

**A REVISION OF *ARGYROLOBIUM*
(CROTALARIEAE, FABACEAE) IN SOUTH
AFRICA**

by

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ABSTRACT

A revision of 45 South African species of *Argyrolobium* is presented comprising nomenclature, typification, recorded distributions and full descriptions. In an attempt to reduce confusion between subtly different species, diagnostic characters are listed and comprehensive illustrations are provided. The dissertation includes numerous taxonomic and nomenclatural changes.

Currently two sections are recognised based on fruit morphology. This is replaced by a system of five new sections based on morphological, micromorphological and phytogeographical evidence.

Constraints and advantages of floral dimorphism and monomorphism are discussed with respect to the fecundity and distribution of sections. It is proposed that the occurrence of facultative cleistogamy in two sections has enhanced their success and distribution.

Generic and specific phylogeny is interpreted using models generated through cladistic methodology.

PREFACE

The experimental work in this thesis was performed under the supervision of Professor J. van Staden and Dr. C.H. Stirton, in the Botany Department of Natal University, Pietermaritzburg, on a part time basis from 1988-1994.

These studies have not been submitted in any form to another University and, except where acknowledged, are the results of my own work.

TREVOR JOHN EDWARDS

CONTENTS

Abstract

Preface

Acknowledgments

Introduction

Chapter 1 Materials & Methods

Chapter 2 Historical Perspectives

Chapter 3 Character Analysis

3.1 Vegetative Characters

3.1.1 Habit

3.1.2 Seed & Seedlings

3.1.3 Leaves

3.1.4 Leaf anatomy

3.1.5 Cytology

3.1.6 Alkaloids

3.2 Sexual Characters

3.2.1 Inflorescence structure

3.2.2 Flowers

3.2.3 Calyx

3.2.4 Corolla

3.2.5 Androecium & Palynology

3.2.6 Breeding systems

3.2.7 Flowering Times

Chapter 4 Phytogeography

Chapter 5 Conservation

Chapter 6 Cladistics

Chapter 8 Formal Taxonomy

Section *Amplexicaule*

1. *A. amplexicaule*

2. *A. crinitum*

Section *Lunare*

3a. *A. lunare* ssp. *lunare*

3b. *A. lunare* ssp. *sericeum*

4. *A. splendens*

Section *Transvaalense*

5. *A. frutescens*

6. *A. transvaalense*

7. *A. muddii*

8. *A. wilmsii*

9. *A. megarrhizum*

10. *A. longifolium*

- 11a. *A. speciosum* ssp. *speciosum*
- 11b. *A. speciosum* ssp. *macrophyllum*
- 12. *A. baptisioides*

Section *Polyphyllum*

- 13. *A. trifoliatum*
- 14. *A. polyphyllum*
- 15. *A. crassifolium*
- 16. *A. incanum*
- 17. *A. parviflorum*

Section *Argyrolobium*

- 18. *A. tomentosum*
- 19. *A. humile*
- 20. *A. ascendens*
- 21. *A. rotundifolium*
- 22. *A. rupestre*
- 23. *A. campicola*
- 24. *A. sericosemium*
- 25. *A. marginatum*
- 26. *A. molle*
- 27. *A. lotoides*
- 28. *A. pauciflorum*
- 29. *A. pumilum*
- 30. *A. candicans*
- 31. *A. stipulaceum*
- 32. *A. velutinum*
- 33. *A. argenteum*
- 34. *A. petiolare*
- 35. *A. pachyphyllum*
- 36. *A. barbatum*
- 37. *A. collinum*
- 38. *A. harmsianum*
- 39. *A. aciculare*
- 40. *A. filiforme*
- 41. *A. rarum*
- 42. *A. harveyanum*
- 43. *A. pseudotuberosum*
- 44. *A. angustissimum*
- 45. *A. tuberosum*

TABLES

Table 1. Sections within *Argyrolobium* and their component species.

Table 2. Recent Synonymy of *Argyrolobium* in South Africa.

Table 3. Various combinations of habit characters in species of *Argyrolobium*.

Table 4. *Argyrolobium* Chromosome numbers (2n) and source literature.

Table 5. A comparison of southern African centres of diversity for *Argyrolobium*, *Crotalaria* and *Lotononis*. Areas are indicated on inset.

Table 6. Characters used in the cladistic analysis of *Argyrolobium* using *Dichilus* and *Polhillia* as out-groups (characters 0 1 2 10 12 19 44 unordered).

Table 7. Data Matrix 1 of character states used in constructing cladograms of *Argyrolobium* (unordered characters 0 1 2 10 12 19 44).

Table 8. Statistics of strict consensus trees generated for *Argyrolobium* from matrices 1 (*A. petiolare* scored as florally monomorphic) & 2 (*A. petiolare* scored as unknown for floral polymorphism) (characters 0 1 2 10 12 19 44 unordered).

Table 9. Character weights following successive approximation weighting of the genus *Argyrolobium* using *Dichilus* as the outgroup (unordered characters 0 1 2 10 12 19 44).

Table 10. Character weights following successive approximation weighting of the genus *Argyrolobium* using *Polhillia* as the outgroup (unordered characters 0 1 2 10 12 19 44).

Table 11. Statistics of maximum parsimony cladograms generated for Group 5 (characters 0 1 2 10 12 19 44 unordered; *A. petiolare* included in matrix 2).

Table 12. Character weights following successive approximation weighting of Group 5 when woodiness and perennation are considered ordered multistate characters (characters 1 10 12 19 44 unordered; group synapomorphies removed).

Table 13. Statistics of cladograms generated for Group 5 when woodiness and perennation (0 & 2) are considered ordered multistate characters using *A. incanum* and a hypothetical outgroup.

FIGURES

Figure 1. Habit diagrams of *Argyrolobium*.

Figure 2. Seeds of selected *Argyrolobium* and *Polhillia* species showing lateral and hilar views.

Figure 3. Seeds of selected *Argyrolobium* and *Polhillia* species showing lateral and hilar views.

Figure 4. Hilar views of selected *Argyrolobium* species.

Figure 5. Testa micromorphology of selected *Argyrolobium* species.

Figure 6. Leaf morphology of selected *Argyrolobium* species.

Figure 7. Distribution of *Argyrolobium* species with large stipules.

Figure 8. Calyx morphology of selected *Argyrolobium* species.

Figure 9. Calyx morphology of selected *Argyrolobium* species.

Figure 10. Calyx morphology of selected *Argyrolobium* species.

Figure 11. Standard morphology of selected *Argyrolobium* species.

Figure 12. Standard morphology of selected *Argyrolobium* species.

Figure 13. Bar graph showing the distribution of petal sculpturing in *Argyrolobium*.

Figure 14. Bar graph showing the occurrence of sculpturing in the sections of *Argyrolobium*.

Figure 15. Wing and keel morphology in *Argyrolobium*.

Figure 16. Wing and keel morphology in *Argyrolobium*.

Figure 17. Wing and keel morphology in *Argyrolobium*.

Figure 18. Pollen morphology and wall stratification.

Figure 19. Floral diagrams of *Argyrolobium*: A. chasmogamous flower; B. cleistogamous flower.

Figure 20. Floral development of *Argyrolobium molle*.

Figure 21. *Argyrolobium ascendens*. A. Cleistogamous calyx; B. cleistogamous standard; C. chasmogamous standard; D. chasmogamous calyx.

Figure 22. *Argyrolobium ascendens* dissected cleistogamous flower with the androecium and corolla reflexed.

Figure 23. Distribution of florally dimorphic species in South Africa.

Figure 24. Distribution of florally monomorphic species in South Africa.

Figure 25. Bar graphs of flowering times in: A. *A. molle*; B. *A. pachyphyllum*; C. *A. pumilum*; D. *A. harmsianum*; E. *A. velutinum*; F. *Argyrolobium*.

Figure 26. Bar graphs of flowering times in: A. *A. lotoides*; B. *A. tomentosum*; C. *A. rupestre*; D. *A. pauciflorum*; E. *A. humile*; F. *A. rotundifolium*.

Figure 27. Bar graphs of flowering times in: A. *A. harveyanum*; B. *A. filiforme*;

Figure 27. Bar graphs of flowering times in: A. *A. harveyanum*; B. *A. filiforme*; C. *A. aciculare*; D. *A. tuberosum*; E. *A. rarum*; F. *A. pseudotuberosum*.

Figure 28. Bar graphs of flowering times in: A. *A. polyphyllum*; B. *A. trifoliatum*; C. *A. crassifolium*; D. *A. incanum*; E. *A. barbatum*; F. *A. argenteum*.

Figure 29. Bar graphs of flowering times in: A. *A. speciosum*; B. *A. longifolium*; C. *A. baptisioides*; D. *A. amplexicaule*; E. *A. petiolare*; F. *A. lunare*.

Figure 30. Bar graph of flowering times in: A. *A. frutescens*; B. *A. transvaalense*; C. *A. muddii*; D. *A. wilmsii*; E. *A. megarrhizum*; F. *A. collinum*.

Figure 31. Bar graphs of flowering times in: A. *A. candicans*; B. *A. campicola*; C. *A. sericosemium*; D. *A. marginatum*; E. *A. stipulaceum*; F. *A. ascendens*.

Figure 32. Species density recorded for *Argyrolobium*.

Figure 33. Species density recorded for *Argyrolobium* sect. *Argyrolobium*.

Figure 34. Species density recorded for *Argyrolobium* sect. *Amplexicaule* and *Argyrolobium* sect. *Lunare*.

Figure 35. Species density recorded for *Argyrolobium* sect. *Transvaalense* and for *Argyrolobium* sect. *Polyphyllum*.

Figure 36. Strict consensus tree of *Argyrolobium* in South Africa using *Dichilus* as the outgroup (Characters 0 1 2 10 12 19 44 unordered) (only the basal topology is illustrated).

Figure 37. Strict consensus tree of *Argyrolobium* in South Africa using *Polhillia* as the outgroup (Characters 0 1 2 10 12 19 44 unordered) (only the basal topology is illustrated).

Figure 38. Strict consensus tree of Group 5 polarising aerial perennation and woodiness as specialised and using a hypothetical outgroup based on *A. incanum* (Characters 1 10 12 19 44 unordered) length 123; ci 76; ri 85).

Figure 39. Strict consensus tree of Group 3 using *A. incanum* as the outgroup (Characters 0 1 2 10 12 19 44 unordered), length 46 steps; ci 94; ri 94.

Figure 40. Chosen cladogram of Group 4 using *A. transvaalense* as the outgroup (Characters 0 1 2 10 12 19 44 unordered), length 14 steps; ci 78; ri 57.

Figure 41. *Argyrolobium amplexicaule*. A. Flowering branch; B. bract and bracteoles; C. calyx; D. keel; E. standard; F. wings; G. androecium; H. stipules; I. leaf.

Figure 42. *Argyrolobium crinitum*. A. Vegetative branch; B. calyx; C. wing; D. keel; E. standard; F. calyx, pedicel and bract. Voucher: *Drège s.n.*

Figure 43. Recorded distribution of *A. amplexicaule* & *A. crinitum*.

Figure 44. *Argyrolobium lunare* ssp. *lunare*. A. Flowering branch; B. standard; C. wing; D. keel; E. calyx.

Figure 45. *Argyrolobium lunare* ssp. *sericeum*. A. Flowering branch; B. standard; C. calyx; D. wing; E. keel; F. androecium.

Figure 46. *A. lunare* ssp. *lunare*; A₁ keel, A₂ wing, A₃ androecium, A₄ large anther, A₅ small anther, A₆ calyx.

A. lunare ssp. *sericeum*; B₁ keel, B₂ wing, B₃ androecium, C₁ keel, C₂ wing, C₄ large anther, C₅ small anther, C₆ calyx.

Figure 47. *Argyrolobium splendens*. A. reproductive branches; B. calyx, inner surface; C. wing; D. keel; E. standard.

Figure 48. Recorded distribution of *A. lunare* & *A. splendens*.

Figure 49. *Argyrolobium frutescens*. A. Flowering branch; B. calyx; C. standard; D. bract & bracteoles; E. keel; F. wing.

Figure 50. *Argyrolobium transvaalense*. A. Flowering branch; B. androecium; C. keel; D. wing; E. standard, abaxial surface; F. calyx with subtending bracts and bracteoles.

Figure 51. Recorded distribution of *A. frutescens* & *A. transvaalense*.

Figure 52. *Argyrolobium muddii*. A. Habit; B. calyx; C. androecium; D. standard, abaxial surface; E. keel; F. wing.

Figure 53. *Argyrolobium wilmsii*. A. Flowering branch; B. calyx; C. keel; D. wing; E. androecium; F. standard, abaxial surface; G. standard, lateral view.

Figure 54. Recorded distribution of *A. muddii*, *A. wilmsii* & *A. megarrhizum*.

Figure 55. *Argyrolobium longifolium*. A. Flowering branch; B. calyx, inner surface; C. standard, abaxial surface; D. standard, lateral view; E. pistil, longitudinal section; F. androecium; G. wing; H. fruits; I. keel.

Figure 56. Scattergram of peduncle length versus plant height in subspecies of *A. speciosum*.

Figure 57. *Argyrolobium speciosum* ssp. *macrophyllum*. A. Habit; B. calyx; C. androecium; D. keel; E. wing; F. standard; G. standard, lateral view.

Figure 58. Recorded distribution of *A. longifolium* & *A. speciosum*.

Figure 59. *Argyrolobium baptisioides*. A. flowering branch; B. standard, abaxial surface; C. standard, lateral view; D. wing; E. keel; F. calyx; G. androecium; H. leaf.

Figure 60. Recorded distribution of *A. baptisioides*.

Figure 61. *Argyrolobium polyphyllum*. A. Flowering branch; B. lower leaves; C. standard, abaxial view; D. wing; E. keel; F. androecium; G. pistil; H. calyx; I. juvenile leaf; J. upper adult leaf.

Figure 62. Recorded distribution of *A. trifoliatum*.

Figure 63. *Argyrolobium incanum*. A. Calyx; B. standard, abaxial surface; C. wing; D. keel; E. flowering branch; F. androecium.

Figure 64. Recorded distribution of *A. polyphyllum* & *A. incanum*.

Figure 65. *Argyrolobium parviflorum*. A. Flowering branch; B. flower, lateral view; C. standard, adaxial surface; D. calyx, lateral view; E. wing.

Figure 66. Recorded distribution of *A. crassifolium* & *A. parviflorum*.

Figure 67. *Argyrolobium tomentosum*. A. Flowering branch; B. calyx; C. fruits; D. keel; E. wing; F. standard, abaxial surface.

Figure 68. Recorded distribution of *A. petiolare* & *A. tomentosum*.

Figure 69. *Argyrolobium humile*. A. Habit; B. calyx, inner surface; C. keel; D. wing.

Figure 70. *Argyrolobium ascendens*. A. Flowering branch; B. calyx, inner surface; C. bracts and bracteoles; D. arillate seed; E. standard, abaxial surface; F. stipules; G. keel; H. wing.

Figure 71. Recorded distribution of *A. ascendens*, *A. rotundifolium* & *A. rupestre*.

Figure 72. *Argyrolobium rotundifolium*. A. Habit; B. leaf; C. fruits; D. standard, abaxial surface; E. keel; F. wing; G. calyx.

Figure 73. *Argyrolobium campicola*. A. Habit; B. leaf and connate stipules, adaxial surface; C. standard, abaxial surface; D. keel; E. wing; F. calyx.

Figure 74. Recorded distribution of *A. humile*, *A. pauciflorum* & *A. campicola*.

Figure 75. *Argyrolobium sericosemium*. A. Habit; B. wing; C. keel; D. bract and bracteoles; E. androecium; F. calyx, inner surface; G. fused and free stipules.

Figure 76. Recorded distribution of *A. sericosemium* & *A. marginatum*.

Figure 77. *Argyrolobium molle*. A. Habit; B, C, D upper leaf variation; E. standard, abaxial view; F. keel; G. wing; H. calyx; I. androecium; J. lower leaf.

Figure 78. *Argyrolobium lotoides*. A. Habit; B. calyx, inner surface; C. standard, adaxial surface; D. wing; E. keel; F. androecium.

Figure 79. Recorded distribution of *A. stipulaceum* & *A. lotoides*.

Figure 80. *Argyrolobium pauciflorum*. A. Habit; B. wing; C. keel; D. standard; E. calyx.

Figure 81. Recorded distribution of *A. harmsianum* & *A. pauciflorum*.

Figure 82. *Argyrolobium pumilum*. A. Habit; B. calyx; C. keel; D. wing; E. standard, abaxial surface; F. standard, lateral view; G. androecium.

Figure 83. Recorded distribution of *A. molle* and *A. pumilum*.

Figure 84. *Argyrolobium candicans*. A. Wing; B. keel; C. habit; D. leaf of coastal form; E. calyx; F. leaf of high altitude form; G. standard, abaxial view.

Figure 85. Recorded distribution of *A. velutinum* & *A. candicans*.

Figure 86. *Argyrolobium stipulaceum*. A. Habit; B. calyx; C. wing; D. keel; E. standard, adaxial surface; androecium.

Figure 87. *Argyrolobium velutinum*. A. Reproductive branches; B. standard, abaxial surface; C. wing; D. keel; E. calyx.

Figure 88. *Argyrolobium argenteum*. A. Flowering branch; B. standard, abaxial surface; C. wing; D. keel; E. calyx, inner surface.

Figure 89. *Argyrolobium petiolare*. A. flowering branch; B. standard, adaxial surface; C. calyx; D. leaf; E. keel; F. wing.

Figure 90. *Argyrolobium pachyphyllum*. A. Habit; B. calyx; C. standard; D. wing; E. keel.

Figure 91. Recorded distribution of *A. argenteum* and *A. pachyphyllum*.

Figure 92. *Argyrolobium barbatum*. A. Habit; B. standard; C. leaf with fused stipules; D. keel; E. wing; F. calyx.

Figure 93. *Argyrolobium collinum*. A. Flowering branch; B. calyx; C. keel; D. wing; E. standard, abaxial surface; F. androecium.

Figure 94. Recorded distribution of *A. barbatum* & *A. collinum*.

Figure 95. *Argyrolobium harmsianum*. A. Habit; B. calyx; C. standard, lateral view; D. androecium; E. wing; F. keel.

Figure 96. *Argyrolobium rarum*. A. Flowering branch; B. keel; C. wing; D. standard, abaxial surface; E. calyx, inner surface.

Figure 97. *Argyrolobium aciculare*, *A. harveyanum*, *A. filiforme* and *A. angustissimum*. A. Habit of *A. aciculare*; B. habit of *A. harveyanum*; C. calyx of *A. filiforme*; D. keel of *A. filiforme*; E. wing of *A. filiforme*; F. standard of *A. filiforme*; G. calyx of *A. angustissimum*; H. keel of *A. angustissimum*; I. wing of *A. angustissimum*; J. standard of *A. angustissimum*; K. pistil of *A. angustissimum*; L. pistil of *A. filiforme*.

Figure 98. Recorded distribution of *A. aciculare* & *A. filiforme*.

Figure 99. *Argyrolobium harveyanum* var. *nigrescens*. A. Habit; B. wing; C. keel; D. standard, lateral view; E. standard, adaxial surface; F. calyx; G. androecium.

Figure 100. *Argyrolobium harveyanum* var. *harveyanum*. A. Habit; B. androecium; C. calyx; D. keel; E. wing; F. standard, abaxial surface; G. upper leaf; H. lower leaf.

Figure 101. Recorded distribution of *A. harveyanum* & *A. rarum*.

Figure 102. *Argyrolobium pseudotuberosum*. A. Habit; B. calyx, inner surface; C. keel; D. wing; E. standard abaxial surface; F. standard, lateral view.

Figure 103. Recorded distribution of *A. pseudotuberosum*, *A. tuberosum* & *A. angustissimum*.

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INTRODUCTION

This thesis was initiated to overcome problems currently experienced in identifying *Argyrolobium* species. Many of the species concepts currently in use rely on unstable characters such as leaf morphology and indumentum. Other valid specific epithets have not been widely used. This is particularly true of names published by Harms (1899, 1909, 1917) where the type material was destroyed during World War II. Where possible these names are clarified. The last consolidated account of South African species is that of Harvey (1862). Subsequently many species have been described which allow new phylogenetic interpretations of the group. Hopefully this regional revision will augment the work of Polhill (1968) on tropical African species and provide a better understanding of the genus.

Argyrolobium includes approximately 91 species which are distributed from the Cape Province to the Mediterranean and west into the highlands of India. The generic concept was conceived by Ecklon and Zeyher in 1836 and includes facies of other papilionoid genera. This prompted Bentham's comment (1865) that *Argyrolobium* is 'readily known among the Genisteae by the calyx of a *Dichilus* (Crotalarieae) with the corolla nearly that of *Crotalaria* (Crotalarieae) and a pod not unlike some *Tephrosiae*'. The complete fusion of the staminal sheath further complicates this mélange of characters. Consequently the tribal placement of *Argyrolobium* generated considerable debate (Bentham 1865, Hutchinson 1964, Polhill 1976 & 1981). The controversy was resolved by Van Wyk & Schutte

(1989) who, with the assistance of alkaloid data (Salatino & Gottlieb 1981, Van Wyk *et al.* 1988, 1988a, 1988b, 1989 & 1990a), unequivocally placed the genus within the Crotalarieae. This predominantly southern African tribe includes 15 genera and approximately 1223 species (Van Wyk 1991). South Africa embraces the plexus of diversity in *Argyrolobium*, and its three main allies (*Polhillia*, *Melolobium* & *Dichilus*) are endemic to the subcontinent.

CHAPTER 1

MATERIALS & METHODS

Typification and morphometric studies were undertaken on herbarium specimens from the following institutions (abbreviations from Holmgren *et al.* 1990): B, BM, BOL, BR, C, G, GRA, J, K, KEI, LYD, MO, NBG, NH, NU, NY, OXF, P, PRE, S, SAAS, SAM, SRGH, STE, TCD, UNIN, UPS, W & Z. These studies were augmented with fresh material and field observations where possible. Most of the line drawings were prepared from fresh or spirit material. When herbarium specimens were used for floral investigations flowers were boiled in water and surfactant before being mounted on slides in 50% glycerine. Where possible 20 specimens were examined from the widest possible geographic range.

Chasmogamous and cleistogamous floral development was investigated using scanning electron microscopy. Fresh buds were critical point dried, mounted on brass viewing stubs and then dissected with insect pins. The dissections were sputter coated with gold palladium for five minutes before being viewed with a Hitachi S-570 S.E.M. at accelerating voltages of 8-10 kV.

Scanning electron microscopy was also used for pollen and vestiture investigations. Anthers were removed from herbarium or fresh specimens of all species. The desiccated thecae were ruptured and the pollen grains were dusted onto brass viewing stubs. These preparations were sputter-coated with gold palladium for five minutes before being viewed at an accelerating voltage of 8

kV. Sections of pollen walls were prepared from fresh pollen fixed within the thecae in 3% glutaraldehyde in 0.05 M sodium-cacodylate buffer for 12 hours. The specimens were then rinsed in two 30 min. washes of 0.05 M sodium-cacodylate buffer. Post fixation was carried out in 2% osmium tetroxide in 0.05 M sodium-cacodylate buffer. Dehydration followed, using 10 min. washes in a graded ethanol series culminating in three washes of 100% ethanol. Specimens were embedded in a graded series of 25%, 50%, 75% Spurr's resin in ethanol, each concentration was maintained for two hours. Finally the specimens were transferred to 100% Spurr's resin for 12 hours. After a change of the final resin specimens were placed into embedding dishes and polymerised at 70° C for 16 hours. The embedded specimens were mounted onto perspex stubs, trimmed and sectioned using a LKB Ultratome III microtome. Sections were mounted on copper viewing grids and stained with 2% uranyl acetate (in darkness) for 15 minutes followed by lead citrate for 15 minutes (Reynolds 1963). Specimens were viewed with a JEOL JEM-100CX T.E.M. at an accelerating voltage of 80 kV.

Free-hand sections were made of the petioles and laminae of most species. These were stained with aqueous Toluidine blue (O'Brein *et al.* 1981) or Fabil (Noel 1964) and mounted in 30% glycerine. In some instances free-hand sections were augmented with resin-embedded sections (method outlined above) which were cut on an ultramicrotome and stained with Ladd's Triple Stain.

Duftmale patterns were revealed by immersing undamaged petals into an aqueous

solution of neutral red for 40 minutes.

Seedling studies were undertaken using field collected seed which was scarified and germinated in petri dishes at 25°C. Vouchers of parent specimens housed at NU.

The character data was transformed into matrices and used in cladistic analysis of the genus. The computer programme Hennig 86 Version 1.5 was used in this study (Farris 1988).

Nomenclatural authorities are given in the formal taxonomy section and are not repeated elsewhere. To avoid cumbersome and repeated explanation the sections recognised in this thesis are outlined below (Table 1).

Table 1. Sections within *Argyrolobium* and their component species.

Section	Included species
<i>Amplexicaule</i>	<i>A. amplexicaule</i> , <i>A. crinitum</i>
<i>Argyrolobium</i>	<i>A. argenteum</i> , <i>A. aciculare</i> , <i>A. angustissimum</i> , <i>A. ascendens</i> , <i>A. barbatum</i> , <i>A. campicola</i> , <i>A. candicans</i> , <i>A. collinum</i> , <i>A. filiforme</i> , <i>A. harmsianum</i> , <i>A. harveyanum</i> , <i>A. humile</i> , <i>A. lotoides</i> , <i>A. marginatum</i> , <i>A. molle</i> , <i>A. pachyphyllum</i> , <i>A. pauciflorum</i> , <i>A. petiolare</i> , <i>A. pseudotuberosum</i> , <i>A. pumilum</i> , <i>A. rarum</i> , <i>A. rotundifolium</i> , <i>A. rupestre</i> , <i>A. sericosemium</i> , <i>A. stipulaceum</i> , <i>A. tomentosum</i> , <i>A. tuberosum</i> , <i>A. velutinum</i>
<i>Lunare</i>	<i>A. lunare</i> , <i>A. splendens</i>

- Polyphyllum* *A. crassifolium*, *A. incanum*, *A. parviflorum*, *A. polyphyllum*,
A. tenue, *A. trifoliatum*
- Transvaalense* *A. baptisioides*, *A. frutescens*, *A. longifolium*, *A.*
megarrhizum, *A. muddii*, *A. speciosum*, *A. transvaalense*, *A.*
wilmsii

CHAPTER 2

HISTORICAL PERSPECTIVES

Early classifications placed *Argyrolobium* species in recognised genera such as *Ononis*, *Lotus*, *Cytisus*, *Galega* and *Crotalaria*. Generic status was attributed on four separate occasions. Sweet (1830) recognised the need for generic circumscription of this predominantly African group and he used the name *Tephrothamnus* to describe *Argyrolobium tomentosum* but his generic name was not validly published. The first legitimate generic description is that of Link (1831) who used the name *Lotophyllus* to emphasise the distinction between *Cytisus argenteus* (= *A. linnaeanum* Walp.) and other members of that genus. Five years later, in January 1836, *Argyrolobium* was coined by Ecklon & Zeyher to accommodate 21 new species collected in South Africa. Because of its widespread use, this epithet is conserved over *Lotophyllus* (Greuter *et al.* 1988). Meyer (1836) was simultaneously describing material collected by Drège and he coined the generic epithet *Chasmone*. The synonymy of *Argyrolobium* is outlined in Table 2. Meyer's investigation was submitted for publication in 1835 but was only effectively published in February the following year and consequently *Argyrolobium* holds precedence over *Chasmone*. The confusion over the effective date of publication of Meyer's work led Meisner (1843) to accept *Chasmone* as the generic epithet but subsequent systematists have maintained consensus in their use of *Argyrolobium*.

Superimposed upon this confusion is the recognition of different generic limits for *Argyrolobium*. Thus, for a brief period, the names *Gamochilum* and *Trichasma* were used (Walpers 1839). These generic concepts were based on differences in the degree of sinus development between the calyx lobes. However due to inconsistency in this character the genera were reunited with *Argyrolobium* (Jaubert & Spach 1843).

Sectional subdivisions of the genus have been limited by an inadequate knowledge of African species. The system of Jaubert & Spach (1843) recognised two series based on leaf morphology. Series *Homophylla* is characterised by equal leaflets within a single leaf while series *Heterophylla* has oblique to dimidiate lateral leaflets. The first series includes six sections and the latter includes two, together these embrace 12 species. Their enumeration covers only five southern African species, under the subheading '*Species Capensis*', and does little to define infrageneric groupings. Bentham (1844) attempted to redress this problem by subdividing *Argyrolobium* into two sections based on fruit structure. His section *Eremolobium* Benth. is highly disjunct, linking North African species with *A. lunare*, of the Cape, based on torulose fruits. The second section was named *Chasmone* (E. Mey.) Benth. Harvey (1862) adopted Bentham's sections in *Flora Capensis* and subdivided the typical section into six informal categories. Of these *Involucrata* Harv. *nom. nud.* has been awarded generic status as *Polhillia* (Stirton 1986) and some of the remaining groups are natural and have been retained in our

circumscription of sections.

Table 2. Synonymy of *Argyrolobium* in South Africa (synonyms in bold).

- A. andrewsianum** (E. Mey.) Steud. = *A. tomentosum* (Andr.) Druce
- A. angustifolium** Eckl. & Zeyh. = *A. tuberosum* Eckl. & Zeyh.
- A. angustistipulatum** De Wild. = *A. tomentosum* (Andr.) Druce
- A. biflorum** Eckl. & Zeyh. = *A. pauciflorum* Eckl. & Zeyh.
- A. brevicalyx** C.H. Stirton = *Polhillia brevicalyx* (C.H. Stirton) B-E. Van Wyk & A.L. Schutte
- A. collinum** Eckl. & Zeyh. var. **angustatum** Harv. = *A. argenteum* (Jacq.) Eckl. & Zeyh.
- A. collinum** Eckl. & Zeyh. var. **seminudum** Harv. = *A. argenteum* (Jacq.) Eckl. & Zeyh.
- A. comanthum** Vogel = *A. baptisioides* (E. Mey.) Walp.
- A. connatum** Harv. = *Polhillia connatum* (Harv.) C.H. Stirton
- A. deflexiflorum** Bak. = *Lotononis angolensis* Welw. ex Bak.
- A. glaucum** Schinz = *A. tuberosum* Eckl. & Zeyh.
- A. goodioides** (Meisn.) Walp. = *A. crassifolium* (E. Mey.) Eckl. & Zeyh.
- A. hirsuticaule** Harms = *A. lotoides* Harv.
- A. involucreatum** (Thunb.) Harv. = *Polhillia involucreatum* B-E. Van Wyk & A.L. Schutte

- A. lanceolatum** (E. Mey.) Eckl. & Zeyh. = *A. lunare* (L.) Druce
- A. lancifolium** Burt Davy = *A. transvaalense* Schinz
- A. leptocladum** Harms = *A. lotoides* Harv.
- A. longipes** N.E. Br. = *A. ascendens* (E. Mey.) Walp.
- A. lydenburgense** Harms = *A. tuberosum* Eckl. & Zeyh.
- A. muirii** L. Bol. = *A. filifolium* (Thunb.) Eckl. & Zeyh.
- A. nanum** Walp. = *A. harveyanum* Oliv.
- A. nanum** Burt Davy = *A. molle* Eckl. & Zeyh.
- A. natalense** Dümmer = *A. longifolium* (Meisn.) Walp.
- A. nigrescens** Dümmer = *A. harveyanum* Oliv.
- A. nitens** Burt Davy = *A. wilmsii* Harms
- A. obcordatum** (E. Mey.) Steud. = *A. trifoliatum* (Thunb.) Druce
- A. obsoletum** Harv. = *Polhillia obsoleta* (Harv.) B-E. Van Wyk
- A. obovatum** (E. Mey.) Eckl. & Zeyh. = *A. argenteum* (Jacq.) Eckl. & Zeyh.
- A. patens** Eckl. & Zeyh. = *A. molle* Eckl. & Zeyh.
- A. pilosum** Harv. = *A. amplexicaule* (E. Mey.) Dümmer
- A. podalyrioides** Dümmer = *A. collinum* Eckl. & Zeyh.
- A. pumilum** Eckl. & Zeyh. var. **pilosum** (E. Mey.) Harv. = *A. argenteum* (Jacq.) Eckl. & Zeyh.
- A. reflexum** N.E. Br. = *Dichilus reflexus* (N.E. Br.) A.L. Schutte
- A. rhodesicum** Bak. f. = *A. rupestre* (E. Mey.) Walp.
- A. rogersii** N.E. Br. = *A. rupestre* (E. Mey.) Walp.

- A. sandersonii** Harv. = *A. baptisioides* (E. Mey.) Walp.
- A. sankeyi** Dümmer = *A. marginatum* H. Bol.
- A. sericeum** (E. Mey.) Eckl. & Zeyh. = *A. trifoliatum* (Thunb.) Druce
- A. shirensense** Taub. = *A. tomentosum* (Andr.) Druce
- A. speciosum** Eckl. & Zeyh. var. **glaberrimum** Harv. = *A. baptisioides* (E. Mey.) Walp.
- A. stenorrhizon** Oliv. = *A. filiforme* (Thunb.) Eckl. & Zeyh.
- A. strictum** Steud. = *A. pauciflorum* Eckl. & Zeyh.
- A. stuhlmannii** Taub. = *A. tomentosum* (Andr.) Druce
- A. summomontanum** Hilliard & Burt = *A. candicans* Eckl. & Zeyh.
- A. sutherlandii** Harv. = *A. baptisioides* (E. Mey.) Walp.
- A. thodei** Harms = *A. lotoides* Harv.
- A. tortum** Suesseng. = *Ptycholobium contortum* (N.E. Br.) Brummitt
- A. tysonii** Harms = *A. rupestre* (E. Mey.) Walp.
- A. uniflorum** Harv. = *A. harveyanum* Oliv.
- A. umbellatum** Walp. = *A. incanum* Eckl. & Zeyh.?
- A. variopile** N.E. Br. = *A. lotoides* Harv.
- A. venustum** Eckl. & Zeyh. = *A. pumilum* Eckl. & Zeyh.
- A. woodii** Dümmer = *A. tuberosum* Eckl. & Zeyh.
- Lotononis magnistipulata** Dümmer = *A. lotoides* Harv.
- Polhillia waltersii** (C.H. Stirton) C.H. Stirton = *Polhillia obsoleta* (Harv.) B-E.

CHAPTER 3

CHARACTER ANALYSIS

Morphometric data are presented in the formal descriptions and are not repeated in this section.

3.1 Vegetative Characters

3.1.1 Habit

Within most groups of plants there is a critical interplay between habit and biogeography. In the Genisteae *s.l.* (Polhill 1976) there are two basic trends. The first is towards perennial stems and persistent leaves, the second is towards ephemeral stems which grow rapidly but which do not persist under adverse conditions. Implicit to the latter is the subterranean proliferation of organs i.e. rhizomes, caudices and lignotubers common in plants associated with seasonal climates and frequent fires. The destruction of aerial parts removes apical dominance and may result in the rapid extension of dormant buds from the base of the stem (James 1984). Between these extremes there exist intermediate herbaceous taxa.

The polarization of lignotubers is problematic, in terms of phylogeny (Stirton 1989). In the Cape flora resprouting is considered plesiomorphic and reseedling apomorphic (Keeley 1977). *Indigofera* follows this trend with reversal to a woody habit in sections *Brevipatentes*, *Spinosa* and *Hispidae* (Schrire 1991). Interpretations of plant habit however often presume that woody correlates to

primitive (Harvey 1862; Dümmer 1913; Polhill 1981). In *Crotalaria* primitive species tend to be forest marginal shrubs of afro-montane regions and the invasion of savanna and grassland was accompanied by a shift to herbaceous and suffrutescent habits (Polhill 1982). Similarly in *Lotononis* the occurrence of lignotubers is derived and has arisen independently in a number of lineages (Van Wyk 1991). Most species of *Argyrolobium* are suffrutescent with new stems being produced from persistent, woody rootstocks. Some of these species have weakly perennial stems which persist and become moribund in the absence of fire or grazing, others produce annual stems from lignotubers (Table 3). A third group, concentrated in the eastern Cape, comprises woody shrubs.

In the tropics shrubby and large suffrutescent species are associated with temperate vegetation and persist as spreading shrubs in situations not affected by fire but behave as suffrutices in more seasonal environments i.e. *A. macrophyllum* Harms and *A. fischeri* Taub. Other species such as *A. friesianum* Harms and *A. tomentosum* tend to be limited to evergreen afro-montane vegetation. An unusual situation occurs in *A. wilmsii* where leaf and stem senescence is often asynchronous with flowers being borne on defoliated plants.

Table 3. Various combinations of habit characters in species of *Argyrolobium*. Basic groups are indicated. WP = weakly perennial; A = annual; P = perennial; L = lignotuber; W = woody rootstock; H = herbaceous; SF = suffrutescent; S = shrub.

GROUP & SPECIES	STEM PERSISTENCE	ROOTSTOCK	HABIT
1a <i>A. aciculare</i>	WP	L	H
1 <i>A. amplexicaule</i>	A	W	H
4 <i>A. argenteum</i>	P	W	S
1 <i>A. ascendens</i>	WP	W	H
2 <i>A. baptisioides</i>	A	L	SF
4 <i>A. barbatum</i>	P	W	S
1 <i>A. candicans</i>	WP	L	SF
1 <i>A. campicola</i>	WP	W	H
1 <i>A. collinum</i>	WP	W	H
4 <i>A. crassifolium</i>	P	W	S
1a <i>A. filiforme</i>	WP	L	H
3 <i>A. frutescens</i>	P	L	SF
1a <i>A. harveyanum</i>	WP	L	H
1 <i>A. harmsianum</i>	WP	W	H
4 <i>A. incanum</i>	P	W	S
2 <i>A. longifolium</i>	A	L	SF
1 <i>A. lotoides</i>	WP	W	H
1 <i>A. lunare</i>	WP	W	H
1 <i>A. marginatum</i>	WP	W	H
3 <i>A. megarrhizum</i>	P	L	SF
1 <i>A. molle</i>	WP	W	H
3 <i>A. muddii</i>	P	L	SF
4 <i>A. pachyphyllum</i>	P	W	S
4 <i>A. parviflorum</i>	P	W	S
1 <i>A. pauciflorum</i>	WP	W	H
4 <i>A. petiolare</i>	P	W	S
4 <i>A. polyphyllum</i>	P	W	S
1a <i>A. pseudotuberosum</i>	WP	L	H
1 <i>A. pumilum</i>	P	W	SF
1 <i>A. rarum</i>	WP	W?	H
1 <i>A. rupestre</i>	WP	W	H
1 <i>A. sericosemium</i>	WP	W	H
2 <i>A. speciosum</i>	A	L	SF
1 <i>A. stipulaceum</i>	WP	W	H
1 <i>A. tomentosum</i>	P	W	SF
3 <i>A. transvaalense</i>	P	L	SF
4 <i>A. trifoliatum</i>	P	W	S
1a <i>A. tuberosum</i>	WP	L	H

1a <i>A. tuberosum</i>	WP	L	H
1 <i>A. velutinum</i>	WP	W	H
3 <i>A. wilmsii</i>	P	W	S

A number of repetitive character combinations occur with respect to habit (Table 3). Herbaceous species with weakly perennial stems (Figure 1) are common in savanna and grassland (Group 1) and one lineage within this group has developed lignotubers (Group 1a).

The larger, suffrutescent species with annual stems (Group 2) also occur in seasonal savanna and grassland but they are limited to areas of summer rainfall and appear to have developed lignotubers convergently with Group 1a. Suffrutescent species with perennial stems are common in the Transvaal and are associated with woodland habitats (Group 3). This growth form is reminiscent of many mesic *Crotalaria* species.

Shrubby *Argyrolobium* species are exclusive to the Cape fynbos and associated vegetation types (Group 4). Shrubs have evolved convergently in sections *Argyrolobium* and *Polyphyllum*.

Stem posture follows similar trends to the groups outlined above. Most of the weakly perennial species are procumbent or decumbent. Species with lignotubers (Groups 1a & 2) and shrubby species (Group 3) are erect.

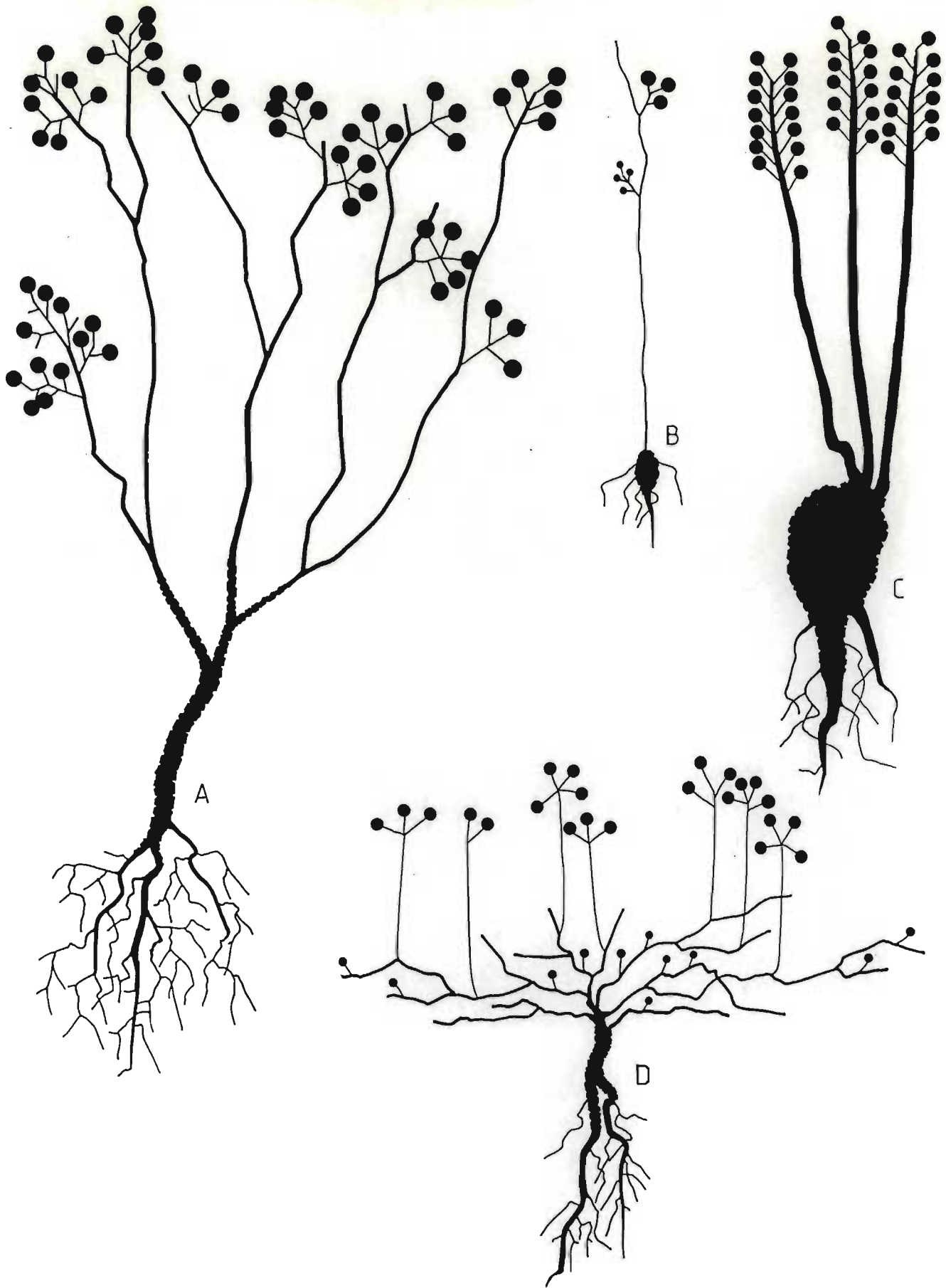


Figure 1.

Habit diagrams of *Argyrolobium*. A. Perennial shrubs, flowers monomorphic; B. perennial herbs with lignotubers, flowers dimorphic; C. suffrutices with annual stems, flowers monomorphic; D. perennial herbs, flowers dimorphic (small circles

The polarisation of habit within *Argyrolobium* is not clear. It would be simplistic to assume that the group follows the trend common in the subfamily because the woody species (Group 4) that occur in the Cape appear to be secondarily derived. From their unspecialized nature and relictual distribution, perennial suffrutices (Group 3) and weakly perennial herbs (Group 1) appear to represent the plesiomorphic state. This polarisation complies with a tropical origin for the genus.¹

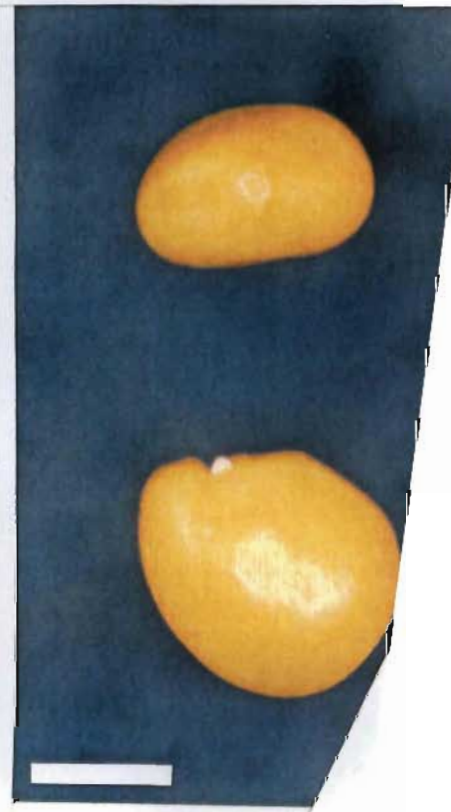
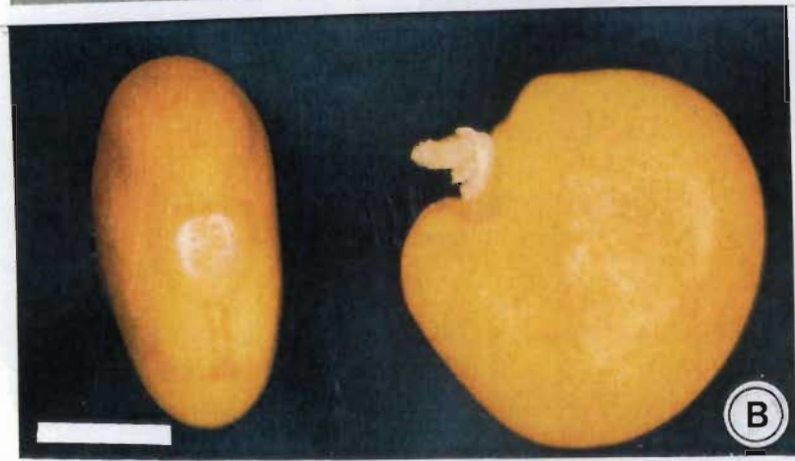
Bark

Stirton (1989) reports the presence of three bark types in the genus *Otholobium*. Some species display a thin phellem with scattered lenticels and photosynthetic stems. This bark type is also common in members of the Crotalariaeae. His second bark type is a modification of the first. Here green tissues lie beneath a thin, ephemeral phellem which is not perforated by lenticels. The third bark type is common in species of seepage areas with many, filed lenticels.

