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Inflorescence morphology of *Lachnaea* and *Cryptadenia* (Thymelaeaceae)

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Keywords: *Cryptadenia*, inflorescence morphology, *Lachnaea*, Thymelaeaceae

ABSTRACT

The current delimitation of *Lachnaea* L. and *Cryptadenia* Meisn. is based on the inflorescence morphology. In *Lachnaea* both indeterminate and determinate inflorescences occur, whereas in *Cryptadenia* only determinate inflorescences are present. The indeterminate inflorescences in *Lachnaea* are capitate or umbellate. The determinate inflorescences in both genera comprise a solitary, terminal flower. It is concluded that the two genera cannot be distinguished on inflorescence structure.

UITTREKSEL

Lachnaea en *Cryptadenia* word tans op grond van hul bloeiwyses onderskei. Beide onbepaalde en bepaalde bloeiwyses kom by *Lachnaea* voor, terwyl by *Cryptadenia* net bepaalde bloeiwyses voorkom. Die onbepaalde bloeiwyses by *Lachnaea* is hofies of skerms. Die bepaalde bloeiwyses by beide genera bestaan uit 'n enkel, terminale blom. Die gevolgtrekking word gemaak dat dié twee genera nie op grond van die struktuur van die bloeiwyses onderskei kan word nie.

INTRODUCTION

The Thymelaeaceae, which is regarded as a medium-sized family comprising 50 genera and 720 species, occurs in both temperate and tropical regions (Mabberley 1990). Most genera belong to the subfamily Thymelaeoideae including the genus *Lachnaea* L. and the genus *Cryptadenia* Meisn. Both these genera are endemic in the Cape Province.

In the classification systems of the Thymelaeaceae by Endlicher (1847, sec. Domke 1934), Meisner (1857), Bentham & Hooker (1880), Gilg (1894) and Domke (1934), *Lachnaea* and *Cryptadenia* have always been placed next to each other, reflecting their close affinity. Only one previous worker, Baillon (1880), did not regard *Cryptadenia* as a separate genus but as a section of *Lachnaea*. In the last taxonomic treatment of the two genera, Wright (1915) followed the classification of Bentham & Hooker (1880).

The floral morphology of *Lachnaea* and its closest related genus, *Cryptadenia*, is similar. The flowers are bisexual, tetramerous, apetalous, with eight floral scales inserted on the hypanthium below the insertion of the eight stamens, which are arranged in two whorls of four each. To distinguish between these two genera Wright (1915) used the inflorescence structure. In *Lachnaea* he regarded the flowers to be terminal, capitate or rarely solitary, whereas in *Cryptadenia* he described them as axillary, solitary and bibracteolate. A study of the descriptions of the different taxa of both genera revealed that *L. axillaris* Meisn., *L. micrantha* Schltr. and *L. ruscifolia* Compton have flowers which are axillary and solitary, whereas the flowers of *L. penicillata* Meisn., according to Wright (1915), are terminal and solitary. If one should apply the criterion used by Wright (1915), the former three species should rather be placed in *Cryptadenia*. Thus, the criterion used by Wright does not hold.

A preliminary examination of herbarium specimens of the Western Cape herbaria has brought to light numerous misidentifications and *incertae*, illustrating the poor state of our knowledge of *Lachnaea* and *Cryptadenia*. The confusion which presently exists regarding the delimitation of *Lachnaea* and *Cryptadenia* can be partly ascribed to the inconsistencies in Wright's interpretation of the inflorescence morphology of these two genera (Wright 1915). As the inflorescence has been considered to be of great taxonomic importance in the past, the study of the inflorescence morphology was undertaken with the view to improving our understanding of these two genera.

Meisner (1840) instituted three sections, *Sphaeroclinium* Meisn., *Conoclinium* Meisn. and *Microclinium* Meisn., within *Lachnaea*, based on the inflorescence morphology. In his later publication of 1857 he followed the same classification. In the section *Sphaeroclinium* he included those taxa having a terminal, dense, many-flowered capitulum, which was either involucrate or evolucrate, the sessile flowers being arranged on a moderately thick, globose receptacle. Meisner (1840, 1857) included *L. buxifolia* Lam. and *L. filamentosa* (Thunb.) Meisn. in this section. In the section *Conoclinium* he regarded the inflorescence as a terminal or subterminal, few- to many-flowered, evolucrate capitulum. Here the moderately thick receptacle was at first hemispherical to conical but by later elongating, became subcylindrical. From the regular arrangement of the flower scars on the receptacle, he regarded the inflorescence as a spike and not a capitulum. In this section he included *L. capitata* (L.) Meisn. and *L. densiflora* Meisn. In the section *Microclinium* he included those taxa having flowers in sessile, terminal, subcapitate or subsolitary inflorescences, or those rarely having axillary, solitary flowers, namely *L. axillaris*, *L. diosmoides* Meisn., *L. ericoides* Meisn. and *L. penicillata* Meisn. Meisner (1840)

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regarded the flowers of *Cryptadenia* as terminal, solitary or geminate, or occasionally as axillary and solitary, but in his later publication of 1857 he described the flowers as being terminal and subsolitary.

Gilg (1894) regarded the inflorescences in *Lachnaea* as usually being terminal, many-flowered heads, but occasionally, when consisting of two flowers, as mostly axillary. In *Cryptadenia* he regarded the flowers as solitary, axillary, with two bracteoles.

