al.* 49 (JRAU). Precise locality unknown: *Ecklon and Zeyher* 2249 (SAM).

7. *NOTOBUBON PUNGENS* (Sond.) Magee in Winter et al. in *Taxon* 57(2): 356. 2008. — *Seseli striatum* auct. non Thunb. Ecklon and Zeyh., *Enum. Pl. Afric. Austral.* 347. 1837. *Peucedanum pungens* E.Mey. ex Sond. in Harv. and Sond., *Fl. Cap.* 2. 557. 1862; B.L. Burtt in *Edinb. J. Bot.* 48(2): 235. 1991; Goldblatt and Manning, *Cape Pl.* 279. 2000.—TYPE: SOUTH AFRICA. Caledon district: near Genadenthal, *Drège s.n.* (lectotype: S!, photo K!, designated by Burtt, 1991; isolectotypes: K!, BM!, P!).

Slender shrub, 1.6–2.0 m tall. *Stem* sparsely branched near ground level, branches glabrous. *Leaves* regularly arranged or often congested along the upper parts of the branches, 90–230 mm × 30–120 mm; blade narrowly ovate, 2-pinnate. *Ultimate leaflet segments* reduced to rigid, spine-tipped pinnules, linear, terete, 4–40 mm long; margins entire; glaucous. *Petioles* up to 40 mm long, sheathing along almost their entire length. *Inflorescence* long (more than two times longer than the diameter of the primary umbel), with large prominent sheathing leaf bases, with 0–6 (8) lateral umbels. *Primary umbel* with (10) 18–26 rays, slightly orbicular, congested; bracts lanceolate, apex acuminate, glabrous; rays 25–37 mm long, subequal, glabrous; bracteoles lanceolate, apex acuminate, glabrous, usually equal to or longer than raylets; raylets glabrous. *Flowers* with sepals small, 0.3–0.4 mm long, apex truncate to obtuse, glabrous; petals glabrous. *Fruit* broadly elliptic, 5.5–6.0 mm × 4.0–5.0 mm; mericarps homomorphic; median and lateral ribs obsolete to slightly prominent; marginal ribs narrowly-winged; commissural vittae broad; vallecular vittae broad; additional vittae under vascular bundles in ribs, smaller than vallecular vittae.

Diagnostic Characters—*Notobubon pungens* is a very distinctive species. The leaflets are reduced to rigid spine-tipped pinnules and the peduncle is long with large prominent sheathing leaf bases and a congested, few-rayed primary umbel.

Distribution and Habitat—A few isolated populations of this recently rediscovered species are known from around Bot River and Caledon (Fig. 12). *N. pungens* occurs in renosterveld vegetation on southern slopes in well-drained shale-derived clay or loam soil. The conservation status of this species is currently under investigation by Helme and Raimondo (unpublished manuscript)

Additional Specimens Examined—SOUTH AFRICA. **Western Cape Province:** Caledon district: 12 km N of Botrivier, on farm Welgemoed, *Helme* 1942 (NBG); 13 km NW of Caledon, ridge E of Florishoogte Pass and Vleytjies Farm 746, *Helme* 2149 (NBG); 3 km S of Helderstroom prison on Brakfontein 123, *Helme* 2264 (NBG), *Magee et al.* 50 (JRAU); Delpport Hope 484, *Helme* 2296 (NBG); 22 km E of Caledon, 1 km S of Jongensklip, *Helme* 2245 (NBG). Bredasdorp district: Potrivier near Langhoogde, *Ecklon and Zeyher* 2226 (K, NBG, S, SAM).

8. *NOTOBUBON SONDERI* (M.Hiroe) Magee in Winter et al. in *Taxon* 57(2): 356. 2008. *Bubon montanum* Sond. in Harv. and Sond., *Fl. Cap.* 2. 560–561. 1862. *Peucedanum montanum* (Sond.) Drude in *Engl. and Prantl, Pflanzenfam.*

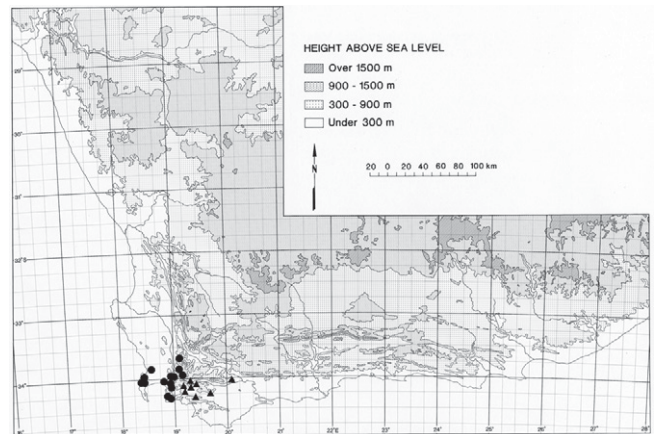


FIG. 12. The known geographical distributions of *Notobubon galbani-ops* (circles) and *N. pungens* (triangles).

3(8): 237. 1898, nom. Illegit. non *P. montanum* Koch (1824). *Seseli sonderi* M. Hiroe, *Umbell. World*, 1128. 1979. *Peucedanum sonderi* (M. Hiroe) B.L. Burtt in *Edinb. J. Bot.* 45: 200. 1989; B.L. Burtt in *Edinb. J. Bot.* 48(2): 235–237. 1991.—TYPE: SOUTH AFRICA. Worcester district: Dutoitskloof, *Drège s.n.* (lectotype: S!, designated by Burtt (1989); isolectotypes: E, G, K!, BM!, PRE!, P!).

Bubon tenuifolium E. Mey. in *Drège, Zwei Pflanzengeog. Doc.* 79. 1843, nom. nud.

Slender shrub, 0.5–1.0 m tall. *Stem* branched at ground level, branches becoming decumbent, glabrous. *Leaves* often congested near the base of the peduncle, (90) 110–250 (390) mm × 40–150 mm; blade ovate, 3-pinnate. *Ultimate leaflet segments* ovate, 10–30 mm × 6–15 mm, pinnatisect; base attenuate; venation pinnate; discolorous, adaxial surface green to dark green, abaxial surface silvery and glaucous; lobes narrowly oblong, flat, 3–10 mm × 0.8–1 mm, margins entire; terminal lobes equal to or 2 times longer than adjacent lateral lobes. *Petioles* up to 100 (180) mm long, sheathing at the base only. *Inflorescence* long (more than two times longer than the diameter of the primary umbel), with 0–4 smaller lateral umbels. *Primary umbel* with 12–20 rays, orbicular; bracts linear to lanceolate, apex acuminate, glabrous; rays 46–64 mm long, subequal, glabrous; bracteoles linear to lanceolate, apex acuminate, glabrous, shorter than raylets; raylets glabrous. *Flowers* with sepals minute, 0.1–0.3 mm long, glabrous; petals glabrous. *Fruit* elliptic, 5.0–6.5 mm × 3.0–3.5 mm; mericarps homomorphic; median and lateral ribs slightly prominent; marginal ribs narrowly-winged; commissural vittae broad; vallecular vittae broad; additional vittae under vascular bundles in ribs, smaller than vallecular vittae.

Diagnostic Characters—*Notobubon sonderi* is distinguishable from *N. gummiferum* by the long-pedunculate inflorescence which is often branched, the fewer-rayed primary compound umbel (12–20 rays), the more finely dissected leaflets as well as the smaller stature of this species with the stems becoming decumbent (see notes under *N. gummiferum*). Together with the previously mentioned characters it can be distinguished from *N. tenuifolium* by the discolorous leaves (adaxial surface green to dark green, abaxial surface silvery and glaucous) and the larger elliptic fruit (5.0–6.5 mm long). It differs from *N. ferulaceum* in the much larger leaves (usually more than 110 mm long) that are congested or irregularly arranged up the decumbent stem, the ultimate leaflet

segments that are always flat and laminate, and the broad commissural vittae in the fruit.