Within *Argyrolobium* three bark types have been observed but these do not conform to those of *Otholobium*. Species of moist environments such as *A. polyphyllum* have thin phellem with scattered lenticels overlying photosynthetic tissue. Shrubby species of fynbos and Karroo vegetation have thicker phellem but

Figure 1.

Habit diagrams of *Argyrolobium*. A. Perennial shrubs, flowers monomorphic; B. perennial herbs with lignotubers, flowers dimorphic; C. suffrutices with annual stems, flowers monomorphic; D. perennial herbs, flowers dimorphic (small circles represent cleistogamous flowers).



A. collinum, *A. filiforme*, *A. harveyanum*, *A. incanum*, *A. longifolium*, *A. lotoides*, *A. marginatum*, *A. molle*, *A. polyphyllum*, *A. pumilum*, *A. rotundifolium*, *A. rupestre*, *A. sericosemium*, *A. speciosum*, *A. tomentosum*, *A. tuberosum* and *A. wilmsii*.

Within the genus seedling morphology approximates that of adult plants. Germination is always epigeal which conforms to the pattern of the Crotalariaeae. The cotyledons are photosynthetic, amphistomatous and suborbicular in all *Argyrolobium* species examined.

Where dimorphic leaves occur in adult specimens, seedlings have broad leaflets with pronounced petioles and stipules which approximate the morphology of the lower leaflets of adult plants. This includes: *A. baptisioides*, *A. harveyanum*, *A. longifolium*, *A. molle*, *A. polyphyllum*, *A. speciosum* and *A. tuberosum*.

In some species with monomorphic shortly petiolate leaves (*A. stipulaceum*, *A. amplexicaule*, *A. collinum*) the first leaves have pronounced petioles.

Seeds of *Argyrolobium* are fairly conservative in structure. They are often irregular shapes due to constraints imposed by the fruit wall and adjacent seeds. The development of the radicular lobe is variable but especially pronounced in *A. tomentosum* (Figure 2). The development of the hilar tongue (Manning & Van

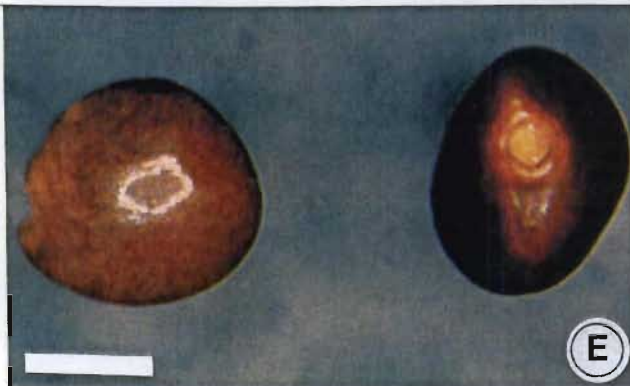
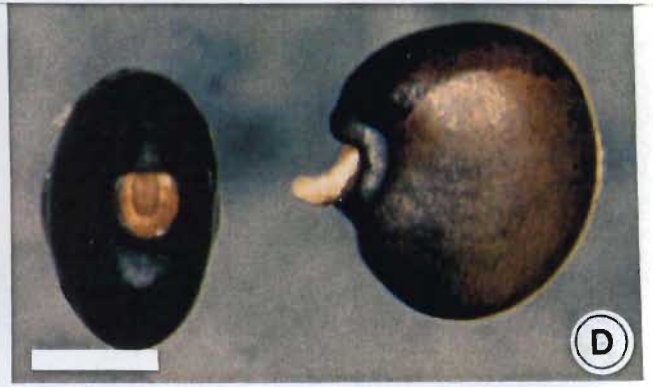
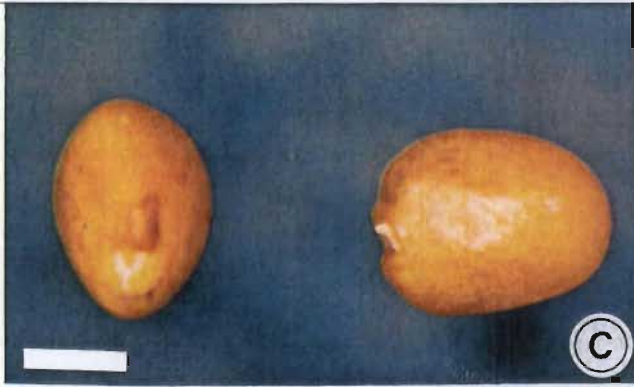
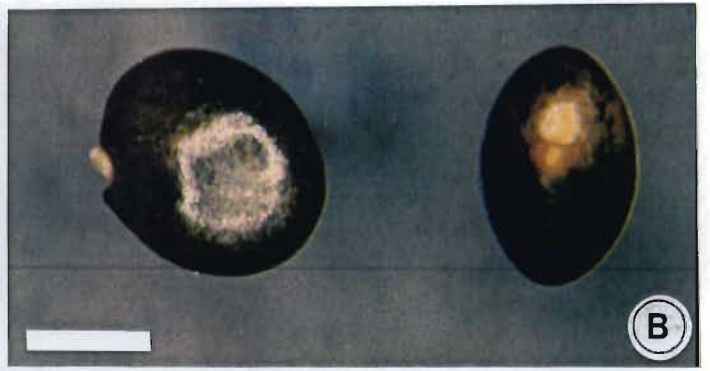
Staden 1987) is also variable within the genus but is usually present. In *A. ascendens* the hilar tongue is superseded by a rim-aril (Figure 3).³

The position and form of the micropyle in relation to the aril was considered phylogenetically important by Manning & Van Staden (1987) who interpret crotalarioid micropyles as punctate and phylogenetically advanced. This condition is merely the result of the ypsiloid aperture being slightly recessed (Figure 4). Within *Argyrolobium* the micropyle is constantly ypsiloid and recessed, positioned just outside or within the hilum (Figure 5).

Seed colour is seldom consistent within species, ranging from red-brown through yellow-brown and green-brown to black (Figures 2 & 3). The testa may be evenly coloured but in many species speckling also occurs. Freshly harvested seed is often yellow but usually darkens to various shades of beige or brown. Because of its instability this character has not been used in taxonomic assessments. Seed size is variable, some of the herbaceous perennial species produce small seed while the shrubs and large suffrutices usually produce large seeds. Seed masses from cleistogamous and chasmogamous flowers harvested simultaneously and kept in

Figure 3.

Seeds of selected *Argyrolobium* and *Polhillia* species showing lateral and hilar views. A. *Argyrolobium sericosemium* (Edwards 337); B. *A. harveyanum* (Edwards 614); C. *A. molle* (Edwards 484); D. *A. amplexicaule* (Edwards 505); E. *A. pumilum* (Edwards 480); F. *A. amplexicaule* (Edwards 763); G. *A. wilmsii* (Edwards 685); H. *A. longifolium* (Edwards 353); I. *Polhillia canescens* C.H. Stirton (*Burgers* 3238); J. *A. ascendens* (Edwards 506). Bars = 1 mm.



identical moisture regimes do not differ significantly for individual plants. ⁴

3.1.3 Leaves

Stipules are common throughout the Crotalariaeae and are sometimes diagnostic. The genera *Lotononis* and *Rothia* are distinctive in possessing single stipules. Unfortunately stipule number is frequently variable across taxa and Van Wyk (1991) recognises seven different conditions within *Lotononis* which he polarises as follows:

Type A. Paired, symmetrical - Plesiomorphic

Type B. Paired, asymmetrical - Intermediate

Type C. Variable - Apomorphic:

C1. Paired basally, solitary above

C2. Usually absent but present at some nodes

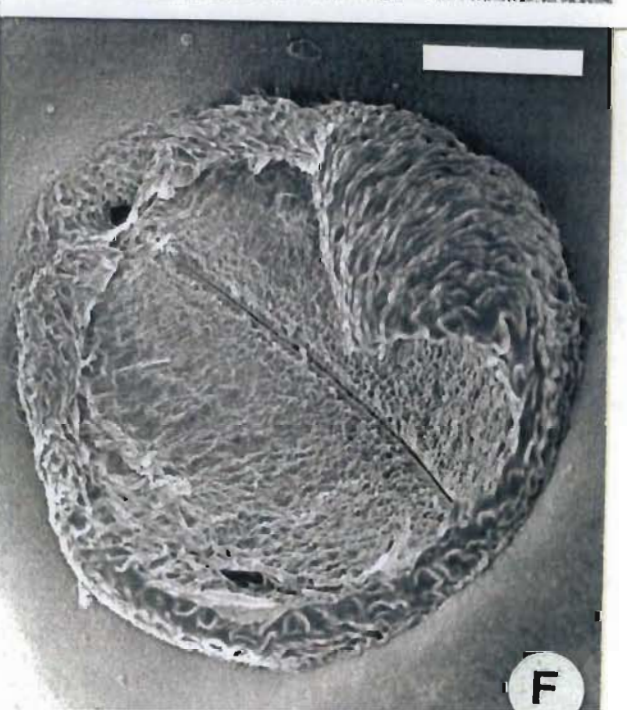
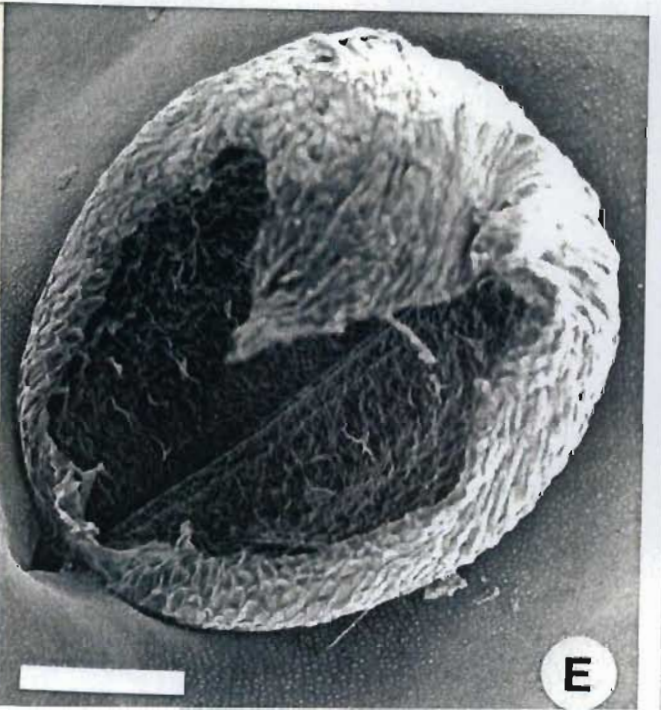
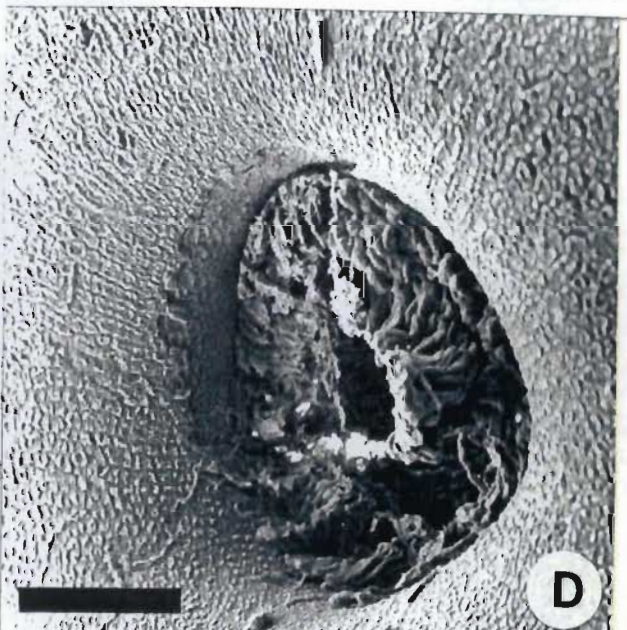
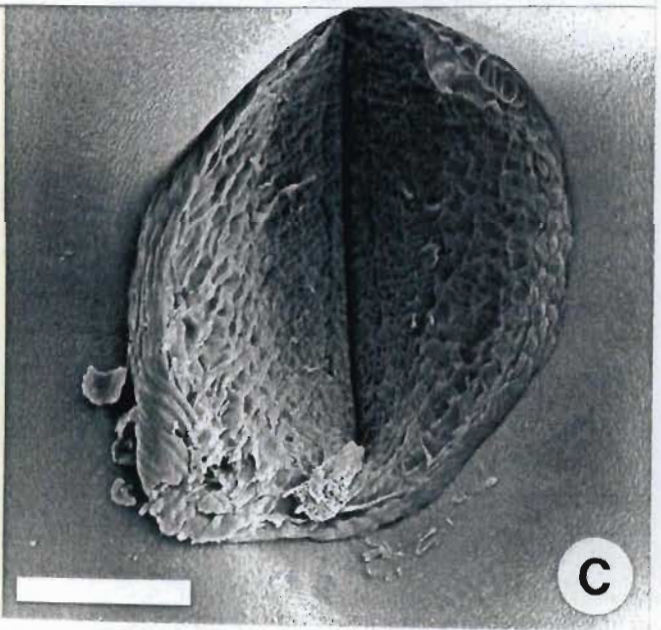
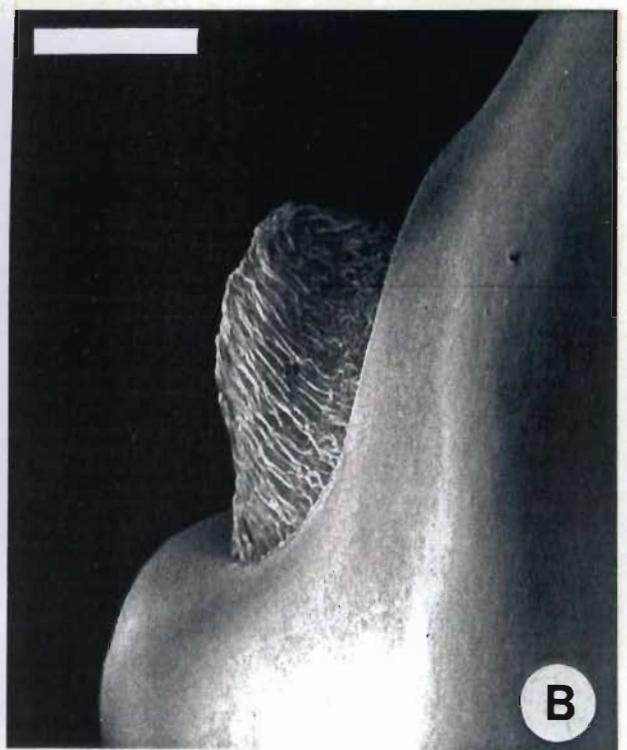
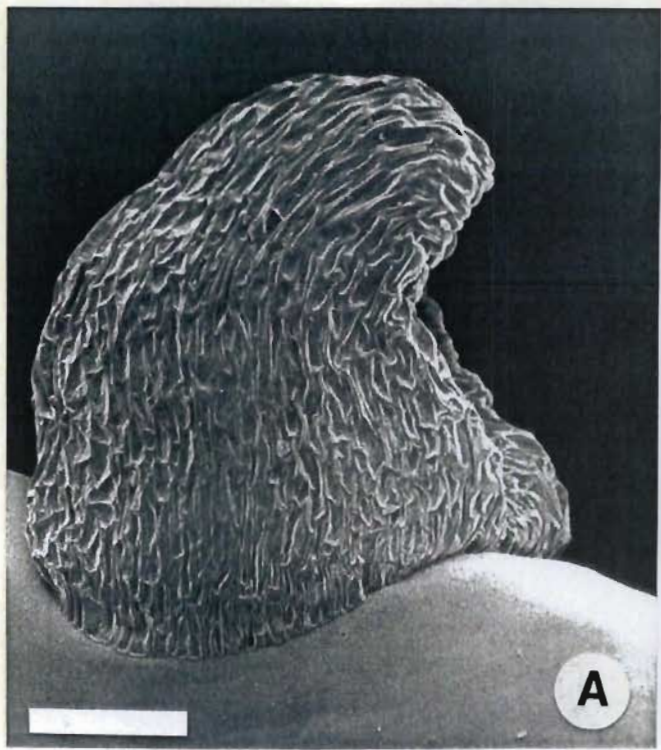
C3. Stipules digitate

Type D. Single at all nodes - Apomorphic

Type E. Exstipulate - Apomorphic

Figure 4.

Hilar views of selected *Argyrolobium* species: A. *A. ascendens* aril, lateral view (Edwards 506); B. *A. sericosemium* hilar tongue, lateral view (Edwards 337); C. *A. collinum* hilum showing counter palisade and hilar tongue (Edwards 481); D. *Polhillia canescens* hilum occluded by funicle remnants (Burgers 3238); E. *A. stipulaceum*, micropyle ypsiloid and outside the hilum (Edwards 433); F. *A. sericosemium* hilum, micropyle 'punctate' and within the hilum (Edwards 337). Bars A, C, E, F = 100 μm ; B = 150 μm ; D = 70 μm .



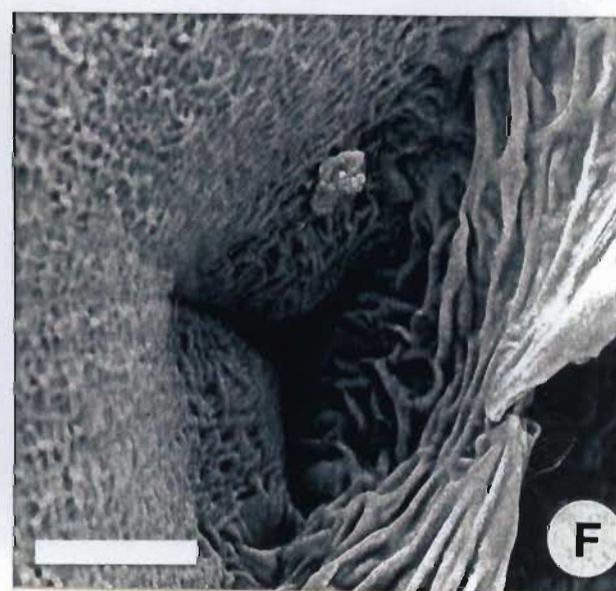
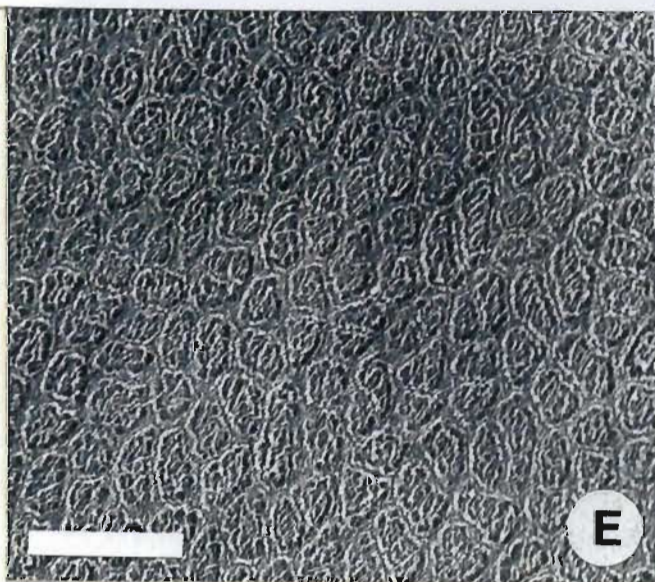
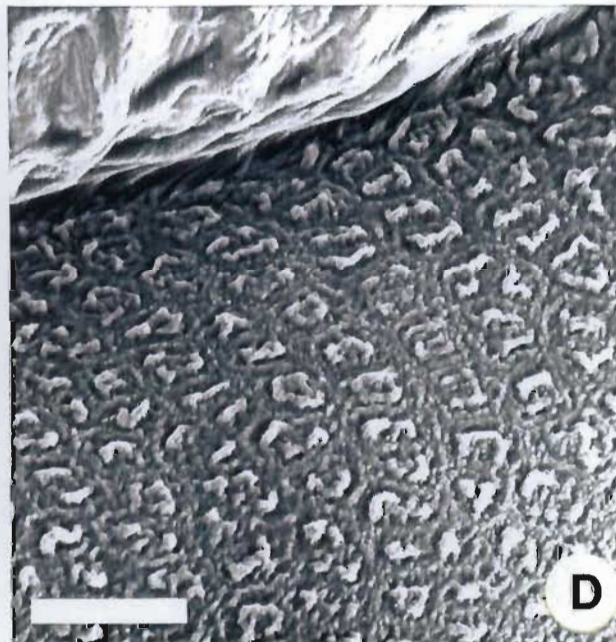
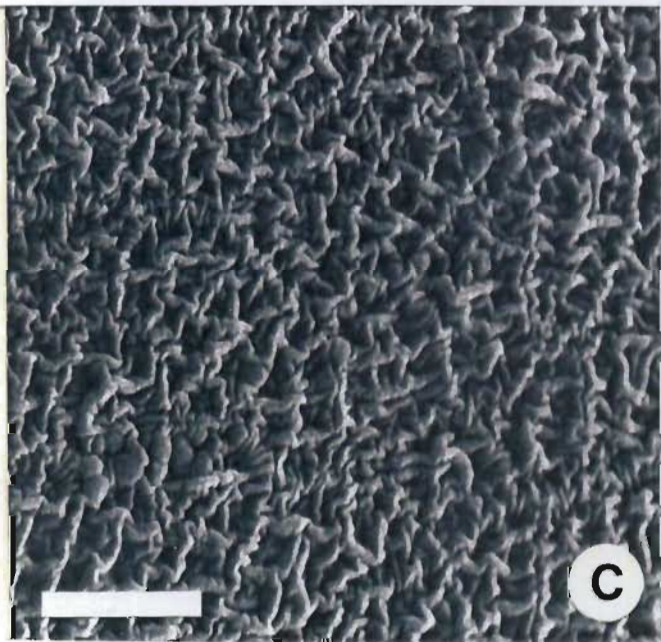
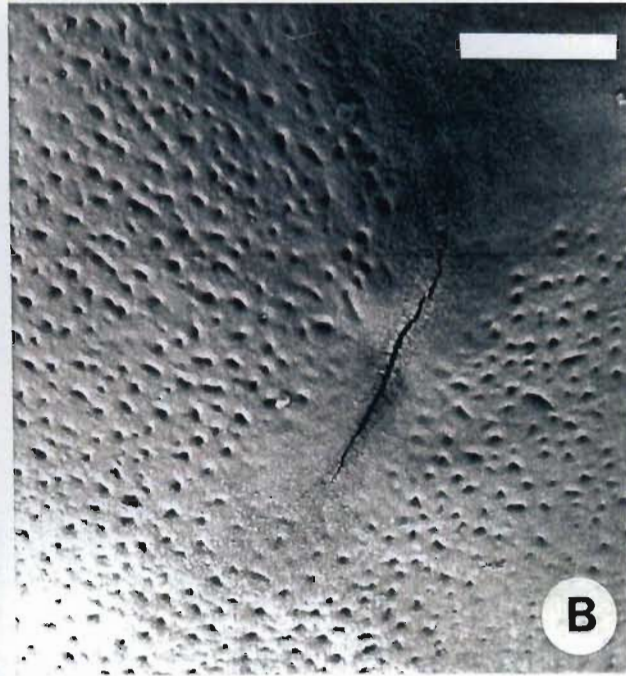
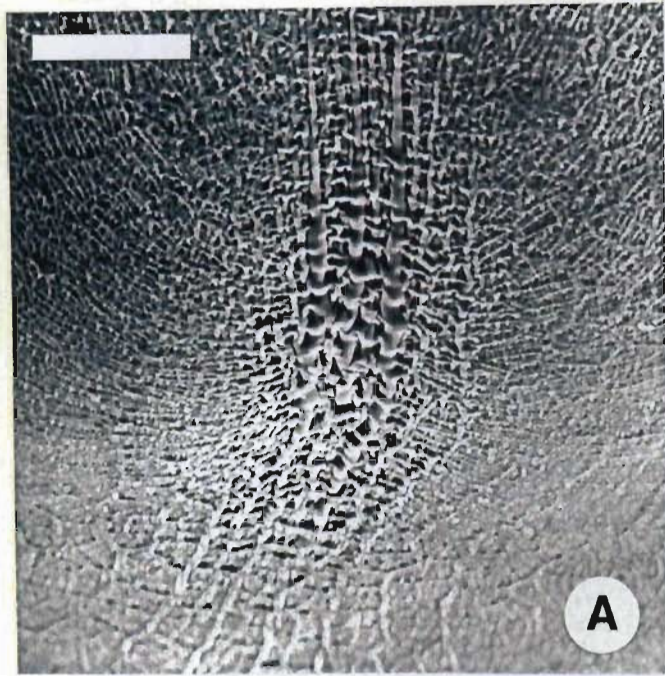
Within *Lotononis* the various stipular states have arisen more than once. A similar situation occurs in *Crotalaria* where all the sections outlined by Polhill (1982) display more than one condition, indicating discrete derivation.

The broad-based, connate stipules of *Polhillia* are a strong linking character with *Argyrolobium*. However adnation of the stipules and petioles in *Argyrolobium* (now *Polhillia* spp.) and *Lupinus*, which was considered autapomorphic by Hutchinson (1964), is clearly convergent based on holistic evidence.

Argyrolobium always has two stipules per leaf. In *A. amplexicaule* and *A. crinitum* these are enlarged and fused along their leaf-opposed margins however their derivation is clear from the venation patterns and 2-lobes in *A. amplexicaule* (in *A. crinitum* the stipule apices are often 4-lobed) (Figure 6). This character grades into the remaining species through partial fusion in *A. campicola*, *A. barbatum* and *A. sericosemium* (Figure 6). In addition the fusion of cataphyllous stipules is common in most species at, and below, ground level.

Figure 5.

Testa micromorphology of selected *Argyrolobium* species: A. *A. collinum* lens (Edwards 481; bar = 30 μm); B. *A. wilmsii* lens (Edwards 562; bar = 200 μm); C. *A. ascendens* testa microsculpturing between the lens and hilum (Edwards 506; bar = 10 μm); D. *A. stipulaceum* testal microsculpturing around hilum (Edwards 433; bar = 20 μm); E. *A. longifolium* lateral testal sculpturing (Edwards 402; bar = 30 μm); F. *A. molle* micropyle (Edwards 484; bar = 10 μm).



Prominent stipules are usually slightly asymmetrical about the midvein and this is accentuated in the Cape species *A. splendens* and *A. lunare* (Figure 6). The large suffrutescent species with annual stems have erect stipules of varied morphology. In *A. speciosum* and *A. baptisioides* stipules are often large but in the remainder of these species stipules are smaller and are sometimes vestigial in *A. megarrhizum*.

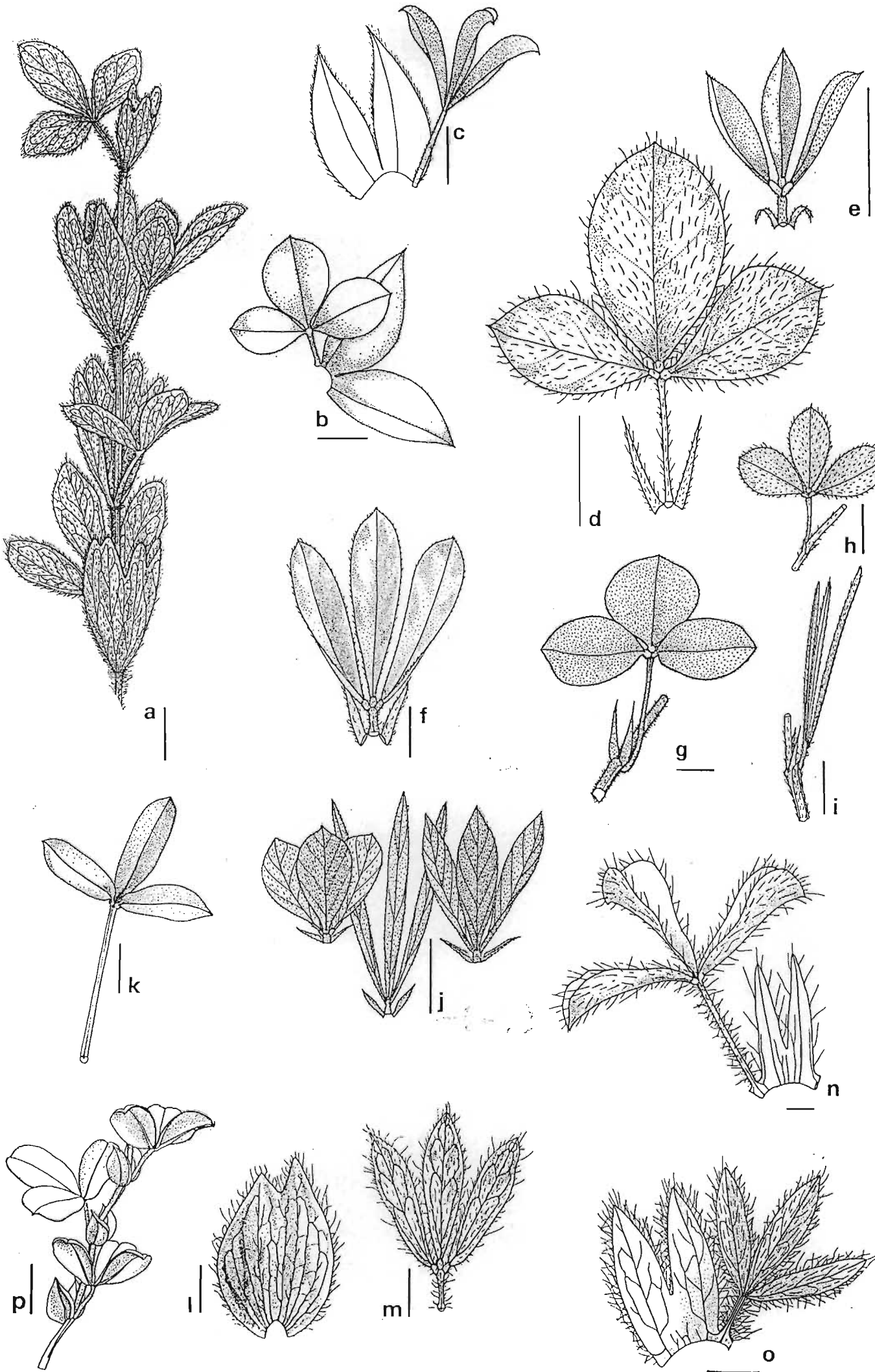
Most *Argyrolobium* species with enlarged stipules have annual or weakly perennial stems and the increased photosynthetic area provided by these organs enhances seasonal growth. This strategy is especially important at high altitudes where favourable growing periods are contracted. The increased transpiration associated with enlarged stipules restricts such species to areas of high rainfall (Figure 7). Reduction and expansion of stipules are considered apomorphic and the intermediate condition, present in tropical species, is considered plesiomorphic.

Leaf dimorphism is common in erect species of *Argyrolobium* where light intensity and air humidity are modified by surrounding vegetation. In extreme cases the lower leaflets are orbicular with well developed petioles and the upper leaflets are linear and sessile. The extent of dimorphism is strongly influenced by shading so that under uniform light regimes leaf dimorphism is minimal. This variability in expression of leaf shape has led to considerable confusion in the species concepts of *A. tuberosum*, *A. harveyanum* and *A. molle*.

Developmental dimorphism has also been recorded from the genus and in these instances the seedling leaflets approximate leaves from the lower stems of adults. Leaf dimorphism is prominent in species with annual or weakly perennial stems and lignotubers however it also occurs in the shrubs *A. polyphyllum* (Figure 6) and *A. trifoliatum*. Leaf dimorphism has not been recorded from suffrutescent species with perennial stems and appears to be apomorphic.

Petiole development is important in distinguishing a number of closely related species of *Argyrolobium*. Within the *A. rupestre* alliance the procumbent species (*A. rupestre* and *A. rotundifolium*) have well developed petioles but erect and decumbent species have very reduced petioles (*A. humile* and *A. ascendens*). This character is remarkably stable and has therefore been used in distinguishing species. Petioles of some fynbos species are also pronounced (*A. argenteum*, *A. petiolare*, *A. lunare*, *A. rarum* and *A. splendens*).

Leaf vestiture has been used extensively in the taxonomy of *Argyrolobium* and has caused confusion in species delimitation. Vestiture is unstable with frequent variation in single specimens. The role of plant vestiture is a dynamic one related to protection from phytophagous insects, protection from high light intensity and reduction in transpiration (Woodman & Fernandes 1991). Both the environment and the age of leaves influences their vestiture with hair density decreasing with age due to abrasion and leaf expansion. Moderate densities are found to be most



efficient in reducing predation (Goertzen & Small 1993; Levin 1973; Schoener 1987; Woodman & Fernandes 1991). This pattern also occurs in *Argyrolobium* although quantitative measurement was beyond the scope of this dissertation. ⁶

Trichomes in most *Argyrolobium* species accumulate tannins which complement the tanniniferous epidermal cells common throughout the genus. Their increased occurrence along leaf margins in most species may deter edge-feeding insects. In species where trichomes are sparse or absent from the adaxial leaf surfaces, tanniniferous epidermal cells are abundant.

Glabrescent species such as *A. harveyanum* var. *nigrescens*, *A. speciosum* and *A. baptisioides* often turn black on exsiccation due to accumulated phenolics which may usurp the anti-predatory function of tannin-containing trichomes.

Figure 6.

A range of leaf morphology in *Argyrolobium*: a. *A. crinitum*, stipules often 4-lobed (*Drège s.n.*); b. *A. candicans*, leaflets narrowly obovate and conduplicate (*Edwards 728*); c. *A. candicans*, leaflets broadly obovate (*Flanagan 1343*); d. *A. polyphyllum*, upper leaf (*Edwards 491*); e. *A. polyphyllum* lower leaf (*Edwards 491*); f. *A. baptisioides* (*Edwards 434*); g. *A. rotundifolium* (*Edwards & Ackermann 329*); h. *A. harveyanum* lower leaf (*Edwards 455*); i. *A. harveyanum* upper leaf (*Edwards 455*); j. *A. molle*, range in leaflet shape (*Edwards 484*); k. *A. petiolare* (*Schlechter 11107*); l. m. *A. amplexicaule* (*Edwards 336*); n. *A. barbatum*, stipules connate (*Janus & Sidey 733*); o. *A. campicola*, stipules connate (*Shirley s.n.*); p. *A. splendens*, leaflets revolute and stipules asymmetrical (*Krauss 927*).

3.1.4 Leaf anatomy

Leaf anatomy was investigated where fresh material was available. Methods of fixation and resin embedding are covered in Chapter 1.

Sections of petioles were made and most species have three distinct vascular traces which, in some instances, are maintained for the length of the petiole. In species with sessile leaves (*A. collinum*, *A. ascendens* and *A. humile*) the vascular tissue usually forms single traces but the abaxial fibres are randomly subdivided into numerous groups. In all species examined the parenchyma, above the bundles, had thickened walls which may represent the vestiges of fibre development.

Lamina anatomy was examined in a number of species and displayed consistent trends. In most species the abaxial leaflet vestiture is pronounced and leaf anatomy is dorsiventral. This correlates to the distribution of stomata, which predominate on the lower surfaces and the occurrence of tanniferous cells in the upper epidermis. Canescent species such as *A. collinum*, *A. candicans*, *A. incanum* and *A. stipulaceum* are amphistomatous and isobilateral, with tanniferous cells in the upper and lower epidermis. Discolorous species such as *A. pumilum*, *A. rotundifolium* and *A. trifoliatum* are hypostomatous and tannins are usually restricted to the upper epidermis.

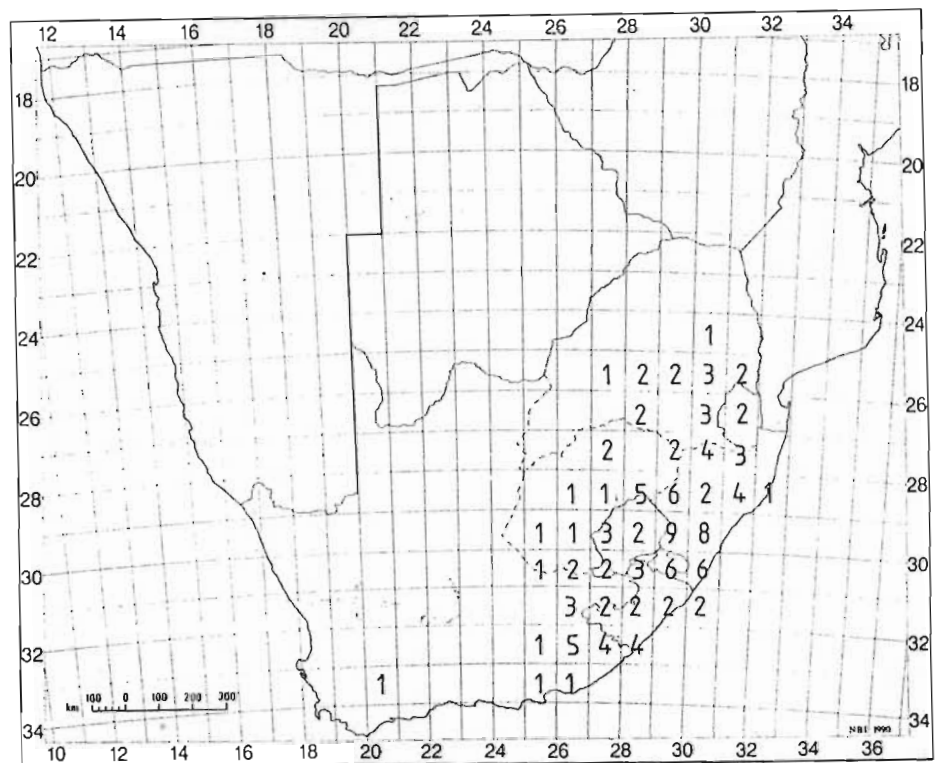
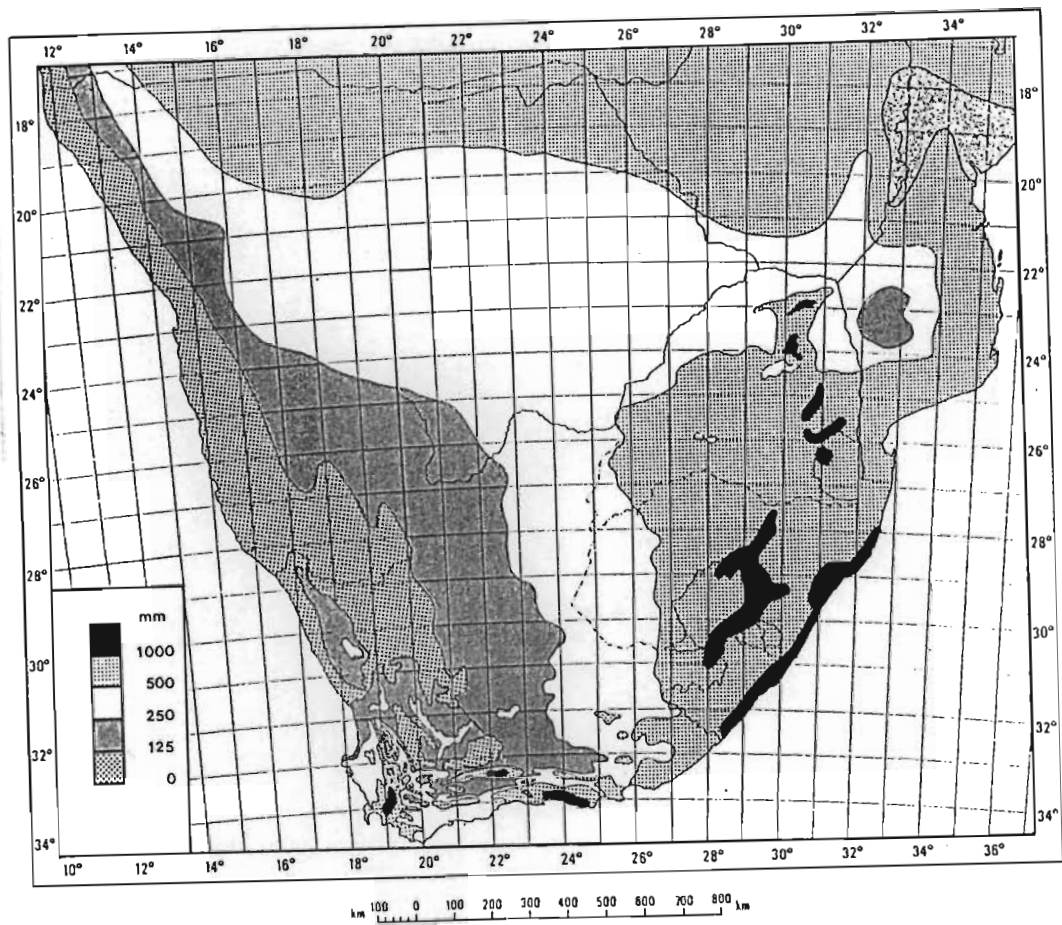


Figure 7. Recorded distribution of species with large stipules and map illustrating average rainfall in southern Africa (adapted from Schultze 1980 & Schutte 1988).

A. speciosum and its allies (*A. longifolium* and *A. baptisioides*) are glabrescent with annual aerial parts and dorsiventral, amphistomatous leaves. *A. filiforme* and its allies (*A. tuberosum*, *A. harveyanum*, *A. pseudotuberosum* and *A. angustissimum*) produce strongly dimorphic leaves which vary in morphology, anatomy and trichome distribution. The lower leaves are amphistomatous, sparsely hairy and dorsiventral. The upper leaves are hypostomatous, glabrous adaxially and tend towards isobilateral arrangement of the mesophyll.

3.1.5 Cytology

Goldblatt (1981) indicated that the cytology of *Argyrolobium* is inconsistent with its placement in the Genisteeae. This situation was resolved by reclassification of the genus into the Crotalarieae (Van Wyk and Schutte 1989).

Table 4. *Argyrolobium* Chromosome numbers (2n) and source literature.

<i>A. fischeri</i>	32	Frahm-Leliveld 1969
<i>A. flaccidum</i>	26	Bir & Sidhu 1966
<i>A. linnaeanum</i>	48	Lorenzo-Andreu 1951, Larsen 1956, Gilot 1965
<i>A. tomentosum</i>	30	Larsen 1956, Gilot 1965
<i>A. tomentosum</i>	32	Frahm-Leliveld 1969
<i>A. variopile</i>	30	Van Wyk & Schutte 1988

Van Wyk and Schutte (1988) reported counts (2n) of 30 and 32 from *Polhillia* which shares a base number of 8 with *Argyrolobium*. Despite the paucity of counts available for *Argyrolobium* it appears highly variable.

3.1.6 Alkaloids

The pioneering alkaloid work of Van Wyk and Verdoorn often in association with others (1988, 1988a, 1988b, 1989, 1990) has been instrumental in realigning classifications of the South African Crotalariaeae. This data compliments the work of Salatino & Gottlieb (1980, 1981) which was restrictive in its perspectives on the tribe. Van Wyk & Verdoorn (1990) provide a list of alkaloids reported from the Crotalariaeae and a cladistic analysis based on their occurrence. In this synopsis *Melolobium*, *Dichilus*, *Polhillia* and *Argyrolobium* form a specialised group with alpha-pyridone alkaloids.

Ammodendrine, sparteine and lupanine are common to much of the Crotalariaeae but the remaining alkaloids present in *Argyrolobium* are more restricted. *Polhillia* shares all its alkaloids with *Argyrolobium* but is not as diverse, lacking Δ 5,6-lupanine, argyrolobine and aphylline.

A preliminary survey of 12 *Argyrolobium* species (Van Wyk & Verdoorn 1989) lists the following alkaloids; anagryne, cytisine, *N*-methylcytisine, lupanine, sparteine, 5,6-dehydrolupanine, ammodendrine and aphylline. Conspicuous

differences in the relative proportions of anagyrine, cytisine, *N*-methylcytisine, lupanine and sparteine occur in the survey however the occurrence of these compounds is uniform and consolidates generic limits. In addition Tsuda and Marion (1964) reported the occurrence of argyrolobine which appears limited to *A. megarrhizum*.

3.2 SEXUAL CHARACTERS

3.2.1 Inflorescence Structure

Various acropetalous racemes characterise most legumes (Tucker 1987). They are based on an alternate pattern of bracts with axillary flowers. Edwards & Getliffe Norris (1990) and Van Wyk (1991) attached taxonomic significance to inflorescence structure and habit in *Buchenroedera* and *Lotononis*. Suffrutescent species with annual stems have inflorescences which terminate seasonal growth and shrubby perennial species have leaf-opposed inflorescences.

The Crotalariaeae are also characterised by reductions in the number of flowers per inflorescence and shortening or lengthening of the rachis and pedicels. Sessile and subsessile flowers are sometimes important in classification i.e. *Lotononis* section *Synclistus* and *Aspalathus* subgen. *Ecklonella*. This trend of reduction is also reported from *Argyrolobium* and *Dichilus* (Van Wyk & Schutte 1989).

Bracts and bracteoles are widespread in the Crotalariaeae and Van Wyk (1991) assigned taxonomic significance to the absence of bracteoles from *Lotononis* in

justifying his wide generic circumscription. Exceptions occur in sections *Listia*, *Lipozygis* and *Leptis*, with large bracts and loss of bracteoles considered apomorphic. Infrageneric bract variation also occurs in *Aspalathus* (Dahlgren 1968) where bract morphology characterises the subgen. *Triplobractea* and is important in the recognition of other groups.

A number of the Genisteae *s.s.* have bracts inserted above the pedicel base (Polhill 1976). Within the Crotalariaeae various patterns have been reported but in most instances the bracts are inserted at the pedicel base. Species of *Lotononis* sections *Lipozygis* and *Leptis* have elevated bract insertion of taxonomic significance (Van Wyk 1989).

Inflorescence characters such as the absence of bracts and bracteoles and the occurrence of 'pseudopeduncles' (in which the vegetative node below the inflorescence is extended) serve as complementary evidence for the recognition of *Polhillia*.

The inflorescences of *Argyrolobium* complement habit data in delimiting a number of groups. In large suffrutescent species many-flowered racemes terminate the annual stems and mass flowering occurs. In groups with perennial stems inflorescences develop from apical meristems but become leaf-opposed due to subapical vegetative growth. Most species within this group produce fasciculate

inflorescences atop peduncles however *A. filiforme*, *A. harveyanum*, *A. petiolare*, *A. collinum*, *A. velutinum* and *A. candicans* produce sessile or subsessile leaf-opposed inflorescences. In all perennial-stemmed species trap-line foraging is likely due to the paucity of open flowers. In addition the group produces cleistogamous flowers often with reduced peduncles (Figure 1).

