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Lotononis caerulescens (Fabaceae — Crotalarieae): A new combination for *Lebeckia microphylla*, with notes on the distinction between *Buchenroedera*, *Lebeckia* and *Lotononis*

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The generic position of *Lebeckia microphylla* E. Mey. has been subject to differing taxonomic interpretations. Previously the species has also been described as *Krebsia argentea* Eckl. & Zeyh. [*Krebsia* Eckl. & Zeyh. is now a section of *Lotononis* (DC.) Eckl. & Zeyh.] and later as *Buchenroedera glabriflora* N.E. Br. and *B. uniflora* Dümmer. Based on new evidence, this species is shown to be better placed in *Lotononis* section *Krebsia*. The new combination *Lotononis caerulescens* (E. Mey.) B-E. van Wyk is made.

Die generiese posisie van *Lebeckia microphylla* E. Mey. is onderhewig aan verskillende taksonomiese interpretasies. Voorheen is die spesie ook al beskryf as *Krebsia argentea* Eckl. & Zeyh. [*Krebsia* is tans 'n seksie van *Lotononis* (DC.) Eckl. & Zeyh.] en later as *Buchenroedera glabriflora* N.E. Br. en *B. uniflora* Dümmer. Aan die hand van nuwe getuienis word aangetoon dat die spesie meer tuis hoort in *Lotononis* seksie *Krebsia*. Die nuwe kombinasie *Lotononis caerulescens* (E. Mey.) B-E. van Wyk word gemaak.

Keywords: *Buchenroedera*, generic limits, *Lebeckia*, *Lotononis*, new combination

Introduction

Lebeckia microphylla E. Mey. is a common papilionoid legume of dry mountain slopes in the eastern Cape. It also seems to extend into Natal (see below).

Ecklon & Zeyher (1836) first validly named it *Krebsia argentea*, but Meyer (1836) described it as *Lebeckia microphylla* a few months later. In the same paper, the species is also described as *Aspalathus caerulescens* E. Mey. When Bentham (1843) relegated the genus *Krebsia* to sectional status within *Lotononis* (DC.) Eckl. & Zeyh., he excluded *Krebsia argentea* and later (Bentham 1844) listed it as a synonym of *Lebeckia microphylla*. Harvey (1862) followed this interpretation but remarked on the similarity with *Buchenroedera* Eckl. & Zeyh. Apparently unaware of the existing synonymy,

Table 1 Various characters of *Lebeckia microphylla* compared to those of other taxa

Characters	*Buchenroedera*	*Lotononis* section *Krebsia* s. str.	*Lebeckia microphylla*	*Lotononis* section *Aulacinthus*	*Lebeckia* (other spp.)
1. Stipules	present, in pairs; absent in some species	solitary or in pairs	absent	absent or present; usually solitary when present	usually absent
2. Bracteoles	absent	absent or vestigial	absent or vestigial	absent or vestigial	present
3. Calyx	lobes subequal or the lateral ones on either side fused a little higher	lobes subequal or the lateral ones on either side fused higher up in pairs	lobes subequal	lateral lobes on either side fused higher up in pairs; rarely sub-equally lobed	lobes equal
4. Flower colour	usually blue, rarely yellow, white or pink	usually blue, rarely yellow or pinkish	blue	yellow	yellow
5. Lobed callosities on claw of the standard	usually absent	usually present	usually present	usually absent (weakly developed in one species)	absent?
6. Fruit shape	short, ovate, few-seeded; laterally slightly inflated	linear, rarely ovate; laterally slightly inflated	linear; laterally inflated	linear to ovate; much inflated laterally	linear; laterally inflated in some species
7. Fruit — upper suture	smooth	smooth or inconspicuously verrucose	distinctly verrucose	distinctly verrucose	smooth
8. Fruit — lower suture	not sunken	not sunken	slightly sunken	distinctly sunken	not sunken
9. Seed surface	smooth	smooth	smooth	tuberculate	smooth
10. Ability to produce hydrocyanic acid (no. of spp. HCN^+ /no. of spp. tested)	often cyanogenic (4/7)	mostly cyanogenic (8/10)	cyanogenic (12/12 specimens)	cyanogenic (6/6)	acyanogenic? (0/11)
11. Major alkaloid type	pyrrolizidine	pyrrolizidine	pyrrolizidine	pyrrolizidine?	quinolizidine

Brown (1901) and Dümmer (1912) described it as new species of *Buchenroedera*, namely *B. glabriflora* and *B. uniflora* respectively.

The correct position of *Lebeckia microphylla* is therefore a problem of long standing. Although Meyer (1836) did not express any doubts, he went to some trouble to point out the differences between *Lebeckia microphylla* and other species that are presently included in *Lotononis*. Dahlgren (1975) remarked on the somewhat distant affinity of *Lebeckia microphylla* to other species of *Lebeckia* and the similarity with *Buchenroedera*. In his extensive re-evaluation of tribal and generic delimitations in the Genisteae *sensu lato*, Polhill (1976) also expressed uncertainty about *Lebeckia microphylla* and he considered it unwise to make any new combination until *Lotononis* had been studied in more detail.

A study of *Lotononis* sections *Aulacinthus* (E. Mey.) Benth. and *Krebsia* (Eckl. & Zeyh.) Benth. revealed new evidence to support the transfer of *Lebeckia microphylla* to *Lotononis*.

Discussion

Similarities and differences between *Lebeckia microphylla* and related groups are summarized in Table 1. All the taxa compared are essentially woody shrubs and are superficially very similar. *Krebsia* is used here in the original sense of Ecklon & Zeyher (1836) and Bentham (1843). The species added to it by Harvey (1862) and Dümmer (1913) are obviously quite different and are excluded from the section for the comparison here. *Buchenroedera* is so closely related to *Lotononis* (especially to section *Krebsia*) that the two genera will probably have to be united. These problems will be addressed elsewhere.

