terminal (but shorter and fewer-flowered) racemes. The same pattern is observed in *L. brevipes*, *L. contaminata*, *L. gracilis*, *L. longipes*, *L. meyeriana* and *L. zeyheri*, but lateral branches are formed less often in *L. pauciflora* and *L. wrightii*. *L. plukenetiana* forms lateral branches that sometimes bear flowers, but they are usually sterile. *L. brevicarpa* may have lateral branches, but these never form inflorescences (they are invariably sterile). *L. grandiflora*, *L. sepiaria* and *L. uniflora* usually have no lateral branches.

The length of the inflorescences is variable in section *Lebeckia* and is usually not of diagnostic value (Fig. 3.7). The Saldanha Bay form (OTU4) of *L. ambiguа* has shorter inflorescences compared to the typical form. This is also true for the Bredasdorp form (OTU4) of *L. contaminata*, the Bredasdorp form (OTU1) of *L. gracilis*, the Cape Point form (OTU3) of *L. meyeriana* and the Darling form (OTU1) of *L. plukenetiana*. The Waaihoek Peak form (OTU2) of *L. longipes* has longer inflorescences compared to the typical form.

Flower size is of some diagnostic value (Fig 3.9; Fig. 3.19). *L. contaminata*, *L. brevipes*, *L. gracilis*, *L. plukenetiana*, *L. wrightii* and *L. zeyheri* have small flowers (up to 8 mm long); *L. ambiguа*, *L. brevicarpa*, *L. grandiflora*, *L. longipes*, *L. meyeriana* (in particular the Kommetjie form - OTU2), *L. pauciflora* and *L. uniflora* have flowers of intermediate size (up to 15 mm long) and *L. sepiaria* has relatively large flowers (up to 18 mm long).
Differences in inflorescence structure are easily observed in situ, but herbarium material is sometimes inadequate for diagnostic purposes.

Fig 3.9. Diagrams of inflorescence structure, disposition (erect or prostrate) and relative flower size in the 14 species of Lebeckia section Lebeckia: (a) L. ambigua; (b) L. brevicarpa; (c) L. brevipes; (d) L. contaminata; (e) L. gracilis; (f) L. grandiflora; (g) L. longipes; (h) L. meyeriana; (i) L. pauciflora; (j) L. plukenetiana; (k) L. sepiaria; (l) L. uniflora; (m) L. wrightii; (n) L. zeyheri. Note the extreme range of variation in the number of flowers and also the absence or presence of lateral branches that sometimes remain vegetative (as in L. brevicarpa – b). Scale bar: 10 mm.
3.4 *Bract and bracteoles*

Bracts are simple in the Crotalarieae with the exception of the trifoliolate bracts in some *Aspalathus* species (Dahlgren, 1963). The bracts are attached near the base of the pedicel (Polhill, 1976) and bracteoles usually near the middle. The bracteoles might be small, minute, caducous or even lacking in the Crotalarieae (Polhill, 1976).

Bracts and bracteoles in section *Lebeckia* are invariably simple and sessile and they are usually glabrous, except in *L. uniflora* and *L. wrightii* (Fig. 3.10). The bracts are attached at the base of the pedicel and usually have a median vein. Bracts and bracteoles are caducous and fall off as soon as the flowers open. In five species (*L. brevicarpa, L. grandiflora, L. plukenetiana, L. uniflora* and *L. wrightii*) the bracts are less caducous and only fall off after the fruit has started developing. The bracts and bracteoles are usually lanceolate and acute, but in *L. ambigua, L. brevicarpa* and *L. plukenetiana* the bracts are narrowly lanceolate and acuminate. The bracts are usually small (1–3 mm long) but in *L. brevicarpa, L. grandiflora* and *L. plukenetiana* they can be relatively long (up to 4.0, 6.5 and 6.0 mm respectively).