Bracts and bracteoles are prevalent in the genus and usually resemble each other. Distinctive, large and cymbiform bracts occur in *A. amplexicaule* and *A. crinitum* but the remaining species produce lanceolate to ovate bracts which are variously attached to the peduncles and pedicels. The anatomy of the pedicels was investigated for evidence of panicle reduction but none was found.

Bracteoles are common in the genus and are inserted either on the pedicel or calyx. These organs vary from ovate to setaceous and in *A. molle* they are often absent. The insertion of bracts and bracteoles is variable even on a single inflorescence and thus no taxonomic significance is attached to it.

3.2.2 Flowers

Floral structure within *Argyrolobium* is consistent and relatively unspecialized. Only two groups of species diverge from this pattern. In *A. amplexicaule* flowers are reduced in size and densely arranged, consequently the standard does not reflex fully and the flowers are somewhat elongate. In *A. speciosum* and its allies

the standard base is modified.

3.2.3 Calyx

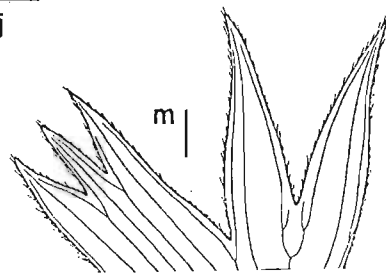
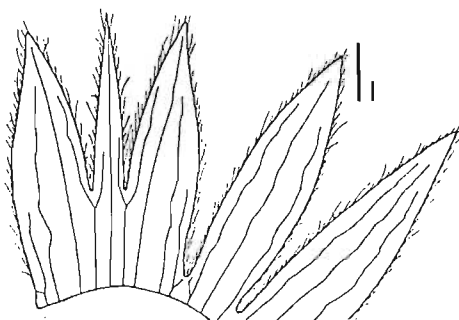
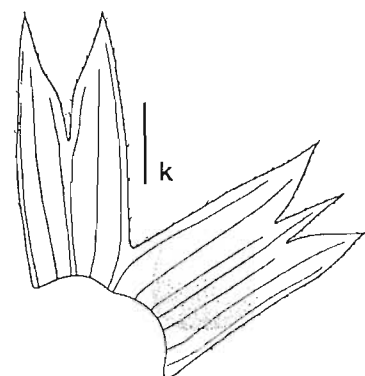
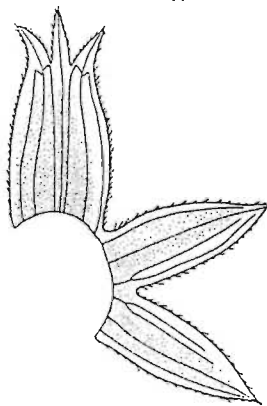
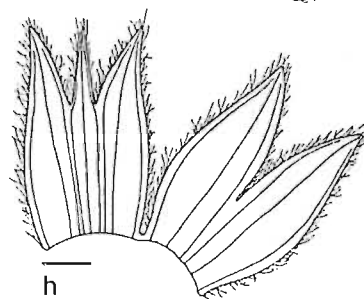
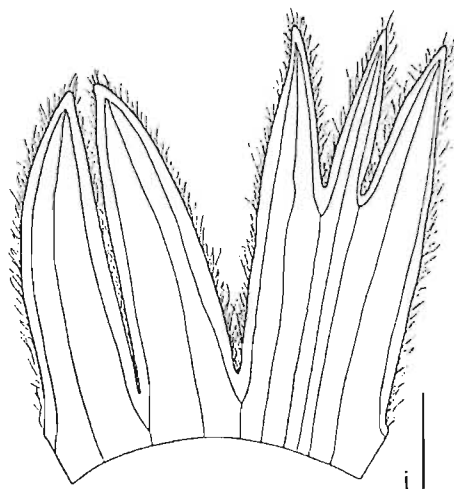
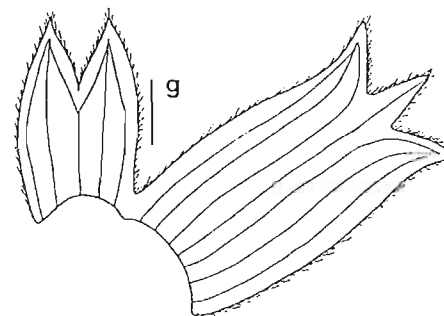
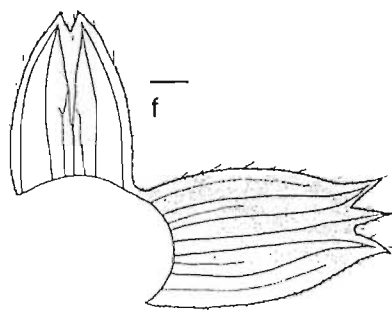
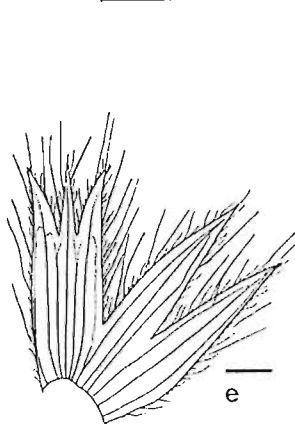
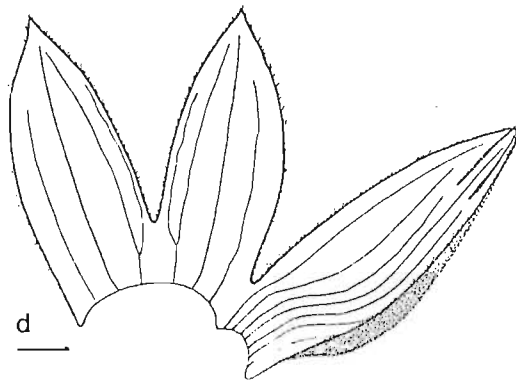
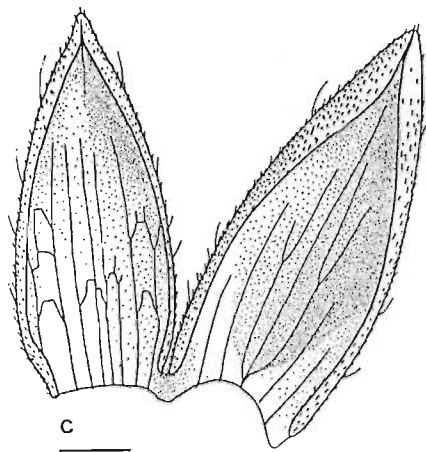
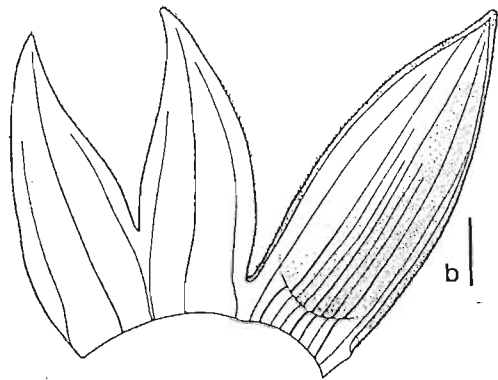
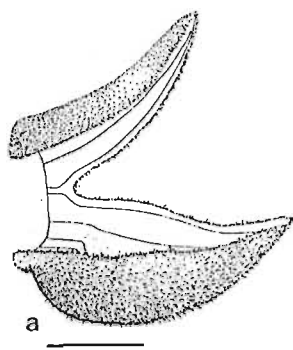
Variation of calycine morphology within the Papilionoideae has been influential in classification. Within the Crotalarieae two groups are discernable on calyx structure. The first includes genera exhibiting a more or less pentamerous calyx such as *Aspalathus*, *Lebeckia* and *Lotononis*. The second group is characterised by genera with bilabiate calyces and includes *Anarthrophyllum*, *Melolobium*, *Dichilus*, *Polhillia*, and *Argyrolobium*. A convergent pattern occurs in the Genisteae in *Adenocarpus* (Genistinae), *Cytisus* (Genistinae), *Genista* (Genistinae), *Ulex* (Genistinae), and *Lupinus* (Lupininae).

7

The evolution of calyces is a compromise between protection of flowers and nectaries, support of landing platforms and erection of standard petals. In most species of *Argyrolobium* the upper sinus is very well developed however exceptions do occur (Figures 8, 9 & 10). In species with complex thickening at the standard bases, the upper calyx sinus tends to be shallower i.e. *A. longifolium*, *A. baptisioides*, *A. speciosum* and *A. pseudotuberosum* (Figures 8 & 10). In addition the standard claws are elongate and perpendicular to the blade

Figure 8.

Calyx morphology of selected *Argyrolobium* species: a. *A. parviflorum* (Snijman 338); b. *A. incanum* (Edwards 478); c. *A. polyphyllum* (Edwards 491); d. *A. wilmsii* (Edwards 562); e. *A. amplexicaule* (Edwards 336); f. *A. longifolium* (Edwards 402); g. *A. baptisioides* (Edwards 434); h. *A. crinitum* (Drège s.n.); i. *A. tomentosum* (Edwards 433); j. *A. sericosemium* (Edwards 337); k. *A. speciosum* (Edwards 575); l. *A. stipulaceum* (Edwards 433); m. *A. harveyanum* (Edwards 455). Bars = 2 mm.



(Figure 11) thus reducing constraints imposed by the calyx by displacing the point of standard erection. Section *Polyphyllum* also displays reduced upper sinus development (Figure 10). All these species produce large flowers *en masse* which reduces the importance of erect standards due to the composite visual impact of the inflorescence.

8

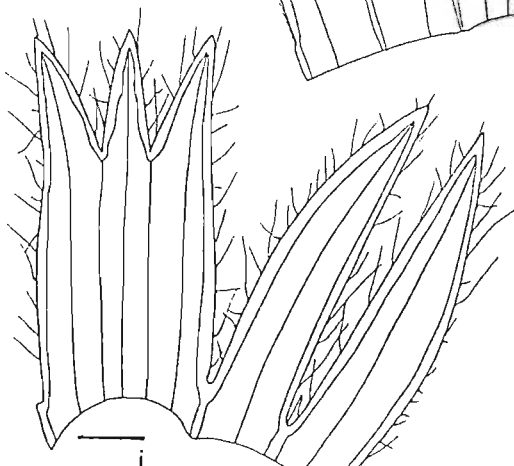
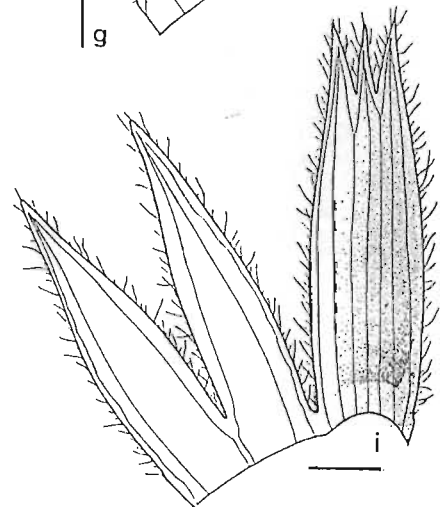
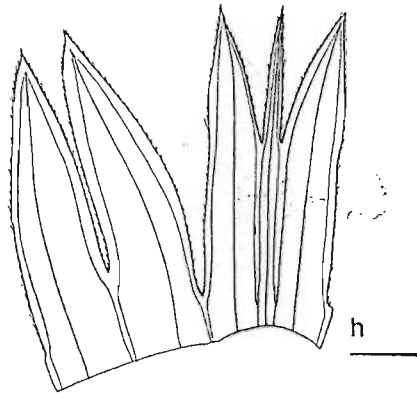
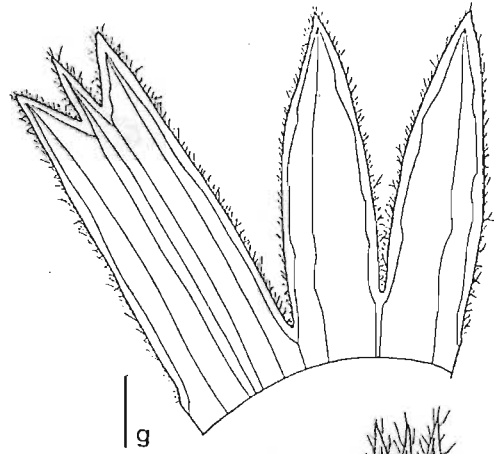
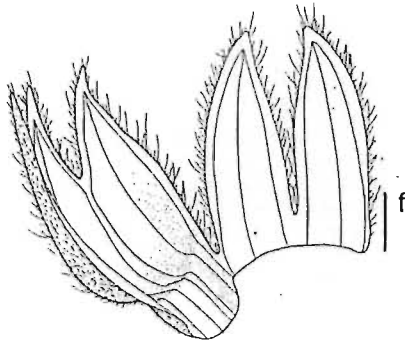
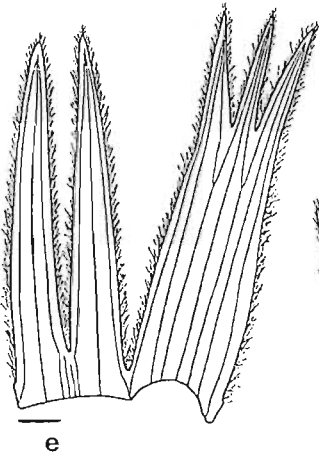
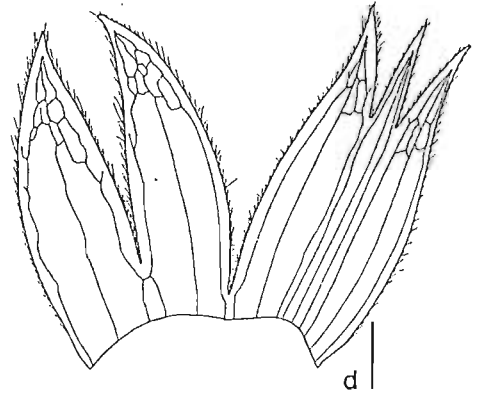
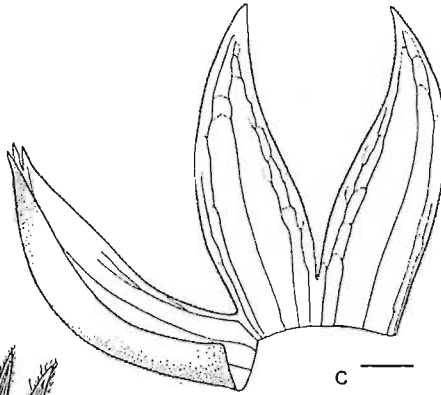
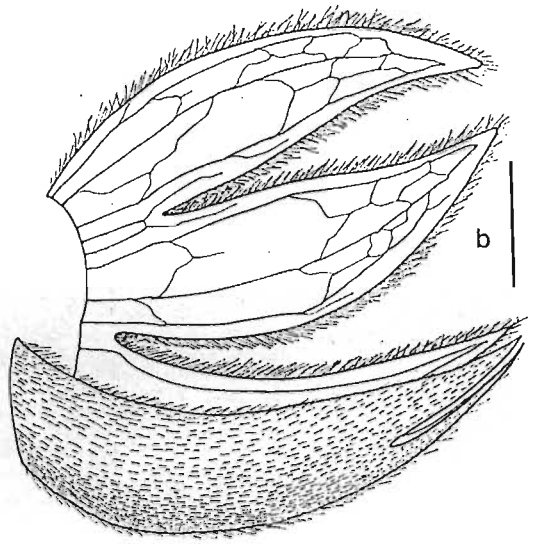
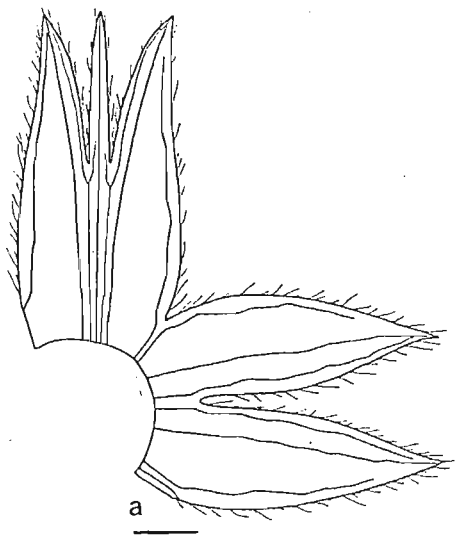
In section *Polyphyllum* the lobes of the lower lip are also reduced or vestigial and may provide added support to the landing platform.

3.2.4 The Corolla

In addition to visual orientational cues for pollinators 'Duftmale' patterns (areas secreting volatile oils) have been recorded in the Genistinae (Adey 1982). Our investigation included a survey of these patterns in *Argyrolobium* where fresh

Figure 9.

Calyx morphology of selected *Argyrolobium* species: a. *A. frutescens* (Edwards 1116); b. *A. lunare* ssp. *lunare* (Williams 757); c. *A. petiolare* (Schlechter 11107); d. *A. lunare* ssp. *sericeum* (Barker s.n.); e. *A. angustissimum* (Drège s.n.); f. *A. pumilum* (Edwards 480); g. *A. harmsianum* (Levyns 10703); h. *A. pseudotuberosum* (Edwards & Burrows 1019); i. *A. harveyanum* (Jacobsz 2003); j. *A. barbatum* (Junus & Sidey 733). Bars = 2 mm.



material was available. The results of this survey show a consistent pattern concentrated at the base of the standard petals of all species investigated. Wing petals occasionally showed a very diffuse pattern and keel petals revealed no pattern.⁹

The Standard

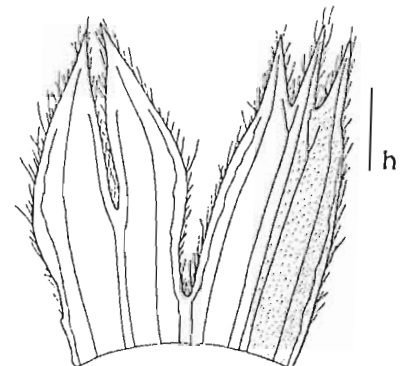
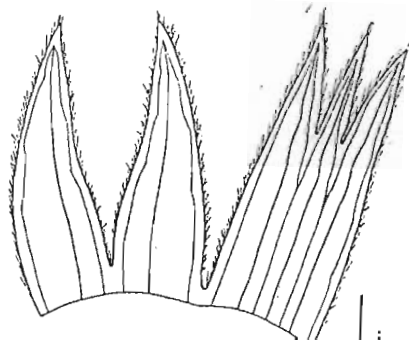
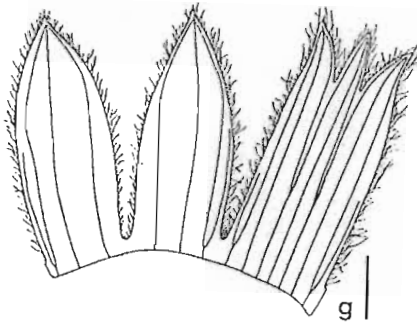
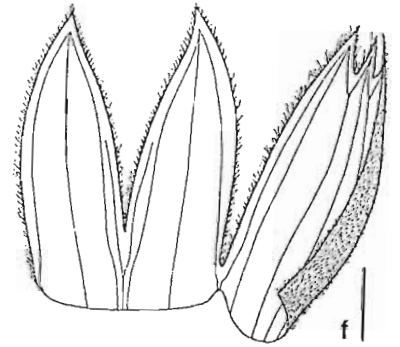
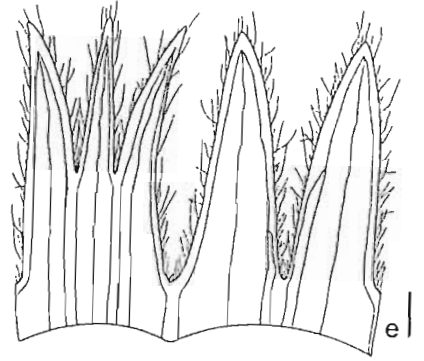
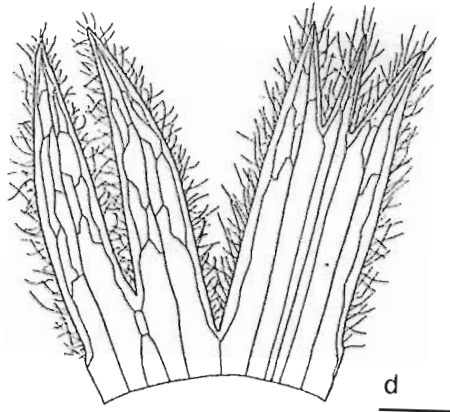
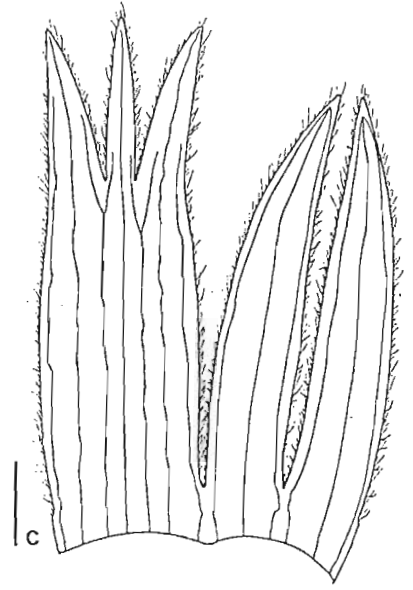
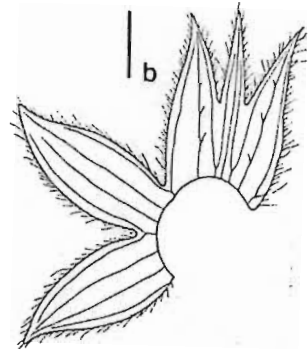
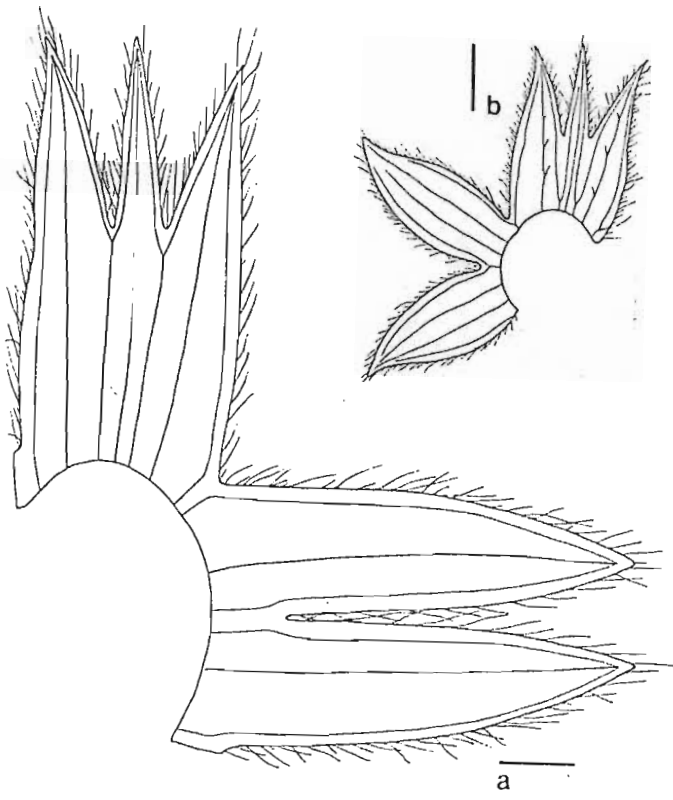
The standard petals of *Argyrolobium* are remarkably consistent (Figures 11 & 12) and are, for the most part, sub-orbicular with varying densities of trichomes on the adaxial surface. Claws are slightly thickened and seldom exceed 3 mm. In some instance the lamina base is ornamented (*A. pseudotuberosum*, *A. baptisioides* and *A. speciosum*) and canaliculate (*A. amplexicaule* and *A. baptisioides*). These modifications are apomorphic and enhance the basal strength of the petals.

The Wings

Many papilionoid species possess rows of wrinkles, lunae, rugae or lamellae on the outer surfaces of the wing petals. The terminology of Stirton (1981) is

9

Figure 10.
Calyx morphology of selected *Argyrolobium* species: a. *A. humile* (Hilliard & Burt 19086); b. *A. rotundifolium* (Edwards & Ackermann 329); c. *A. pauciflorum* (Bowker 58); d. *A. campicola* (Shirley s.n.); e. *A. lotoides* (Browning 183); f. *A. collinum* (Edwards 481); g. *A. molle* (Edwards 484) h. *A. ascendens* (Edwards 506); i. *A. velutinum* (Bolus 7074). Bars = 2 mm.



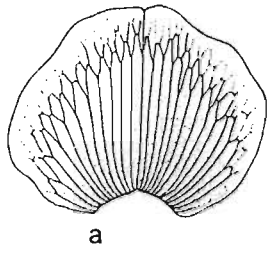
followed in describing the distribution and type of petal sculpturing. Petal sculpturing and appears to have evolved in conjunction with mellitophilous pollination syndromes (Arroyo 1981) and provides traction for pollinators (Tewari & Nair 1979; Stirton 1981 and Edwards 1984). Species-specific patterns have been reported in *Aspalathus* and *Wiborgia* (Dahlgren 1963 & 1975) and the Indian component of *Crotalaria* (Tewari & Nair 1979). However petal sculpturing is not usually species-specific (Stirton 1989; Edwards 1984 & 1987).

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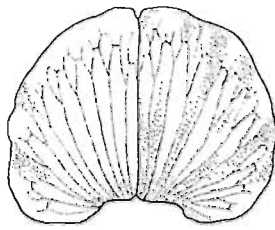
Wing micromorphology is also modified by the occurrence of trichomes which are sometimes of taxonomic value (Edwards 1987; Van Wyk 1991).

Figure 11.

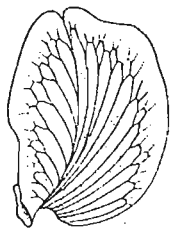
Standard petals of *Argyrolobium*: a. *A. wilmsii*, abaxial view, b. lateral view (Edwards 562); c. *A. incanum*, abaxial view (Edwards 478); d. *A. pseudotuberosum*, lateral view, e. abaxial view (Edwards & Burrows 1015); f. *A. speciosum*, lateral view, g. abaxial view (Edwards 575); h. *A. longifolium*, lateral view, i. abaxial view (Edwards 402); j. *A. baptisioides*, abaxial view, k. lateral view (Edwards 434); l. *A. splendens*, oblique abaxial view (Krauss 927); m. *A. amplexicaule*, abaxial view (Edwards 336); n. *A. crinitum*, oblique abaxial view (Drège s.n.); o. *A. lunare*, abaxial view (Williams 757). Bars = 2 mm.



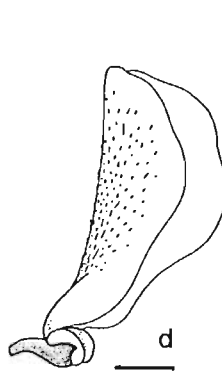
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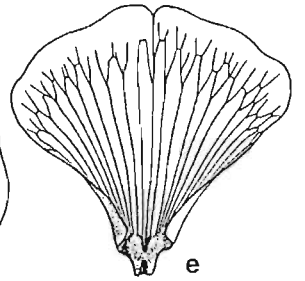
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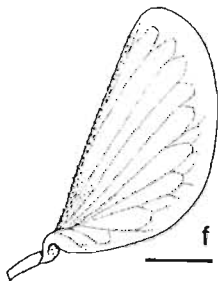
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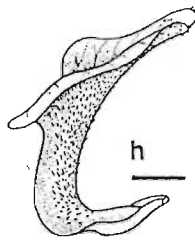
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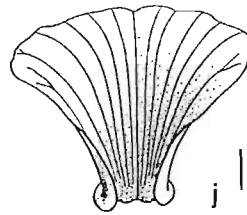
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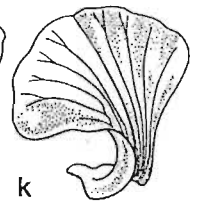
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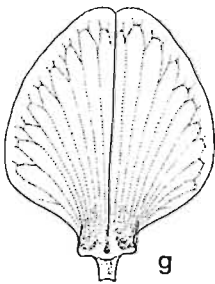
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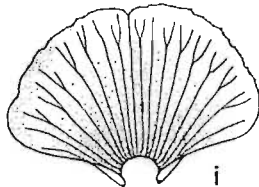
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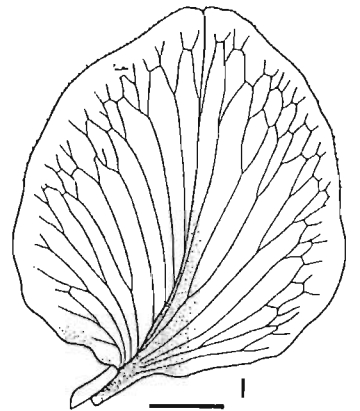
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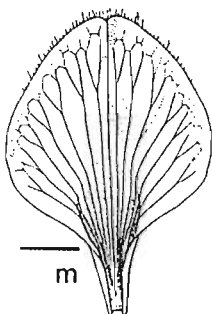
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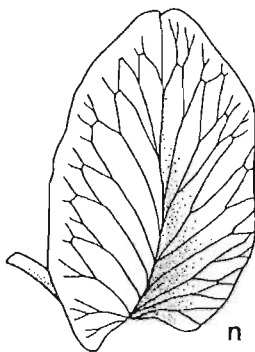
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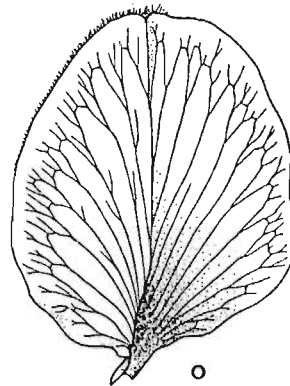
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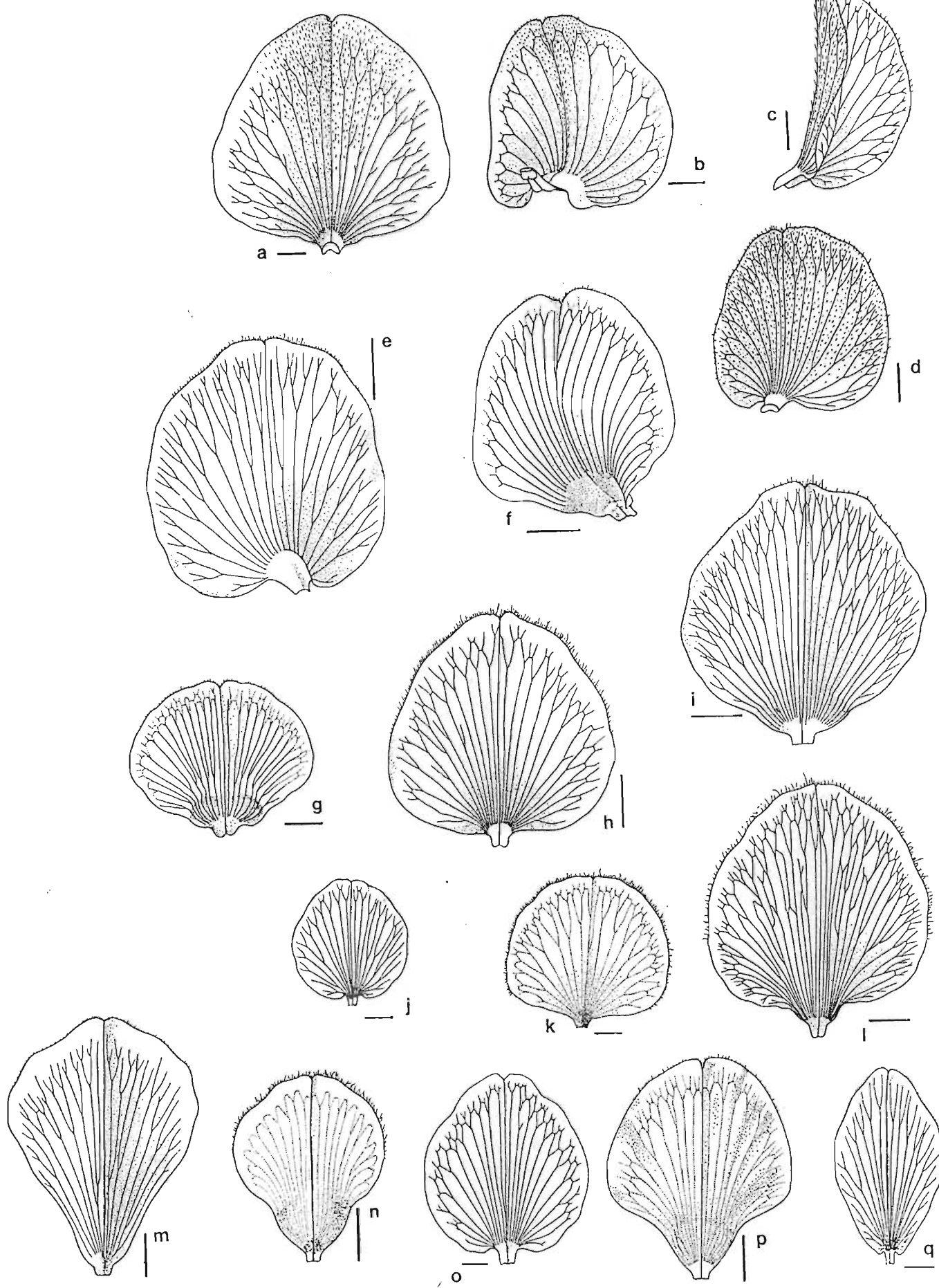
The wing petals are generally longer and narrower than the keel petals in *Argyrolobium*. Most species display petal sculpturing of varied distribution across the outer surface. The most common zones of ornamentation in *Argyrolobium* are the upper basal and the upper central zones (Figure 13) however patterns are intraspecifically variable. Sculpturing is always transcostal and of the lunate-lamellate type (Figures 15, 16, 17). The loss of sculpturing has occurred independently in many of the sections (Figure 14) and is considered apomorphic.

Wing vestiture occurs intermittently in several species and does not correlate to sectional characters. ¹¹

The Keel

The keel petals of *Argyrolobium* are always valvate and shorter than the wing petals. They are fused along their lower margin and have blunt apices which represents an unspecialised condition within the tribe. The use of keel vestiture in

Figure 12. Standard petals of *Argyrolobium*: a. *A. petiolare*, adaxial view (Schlechter 11107); b. *A. lotoides*, adaxial view (Browning 183); c. *A. harveyanum*, lateral view (Jacobsz 2003), d. adaxial view; e. *A. candicans*, abaxial view (Flanagan 1343); f. *A. ascendens*, abaxial view (Edwards 506); g. *A. rotundifolium*, abaxial view (Edwards & Ackermann 329); h. *A. muddii*, abaxial view (Edwards 654); i. *A. barbatum*, abaxial view (Janus & Sidey 733); j. *A. filiforme*, abaxial view (Walgate 399); k. *A. harveyanum*, abaxial view (Edwards 455); l. *A. campicola*, abaxial view (Shirley s.n.); m. *A. frutescens*, abaxial view (Edwards 1116); n. *A. sericosemium*, abaxial view (Edwards 337); o. *A. transvaalense*, abaxial view (Edwards 572); p. *A. collinum*, abaxial view (Edwards 481); q. *A. angustissimum*, abaxial view (Drège s.n.). Bars = 2 mm.



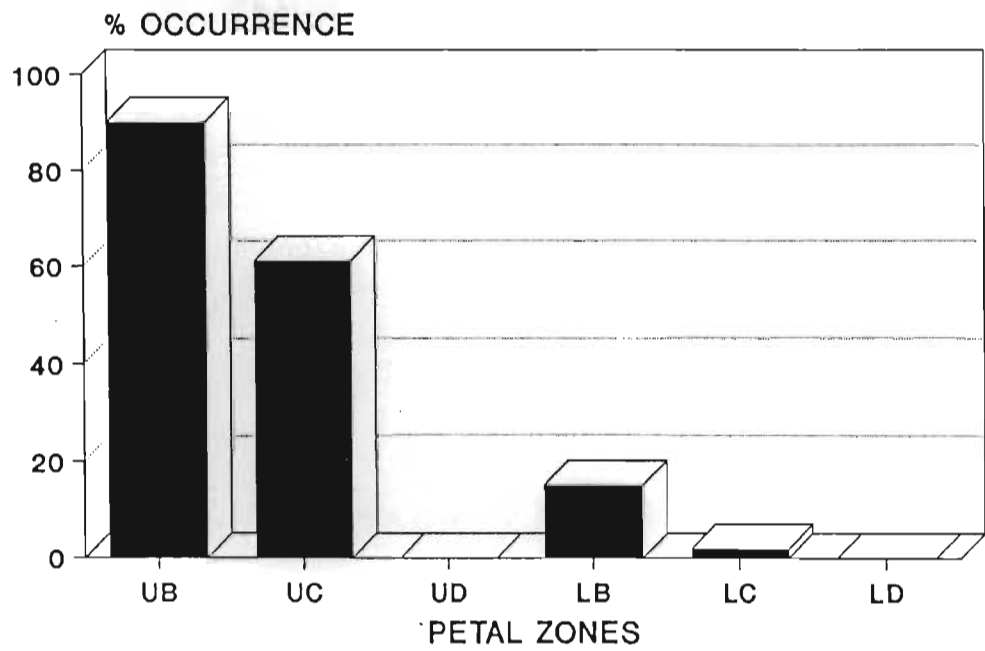


Figure 13. Bar graph showing the distribution of petal sculpturing in *Argyrolobium*

UB = upper basal zone

LB = lower basal zone

UC = upper central zone

LC = lower central zone

UD = upper distal zone

LD = lower distal zone

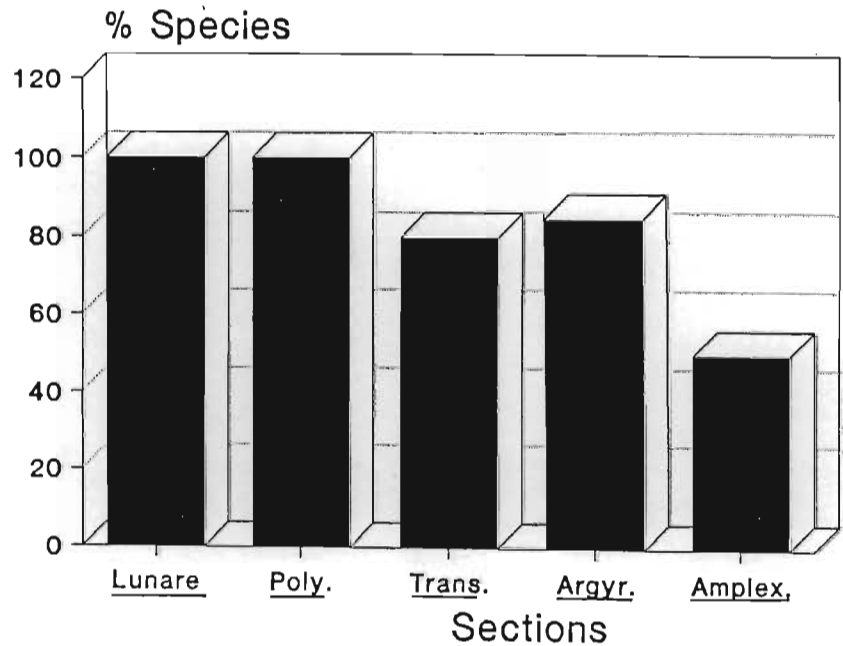


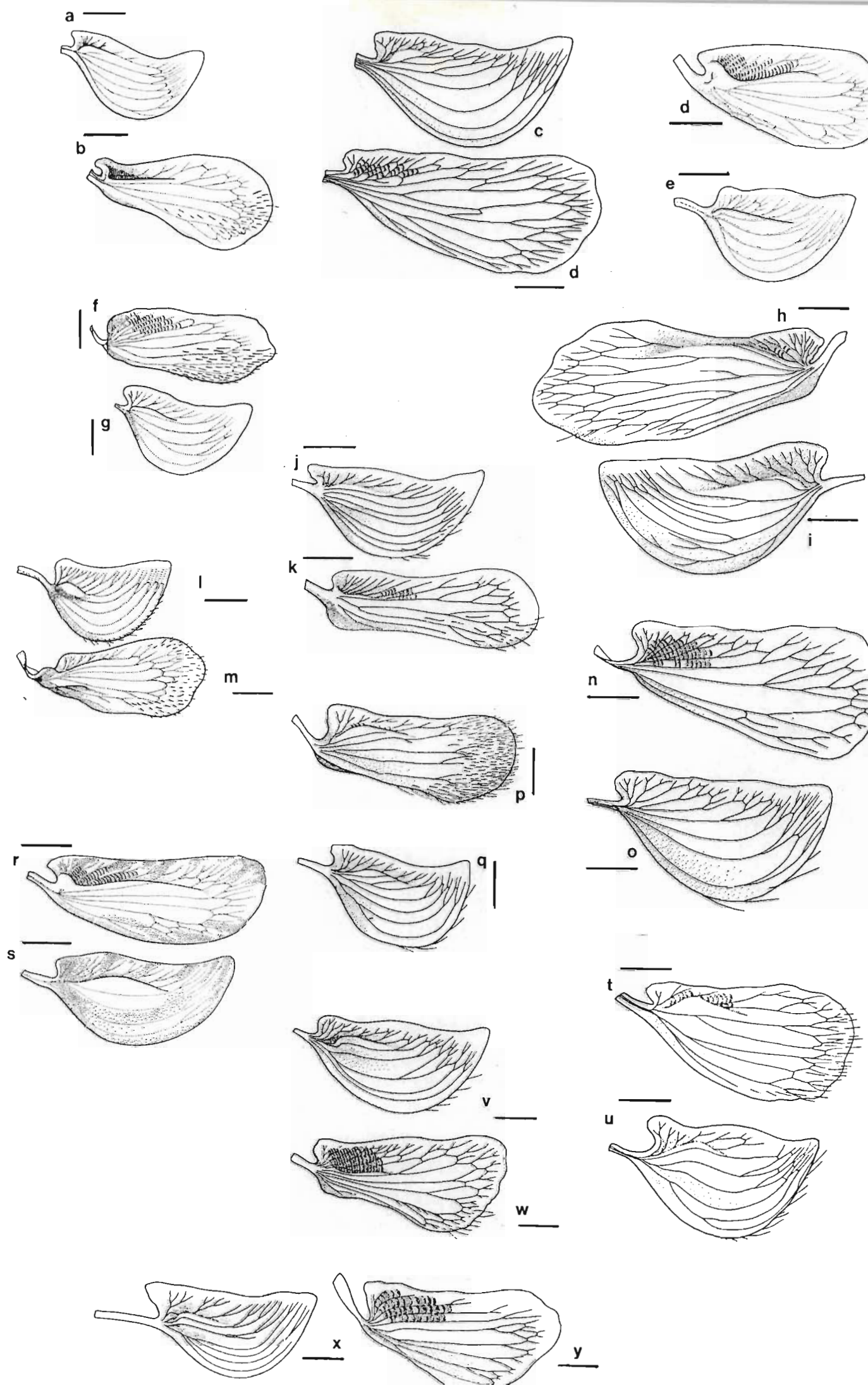
Figure 14. Bar graph showing the occurrence of sculpturing in the sections of *Argyrolobium*.

the delimitation of taxa is possible in sections of *Lotononis* (Edwards 1987; Van Wyk 1991) however within *Argyrolobium* this character is unstable. In other aspects keel morphology is consistent throughout the genus (Figures 15, 16, 17).

12

Figure 15.

Wing and keel petals of *Argyrolobium*. a. *A. molle*, keel, b. wing (Edwards 484); c. *A. barbatum*, keel, d. wing (Janus & Sidey 733); e. *A. pumilum*, keel, z. wing (Edwards 480); f. *A. sericosemium*, wing, g. keel (Edwards 337); h. *A. pauciflorum*, wing, i. keel (Bowker 58); j. *A. ascendens*, keel, k. wing (Edwards 506); l. *A. rotundifolium*, keel, m. wing (Edwards & Ackermann 329); n. *A. pachyphyllum*, wing, o. keel (Burgers 1580); p. *A. velutinum*, keel, q. wing (Bolus 7074); r. *A. collinum*, wing, s. keel (Edwards 481); t. *A. humile*, wing, u. keel (Hilliard & Burt 19086); v. *A. campicola*, keel, w. wing (Shirley s.n.); x. *A. lotoides*, keel, y. wing (Browning 183). Bars = 2 mm.