Distribution and Habitat—A montane species found at high altitudes, from the Cedarberg Mountains in the Western Cape Province to the Groot Winterhoek Mountains in the Eastern Cape Province (Fig. 13). *Notobubon sonderi* occurs in moist soil on scree or steep rocky, east, south or west facing slopes, invariably at altitudes above 900 m.

Additional Specimens Examined—SOUTH AFRICA. **Western Cape Province:** Clanwilliam district: Piquetberg, *Zinn s.n.* (NBG). Wuppertal district: Wolfberg, *Esterhuysen 20580* (BOL). Cape Town district: Table Mountain, *Esterhuysen 3009* (NBG); Ascension Ravine, Table Mountain, *Esterhuysen 27740* (BOL, PRE), *Esterhuysen 28220* (BOL, NBG, PRE 1 and 2); Langrivier, Jonkershoek, *Kerfoot K5548* (PRE). Worcester district: Great Winterhoek Mountains, *Andrae 913* (PRE), *Esterhuysen 26988* (BOL), *Galpin 12583* (K, PRE), *Galpin s.n.* (BOL); Mostert's Hoek, Twins, *Esterhuysen 18492* (BOL 1 and 2), *Esterhuysen 24311* (BOL, K), *Esterhuysen 24273* (BOL 1, 2 and 3, K 1 and 2); Roodeberg, *Compton 8462* (BOL, NBG), *Esterhuysen 27680* (BOL); Valsgatklouf, *Esterhuysen 1550* (BOL, PRE); Bailey's Peak, Baines Kloof at head of Sebastian's Kloof, *Esterhuysen 22768a* (BOL, K); Fonteintjiesberg, *Esterhuysen 16692, 20020* (BOL); Haalhoek, Sneekop, *Esterhuysen 7711* (BOL, PRE), *Esterhuysen 15162, 19929* (BOL); Riviersonderend Moun-tains, Jonaskop, above Meulrivier, *Oliver 8451* (JRAU, NBG). Montagu district: Summit of Craggy Peak on mountains near Swellendam, *Burchell 7370, 7420* (K). Ladismith district: Toverkop, *Esterhuysen 18530, 28243* (BOL); Seweweekspoort Peak, *Van Wyk 3325* (JRAU). Oudtshoorn district: Swartberg Pass, *Bond 10442* (NBG), *Esterhuysen 4547* (BOL); Kammanassie Mountains, *Bond 10554* (NBG), *Matthews 1024* (NBG); Kammanassie Mountains, Buffelsberg, *Viviers and Vlok 31* (PRE); Kammanassie Mountains, Mannetjiesberg, *Esterhuysen 4730, 18376* (BOL). Simonstown district: kloof on SW slopes of Guardian Peak, *Esterhuysen 24103* (BOL, K); Langklippie kloof, S side of Valleiberg, *Esterhuysen 28990* (BOL, PRE); Jonkershoek Forest Reserve, SE slope of Triplets, *Kruger KR1007* (NBG, PRE); path from Landdroskloof Nek to Sneekop, *McDonald 624* (NBG, PRE); Lourensford, *Esterhuysen 7839* (K); Somerset West, Triplets, *Esterhuysen 15247* (BOL). Caledon district: Jonkershoek State Forest, Dwarsberg, *Kerfoot 6258, 6628* (PRE), *Kerfoot K6218* (NBG), Victoria Peak, *Esterhuysen 33754* (BOL, PRE), *Taylor 10290* (K, NBG, PRE); Banhoek Peak, *Rourke 748* (NBG); Bosjesveld Mountains, *Stokoe s.n.* (NBG); Skilpadkop, *Esterhuysen 5060, 21056* (BOL); Riviersonderend Peak, *Esterhuysen 18762* (BOL); Pilaarkop, *Oliver 11060* (NBG). **Eastern Cape Province:** Willowmore district: Cradock Peak, Montagu Pass, *Zinn s.n.* (NBG). Steytlerville district: Cockscomb, *Archibald 3460* (BOL), *Esterhuysen 27506* (BOL, PRE), *Esterhuysen 27125* (BOL 1, 2 and 3, PRE).

9. *NOTOBUBON GUMMIFERUM* (L.) Magee in Winter et al. in Taxon 57(2): 356. 2008. *Bubon gummiferum* L., Sp. Pl. 254. 1753; Aiton., Hort. Kew. 1. 352. 1789; W. T. Aiton., Hort. Kew. 2. 147. 1811; DC., Prodr. IV. 185. 1825; Ecklon and Zeyh., Enum. Pl. Afric. Austral. 353. 1837; D. Dietr., Syn. Pl. 2.

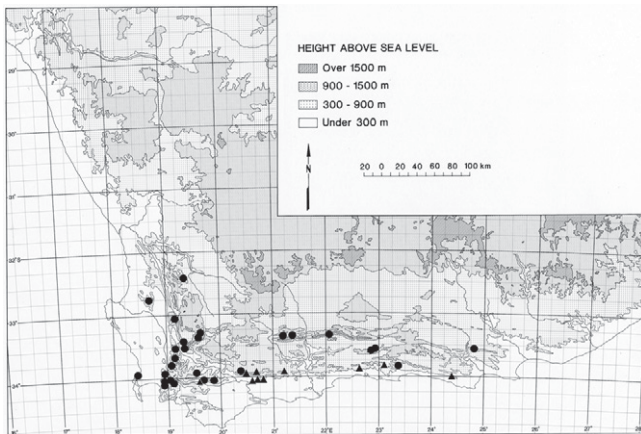


FIG. 13. The known geographical distributions of *Notobubon sonderi* (circles) and *N. gummiferum* (triangles).

969. 1840. *Selinum gummiferum* (L.) Spreng. in Roem. and Schult., Syst. Veg. 6. 564. 1820. *Glia gummifera* (L.) Sond. in Harv. and Sond., Fl. Cap. 2. 548. 1862, quoad basion. tantum. *Annesorhiza gummifera* (L.) Kuntze, Revis. Gen. Pl. 3. 111. 1898; Hiroe, Umbell. World. 675. 1979. *Peucedanum gummiferum* (L.) D.O.Wijnands, Bot. Commelins 200, pl. 23. 1983; B.L. Burt in Edinb. J. Bot. 48(2): 231–232. 1991.—TYPE: SOUTH AFRICA. Commelin, Hort. Med. Amst. 2. 115, t. 58. 1701, (lectotype, designated by Wijnands, 1983). See note 1.

Pimpinella capensis Thunb., Prodr. Fl. Cap. 51. 1794. *Sison capensis* (Thunb.) Spreng., Sp. Umbell. 111. 1818, and in Roem. and Schultes, Syst. Veg. 6: 411. 1820.—TYPE: SOUTH AFRICA. Cape, *Thunberg s.n. sub THUNB-UPS 7270* (lectotype: UPS!, designated by Magee et al. (2008a); isolectotype: W.).

Oreoselinum uliginosum Eckl. & Zeyh. var. *glaucum* Eckl. & Zeyh., Enum. Pl. Afric. Austral. 350. 1837. *Oreoselinum glaucum* (Eckl. & Zeyh.) K.Presl, Bot. Bemerk. 75. 1845.—TYPE: SOUTH AFRICA. Montagu district: Duyvels and Voormannsbosch near Swellendam, *Ecklon and Zeyher 2238* (lectotype: SI, designated by Magee et al. (2008a); isolectotype: SAM!).