Domke (1934) described the inflorescences in *Lachnaea* as being usually terminal heads, which are basally enclosed by an involucre, or congested heads without an involucre. No mention was made of the solitary-flowered inflorescence in his generic description of the genus. In *Cryptadenia* he regarded the flowers as being solitary or few, either terminal or axillary with two bracteoles.

Dyer (1975) followed Wright (1915) and also used the inflorescence structure to distinguish between *Lachnaea* and *Cryptadenia*. According to Dyer (1975) the flowers in *Lachnaea* are arranged either in terminal, bracteate or ebracteate heads or a congested spike, or are rarely solitary, whereas in *Cryptadenia* the flowers are axillary and solitary.

In the most recent publication on the inflorescence morphology of the Thymelaeaceae, Weberling & Herkommer (1989) regarded the inflorescences in *Lachnaea* as being capitate or spicate, or having solitary, axillary flowers borne on a proliferating spike as in *L. axillaris*. In *Cryptadenia* they considered the flowers as being solitary and terminal.

From the above literature survey there seems to be consensus with regard to the terminal, many-flowered heads but not with regard to the position of the single-flowered inflorescences in *Lachnaea*. Similarly in *Cryptadenia* different views are expressed with regard to the position of the inflorescence and the number of flowers in an inflorescence.

The aim of the present investigation was to determine whether the inflorescence morphology could be used to delimit the two genera.

MATERIALS AND METHODS

Material used in this study comprised herbarium specimens and plants collected in the wild, with the exception of *L. nervosa* Meisn. of which fresh material was unobtainable. Eighteen taxa were selected, 14 from *Lachnaea* and four from *Cryptadenia*. The aim in selecting the taxa was to have as broad a representation as possible of all the taxa in the two genera. The criteria used for selecting the taxa were: 1, taxa representative of the three sections instituted by Meisner (1840), taking in account the variation in each section; and 2, taxa with solitary flowers.

Four of the five species of *Cryptadenia* currently recognized were studied. *Cryptadenia breviflora* Meisn. was excluded as it is an intermediate taxon between *Cryptadenia grandiflora* (L.f.) Meisn. and *Cryptadenia uniflora* Meisn. Levyns (1950) considered *C. breviflora* as a hybrid between the two species.

The 18 species studied were: *Lachnaea aurea* Eckl. & Zeyh., *L. axillaris*, *L. burchellii* Meisn., *L. buxifolia*, *L. capitata*, *L. densiflora*, *L. diosmoides*, *L. ericoides*, *L. eriocephala* L., *L. filamentosa*, *L. funicaulis* Schinz, *L. nervosa*, *L. penicillata*, *L. ruscifolia*, *Cryptadenia filicaulis* Meisn., *C. grandiflora*, *C. laxa* Wright and *C. uniflora* (nomenclature according to Arnold & De Wet 1993).

RESULTS

Inflorescence structure within *Lachnaea*

Both major types of inflorescences, as recognized by Radford *et al.* (1974) and Cronquist (1988), namely indeterminate and determinate, occur in *Lachnaea*.

Indeterminate inflorescences

Within the indeterminate inflorescences the capitulum and the umbel are represented.

1. Species with capitula

L. buxifolia, *L. capitata*, *L. densiflora* and *L. filamentosa* have terminal, multi-flowered, ebracteate capitula. These capitula are borne singly at the ends of branches on sericeous peduncles, which vary in length from 3–10 mm. The sessile flowers are arranged on a moderately thick, convex receptacle, which elongates during the flowering period, becoming narrowly conical or conical. Different stages of flower development are present within a capitulum. The fruiting stage may be present basally while buds are still developing distally. An accurate number of flowers in an inflorescence is therefore not easily determined. The number of mature flowers, at a given time, varies from ± 50 in *L. buxifolia*, 20–50 in *L. filamentosa*, ± 12 in *L. densiflora* and only 1–3 in *L. capitata*.

After flowering, vegetative growth is resumed by lateral branches developing in the axils of the upper leaves immediately beneath the capitulum. These will eventually terminate in new capitula in the following flowering period. However, some of these lateral shoots, as in *L. densiflora*, may terminate in capitula within the same flowering period. Lateral branches may also develop from the axils of the leaves below the distal leaf on the main flowering branches. These branches will, in the following flowering period, be terminated by capitula (Figure 1).

2. Species with umbels

Two types of indeterminate umbels, namely bracteate umbels as in *L. eriocephala* and ebracteate umbels as in *L. diosmoides*, are recognized. The pedicels remain in the old inflorescences for some time after the upper portion of the flowers and the fruits have been shed. The number of pedicels present indicates the number of flowers in each inflorescence.