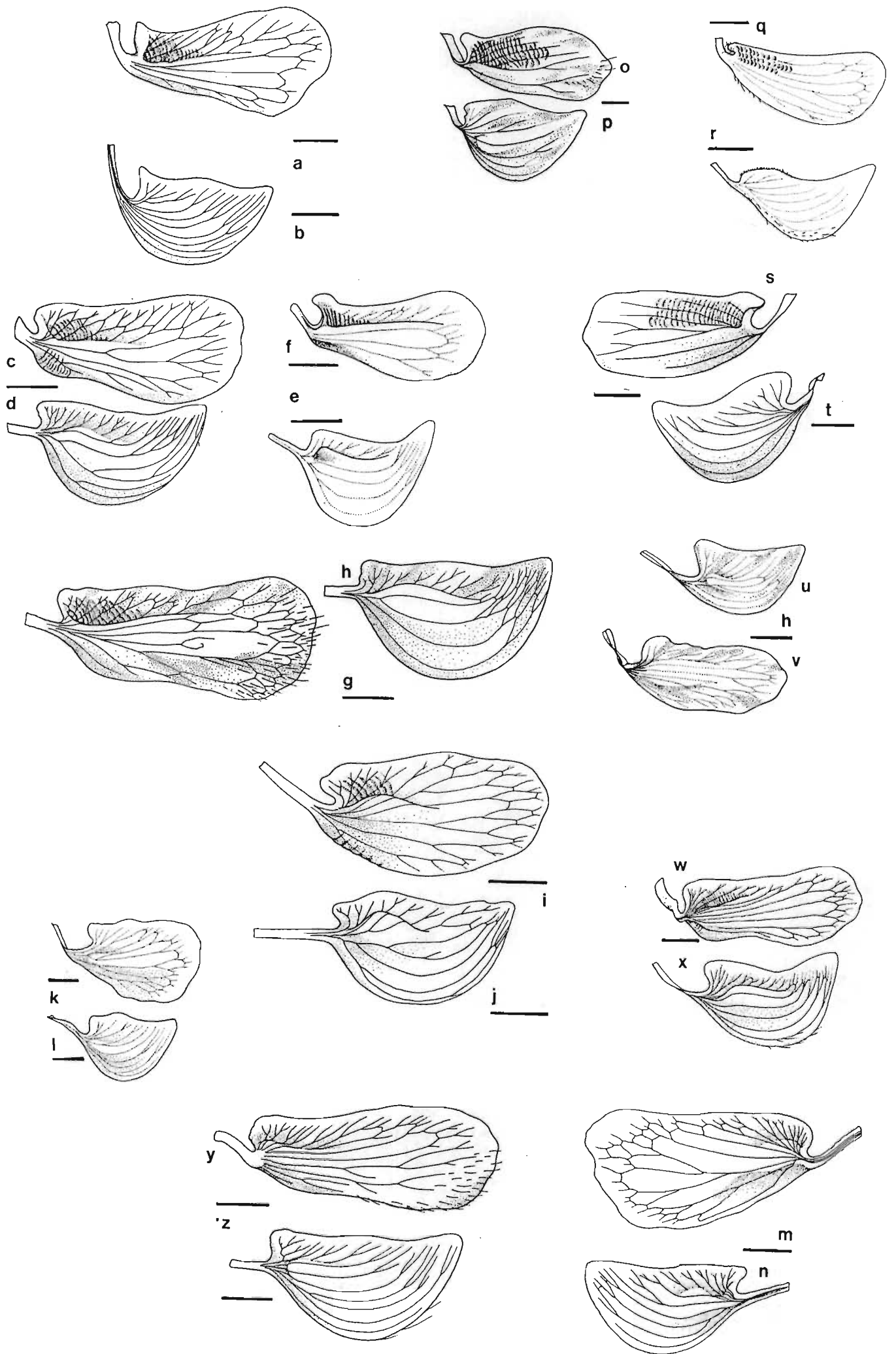
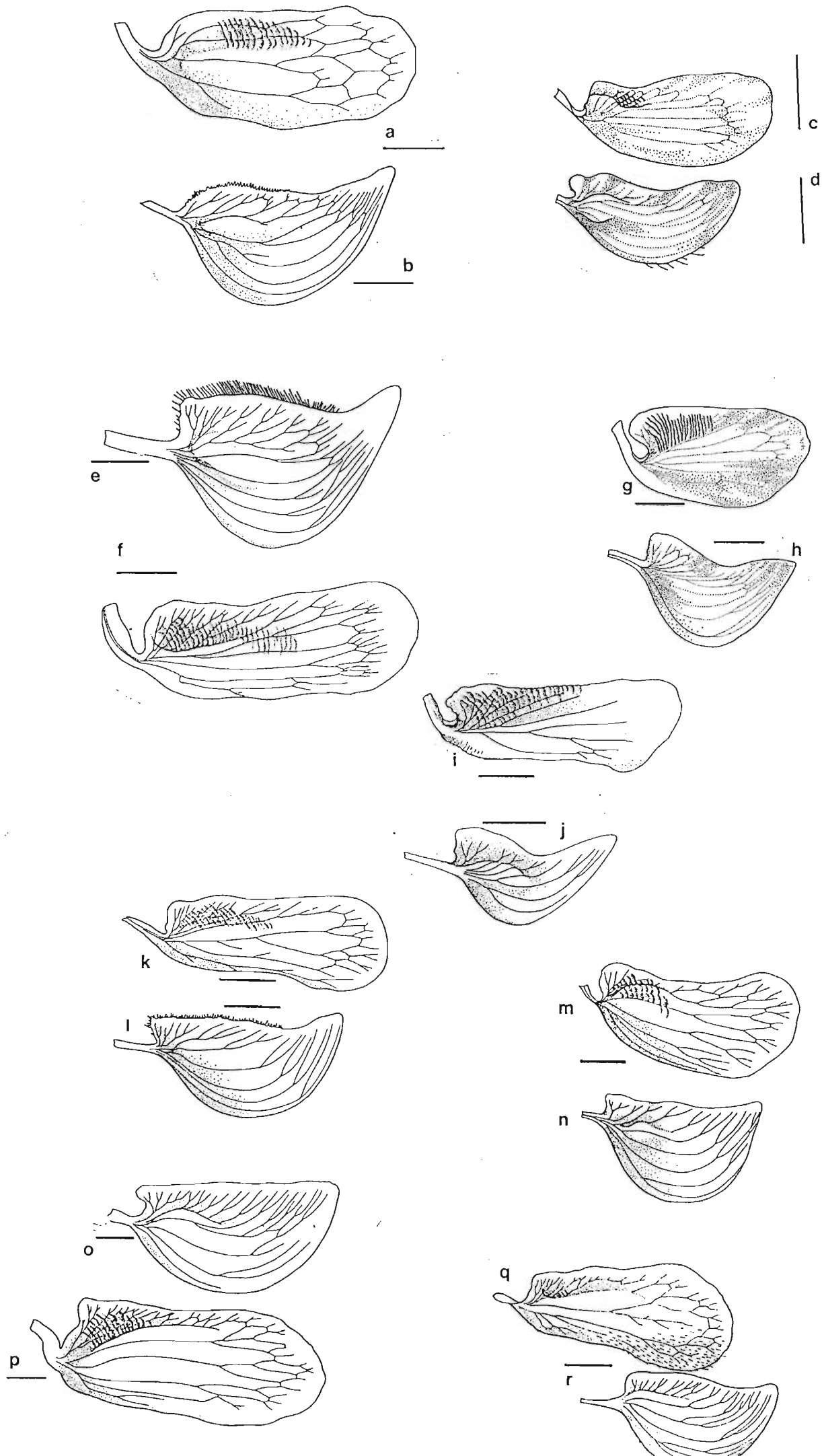


Figure 16.

Wing and keel petals of *Argyrolobium*: a. *A. pseudotuberosum*, wing, b. keel (Edwards & Burrows 1019); c. *A. harveyanum*, wing, d. keel (Jacobsz 2003); e. *A. harveyanum*, keel, f. wing (Edwards 455); g. *A. harmsianum*, wing, h. keel (Levyns 10703); i. *A. crinitum*, wing, j. keel (Drège s.n.); k. *A. tomentosum*, wing, l. keel (Edwards 433); m. *A. muddii*, wing, n. keel (Edwards 654); o. *A. baptisioides*, wing, p. keel (Edwards 434); q. *A. speciosum*, wing, r. keel (Edwards 575); s. *A. longifolium*, wing, t. keel (Edwards 402); u. *A. amplexicaule*, keel, v. wing (Edwards 336); w. *A. wilmsii*, wing, x. keel (Edwards 562); y. *A. frutescens*, wing, z. keel (Edwards 1116). Bars = 2 mm.

Figure 17.

Wing and keel petals of *Argyrolobium*: a. *A. splendens*, wing, b. keel (Krauss 927); c. *A. polyphyllum*, wing, d. keel (Edwards 491); e. *A. lunare* ssp. *lunare* keel, f. wing (Williams 757); g. *A. incanum*, wing, h. keel (Edwards 478); i. *A. parviflorum*, wing, j. keel (Snijman 338); k. *A. lunare* ssp. *sericeum*, wing, l. keel (Barker s.n.); m. *A. candicans*, wing, n. keel (Flanagan 1343); o. *A. petiolare*, keel, p. wing (Schlechter 11107); q. *A. stipulaceum*, wing, r. keel (Edwards 433). Bars = 2 mm.



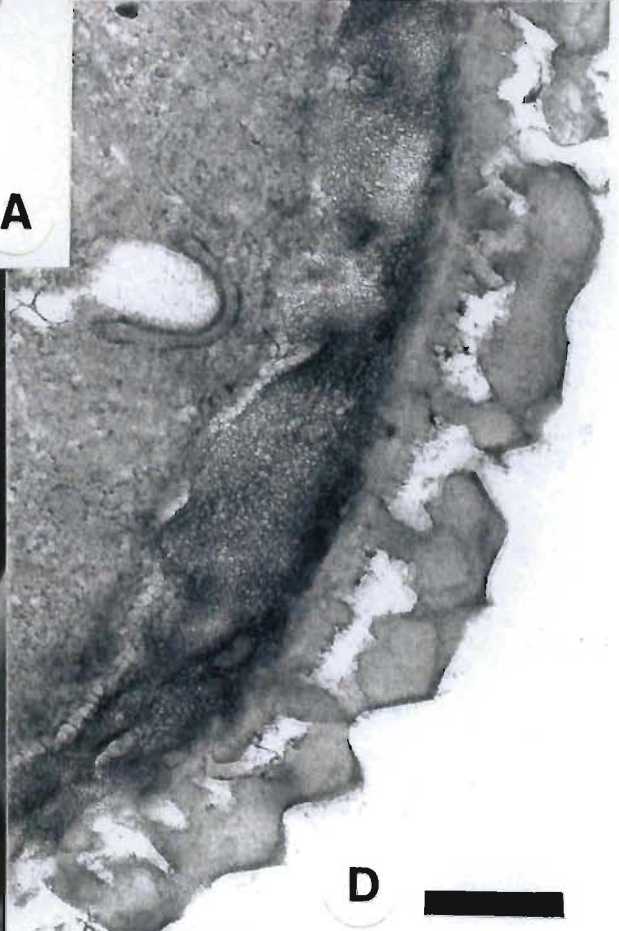
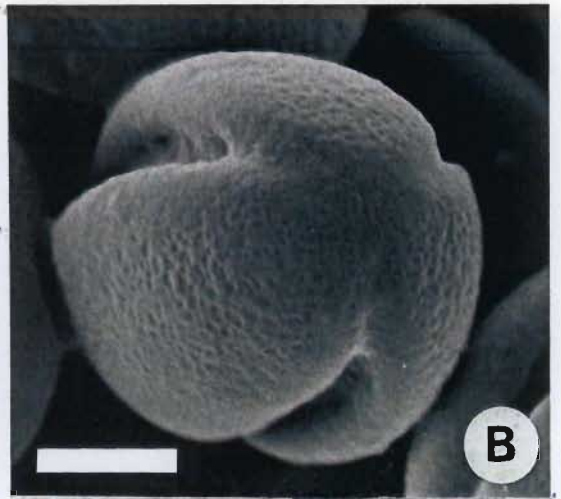
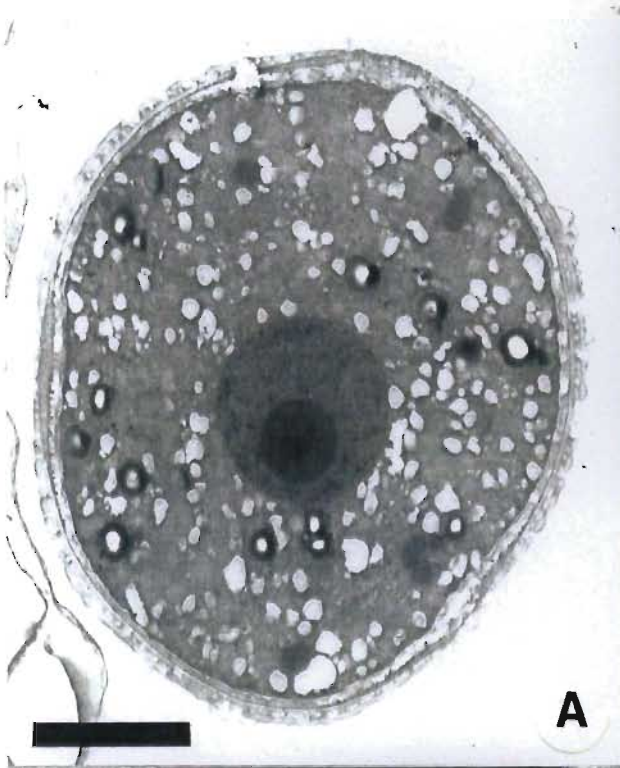


Figure 18.

Pollen morphology and wall stratification in *Argyrolobium*: A. section of *A. ascendens* (voucher = *Edwards 506*, bar = 5 μm); B. *A. incanum* polar view (voucher = *Edwards & Ackermann 477*, bar = 5 μm); C. *A. amplexicaule* equatorial view (voucher = *Taylor 95*, bar = 5 μm); D. section of the wall of *A. ascendens* showing tectal perforations and slightly reduced columellae (voucher = *Edwards 506*, bar = 1 μm).

3.2.5 The Androecium & Palynology

A progressive fusion of filaments occurs within the Podalyrieae and Crotalarieae. Associated with this trend is an increase in anther dimorphism. Bentham (1865) placed strong emphasis on these sexual modifications in the generation of classifications but with the accumulation of systematic data it has become increasingly apparent that these trends are often convergent (Polhill 1976; Van Wyk & Schutte 1989). The complete fusion of the staminal sheath in *Argyrobium* was the primary character used to justify its placement within the Genisteae s.s.

Staminal dimorphism occurs in *Argyrobium* with five short stamens with large basifixed anthers and five long stamens with small dorsifixed anthers. Occasionally hairs occur on the thecae of *A. lunare*.

Filament fusion occurs late in floral development and is variable within *Argyrobium*. Strong trends towards diadelphly are present in *A. harveyanum*, *A. lunare* and *A. sericosemium* (for which the term pseudodiadelphly is used) but monadelphly with adaxial cleavage is more common. Complete adaxial cleavage occurs only in *A. baptisioides*, *A. pseudotuberosum*, *A. speciosum*, *A. tuberosum* and *A. longifolium* and appears to be a reversal.

Palynology has provided many characters for delimiting natural groups in plant

phylogeny (Walker & Doyle 1976 & Blackmore 1984). Pollen variation within the Crotalariaeae is however comparatively small and concerned mainly with aperture structure but Ferguson & Skvarla (1981) consider it useful in tribal circumscription. The Podalyrieae and Genisteae *s.l.* are distinguished by the raised surface reticulation (supra reticulation) of their pollen grains (Polhill 1976).

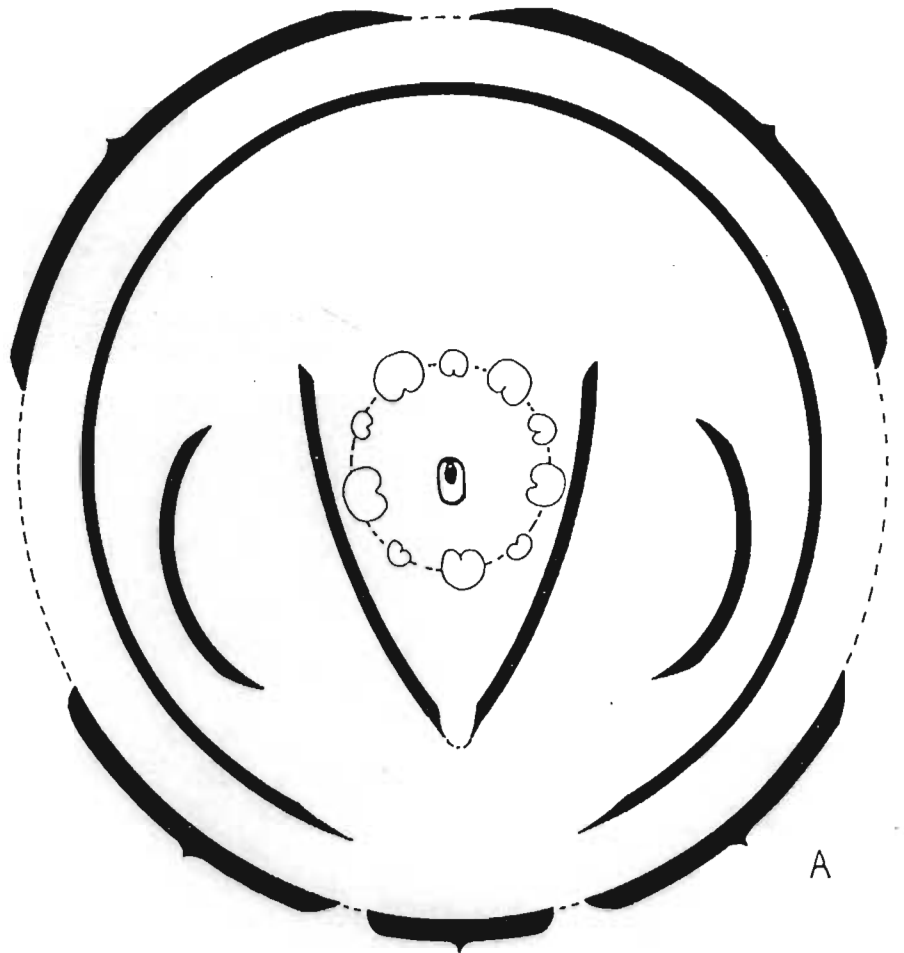
Tricolpate pollen is prominent in the Crotalariaeae while tricolporate grains occur in the Lipariaeae, Podalyrieae and Sophoreae. Consequently the former pollen type is regarded as specialised (Ferguson & Skvarla 1981; Guinet 1981). Within the Crotalariaeae tricolpate pollen is common to *Aspalathus*, *Bolusia*, *Melolobium*, *Dichilus* and *Argyrolobium*. *Wiborgia* and *Lebeckia* have tricolporate grains with small apertures in the endexine.

Argyrolobium is stenopalynous and grains are prolate, tricolpate and apocolpate throughout (Figure 18). Grain size ranges, 18--25 x 15--18 μm , and surface micromorphology is consistently reticulate with slight variation in pattern definition.

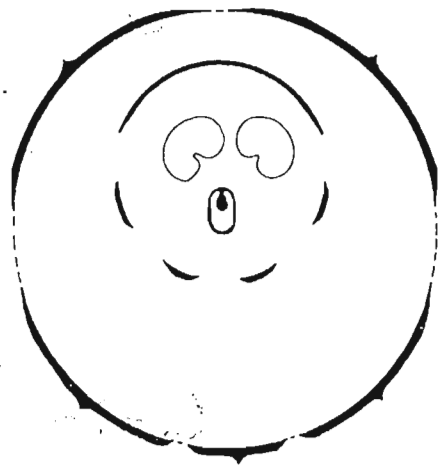
Sections through the grain wall reveal relatively unspecialised stratification which conforms with the patterns reported by Ferguson & Skvarla (1981) (Figure 18).

3.2.6 Breeding systems

The phenomenon of cleistogamy is common in the flowering plants and involves



A



B

Figure 19.

Floral diagrams of *Argyrolobium*. A. Chasmogamous flower; B. cleistogamous flower.

the sexual production of seed without anthesis. In some instances this is combined with reductions in the number and size of floral organs leading to floral dimorphism. Within the Crotalarieae most cleistogamous species show little floral modification and dimorphism has only been reported from *Argyrolobium* (Harms 1909, 1917; Polhill 1968; Edwards, van Staden & Stirton 1992) and *Lotononis* (Van Wyk 1990). Comparisons of the degree of floral dimorphism displayed by these genera reveals that reduction is extreme in *Argyrolobium* (Figure 19) and fairly minor in *Lotononis*.

To understand the uniform pattern of organ abortion in cleistogamous flowers of *Argyrolobium* its floral development was investigated. Within the Papilionoideae floral development follows a pattern which is unusual in the angiosperms (Tucker 1984). Zygomorphy of the corolla is established with the asymmetrical initiation of the petals. Standard primordia develop first followed by the wings and then the keel (Figure 20). This dorso-ventral pattern is repeated in the stamens which, although monodelphous in chasmogamous flowers, are initiated as two separate whorls (Figure 20). The outer whorl comprises 5 large anthers on short filaments which develop before the inner whorl of 5 small anthers on long filaments. Development is initiated in the adaxial organs of each successive whorl, and progresses abaxially. In addition the development of the whorls progresses centripetally but overlaps slightly thus the adaxial anthers of the outer whorl develop before the abaxial petals.

Figure 20. Floral development of *Argyrolobium molle*. A. Young cleistogamous flower showing the marked asymmetry of the petals and androecium; B. young chasmogamous flower showing the slightly asymmetrical development of the petals and large basifixed anthers; C. young cleistogamous flower with the calyx and carpel removed, note the absence of the five inner staminal primordia; D. young chasmogamous flower with the calyx and carpel removed, showing the inner staminal primordia; E. asymmetrical development of the calyx; F. adaxial view of the functional stamens and recurved style in a cleistogamous flower; G. lateral view of a young chasmogamous flower with the calyx removed showing the relative rates of organ development; H. lateral view of a mature cleistogamous flower with the calyx removed, note the unusual occurrence of anthers on the lower stamens (bars A, B, C, D = 110 μm ; E = 100 μm ; F = 1.9 mm; G = 200 μm ; H = 0.9 mm).

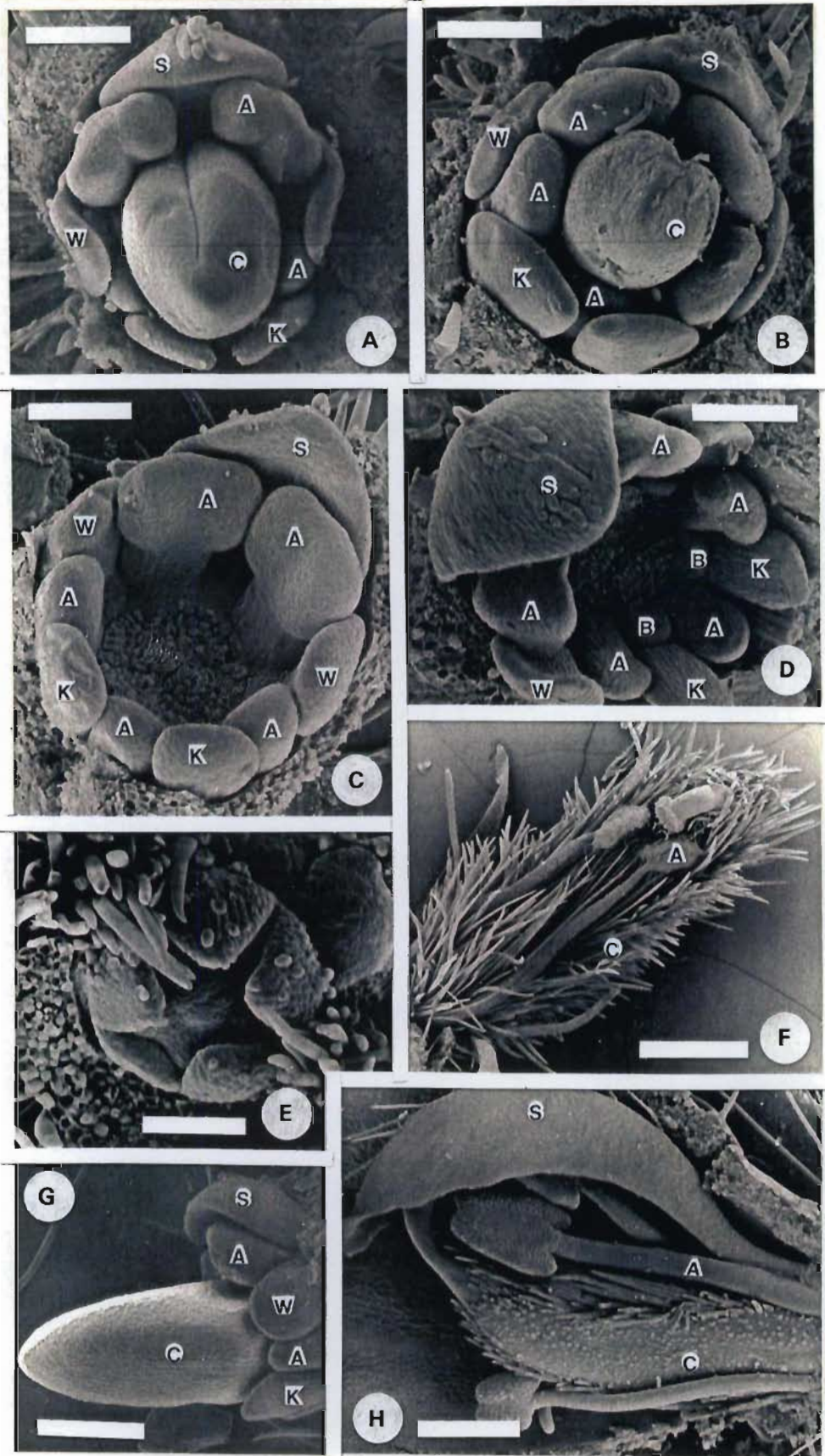


Fig 20.

Cleistogamous flowers of *Argyrolobium* display the loss or inhibition of several organs. The extent of inhibition is related to the position of floral primordia. Thus in cleistogamous flowers (Figure 21 & 22) the standard, although reduced, is always present, the wings usually occur as fragile spathulate appendages and the keel petals are filamentous. The androecium shows even greater reduction with only 2 functional anthers remaining. These correspond to the large abaxial anthers of the outer whorl. The remaining three stamens of this whorl usually occur as irregular filaments. On rare occasions the lateral stamens bear vestigial anthers but these seldom contain pollen and never achieve pollination due to their lateral placement. Stamens of the inner whorl are always absent. This reduction in stamens correlates to a major reduction in the amounts of pollen produced per flower. In addition, pollen loads of the retained anthers are reduced.

Cleistogamous styles are shortened and sharply recurved, making contact with the viable anthers. Pollen germinates *in situ* and grows through the anther walls into the stigma.

In chasmogamous flowers outbreeding is encouraged by separation of the sexual whorls through differential elongation of the filaments and styles. Pollen is deposited on the stigma through perianth distortion by visiting insects. In cleistogamous flowers this spacial separation is circumvented by abbreviation of the staminal filaments and style in conjunction with reflexion of the latter. The scenario conforms to progenesis (Lloyd 1983) in which specializations that reduce

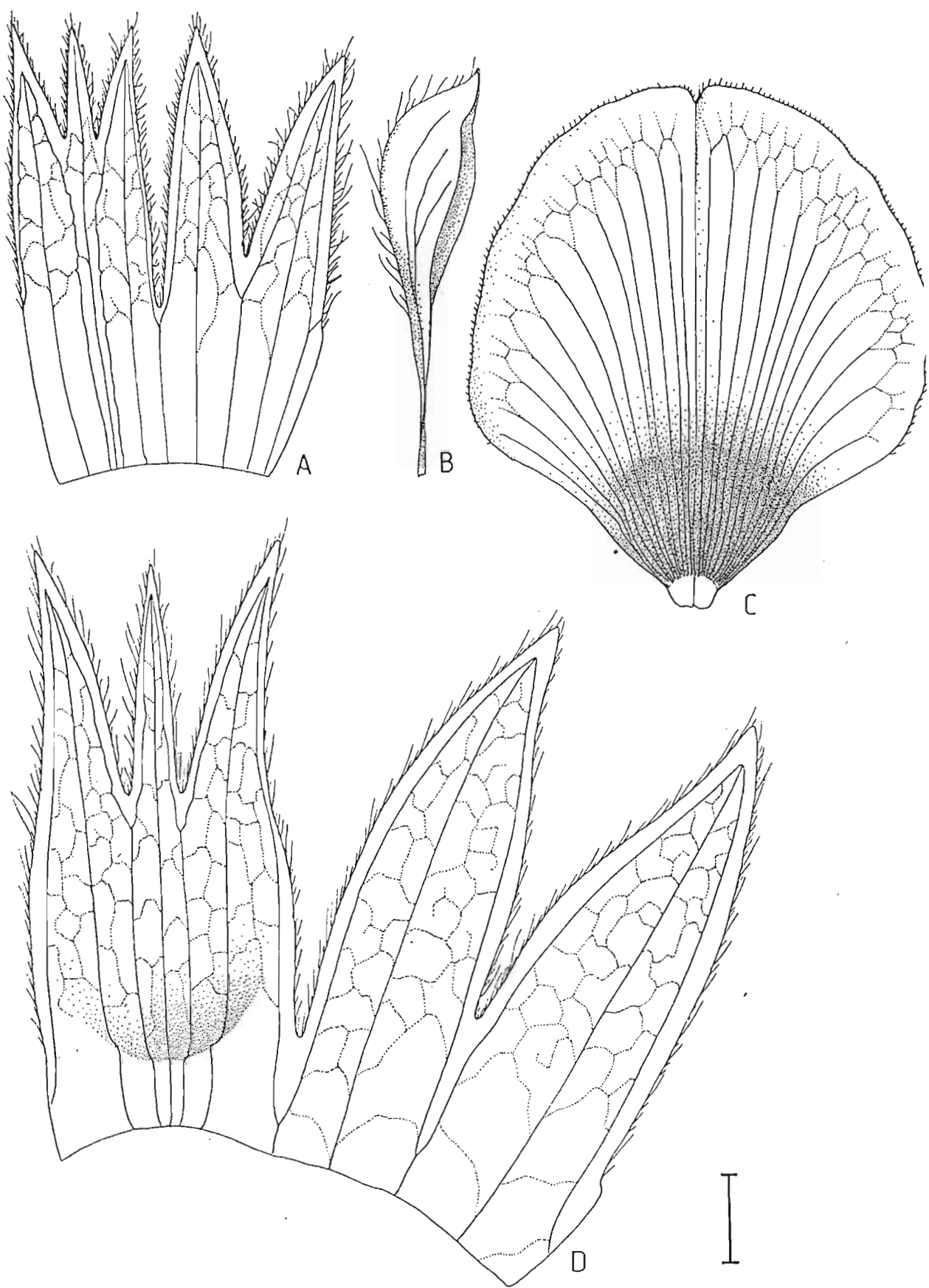


Figure 21.

Argyrolobium ascendens. A. Cleistogamous calyx; B. cleistogamous standard; C. chasmogamous standard; D. chasmogamous calyx. Bar = 3 mm. Voucher: *Edwards 506*.

autogamy in chasmogamous flowers are overcome by the precocial maturation of sexual organs. It is significant that chasmogamous flowers of dimorphic species are more strongly outcrossing than monomorphic species. In dimorphic *Argyrolobium* species chasmogamous flowers are produced in low numbers, forcing pollinators to move between plants. This contrasts with monomorphic species which flower *en masse* thus enhancing geitonogamy.

Evolutionary consideration of the phenomenon requires a comparison of the success of the two flower types. Without pollinators chasmogamous flowers set little seed and cleistogamy overcomes this constraint. The genetic advantage of outbreeding is maintained by producing chasmogamous flowers when pollinators are available. This necessitates the perception of environmental stimuli by the plant resulting in seasonal production of different flower types. The cryptic nature of cleistogamous flowers reduces their vulnerability to pollen thieves and fruit predators. In addition, from field observations, it appears that cleistogamous production of seed early and late in the season is out of synchrony with larval stages of bruchid beetles as this seed is seldom parasitised.

Reduced paternal investment in cleistogamous flowers allows reproduction when resources are low (Schoen & Lloyd 1984). This capacity allows neoteny in dimorphic species of *Argyrolobium* which may behave as facultative annuals. Seed of *A. molle* (Edwards 486), *A. collinum* (Edwards 476), *A. rotundifolium*, *A. pumilum* (Edwards 480), *A. ascendens* (Edwards 506) and *A. stipulaceum*

(Edwards 459) was germinated and monitored for flowering. Most of these species commence flowering from between two and five months after germination and initial flowers were always cleistogamous.

Seed production in such instances is probably too low for the assumption of an annual existence over any lengthy period. However the strategy occurs widely in species of *Argyrolobium* and *Lotononis* from areas of the eastern Cape with unpredictable climate. Distributional data indicates that florally monomorphic species are limited to areas of predictable climate and that dimorphic species of *Argyrolobium* are widespread (Figure 23). Predictably these data also relate to habit. Dimorphic species are usually weakly perennial geophytes with diffuse flowering periods. By contrast, monomorphic species are large shrubby perennials or robust suffrutices with annual aerial stems. In these species growth is geared towards mass flowering and individuals require a number of years to reach reproductive status. Their distribution is somewhat curtailed (Figure 24).

In southern Africa *Argyrolobium* is limited to the eastern areas. Its absence from dry regions of the west coast, where rainfall is low and highly unpredictable, is attributed to the lack of annuals within the genus. This contrasts with *Lotononis* where annuals occur in the drier western regions (Van Wyk 1990). In both genera floral dimorphism is a seasonal alternative to outbreeding rather than a step towards autogamy. This explains the advanced state of dimorphism and the lack of annuals within *Argyrolobium* when compared with *Lotononis*.

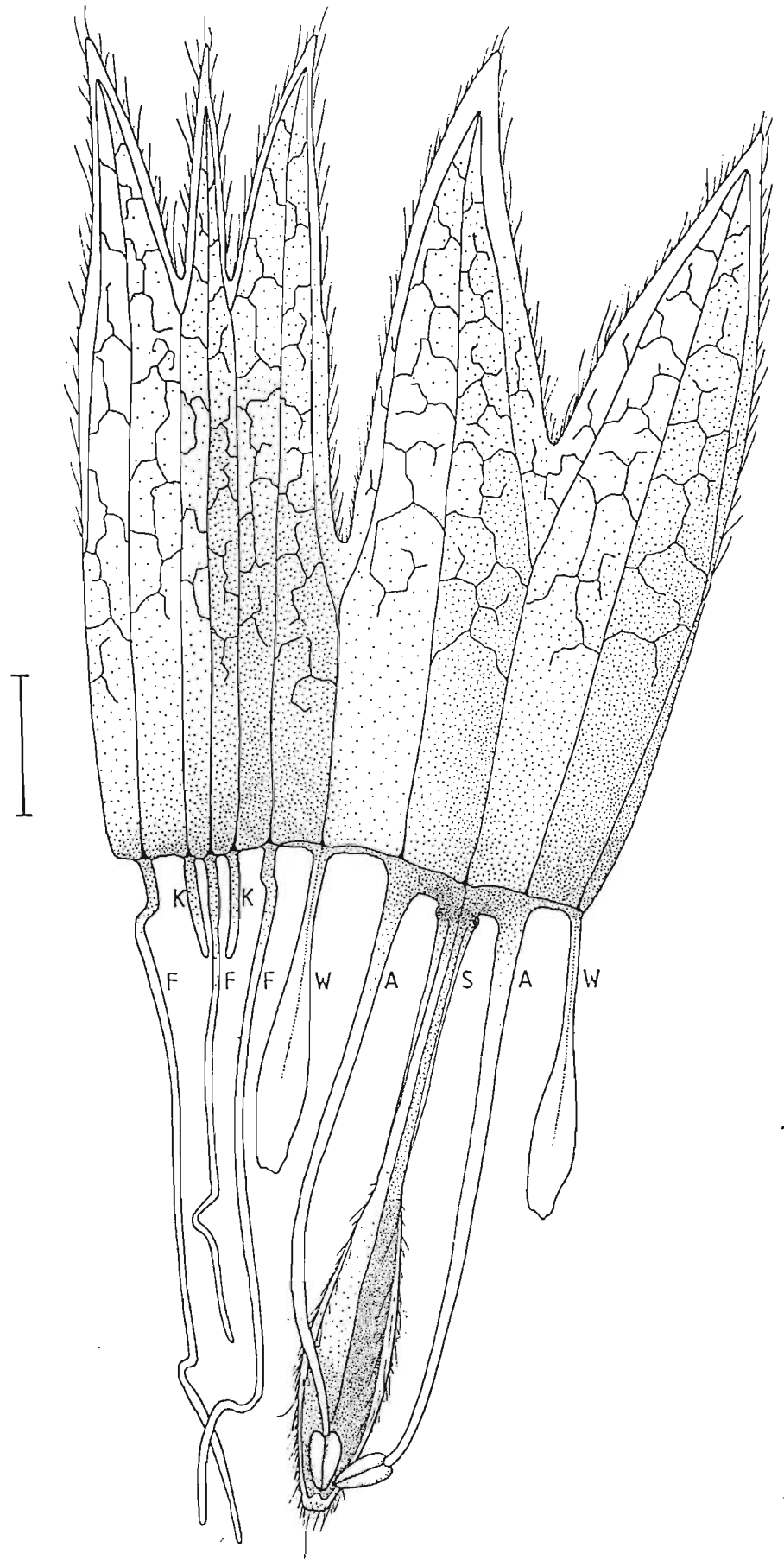


Figure 22.

Argyrolobium ascendens dissected cleistogamous flower with the androecium and gynoecium exposed, corolla reflexed (A = fertile stamens, F = staminal filaments, K = keel petals, W = wings, S = stigma)

Previous reports (Harms 1909 & 1917) of floral dimorphism within *Argyrolobium* list 7 South African species. The current examination reveals 23 dimorphic species in South Africa.

Florally monomorphic species of *Argyrolobium* in South Africa: *A. amplexicaule*, *A. baptisioides*, *A. crassifolium*, *A. filiforme*, *A. frutescens*, *A. harmsianum*, *A. incanum*, *A. longifolium*, *A. lunare*, *A. megarrhizum*, *A. muddii*, *A. pachyphyllum*, *A. parviflorum*, *A. petiolare*, *A. polyphyllum*, *A. speciosum*, *A. transvaalense*, *A. trifoliatum*, *A. wilmsii*.

Argyrolobium species with dimorphic flowers in South Africa: *A. ascendens*, *A. argenteum*, *A. barbatum*, *A. campicola*, *A. candicans*, *A. collinum*, *A. filiforme*, *A. harveyanum*, *A. humile*, *A. lotoides*, *A. marginatum*, *A. molle*, *A. pachyphyllum*, *A. pauciflorum*, *A. pseudotuberosum*, *A. pumilum*, *A. rotundifolium*, *A. rupestre*, *A. sericosemium*, *A. stipulaceum*, *A. tomentosum*, *A. tuberosum*, *A. velutinum*.

The advantages conferred upon dimorphic species include the maximisation of seed set through assured pollination, reduced pollen and seed predation, an increase in the duration of the flowering season and precocial flowering. The disadvantage of reduced gene flow is minimised by the strongly outbreeding chasmogamous flowers.

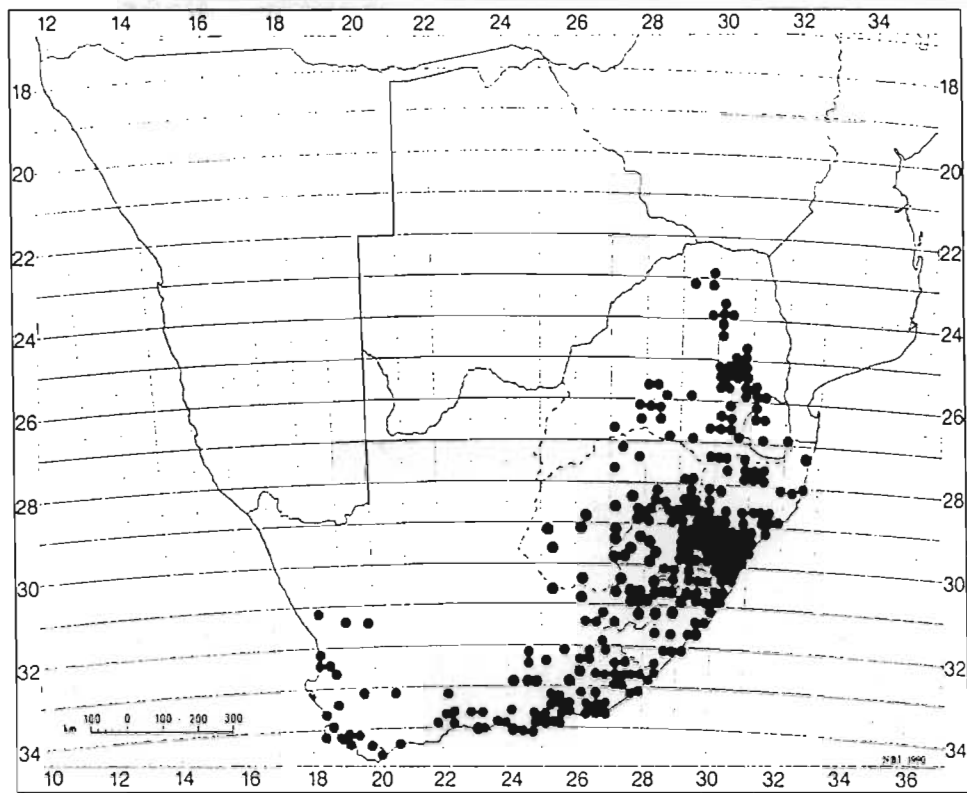


Figure 23.

Distribution of florally dimorphic species in South Africa.

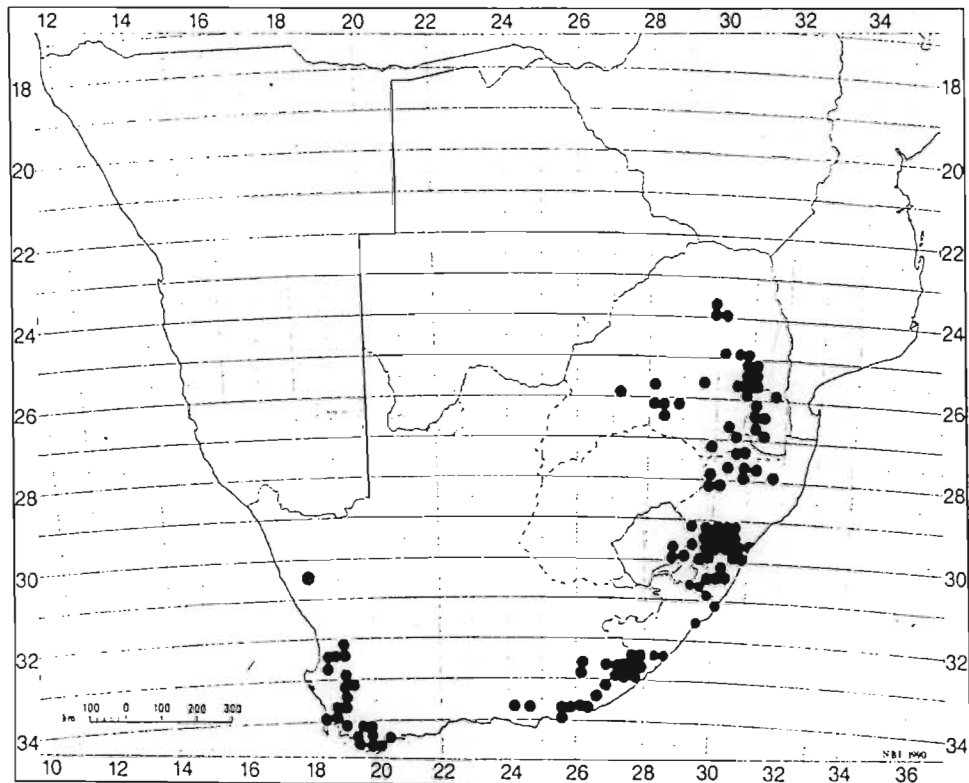


Figure 24.

Distribution of florally monomorphic species in South Africa.

3.2.7 Flowering Times

The flowering times for species included in this dissertation were obtained from herbarium specimens. Because such collections are made predominantly from chasmogamous specimens it was not possible to assess cleistogamous flowering in this way. Cultivated specimens of dimorphic species produce cleistogamous early and late in the season. Chasmogamous flowering times are presented as percentages of herbarium specimens collected in particular months (Figures 25, 26, 27, 28, 29, 30, 31). This data is biased by inconsistencies in the areas collected, the intensity of collecting across seasons and sample sizes for each species. Despite these flaws the data provides patterns worthy of interpretation.

Species from exceedingly dry habitats tend to flower opportunistically and consequently show rather erratic profiles (*A. argenteum* and *A. petiolare*). This behaviour extends into widespread species which traverse areas of different rainfall patterns (*A. molle*, *A. collinum*, *A. tomentosum*, *A. rupestre*, *A. rotundifolium*, *A. harveyanum* and *A. amplexicaule*). The trend is also apparent in eastern Cape endemics which have evolved diffuse and irregular flowering periods in response to the non-seasonal precipitation (*A. polyphyllum*, *A. trifoliatum*, *A. parviflorum*, *A. incanum* and *A. barbatum*). However the overwhelming chasmogamous pattern within the genus is summer flowering from October to February with very little flowering from April to August.

The chasmogamous pattern is augmented by cleistogamous flowering. Although

some degree of overlap between these flower types occurs cleistogamous flowers significantly extend flowering period into the early and late season. Of particular interest is the reduced incidence of cleistogamy in macchia vegetation. This transition is most marked in *A. filiforme* which seldom produces cleistogamous flowers compared to its close ally *A. harveyanum*. The two sections which appear to have evolved in fynbos vegetation (*Polyphyllum* and *Lunare*) do not display cleistogamy and its absence may represent a reversal. Certainly the opportunities for allogamy in herbaceous pyrophytes are limited in this vegetation and may favour chasmogamy and facultative outbreeding after fires. Presumably cleistogamous specimens are frequently overlooked by collectors.