Bubon hypoleucum Meisn. in J. D. Hook., Lond. J. Bot. 2. 536. 1843; Sond. in Harv. and Sond., Fl. Cap. 2. 560. 1862. *Peucedanum tenuifolium* var. *hypoleucum* (Meisn.) Kuntze, Revis. Gen. Pl. 3(2): 115. 1898. *Peucedanum hypoleucum* (Meisn.) Drude in Engl. and Prantl, Nat. Pflanzenfam. 3(8): 237. 1898; B.L. Burt in Edinb. J. Bot. 48(2): 232. 1991.—TYPE: SOUTH AFRICA. Caledon district: near Genadenthal, *Krauss 1183*. See note 2.

Slender to robust shrub or small tree, 1.5–5.0 m tall. *Stem* solitary, sparsely branched above ground level, branches becoming very thick and cane-like, glabrous. *Leaves* regularly arranged along the upper parts of the branches, (130) 200–420 mm × (70) 170–340 mm; blade broadly ovate, 3- to 4-pinnate. *Ultimate leaflet segments* narrowly ovate, 25–40 mm × 12–20 mm, decreasingly pinnatisect; base attenuate; venation pinnate; discolorous, adaxial surface dark green, abaxial surface silvery and glaucous; lobes narrowly oblong to oblong, flat, 5–20 mm × 2–3 mm, margins entire; terminal lobes 2–3 times longer than adjacent lateral lobes. *Petioles* up to 150 mm long, sheathing at the base only. *Inflorescence* short (less than 1.5 times as long as the diameter of the primary umbel), with 2–4 lateral umbels. *Primary umbel* with (18) 25–41 rays, orbicular; bracts linear to lanceolate, apex acuminate, glabrous; rays (53) 60–80 mm long, subequal, glabrous; bracteoles linear to lanceolate, apex acuminate, glabrous, usually shorter than raylets; raylets glabrous. *Flowers* with sepals minute, 0.1–0.2 mm long, apex obtuse, to acute, glabrous; petals glabrous. *Fruit* elliptic, 5.5–8.5 mm × 3.0–4.0 mm; mericarps homomorphic; median and lateral ribs slightly prominent; marginal ribs narrowly-winged, thick; commissural vittae broad; vallecular vittae broad; additional vittae under vascular bundles in ribs, similar in size to vallecular vittae.

Notes—1. The type of this taxon, previously considered a species dubia, was found to be identical to the species previously known as *Peucedanum hypoleucum*, the correct name for which should therefore be *P. gummiferum* (Magee et al. 2008a).

2. As mentioned by Magee et al. (2008a), the type specimen has yet to be located. However, the description and locality leave no doubt about the identity of this name.

Diagnostic Characters—*Notobubon gummiferum* differs most obviously from *N. sonderi* in that it is a large shrub or small tree reaching a height of up to 5 m (*N. sonderi* is a small decumbent shrub of less than 1 m in height). Furthermore it has a shortly pedunculate inflorescence, very large and multiradiate primary umbel (usually 25–41 rays) and often broader ultimate leaflet segment lobes. It differs from *N. tenuifolium* in the larger, elliptic fruit (5.5–8.5 mm long), discolorous leaves (adaxial surface dark green, abaxial surface silvery and glaucous) with the lobes of the ultimate leaflet segments broader and more congested.

Distribution and Habitat—*Notobubon gummiferum* occurs from Swellendam in the Western Cape Province to Kareedouw in the Eastern Cape Province (Fig. 13) where it grows in stream beds along forest margins.

Additional Specimens Examined—SOUTH AFRICA. **Western Cape Province:** Montagu district: Duyvels and Voormansbosch, Magee et al. 61 (JRAU); below 10 O'clock Mountain, Compton 453 (NBG); Tradouws Pass, Barnard s.n. (NBG); Bowie s.n. (BM), Killick 3463 (K, PRE), Magee et al. 62 (JRAU). Ladismith district: Garcia's Pass, Bohnen 7762 (NBG, PRE), Phillips 358 (NBG). Oudtshoorn district: 400 m N of Collinshoek Village, Baard 353 (PRE). Caledon district: Riviersonderend Mountains near Greyton, Esterhuysen 21092 (BOL), Esterhuysen 25085, 25339a (K); road between Schoemans Falls and Suurbraak, Burchell 7257 (K 1 and 2); Suurbraak Mountain, Galpin 4097 (PRE); Grootvadersbosch, Esterhuysen 18284 (BOL, PRE). **Eastern Cape Province:** Willowmore district: Prince Alfred's Pass, Fourcade 2475 (K, PRE). Humansdorp district: Kareedouwberg, Thode A850 (K, PRE). Precise locality unknown: Swellendam District, Kuntze s.n. (K); Anon. s.n. (BM); Drège s.n. (BM, K 1 and 2, SAM).

10. *NOTOBUBON TENUIFOLIUM* (Thunb.) Magee in Winter et al. in Taxon 57(2): 356. 2008. *Peucedanum tenuifolium* Thunb., Prodr. Fl. Cap. 50. 1794; Spreng. in Roem. and Schultes, Syst. Veg. 6. 570. 1820; Thunb., Fl. Cap. 257. 1823; DC., Prodr. IV. 178. 1825; Ecklon and Zeyh., Enum. Pl. Afric. Austral. 349. 1837; D. Dietr., Syn. Pl. 2. 965. 1840; Adamson and Salter, Fl. Cape Penins. 625. 1950; B.L. Burtt in Edinb. J. Bot. 48(2): 238–239. 1991; Goldblatt and Manning, Cape Pl. 279. 2000. *Bubon tenuifolium* (Thunb.) Sond. in Harv. and Sond., Fl. Cap. 2. 560. 1862.—TYPE: SOUTH AFRICA. Worcester district: Mostert's Hoek, Cape of Good Hope, Thunberg s.n. sub THUNB-UPS 6926 (lectotype: UPS!, here designated). See note 1.

Oreoselinum uliginosum Eckl. & Zeyh., Enum. Pl. Afric. Austral. 350. 1837. *Peucedanum uliginosum* (Eckl. & Zeyh.) D. Dietr., Syn. Pl. 2. 967–968. 1840; Walp., Repert. Bot. Syst. 2. 410. 1843.—TYPE: SOUTH AFRICA. Humansdorp district: Kromme Rivier, Ecklon and Zeyher 2238 (lectotype: S!, sheet A, photo in K!, here designated; isolectotypes: S! sheets B and C, photos in K!, SAM!). See note 2.

Slender shrub, 1.2–3.0 m tall. *Stem* solitary, sparsely branched above ground level, branches glabrous. *Leaves* regularly arranged along the upper parts of the branches, 80–300 mm × 60–140 mm; blade narrowly ovate to ovate, 3-pinnate. *Ultimate leaflet segments* very narrowly ovate, (12) 20–38 (55) mm × (4) 6–15 (19) mm, decreasingly pinnatisect; base attenuate; venation pinnate; concolorous, usually bright green, less often slightly glaucous; lobes narrowly oblong, flat, 4–30 mm × 1–2 mm, margins entire; terminal lobes 2–3 times longer than adjacent lateral lobes. *Petioles* up to 45 (55) mm long, sheathing at the base only. *Inflorescence* short (less than 1.5 times as long as the diameter of the primary umbel), rarely with 2 smaller lateral umbels. *Primary umbel* with (22) 48–64 (84)

rays, orbicular; bracts linear to lanceolate, apex acuminate, glabrous; rays (41) 57–82 (94) mm long, subequal, glabrous; bracteoles linear to lanceolate, apex acuminate, glabrous, usually shorter than raylets; raylets glabrous. *Flowers* with sepals minute, 0.1–0.2 mm long, apex obtuse to acute, glabrous; petals glabrous. *Fruit* rotund to rarely elliptic, 3.0–4.5 (5.0) mm × 2.5–3.0 mm; mericarps homomorphic; median and lateral ribs slightly prominent to prominent; marginal ribs narrowly-winged; commissural vittae broad; vallecular vittae broad; additional vittae under vascular bundles in ribs, smaller than vallecular vittae.