The paired bracteoles near the middle of the pedicel are usually triangular, acute and vary in length from 0.5 mm to 2.0 mm. The lanceolate bracteoles in *L. grandiflora* are diagnostically longer (±5.5 mm) and are almost as long as the bract (±6.5 mm).
The diagnostic value of the bracts and bracteoles are somewhat limited in the herbarium – they are usually similar in size and shape and they are caducous and therefore often absent. The size and shape of the bracts and bracteoles are nevertheless helpful in the identification of *L. brevicarpa, L. grandiflora* and *L. plukenetiana*. 
Fig. 3.10. Bracts and bracteoles of the 14 species in *Lebeckia* section *Lebeckia*, showing variation in size and shape: (a) *L. ambigu*a; (b) *L. brevicarpa*; (c) *L. brevipes*; (d) *L. contaminata*; (e) *L. gracilis*; (f) *L. grandiflora*; (g) *L. longipes*; (h) *L. meyeriana*; (i) *L. pauciflora*; (j) *L. plukenetiana*; (k) *L. sepiaria*; (l) *L. uniflora*; (m) *L. wrightii*; (n) *L. zeyheri*. Vouchers: (a) from Rossouw 18619 (NBG); (b) from Van Wyk 2550 (JRAU); (c) from Compton 21819 (NBG); (d) from Stirton and Zantovska 11476 (NBG); (e) from Esterhuysen 23529 (BOL); (f) from Esterhuysen 14102 (P); (g) from Esterhuysen 8285a (BOL); (h) from Van Wyk 3009 (JRAU); (i) from Hanekom 3189 (NBG); (j) from Hutchinson 221 (BOL); (k) from Forrester 514 (NBG); (l) from Boucher 2175 (NBG); (m) from Esterhuysen 31726 (BOL); (n) from Zeyher 378 (S). Scale bar: 1 mm. (l and m drawn by B-E. van Wyk).
3.5 Calyx

The tribe Crotalarieae is characterised by a subequally lobed calyx (Polhill, 1976), differing markedly from the Genisteae, where the calyx is two lipped (Van Wyk and Schutte, 1995). The genera of the Crotalarieae can be divided into two groups: (1) the “lebeckioid group” (Lebeckia, Aspalathus, Bolusia, Crotalaria, Rafnia, Spartidium, Wiborgia), with a subequally lobed calyx and (2) the “lotononoid group” (Lotonomis, Pearsonia, Rothia, Robynsiophyton) with relatively shallow lateral sinuses and a narrower lower lobe (Polhill, 1976).

All the species in section Lebeckia invariably have the calyces subequally lobed (“lebeckioid calyx”). The sinuses are subequal, with the upper sinus (the sinus between the two upper lateral lobes) sometimes markedly wider than the lateral and lower sinuses (Van Wyk and Schutte, 1989).

Four calyx characters were used in the cladistic analysis: (1) the lowermost lobe being ± equal to the other lobes (not narrower as in most other taxa). This is interpreted as a synapomorphy for L. section Lebeckia; (2) the calyx lobe length – longer than the tube is considered a synapomorphy for the L. pauciflora–L. wrightii group; (3) the manner in which the calyx is lobed (equal in L. gracilis or subequal in all other species) and (4) the vestiture of the outer surface of the calyx – glabrous in all species except L. wrightii and L. uniflora (where it is sparsely pubescent).
Total calyx length is of some diagnostic value (Fig. 3.11). *L. grandiflora*, *L. pauciflora* and *L. uniflora* have longer calyces that vary between 7.5 mm and 12.5 mm in length. *L. wrightii* has a total calyx length that varies between 5.5 mm and 8.0 mm and overlaps with those of *L. sepiaria* (4.0–6.5 mm). The remaining nine species have total calyx lengths varying between 3.5 mm and 6.0 mm.

Fig. 3.11. Variation of total calyx length in the 14 species of *Lebeckia* section *Lebeckia*. The average of three measurement from three specimens (where possible) per OTU and range (lowest and highest values) of each OTU are given. *L. grandiflora* has the longest calyces and *L. zeyheri* the shortest.
The calyx lobes are usually shorter than or as long as the calyx tube except in *L. grandiflora*, *L. pauciflora*, *L. uniflora* and *L. wrightii*, where the lobes are longer than the tube (Fig. 3.12; Fig. 3.13). *L. gracilis* has diagnostically short calyx lobes that are almost equal in size and shape. *L. plukenetiana* and *L. zeyheri* both have subequally lobed calyces that also tend to be short (Fig. 3.14).