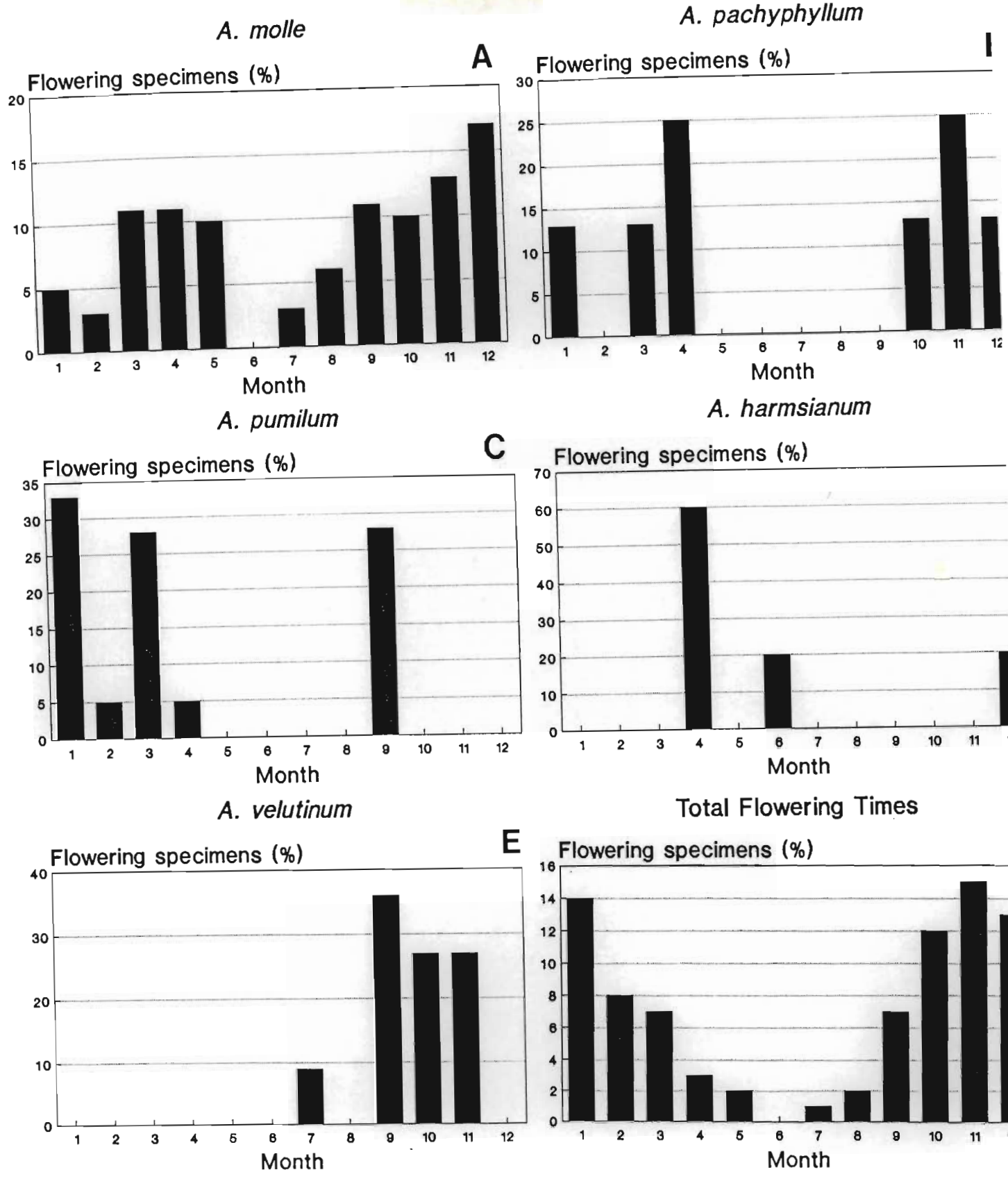
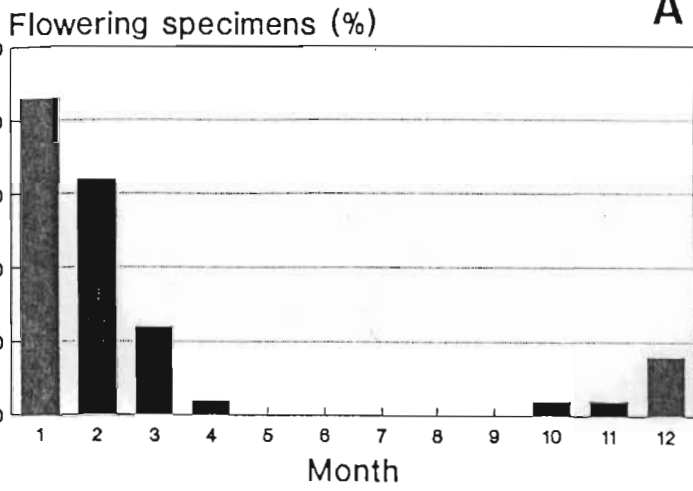
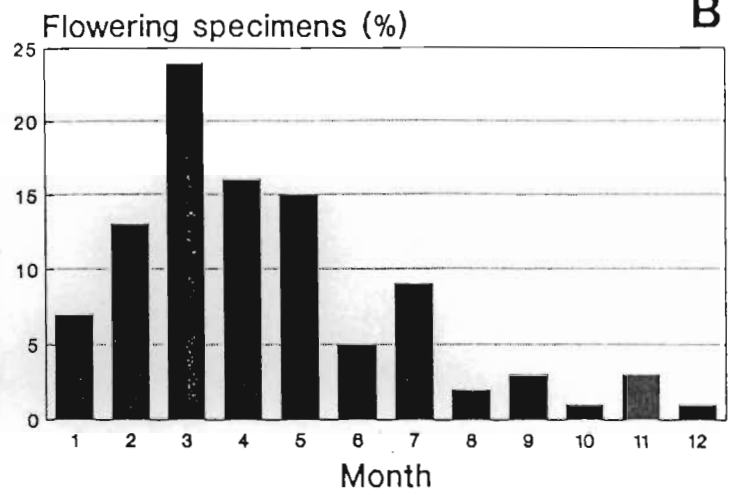


Figure 25.
 Bar graphs of flowering times in: A. *A. molle*; B. *A. pachyphyllum*; C. *A. pumilum*;
 D. *A. harmsianum*; E. *A. velutinum*; F. *Argyrolobium*.

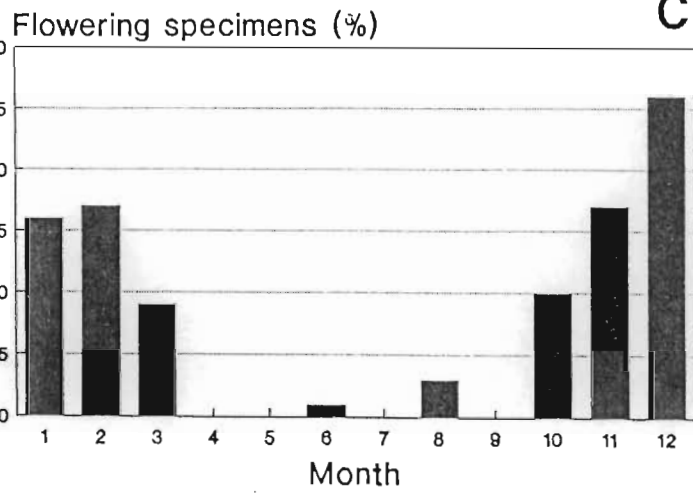
A. lotoides



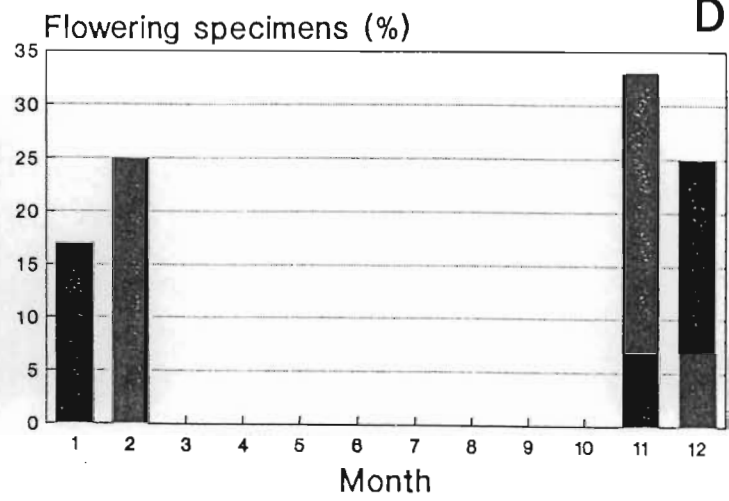
A. tomentosum



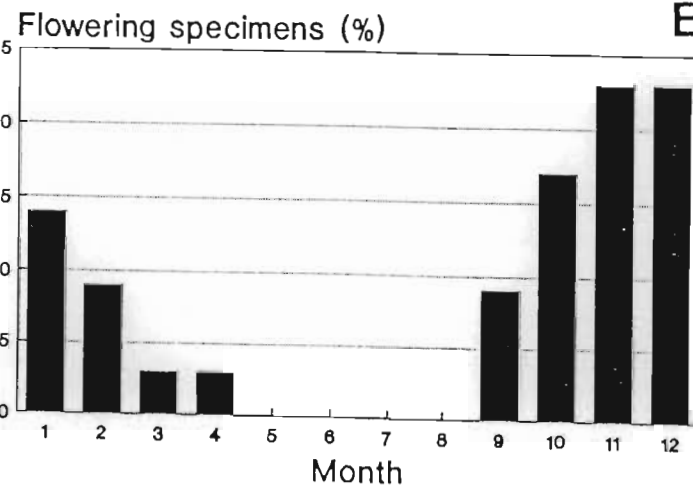
A. rupestre



A. pauciflorum



A. humile



A. rotundifolium

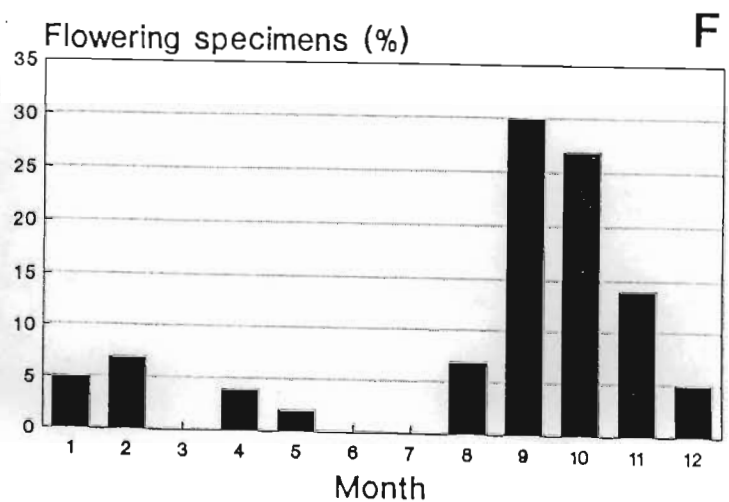


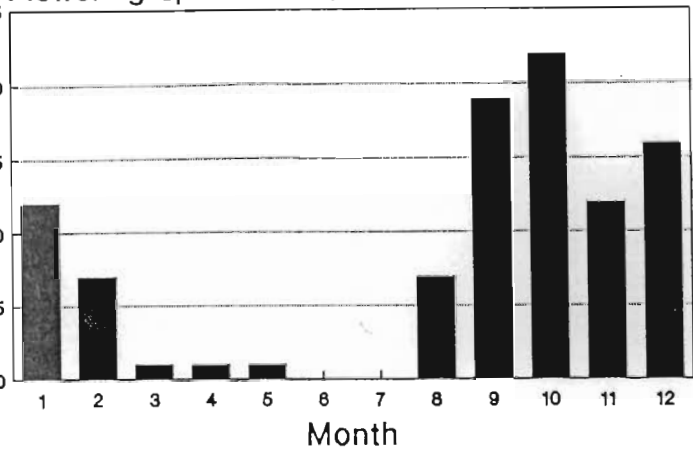
Figure 26.

Bar graphs of flowering times in: A. *A. lotoides*; B. *A. tomentosum*; C. *A. rupestre*; D. *A. pauciflorum*; E. *A. humile*; F. *A. rotundifolium*.

A. harveyanum

Flowering specimens (%)

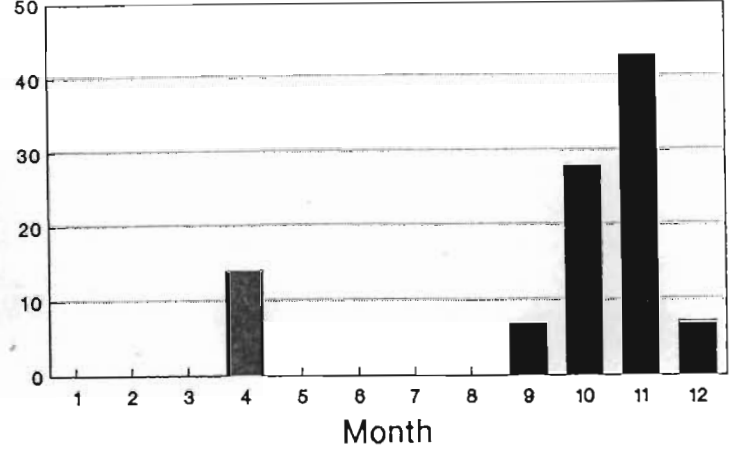
A



A. filiforme

Flowering specimens (%)

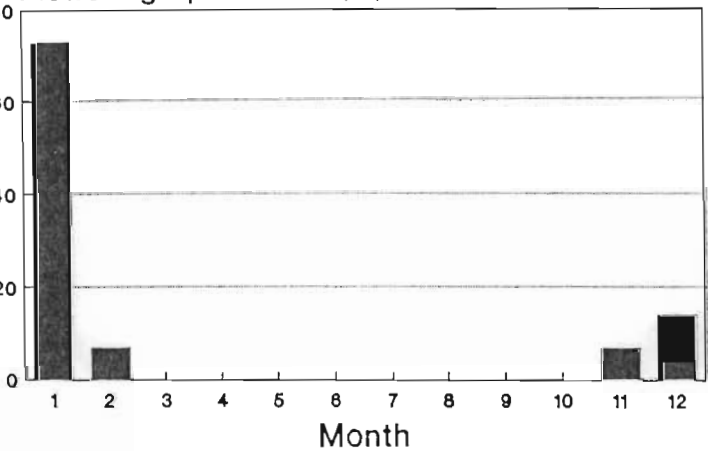
B



A. aciculare

Flowering specimens (%)

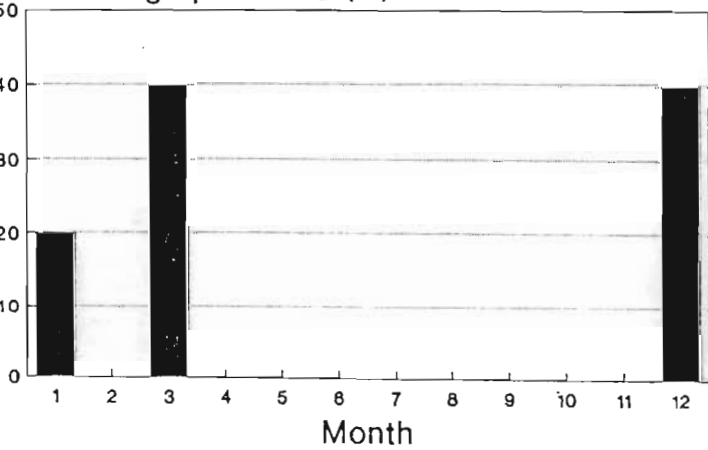
C



A. rarum

Flowering specimens (%)

E



A. pseudotuberosum

Flowering specimens (%)

F

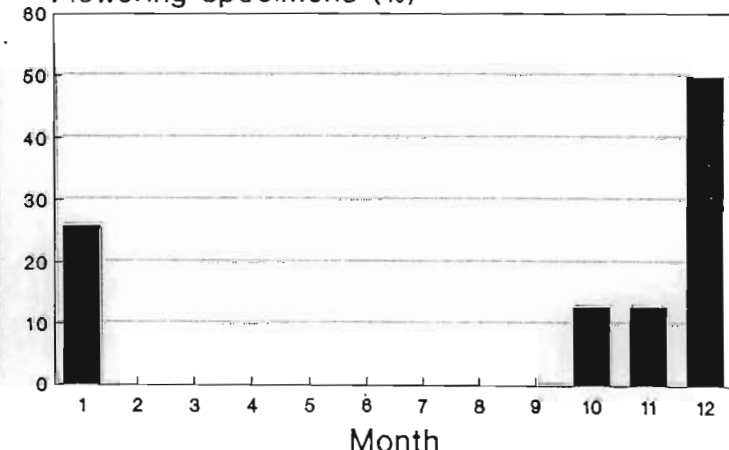


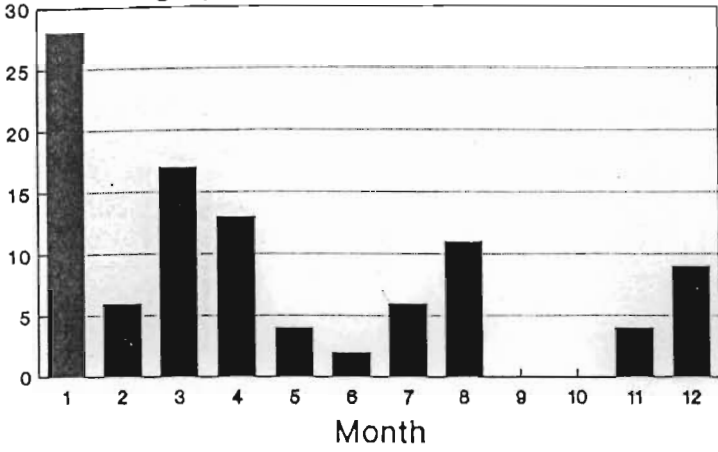
Figure 27.

Bar graphs of flowering times in: A. *A. harveyanum*; B. *A. filiforme*; C. *A. aciculare*; D. *A. tuberosum*; E. *A. rarum*; F. *A. pseudotuberosum*.

A. polyphyllum

A

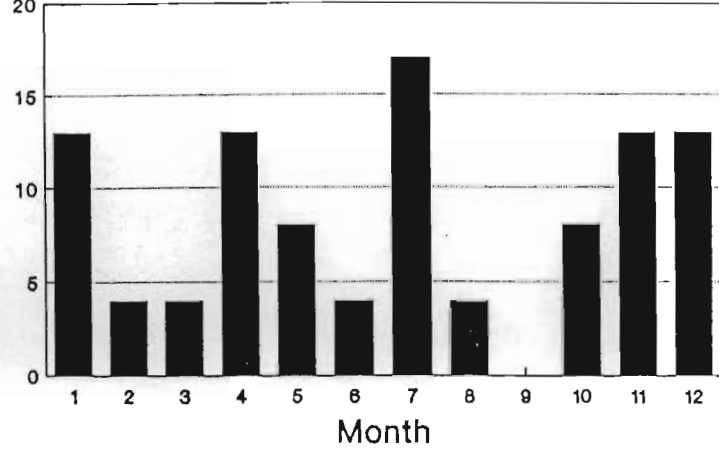
Flowering specimens (%)



A. trifoliatum

B

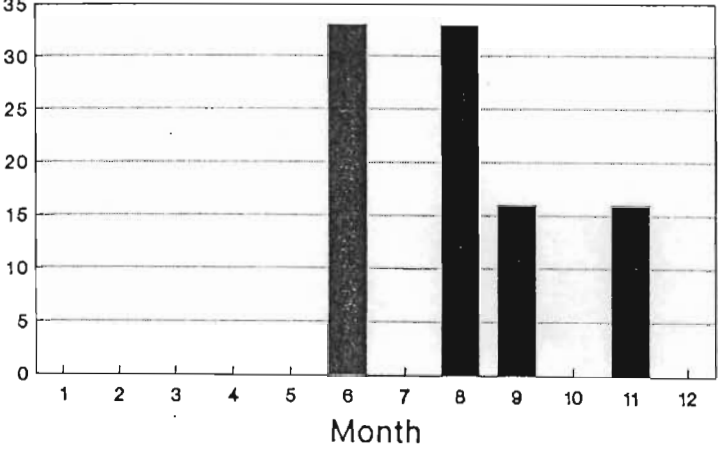
Flowering Specimens (%)



A. crassifolium

C

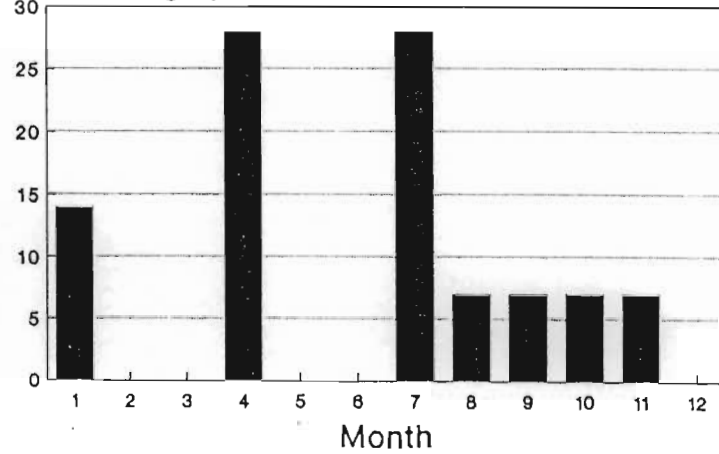
Flowering specimens (%)



A. incanum

D

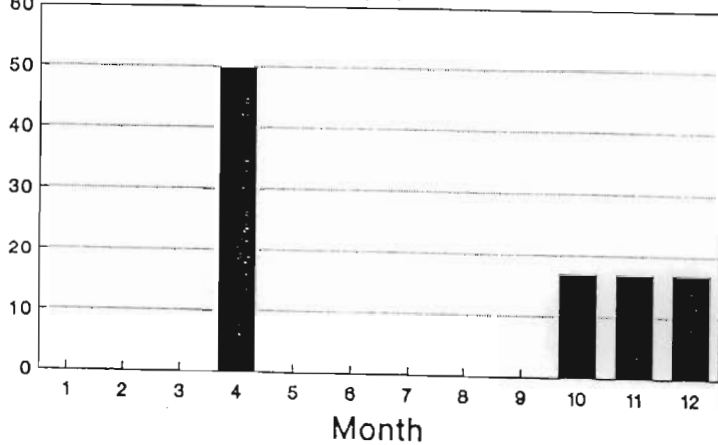
Flowering specimens (%)



A. barbatum

E

Flowering specimens (%)



A. argenteum

F

Flowering specimens (%)

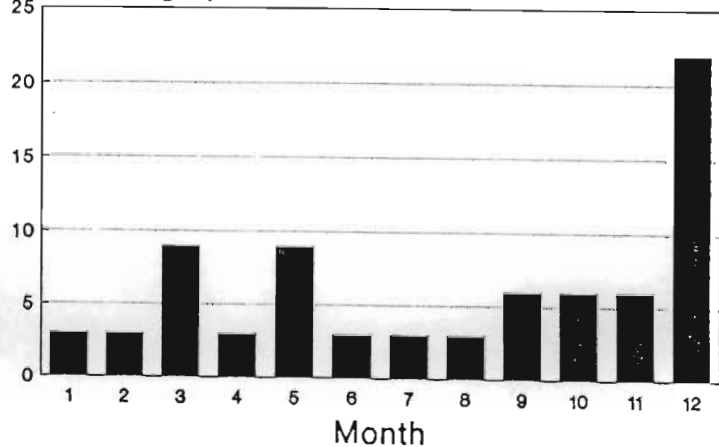


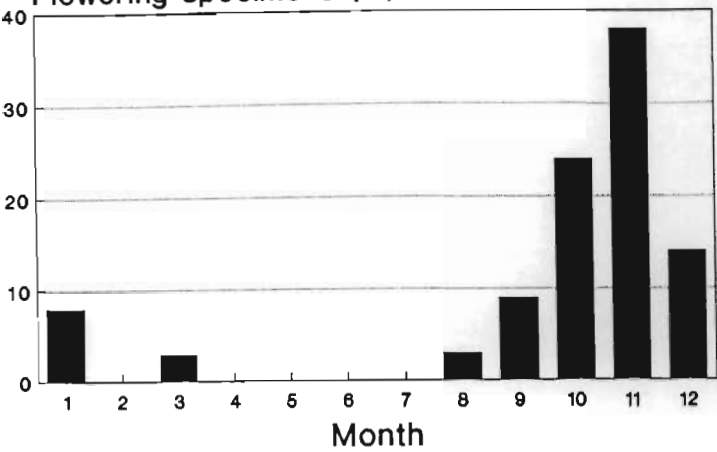
Figure 28.

Bar graphs of flowering times in: A. *A. polyphyllum*; B. *A. trifoliatum*; C. *A. crassifolium*; D. *A. incanum*; E. *A. barbatum*; F. *A. argenteum*.

A. speciosum

A

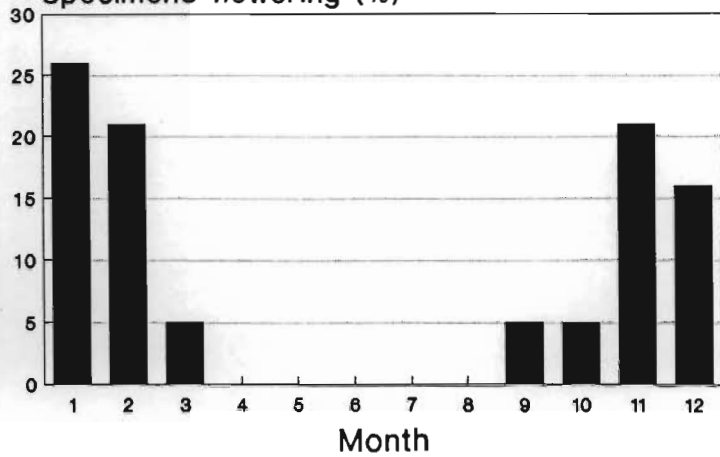
Flowering specimens (%)



A. longifolium

B

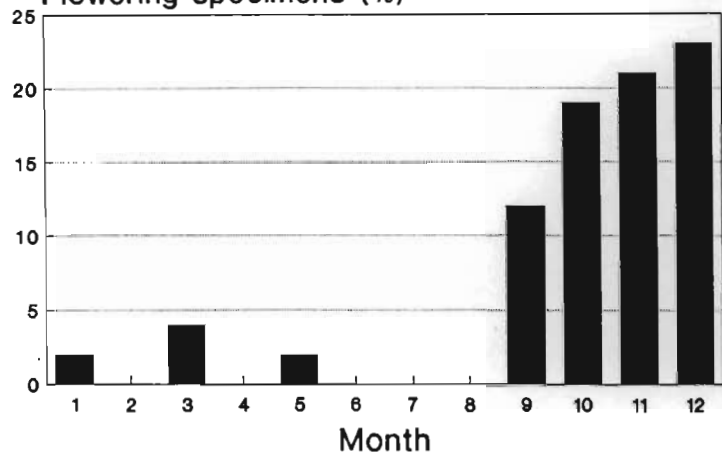
Specimens flowering (%)



A. baptisioides

C

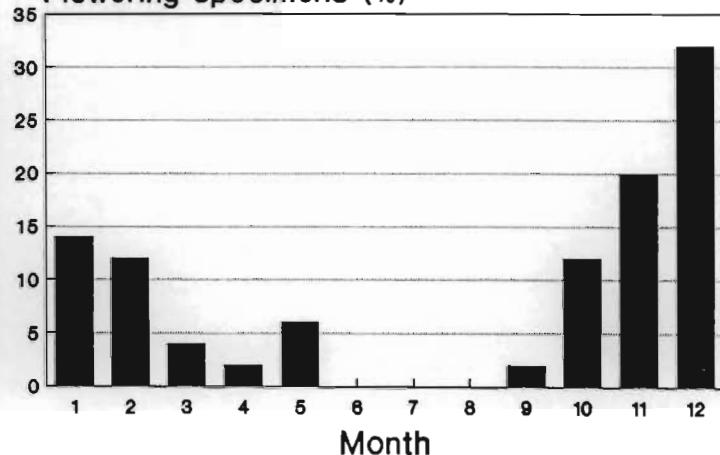
Flowering specimens (%)



A. amplexicaule

D

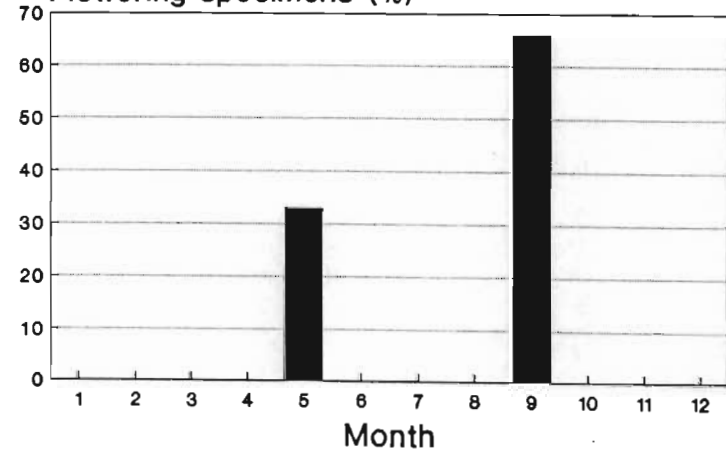
Flowering specimens (%)



A. petiolare

E

Flowering specimens (%)



A. lunare

F

Flowering specimens (%)

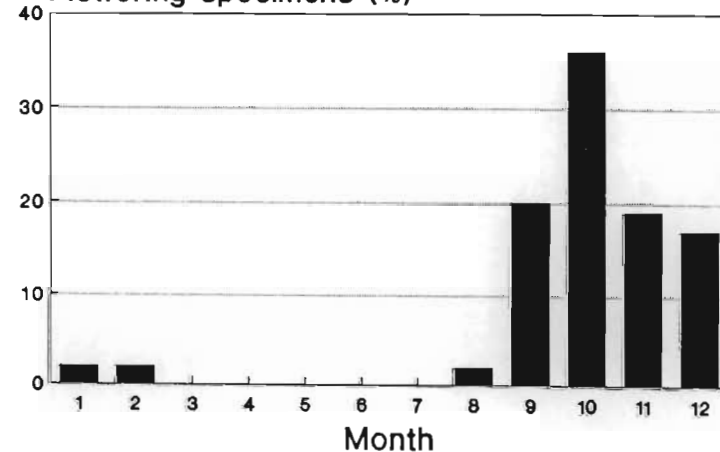


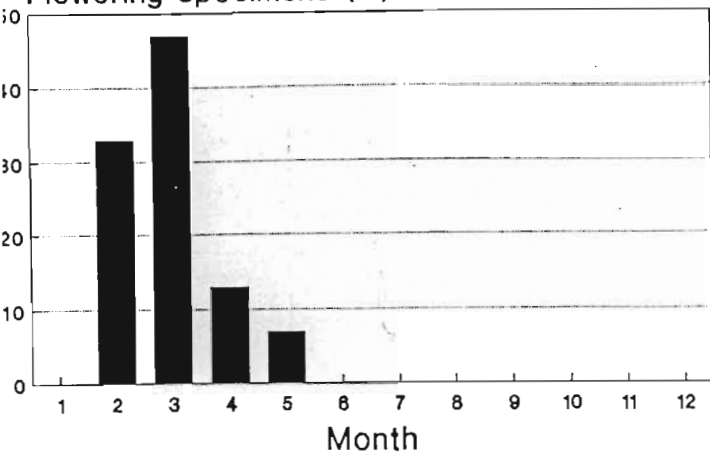
Figure 29.

Bar graphs of flowering times in: A. *A. speciosum*; B. *A. longifolium*; C. *A. baptisioides*; D. *A. amplexicaule*; E. *A. petiolare*; F. *A. lunare*.

A. frutescens

A

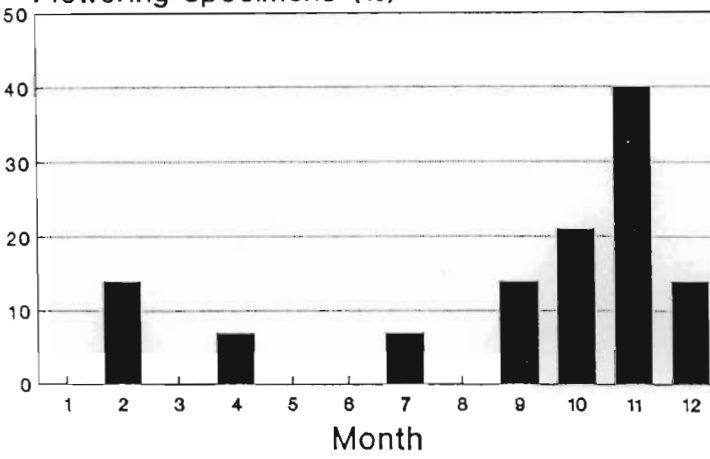
Flowering specimens (%)



A. muddii

C

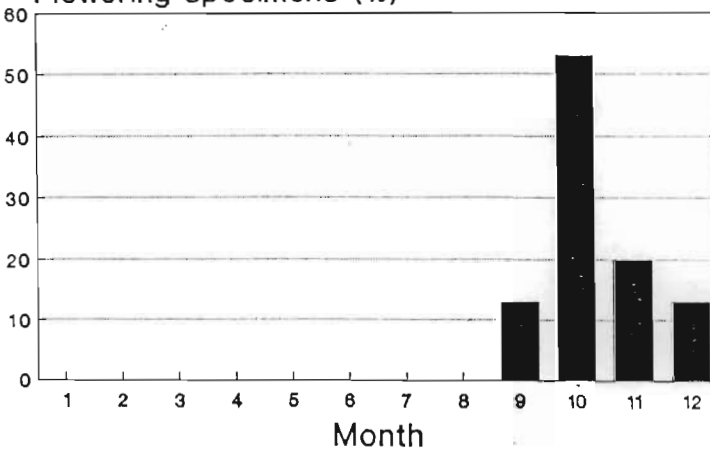
Flowering specimens (%)



A. megarrhizum

E

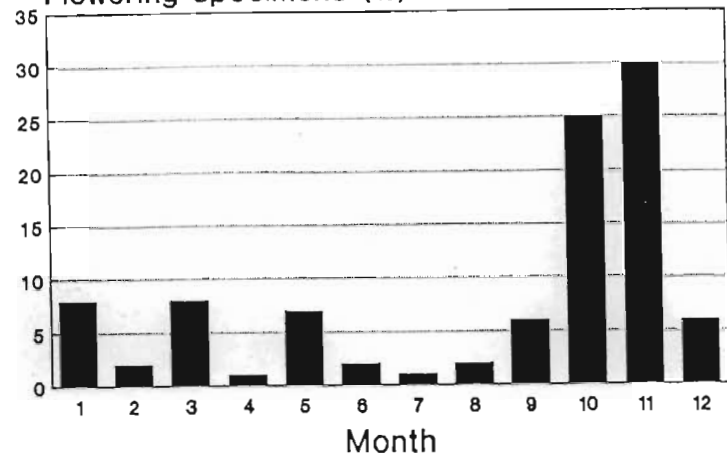
Flowering specimens (%)



A. transvaalense

B

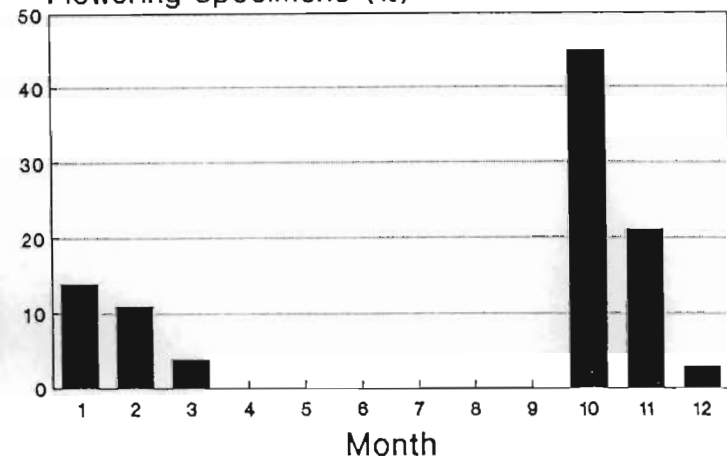
Flowering specimens (%)



A. wilmsii

D

Flowering specimens (%)



A. collinum

F

Flowering specimens (%)

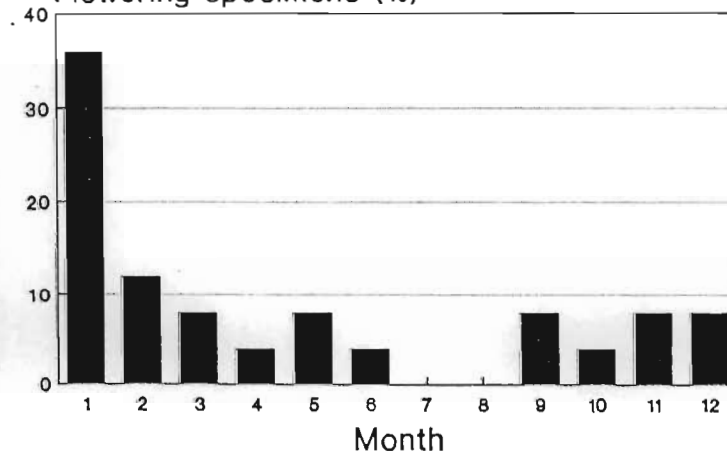


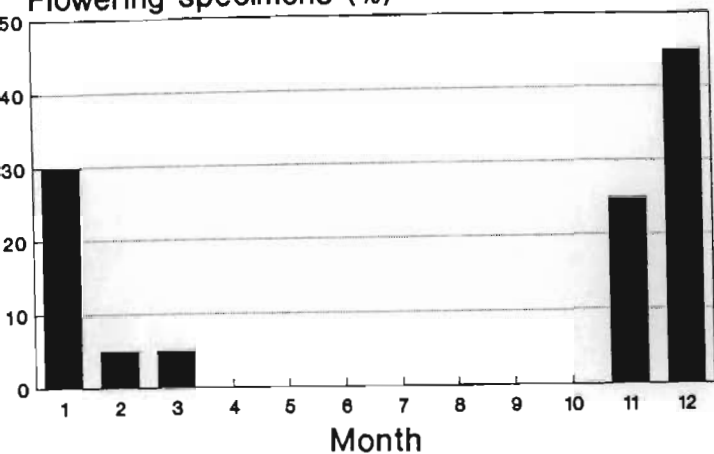
Figure 30.

Bar graph of flowering times in: A. *A. frutescens*; B. *A. transvaalense*; C. *A. muddii*; D. *A. wilmsii*; E. *A. megarrhizum*; F. *A. collinum*.

A. candicans

A

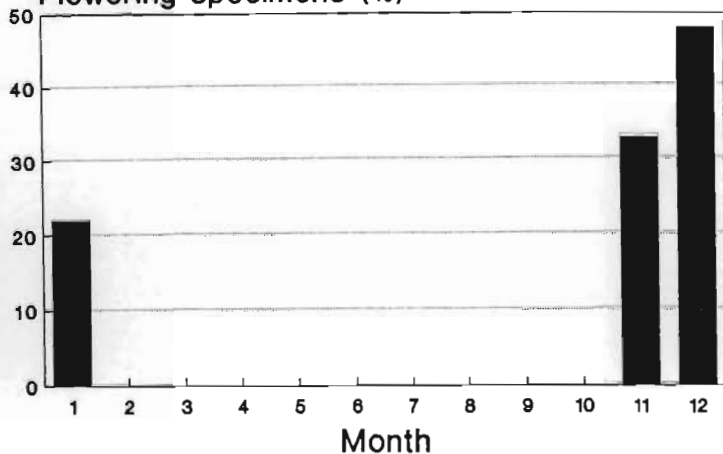
Flowering specimens (%)



A. campicola

B

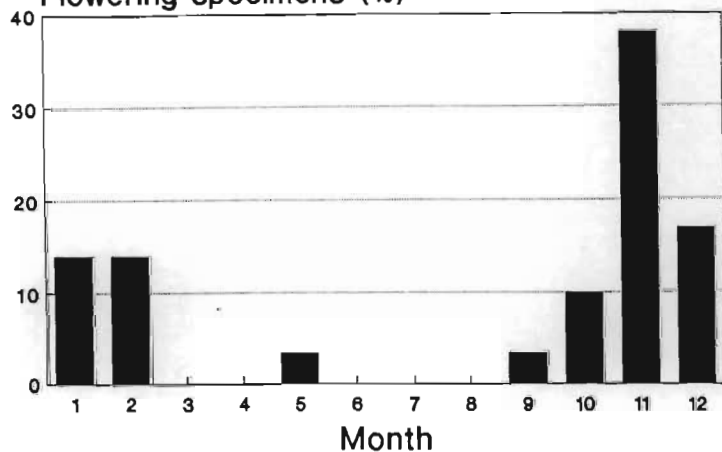
Flowering specimens (%)



A. sericosemium

C

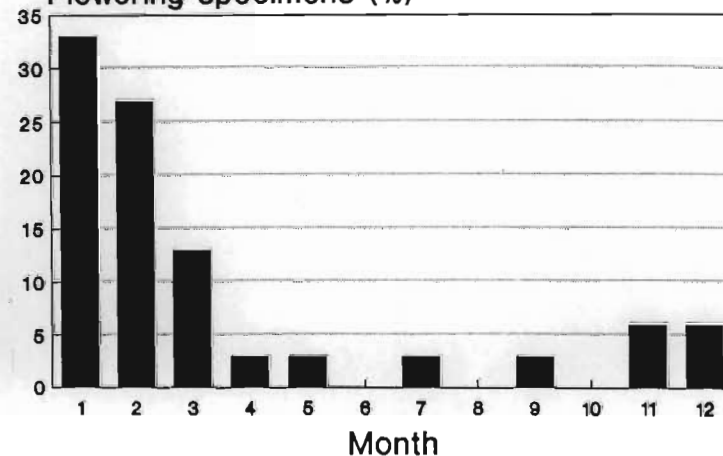
Flowering specimens (%)



A. marginatum

D

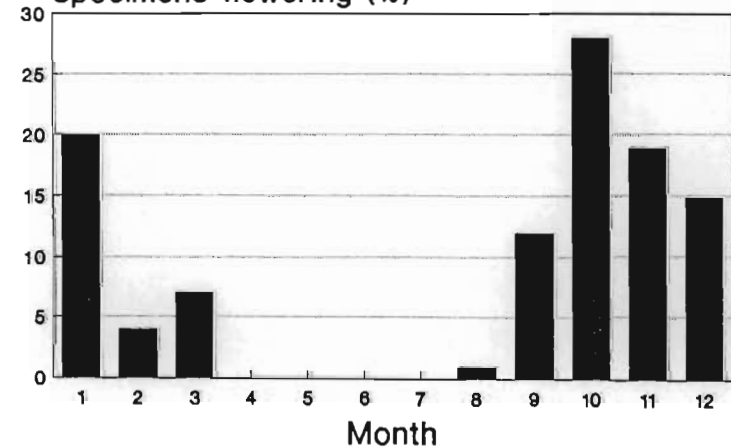
Flowering specimens (%)



A. stipulaceum

E

Specimens flowering (%)



A. ascendens

F

Flowering specimens (%)

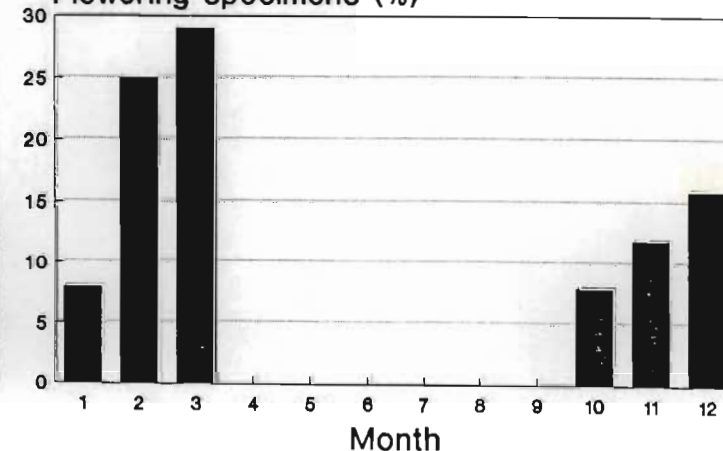


Figure 31.

Bar graphs of flowering times in: A. *A. candicans*; B. *A. campicola*; C. *A. sericosemium*; D. *A. marginatum*; E. *A. stipulaceum*; F. *A. ascendens*.

CHAPTER 4

PHYTOGEOGRAPHY

If one accepts that the distribution patterns of biota are the product of their biology and the history of the environments in which they occur then the phylogeny of groups can be partly elucidated by their present distributions. Southern Africa is a mosaic of climatic zones, from strongly seasonal winter rainfall in the south to strongly seasonal summer rainfall in the east. Between these extremes there exists a continuum in which rainfall is not strongly seasonal. Superimposed upon climatic diversity are edaphic and topographic features which reach their height of expression in the Cape.

Bond & Goldblatt (1984) estimate that approximately 8578 species or 46% of the plant diversity in southern Africa falls within the Cape Floral Kingdom. Through geological time there has been considerable exchange of taxa between this southern vegetation and its northern neighbours resulting in the m \acute{e} lange of today.

- The vegetation patterns of southern Africa described by Acocks (1975), Oliver *et al.* (1983) & Weimarck (1941) have been useful in the present synthesis. Where possible these have been augmented by patterns reported in recent revisions of plant taxa.

Distribution patterns were generated from the cited herbarium specimens. Maps were plotted according to the grid reference system of Edwards & Leistner

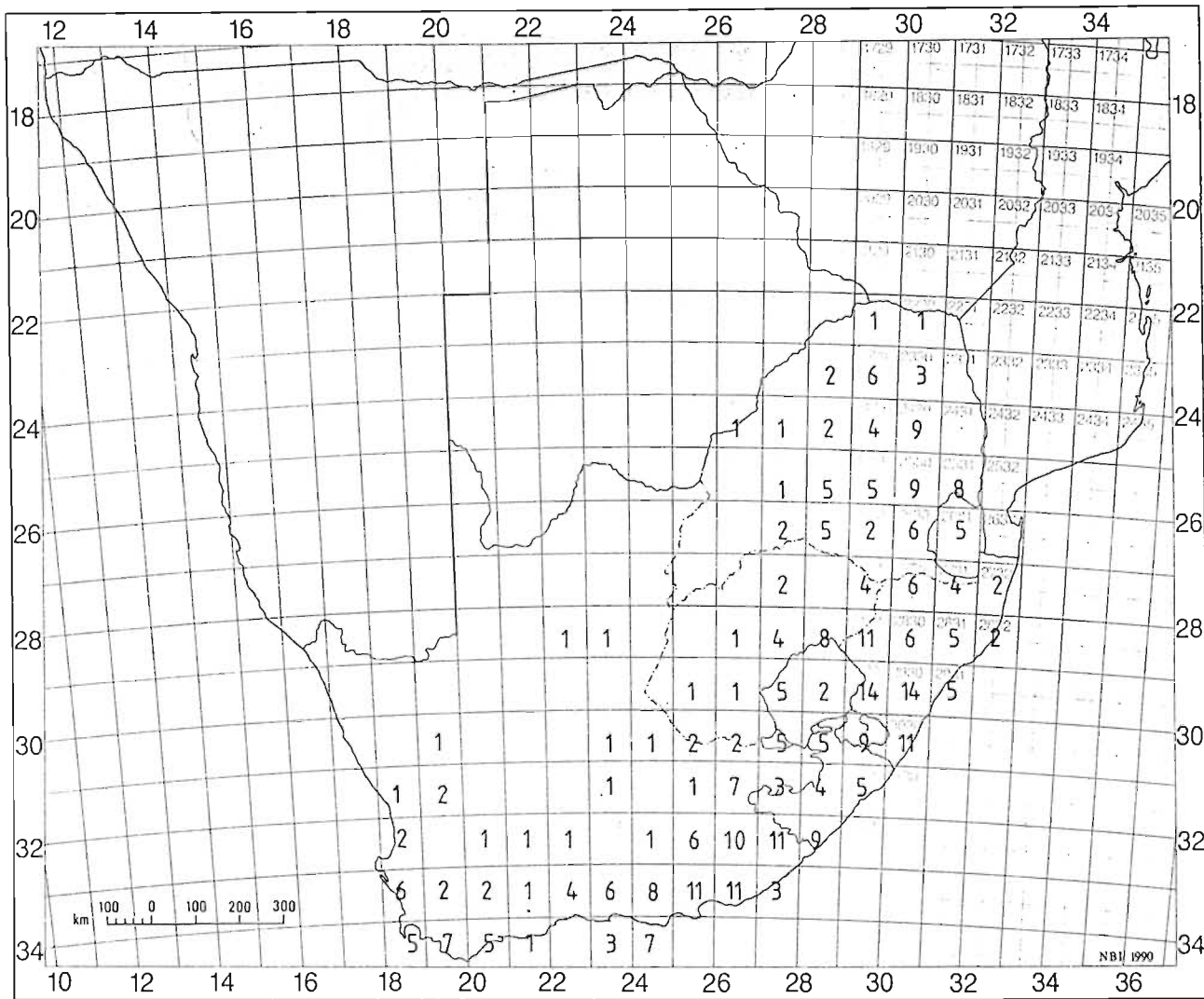


Figure 32. Species density recorded for *Argyrolobium*.