Notes—1. This is the only specimen in Thunberg's herbarium, it is annotated on the reverse by him and so is here designated.

2. There are three sheets of this collection in S and another in SAM. As the specimen in S is the most complete collection with mature fruit it is designated here.

Diagnostic Characters—Both this species and *N. gummiferum* are large shrubs or even small trees bearing shortly pedunculate, large and multiradiate primary umbels, and as such are easily distinguished from *N. sonderi* (see notes under the latter). It differs from *N. sonderi* and *N. gummiferum* in that the leaves are concolorous and the fruit smaller and more rotund, 3.0–4.5 (–5.0) mm long. It is often confused with *N. ferulaceum* but is easily distinguished by the shortly pedunculate, large and multiradiate primary umbel, the smaller, narrowly-winged fruit (broadly-winged in *N. ferulaceum*) and the ultimate leaflet segments with the terminal lobes 2–3 times longer than the adjacent lateral lobes. *Notobubon tenuifolium* differs from *N. capense* in having prominently pinnatisect ultimate leaflet segments with flat laminate lobes.

Distribution and Habitat—*Notobubon tenuifolium* is widely distributed from Van Stadens in the Eastern Cape Province to Worcester and the Cedarberg Mountains in the Western Cape Province (Fig. 14). It grows in fynbos, renosterveld or semikarroid vegetation in sand or loam, on rocky slopes or along streams.

Ethnobotany—*Notobubon tenuifolium* is reported to be used medicinally (Watt and Breyer-Brandwijk 1962) but no recorded anecdotes were found in the literature. The only known ethnobotanical information found about this species was recorded by Hanekom, on the label of a herbarium specimen (Hanekom 2068, PRE). He mentions that in the Cedarberg region, the leaves of *N. tenuifolium* (*selderybos*) are bruised, heated and eaten as a porridge against stomachic fever.

Additional Specimens Examined—SOUTH AFRICA. **Western Cape Province:** Clanwilliam district: Pakhuis Pass between Klein Kliphuis and Leipoldt's Grave, Taylor 10740 (JRAU); Pakhuis Pass, rocks near Leipoldt's Grave, Van Wyk et al. 3515 (JRAU); Cedarberg Mountains, Norman 334 (BM). Wuppertal district: Boskloof trail below Faith, Hope and Charity, Magee and Boatwright 32 (JRAU), Magee et al. 44 (JRAU); Pakhuis Peak, Esterhuysen 3414 (PRE); Pakhuis, Esterhuysen 26869 (K, PRE), Rogers 16829 (BOL), Stirton 10195 (NBG); Algeria Forest Station, Stokoe 58668 (SAM); Cedarberg, Middelberg, Compton 12692 (NBG), Stokoe 58667 (SAM); Cedarberg, Uitkykrivier, Viviers 780 (PRE); Suurvleiberg in kloof above Algeria, Esterhuysen 2529 (BOL, PRE); Wolfberg, Esterhuysen 22436 (BOL); Hexberg, Old Elands Kloof, Magnum 871 (NBG); Baliesgat-se Berg, Hanekom 2068 (K, PRE). Montagu district: Donken Kloof, Adamson 6464 (BOL 1 and 2); Donken Kloof, on Blouput hiking trail, Magee and Van Wyk 60 (JRAU); Kogmans Kloof, Acocks 20342 (PRE); E end of Anysberg, Van Wyk 1045 (PRE); Touwsberg, farm Wolwefontein, Van Wyk et al. 3430 (JRAU 1 and 2, PRE); Langeberge, Witbooisrivier, Burgers 47 (K, PRE). Ladismith district: below Toverkop, Esterhuysen 18536 (BOL); Seweweekspoort, Bohnen 8895 (NBG, PRE), Compton 3929 (BOL), Compton 8617, 10650 (NBG), Gentry and Barclay 19106 (PRE), Magee et al. 52 (JRAU), Muir 4589 (BOL, K, PRE), Phillips 1445 (SAM), Pole-Evans 19115 (PRE), Van Wyk 3320 (JRAU), Winter and Viljoen 232 (JRAU); Gamkaskloof, Geldenhuys

447 (PRE); Rooiberg, *Marshall 198* (JRAU); Garcia's Pass, *Thorne s.n.* (SAM); Rooiberg, *Bosrivier kloof, Thompson 3568* (NBG, PRE); stream near Ladismith, *Adamson 3676* (PRE 1 and 2). Oudtshoorn district: Bassonsrus, Upper Congo Valley, *Moffett 580* (NBG); Oudtshoorn, *Lubke 3543* (GRA); Swartberg Pass, *Esterhuysen 4518* (BOL), *Gillett 1980* (BOL), *Hafstrom and Acocks 1036* (PRE), *Hutchinson 1162* (BM, BOL, K, PRE), *Jackson 15* (BOL), *Stokoe 53663* (SAM); De Rust, *Van Tonder 86* (PRE); Meiringspoort, *Bayliss 282* (K, PRE), *Leipold s.n.* (BOL); Camfer Kloof, *Van Wijk 504* (PRE); Kammanassie Mountains, Kleinberg Nature Reserve, *Matthews 1175* (PRE); Kammanassie, *Zeeman 41* (PRE). Caledon district: Happy Valley near Greyton, *Esterhuysen 21092* (BOL). **Eastern Cape Province:** Willowmore district: Aasvogelberg, *Marloth 14147* (PRE); Avontuur Poort, *Fourcade 3575* (BOL), *Fourcade 4519* (K), *Fourcade 5854* (BOL); Uniondale Poort, *Acocks 19978* (PRE); Bo-Kouga *Bayliss 998* (PRE); Boskloof, just N of Sipon se Kop, *Van Jaarsveld 7841* (NBG); Kouga peak, near Joubertina, *Esterhuysen 16244* (BOL 1 and 2). Steytlerville district: Doringkloof, *Baviaanskloof, Geldenhuys 1022* (PRE); Cockscomb, *Archibald 3479* (BOL), *Esterhuysen 28045* (BOL 1, 2 and 3, PRE). Port Elizabeth district: Slopes of the Witteklip Mountains, near Van Stadens, *Armer, sub Comins, s.n.* (PRE). Precise locality unknown: Tweefontein, *Schlechter 1877* (K, PRE 1 and 2); *Drège s.n.* (BM, K).

11. *NOTOBUBON GALBANUM* (L.) Magee in Winter et al. in *Taxon* 57(2): 356. 2008. *Bubon galbanum* L., Sp. Pl. 253. 1753; Aiton, Hort. Kew. 1. 352. 1789; Thunb., Prodr. Fl. Cap. 51. 1794; W. T. Aiton, Hort. Kew. 2. 146. 1811; Thunb., Fl. Cap. 258. 1823; DC., Prodr. IV. 185. 1825; Ecklon and Zeyh., Enum. Pl. Afric. Austral. 352–353. 1837; D. Dietr., Syn. Pl. 2. 969. 1840; Meisn. in J. D. Hook., Lond. J. Bot. 2. 536. 1843; Sond. in Harv. and Sond., Fl. Cap. 2. 560. 1862. *Bubon galbaniferum* Hill, Syst. Veg. 6. 21, t. 19 Fig. 1. 1764. *Agasyllis galbanum* (L.) Spreng., Ges. Naturf. Fr. Berlin, Mag. 6. 259. 1813. *Selinum galbanum* (L.) Spreng. in Roem. and Schultes, Syst. Veg. 6. 563–564. 1820. *Galbanon officinale* Raf., Good Book 58. 1840, reimp. Scad. Gen. Omb. Pl. 58 (Amer. Midl. Nat. Repr. 3. 1913). *Peucedanum galbanum* (L.) Drude in Engl. and Prantl, Nat. Pflanzenfam. 3(8): 237. 1898; Kuntze, Revis. Gen. Pl. 3(2): 115. 1898; Adamson and Salter, Fl. Cape Penins. 624–625. 1950; Hiroe, Umbell. World. 1569–1570. 1979; Goldblatt and Manning, Cape Pl. 278. 2000.—TYPE: Herb. Clifford: 96, Bubon 3, BM000558280, sheet A (lectotype: BM!, designated by Van Wyk and Tilney in Jarvis et al. 2006).