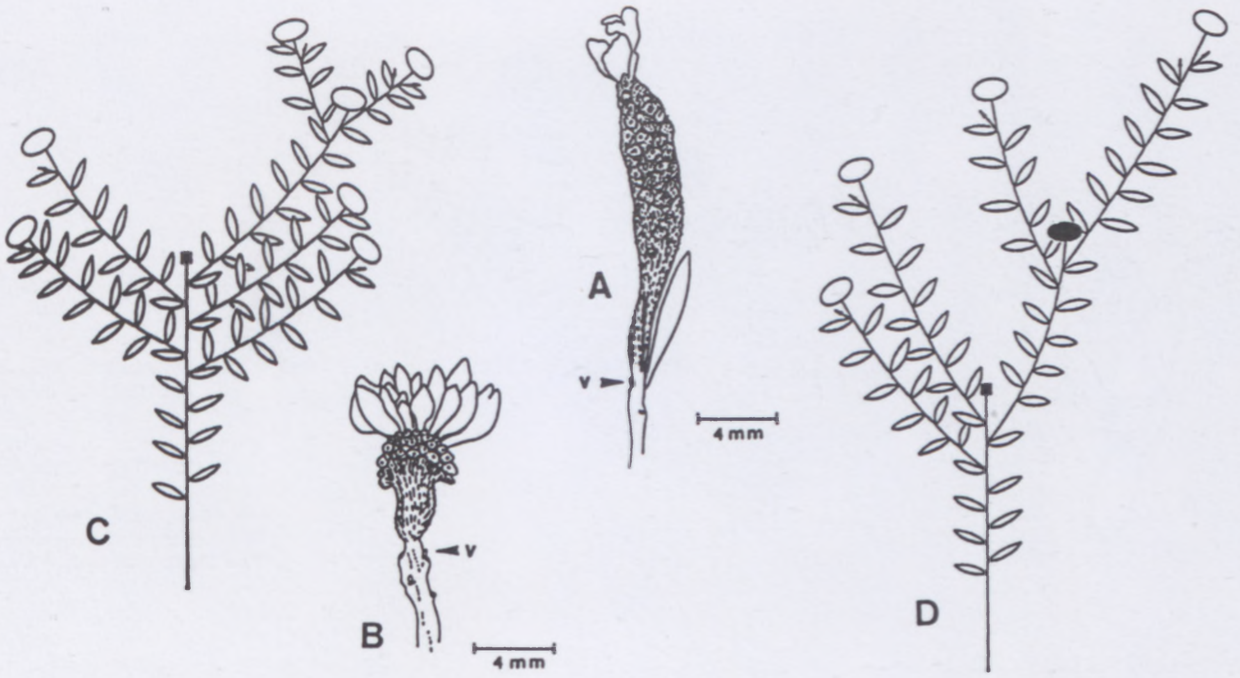

FIGURE 1.—Capitate inflorescences of *Lachnaea* species. A, capitulum of *L. capitata, Beyers 128*, illustrating elongated receptacle after lower flowers have been shed; B, capitulum of *L. buxifolia, Beyers 122*, with flowers partly removed. Diagrammatic illustration of branching pattern of flowering branches: C, *L. densiflora*; D, *L. filamentosa*: ■, remains of previous year's inflorescence; ○, flowering capitulum; ●, capitulum with fruits only; v, bud of new vegetative shoot.

2.1. Species with sessile bracteate umbels

Sessile, bracteate umbels occur in *L. aurea, L. eriocephala* and *L. penicillata*. In *L. eriocephala* (Figure 2) the inflorescence is comprised of about 40 shortly pedicellate flowers, which are surrounded by a bracteate involucrum consisting of four large bracts, in two whorls of two. These bracts follow on the stem after the linear-elliptic to lanceolate leaves. Similarly in *L. aurea* the ± 50-flowered umbel is surrounded by 8–10 bracts which are spirally arranged. From the axils of the foliage leaves immediately below the bracteate umbels, vegetative growth is resumed by lateral branches in both species. These lateral branches will eventually terminate in bracteate umbels in the following flowering period. Lateral branching is not only restricted to the axil of the distal leaf when the leaves are alternately arranged as in *L. aurea*, or to the distal pair of leaves, when opposite as in *L. eriocephala*, but may originate from the axils of the other upper foliage leaves. These lateral branches are also terminated by bracteate umbels in the following flowering period. In both cases the lateral branches may elongate considerably.

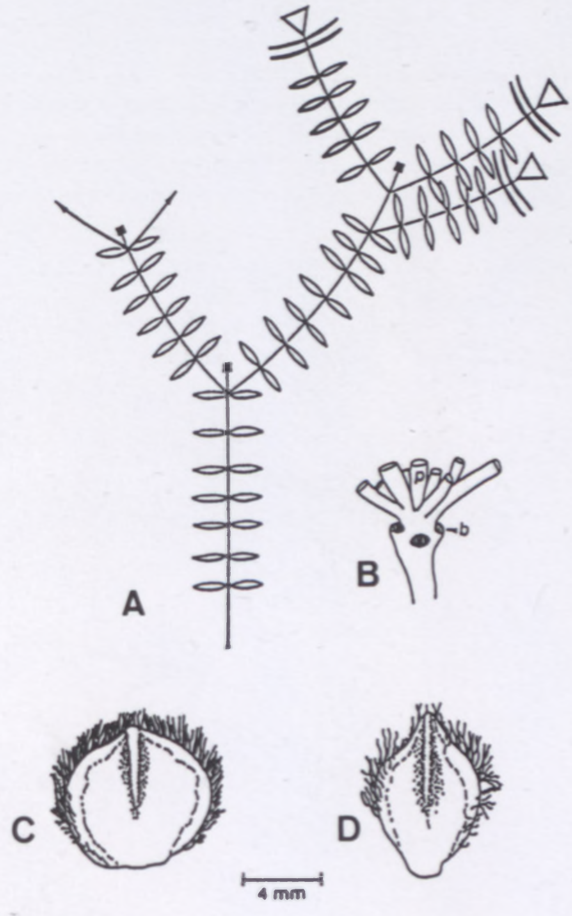

FIGURE 2.—*L. eriocephala, Beyers 54*. A, diagrammatic illustration of branching pattern of flowering branches; B, bracteate umbel with flowers and bracts removed; C, abaxial view of one of inner pair of bracts; D, abaxial view of one of outer pair of bracts; ■, remains of previous year's inflorescence; ▽, umbel; b, scar of removed bract; p, pedicel.