Absence of stipules is certainly not a character unique to *Lebeckia*. This condition is also present in two species of *Buchenroedera* and at least five species of *Lotononis*. It is perhaps significant that the exstipulate species of *Lotononis* are usually the ones that most closely resemble species of *Lebeckia*.

Bracteoles are extremely reduced or absent in *Lotononis* and *Buchenroedera*. Those that do occur are vestigial only and not visible without magnification (Figure 1: 15 – 18). In *Lebeckia*, bracteoles are well-developed and often relatively large. The total or virtual absence of bracteoles in *Lotononis* [the *Lotononis angolensis*-group of section *Polylobium* (Eckl. & Zeyh.) Benth. is an exception] is a useful character to

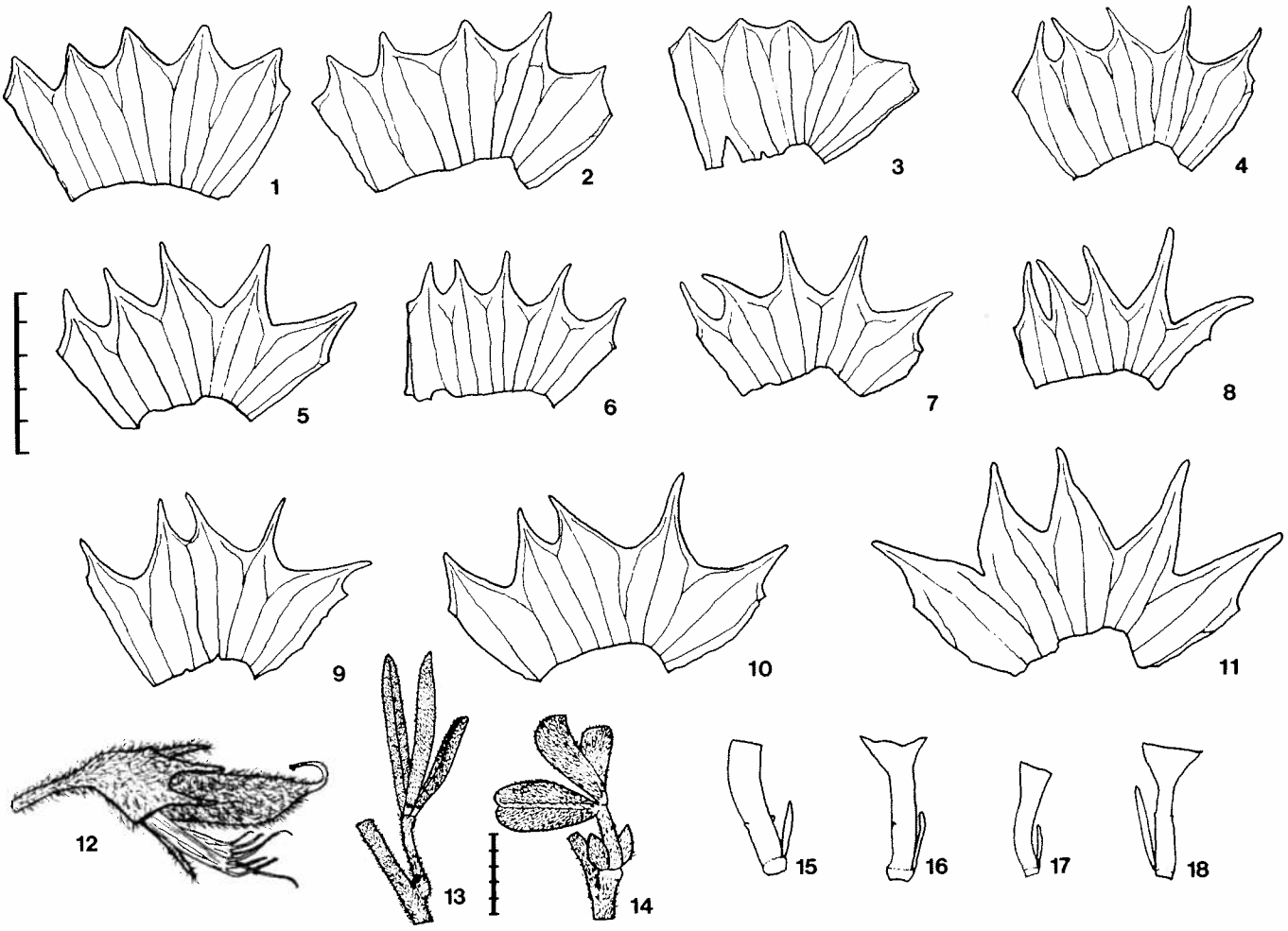

Figure 1 Calyx structure, leaves, bracts and bracteoles of *Lebeckia microphylla* and various species of *Lotononis* section *Krebsia*. 1 – 11, calyx opened out with the upper lobes to the left, vestiture not shown: 1, *L. microphylla*, subequal broadly triangular lobes (*Bayliss 7949*); 2, *L. microphylla*, lateral lobes fused slightly higher (*Tyson s.n. sub SAM 2260*); 3, *L. microphylla*, extremely short lobes, lateral ones fused slightly higher (*Thorns 42*); 4, *L. microphylla*, subequal elongated lobes (*Thode 3143*); 5, *Lotononis galpinii* Dümmer, lobes subequal (*Hilliard & Burtt 15034*); 6 & 7, *L. galpinii*, lobes subequal (*Compton 21482*); 8, *L. galpinii*, lateral lobes fused slightly higher (*Galpin s.n. sub BOL 37245*); 9, *Lotononis carnosa* (Eckl. & Zeyh.) Benth. var. *condensata* Harv., lateral lobes in pairs (*Bandert 6*); 10, *Lotononis bachmanniana* Dümmer, lateral lobes in pairs (*Abbott 250*); 11, *Lotononis cytisoides* (E. Mey.) Benth., lateral lobes in pairs (*Jacot-Guillarmod 8551*); 12, young fruit of *Lebeckia microphylla* — lateral lobes of the calyx fused much higher up (*Bolus 2580*); 13 & 14, leaves in side view: 13, *L. microphylla*, swollen exstipulate leaf base (*Oliver 5272*); 14, *Lotononis biflora* (H. Bol.) Dümmer, paired stipules and swollen leaf base (*Van Wyk 1953*). 15 – 18, pedicels, showing bracts and vestigial bracteoles: 15, *Lebeckia microphylla* (*Bayliss 7949*); 16, *L. microphylla* (*Oliver 5272*); 17, *Lotononis galpinii*, bracteoles absent (*Galpin s.n. sub BOL 37245*); 18, *Lotononis cytisoides*, bracteoles scarcely visible (*Jacot-Guillarmod 8551*). Scale in mm.