(1971). Individual records are plotted on $\frac{1}{16}$ divisions of 91 squares. Maps indicating the concentration of species across South Africa, for the sections and for the genus, are provided in this chapter. The accuracy of these maps is limited by variation in collecting activity across the area under study and spurious collection data which has been disregarded when discernable. The coarse nature of the mapping system used, negates species density in some areas. This is prominent where geological or geomorphologic features occupy small portions of the plotting squares but support large species complements. General patterns of distribution are however clear from the present system.

Polhill (1976) subdivided the Genisteae *s.l.* into four geographically distinct tribes; the Genisteae *s.s.* in the northern hemisphere, the Liparieae in the Cape, the Crotalarieae predominantly in Africa and the Bossiaeeae in Australia. The phytogeography of the Crotalarieae was subsequently outlined by Van Wyk & Schutte (1988) and Van Wyk (1991a). Most of the component genera are limited to Africa, with only *Crotalaria* and *Rothia* occurring in the New World. *Argyrolobium* extends through Africa into the Mediterranean and west through Syria, Afghanistan and Pakistan into India. Only *Crotalaria*, *Pearsonia* and *Argyrolobium* are represented in Madagascar. Van Wyk's (1991a) cladistic analysis of the Crotalarieae postulates an alliance between *Melolobium*, *Dichilus*, *Polhillia* and *Argyrolobium*. A comparison of their distribution patterns indicates that *Melolobium* is distributed across all climatic regions of southern Africa.

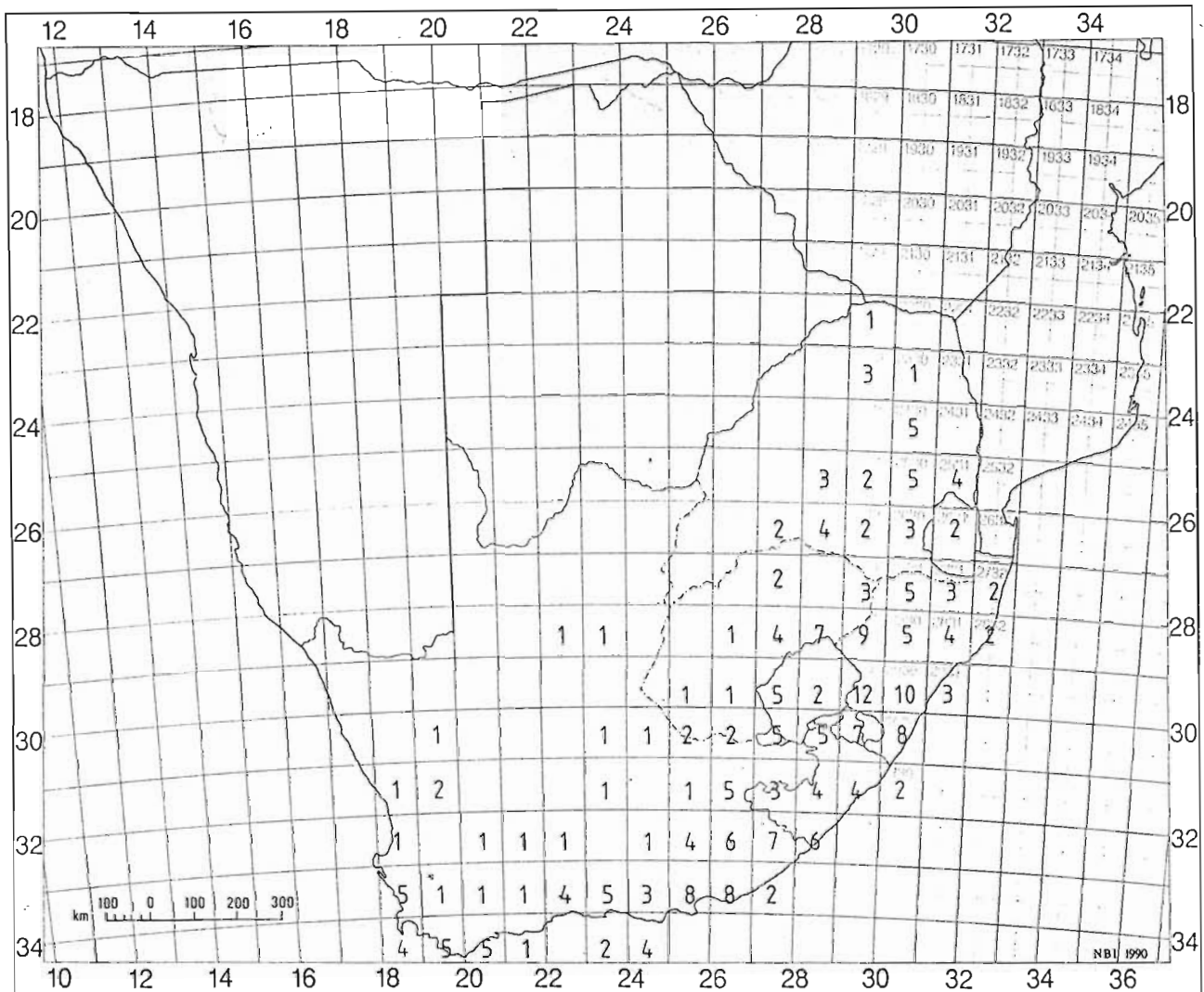


Figure 33. Species density recorded for *Argyrolobium* sect. *Argyrolobium*.

Dichilus is limited to the summer rainfall regions of eastern and central southern Africa and Schutte (1988) suggested an Afromontane origin for it. *Polhillia* is endemic to the south-western Cape and *Argyrolobium* species occur predominantly in the eastern regions of southern Africa.

56% of *Argyrolobium* species occur in South Africa, 21% occur in tropical Africa, 9% occur in north Africa and the Mediterranean and 20% occur in Asia (these percentages exceed 100% due to the occurrence of single species in more than one region). The distribution of *Argyrolobium* is essentially a temperate one. Most species are limited to the eastern seaboard or elevated areas in drier and tropical regions. The drop in species diversity at lower latitudes is a common trend in many southern genera (Beard 1963, Goldblatt 1978, 1983 & 1991, Linder 1983, Oliver 1991, Stirton 1989, Van der Walt & Vorster 1983, Van Wyk 1991a). *Argyrolobium* species densities for South Africa are depicted in Figure 32.

It is informative to compare patterns across *Crotalaria*, *Lotononis* and *Argyrolobium* as similarities exist which help in the explanation of their present distributions. In *Crotalaria* the highest concentrations of species occur in highland areas and although the Afromontane Region is vital to a small forest-linked element, its importance seems to have been principally as a refuge (Polhill 1982). In times of climatic amelioration these refugia provided the genetic core from which more specialized savanna species evolved. Therefore within *Crotalaria*

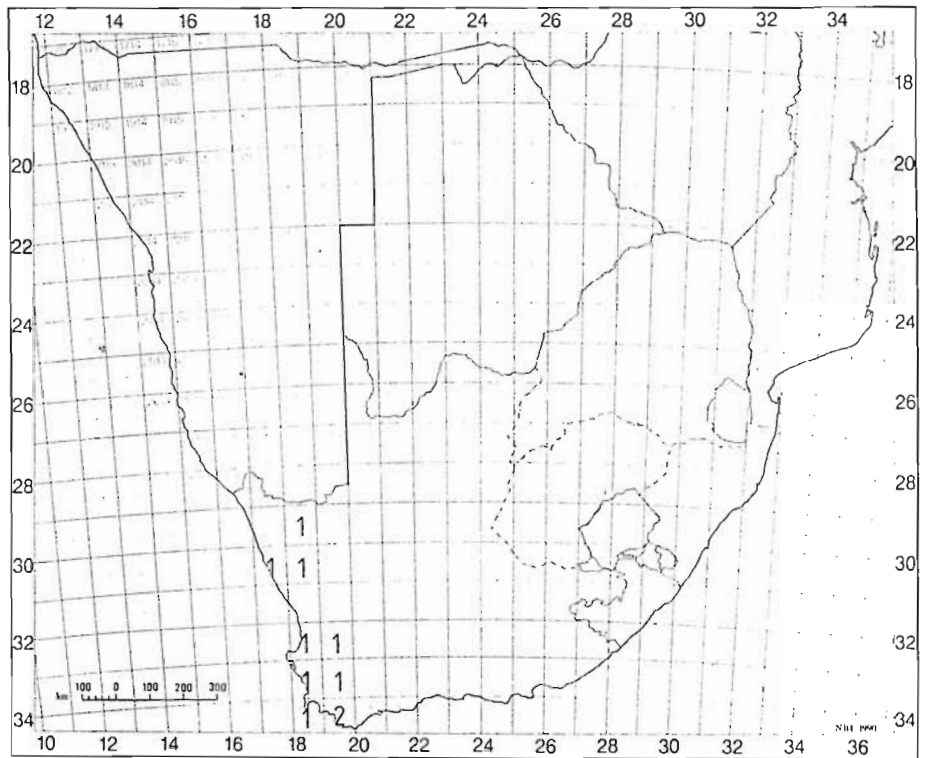
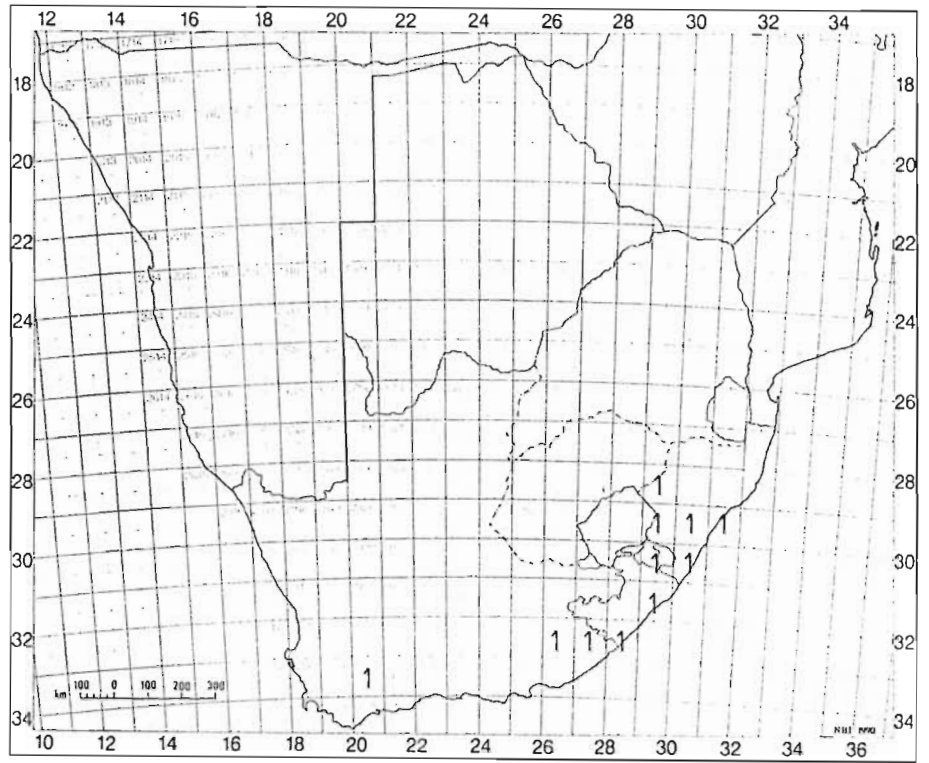


Figure 34. Species density recorded for *Argyrolobium* sect. *Amplexicaule* (A) and *Argyrolobium* sect. *Lunare* (B).

notable disjunctions occur in unspecialised species not closely associated with modern vegetation types. The southern species of *Argyrolobium* which display major disjunctions are *A. rupestre* and *A. tomentosum* both of which appear to have been core species from which similar radiation has taken place. It is not surprising therefore that *Argyrolobium* shows similar trends to *Crotalaria* since *A. tomentosum* and *A. fischeri* Taub. are remarkably similar in habit and distribution to members of *Crotalaria* section *Grandiflorae* which are putative core species (Polhill 1982). Major differences in distributions of the genera relate to the paucity of refuge species and annuals in *Argyrolobium*.

Van Wyk (1991) suggested that the distribution of *Lotononis* supports Goldblatt's (1978) concept of southern Africa as a survival centre for mesic and temperate floristic elements which have subsequently radiated. A comparison of species density between *Lotononis* and *Argyrolobium* shows similar patterns of diversity in Transvaal, Natal, the eastern Cape and the southern Cape coast. No similarities exist in western and central southern Africa due to the absence of annual *Argyrolobium* species in this region. This contrasts with the proliferation of annuals within *Lotononis* for these areas.

Patterns of endemism have been well documented for *Lotononis* (Van Wyk 1991) and *Crotalaria* (Polhill 1982). Our analysis of *Argyrolobium* reveals an intermediate pattern between the aforementioned genera. The main centres of

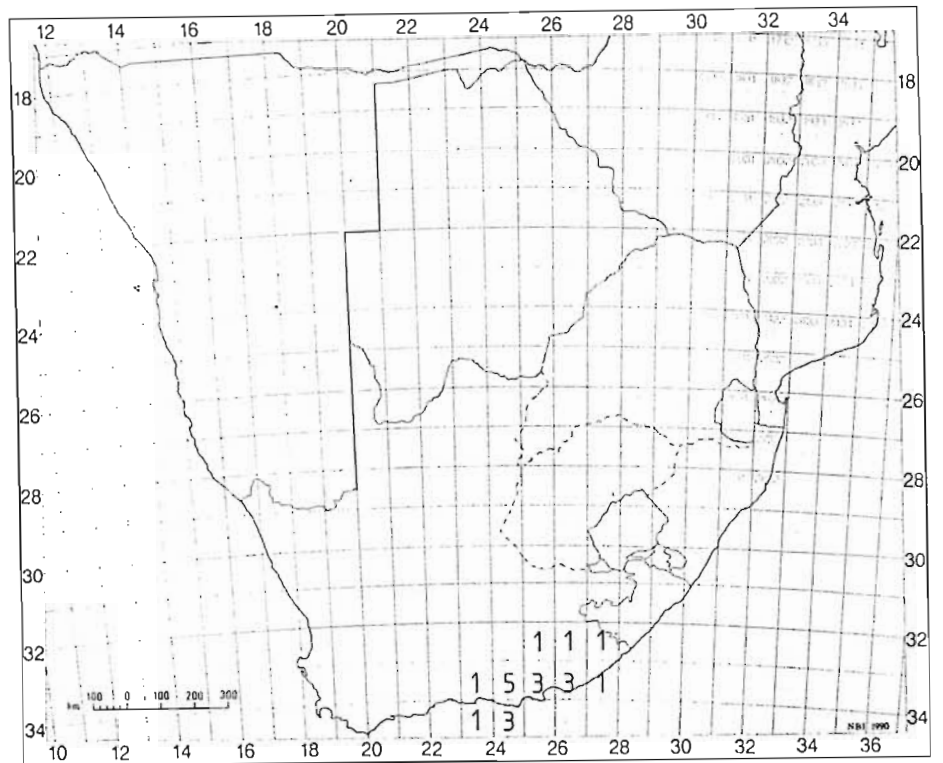
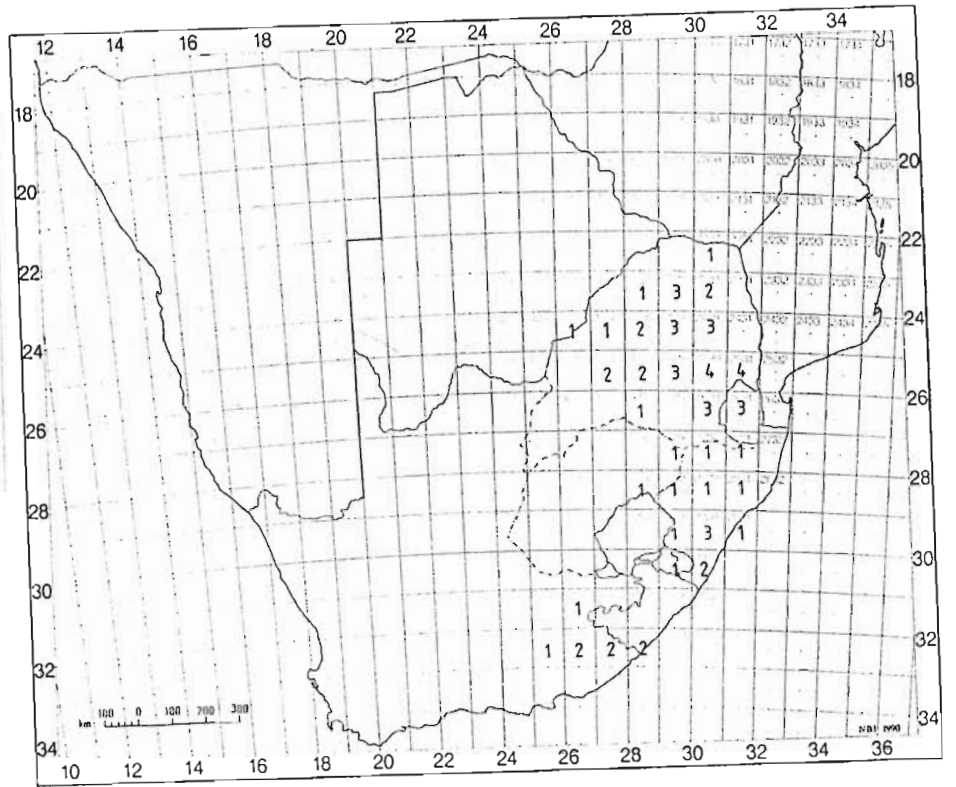


Figure 35. Species density recorded for *Argyrolobium* sect. *Transvaalense* (A) and for *Argyrolobium* sect. *Polyphyllum* (B).

diversity for *Crotalaria* are Tropical African while those of *Lotononis* are southern African. Overlapping areas of high diversity for the genera are southern Angola, central Zimbabwe and Nyika Plateau (Table 5).

Table 5. A comparison of southern African centres of diversity for *Argyrolobium*, *Crotalaria* and *Lotononis* (data from Polhill 1982 and Van Wyk 1991). Area: 1 = Cape Region; 2 = Namaqualand; 3 = eastern Cape; 4 = Natal; 5 = southern Namibia; 6 = Transvaal.

ARE A,	<i>LOTONONIS</i> SPP. % END.	<i>CROTALARIA</i> SPP. % END.	<i>ARGYROLOBIUM</i> SPP. % END.
1	58 36	7 3	14 64
2	24 13	0 0	2 100
3	30 0	25 0	17 42
4	36 16	25 0	20 15
5	20 8	7 3	0 0
6	23 2	20 1	16 25

Most sections display parochial radiation with the exception of section *Argyrolobium* (Figure 33). It is cogent that this section exhibits cleistogamy which is also common in widespread *Lotononis* species such as *L. tenella* (E. Mey.) Eckl. & Zeyh., *L. pungens* Eckl. & Zeyh. and *L. laxa* Eckl. & Zeyh.

Of the remaining sections:

1) *Lunare* is limited to the southern and western Cape (Figure 34). *A. petiolare* is an addition to the growing list of endemics of the Kamiesberg Range (Adamson 1938; Rourke 1990).

2) *Polyphyllum* is limited to areas of nonseasonal rainfall in the eastern Cape (Figure 35).

3) *Transvaalense* has radiated in the Transvaal and Tropical Africa (Figure 35).

4) *Amplexicaule* shows a disjunct distribution with the type species in the eastern Cape and Natal and *A. crinitum* endemic to the Langeberg Centre (Figure 34).

Endemism in the Cape Centres (groups after Weimark 1941).

<i>A. aciculare</i>	South-Western Group (SW)
<i>A. angustissimum</i>	SW
<i>A. barbatum</i>	South-Eastern Group (SE)
<i>A. collinum</i>	Knysna Group, SE
<i>A. crassifolium</i>	SE
<i>A. crinitum</i>	Lange Berg Group
<i>A. filiforme</i>	SW
<i>A. harmsianum</i>	SW (limestone holoendemic)
<i>A. incanum</i>	SE
<i>A. lunare</i>	SW, North-Western Group (NE)
<i>A. pachyphyllum</i>	SW
<i>A. parviflorum</i>	SE
<i>A. petiolare</i>	NW (Kamiesberg Subcentre)
<i>A. polyphyllum</i>	SE, and slightly north

<i>A. pumilum</i>	SE
<i>A. trifoliatum</i>	SE
<i>A. velutinum</i>	SW, NW

Natal Endemism (mainly Natal with small overlaps into neighbouring areas).

<i>A. longifolium</i>	southern Natal
<i>A. marginatum</i>	southern Natal
<i>A. sericosemium</i>	southern Natal

Transvaal/Swaziland Endemics

<i>A. frutescens</i>	Barberton/Swaziland (serpentine holoendemic)
<i>A. megarrhizum</i>	Transvaal
<i>A. muddii</i>	Transvaal
<i>A. transvaalense</i>	Transvaal
<i>A. wilmsii</i>	Transvaal

Species which evolved along the Drakensberg usually occur in the eastern Cape, Natal and the eastern Transvaal. Some of these species also extend into the highlands of Zimbabwe and Mozambique (*A. rupestre*, *A. harveyanum*, *A. tuberosum*, *A. tomentosum*).

An interesting anomaly occurs in the Transkei where both *Lotononis* and *Argyrolobium* are poorly represented. The low species diversity in this area is frequently presumed to be the product of undercollecting. However Weimarck (1941) referred to the area as the Kaffraria Interval which he claimed results partly from the inability of the 'Cape element to penetrate xeromorphic biotypes of the

Great Fish River Valley'. This explanation is unsatisfactory as the distributional gap occurs to the north of this valley. A plausible explanation is the discontinuity in sandstones for about 600 km in the Transkei (A.E. Van Wyk 1990). The southernmost outcrops of Natal Group sandstones occur at Port St. Johns and the northern exposures of the Cape Supergroup occur at Suurberg. The intervening landscape is Karoo Sequence interspersed with dolerite intrusions. Although no *Argyrolobium* species are thought to be sandstone endemics these substrates may have provided refugia in the past. Species which conform to the northern limit of the Cape Supergroup sandstones are: *A. barbatum*, *A. collinum*, *A. incanum*, *A. polyphyllum*, *A. pumilum* and *A. trifoliatum*. Species which display a prominent gap in the Transkei are: *A. baptisioides*, *A. molle* and *A. speciosum*.

Thus in conclusion the overall distribution of *Argyrolobium* shows a concentration of species along the eastern seaboard. Highest diversity occurs in afromontane areas of Natal and the eastern Transvaal, a pattern repeated, to some extent, in *Lotononis* (Van Wyk 1991), *Crotalaria* (Polhill 1982) and *Pearsonia* (Polhill 1974). Due to the absence of annuals the genus is represented by a single species (*A. argenteum*) in the dry interior. Species associated with afromontane vegetation are disjunct and probably represent core species.

- 5) Sparse over a large range in several habitats
- 6) Sparse over a large range in one habitat
- 7) Sparse over a restricted range in one habitat.

Despite extensive field work it was impossible to survey all known populations and studies on population dynamics are beyond the scope of this revision. Abridged distributional ranges are presented here (comprehensive distributional data is included in the formal taxonomy and is not repeated in this section).

Locally abundant over a moderate range in several habitats:

A. tomentosum, *A. molle*, *A. stipulaceum*, *A. amplexicaule*, *A. argenteum*, *A. ascendens*, *A. baptisioides*, *A. collinum*, *A. harveyanum*, *A. lotoides*, *A. marginatum*, *A. pseudotuberosum*, *A. rotundifolium*, *A. rupestre*, *A. tuberosum*.

Locally abundant in a specific habitat but restricted geographically:

A. frutescens, *A. longifolium*, *A. incanum*, *A. lunare* ssp. *lunare*, *A. megarhizum*, *A. polyphyllum*, *A. pumilum*, *A. speciosum* ssp. *speciosum*, *A. transvaalense*, *A. wilmsii*.

Constantly sparse and geographically restricted in specific habitats:

A. aciculare, *A. barbatum*, *A. harmsianum*, *A. pachyphyllum*, *A. petiolare*, *A. rarum*, *A. velutinum*.

CHAPTER 5

CONSERVATION

Hall *et al.* (1980) published the first inventory of threatened plants in southern Africa. This list includes 81 species of Leguminosae and only 35 species of Crotalariae (*Aspalathus*) are included. A revised version of the list was published for the Fynbos and Karoo Biomes (Hall & Veldhuis 1985). 61 species of *Aspalathus*, one species of *Polhillia*, four species of *Lotononis* and two species of *Rafnia* are listed for the Crotalariae. Clearly both reports grossly understate the threat to tribal diversity.

The lack of entries for *Argyrolobium* is the product of a poor taxonomic understanding of the genus. Hopefully recent systematic research in the Crotalariae will be incorporated in subsequent analyses to give a more realistic overview of the conservation status of the tribe as a whole.

Rabinowitz (1981) suggested a classification of rare plants into seven basic categories reliant on geographic distribution and local population sizes. A general outline of rarity using these categories is given below.

- 1) Locally abundant over a large range in several habitats
- 2) Locally abundant over a large range in a specific habitat
- 3) Locally abundant over a restricted range in several habitats
- 4) Locally abundant over a restricted range in one habitat

5) Sparse over a large range in several habitats

6) Sparse over a large range in one habitat

7) Sparse over a restricted range in one habitat.

Despite extensive field work it was impossible to survey all known populations and studies on population dynamics are beyond the scope of this revision. Abridged distributional ranges are presented here (comprehensive distributional data is included in the formal taxonomy and is not repeated in this section).

Locally abundant over a moderate range in several habitats:

A. tomentosum, *A. molle*, *A. stipulaceum*, *A. amplexicaule*, *A. argenteum*, *A. ascendens*, *A. baptisioides*, *A. collinum*, *A. harveyanum*, *A. lotoides*, *A. marginatum*, *A. pseudotuberosum*, *A. rotundifolium*, *A. rupestre*, *A. tuberosum*.

Locally abundant in a specific habitat but restricted geographically:

A. frutescens, *A. longifolium*, *A. incanum*, *A. lunare* ssp. *lunare*, *A. megarhizum*, *A. polyphyllum*, *A. pumilum*, *A. speciosum* ssp. *speciosum*, *A. transvaalense*, *A. wilmsii*.

Constantly sparse and geographically restricted in specific habitats:

A. aciculare, *A. barbatum*, *A. harmsianum*, *A. pachyphyllum*, *A. petiolare*, *A. rarum*, *A. velutinum*.

Argyrolobium is represented by a number of very narrow Cape endemics which are poorly represented in herbaria and should be attributed threatened status. Populations of some of these species are sparse: *A. barbatum*, *A. crassifolium*, *A. petiolare*, *A. harmsianum*, *A. pachyphyllum*, *A. parviflorum* and *A. rarum*. All the listed species are endemic to the Cape. Species of summer rainfall areas tend to be more widely distributed however extensive afforestation of the Natal Midlands and the eastern Transvaal escarpment and the invasion of weeds associated with silviculture is drastically reducing the viable populations.

Four species, *A. angustissimum*, *A. splendens*, *A. tenue* and *A. crinitum* are known from single collections and are probably extinct.

CHAPTER 6

CLADISTICS

Recent cladistic analyses are available for the Crotalariaeae (Van Wyk & Schutte 1989; Van Wyk 1991) and elsewhere in the family (Crisp & Weston 1987; Lavin 1987; Schrire 1991 and Zandee & Geesink 1987). The technique was applied to the present revision to examine infra-generic groupings of *Argyrolobium*.

The placement of *Argyrolobium* within the Crotalariaeae (Van Wyk & Schutte 1989; Van Wyk 1991) conforms with morphological, phytochemical and distributional data and finally resolves the tribal position of the genus. *Dichilus* and *Polhillia* are the closest relatives sharing similar calyces and the occurrence of a-pyridone alkaloids with *Argyrolobium*. They were therefore selected as outgroups in this cladistic survey. The closest ally appears to be *Polhillia* which produces stem-clasping stipules similar to those of *Argyrolobium*.

The data collected for *Argyrolobium* in the present survey was manipulated using the computer programme HENNIG 86 Version 1.5 (Farris 1988). Characters and character states are listed in Table 6. The main data matrix is listed in Table 7.

Table 6. Characters used in the cladistic analysis of *Argyrolobium* using *Dichilus* and *Polhillia* as out-groups (characters 0 1 2 10 12 19 44 unordered).

- 0) Habit; suffrutescent=0, herbaceous=1, woody=2 (unordered)
- 1) Posture; decumbent=0, erect=1, procumbent=2 (unordered)
- 2) Stems; weakly perennial=0, annual=1, perennial=2 (unordered)
- 3) Basal stems; numerous=0, solitary=1
- 4) Stolons; absent=0, present=1
- 5) Adventitious roots; absent=0, present=1
- 6) Lignotubers; absent=0, solitary=1, proliferating=2
- 7) Lignotubers; absent=0, small=1, large=2
- 8) Stipules; paired, free=0, partially fused=1, well fused=2, solitary, amplexicaul=3
- 9) Stipules; symmetric=0, weakly asymmetric=1, markedly asymmetric=2
- 10) Stipules; moderate=0, subulate=1, equal to the leaves=2, very large=3 (unordered)
- 11) Stipules; uninerved=0, multinerved=1
- 12) Petioles; nearly equal to leaflets=0, very short=1, very long=2; dimorphic=3 (unordered)
- 13) Leaves; monomorphic=0, dimorphic=1
- 14) Leaflets; flat=0, weakly conduplicate=1, conduplicate=2
- 15) Leaflets; hairy above=0, glabrous above=1
- 16) Filiform leaflets; absent=0, present=1
- 17) Leaves (in dried material); green=0, black=1
- 18) Inflorescence; leaf-opposed=0, leaf-opposed and terminal=1, terminal=2
- 19) Peduncle; exceeding the leaflets=0, sessile=1, very well developed=2

(unordered)

- 20) Flowers; > 10=0, 2--10=1, solitary=2
- 21) Inflorescence; racemose=0, moderately pseudo-umbellate=1, strongly pseudo-umbellate=2
- 22) Bracts; shorter than flowers=0, longer than flowers=1
- 23) Bracteoles; large=0, setaceous to absent=1
- 24) Flowers; yellow=0; yellow & russet=1
- 25) Flowers; broad=0; elongate=1
- 26) Calyx; monomorphic=0; dimorphic=1
- 27) Standard; monomorphic=0, dimorphic=1
- 28) Wings; monomorphic=0, dimorphic=1
- 29) Keel; monomorphic=0, dimorphic=1
- 30) Cleistogamous inflorescence; pedunculate=0, sessile=1
- 31) Lower calyx lobes; prominent=0, vestigial=1
- 32) Upper calyx sinus; prominent=0, vestigial=1
- 33) Standard; orbicular=0, ovate or obovate=1, oblanceolate=2
- 34) Standard claw; not notably ornamented=0, ornamented=1, canaliculate=2
- 35) Wings; glabrous=0, hairy=1
- 36) Wings; sculptured=0, smooth=1
- 37) Keel; glabrous=0, hairy=1
- 38) Keel upper margin; smooth=0, papillate=1
- 39) Petal claws; short=0, prominent=1
- 40) Stamens; always 10=0; 10 & 2=1

- 41) Anthers; glabrous=0, occasionally hairy=1
- 42) Filaments; monomorphic=0, dimorphic=1
- 43) Pollen germination never precocial=0, often precocial=1
- 44) Chasmogamous staminal sheath; completely fused=0, pseudodiadelphous=1, split adaxially=2 (unordered)
- 45) Style; always arcuate=0; dimorphic=1
- 46) Fruit; flat=0, inflated=1
- 47) Fruit; not septate=0, torulose=1
- 48) Fruits; broadly linear=0, narrowly linear=1
- 49) Sexual maturation; slow (>3 years)=0, neotenous=1

Table 7. Data Matrix 1 of character states used in constructing cladograms of *Argyrolobium* (unordered characters 0 1 2 10 12 19 44).

Dichilus

01200 00000 10000 00000 00000 00000 ?0000 00001 00002 00000

petiolare

21200 00000 10201 10001 2?000 00000 ?1000 00000 00000 00000

lunare

10000 00002 21200 ?0002 1?000 00000 ?0000 00011 01000 02000

splendens

10000 00002 21200 ?0002 1?000 00000 ?0000 00011 ???00 00000

tomentosum

01010 00000 10000 00010 10000 01111 00000 01000 10110 10001

pumilum

12000 00000 00000 10000 1?000 01111 00000 00000 10110 10001

molle

10000 00000 0031? 00000 11010 01111 10000 10000 10110 10001

stipulaceum

11001 00001 21001 00000 11000 01111 10010 00000 10110 11001

candicans

01001 00001 20001 00001 2?000 01111 10000 00000 10110 11001

pauciflorum

10001 00000 0021? 10000 11000 01111 00000 00000 10110 10001

barbatum

21200 00010 01002 10000 11000 01111 00000 00000 10110 10001

pachyphyllum

21200 00000 10102 10011 2?000 01111 10000 00000 10110 10001

campicola

11001 00010 20000 00000 2?000 01111 10000 10100 10110 10001

rotundifolium

12001 00000 00000 00000 11000 01111 00000 11100 10110 10001

rupestre

10001 00000 00000 00000 11000 01111 00000 10100 10110 10001

lotoides

10001 00000 20000 10000 11000 01111 00000 00000 10110 10001

ascendens

10001 00000 00000 00000 11000 01111 00000 10100 10110 10001

humile

11001 00000 00000 00000 2?000 01111 10000 10100 10110 10001

sericosemium

10001 00010 00002 00000 11000 01111 00000 10000 10110 10001

marginatum

10001 00010 00000 00000 11000 01111 00000 10000 10110 10001

argenteum

21210 00000 10000 10001 21000 01111 10001 10000 10110 10001

collinum

11011 00000 10102 00001 2?000 01111 01000 00000 10110 10001

velutinum

11010 00001 00000 00001 11000 01111 10000 00000 10110 11001

crassifolium

21210 00000 10000 10010 10000 00000 ?1000 00000 00000 00000

incanum

21210 00000 10000 00000 10000 00000 ?1000 00000 00000 00000

trifoliatum

21210 00000 00310 10010 10000 00000 ?1000 00000 00000 00000

polyphyllum

21210 00000 00310 10020 10000 00000 ?1100 00100 00000 00000

parviflorum

21210 00000 10000 00010 10000 00000 ?1100 00000 00000 0??00

transvaalense

01010 00000 00000 10020 00000 00000 ?1000 00000 00000 00000

megarhhizum

01010 01200 00001 10020 00000 00000 ?1100 00000 00000 00000

muddii

01011 00000 00000 10020 00000 00000 ?0000 01000 00000 00000

frutescens

01000 00000 00100 10020 00000 00000 ?0000 01100 00000 00000

wilmsii

01001 00000 00000 10020 00000 00000 ?0000 00100 00000 00000

speciosum

01101 01201 21100 10120 00000 00000 ?0011 10000 00002 00010

longifolium

01110 01200 00112 11120 00000 00000 ?1101 00000 00002 02010

baptisioides

01101 01201 20110 10120 00000 00000 ?1121 10000 00002 00010

filiform

11000 01100 10111 01001 11000 01111 10000 10100 10110 10001

aciculare

11000 01101 00101 11000 11000 01111 10000 00000 10110 10001

angustissimum

11010 01100 00312 11110 11001 01??? ?0000 00000 ?0??2 ???01

tuberosum

11010 02100 00312 11110 11001 01111 00000 00000 10112 10101

harveyanum

11011 12100 00312 11001 21000 01111 10000 00000 10111 10101

pseudotuberosum

11010 02100 00311 11010 10000 01111 00011 00000 10112 10101

rarum

11010 0?100 10111 11001 21010 01111 10000 00000 10110 10001

amplexicaule

11001 ?0032 31100 00010 01100 10000 ?0012 00001 00000 01010

crinitum

11001 ??032 31100 00010 00100 10000 ?0012 00001 00000 0???0

Data Matrix 2 identical to Matrix 1 except that *A. petiolare* is scored as unknown for floral dimorphism to alleviate potential bias due to undercollecting (characters 26 27 28 29 30 40 42 43 45 49).

A. petiolare

21200 00000 10201 10001 2?000 0???? ?1000 ?0000 ?0??0 ?000?

Initial attempts at analysis were made using the ie command (which generates trees by implicit enumeration) this however failed to resolve the generic matrix. As an

alternative, the `mhennig*` command was used (which constructs several trees each by a single pass but adds the taxa in a different sequence each time and then applies branch-swapping to each of the trees retaining a single parsimonious tree for each initial tree). The resulting cladograms were manipulated using branch-swapping (`bb`). Often uniform weighting is too relaxed an assumption and results in an overwhelming array of equally parsimonious topologies or little resolution due to the inclusion of misleading characters (Wheeler 1990). Consequently where more than one equally parsimonious tree was generated from initial manipulations, successive approximation weighting (`xs w`) (Farris 1969, Carpenter 1988) was applied to reduce the possible number of trees and to accentuate the consistent characters (reduce homoplasy). Following this the character weights were recorded to determine the importance of individual characters. Weights were reset to a value of 1 to negate their influence on tree length and the tree lengths were recalculated and compared with the initial set of trees.

The `Dos Equis Command (xx)` was used for the examination of character distribution across the cladograms. This allows analysis of the distribution and plausibility of synapomorphies and reversals within the cladograms.

The synapomorphies and reversals were then plotted on the cladograms. In those instances where multiple cladograms were produced, strict consensus trees were generated using the `'nelsen'` command. These trees are usually longer than trees from which they are derived (Miyamoto 1985) but provide useful information on

unambiguous parts of the cladograms. From the generic analysis a number of monophyletic lineages were identified. These clades were reanalysed individually using a species from the most closely related lineage as the outgroup. Character distribution was rescrutinised using the Dos Equis Command (xx).

Results & Discussion

The choice of outgroup scarcely influenced tree topology and did not affect the composition of the main monophyletic clades. The most parsimonious cladograms, generated using *Dichilus* as the outgroup, measured 202 steps with a consistency index of 34 and a retention index of 75. When *Polhillia* was used as the outgroup the most parsimonious trees measured 206 steps with a consistency index of 34 and a retention index of 75. In both instances branch-swapping produced over 100 trees but the strict consensus trees (Figures 36 & 37) retained five monophyletic groups consistently, these were:

Group 1 = *A. amplexicaule* and *A. crinitum*

Group 2 = *A. lunare* and *A. splendens*

Group 3 = *A. crassifolium*, *A. incanum*, *A. parviflorum*, *A. petiolare*, *A. polyphyllum* and *A. trifoliatum*

Group 4 = *A. baptisioides*, *A. frutescens*, *A. longifolium*, *A. megarhizum*, *A. muddii*, *A. speciosum*, *A. transvaalense* and *A. wilmsii*

Group 5 = *A. aciculare*, *A. angustissimum*, *A. argenteum*, *A. ascendens*, *A. barbatum*, *A. campicola*, *A. candicans*, *A. collinum*, *A. filiform*,

A. harmsianum, *A. harveyanum*, *A. humile*, *A. lotioides*, *A. marginatum*, *A. molle*, *A. pachyphyllum*, *A. pauciflorum*, *A. pseudotuberosum*, *A. pumilum*, *A. rarum*, *A. rotundifolium*, *A. rupestre*, *A. sericosemium*, *A. stipulaceum*, *A. tomentosum*, *A. tuberosum* and *A. velutinum*.

Examination of the cladograms revealed the placement of *A. petiolare* within Group 3. This is anomalous due to the species elongated petioles, short narrow leaflets and solitary leaf-opposed flowers. In addition *A. petiolare* is geographically disjunct from other members of Group 3. Few specimens of *A. petiolare* are presently available and it may prove to be florally dimorphic which would align it with Group 5. This alternative is also more likely in terms of its morphological and geographic proximity to *A. argenteum*. To negate the influence of potentially miscoded data, characters relating to floral dimorphism in *A. petiolare* were entered as unknown (?) and the revised matrix (Matrix 2) was tested. Thus possible bias introduced by miscoding dimorphic characters was removed. A new set of cladograms was produced with *A. petiolare* being positioned as a close ally of *A. argenteum* and *A. pachyphyllum*. The most parsimonious trees from this set, using *Dichilus* as the outgroup, were 198 steps long (cf. 202 steps) and had consistency and retention indices of 35 and 75 respectively (cf. 34 & 75). The exercise was repeated using *Polhillia* as the outgroup, again *A. petiolare* was positioned as a close ally of *A. argenteum* and

A. pachyphyllum. The most parsimonious trees produced from this manipulation were 202 steps (cf. 206 steps) with consistency indices of 35 and retention indices of 75 (cf. 34 & 75 respectively). Weighted and unweighted strict consensus trees were also consistently shorter for Matrix 2 (Table 8). Without proof of floral dimorphism this alternative arrangement is speculative however in terms of parsimony and inferred relatedness it appears the most likely scenario. In all subsequent manipulations both alternatives were considered for *A. petiolare* to test their plausibility.

Table 8. Statistics of strict consensus trees generated for *Argyrolobium* from matrices 1 (*A. petiolare* scored as florally monomorphic) & 2 (*A. petiolare* scored as unknown for floral polymorphism) (characters 0 1 2 10 12 19 44 unordered).

Outgroup	Matrix	Unweighted tree			Weighted tree		
		length	ci	ri	length	ci	ri
<i>Dichilus</i>	1	237	34	75	238	66	94
<i>Dichilus</i>	2	242	35	75	211	66	93
<i>Polhillia</i>	1	257	34	75	219	65	93
<i>Polhillia</i>	2	223	35	75	218	65	93

The character weights following successive approximation weighting are listed in Tables 9 & 10. Characters with a high degree of homoplasy have very low

weights and conversely characters with a low degree of homoplasy have high weights. Highly weighted characters are consistent for both outgroups.

An influential suite of characters within the trees relates to breeding systems and the occurrence of floral dimorphism. Within the Crotalarieae these characters (26; 27; 28; 29; 40; 42; 45; 49) are unique to *Argyrolobium* and are limited to Group 5.

Characters 22 and 25 are synapomorphies which relate to flower and bract morphology of *A. amplexicaule* and *A. crinitum* (Group 1) and display no homoplasy. Character 24, the production of russet and yellow flowers, is synapomorphic for *A. tuberosum* and *A. angustissimum* (Group 5). Likewise characters 38 and 39 are synapomorphic for *A. lunare* and *A. splendens* (Group 2) and refer to diagnostic corolla specializations. Character 5 (adventitious roots) appears to be autapomorphic for upland forms of *A. harveyanum* and consequently is weighted highly.

The separate derivation of lignotubers amongst suffrutescent species of Group 3 (*A. speciosum*, *A. baptisioides*, *A. megarhizum* and *A. longifolium*) and herbaceous species of Group 5 (*A. tuberosum*, *A. filiform*, *A. pseudotuberosum*, *A. harveyanum* and *A. aciculare*) reduces their weight (characters 6 & 7). Both lineages evolved in seasonal grasslands which are susceptible to fire and

consequently the convergence is not surprising.

Shrubs occur in Groups 4 and 5 and so characters (0 & 2) are somewhat homoplasious in the generic analysis with a low weight. Shrubs appear to have evolved in conjunction with different woody vegetation types. Convergent derivation of these characteristics occurs in fynbos species of Group 4 (*A. incanum*, *A. crassifolium*, *A. parviflorum*, *A. polyphyllum* and *A. trifoliatum*) and in dry scrubland species of Group 5 (*A. argenteum*, *A. barbatum*, *A. pachyphyllum* and *A. petiolare*).

The enlargement and fusion of stipules (characters 8, 9 & 10) are convergent attributes in Groups 1, 2, 3 and 5 and consequently these characters have low weights. Their degree of expression varies but in Group 1, the extreme development and amplexicaul nature of the stipules is clearly synapomorphic. Stipule morphology is also useful in defining Group 2 where the asymmetric stipule bases (character 9) are synapomorphic.

Table 9. Character weights following successive approximation weighting of the genus *Argyrolobium* using *Dichilus* as the outgroup (unordered characters 0 1 2 10 12 19 44).

OUTGROUP *Dichilus* Matrix 1 (*A. petiolare* scored as chasmogamous)

Weight	Characters
0	3 4 13 14 23 32 35 36 37
1	10 11 12 15 18 19 20 30 31 33 46
2	8 21 34
3	0 9 17 44 48
4	2 6 16
5	1
6	7
10	5 22 24 25 26 27 28 29 38 39 40 41 42 43 45 47 49

OUTGROUP *Dichilus* Matrix 2 (floral dimorphism for *A. petiolare* scored as unknown (?)).

Weight	Characters
0	3 4 13 14 23 32 35 36 37
1	10 11 12 15 18 19 30 31 33 46
2	8 20 21 34
3	0 9 17 44 48
4	2 6 16
5	1
6	7
10	5 22 24 25 26 27 28 29 38 39 40 41 42 43 45 47 49

Table 10. Character weights following successive approximation weighting of the genus *Argyrolobium* using *Polhillia* as the outgroup (unordered characters 0 1 2 10 12 19 44).

OUTGROUP *Polhillia* Matrix 1 (*A. petiolare* scored as chasmogamous)

Weight	Characters
0	3 4 13 14 23 32 35 36 37
1	10 11 12 15 19 30 31 33 46
2	0 18 34
3	8 9 17 21 48
4	2 6 16
5	1 44
6	7
10	5 22 24 25 26 27 28 29 38 39 40 41 41 43 45 49

OUTGROUP *Polhillia* Matrix 2 (floral dimorphism for *A. petiolare* scored as unknown (?)).