In *L. penicillata* (Figure 3) the inflorescence is also a terminal bracteate umbel. The umbel, usually eight-flowered, is surrounded by four bracts, in two whorls of two each. Only the distal portion of a single mature flower is visible at a time. Wright (1915) inadvertently regarded the flowers as being 'terminal, solitary, sessile'. The elongated pedicels and buds enclosed by the bracts were ignored by him. Lateral branching arises from the axils of either the first or second pair of foliage leaves immediately below the inflorescence. These lateral branches may elongate considerably or may be reduced to comprising only one or two pairs of foliage leaves before being ter-

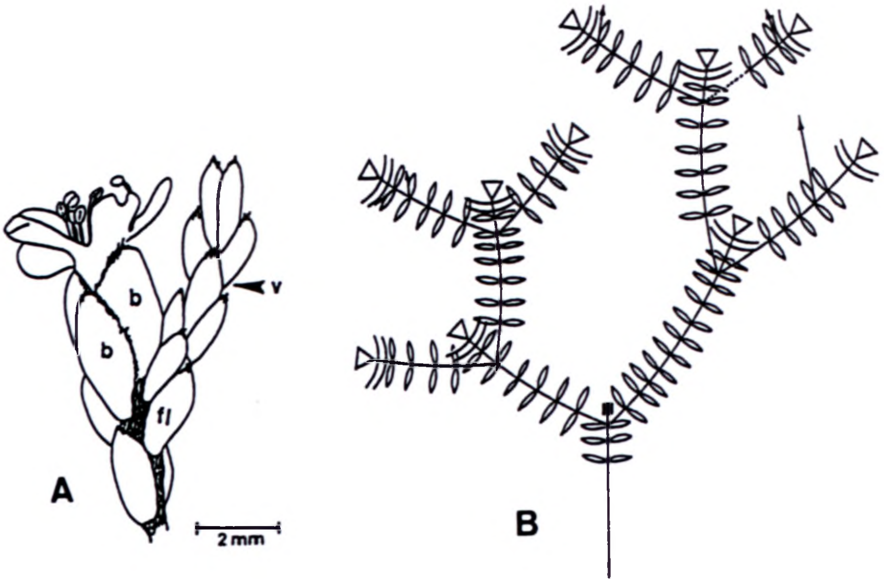

FIGURE 3.—*L. penicillata*, *Oliver & Fellingham 9145*. A, flowering branch with a terminal bracteate umbel; B, diagrammatic illustration of branching pattern of flowering branches; ■, remains of previous year's inflorescence; ∇, umbel; b, bract; fl, foliage leaf; v, new vegetative shoot.

minated by an inflorescence. Up to three generations of flowering branches may develop in one flowering period. Vegetative growth is resumed by lateral branches developing from the axils of the upper foliage leaves of the last flowering generation.

2.2. Species with sessile ebracteate umbels

In *L. diosmoides*, *L. ericoides*, *L. funicaulis* and *L. nervosa* the flowers are borne in sessile, ebracteate umbels at the tips of the branches. No bracts surround the inflorescence as new vegetative growth arises from the axils of the leaves immediately beneath the umbel (Figure 4). The number of flowers per umbel varies among the different species and also within each species. In *L. diosmoides* and *L. funicaulis* 6–20 flowers are present, whereas in *L. nervosa* the number varies from 4–14 and in *L. ericoides* from 2–8. As a result of the different developmental stages of the flowers present in each umbel, only a few mature flowers are present at a time. Lateral branching is resumed from the axil of the upper leaves below the inflorescences but is not restricted only to the most distal leaves immediately behind the inflorescence. In *L. nervosa* (Figure 4) short, lateral branches also arise in the axils of the leaves lower down on the main flowering branch, which in the same flowering period are terminated by inflorescences. Consequently the main flowering

FIGURE 4.—Diagrammatic illustration of branching pattern of flowering branches: A, *L. ericoides*; B, *L. nervosa*. C, terminal ebracteate umbel in *L. nervosa*, *De Kock 152*, illustrating new vegetative shoot (v) in the axil of the distal foliage leaf (fl). ■, remains of previous year's inflorescence; ∇, umbel.

branch has the appearance of a racemose inflorescence. Similarly in *L. diosmoides* lateral vegetative shoots arising in the axils of the leaves immediately below the inflorescence, may be terminated by inflorescences in the same flowering period. Here they may overtop the umbel on the main flowering branch, forming a dense cluster of umbels, and at the same time reduced lateral shoots may develop lower down in the axils of the foliage leaves of the same main branch with a racemose appearance, as in *L. nervosa.*

In *L. ericoides* (Figure 4) a first and second generation of flowering shoots may occur. These shoots, as in the previous taxa, develop from the axils of the leaves immediately below the inflorescence. Below the most distal leaf on the main flowering shoot, further lateral shoots may develop which may terminate in inflorescences in the same flowering period or in the next flowering period. These flowering shoots are, unlike those in *L. diosmoides,* restricted to the upper leaves on the main flowering branch. Vegetative shoots may also develop lower down on the main flowering branches of the previous flowering period which again will be terminated by inflorescences in the following flowering period.

In *L. funicaulis* a pair of bract-like foliage leaves occurs at the base of the umbels. These umbels appear bracteate and resemble those of *L. penicillata,* but, unlike *L. penicillata,* lateral vegetative growth develops in the axils of the bract-like foliage leaves. These lateral vegetative shoots will terminate in ebracteate umbels in the following flowering period. Reduced lateral shoots also develop in the axils of the upper leaves, behind the bract-like foliage leaves on the main flowering branch, which may terminate in ebracteate umbels within the same flowering period, forming a cluster of inflorescences towards the end of the main flowering branch.