distinguish those species that closely resemble species of *Lebeckia* in various other characters.

The structure of the calyx is traditionally used as a key character in the Crotalarieae. *Lebeckia* is characterized by short, equal calyx-lobes with rounded sinuses. This character appears to be more variable than previously thought. In Figure 1, the calyx structure of some species of *Lotononis* section *Krebsia* is compared to that of *Lebeckia microphylla*. The lobes are often exceptionally short in *Lebeckia microphylla*, but the one collection from Natal (*Thode 3143*, Figure 1: 4) has the calyx-lobes similar to *Lotononis galpinii* Dümmer (Figure 1: 5 – 8). In two collections (*Tyson 122* and *Bolus 2580*), the lateral lobes are fused higher up in pairs, exactly as in most species of *Lotonònis* (Figure 1: 12). In view of the variability of the calyx structure in *Lotononis* and *Buchenroedera*, this character seems to be of limited diagnostic value to separate *Lotononis* and *Lebeckia*.

The corolla of *Lebeckia microphylla* is typical of *Lotononis* section *Krebsia*, not only in colour (Table 1) but even in such detail as the presence of two callosities on the claw of the standard (Figure 2). These are as variable within different species of *Krebsia* as they are within *Lebeckia microphylla*. The full variation in *Lebeckia* is not known. Callosities were observed in *L. cytisoides* Thunb. for example, but these are merely thickenings of the claw and are not lobed as in *Lotononis*.

Perhaps the most significant morphological evidence is offered by the fruit (Figure 3). The presence of warty protuberances along the upper suture (Figure 3: 12, 13 & 14) clearly indicates an affinity with *Lotononis* rather than *Lebeckia*. Dahlgren (1964) first drew attention to this character, which occurs in many species of *Lotononis* but has never been observed in any other genus of the Crotalarieae. In terms of shape, the pods of *Lebeckia microphylla* are identical to some species of *Lotononis* section *Aulacinthus*, especially to *Lotononis rigida* (E. Mey.) Benth. Even the ventral suture tends to be slightly sunken, as is typical in the section *Aulacinthus* (Figure 3: 9 – 11).

The seeds of *Lebeckia microphylla* are, in terms of size, shape and surface colouration, entirely within the range of variation found in *Buchenroedera* and the two sections of *Lotononis* under discussion. An interesting difference between section *Aulacinthus* and the other groups is the presence of distinct warty tubercles on the seeds. These are quite large and visible under low (10×) magnification. It occurs in most species of *Lotononis*, but neither in the section *Krebsia sensu*

