Macromorphological floral characters in *Bequaertiodendron magalismontanum*: possible taxonomic significance

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Gynodioecious populations of *Bequaertiodendron magalismontanum* (Sond.) Heine & J.H. Hemsl. are seemingly widespread in southern Africa. Macromorphological characters of female and hermaphrodite flowers from such populations are given and used to evaluate Liben's (1989) concept of *B. magalismontanum sensu lato*.

Ginodiësiëses populasies van *Bequaertiodendron magalismontanum* (Sond.) Heine & J.H. Hemsl. kom skynbaar wydverspreid in suidelike Afrika voor. Makromorfologiese kenmerke van vroulike en hermaphroditiese blomme, afkomstig vanuit sulke populasies, word beskryf en gebruik om Liben (1989) se konsep van *B. magalismontanum sensu lato* te evaulueer.

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Introduction

The taxonomic position and synonymy of *Bequaertiodendron magalismontanum* (Sond.) Heine & J.H. Hemsl. have been under dispute since the earliest name, *Chryso­phyllum magalismontanum* Sond., was proposed in 1850 for a plant, collected by Zeyher from the Magaliesberg, Transvaal (Hemsley 1966). Arising from numerous researches that, individually, covered only small areas of the continent, a wealth of names has resulted since 1850: *B. magalismontanum sensu lato* has since been reported from Cameroon and Gabon, through Zaire to Tanzania and southwards through Angola, Zambia, Malawi, Zimbabwe, Mozambique and many parts of southern Africa, such as Botswana, Venda, Swaziland, the Transvaal and Natal (Heine & Hemsley 1960; Hemsley 1966; Kupicha 1983; Meeuse 1963). Liben (1989) maintains that, as far as West and Central Africa are concerned, eight species have been confused under the concept of *B. magalismontanum*; these species belong to three genera, namely *Englerophytum* Krause, *Wildemaniodoxa* Aubrév. & Pellegr. and *Zeyherella* (Pierre ex Engl.) Aubrév. & Pellegr. Liben (1989) delimits these genera mainly on the basis of macromorphological floral and seed characters and reinstated the name *Z. magalismontana* (Sond.) Aubrév. & Pellegr. for forms of *B. magalismontanum* from Kasai and Haut-Katanga, corresponding to Zeyher's type specimen.

Detailed floral morphological/reproductive biological studies in *B. magalismontanum*, based on extensive field work, are in progress at this institution (Steyn & Robbertse 1988, 1990, unpublished data). Since this taxon is a widespread and synecologically important species in southern Africa, the question arises as to whether the proposed relegation of the species name to the synonymy of *Z. magalismontana* should be accepted by workers in this part of Africa. Furthermore, such a step would also question the position of *B. natal­ense* (Sond.) Heine & J.H. Hemsl., another widely distributed and well-known representative of the genus in southern Africa. The purpose of this note, therefore, is to evaluate the merit of Liben's proposals from the point of view of floral morphology.