Weight	Characters
0	3 4 13 14 23 32 35 36 37
1	10 11 12 15 30 31 33 46
2	0 2 18 19 20 34
3	8 9 17 21 48
4	6 16
5	1 44
6	7
10	5 22 24 25 26 27 28 29 38 39 40 41 42 43 45 47 49

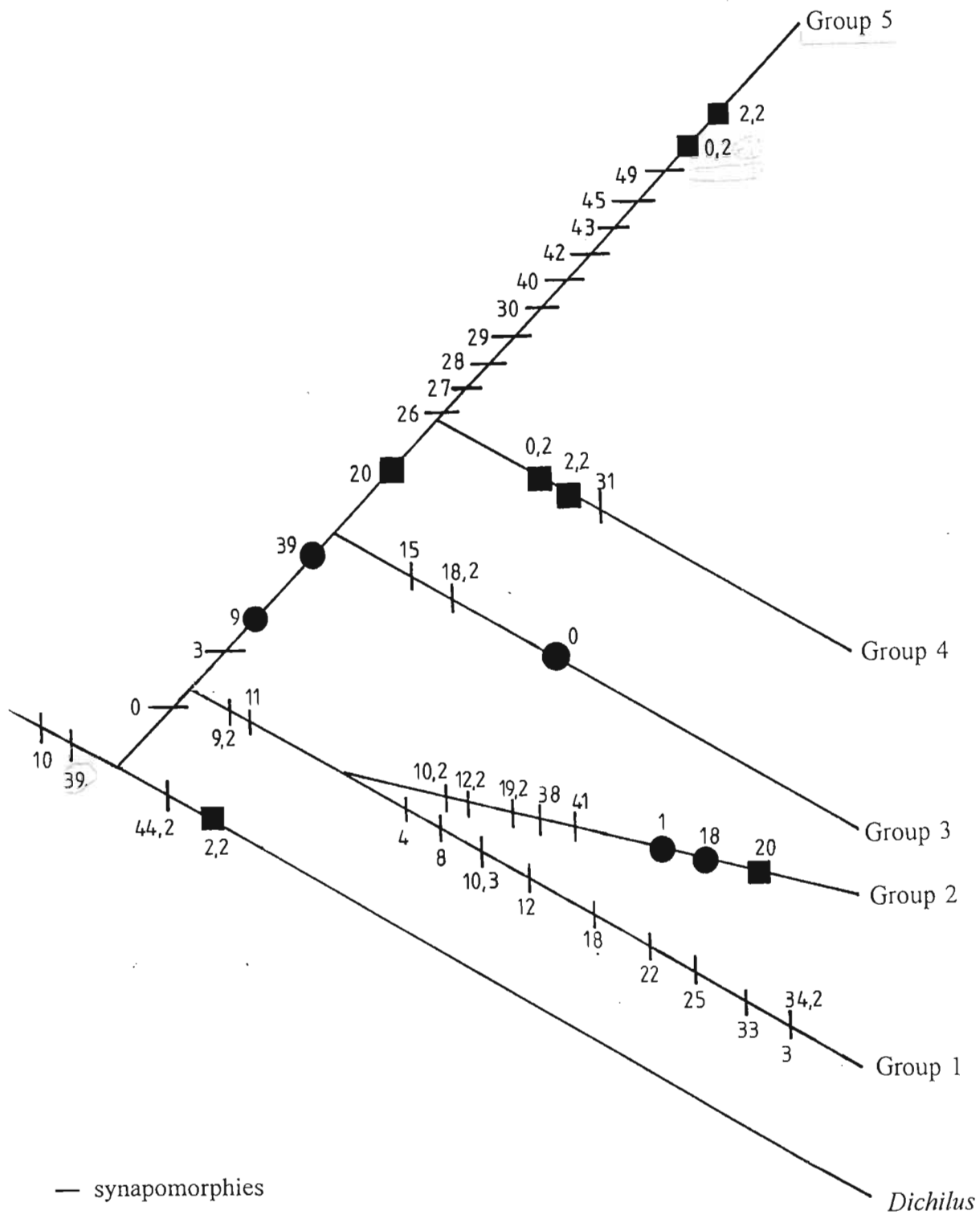


Figure 36. Strict consensus tree of *Argyrolobium* in South Africa using *Dichilus* as the outgroup (Characters 0 1 2 10 12 19 44 unordered) (only the basal topology is illustrated).

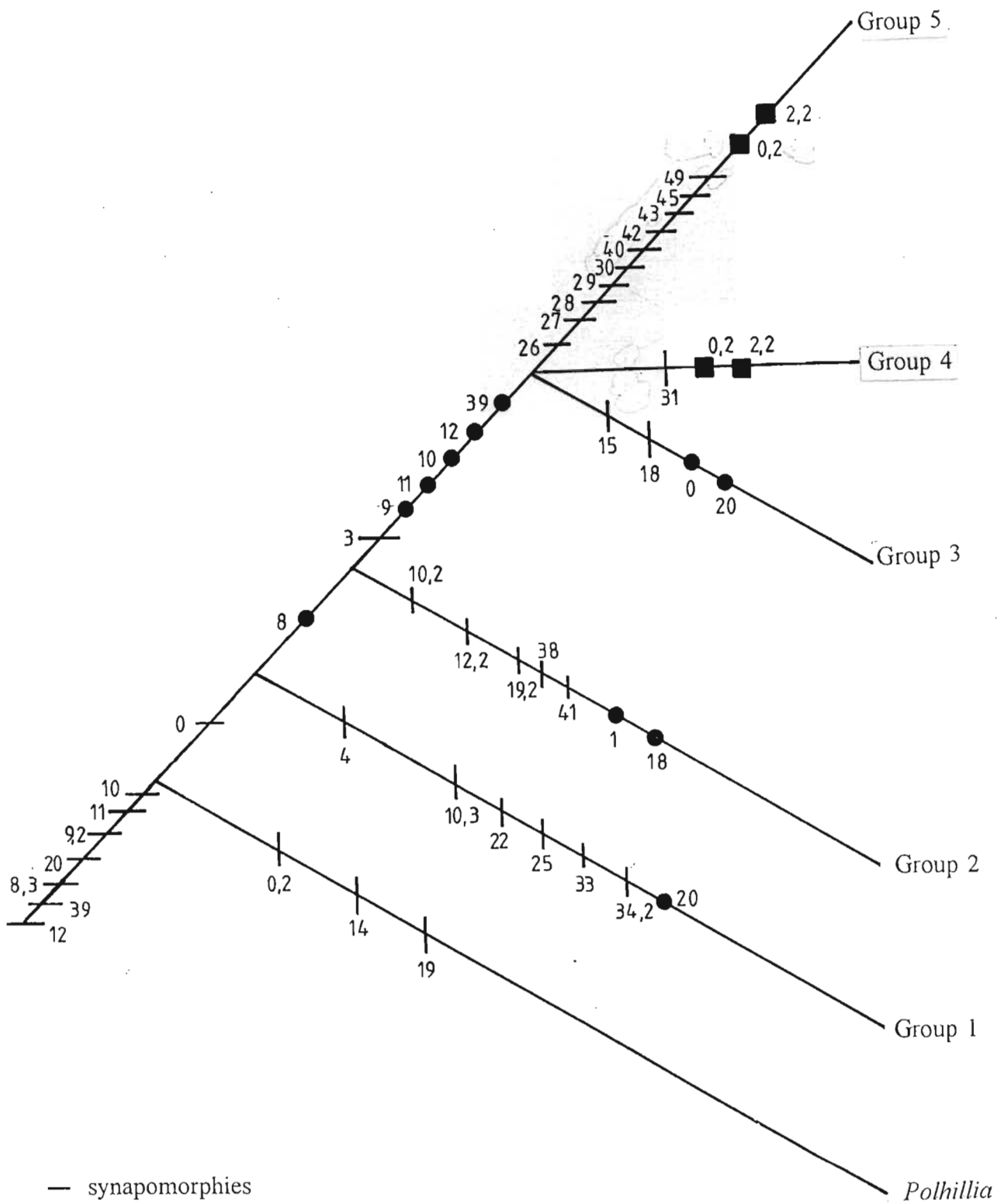


Figure 37. Strict consensus tree of *Argyrolobium* in South Africa using *Polhillia* as the outgroup (Characters 0 1 2 10 12 19 44 unordered) (only the basal topology is illustrated).

The trees generated when *Dichilus* was used as the outgroup are slightly shorter than those produced using *Polhillia* however the position of the branch comprising *A. amplexicaule* and *A. crinitum* is less convincing. These species are very distinct with respect to both vegetative and floral characteristics and this is clearly displayed when *Polhillia* is used as the outgroup (Figure 37). The divergent nature of Group 1 comprising *A. amplexicaule* and *A. crinitum* requires formal recognition in the classification of *Argyrolobium*. The remaining groups are closely allied and the recognition of hierarchical differences on the basis of topology contributes little additional information.

Groups 3, 4 & 5 comprise more than two species and were reanalysed in isolation and rooted using species of the nearest sister group. This allowed a reconsideration of characters which were homoplasious in the global comparison.

Group 5, with 26 species, is the largest monophyletic clade in the generic tree and was manipulated using *A. incanum* as the outgroup. The inclusion of *A. petiolare* had little effect on overall topology or tree length (comparative statistics are presented in Table 11). The strict consensus tree generated following successive approximation weighting was 123 steps when *A. petiolare* was excluded and 125 steps when it was included.

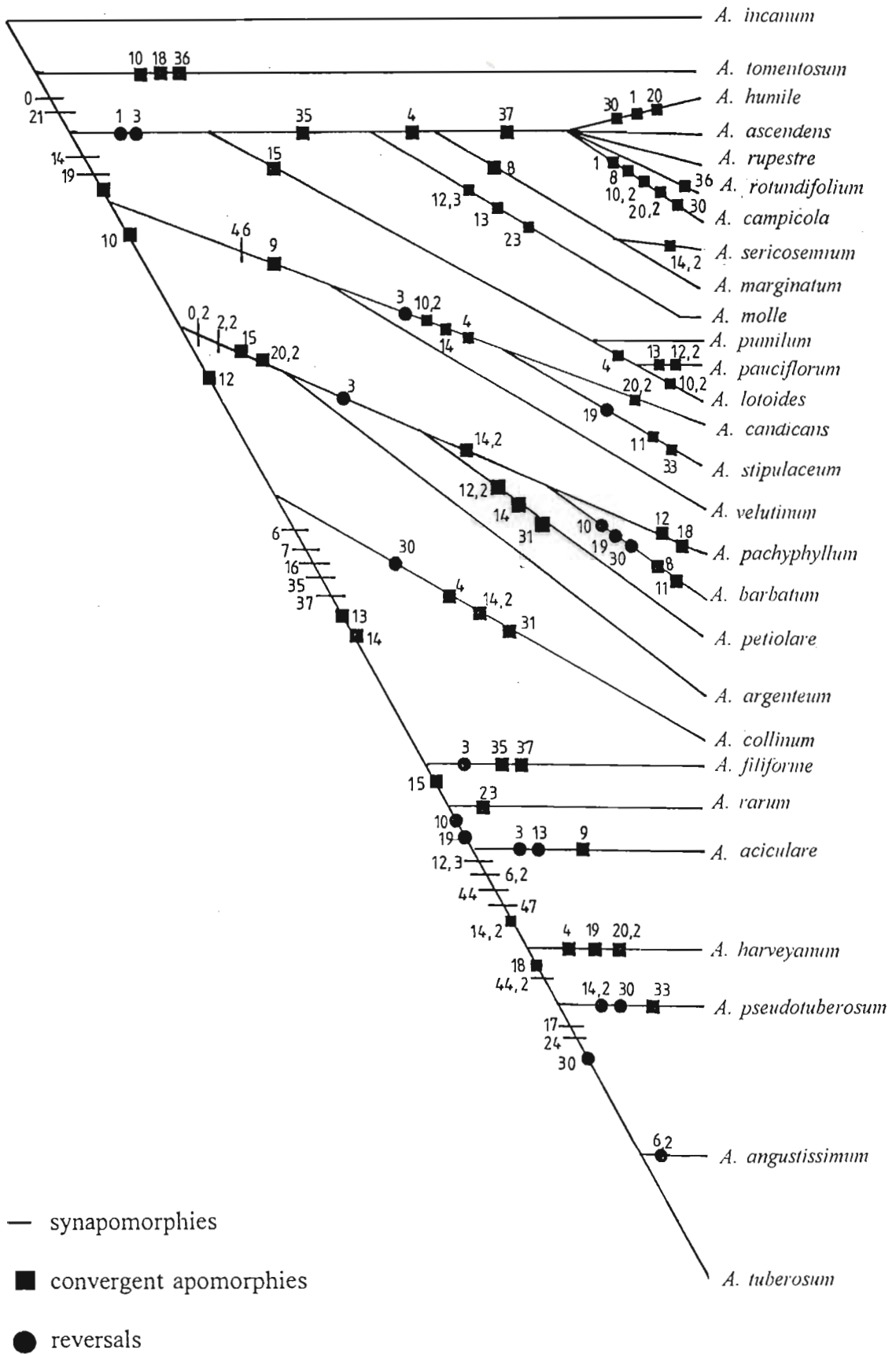


Figure 38. Strict consensus tree of Group 5 polarising aerial perennation and woodiness as specialised and using a hypothetical outgroup based on *A. incanum* (Characters 1 10 12 19 44 unordered) length 123; ci 76; ri 85).

Table 11. Statistics of maximum parsimony cladograms generated for Group 5 (characters 0 1 2 10 12 19 44 unordered; *A. petiolare* included in matrix 2).

Outgroup	Matrix	Unweighted tree		Weighted tree	
		length	ci ri	length	ci ri
<i>A. incanum</i>	1	112	45 64	118	79 86
<i>A. incanum</i>	2	118	44 63	119	79 87

Initial manipulations of Group 5 produced a strict consensus tree in which the shrubs (*A. argenteum*, *A. pachyphyllum*, *A. petiolare*, *A. barbatum*) occur as progenitors to the geophytes (*A. filiform*, *A. harveyanum*, *A. pseudotuberosum*, *A. tuberosum*, *A. angustissimum*). This unlikely scenario requires evolution and subsequent loss of the shrub habit. To accommodate the likelihood that woodiness is specialised, characters 0 & 2 were reconsidered as ordered in a second analysis.

Table 12. Character weights following successive approximation weighting of Group 5 when woodiness and perennation are considered ordered multistate characters (characters 1 10 12 19 44 unordered; group synapomorphies removed).

Weight	Characters
0	11 19 20 21 23 30 31 33 34 36
1	3 4 8 10 13 14 18
2	15 35

3	1 9 12
4	37
5	0 6
10	2 5 7 16 32 44 46 48

The strict consensus tree generated when woodiness is considered apomorphic is the same length as the previous manipulation but the consistency and retention indices are higher (ci 79 vs 42 & ri 87 vs 64). The modified tree depicts four main lines of evolution. Habit and perennation (characters 0 & 2) are highly influential in the cladogram (weighted 5 & 10 respectively) generating a single woody group comprising *A. petiolare*, *A. argenteum*, *A. barbatum* and *A. pachyphyllum*. The basal position of these species contradicts their consistent alliance with the geophytes in the earlier cladograms and is a product of convergent woodiness in the outgroup (*A. incanum*). To overcome this artifactual association between *A. incanum* and shrubs of the ingroup a hypothetical outgroup was generated which retained the coding of *A. incanum* in all characters except those concerned with woodiness and perennation (0 & 2) which were scored as unspecialized. The cladograms generated from this manipulation are the most parsimonious (Table 13) and accord well with current knowledge of the group.

Table 13. Statistics of cladograms generated for Group 5 when woodiness and perennation (0 & 2) are considered ordered multistate characters using *A. incanum* and a hypothetical outgroup.

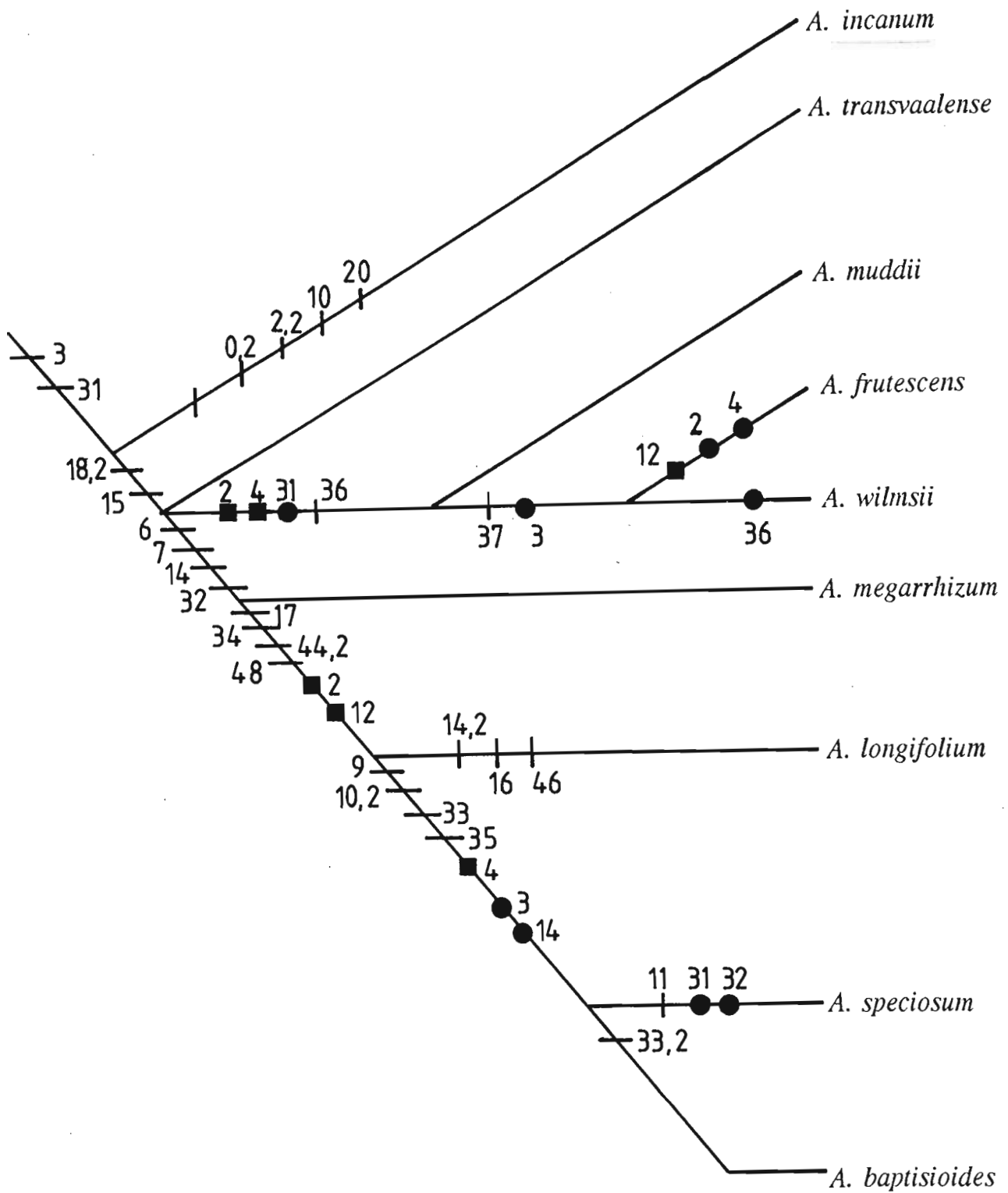


Figure 39. Strict consensus tree of Group 3 using *A. incanum* as the outgroup

(Characters 0 1 2 10 12 19 44 unordered), length 46 steps; ci 94; ri 94.

Outgroup	Unweighted tree		Weighted tree	
	length	ci ri	length	ci ri
<i>A. incanum</i>	118	44 63	119	79 87
Hypothetical	114	44 64	114	77 84

The strict consensus tree from this manipulation (figure 38) depicts the geophytic and woody species as separate specialized lines. Filiform leaflets and lignotubers (characters 7 & 16) are heavily weighted and the clade containing *A. filiforme* and its allies is particularly robust. These specializations to habit have allowed the invasion of areas subjected to seasonal drought. The lineage also shows a reduction in flower number which is synapomorphic with the woody species but convergent with *A. candicans* and reversed in *A. pseudotuberosum*, *A. tuberosum*, *A. filiform*, *A. aciculare* and *A. angustissimum*.

The widespread suffrutex, *A. tomentosum*, is a generalist species and is basal in the chosen cladogram (figure 38). *A. velutinum*, *A. candicans* and *A. stipulaceum* are consistently grouped due, largely, to the synapomorphic occurrence of turgid fruits.

The mesic herbs which form a complex around *A. rupestre* are closely related and problematic. *A. sericosemium* and *A. marginatum* appear to be sister species and were consistently paired in the cladograms. Many of the remaining species are

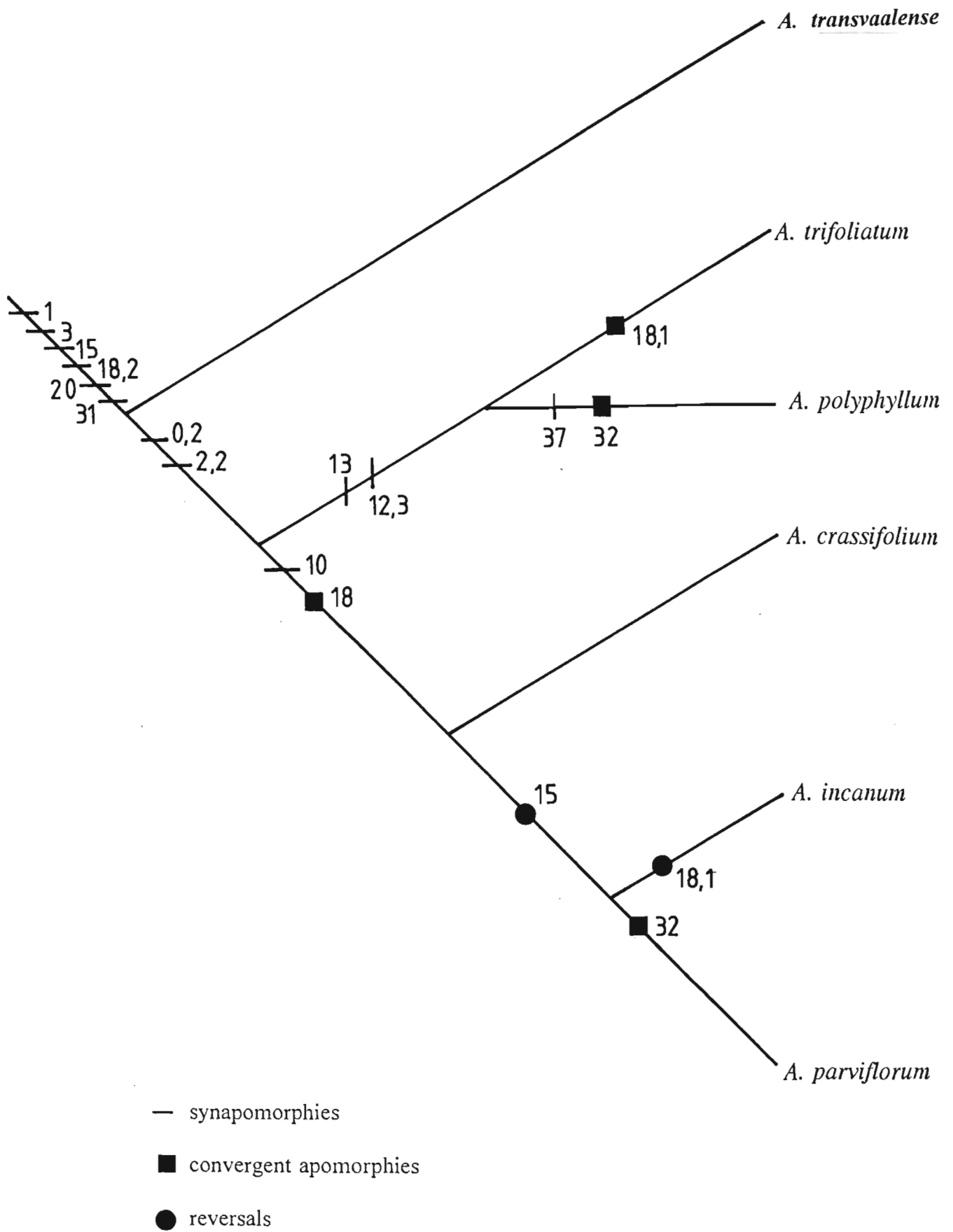


Figure 40. Chosen cladogram of Group 4 using *A. transvaalense* as the outgroup

(Characters 0 1 2 10 12 19 44 unordered), length 14 steps; ci 78; ri 57.

identifiable due to autapomorphies which provide no contribution to topology and consequently resolution within the complex is poor. Wing (35) and keel vestiture (37) are prominent in the *A. rupestre* alliance but are convergent in *A. filiforme* and are therefore only moderately weighted.

Group 3 comprises eight species from which two equally parsimonious trees (46 steps) were generated using implicit enumeration (ie). Following successive approximation weighting the consistency index was improved from 78 to 94 and the retention index was improved from 77 to 94. The two resulting trees differ only in the position of *A. transvaalense* which is either basal to the clade comprising *A. frutescens*, *A. muddii* and *A. wilmsii* or basal to the entire group. Based on our current knowledge either interpretation is acceptable. The strict consensus tree generated from this set was identical to one of the component trees (figure 39). The main dichotomy within the group results from adaptations to seasonal grassland such as lignotubers (characters 6 & 7) and the fusion of the upper calyx sinus in *A. baptisioides*, *A. longifolium* and *A. megarrhizum* (character 32). In terms of floral morphology *A. longifolium*, *A. speciosum* and *A. baptisioides* are specialised with structural modification of the standard bases and accentuation of staminal sheath sinus (characters 34 & 44). In this respect *A. megarrhizum* is plesiomorphic retaining the conservative floral morphology of *A. transvaalense*.

Group 4 comprises shrubs from the eastern Cape which are convergent with *A. argenteum* and its woody allies (Group 5). Implicit enumeration (ie) was used to produced a single most parsimonious tree with a length of 13 steps, a ci of 84 and a ri of 71 (figure 40). Xeric specialisation of *A. incanum* and *A. parviflorum* supports their derived position on the cladogram. *A. polyphyllum* and *A. trifoliatum* are mesic shrubs often associated with forest margins, their coppicing habit and leaf indumentum conforms to that of the outgroup and thus their basal position on the cladogram is not surprising.

Conclusion

This analysis supports the recognition of five main infrageneric taxa. Group 1 is very distinct and is attributed subgeneric status (subgenus *Amplexicaule*). The remaining groups are included in the typical subgenus and are recognised as four closely allied sections. The recognised taxa are listed below with their corresponding groups:

Group 1	Subgenus <i>Amplexicaule</i>	Section <i>Amplexicaule</i>
Group 2	Subgenus <i>Argyrolobium</i>	Section <i>Lunare</i>
Group 3	Subgenus <i>Argyrolobium</i>	Section <i>Transvaalense</i>
Group 4	Subgenus <i>Argyrolobium</i>	Section <i>Polyphyllum</i>
Group 5	Subgenus <i>Argyrolobium</i>	Section <i>Argyrolobium</i> .

An overview of extraterritorial species was undertaken and these species fit within

the proposed classification. Tropical African suffrutices are a prominent component of Group 3 and the remaining species belong to Group 5.

Formal Taxonomy

Argyrobium Eckl. & Zeyh., Enum. Pl. Afr. Austr. 2: 184 (Jan. 1836); Harv.: 67 (1862); Polhill: 145 (1968); Polhill: 332 (1976); Van Wyk & Schutte: 397 (1989); Van Wyk: 282 (1991a), *nom. cons.* Type species: *Argyrobium argenteum* (N.J. Jacq.) Eckl. & Zeyh. (*Crotalaria argentea* Jacq.) (*typ. cons.*).

Lotophyllus Link, Handb. 2: 156 (1831) *nom. rej.* Type species: *Lotophyllus argenteus* Link [now *Argyrobium linnaeanum* Walp.]

Chasmone E. Mey. Comm. Pl. Afr. Austr. 1(1): 71 (5 Feb.--5 Jun. 1836).
Lectotype species (selected here): *Chasmone argentea* (Jacq.) E. Mey. [now *Argyrobium argenteum* (Jacq.) Eckl. & Zeyh.].

Gamochilum Walp. in Linn. 13: 509 (1839). Lectotype species (selected here): *Gamochilum sericeum* (E. Mey.) Walp. [now *Argyrobium trifoliatum* (Thunb.) Druce].

Trichasma Walp. in Linn. 13: 510 (1839). Lectotype species (selected here): *Trichasma ciliatum* (Sprgl.) Walp. [now *Argyrobium tomentosum* (Andr.) Druce].

Perennial herbs, suffrutices or shrubs. *Leaves* alternate, digitately trifoliolate, petiolate or sessile; stipules 2, free or variously connate, subulate to foliaceous, bases often amplexicaul. *Inflorescence* solitary-flowered, racemose or pseudo-umbellate, usually terminal or leaf-opposed; bracts cymbiform to

lanceolate, variously attached to the peduncle or pedicels; bracteoles 2, setaceous to lanceolate, variously attached to the pedicels or calyces. *Flowers* often dimorphic. *Calyx* bilabiate, upper lip usually 2-lobed, lower lip usually 3-lobed. *Corolla* yellow becoming russet or russet and yellow; standard ovate, obovate or suborbicular, adaxial surface variously sericeous, base cordate to cuneate, claw short; wings oblong to obovate, sometimes distally sericeous, lunate-lamellate sculpturing usually present; keel cymbiform, apex blunt, abaxial suture and distal lamina sometimes sparsely sericeous. *Stamens* 10, monadelphous or pseudodiadelphous, sheath often deeply split adaxially; anthers dimorphic, alternating, 5 large, oblong and basifixed, 5 small, ovate and dorsifixed. *Ovary* *sessile*, narrowly oblong usually densely sericeous, ovules numerous; style arcuate, glabrous; stigma capitate. *Fruit* *sessile*, densely sericeous, oblong or linear, flat, sub-torulose or turgid, many seeded. *Seed* irregular, suborbicular or reniform, 1--3 mm in diameter, hilar rim raised or flat, hilar tongue usually present, rarely arillate (*A. ascendens*), testa smooth.

The genus includes about 91 species 45 of which occur in South Africa. Species are distributed from the Cape Province to the Mediterranean and West into the highlands of India.

The genus is closely allied to other Old World members of the Crotalarieae with bilabiate calyces in which the lower lip comprises three lobes and the upper lip

two lobes. It is distinguished from these genera by its broad-based (often amplexicaul) stipules (not auriculate as in *Melolobium*, inconspicuous as in *Dichilus*, or adnate to the petioles as in *Polhillia*). Its wing and keel petals are of similar length to the lower calyx lip and shorter than the standard (unlike *Lebeckia* and *Dichilus*). Bracteoles are present in all species of *Argyrolobium* although they may be setaceous or vestigial in some specimens (usually absent in *Polhillia*). The occurrence of pseudopeduncles is limited to *Polhillia* and a few species of *Argyrolobium* (notably *A. argenteum*, *A. filiforme* and *A. aciculare*). The fusion of the stamens into a closed sheath is not consistent throughout the genus and is therefore not a reliable diagnostic character.

KEY TO SOUTH AFRICAN SPECIES OF *ARGYROLOBIUM*

1. Stipules fused for more than half their length 2
 Stipules free or fused for less than half their length 5

2. Bracts as long as or longer than the calyx, cymbiform; flowers
 monomorphic 3
 Bracts shorter than the calyx, ovate; flowers dimorphic 4

3. Stipules 4-lobed *A. crinitum* (pg. 120)
 Stipules 2-lobed *A. amplexicaule* (pg. 116)

4. Inflorescence pedunculate *A. campicola* (pg. 192)
 Inflorescence sessile *A. candicans* (pg. 215)

5. Flowers monomorphic 6
 Flowers dimorphic (fruits with reduced calyces) 26

6. Suffrutices 7
 Shrubs or herbs 15

7. Leaves monomorphic; exsiccatae green, silver or brown 8
 Leaves dimorphic; exsiccatae black 12

8. Leaves sparsely sericeous, green 9
 Leaves velutinous, silver *A. wilmsii* (pg. 139)
9. Standard petal ovate to suborbicular 10
 Standard petal obovate *A. frutescens* (pg.132)
10. Calyx lobes prominent 11
 Calyx lobes vestigial *A. megarrhizum* (pg. 142)
11. Plants forming short, dense clumps (less than 0.5 m tall); petioles
 prominent *A. muddii* (pg. 137)
 Plants virgate (taller than 0.5 m); petioles short
 *A. transvaalene* (pg. 133)
12. Plants tall (> 0.6 m excluding the inflorescences), virgate, well
 branched above *A. longifolium* (pg. 144)
 Plants short (< 0.4 m excluding the inflorescences), branched basally
 13
13. Standard obovate to oblanceolate, plain yellow
 *A. baptisioides* (pg. 145)
 Standard suborbicular, veins reddish 14

14. Plants slender, often decumbent; peduncles prominent; limited to the eastern Cape *A. speciosum* ssp. *speciosum* (pg. 147)
- Plants robust, erect, peduncles short; limited to Natal and the Transvaal *A. speciosum* ssp. *megaphyllum* (pg. 150)
15. Shrubs 16
- Herbs 23
16. Leaves dimorphic 17
- Leaves monomorphic 18
17. Upper leaves small, 5--9(--17) x 2--4 mm, on brachyblasts
- *A. polyphyllum* (pg. 163)
- Upper leaves large, 10--24 x 8--14 mm, not borne on brachyblasts
- *A. trifoliatum* (pg. 160)
18. Leaflets with reticulate abaxial ribs *A. parviflorum* (pg. 170)
- Leaflets lacking abaxial ribs 19
19. Petioles longer than terminal leaflets *A. petiolare* (pg. 229)
- Petioles shorter than terminal leaflets 20
20. Stipules connate in the basal third *A. barbatum* (pg. 232)

- Stipules free 21
21. Leaflets strongly conduplicate, crescent-shaped
. *A. pachyphyllum* (pg. 231)
Leaflets seldom conduplicate or crescent-shaped 22
22. Leaflets densely hairy, coriaceous *A. incanum* (pg. 168)
Leaflets sparsely hairy, usually glabrous adaxially, membranous
. 23
23. Slender, well branched shrubs; leaflets shorter than 12 mm;
inflorescences less than 5-flowered *A. crassifolium* (pg. 165)
Sparsingly branched shrubs; leaflets longer than 16 mm; inflorescences
many-flowered *A. trifoliatum* (pg. 160)
24. Leaflet margins revolute; fruits compressed
. *A. splendens* (pg. 129)
Leaflet margins flat; fruits torulose 25
25. Plants robust; limited to the Caledon area
. *A. lunare* ssp. *lunare* (pg. 123)
Plants slender; widespread
. *A. lunare* ssp. *sericeum* (pg. 125)

26. Leaves monomorphic or slightly dimorphic 27
 Leaves strongly dimorphic, upper leaflets filiform 47
27. Plants shrubby or suffrutescent 28
 Plants herbaceous 31
28. Stipules connate in the basal third *A. barbatum* (pg. 232)
 Stipules free 29
29. Leaflets strongly conduplicate, crescent-shaped; petioles less than 5 mm
 long *A. pachyphyllum* (pg. 231)
 Leaflets flat or weakly conduplicate; petioles greater than 5 mm long
 30
30. Mesic suffrutices of forest margins; leaves flat; young stems green
 *A. tomentosum* (pg. 173)
 Xeric shrubs; leaves weakly conduplicate; young stems densely
 sericeous, white *A. argenteum* (pg. 225)
31. Chasmogamous flowers sessile 45
 Chasmogamous flowers pedunculate 32
32. Abaxial veins of leaflets prominent *A. molle* (pg. 200)

- Abaxial veins of leaflets obscure 33
33. Leaflets discolorous *A. pumilum* (pg. 213)
 Leaflets concolorous 34
34. Stipules larger than leaflets *A. stipulaceum* (pg. 219)
 Stipules smaller than leaflets 35
35. Leaflets conduplicate and reflexed *A. sericosemium* (pg. 194)
 Leaflets not reflexed 36
36. Seeds with well developed, symmetrical arils
 *A. ascendens* (pg. 181)
 Seeds with asymmetrical hilar tongues 37
37. Wing petals without sculpturing *A. rotundifolium* (pg. 185)
 Wing petals sculptured 38
38. Upper petioles shorter than stipules 39
 Upper petioles longer than stipules. 45
39. Individual flowers russet & yellow *A. tuberosum* (pg. 256)
 Flowers uniformly yellow (often becoming russet with age) 40

40. Leaflets linear, less than 2 mm broad *A. aciculare* (pg. 244)
 Leaflets ovate to elliptic, broader than 2 mm 41
41. Inflorescence 1-2--flowered, leaf-opposed . . . *A. humile* (pg. 178)
 Inflorescence many-flowered, terminal *A. marginatum* (pg. 197)
42. Stipules shorter than 6 mm *A. rupestre* ssp. *rupestre* (pg. 188)
 Stipules longer than 6 mm 43
43. Bracts small (usually less than 4 mm long), bracteoles minute
 *A. lotoides* (pg. 205)
 Bracts large (usually greater than 6 mm long), bracteoles 4--7 mm long
 *A. marginatum* (pg. 197)
44. Flowers solitary; legume compressed 45
 Flowers seldom solitary; legume inflated *A. velutinum* (pg. 223)
45. Leaflets oblong to oblanceolate, glabrous adaxially 46
 Leaflets obovate, densely sericeous *A. collinum* (pg. 234)
46. Stamens pseudodiadelphous *A. harveyanum* (pg. 245)
 Stamens monadelphous *A. harmsianum* (pg. 237)

47. Individual flowers russett and yellow 51
 Individual flowers uniformly yellow 48
48. Chasmogamous inflorescences sessile 49
 Chasmogamous inflorescences pedunculate 52
49. Chasmogamous flowers solitary 50
 Chasmogamous flowers in fascicles *A. filiforme* (pg. 239)
50. Upper leaves with reduced petioles *A. harveyanum* (pg. 245)
 Upper leaves with pronounced petioles *A. rarum* (pg. 242)
51. Flowers large; lower calyx lip 15--17 mm long
 *A. angustissimum* (pg. 254)
 Flowers small; lower calyx lip less than 12 mm long
 *A. tuberosum* (pg. 256)
52. Plants hairy; upper leaflets with prominent petioles
 *A. pauciflorum* (pg. 210)
 Plants glabrescent; upper leaflets with short petioles or subsessile
 *A. pseudotuberosum* (pg. 252)

SPECIES DESCRIPTIONS

A. tenue Walp. is incompletely known and is therefore not included. From its distribution and fruiting isotype the species appears to be closely allied to section *Polyphyllum* however it is distinguished from other species in that section by its oblanceolate leaflets and short petioles. A flowering type specimen is housed at K but, due to the paucity of flowers, our request to dissect one was denied.

Sectio 1. Amplexicaule T.J. Edwards sect. nov. habens flores monomorphos, stipulas connatas foliceasque, et bracteas cymbiformes excedentes flores longitudine.

A distinct section based on the enlarged, amplexicaul stipules and the prominent floral bracts. The fruits of *A. crinitum* are unknown but *A. amplexicaule* has inflated fruits which are convergent to those of some

species in section *Argyrolobium*.

Type species: *A. amplexicaule* (E. Mey.) Dümmer.

Suffrutices, forming clumps, branched basally; stems erect, annual, pilose, becoming glabrous; roots ligneous, perennial. *Leaves* pilose; leaflets ovate to obovate, apex rounded to acute, apiculate; petiole adaxially canaliculate, stipules amplexicaul, distal margin entire to deeply lobed. *Inflorescence* pedunculate; bracts large, narrowly ovate; bracteoles narrowly oblanceolate to filiform. *Calyx* pilose, deeply bilabiate. *Corolla* yellow; standard suborbicular, adaxial surface sericeous, claw, canaliculate; wings oblong, glabrous, claw prominent; keel cymbiform, claw prominent. *Stamens* monadelphous, sheath completely fused above. *Fruit* pilose, inflated.

1. *Argyrolobium amplexicaule* (E. Mey.) Dümmer Lond. J. Bot.: 222 (1913); Harms: 177-178 (1917). Type: Between Zandplaat & Komgha, Drège s.n. (K!, lecto. selected here).

Lotus amplexicaulis E. Mey.: 92 (1835); Harv.: 158 (1862). Type: as above.

Argyrolobium pilosum Harv.: 71 (1862). Type: Transkei Country, Bowker 106 (TCD!, lecto. selected here).

Suffrutex up to 400 mm tall, forming clumps, branched basally; stems annual, pilose, becoming glabrous. *Leaves* pilose; leaflets 25--40 x 6--17 mm, ovate to obovate, apex rounded to acute, apiculate; petiole 7--14 mm long, adaxially canaliculate; stipules 15--45 x 12--40 mm, amplexicaul, apex often emarginate. *Inflorescence* (3--)7--45-flowered, terminal; peduncle 5--70 mm long; bracts 15--24 x 3--7 mm, cymbiform; bracteoles 3--6 x 0.5--1.5 mm, oblanceolate to filiform. *Calyx* pilose, deeply bilabiate; upper lobes 8--13 mm long, upper sinus 2.5--4 mm deep, lower lip 9--16 mm long, lobes acute, 4--6 mm long. *Corolla* yellow; standard suborbicular, 10--14 x 8--12 mm, adaxial surface sericeous, claw, canaliculate, 3 mm long; wings oblong, 8--11 x 3.5--4 mm, glabrous, claw 1.5--2 mm long; keel cymbiform, 7--9 x 3.5--4 mm, claw 1.5--2.5 mm long. *Stamens* monadelphous, sheath completely fused above. *Ovary* narrowly oblong, 4--5 mm long; style 3--4 mm long. *Fruit* pilose, inflated, 15--25 x 4-5 mm. *Seed* suborbicular to reniform, 2 mm in diameter, slightly compressed.

A. amplexicaule is distinctive due to its large connate stipules and dense, pseudo-umbellate inflorescences. Its closest ally, *A. crinitum*, differs in having four-lobed stipules and spicate inflorescences.

A. amplexicaule is often found in association with *Lotononis corymbosa* (E. Mey.) Benth. forming floral guilds. Plants occur in Coastal Thornveld, Highland Sourveld, Dohne Sourveld (Figure 43). Wood (1910) reports the occurrence of

cleistogamy in this species but our investigation revealed no evidence of floral dimorphism and we suspect the earlier record is erroneous.

Without precise locality: *Flanagan* 3673 (PRE); *Gerrard* 1729 (BM); Transkei Country, *Bowker s.n.* (TCD). 2829 (Harrismith): Kerkenberg, (--AC), *Jacobs* 1267 (PRE); Oliviershoek Pass, (--CA), *Hilliard* 2422 (NU). 2929 (Underberg): Giant's Castle, (--AB), *Bolus* 6878 (BOL); *McKeown* 81 (E, NU); Tabamhlope Vlei, (--BA), *Downing* 161 (NU); Lowlands Station, Weenen, (--BB), *Acocks* 11350 (BR, PRE); Gladstones Nose, (--BC), *Edwards* 763 (NU); Kamberg, (--BC), *Hilliard & Burt* 5723 (E, NU); Sani Pass, (--CB), *Hilliard & Burt* 17945 (E, K, NU, PRE, S); Polela District, Prosperity, (--CB), *Rennie* 231 (E, NU); Bamboo Mt., (--CB), *Grice s.n.* (E, NU); Chameleon Cave, about 12 km N of Castle View Farm, (--CB), *Hilliard & Burt* 17836 (E); Garden Castle Forest Reserve, (--CC), *Hilliard & Burt* 13776 (E, NU); *Solomon* 4 (NU); Coleford, (--CD), *Harvey* 41 (NU); Loteni Nature Reserve, (--DA), *Edwards* 40 (NU); Bulwer, Sunset, (--DD), *Rennie* 428 (E, NU); *Rennie* 973 (NU). 2930 (Pietermaritzburg): Mooi River, (--AA), *Johnston* 540 (E); *Wood s.n.* (GRA); *Wood* 4074 (MO, BOL); *Wood* 789 (E, SAM); Balgowan, Glen Arum, (--AC), *Mogg* 3838 (PRE); Twin Falls, Howick, (--AC), *Grove* 62 (NU); Shafton, Howick, (--AC), *Hutton* 351 (PRE); Lion's River, The Dargle, (--AC), *Hilliard* 2145 (NU); Fort Nottingham Commonage, Garlick's Farm, (--AC), *Edwards* 336 (NH); Karkloof, Hancock's Farm, (--AD), *Edwards* 511 (NU); Noodsberg, New



Beattie s.n. (NU); *Randles 84* (NU); Inanda, (--DB), *Wood 611* (BOL); *Wood 1181* (BM, BOL); Pinetown, (--DD), *Rogers 28100* (GRA, PRE). 3029 (Kokstad): Mt. Currie, (--AD), *Taylor 5567* (NBG); *Coleman 549* (NH); Clydesdale, (--BD), *Tyson 1256* (BM, BOL, SAM, UPS, W); *Tyson 1914* (BOL, NBG, NH, SAM); *Tyson 1884* (BM); *Mogg 1833* (PRE); *Bokelmann 6* (NBG); *Mildred 252* (NBG); Ngeli, (--DA), *Hilliard 1288* (NU); Weza State Forest, (--DA), *Edwards & Ackermann 505* (NU); Ingeli Forest, grassland, (--DA), *Coleman 811* (PRE); Harding, Bedford, (--DB), *Lennox s.n.* (NU); Bizana, (--DD), *Stirton 5595* (PRE); *Baur 497* (SAM). 3030 (Port Shepstone): Ixopo, (--AA), *Mogg 2364* (PRE); 3 km from Ixopo to Highflats, (--AA), *Stirton 8194* (NU, PRE); *Shirley s.n.* (NU). 3129 (Port St. Johns): Port St. Johns, (--DA), *Barker 14135* (PRE). 3130 (Port Edward): Port Edward, (--AA), *Schrire 410* (NH); *Stirton 8194* (NU). 3226 (Fort Beaufort): Menziesberg, (--DB), *Phillipson 1161* (UFH). 3227 (Stutterheim): Keiskammahoek, (--CA), *Gibbs Russell 3470* (GRA); Cata Forest Reserve, (--CA), *Story 3724* (GRA, PRE); Dohne, (--CB), *Sim 20133* (PRE); Pirie, Kingwilliams Town, (--CD), *Sim 4009* (GRA); Komgha, (--DB), *Flanagan 855* (GRA). 3228 (Butterworth): Kentani, (--AD), *Pegler 1148* (BOL, PRE); Mhlahlane Forestry Reserve, (--BC), *Hutchings 1814* (NH).

13

Figure 41

Argyrolobium amplexicaule. A. Flowering branch (bar = 15 mm); B. bract and bracteoles (bar = 2 mm); C. calyx (bar = 2 mm); D. keel (bar = 2 mm); E. standard (bar = 2 mm); F. wings (bar = 2 mm); G. androecium (bar = 2 mm); H. stipules (bar = 2 mm); I. leaf (bar = 2 mm). Voucher: *Edwards 763*.

2. **Argyrolobium crinitum** (E. Mey.) Walp. in *Linnaea* 13: 506 (1839); Walp.: 630 (1843); Benth.: 340 (1844); Harv.: 68 (1862). Type: Cape, Swaartberge, Trado, *Drège* 6627 (P!).

Chasmone crinita E. Mey.: 71 (1836). Type: as above.