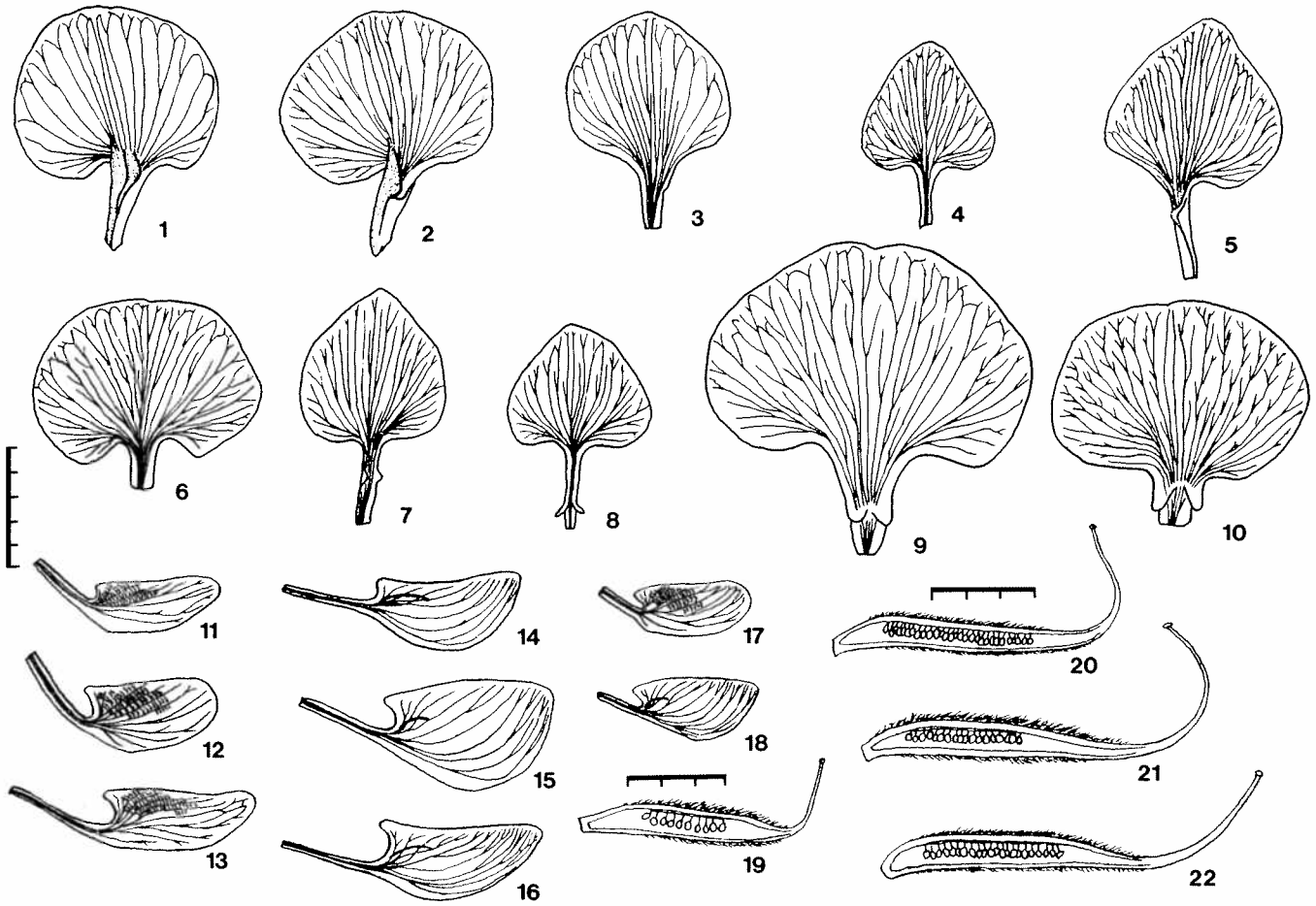

Figure 2 Corollas and pistils of *Lebeckia microphylla* and various species of *Lotononis* section *Krebsia*. 1 – 10, standard in adaxial view, showing presence of callosities on the claw: 1, *L. microphylla*, callosities well-developed (*Bayliss 7949*); 2, *L. microphylla*, only the one callosity well-developed (*Oliver 5272*); 3, *L. microphylla*, callosities nearly absent (*Thorns 42*); 4, *L. microphylla*, callosities absent (*Tyson s.n. sub SAM 2260*); 5, *L. microphylla*, only one callosity (*Thode 3143*); 6, *Lotononis galpinii* Dümmer, callosities absent (*Hilliard & Burtt 15034*); 7, *Lotononis carnosa* (Eckl. & Zeyh.) Benth. var. *condensata* Harv., short callosities near the middle of the claw (*Bandert 6*); 8, *Lotononis carnosa* var. *condensata*, elongated callosities near base of claw (*Pegler 1363*); 9, *Lotononis bachmanniana* Dümmer, well-developed callosities (*Abbott 250*); 10, *Lotononis cytisoides* (E. Mey.) Benth., well-developed callosities (*Jacot-Guillarmod 8551*); 11, 12 & 13, wing petals of *Lebeckia microphylla* showing variation in shape: 11, oblong, slightly pointed (*Oliver 5272*); 12, broad, obtuse (*Baylis 7949*); 13, oblong, pointed (*Thode 3143*); 14, 15 & 16, keel petals of *L. microphylla* showing variation in shape: 14, narrow, slightly pointed (*Oliver 5272*); 15, broad, obtuse (*Bayliss 7949*); 16, oblong, pointed (*Thode 3143*). 17, 18 & 19, wing petal, keel petal and pistil of *Lotononis galpinii* (*Compton 21482*). 20, 21 & 22, pistils of *Lebeckia microphylla* showing variation in the curvature of the style (*Oliver 5272, Baylis 7949 & Thode 3143* respectively). Scale in mm.