Fig. 3.12. Variation in calyx lobe length of the 14 species in *Lebeckia* section *Lebeckia*. The average of three measurement from three specimens (where possible) per OTU and range (lowest and highest values) of each OTU are given. The calyx lobe length is diagnostically longer in *L. grandiflora*, *L. pauciflora*, *L. uniflora* and *L. wrightii* and the shortest in *L. gracilis*.
Fig. 3.13. Variation in the calyx tube : calyx lobe ratio in the 14 species in *Lebeckia* section *Lebeckia*. The average of three ratios from three specimens (where possible) per OTU and range (lowest and highest values) of each OTU are given. *L. grandiflora*, *L. pauciflora*, *L. uniflora* and *L. wrightii* has calyx lobes that are generally longer than the calyx tube.
Fig. 3.14. Calyces of the 14 species in *Lebeckia* section *Lebeckia* showing variation in size and structure (calyces are opened out with the upper lobes to the left): (a) *L. ambigu*a; (b) *L. brevicarpa*; (c) *L. brevipes*; (d) *L. contaminata*; (e) *L. gracilis*; (f) *L. grandiflora*; (g) *L. longipes*; (h) *L. meyeriana*; (i) *L. plukenetiana*; (j) *L. zeyheri*; (k) *L. pauciflora*; (l) *L. sepiaria*; (m) *L. uniflora*; (n) *L. wrightii*. Vouchers: (a1) from Rossouw 18619 (NBG); (a2) from Barker 9781 (NBG); (a3) from Boucher 2946e (NBG); (b1) from Bolus 23854 (BOL); (b2) from Van Wyk 2550 (JRAU); (b3) from Schutte 261 (JRAU); (c1) from Compton 21819 (NBG); (c2) from Esterhuysen 4601 (BOL); (d1) from Le Roux et al. 15 (JRAU); (d2) from Compton 10116 (NBG); (d3) from Salter 7976 (BOL); (e1) from Bohnen 7617 (NBG); (e2) from Patterson 773 (BOL); (e3) from Esterhuysen 23259 (BOL); (f1) from Esterhuysen 14102 (P); (g1) from Esterhuysen 16214 (BOL); (g2) from Schlechter 9978 (BOL); (g3) from Esterhuysen 13368 (BOL); (h1) from Van Wyk 3009 (JRAU); (h2) from Hall. s.n. (NBG); (h3) from Lewis 472 (SAM); (i1) from Hutchinson 221 (BOL); (i2) from Maguire 453 (NBG); (i3) from Acock 2062 (S); (j1) from Zeyher 378 (S); (k1) from Fourcade 3117 (BOL); (k2) from Hanekom 3189 (NBG); (k3) from Fourcade 1707 (BOL); (l1) from Anon. 252 (NBG); (l2) from Marloth 6240 (NBG); (l3) from Barker 6515 (NBG); (m1) Boucher 1878 (NBG); (m2) Stokoe 964 (BOL); (n1) Esterhuysen 31726 (BOL); (n2) Boucher
The inner tips of the calyx lobes are minutely pubescent in all species of section *Lebeckia*. Fig. 3.15 is an example of hairs found on the inside of a calyx lobe. The hair distribution inside calyx lobes does not seem to be diagnostically useful at species or sectional level, as this is also found in the other sections of *Lebeckia* (and in *Rafnia* – see Campbell and Van Wyk, 2001). The outer surface of the calyx in *L. uniflora* and *L. wrightii* are hairy, but totally glabrous in all the other species.

Fig. 3.15. SEM photograph of *Lebeckia meyeriana* showing the hair distribution on the inner surface of a calyx lobe, which is typical for all species in *L. section Lebeckia*. Voucher: from *Van Wyk 3009* (JRAU). Scale bar: 100 µm.