Observations

The type specimen (Zeyher 1849) came from the Magaliesberg and from habitats that appeared to be among the least favourable (Hemsley 1966). Many similar places are known in the Transvaal. At one such locality, Steyn & Robbertse (1988, 1990) reported the occurrence of morphological gynodioecy, functional subdioecy and labile sex expression in a seemingly hermaphrodite population of *B. magalismontanum* and postulated that this breeding system may have been instrumental in the extreme adaptability and vast distribution of the taxon. Similar populations have since been found at Warmbaths and Moloto, 125 km and 50 km from Pretoria respectively. We also believe that Zeyher's gathering of the type specimen (which included material from a female plant, illustrated by Engler 1904), as well as *Behr 584* and *Smith 664* (both at PRE), collected from Baviaanspoort and Potchefstroom respectively, came from gynodioecious populations. Kupicha (1983) reported similar sexual forms from the Flora Zambesiaca area. There is therefore positive evidence that gynodioecy is widespread, which lends substance to the postulation given above. Female floral structure has, however, not been described or taken into account in taxonomic revisions of *B. magalismontanum sensu lato*, probably because such material is underrepresented in herbaria. Low female frequency, inconspicuousness of female flowers (Steyn & Robbertse 1988, 1990) and the (erroneous) idea that such material is 'clearly abnormal' and of 'no taxonomic value' (Meeuse 1963, p. 39) may have led
to a preponderance of hermaphrodites in herbarium collections. During a four-year study of various
gynodioecious populations in the field and an analysis of
flowering material at PRE and PRU, the following floral
characters were found consistently in female and
hermaphrodite plants of B. magalismontanum:
Female flowers pedicellate, borne in few- to many-
flowered fascicles on new and old wood, from axils of
current leaves to near ground level on main trunks/
branches, actinomorphic, usually tetracyclic and
pentameres, but often pentacycles. Calyx (Figure 1A)
cup-shaped, free almost to base with segments broadly
ovate, aestivation quincuncx; exterior segments 2–3 mm
long, abaxial surface rusty-tomentose; interior segments
shorter with trichomes concentrated on median, abaxial
surface, margins glabrous. Corolla (Figure 1G, 1D–J)
campanulate (even in full sunlight), greenish-white,
glabrous, (2.6–)3–4(–4.6) mm long; tube c. 1/3 of
corolla length; lobes (4)5(10), ovate with rounded apices
and auriculate bases. Alternipetalous staminodes (1–5)
often present, always attached to corolla tube at same
level as corolla lobes, very variable even within a single
flower, ranging in size and shape from small triangular
(Figure 1H) or ovate-dentate petaloid scales to large
structures, simulating adjacent corolla lobes (Figure
1E). Epipetalous staminodes (4)5(10), always present,
2–3 mm long, inserted near base of corolla tube, inser-
tion always lower than alternipetalous staminodes, type
usually consistent in the same flower and in flowers on
the same plant, usually sessile and lanceolate with
margins entire or weakly 3-lobed, often with basal part
filamentous, upper part sagititate to heart-shaped (Figure
1F–H), seldom with 2 abaxial, indehiscent, minute
pollen sacs (Figure 1G). Pistil 3–4(–4.8) mm long,
subulate; stigma usually 5-lobed; style 1.5–2.5(–3) mm
long, glabrous, hollow with compitum at base of style
(Figure 1B); ovary 2 mm long, ovoid, (4)5(10)-locular,
densely pilose except at base where glabrous, annular-
multilobed nectary occurs (Figure 1B & C); ovules
(4)5(10), 0.6 mm long, 1 per locule, anatropous, axile,
pendulous, nearly sessile.

Hermaphrodite flowers differ from their female
counterparts in the following aspects: 1. Alternipetalous
staminodes are small (Figure 1I) and never resemble
corolla lobes. 2. Epipetalous stamens are always present
with terete filaments and 4-sporangiate, 2-thecate
anthers, 2–2.5 mm long, subdorsifixed, nonversitile
with pollen sacs (Figure 1G). 3. Although members
of all floral whorls are significantly larger (unpublished
statistically analysed data), their number (5) is constant
and small.

Discussion and Conclusion
Liben (1989) does not mention the presence of female
flowers/plants in tropical populations, which may mean
that gynodioecy does not occur or is rare in the tropics
but Heine & Hemsley (1960) reported ‘in some cases, a
gradient of sexual forms’ present in herbarium material
from tropical Africa, as in Stolz 1585 and Bates 1776
(Hemsley 1966). Nevertheless, this investigation shows
that macromorphological floral characters in B. magalis-
montanum sensu lato from southern Africa and Z.
magalismonunta (sensus Liben 1989) from tropical Africa
are very similar, except for the invariable presence (in
southern African plants) of a stylar compitum, an ovarial
nectary, introrse, apiculate stamens, or staminodes
derived from such stamens (Figure 1D–J) and a
tendency in female plants to increase the number of
corolla lobes, epipetalous staminodes and locules to ten.
The first two characters have not been reported in
taxonomic literature on African Sapotaceae, probably
because these characters have been overlooked in
herbarium specimens. Apiculate stamens and 10-
membered floral whorls are characteristic of Wildemaniodoxa, Zeyherella and Englerophytum have non-apiculate stamens and 5-membered floral whorls (sensu Liben 1989). On account of floral structure, the South African plants seem to span a bridge between Wildemaniodoxa and Zeyherella and provide further evidence that no specific boundaries exist between members of B. magalismontanum sensu lato (Heine & Hemsley 1960).

On the other hand, staminal structure in southern African plants and Englerophytum (sensu Liben 1989, Figure 2) differs considerably. In the latter taxon short filaments are united in a staminal tube that, together with non-apiculate anthers, adheres tightly to and completely covers the pistil. To complicate this matter, Liben’s concept of the latter genus also includes the type species of Bequaertiodendron De Wild., namely B. congolense De Wild., but according to De Wildeman (1926) this species has apiculate anthers. Therefore, although Bequaertiodendron proved to be antedated by Englerophytum (Kupicha 1983; Liben 1989) we propose that the names of the South African species be retained, until more substantial taxonomic evidence, justifying a change of name, has been presented.

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