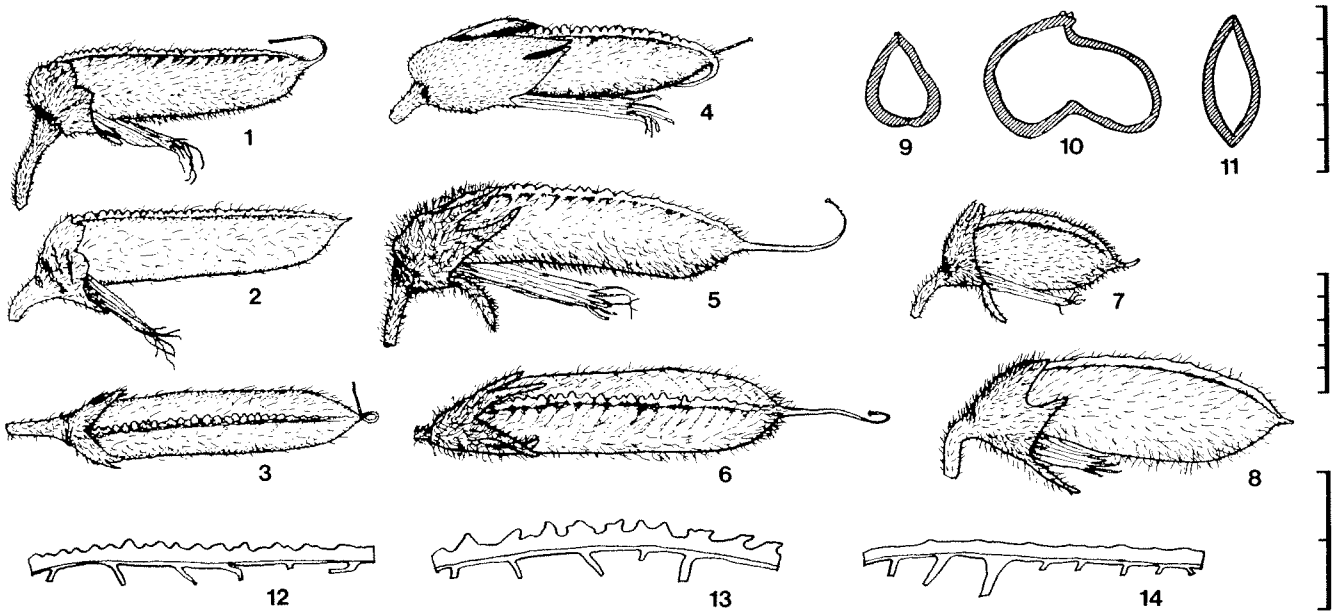

Figure 3 Detail of the fruit of *Lebeckia microphylla* and various species of *Lotononis*. 1 – 8, mature fruit in lateral or top view: 1, 2 & 3, *Lebeckia microphylla*, upper suture distinctly verrucose (*Van Wyk 2483*); 4, *Lotononis gracilis* (E. Mey.) Benth. (*Guthrie 2580*); 5 & 6, *Lotononis rigida* (E. Mey.) Benth. (*Van Breda & Joubert 1995*); 7 & 8, *Lotononis galpinii* Dümmer, upper suture only slightly verrucose (7, *Galpin s.n. sub BOL 37245*; 8, *Hilliard & Burtt 15034*). 9, 10 & 11, fruit in transverse section: 9, *Lebeckia microphylla*, pod laterally inflated at base, lower suture slightly sunken (*Van Wyk 2483*); 10, *Lotononis gracilis*, pod much inflated, lower suture sunken (*Van Wyk 2559*); 11, *Lotononis galpinii*, pod not much inflated, lower suture not sunken (*Roux 1158*). 12, 13 & 14, upper suture of the fruit after dehiscence, as viewed from inside: 12, *Lebeckia microphylla*, distinctly verrucose (*Van Wyk 2483*); 13, *Lotononis gracilis*, distinctly verrucose (*Van Wyk 2559*); 14, *Lotononis galpinii*, nearly smooth (*Roux 1158*). Scale in mm.

stricto nor in *Buchenroedera*.

Other characters, such as the inflorescence structure, prominent leaf-base (Figure 1: 13 & 14) and a tendency for side shoots to be abbreviated are present to various degrees in all the groups under consideration. The phenomenon that the leaflets of *Lebeckia microphylla* are individually shed leaving the petioles (Dahlgren 1963), is not unique to *Lebeckia* and *Wiborgia*, but is also characteristic of most species of *Lotononis* section *Aulacinthus*.

Cyanogenesis is a distinct feature of *Lotononis* (van Wyk, unpublished data) with nearly half of the species reacting strongly positive to the Feigl-Anger cyanogenesis test as described by Feigl & Anger (1966). I have tested numerous specimens of *Lebeckia microphylla* (both fresh and herbarium material from four different localities) and all reacted strongly positive. All of the 11 species of *Lebeckia* tested so far gave a negative result, while the other three taxa under discussion are predominantly cyanogenic (Table 1).

It is now known that *Lebeckia microphylla* contains integerrimine as one of its major alkaloids (van Wyk & Verdoorn 1988). In the Fabaceae, this pyrrolizidine alkaloid was previously known only from some species of *Crotalaria* L. Integerrimine was detected in all species of *Buchenroedera* and *Lotononis* section *Krebsia* examined so far. *Lebeckia* however, contains tetracyclic quinolizidine alkaloids (Gerrans *et al.* 1976; van Wyk *et al.* 1988) and it therefore seems that *Lebeckia microphylla* is chemically more closely related to *Lotononis* than *Lebeckia*.

Geographical distribution patterns are of considerable taxonomic importance in the Fabaceae. The splitting of larger tribes into smaller regional ones (Polhill 1976) is a case in point. Figure 4 shows the approximate geographical distribution of the taxa compared in Table 1. The distribution of *Lotononis* section *Aulacinthus* and *Lebeckia* shows a strong trend towards a winter rainfall distribution in the western part of southern Africa. In this sense, *Lebeckia microphylla* is perhaps better placed in *Lotononis* section *Krebsia* which, like *Buchenroedera*, is restricted to the eastern parts of southern Africa with a predominantly summer rainfall regime.

Conclusions

The subequally lobed calyx and absence of stipules were traditionally used when *Lebeckia microphylla* was placed in *Lebeckia* rather than *Lotononis* or *Buchenroedera*. Individually these characters break down as shown in Figure 1 and Table 1.

Lebeckia microphylla shares with *Lotononis* the virtual absence of bracteoles, a similar flower colour, the presence of lobed callosities on the claw of the vexillum, a verrucose upper suture of the fruit, the ability to produce HCN, integerrimine as a major alkaloid and a similar geographical distribution. It differs from *Buchenroedera* in the shape of the fruit, which is the only consistent diagnostic character known to separate this genus and *Lotononis*. The best position is therefore in the genus *Lotononis*, being most similar to species of the sections *Aulacinthus* and *Krebsia*. Considering the flower colour, corolla structure and smooth seed surface, it is more closely related to the latter.

The weight of evidence clearly shows that *Lebeckia microphylla* is a species of *Lotononis* and not *Lebeckia*. When placed in the section *Krebsia*, it may not even be considered anomalous. In terms of fruit characters, the existing morphological discontinuity between the sections *Aulacinthus* and *Krebsia* is in fact considerably reduced.

Lotononis caerulescens *(E. Mey.) B-E. van Wyk* comb. nov.

Type: In collibus saxosis inter Klipplaatrivier et Zwart-Key alt. 3500 – 4000 ped., *Drège s.n.* (K, *Herb. Benth.* specimen, photo!; K, *Herb. Hook.* specimen, photo!; W, photos!, 3 specimens).

Aspalathus caerulescens E. Mey., Commentariorum de plantis Africae australioris, Vol. 1(1): 54 (1836, February or later); Benth.: 361 (1844), as synonym of *Lebeckia microphylla* E. Mey.