Bubon galbanum L. var. *tulbaghicum* Eckl. & Zeyh., Enum. Pl. Afric. Austral. 352. 1837.—TYPE: SOUTH AFRICA. Worcester district: Tulbagh, near Winterhoek Waterfall, *Ecklon and Zeyher s.n.* (lectotype: S!, here designated, isolectotype: SAM!). See note 1.

Peucedanum galbanum L. var. *dentatum* Kuntze, Revis. Gen. Pl. 3(2): 115. 1898.—TYPE: SOUTH AFRICA. Simonstown district: Muizenberg, *O. Kuntze s.n. sub. NY 743329* (lectotype: NY!, here designated). See note 2.

Peucedanum galbanum L. var. *incisodentatum* Kuntze, Revis. Gen. Pl. 3(2): 115. 1898.—TYPE: SOUTH AFRICA. Cape Town district: Devil's Peak, *O. Kuntze s.n. sub. NY 743328* (lectotype: NY!, fruiting specimen, here designated; isolectotypes: K! 3 sheets). See note 3.

Slender to robust shrub, 1–2.5 m tall. *Stem* solitary, sparsely branched above ground level, branches glabrous. *Leaves* regularly arranged along the upper parts of the branches, 90–250 mm × 60–150 mm; blade broadly ovate, 2-pinnate. *Ultimate leaflet segments* rhomboid to obovate, (20) 40–65 (85) mm × (12) 20–50 (70) mm, 3-lobed to 3-partite, usually regularly toothed over upper half or two thirds; teeth prominent; margins irregularly serrate or less often lacerate; base cuneate to obtuse,

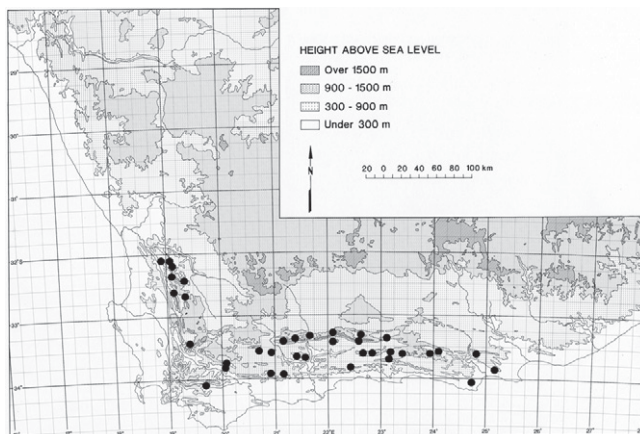


FIG. 14. The known geographical distribution of *Notobubon tenuifolium* (circles).

often asymmetrical; lamina not revolute along the margins; venation clearly reticulate; discolorous, adaxial surface green, occasionally covered with a fine bloom, abaxial surface glaucous. *Petioles* up to 25 (40) mm long, sheathing at the base only. *Inflorescence* short (less than 1.5 times as long as the diameter of the primary umbel), rarely with 2 smaller lateral umbels. *Primary umbel* with (30) 52–120 (180) rays, orbicular; bracts linear to lanceolate, apex acuminate, glabrous; rays (32) 39–76 (102) mm long, subequal, glabrous; bracteoles linear to lanceolate, apex acuminate, glabrous, usually shorter than raylets; raylets glabrous. *Flowers* with sepals small, 0.1–0.3 mm long, glabrous; petals glabrous. *Fruit* elliptic to rotund, 3.5–6.0 mm × 2.5–3.5 mm; mericarps homomorphic; median and lateral ribs obsolete or slightly prominent; marginal ribs narrowly-winged; commissural vittae broad; vallecular vittae broad; additional vittae under vascular bundles in ribs, smaller than vallecular vittae.

Notes—1. The specimen in S closely matches the prototype and is therefore designated as lectotype of *Bubon galbanum* var. *tulbaghicum*.

2. Kuntze described this variety from his collection near Muizenberg. As the specimen from NY formed part of Kuntze's own herbarium it is selected as lectotype.

3. The NY specimen is chosen here as it bears the original locality description and is from the author's herbarium.

Diagnostic Characters—This species is superficially similar to *N. galbaniopse*, from which it is readily distinguished by the shortly pedunculate inflorescence with at most two small secondary umbels, the very large and multiradiate primary umbel and the homomorphic fruit. It can often be distinguished from *N. galbaniopse* also by the regularly toothed leaflets and the lamina which is never revolute along the margins. Hybrids between this species and *N. ferulaceum* [*Marloth 7687* (PRE), *Winter 103* (JRAU)], around Camps Bay, as well as *N. capense* [*Esterhuysen 27652* (BOL), *McDonald 839* (NBG), *Magee et al. 48* (JRAU)], around Jonkershoek and Worcester, have been recorded (Magee et al. unpublished data).

Distribution and Habitat—*Notobubon galbanum* is a well-collected species, recorded from Elands Bay to the Cape Peninsula and east to Albertinia in the Western Cape Province (Fig. 15). It grows in fynbos vegetation on moist, rocky or stony, sandy or clay soils.

Ethnobotany—*Notobubon galbanum* (blisterbush, *bergseldery, wilde seldery, droëdas*) is a well-known Cape medicinal

plant whose ethnobotanical uses have been well documented (Dykman 1891; Kling 1923; Marloth 1925; Pappé 1857; Rood 1994; Van Wyk et al. 1997; Watt and Breyer-Brandwijk 1962). It has been recorded primarily as a remedy for rheumatism, gout, bladder ailments, water retention and high blood pressure.