In *L. burchellii* (Figure 5), contrary to the interpretation of Meisner (1840, 1857) and Wright (1925) who regarded the inflorescences to be bracteate, the inflorescences are terminal, sessile, ebracteate umbels. The umbels consist of up to ten flowers, with 1 or 2 mature flowers at a time. Vegetative growth is resumed from the axils of the leaves immediately below the umbels. On some specimens the inflorescences appear to be bracteate. These 'bracteate' umbels are in fact reduced lateral branches, each terminated by an ebracteate umbel. The leaves on these branches differ in size and shape from the foliage leaves on the rest of the plant. In the axil of the most distal leaf

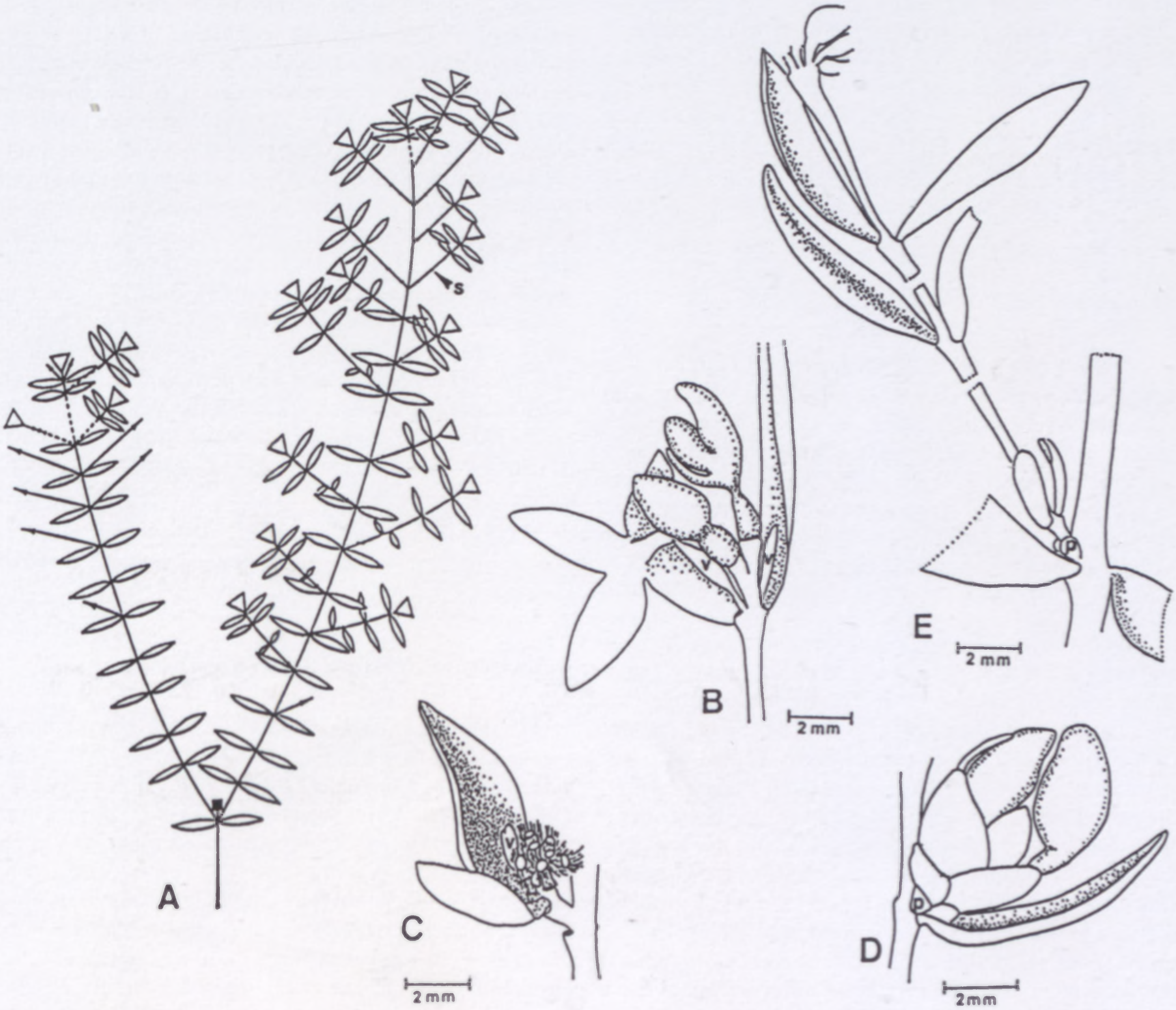

FIGURE 5.—*L. burchellii.* A, diagrammatic illustration of branching pattern of flowering branches; B, terminal ebracteate umbel, *Spreeth 155;* C, short lateral flowering shoot illustrating new vegetative shoot (v) in axil of bract-like leaf, *Spreeth 155;* D, short lateral flowering shoot, *Oliver 9251;* E, elongated lateral flowering shoot showing similar small prophylls (p) basally; s, scar of caducous bract-like leaves; ∇, umbel.