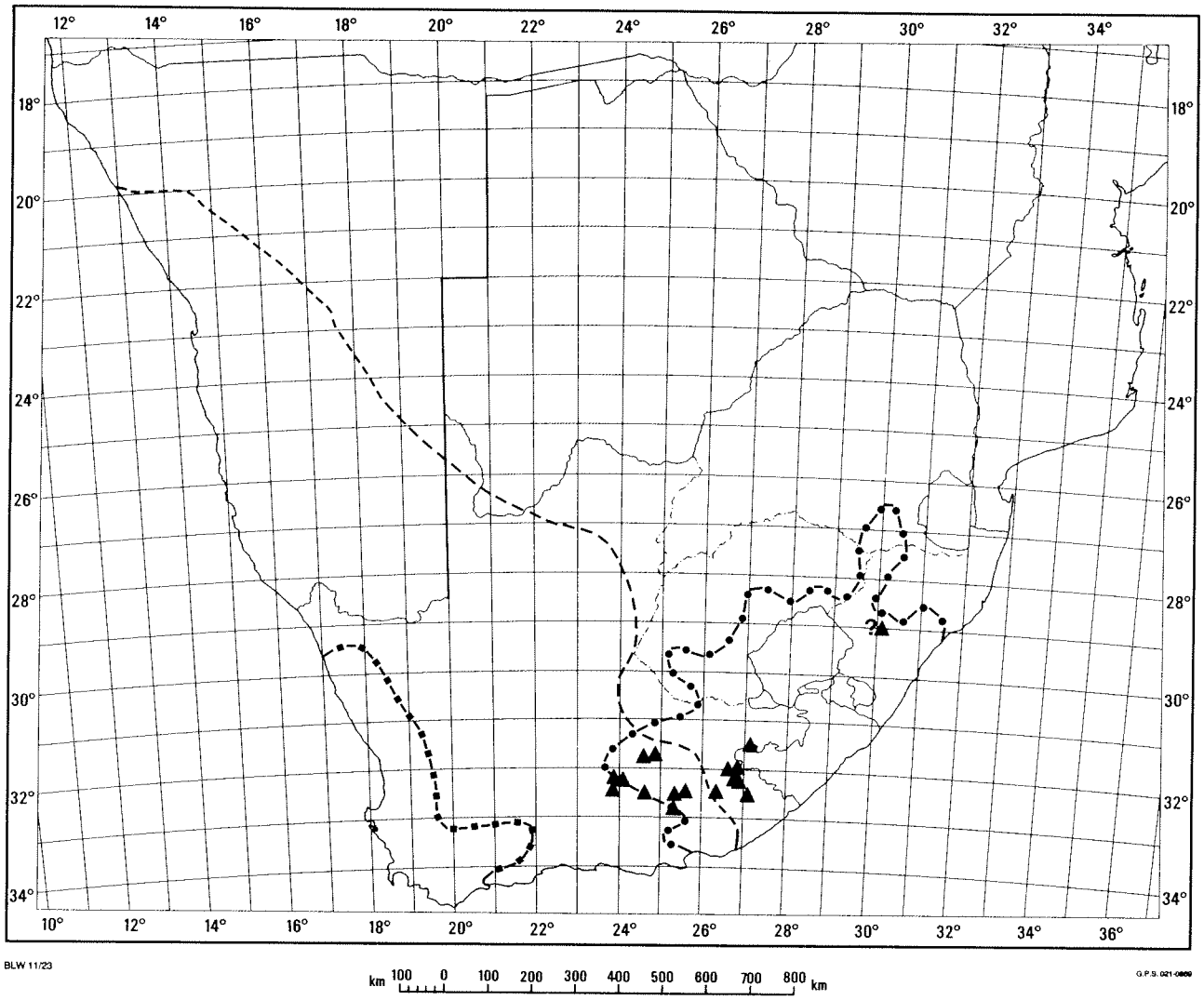

Figure 4 The known geographical distribution of *Lebeckia microphylla* (indicated by triangles), compared to the approximate distribution areas of *Lotononis* section *Krebsia sensu stricto* (–•–•–•–), *Lotononis* section *Aulacinthus* (–■–■–■–) and *Lebeckia* (– – – –). (The distribution of the genus *Lebeckia* was contributed by Dr A Schreiber of München.)

Buchenroedera caerulescens (E. Mey.) Presl: 477 (1845).

Krebsia argentea Eckl. & Zeyh.: 179 (1836, January), non *Lotononis argentea* Eckl. & Zeyh.: 176 (1836); Benth.: 361 (1844), as synonym of *Lebeckia microphylla* E. Mey.; Presl: 477 (1845). Type: In lapidosis (altit. III, IV) laterum montium prope 'Silo' ad flumen 'Klipplaatrivier' (Tambukiland), *Ecklon & Zeyher 1286* (M, photo!; W, photo!; SAM, photo!).

Lebeckia microphylla E. Mey.: 155 (1836, February or later), non *Lotononis microphylla* Harv.: 65 (1862); Benth.: 361 (1844); Harv.: 88 (1862). Types: In montibus saxosis Camdeboosberg, alt. 4000–4500 ped., *Drège (a)* (K, photo!; W, photo!); In montibus saxosis Klein Bruintjeshoogte, alt. 2600–3000 ped., *Drège (b)* (BOL, photo!; K, photo!; PRE, photo!; W, photo!).

Lebeckia microphylla E. Mey. var. *leptophylla* E. Mey.: 155 (1836); Benth.: 361 (1844). Types: prope Graafreynet, alt. 3000 ped., *Drège (a)*; Los Tafelberg, alt. 5000–6000 ped., *Drège (b)* (not seen).

Buchenroedera glabriflora N.E. Br.: 120 (1901); Polhill: 325 (1976). Type: mountain sides near Queenstown, alt. 1220 m, *Galpin 1596* (K, holo., photo!; BOL!).

Buchenroedera uniflora Dümmer: 226 (1912). Type: Graaff Reinet Div.; on the summit of Mount Koudveld, Sneeuwberg Range, 1500 m, *Bolus 2580* (K, holo!; BOL!).