Additional Specimens Examined—SOUTH AFRICA. **Western Cape Province:** Clanwilliam district: near Elands Bay, *Lavranos* 11650 (PRE); Muishoekberg, *Pillans* 8649 (BOL, K); Swartberg, Looprivier, *Hanekom* 3266 (NBG); Piquetberg, *Guthrie* 2616 (NBG). Wuppertal district: Suurvlieberg in kloof above Algeria, *Esterhuysen* 2498 (BOL); near Agtuurkop, *Hanekom* 1768 (K, PRE); Citrusdal, Theerivier, *Hanekom* 1138 (PRE), *Hanekom* 3090 (NBG, PRE). Cape Town district: hill between Mamre and Darling, *Esterhuysen* 18865 (BOL); Riebeeck Kasteel, *Barnard* s.n. (SAM), *Pillans* 6295 (BOL); Ascension Ravine, Table Mountain, *Esterhuysen* 3009 (BOL); Camps Bay, *Magee et al.* 47 (JRAU), *Marloth* 5934 (PRE), *Norman* 322 (BM); Devil's Peak, *Zeyher* s.n. (SAM); Kirstenbosh, *Salter* 9756 (BM); Lion's Head above Bantry Bay, *Winter* 101 (JRAU); W slopes of Lion's Head, *Garside* 1735 (K); Table Mountain, Newlands Ravine, *Mielke and Bourne* s.n. (BOL, K); Skeleton Gorge, Kirstenbosch, *Compton* 15595 (NBG), *Rodin* 3215 (K), *Rodin* 3216 (PRE); slopes of Table Mountain, *Anon.* s.n. (PRE), *Bolus* 2792 (BOL), *Bowie* s.n. (BM), *Flanagan* 2461 (PRE), *Mac Gillivray* 574 (K), *Mac Owan* 1880 (BM, K, SAM), *McKinnon* 97 (NBG), *Rodin* 3216 (BOL), *Stokoe* s.n. (SAM), *Worsdell* s.n. (K); Table Mountain, Contour Path, *Herdien and Mannie* 7 (NBG), *Winter* 104 (JRAU); Moytons Vlei, *Pillans* 7426 (BOL); Paarl, Berg River Hoek Forest Reserve, *Esterhuysen* 12402 (PRE); Bottelary Berg summit, *Boucher* 4121 (NBG, PRE); hills around Klapmuts, *Marloth* 1197 (PRE); Swartboschkloof, Jonkershoek, *McDonald* 839 (NBG). Worcester district: Groot Winterhoek Mountain, *Bands* s.n. (PRE); Roodesand Pass, *Adamson* 1005 (BOL), *Adamson* 1996 (BOL); Baines Kloof Pass, *Magee and Boatwright* 38 (JRAU); Du Toit's Kloof, *Esterhuysen* 12351, 19881 (BOL), *Maquire* 1109 (NBG); Du Toit's Kloof Pass, *Magee and Boatwright* 20 (JRAU), *Magee et al.* 56 (JRAU), *Van Wyk and Winter* 3489 (JRAU); Kromme River, *Fellingham* 1292 (NBG, PRE); Audensberg, *Esterhuysen* 3416 (BOL); Brandwagt in Fairy Glen Valley, *Van Breda* 343 (K, PRE), *Van Breda* 591 (PRE), *Marloth* 7505 (PRE); foot of Fonteintjesberg, *Esterhuysen* 16717 (BOL); Franschoek, Assegaibosch Kloof, *Stehle* 16 (PRE); Drosterberg, *Van Wyk* 1903 (PRE); Franschoek Pass, *Boucher* 2371 (NBG, PRE), *Potts* s.n. (BOL), *Phillips* 1157 (SAM), *Van Der Kooy* 3 (PRE); Groot Drakenstein Mountains, Devil's Tooth, *Esterhuysen* 9524 (BOL, PRE); Klein Drakenstein Mountains, Upper Kasteelkloof Catchment, *Kruger* 1593 (NBG); Wemmerhoek Mountains, *Esterhuysen* 17700 (BOL); Zachariashoek State Forest Kasteelkloof Catchment, *Van Wilgen* 143 (PRE), *Viviers* 680 (NBG, PRE); below Ben Heathie and above Toll Kloof, *Esterhuysen* 27652 (K). Simonstown district: Chapman's Peak drive, *Stirton* 9968 (NBG, PRE); Hout Bay, *Rodin* 3063 (K, PRE), *Viviers* 171 (NBG, PRE); Noordhoek Pass, *Van Wyk* 4099 (JRAU); Silvermine, *Werdermann and Oberdieck* 100 (PRE); Simonstown, *Schlechter* 406 (PRE); Muizenberg, *Wallich* 294 (BM, K); Gordon's Bay, *Gillet* s.n. (NBG); talus slope along path from Landroskloof nek to Sneeuukop, *McDonald* 624 (K). Caledon district: Near Caledon, *Fries, Norlich and Weimarck* 1465 (BM, PRE); Hermanus, *De Beer* 16532 (PRE); Vogelgat Nature Reserve, *Burman* 1206 (BOL); Vogelgat Kloof, *Williams* 2672 (NBG); Happy Valley near Greytown, *Esterhuysen* 21082 (BOL). Bredasdorp district: Potberg, in Boschkloof, *Burgers* 1123 (NBG), *Magee and Boatwright* 10 (JRAU), *Pillans* 9467 (BOL); near Malgas, *Bayliss* BRI. B. 921 (PRE). Riversdale district: Summit of hills behind Albertina, *Muir* 636 (PRE). Precise locality unknown: Cape Peninsula, *Wolley Dod* 2239 (BM); Cedarberg, *Thode* A2158 (K, PRE); *Talbot* s.n. (K); *Watt and Brandwyk* 243, 2493 (PRE).

12. NOTOBUBON CAPENSE (Eckl. & Zeyh.) Magee in Winter et al. in Taxon 57(2): 356. 2008. *Oreoselinum capense* Eckl. & Zeyh., Enum. Pl. Afric. Austral. 350. 1837. *Peucedanum capense* (Eckl. & Zeyh.) D.Dietr., Syn. Pl. 2. 967. 1840; Walp., Repert. Bot. Syst. 2. 411. 1843, nom. rejic. – non Sond. in Harv. and Sond., Fl. Cap. 2. 554–555. 1862, nom. conserv. *Bubon capense* (Eckl. & Zeyh.) Sond. in Harv. and Sond., Fl. Cap. 2. 561. 1862. *Peucedanum multiradiatum* Drude in Engl. and Prantl, Nat. Pflanzenfam. 3(8): 237. 1898; B.L. Burtt in Edinb. J. Bot. 48(2): 234. 1991, nom. illegit. *Peucedanum polyactinum* B.L. Burtt in Bothalia 27(1): 51. 1997; Goldblatt and Manning, Cape Pl. 279. 2000.—TYPE: SOUTH AFRICA. Cape Town district: Stellenbosch,

Klapmuts, *Ecklon and Zeyher* 2239 (lectotype: S!, here designated; isolectotype: SAM!). See note 1.

Bubon multiradiatum E.Mey. in Drège, Zwei Pflanzengeog. Doc. 169. 1843, nom. nud.

Peucedanum kamiesbergense B.L. Burtt in Edinb. J. Bot. 48(2): 272. 1991.—TYPE: SOUTH AFRICA. Kamiesberg district: Rooiberg, *Rourke* 1679 (holotype: isotypes: E; NBG!, PRE!).

Slender shrub, 0.5–1.5 m tall. *Stem* solitary, sparsely branched above or near ground level, branches glabrous. *Leaves* regularly arranged along the upper parts of the branches, 60–210 mm × 35–140 mm; blade narrowly ovate to ovate, (2) 3-pinnate. *Ultimate leaflet segments* ovate to obovate, 20–40 (–60) mm × 10–15 mm, weakly pinnatisect or usually 3-sect; base attenuate; venation not visible; concolorous, glaucous; lobes linear, subterete or sometimes flattened and ribbon-like near the apices (in the Northern Cape Province), 5–30 (165) mm × 0.8–1.0 (2.0) mm, margins entire; terminal lobes longer, subequal or shorter than adjacent lateral lobes. *Petioles* up to 35 (60) mm long, sheathing usually along almost their entire length or less often at the base only. *Inflorescence* usually short (less than 1.5 times as long as the diameter of the primary umbel), rarely with 2 lateral umbels. *Primary umbel* with (11) 42–104 rays, orbicular; bracts linear to lanceolate, apex acuminate, glabrous; rays (19) 57–80 mm long, subequal, glabrous; bracteoles linear to lanceolate, apex acuminate, glabrous, usually shorter than raylets; raylets glabrous. *Flowers* with sepals minute, 0.1–0.3 mm long, glabrous; petals glabrous. *Fruit* rotund to less often elliptic, 4.0–5.0 mm × 2.5–3.5 mm; mericarps homomorphic; median and lateral ribs obsolete or slightly prominent; marginal ribs narrowly winged; commissural vittae broad; vallecular vittae broad; additional vittae under vascular bundles in ribs, smaller than vallecular vittae.