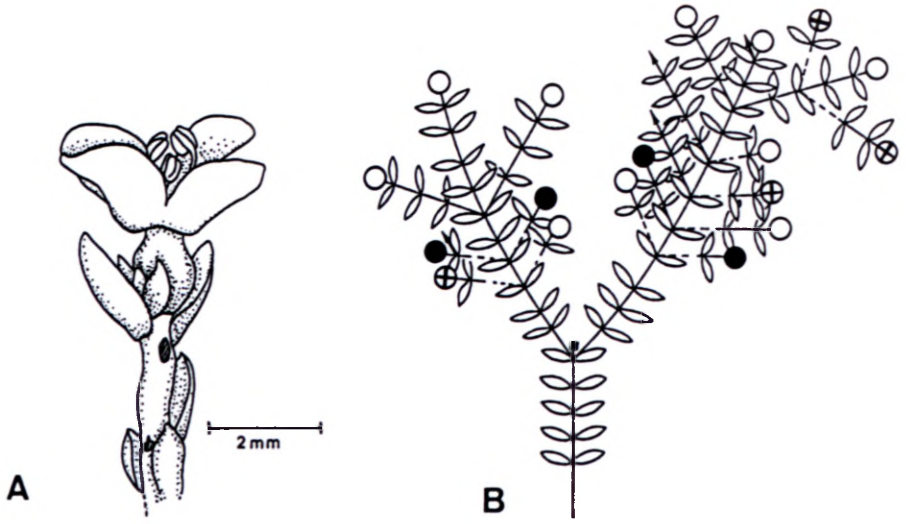

FIGURE 6.—*L. axillaris*. A, flowering shoot illustrating new vegetative shoot in axil of distal leaf, *Morley 174*; B, diagrammatic illustration of branching pattern of flowering branches; ■, scar of flower of previous year; ⊕, flower bud; ◯, open flower; ●, fruit.

on one of these reduced flowering branches, a well-developed bud of the new vegetative shoot was observed. The lower two pairs of leaves on some of the elongated lateral flowering branches, resemble those modified foliage leaves of the reduced flowering branches. These leaves are often caducous. Vegetative growth is resumed by lateral branches developing from the axils of the upper leaves immediately below the umbel and may also originate from the leaf axils lower down on the main flowering branch. These lateral branches will terminate in umbels in the following flowering period. Flowering branches may develop at random on the main flowering branch, as in *L. nervosa*. These flowering branches arise from the axils of the leaves behind the most distal leaf pair during the same flowering period. The main flowering branch thus has the appearance of a racemose inflorescence.

Determinate inflorescences

Meisner (1840) described the flowers of *L. axillaris* as being axillary, opposite or scattered, always solitary, with two intra-axillary bracteoles. In his later publication (1857) he referred to the flowers as being subsolitary, axillary or rarely terminal. Wright (1915) regarded the flowers as being axillary and solitary. According to Weberling & Herkommer (1989) the flowers of *L. axillaris* are solitary, axillary with two transverse bracteoles.

The flowers of *L. axillaris* were found to be solitary and terminal. A well-developed bud of the new vegetative shoot occurs in the axil of one of the leaves of the pair of foliage leaves immediately below the flower (Figure 6). Lateral branches, each terminated by a solitary flower, develop at random on the main flowering branches within the same flowering period. These flowering branches arise from the axils of the foliage leaves below the leaf pair immediately behind the terminal flower. These lateral flowering branches vary in length and may even be reduced to having one pair of opposite leaves. Consequently the main flowering branch may have the appearance of a racemose or spicate inflorescence (Figure 6). Previous authors inadvertently regarded these leaves immediately behind the solitary flower as transverse bracteoles. It was found that the new vegetative growth originates in the axils of these leaves and terminates in flowers in the following flowering period. This growth is not always visible on herbarium material as specimens are usually collected when they are in full flower.

The flowers of *L. ruscifolia* were regarded by Compton (1953) as being 'solitary, axillary, sessile'. On studying fresh material in the fruiting stage, well-developed vegetative buds were found in the axils of the bracteoles (Figure 7). These bracteoles are in fact bracteose foliage leaves similar to those found on the short lateral flowering shoots in *L. burchellii*. In *L. ruscifolia* the flowers are therefore solitary and terminal on much reduced, lateral, flowering shoots which develop at random in the axils of the foliage leaves on the main flowering branches giving them a spicate appearance (Figure 7). Occasionally the lateral flowering shoot may consist of an additional pair of foliage leaves between the bracteose leaves (prophylls) and the flower (Figure 7). No terminal flower was observed on the main branches probably due to the abortion of the apical meristem. From the axil of the leaf behind the aborted meristem new vegetative growth may resume or a reduced flowering shoot may develop (Figure 7). Two scarious prophylls which resemble the bracteose leaves on the lateral flowering shoot, occur at the base of the developing lateral vegetative shoot (Figure 7).

Thus, in both *L. axillaris* and *L. ruscifolia* the inflorescences are determinate, consisting of solitary, terminal flowers.

Inflorescence structure within *Cryptadenia*

The inflorescences in *Crytadenia* are all cymose. In all the taxa well-developed buds of the new proliferating shoot develop in the axils of the upper leaf pair immediately behind the flower (Figure 8). These vegetative shoots usually terminate in flowers in the following flowering period, except in *C. filicaulis* and *C. grandiflora* where they may terminate in flowers in the same flowering period. Lateral branches may also arise at random from the axils of the leaves beneath the distal pair below the terminal flower on the main flowering branch. These branches vary in length and may even be reduced to only the terminal flower and a pair of foliage leaves as in *C. filicaulis* (Figure 8). Consequently the main flowering branch, as in *L. axillaris*, has the appearance of a racemose or spicate inflorescence. Lateral branches, each terminating in a solitary flower in the following flowering period, may also develop from the axils of the leaves lower down on the main flowering branches (Figure 8).