Ecklon & Zeyher 1287 in SAM is undoubtedly from the same collection as *Ecklon & Zeyher 1286* in M and W, and should be considered an isosyntype. When Pappe rewrote the label he made the mistake of writing '1287' instead of '1286'. The real *Ecklon & Zeyher 1287* is *Krebsia carnosa*, a totally different species and not likely to be confused with *Krebsia argentea*. This error is easily explained by the fact that both collections are from the same locality.

I have been unable to trace any type specimens of *Lebeckia microphylla* var. *leptophylla*. This name has been ignored by both Bentham (1844) and Harvey (1862), possibly due to a confusion between the Drège specimens 'a' and 'b' of the type and those of the variety. Judged by the description and the type localities however, it is obviously only a minor variation of the typical form and thus not of much importance.

Phillips (1917) erroneously cited *Thode 7* (the same collection as *Thode 6276* and *Thode 6282* in STE) as *Buchenroedera glabriflora* N.E. Br. *Thode 7* in BOL turns out to be *Lotononis galpinii* Dümmer, a species which, unlike '*B. glabriflora*', does occur in the Drakensberg.

Woody, much-branched shrub; procumbent, 0,2–0,5 m high and up to 1 m wide or erect, up to 1 m high. *Branches* densely leafy, canescent, glabrescent with age. *Leaves* exstipulate, digitately trifoliolate, densely canescent. *Petiole* (1–)2–3(–4) mm long, usually much shorter than the leaflets, on a prominent swollen leaf base. *Leaflets* (1–)2–5(–7) mm long, 0,5–1 mm wide, narrowly linear, conduplicate; apex acute, often slightly recurved. *Inflorescence* a terminal or leaf-opposed congested raceme, 1–3(–6)-flowered; peduncle short or absent, rarely up to 5 mm long.

Flowers 7 – 10(– 12) mm long, bright blue; pedicel 1 – 4 mm long; bracteoles absent or vestigial, less than 0,1 mm long when present. *Calyx* 3 – 5 mm long, densely sericeous; lobes subequal, very short or up to 1,5 mm long, broadly to narrowly triangular, the upper and lateral lobes on either side occasionally fused slightly higher up in pairs. *Standard* up to 12 mm long; claw 2,5 – 4 mm long, with two callosities usually present near its apex; blade 5 – 7 mm long, 5 – 10 mm wide; broadly ovate, depressed ovate to rounded; glabrous, or with a line of hairs dorsally along the middle. *Wing petals* up to 10 mm long; claw shorter than the blade, 2,5 – 4 mm long; blade 4 – 6 mm long, up to 4 mm wide, broadly oblong, obtuse or somewhat pointed, auricled; sculpturing upper basal and upper central, lunate to lunate-lamellate, in 4 – 7 rows of 10 – 20 irregular reclined mostly intercostal lunae. *Keel petals* up to 11 mm long, as long or longer than the wing petals; claw up to 4 mm long; blade up to 7 mm long and 4 mm wide, broadly semicircular, obtuse, auricled and pocketed near the base. *Androecium* as long as the keel, in a sheath open on the upper side; anthers dimorphic. *Pistil* 7 – 12 mm long, subsessile; ovary 4 – 6 mm long, linear, nearly terete, densely sericeous; style merging gradually with ovary, curved gently to sharply upwards; stigma small, terminal; ovules *ca.* 15 – 25, funicles as long as or slightly longer than the ovules. *Fruit* 11 – 15 mm long, 3 – 4 mm wide, 4 – 6-seeded, linear, triangular-terete in transverse section, laterally inflated along the lower suture, densely pubescent, glabrescent with age, with distinct irregular warty protuberances along the upper suture; lower suture somewhat sunken before dehiscence. *Seed* up to 3,5 mm long and 2 mm wide, broadly obovate to oblong in lateral view, radicular lobe prominent; testa smooth, greenish-yellow with irregular dark purple-brown marks (Figures 1, 2 & 3).

There is considerable variation in habit, leaf size and flower size but no subspecific treatment is attempted here. I have studied most of the different forms *in situ*, and consider them all as geographical races of one variable species. The single specimen from Natal [*Thode 3143* (STE)] however, differs in a number of characters from the eastern Cape collections. The locality on the label ('Scottspoort') was traced by Killick (1977) to near Weenen in Natal (Figure 4). The plant seems much more erect and robust; the inflorescences are strictly terminal and up to 6-flowered; and the keel petals are narrower and more pointed. It is possible to separate it at subspecific level, but I am hesitant to do so before a wider range of material from Natal (especially fruiting material) becomes available for study.