Notes—1. Ecklon and Zeyher described *Oreoselinum capense* from a single collection of theirs from Klapmuts near Stellenbosch, namely *Ecklon & Zeyher* 2239. There are two specimens of this collection, one in S and the other in SAM. Both specimens bear the Enumeratio label and Ecklon's handwriting. However, as the specimen in S is the richer specimen clearly showing the large multiradiate umbel as described in the original protologue it is here selected as lectotype.

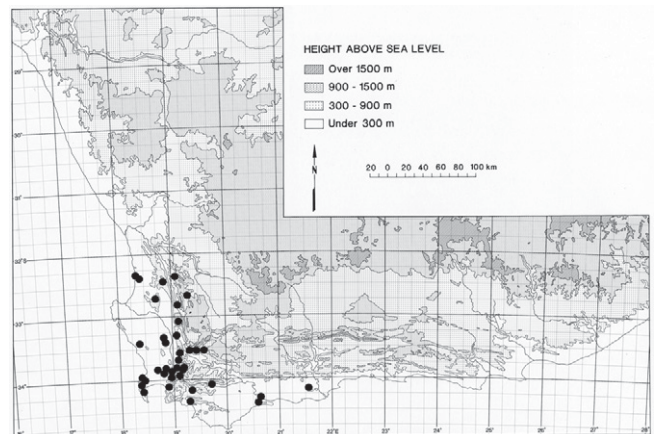


FIG. 15. The known geographical distribution of *Notobubon galbanum* (circles).

Diagnostic Characters—This species differs from *N. tenuifolium* in the weakly pinnatisect or 3-sect ultimate leaflet segments with subterete and needle-like lobes. It is easily distinguished from *N. ferulaceum* by the stout, shortly pedunculate inflorescence with at most two small secondary umbels, the very large and multiradiate primary umbel and the glaucous appearance of the entire plant. It differs furthermore from *N. ferulaceum* by having smaller, usually rotund fruit that are more narrowly-winged. The Kamiesberg form of *N. capense* is unusual in that the inflorescence may appear somewhat long-pedunculate, the primary umbel few-rayed and the ultimate leaflet segments longer and significantly thicker. This taxon was once considered a separate species (*Peucedanum kamiesbergense*). However, intermediate specimens collected in other localities in the Northern Cape Province suggest that it is merely an extreme northern form. It can however, as in the typical form, be distinguished from *N. ferulaceum* and *N. pearsonii* by the small, rotund fruit with narrow marginal wings and the combination of additional vittae below the vascular bundles in the ribs and broad commissural vittae.

Distribution and Habitat—*Notobubon capense* is recorded from Betty's Bay in the Western Cape Province to the Kamiesberg Mountains in the Northern Cape Province (Fig. 16). It grows in fynbos on rocky or stony, moist, sandy slopes or along streams. In the Kamiesberg it is restricted to granite fynbos vegetation at the base of granite boulders on the summit peaks.

Additional Specimens Examined—SOUTH AFRICA. **Northern Cape Province:** Hondeklipbaai district: Sneekop, *Rourke and Nelson* 1943 (NBG). Kamiesberg district: Kamiesberg, summit of Rooiberg, *Helme* 3089 (NBG); Stalberg summit, *Magee et al.* 43 (JRAU). **Western Cape Province:** Vanrhynsdorp district: Matsikkammaberg, *Van Jaarsveld and Bodenstein* 8272 (NBG). Calvinia district: Oorlogskloof Nature Reserve, *Pretorius* 77 (NBG); Lokenburg, *Acocks* 17372 (PRE). Cape Town district: Eersterivier, *Kerfoot* K5695 (PRE); Jakkalsvlei, *Taylor* 5180 (PRE); Jonkershoek, *Adamson* 1842, 8485 (BOL), *Esterhuysen* 15220 (BOL), *Werdermann et al.* 364 (K, PRE); Guardian Peak, *Adamson* 3650 (BOL); Jonkershoek Twins, *Adamson* 3656 (PRE), *Esterhuysen* 24311 (BOL); Lambrechtsbos, *Kerfoot* 5106 (PRE); Langrivier, *Jordaan s.n.* (NBG), *Kerfoot* K5260 (NBG, PRE); hills near Simondium, *Marloth* 10054 (NBG, PRE); Swartboskloof, *Van Rensburg* 2126 (K, PRE). Worcester district: Banhoek, *Compton* 10353 (BOL, NBG); Drakenstein Mountains, Devils Tooth, *Esterhuysen* 9523 (BOL); below Ben Heathie and above Toll Kloof, *Esterhuysen* 27651 (K, specimen in the centre of the sheet). Simonstown district: Helderberg Nature Reserve, *Runnalls* 642 (NBG); Landrostkop Ravine, *Esterhuysen* 2600 (BOL); Lourensford, *Esterhuysen* 7839 (BOL), *Pillans* 18614 (BOL); Betty's Bay, *Boucher* 2435 (PRE, NBG), *Compton* 21896 (NBG), *Ewes s.n.* (NBG 1 and 2); slopes of Groot Hangklip, *Boucher* 589 (NBG), *Compton* 6103 (NBG); Harold Porter

Botanical Garden, *Compton* 21896 (NBG), *Ebersohn* 69 (NBG), *Esterhuysen* 36992 (NBG), *Magee et al.* 37, 87 (JRAU), *Van Wyk* 3571b (JRAU); Nerine Kloof, *Andreae* 886 (NBG, PRE), *Jordaan s.n.* (NBG); Palmiet River Mouth, *de Vos* 813 (NBG), *Esterhuysen* 12599 (BOL), *Pillans* 8508 (BOL) *Stokoe* 9057 (BOL), *Stokoe* 58664, 68030 (SAM); ± 50 m from the Palmiet River, *Kruger* 1160 (NBG). Caledon district: Lambrechtsbos, *Kerfoot* 5106 (PRE); Kleinmond, *Mostert* 229 (NBG); Skilpad kop, *Esterhuysen* 5060 (K).

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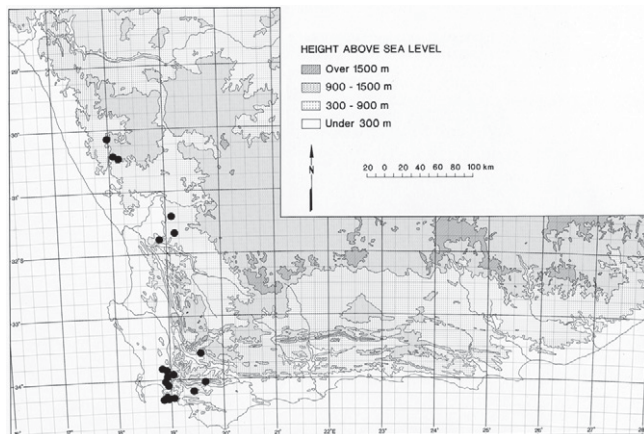


FIG. 16. The known geographical distribution of *Notobubon capense* (circles).

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APPENDIX 1. Voucher specimens of fruit material studied in transverse section.

Notobubon capense: mature fruit, Magee and Boatwright 37 (JRAU), Marloth 10054 (PRE), Rourke 1979 (NBG). *Notobubon ferulaceum*: mature fruit, Marloth 7314 (PRE), Winter 158 (JRAU). *Notobubon galbaniopse*: immature fruit, Compton 10321 (NBG); mature fruit, Pillans 20061 (PRE), Taylor 7647 (NBG). *Notobubon galbanum*: immature fruit, Van Wyk 3489 (JRAU); mature fruit, Thode 18947 (PRE); Winter 104 (JRAU). *Notobubon gummiferum*: mature fruit, Thode A850 (PRE). *Notobubon laevigatum*:

immature fruit, Paterson 22109 (PRE), Ross 2083 (PRE); mature fruit, Botha 3547 (PRE), Drège s.n. (PRE). *Notobubon montanum*: immature fruit, Zeyher 2689 (PRE); mature fruit, Anon. s.n. (K). *Notobubon pearsonii*: mature fruit, Esterhuysen 35464 (BOL). *Notobubon pungens*: mature fruit, Drège s.n. (S), Helme 1865 (JRAU). *Notobubon sonderi*: mature fruit, Taylor 10290 (PRE). *Notobubon striatum*: mature fruit, Muir 1964 (PRE). *Notobubon tenuifolium*: mature fruit, Armer 28891 (PRE), Esterhuysen 2689 (PRE).