DISCUSSION

In the genus *Lachnaea* the flowers are arranged in terminal, indeterminate, capitate or umbellate inflorescences, or they are solitary and terminal. In *Cryptadenia* the flowers are solitary and terminal. Determinate inflorescences occur in both *Lachnaea* and *Cryptadenia*, whereas indeterminate inflorescences occur only in *Lachnaea*. Table 1.

In both genera the differentiation of a long shoot/short shoot system can be observed. In some taxa within *Lachnaea* and *Cryptadenia* this system is more conspicuous than in others. In both genera new vegetative growth arises from the axils of the foliage leaves immediately below the inflorescences, and this may terminate in an inflorescence within the same flowering period. Thus two generations of flowering branches may occur together on a plant (Figures 4 & 8).

Weberling & Herkommer (1989) regarded the terminal, single-flowered inflorescence found in *Cryptadenia* as a monotelic inflorescence. The inflorescence in *L. axillaris* and *L. ruscifolia* can therefore be regarded as monotelic. The polytelic inflorescence on the other hand would, according to their terminology, include the capitulum and umbel in *Lachnaea*. According to Weberling (1983) the polytelic type of inflorescence has probably been derived repeatedly from the monotelic type during the evolution of angiosperms by the reduction of the terminal flower and specialization of the paracladia of the monotelic system. The distal elements are reduced to single lateral flowers or lateral cymes, which constitute elements of an apical system composed of lateral flowers. Therefore the floral axis, instead of terminating in a single flower, terminates in a multi-flowered polytelic inflorescence.

According to Weberling & Herkommer (1989) *Gonystylus* Teijsm. & Binn. and *Amyxa* van Tiegh. of the Gonystyloideae which is regarded as a relatively primitive group, have monotelic synflorescences (synflorescence according to Weberling 1983). Within the Thymelaeoideae, the Gnidioideae and probably the Aquilarioideae, certain taxa were also found to have monotelic synflorescences. They came to the conclusion that, considering the other more or less primitive characters and the different taxonomic evaluation of those combinations, it was impossible to draw any taxonomic conclusions exclusively from the existence of the monotelic synflorescences within those taxa.