Material examined

—**2830** (Dundee): Weenen district, Scottspoort (– CC), *Thode 3143* (STE) [not typical].
—**3124** (Hanover): Middelburg district, Gordonville (– DA), *Acocks 16574* (PRE); Lootsberg Pass, 63 km from Graaff-Reinet towards Middelburg (– DB), *Van Wyk 2033* (JRAU).
—**3126** (Queenstown): Queenstown district, Bowker's Kop (– DC), *Page s.n.* (BOL, photo in JRAU), *Tyson s.n. sub SAM 2260* (SAM), *s.n.* (K, 3 sheets, photos in JRAU); Queenstown district, Madeira Hill (– DD), *Everitt 4* (PRE); 'Madiera', Queenstown (– DD), *Thorns 42* (NBG); Mountain sides near Queenstown (– DD?), *Galpin 1596* (BOL, K, photo in JRAU); Queenstown district (– DD?), *Sidey 3732* (PRE).
—**3127** (Lady Frere): Clarke's Siding near Dordrecht (– AC), *Bayliss 7949* (GRA, M, NBG, photo in JRAU, PRE).
—**3223** (Rietbron): Murraysburg district, Grootberg slopes (– BB), *Acocks 21038* (K, photo in JRAU); Camdeboosberg (– BD), *Drège s.n.* (K, photo in JRAU, W, photo in JRAU).
—**3224** (Graaff-Reinet): Houd Constant Pass south of the farm to Moordenaarsrivier (– AA), *Oliver 5272* (STE); Sneeuberg in northern Koudeveld between Graaff-Reinet and Murraysburg (– AA), *Oliver 5192* (PRE); Summit of Koudveld mountain, Sneeuberge (– AA), *Bolus 2580* (BOL, K); Summit of Koudeberg (– AA), *Tyson 122* (BOL); Cave Mountain near Graaff-Reinet (– BC), *Bolus 153* (BOL, photo in JRAU); Foot of Spandouw Kop near Graaff-Reinet (– BC), *Sister Francis 4* (BOL, photo in JRAU); Graaff-Reinet (– BC), *Wall s.n.* (S, photo in JRAU).
—**3225** (Somerset East): Mountain Zebra National Park, Bankberg plateau (– AD), *Van Wyk 1329, 1330* (JRAU); Top of Swagershoek Pass (– BC), *Acocks 15699* (PRE); Near top of Swagershoek Pass on Pearston side (– BC), *Van Wyk 1612, 1613, 1614, 1615, 2483* (JRAU); Klein Bruintjeshoogte, between Zondagsrivier and Keiskamma (– CB), *Drège s.n.* (BOL, photo in JRAU, K, 2 sheets, photos in JRAU, PRE, photo in JRAU, W, photo in JRAU).
—**3226** (Fort Beaufort): Road between Adelaide and Tarkastad, 1 km south of turn-off to Bedford via Baviaansrivier (– AD), *Van Wyk 1724* (JRAU); Between Klipplaatrivier and Zwart-Key [Cathcart district] (– BA/ – BB), *Drège s.n.* (K, 2 specimens on 1 sheet, photo in JRAU, W, 3 sheets, photo in JRAU); Near Silo at the Klipplaatrivier (– BB), *Ecklon & Zeyher 1286* (M, photo in JRAU, W, photo in JRAU), *Ecklon & Zeyher '1287'* [= *1286*] (SAM, photo in JRAU).
—**3227** (Stutterheim): Vogelberg, Cathcart (– AC), *Pole Evans 1755* (K, photo in JRAU, PRE); Windvogelberg (– AC), *Baur 837?* (K, photo in JRAU).

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References

BENTHAM, G. 1843. Enumeration of Leguminosae, indigenous to southern Asia, and central and southern Africa. *Hook., Lond. Journ. Bot.* 2: 504 – 613.
BENTHAM, G. 1844. Enumeration of Leguminosae, indigenous to southern Asia, and central and southern Africa. *Hook., Lond. Journ. Bot.* 3: 338 – 365.
BROWN, N.E. 1901. Diagnoses africanae 13. *Kew Bull.* 1901: 119 – 138.
DAHLGREN, R. 1963. Studies on *Aspalathus* and some related genera in South Africa. *Opera Bot.* 9(1): 1 – 301.
DAHLGREN, R. 1964. The genus *Euchlora* Eckl. & Zeyh. as distinguished from *Lotononis* Eckl. & Zeyh. *Bot. Notiser* 117(4): 371 – 388.
DAHLGREN, R. 1975. Studies on *Wiborgia* Thunb. and related species of *Lebeckia* Thunb. (Fabaceae). *Opera Bot.* 38: 1 – 83.
DÜMMER, R.A. 1912. Diagnoses Africanae 48. *Kew Bull.* 1912: 224 – 240.
DÜMMER, R.A. 1913. A synopsis of the species of *Lotononis*, Eckl. & Zeyh., and *Pleiospora*, Harv. *Trans. R. Soc. S. Afr.* 3(2): 275 – 335.
ECKLON, C.F. & ZEYHER, C. 1836. Enumeratio plantarum Africae Australis extratropicae. Vol. 2, p. 179, Perthes & Besser, Hamburg.
FEIGL, F. & ANGER, V. 1966. Replacement of benzidine by copper ethylacetoacetate and tetra base as spot-test reagent for hydrogen cyanide and cyanogen. *Analyst* 91: 282 – 284.
GERRANS, G.C., HOWARD, A.S. & NATTRASS, M.J. 1976. Major alkaloids of *Lebeckia pluckenetiana*. *Phytochem.* 15: 816.
HARVEY, W.H. 1862. Leguminosae. In: Flora Capensis, eds Harvey, W.H. & Sonder, O.W. Vol. 2, p. 65, Hodges, Smith & Co., Dublin.
KILLICK, D.J.B. 1977. Hans Justus Thode (1859 – 1932), pioneer plant collector in the Natal Drakensberg. *Bothalia* 12(2): 169 – 175.

MEYER, E.H.F. 1836. Commentariorum de plantis Africae Australioris. Vol. 1(1), pp. 54 & 155, Regiomonti, Leipzig.

PHILLIPS, E.P. 1917. A contribution to the flora of the Leribe Plateau and environs . . . *Ann. S. Afr. Mus.* 16: 1 – 379.

POLHILL, R.M. 1976. Genisteae (Adans.) Benth. and related tribes (Leguminosae). *Bot. Syst.* 1: 143 – 368.

PRESL, J.S. 1845. Botanische Bemerkungen . . . *Abh. K. Böhm. Ges. Wiss.* 5(3): 431 – 584.

VAN WYK, B-E. & VERDOORN, G.H. 1988. The chemotaxonomic significance of integerrimine in *Buchenroedera* and *Lotononis* section *Krebsia*. *Biochem. Syst. Ecol.* (in press).

VAN WYK, B-E., VERDOORN, G.H. & SCHUTTE, A.L. 1988. Observations on the occurrence and distribution of alkaloids in some genera and species of the tribe Crotalarieae (Fabaceae). *S. Afr. J. Bot.* 54: 75 – 79.