APPENDIX 2. Voucher specimens of fruit material used to study the three-dimensional structure of the vittae.

Afroligusticum thodei: Hoener 2214 (PRE). *Afroscidium magalismontanum*: Verdoorn 136 (JRAU). *Cynorhiza typica*: Ecklon and Zeyher 2244 (SAM). *Lefebvrea grantii*: Dinter 7359 (BOL). *Nanobubon capillaceum*: Leighton 1563 (BOL). *Nanobubon strictum*: Adamson 2784 (BOL). *Notobubon capense*: Compton 21896 (NBG), Rourke 1679 (NBG). *Notobubon ferulaceum*: Winter 102 (JRAU), Winter 158 (JRAU). *Notobubon galbaniopse*: Pillans 20061 (BOL). *Notobubon galbanum*: Esterhuysen 19881 (BOL), Winter 104 (JRAU). *Notobubon gummiferum*: Thode A850 (PRE). *Notobubon laevigatum*: Bolus 582 (BOL), Bond 254 (NBG). *Notobubon pearsonii*: Esterhuysen 35464 (BOL). *Notobubon pungens*: Helme 1865 (JRAU). *Notobubon sonderi*: Taylor 10290 (NBG). *Notobubon striatum*: Muir 1964 (PRE). *Notobubon tenuifolium*: Esterhuysen 2243b (BOL).

APPENDIX 3. Morphological and anatomical characters and character states used in the cladistic analysis.

1. Life history: (0) monocarpic, (1) perennial. **2. Habit:** (0) herbs, (1) rhizomatous suffrutices, (2) shrublets, less than 0.4 m high, (3) large shrubs, more than 0.5 m high. **3. Branching:** (0) branching only slightly along the stem, (1) branching almost exclusively from the base, (3) branching regularly along the stem. **4. Leaf persistence:** (0) deciduous, (1) permanent, evergreen. **5. Phenology:** (0) leaves present at fruiting, (1) leaves absent at fruiting. **6. Leaf texture:** (0) soft or coriaceous, (1) sclerophyllous. **7. Leaflet shape:** (0) flat, (1) terete or sub-terete. **8. Leaf arrangement:** (0) radical or radical and cauline, cauline leaves borne on deciduous branches, (1) all cauline, borne on permanent branches. **9. Leaf length:** (0) more than (20—) 40 mm long, (1) less than 20 mm long. **10. Peduncle length:** (0) long (more than 2 times as long as the diameter of the primary umbel), (1) short (less than 1.5 (2) times as long as the diameter of the primary umbel). **11. Inflorescence branching:** (0) with the propensity to form normal secondary umbels, (1) without secondary umbels, if rarely occurring then very poorly developed. **12. Primary umbel shape:** (0) flat-topped, (1) slightly orbicular, (2) orbicular. **13. Number of rays in the primary umbel:** (0) percentile values under 35, (1) percentile values above than 35. **14. Ray length in the primary umbel:** (0) percentile values under 45 mm, (1) percentile values above 45 mm. **15. Raylet vestiture:** (0) raylets glabrous, (1) raylets densely scabrous. **16. Ratio of functionally male flowers:** (0) equal ratio of male and female flowers in all raylets of the umbellules, (1) inner raylets of umbellules functionally male. **17. Sepal size:** (0) less than 0.3 mm, (1) more than 0.4 mm. **18. Fruit length:** (0) more than 9 mm, (1) less than 9 mm. **19. Marginal wing breadth:** (0) broad (broader than fertile portion), (1) narrow (less than fertile portion). **20. Marginal wing thickness:** (0) thin (less than 0.2 mm), (1) thick (more than 0.2 mm). **21. Commissural vittae breadth:** (0) narrow (less than 25%), (1) broad (45% to 75%), (2) very broad (greater than 80%). **22. Commissural vittae cells:** (0) longitudinally oblong, (1) transversely oblong. **23. Rib vittae:** (0) absent, (1) present. **24. Rib oil ducts in the marginal wings:** (0) absent, (1) present. **25. Lignified cells in the wings:** (0) prominently elongated, (1) not prominently elongated. **26. Wood vessels:** (0) without helical thickenings; (1) with helical thickenings.

APPENDIX 4. Taxon by character matrix used for the morphological and anatomical phylogenetic analysis. See Appendix 3 for a description of characters and character states.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26		
<i>Lefebvrea abyssinica</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	?	
<i>Afroligusticum classensii</i>	1	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	?
<i>Cynorhiza typica</i>	1	0	1	0	1	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	1	0	?	
<i>Cynorhiza meifolia</i>	1	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	?	
<i>Cynorhiza sp. 1</i>	1	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	?	
<i>Nanobubon strictum</i>	1	1	1	1	0	1	1	0	0	0	0	0	0	0	1	1	1	0	0	1	0	0	0	0	1	1	?	
<i>Nanobubon capillaceum</i>	1	1	1	1	0	1	1	0	0	0	0	0	0	0	1	1	1	0	0	1	0	0	0	0	1	1	?	
<i>Notobubon striatum</i>	1	2	2	1	0	1	0	1	1	0	0	0	0	0	1	0	1	1	1	1	0	0	0	0	0	1	1	
<i>Notobubon montanum</i>	1	2	2	1	0	1	0	1	1	0	0	0	0	0	1	0	1	1	1	1	0	0	0	0	0	1	?	
<i>Notobubon laevigatum</i>	1	2,3	1	1	0	1	0	1	0	0,1	0	0	0,1	0,1	0	0	0	1	1	1	0	0	0	0	0	1	1	
<i>Notobubon ferulaceum</i>	1	3	1	1	0	1	0	1	0	0	0	0	0	0	0	0	0	1	1	1	0	1	1	0	1	1		
<i>Notobubon pearsonii</i>	1	3	1	1	0	1	1	1	0	0	0	1	0	0	0	0	0	1	1	1	1	1	0	0	1	1		
<i>Notobubon galbaniopse</i>	1	3	0	1	0	1	0	1	0	0	0	1	0	0	0	0	0	1	1	1	1	1	1	0	1	1		
<i>Notobubon pungens</i>	1	3	0	1	0	1	?	1	0	0	0	1	0	0	0	0	0	1	1	1	1	1	1	0	1	1		
<i>Notobubon sonderi</i>	1	3	0	1	0	1	0	1	0	0	0	2	0	1	0	0	0	1	1	1	1	1	1	1	0	1	?	
<i>Notobubon gummiferum</i>	1	3	0	1	0	1	0	1	0	1	0	2	0	1	0	0	0	1	1	1	1	1	1	0	1	0		
<i>Notobubon tenuifolium</i>	1	3	0	1	0	1	0	1	0	1	1	2	1	1	0	0	0	1	1	1	2	1	1	0	1	0		
<i>Notobubon galbanum</i>	1	3	0	1	0	1	0	1	0	1	1	2	1	1	0	0	0	1	1	1	2	1	1	0	1	0		
<i>Notobubon capense</i>	1	3	0	1	0	1	0,1	1	0	0,1	1	2	1	1	0	0	0	1	1	1	2	1	1	0	1	0		