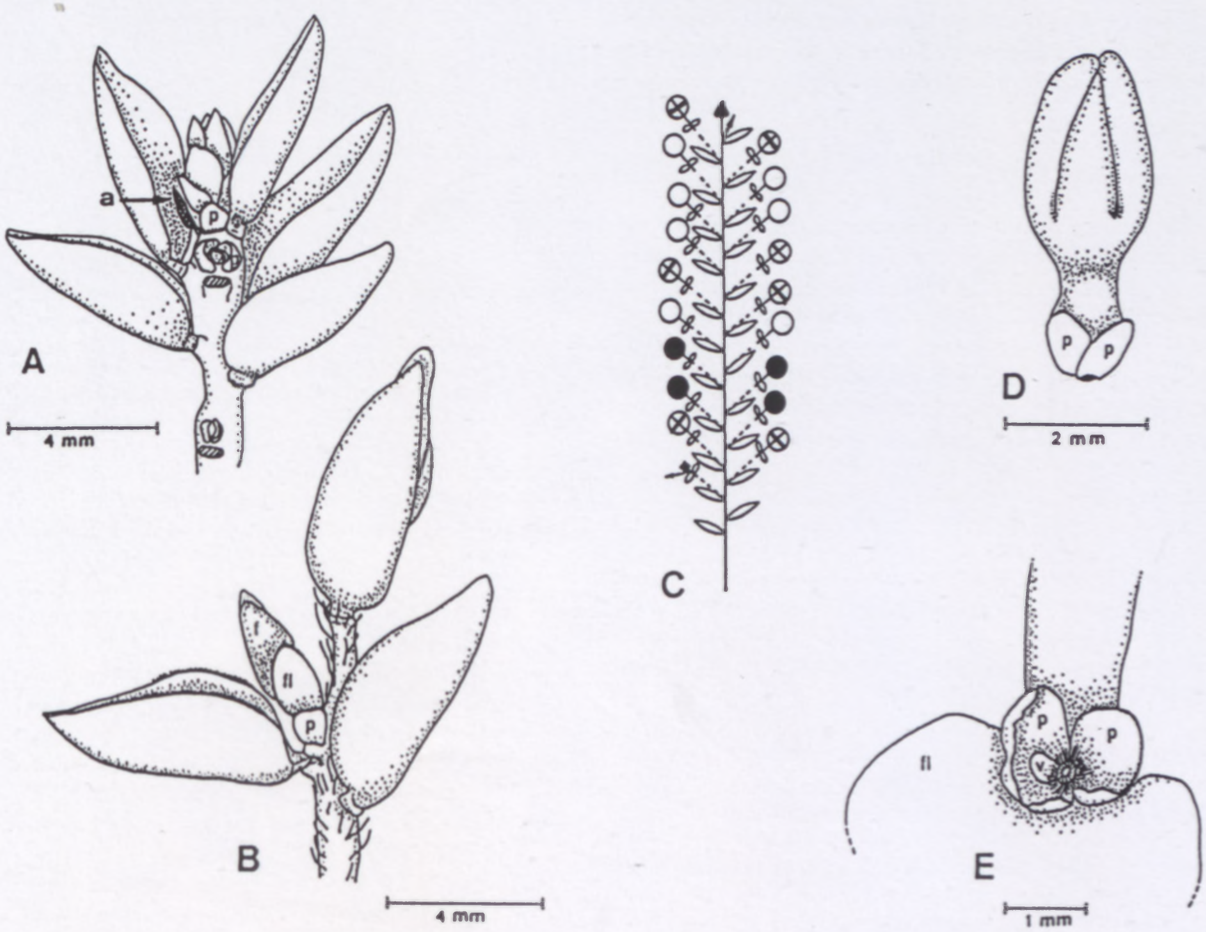

FIGURE 7.—*L. ruscifolia*. A, branch illustrating aborted apical meristem (a) being displaced by new lateral shoot developing from axil of distal foliage leaf, *Marshall 39*; B, main branch with short lateral flowering shoot, *Vlok 166*; C, diagrammatic illustration of branching pattern of flowering branches; D, flower bud with two bracteose leaves (p), *Vlok 166*; E, vegetative shoot (v) arising from axil of one of bracteose leaves; f, flower; fl, foliage leaf; ▲, aborted apical meristem; ⊕, flower bud; ○, open flower; ●, fruit; ■, scar of flower of a previous year.

TABLE 1.—Inflorescence characters of *Cryptadenia* and *Lachnaea*

Species	Indeterminate inflorescences				Determinate inflorescences with solitary flower
	Capitulum	Umbel	No. bracts	No. flowers	
Cryptadenia					
filicaulis					x
grandiflora					x
laxa					x
uniflora					x
Lachnaea					
aurea		x	8–10	± 50	
axillaris					x
burchellii		x	0	±10	
buxifolia	x		0	± 50 (mature)	
capitata	x		0	1–3 (mature)	
densiflora	x		0	± 12 (mature)	
diosmoides		x	0	6–20	
ericoides		x	0	2–8	
eriocephala		x	4	± 40	
filamentosa	x		0	20–50 (mature)	
funicaulis		x	0	6–20	
nervosa		x	0	4–14	
penicillata		x	4	± 8	
ruscifolia					x

Weberling & Herkommer (1989) regarded the ramification type of the polytelic synflorescences in the Thymelaeaceae to be thyrsic. Within many genera, according to them, these synflorescences have been reduced to racemes, spikes or umbels and in some taxa, as in *Lachnaea*, the umbel-like aggregation of flowers is combined with the formation of an involucrum.

From the above one could conclude that within *Lachnaea* the terminal, solitary flower is the primitive state and that the bracteate umbel is the advanced state.

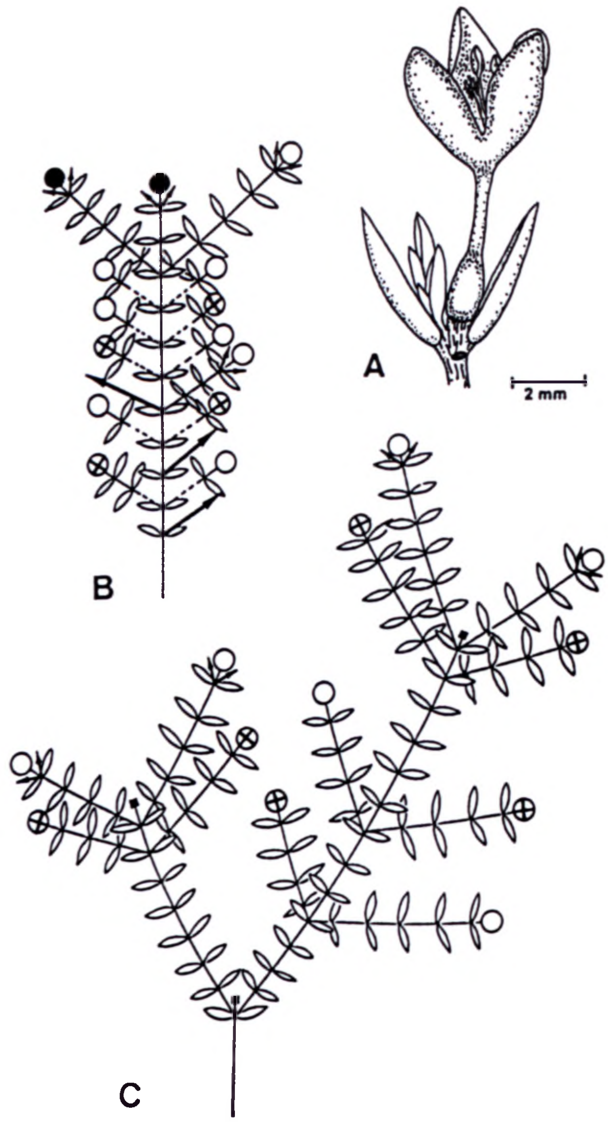

FIGURE 8.—Inflorescence structure and branching patterns of *Cryptadenia* species. A, flowering shoot in *C. laxa*, *Bodkin sub Guthrie 3585*. Diagrammatic illustration of branching pattern of flowering branches: B, *C. filicaulis*; C, *C. uniflora*; ⊕, flower bud; ○, open flower; ●, fruit; ■, scar of flower of a previous year.

CONCLUSION

The inflorescence morphology revealed determinate and indeterminate inflorescences in *Lachnaea* and only determinate inflorescences in *Cryptadenia*. In both genera the determinate inflorescence comprises a solitary, terminal flower. No distinct differences with regard to the inflorescence morphology could be found between these two genera. Therefore the inflorescence structure can not, as in the past, be used to distinguish between the two genera.

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