Suffrutex up to 600 mm tall, forming clumps, branched basally; stems annual, rufous-pilose. *Leaves* pilose; leaflets 30--50 x 14--23 mm, ovate to obovate, apex rounded; petiole 10--20 mm long, adaxially canaliculate; stipules 20--40 x 18--24 mm, amplexicaul, apex usually 4-lobed. *Inflorescence* elongate, terminal; bracts 13 x 5 mm, ovate; bracteoles 2 x 0.75 mm, filiform. *Calyx* pilose, deeply bilabiate; upper lobes 6 mm long, upper sinus 4.5 mm deep, lower lip 8 mm long, lobes acute, 3 mm long. *Corolla* yellow; standard suborbicular, strongly reflexed, 8 x 8 mm, adaxial surface sparsely sericeous medially, claw, canaliculate, 4 mm long; wings oblong, 9 x 4 mm, glabrous, claw 4 mm long, sculpturing in the lower basal and upper basal zones; keel cymbiform, 7 x 4 mm, claw 5 mm long. *Stamens* monadelphous, sheath split above. *Ovary* narrowly oblong, 9 mm long, densely rufo-sericeous, 6-seeded; style 4 mm long. *Fruit & seed* unknown.

14

A. crinitum is a distinctive species with large, 4-lobed stipules. It was collected

Figure 42

Argyrolobium crinitum. A. Vegetative branch (bar = 20 mm); B. calyx (bar = 2 mm); C. wing (bar = 2 mm); D. keel (bar = 2 mm); E. standard (bar = 2 mm); F. calyx, pedicel and bract (bar = 2 mm). Voucher: *Drège s.n.*

once, in False Macchia, and is probably extinct (Figure 43). Its distinctive morphology led Meyer (1835) to suggest that it may represent a new genus. This comment must be viewed in the light of his placement of *A. amplexicaule* within *Lotus*. These species are closely allied having similar leaves, stipules and vestiture. Only a single flower of *A. crinitum* was available for examination and so details of inflorescence structure were taken from Meyer (1836). The calyx has a truncate base and the petals have well developed claws. The fusion of the filaments, the dimorphic anthers and the calyx morphology however support its placement within *Argyrolobium*.

3320 (Montagu): Swaartberge, Trado, (--DD), *Drège* 6627 (P).

Sectio 2. Lunare T.J. Edwards sect. nov. Herbae perennes, suffrutices vel frutices, foliolis conduplicatis, petiolis prominentibus, stipulis asymmetricice ovatis vel dimidiatis (subulatis in *A. petiolari*), floribus monoformis, antheris saepe pilosis.

Type species: *A. lunare* (L.) Druce.

Herbaceous to shrubby, often decumbent, sparsely branched. *Leaves* variously sericeous, leaflets narrowly elliptic to ovate, apex acute to emarginate, petioles prominent; stipules asymmetrically lanceolate to ovate, base obliquely cordate to obtuse. *Inflorescence* 1--3-flowered, peduncle usually well developed, leaf-

opposed; bracts lanceolate to cordate; bracteoles lanceolate. *Calyx* sericeous, deeply bilabiate. *Corolla* yellow becoming russet; standard orbicular, adaxial surface sparsely sericeous, base obtuse to cordate, claw prominent; wings oblong, usually with lunate-lamellate sculpturing in the upper basal and upper central zones, claw prominent; keel cymbiform, upper margin markedly ciliate, claw prominent. *Stamens* monodelphous, vexillary filament sometimes largely free; anthers often slightly hairy proximally. *Ovary* densely sericeous; style basally hairy. *Fruit* compressed, sometimes torulose, sericeous.

This section is characterised by its monomorphic flowers and a combination of other characters. Most species are suffutescent or herbaceous with very prominent petioles and peduncles.

The section is limited to the Cape. Hairy anthers are unique to this alliance but do not occur throughout.

A. lunare has been grouped with the North African and Mediterranean species in section *Eremolobium* (Bentham 1844; Harvey 1862). In our opinion the small alliance surrounding *A. lunare* is exclusive to the Cape Floral Kingdom.

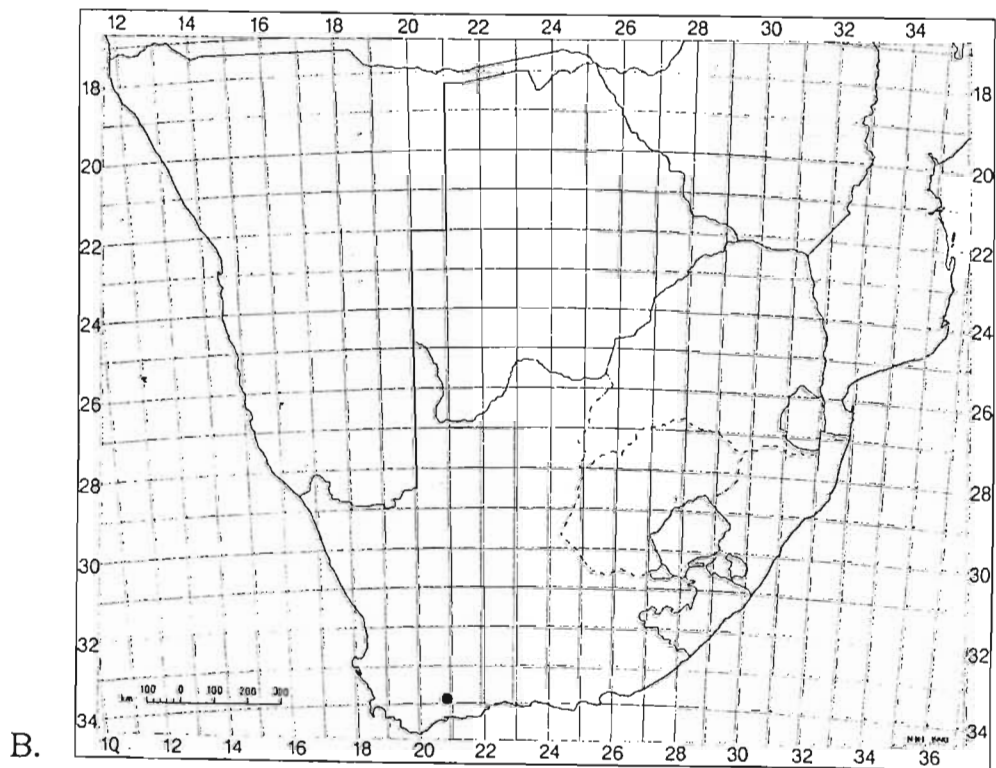
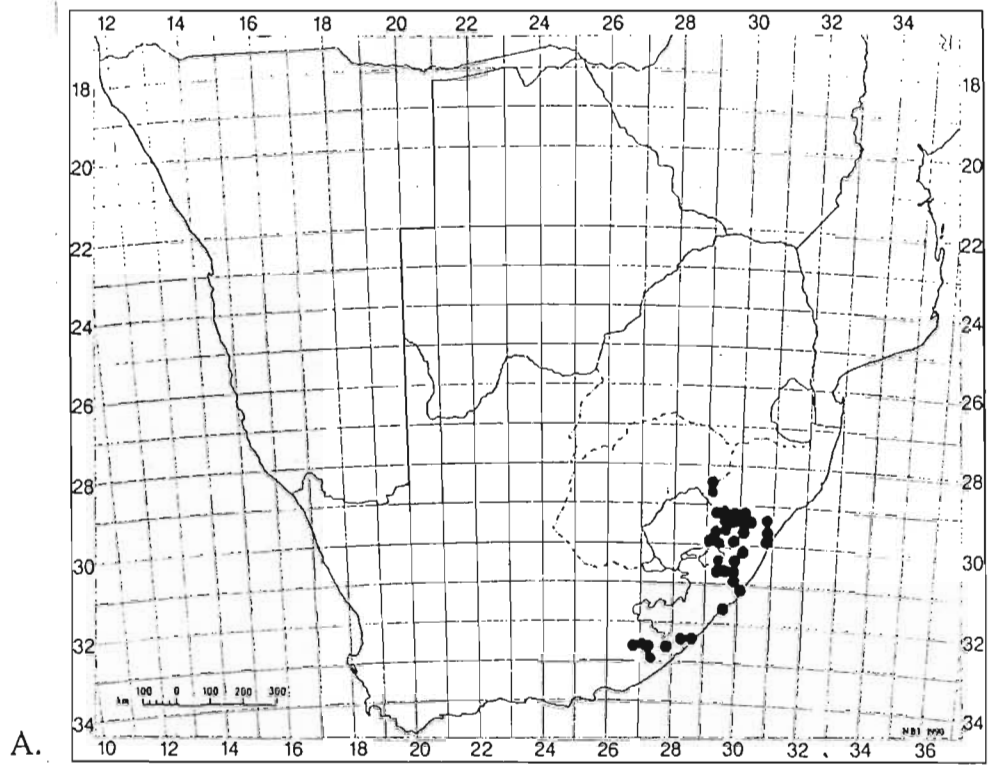


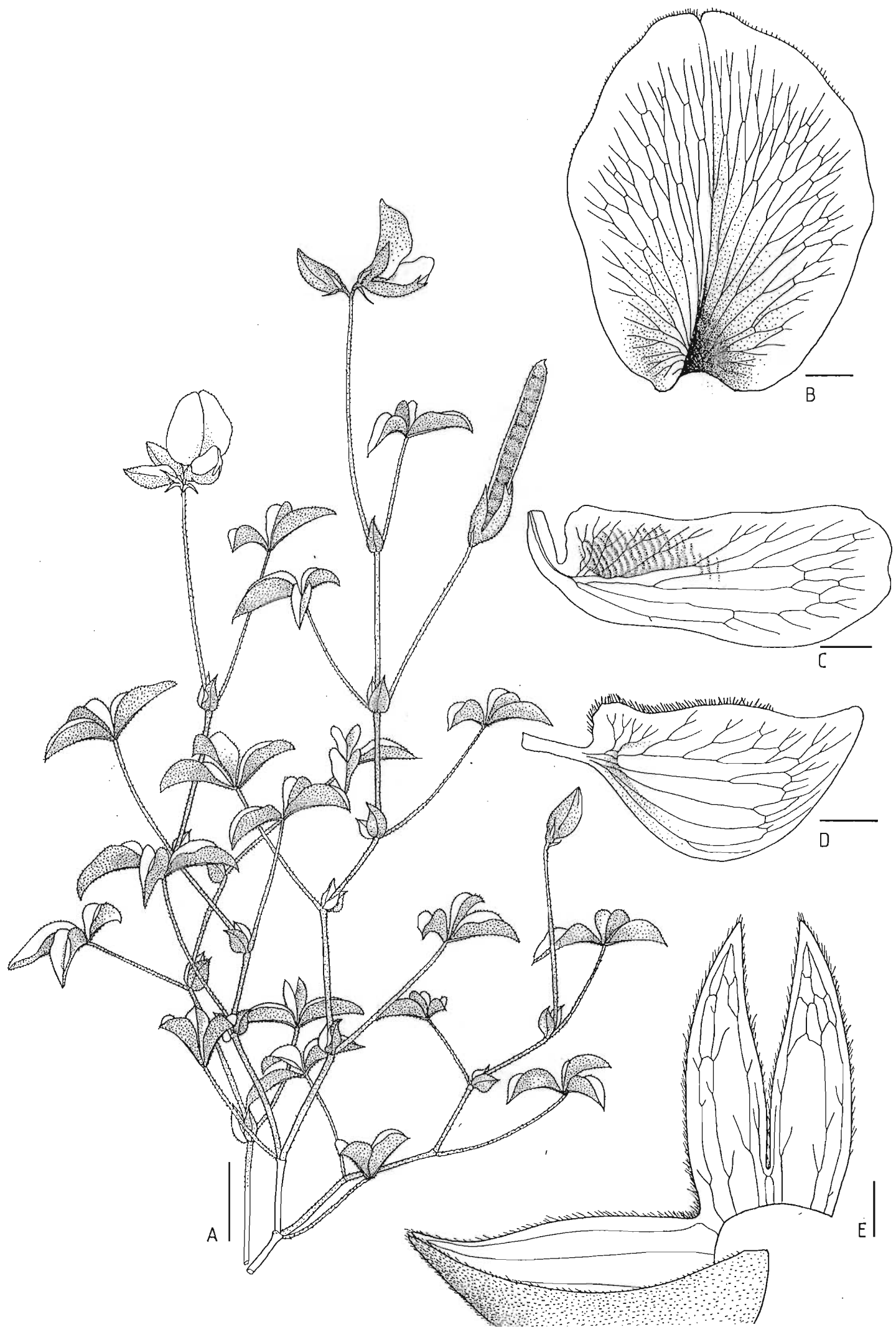
Figure 43. Recorded distribution of A. *A. amplexicaule* & B. *A. crinitum*.

evolution of torulose fruits in the Leguminosae provides added resistance to seed predation and is frequently convergent. In addition torulose fruits do not occur in *A. splendens* which is clearly a close ally of *A. lunare*.

3a. *Argyrolobium lunare* (L.) Druce subsp. *lunare* in Rep. Bot. Exch. Brit. Isles, 1913, 3: 414 (1914).

Crotalaria lunaris L.: 715 (1753), non *Crotalaria lunaris* Burm. f. Type: Cape of Good Hope, *Crotalaria* no. 5, Herb. Clifford 357 (BM!).

Suffrutices, 0.2--0.3 m tall, decumbent, sparsely branched, stems weakly perennial, shortly sericeous, plants forming small clumps. *Leaves* abaxially densely sericeous, adaxially sparsely sericeous to glabrous; leaflets elliptic to narrowly ovate, 14--30 x 5--14 mm, apex acute, petiole 20--40 mm long; stipules lanceolate to ovate, 3--10 x 3--8 mm, base obliquely cordate to obtuse. *Inflorescence* 1--3-flowered, peduncle well developed, 30--150 mm, leaf-opposed; bracts lanceolate to cordate, 4--6 x 1--2 mm; bracteoles lanceolate, 3--5 x 1--1.5 mm. *Calyx* shortly sericeous, upper lip 10--12 mm long, sinus 8--9 mm deep; lower lip 14--17 mm long, lobes 3--5 mm long, medial lobe linear. *Corolla* yellow becoming russet; standard orbicular, 13--17 x 13--16 mm, adaxial surface sparsely sericeous, base obtuse to cordate, claw 3--4 mm long; wings oblong, 11--15 x 4--5 mm, with lunate-lamellate sculpturing in the upper basal and upper central zones, claw 3--4 mm long; keel cymbiform, 14--15 x 6--7 mm, upper margin ciliate,



claw 3--4 mm long. *Stamens* monodelphous, vexillary filament often largely free; anthers dimorphic, often slightly hairy proximally. *Ovary* narrowly oblong, 9--10 mm long, densely sericeous; style 5--6 mm long, basally hairy. *Fruit* torulose, sericeous, 60--70 x 4--5 mm. *Seed* suborbicular, dark brown, 2-3 mm, hilar tongue prominent.

This species is closely allied to *A. splendens* (Meisn.) Walp. which differs in its shorter petioles, coriaceous leaves with strongly revolute margins and evenly compressed fruits.

Argyrolobium lunare is closely associated with the Table Mountain Series of the Cape System (Figure 48). It is variable in both vegetative and floral characters (Figures 44, 45, 46).

This subspecies (Figure 48) is limited to the Caledon Area and is distinguished by its robust reproductive and vegetative organs.¹⁵

3419 (Caledon): Jakkalsrivier Catchment Id, (--AA), *Haynes 1145* (STE); *Haynes 473* (PRE, STE); *Smith 40* (STE); Pietersfontein, (--AC), *Bolus 9858* (BOL,

Figure 44

Argyrolobium lunare ssp. *lunare*. A. Flowering branch (bar = 20 mm); B. standard (bar = 2 mm); C. wing (bar = 2 mm); D. keel (bar = 2 mm); E. calyx (bar = 2 mm). Voucher: *De Vos 155*.

GRA, NH, PRE); Kleinmond, (--AC), *de Vos 155* (STE); *Van Jaarsveld 4668* (PRE); Hermanus, Pietersfontein, (--AC), *Galpin 3954* (BOL, PRE); Hermanus, Voelklip, (--AC), *Stirton 11113* (STE); *Taylor 9894* (PRE, STE); *Williams 757* (MO); *Williams 2637* (MO, PRE); Vogelgat, (--AD), *Barker 1845* (PRE); *Schlechter 9524* (E, G, GRA, PRE); Hermanus, (--AD), *Blake s.n.* (BOL); *Burman 956* (BOL); *Rogers 22638* (PRE); Grensmond Vlei, (--AD), *Gillett 19* (STE); *Grobbelaar 2770* (PRE); Mosselrivier, (--AD), *Guthrie s.n.* (PRE); Fern Kloof Nature Reserve, (--AD), *Orchard 314* (BR, MO, PRE, STE); Onrust River, (--AD), *Van Niekerk 309* (PRE); Rooiels, (--BD), *Leipoldt 4185* (BOL, PRE).

3b. *Argyrolobium lunare* (L.) Druce subsp. *sericeum* (Thunb.) T.J. Edwards *stat. nov.*

Ononis sericea Thunb.: 129 (1794) non *Argyrolobium sericeum* Eckl. & Zeyh. Type: Cape Province, *Thunberg s.n. sub. THUNB-UPS 16642* (UPS!, syn.) & *16643* (UPS!, syn.).

Dichilus lanceolatus E. Mey.: 154 (1832), *nom. illegit.* Type: Cape Town, below Table Mountain, *Ecklon 388* (S!).

Argyrolobium lanceolatum (E. Mey.) Eckl. & Zeyh.: 186 (1836); Harv. in Harv. & Sond. Fl. Cap. 2: 76 (1862). Type: as above.

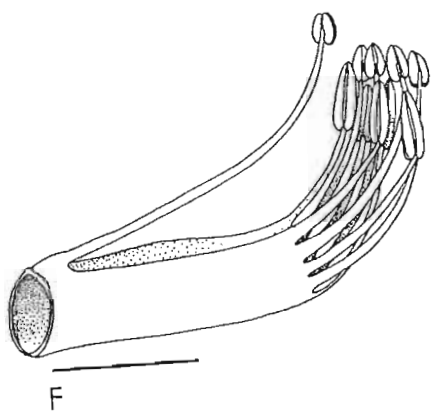
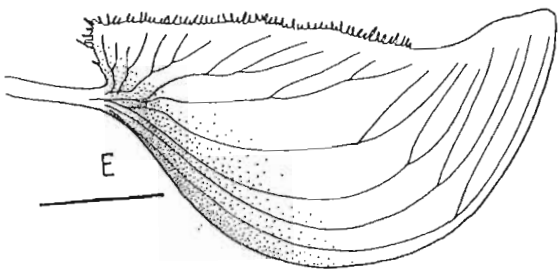
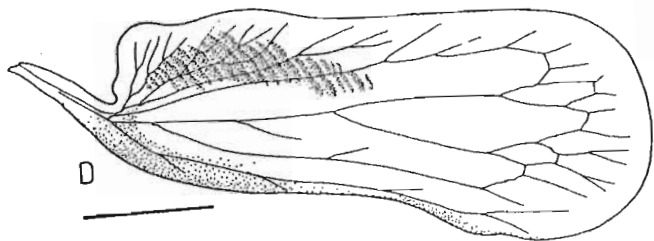
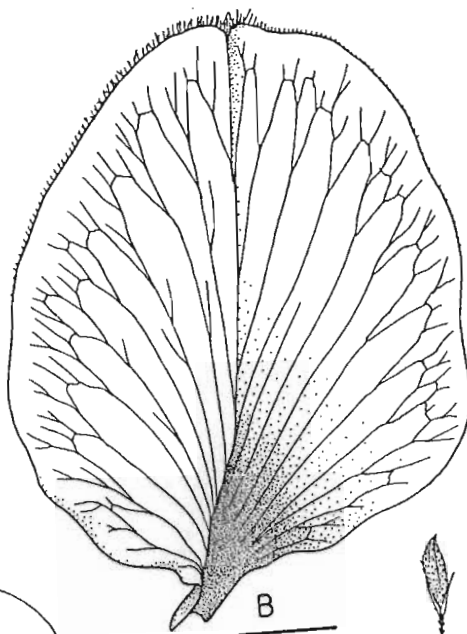
Chasmone lanceolata (E. Mey.) E. Mey.: 75 (1836). Type: as above.

Herb, 0.2--0.3 m tall, decumbent, sparsely branched, stems weakly perennial,

shortly sericeous, plants forming small clumps. *Leaves* abaxial surface shortly sericeous, adaxial surface glabrescent; leaflets lanceolate to narrowly ovate, lower leaflets broader, 10--27(--34) x 2--8(--11) mm, apex acute, petiole 10--45 mm long; stipules lanceolate to ovate, 2.5--7 x 1--4 mm, base obliquely cordate to obtuse. *Inflorescence* 1--3-flowered, peduncle well developed, (40--) 70--140 mm, leaf-opposed; bracts lanceolate, 1--5 x 0.5--2 mm; bracteoles lanceolate, 1--4 x 0.5--1 mm. *Calyx* shortly sericeous, upper lip 4--9 mm long, sinus 3--8 mm deep; lower lip 4--11 mm long, lobes 1--5 mm long, medial lobe linear. *Corolla* yellow; standard sub-orbicular, 6--11 x 5--10 mm, apex emarginate to rounded, adaxial surface sparsely sericeous, base obtuse, claw 2.5--3 mm long; wings narrowly oblong, 5--10 x 1--4 mm, with lunate-lamellate sculpturing in the upper basal and upper central zones, claw 1--2 mm long; keel cymbiform, 5--12 x 2--4.5 mm, claw 1--3 mm. *Stamens* monodelphous, vexillary filament often largely free; anthers dimorphic, often slightly hairy. Ovary weakly arcuate, 3--8 mm long, densely sericeous but sometimes laterally glabrous; style 3--5 mm long, basally hairy. *Fruit* torulose, 35--60 x 3.5--4 mm. *Seed* suborbicular, dark brown, 1.5--2.5 mm, hilar tongue prominent.

3218 (Clanwilliam): Arora, Engelsman se Baken, (--DA), *Oliver* 7889 (STE); Olifantsrivierberge, (--DB), *Esterhuysen* 13455 (BOL); Cardouw Pass, (--DB), *Johnson* 308 (NBG, STE); Piquetberg, (--DC), *Stokoe* 8423 (BOL); *Goldblatt* 6507 (MO, PRE); *Pillans* 7463 (BOL); *Pillans* 7881 (BOL); *Van Niekirk* s.n.

(BOL). 3219 (Wuppertal): Heunig Vlei, Cedarberg, (--AC), *Doesch 625* (STE); Twenty Four Mountains, (--CC), *Esterhuysen 16746* (BOL); Koue Bokkeveld, (--CC), *Hanekom 2515* (PRE). 3318 (Cape Town): without precise locality, *Burke & Zeyher 388* (O); Platteklip, (--AD), *Dümmer 444* (E); Bergrivier, (--BD), *Drège s.n.* (BM); Kirstenbosch, (--CD), *Barker s.n.* (BOL); Table Mountain, (--CD), *Drège s.n.* (BM, P); *Ecklon 216* (P); *Mortensen 294* (C); *Goldblatt 5307* (MO); *Thode 6037* (STE); Cape Town, (--CD), *Ecklon & Zeyher 84* (S); Kirstenbosch, (--CD), *Esterhuysen 23243* (BOL); *Young 26718* (PRE); *Young 215* (PRE); *Salter 7661* (BOL); *Walgate 421* (PRE); *Forbes 188* (NH); *Harvey s.n.* (TCD); *Paterson 55* (GRA); Devil's Peak, (--CD), *Leighton 2092* (BOL); Cape Town University, (--CD), *Levyns 3648* (BOL); Disa Gorge, (--CD), *Moss 7807* (J); Duivelsbosch, (--CD), *Zeyher 388* (BM, G, GRA, P, STE); Paarl, (--DB), *Acocks 20640* (PRE); Paarlberg, (--DB), *Drège s.n.* (NY, P, S); Brakenfell, (--DC), *Dümmer 1827* (E); Koelmhof, (--DD), *Cloete 5* (STEU); Stellenbosch Mt., (--DD), *Gillett 1753* (STE); Jonkershoek State Forest, (--DD), *Grobbelar 1169* (PRE); *Kerfoot 5504* (STE); *Borchardt 565* (STE); *Kruger 224* (GRA); *Kruger 209* (PRE, STE); *Parker 4538* (BOL, MO); *Schoeman 11* (STE); Bottelaryberg, (--DD), *Taylor 4134* (PRE); Botmaskop, (--DD), *Van Rensburg 385* (STE); Stellenbosch, (--DD), *Taylor 4510* (PRE, STE); *Taylor 6917* (STE). 3319 (Worcester): Groot Winterhoek Mountains, (--AA), *Boucher 1991* (STE); Kleinwintershoek Mountains, Tulbach, (--AA), *Stirton 8311* (PRE); Gyndouw, (--AB), *Bolus s.n.* (BOL); Skurfteberg, (--AB), *Zeyher 388* (S); Cedarberg



Mountains, (--AC), *Esterhuysen* 7230 (BOL, PRE); Mitchell's Pass, (--AD), *Marloth* 10687 (PRE, STE); du Toit's Kloof Pass, (--CA), *Barker* 8791 (STE); *Drège s.n.* (BM, P); *Wedermann & Oberdieck* 727 (PRE); Bainskloof, (--CA), *Schlechter* 9169 (BR, E, G, GRA); French Hoek Pass, Middagkransberg, (--CC), *Boucher* 2400 (STE); Middagkransberge, (--CC), *Stirton* 10107 (STE); Stettynsberg, (--CD), *Esterhuysen* 11116 (BOL). 3418 (Simonstown): Simonsberg, (--AB), *Gray* 37 (BOL); Wynberg Hill, (--AB), *Pillans* 10471 (MO); *Wolley* 25 (BOL); Constantiaberg, (--AB), *Schlechter* 888 (G); Somerset, Sneeuberg, (--BB), *Cummings* 48 (NY); *Esterhuysen* 2633 (BOL); Sir Lowrys Pass, (--BB), *Schlechter* 5334 (G, GRA). 3419 (Caledon) Riviersondereinde, (--AB), *Leipoldt* 16234 (BOL, MO, STE); *Zeyher* 389 (BOL, S).

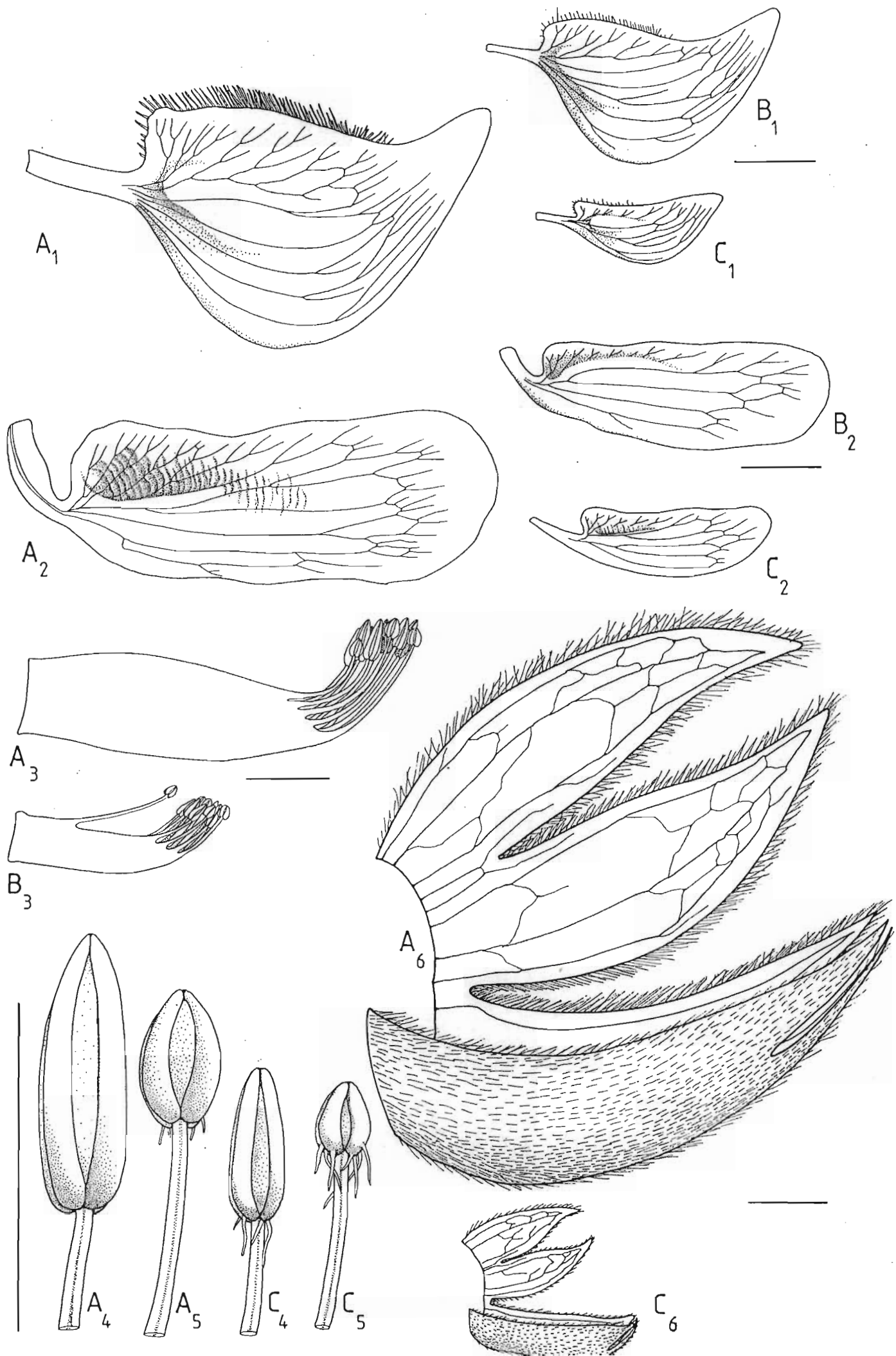
16

Within *A. lunare* morphometric variation shows some degree of geographic pattern. Terete-leaved forms are restricted to the Cederberg, Olifantsrivierberge, Koue Bokkeveld and Piketberg (Figure 48). However the variability of leaf shape within the species forms a continuum.

Small-flowered specimens are widespread and often sympatric with the remaining morphs. Large-flowered individuals are restricted to the south but no discontinuity

Figure 45

Argyrobium lunare ssp. *sericeum*. A. Flowering branch (bar = 20 mm); B. standard (bar = 2 mm); C. calyx (bar = 2 mm); D. wing (bar = 2 mm); E. keel (bar = 2 mm); F. androecium (bar = 2 mm). Voucher: *Gray* 37.



between these extremes exists. The species occurs in Coastal Macchia and Coastal Renosterbosveld.

The distribution of the subspecies repeats a pattern found in *Aspalathus carnosa* Berg. Small-flowered forms of the latter also occur on Table Mountain while large-flowered forms are restricted around Caledon (Dahlgren 1963). This pattern may relate to pollinators since it is likely that the species share vectors.

17

4. *Argyrolobium splendens* (Meisn.) Walp. Repert. Bot. Syst. 2: 845 (1843); Benth.: 348 (1844); Harv.: 76 (1862). Type: Cape Province, mountain sides around Klein Rivier, Swellendam, *Krauss 927* (B†; NY!, lecto. selected here; G!, MO!, W!, isolecto.).

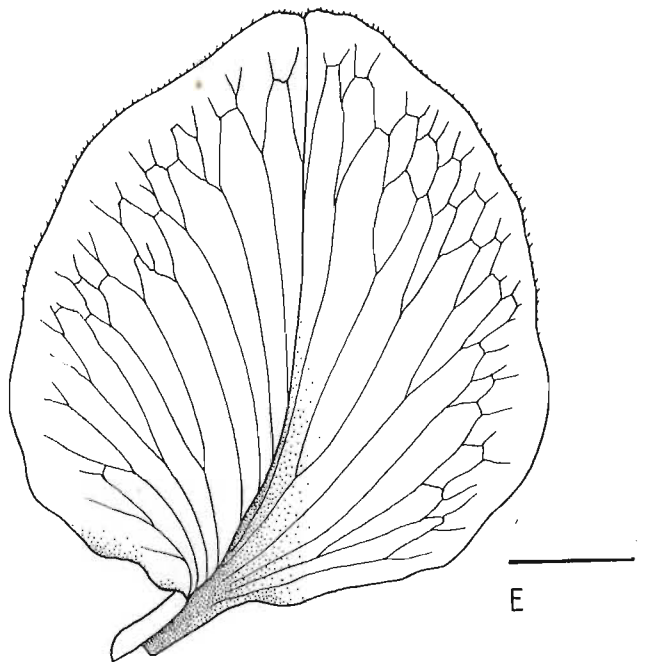
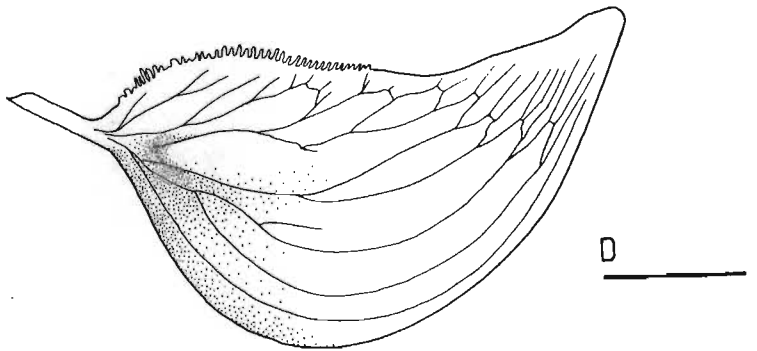
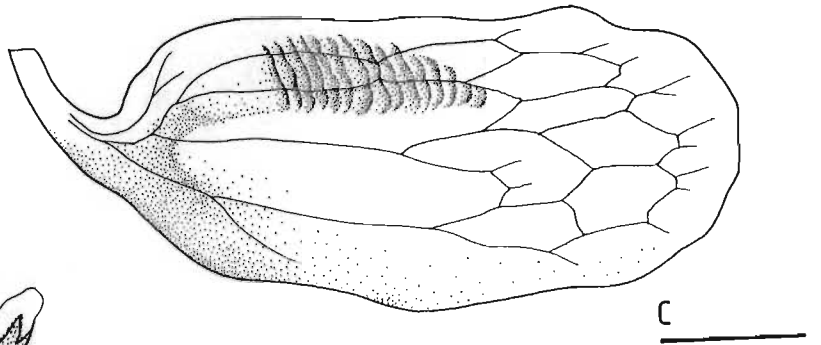
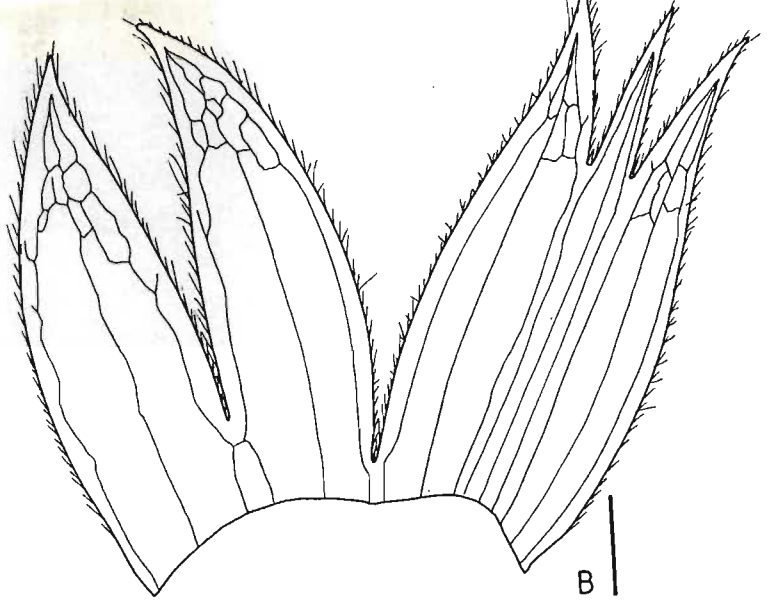
Chasmone splendens Meisn.: 78 (1843). Type: as above.

Herb, 0.2--0.3 m tall, erect, well branched, stems shortly sericeous, plants forming clumps. *Leaves* abaxial surface densely sericeous, adaxially sparsely sericeous becoming glabrous; leaflets oblong to obovate, 20--35 x 7--14 mm, strongly revolute, apex rounded, apiculate, petiole 5--12 mm long; stipules ovate,

Figure 46

A. lunare ssp. *lunare*; A₁ keel, A₂ wing, A₃ androecium, A₄ large anther, A₅ small anther, A₆ calyx (bars = 2 mm). Voucher: *De Vos 155*.

A. lunare ssp. *sericeum*; B₁ keel, B₂ wing, B₃ androecium, C₁ keel, C₂ wing, C₄ large anther, C₅ small anther, C₆ calyx (bars = 2 mm). Vouchers: B = *Gray 37*; C = *Borchardt 565*.



7--9 x 4 mm, base obliquely cordate. *Inflorescence* fasciculate, 1--3-flowered, peduncle well developed, 25--60 mm long, leaf-opposed; bracts lanceolate, 4--5 x 1.5--2 mm; bracteoles lanceolate, 3 x 1 mm. *Calyx* shortly sericeous, upper lip 10--11 mm long, sinus 7--9 mm deep; lower lip 11--12 mm long, lobes 3--4 mm long, medial lobe linear. *Corolla* yellow; standard orbicular, 12--14 x 9--12 mm, adaxial surface sparsely sericeous, base obtuse, claw 3 mm long; wings oblong, 11--12 x 3 mm, with lunate-lamellate sculpturing in the upper central zone, claw 3 mm long; keel cymbiform, 9--10 x 4 mm, upper margin shortly ciliate, 3 mm long. *Stamens* monodelphous; anthers dimorphic. Ovary weakly arcuate, 8--9 mm long, densely sericeous; style 4--5 mm long, basally hairy. *Fruit* compressed, sericeous, 38--42 x 5 mm. *Seed* not seen. ¹⁸

The obvious alliance between this species and *A. lunare* (Meisner 1843; Harvey 1862) contradicts the use of torulose fruits as a sectional character (Bentham 1844; Harvey 1862). *A. splendens* is known only from the type collection which was gathered on the coastal fold mountains which flank the Kleinrivier. Distributionally the species is close to its ally *A. lunare* which is distinguished by its torulose fruits, longer petioles and non-revolute leaf margins (Figure 46).

Figure 47

Argyrolobium splendens. A. reproductive branches (bar = 20 mm); B. calyx, inner surface (bar = 2 mm); C. wing (bar = 2 mm); D. keel (bar = 2 mm); E. standard (bar = 2 mm). Voucher: *Krauss 927*.

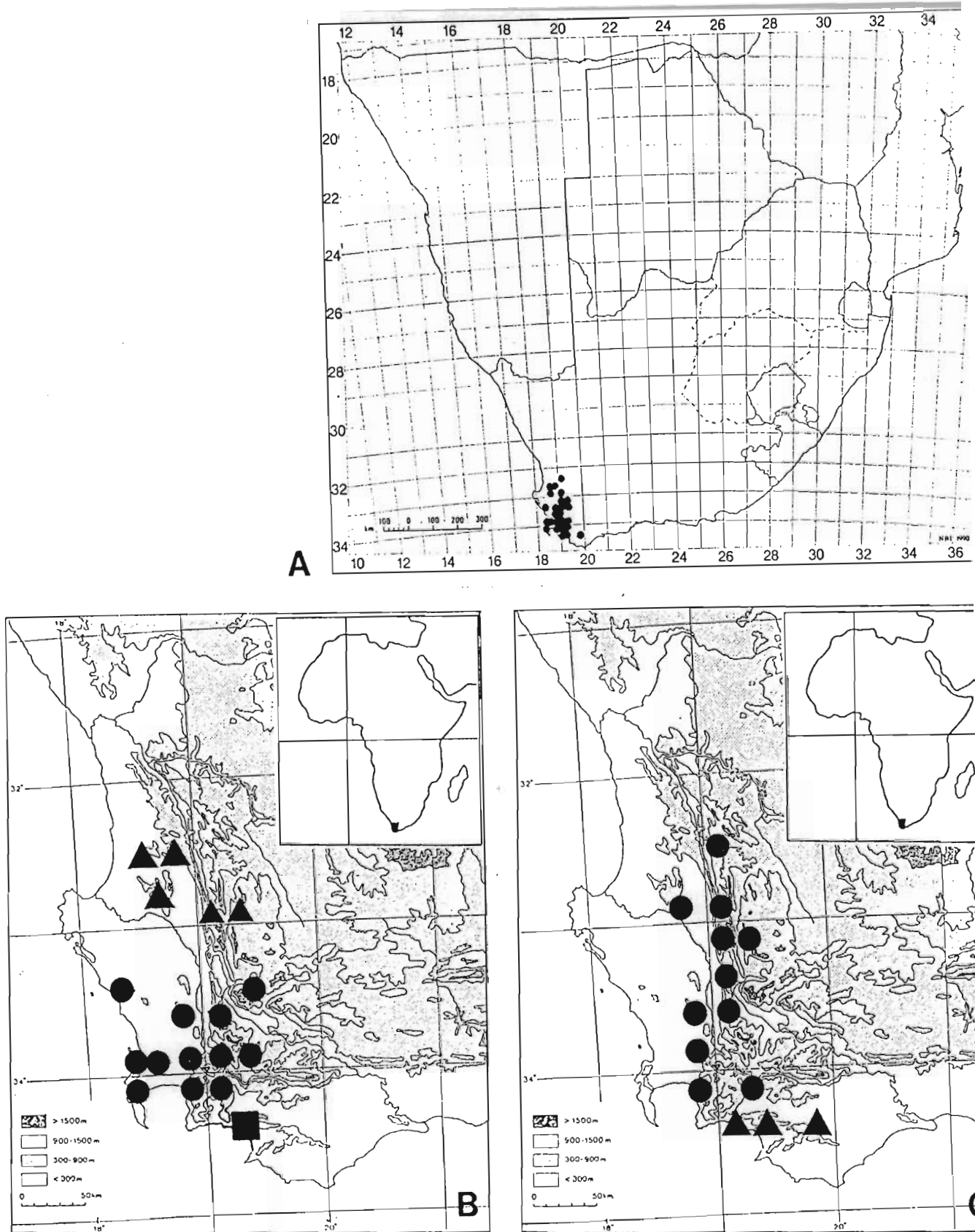


Figure 48.

Recorded distribution of A. *Argyrolobium lunare* s.l. B. *Argyrolobium lunare* ssp. *sericeum* terete-leaved form ▲, typical form ● and *A. splendens* and C. *Argyrolobium lunare* ssp. *lunare* ▲ and *Argyrolobium lunare* ssp. *sericeum* small flowered form ●.

3419 (Caledon): mountain sides around Klein Rivier, *Krauss* 927 (NY, G, MO, W).

Sectio 3. Transvaalense T.J. Edwards sect. nov. Suffruticosa, foliis monomorphis et dimorphis, habitu ramoso, exsiccatis viridibus et nigrescentibus, floribus monomorphis.

Species of this section do not turn black when pressed, have monomorphic flowers and leaves and a suffrutescent habit. The section is centred in the eastern Transvaal, South Africa but includes four Tropical African species (*A. friesianum* Harms, *A. fischeri* Taub., *A. macrophyllum* Harms and *A. aequinoctiale* Welw. ex Baker).

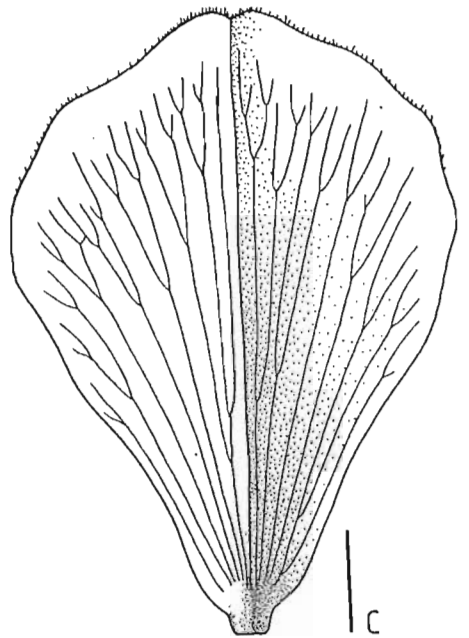
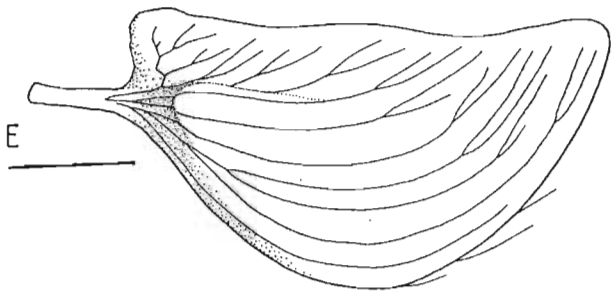
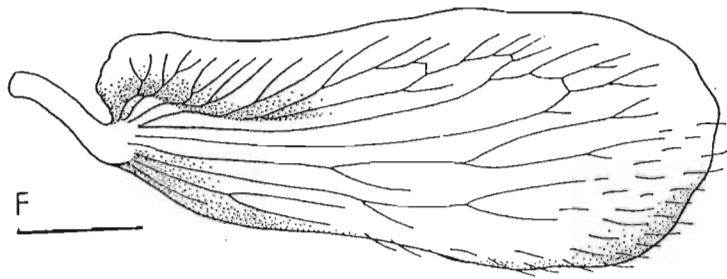
Type species: *A. transvaalense* Schinz.

Suffrutices, erect, usually well branched, with woody stem bases, variously sericeous. *Leaves* variously sericeous; stipules lanceolate to ovate. *Inflorescence* racemose to pseudo-umbellate, terminal or axillary; bracts ovate to lanceolate; bracteoles lanceolate. *Calyx* variously sericeous; sinuses well developed to vestigial. *Corolla* yellow becoming russet with age; standard ovate, obovate or suborbicular, adaxial surface sericeous, base obtuse to cuneate, claw undifferentiated; wings oblong to obovate, sometimes sericeous, sculpturing lunate

or absent; keel cymbiform, abaxial suture sometimes sparsely sericeous. *Stamens* monadelphous, sheath often deeply split adaxially. *Ovary* narrowly oblong. *Fruit* sericeous, sub-torulose or compressed. *Seed* irregular or suborbicular, 1--3 mm in diameter.

5. *Argyrolobium frutescens* Burt Davy, A manual of the flowering plants and ferns of the Transvaal with Swaziland, South Africa, 393 (1926). Type: eastern Transvaal, Barberton, *Rogers 23984* (K!, lecto. selected here; J!, isolecto.).

Suffrutex, up to 1 m tall, erect, well branched, stems sericeous, becoming glabrous. *Leaves* sericeous; leaflets elliptic to obovate, 10--35 (--55) x 4--13 mm, apex acute to rounded, apiculate; petiole 2--5 mm long; stipules lanceolate to ovate, 3--7 x 0.5--2 (--3) mm. *Inflorescence* racemose to pseudo-umbellate, 1--12-flowered, terminal or axillary; peduncle 0--30 mm long, densely sericeous; bracts ovate to lanceolate, 3--5 x 0.5--1.5 mm; bracteoles lanceolate, 2.5--3 x 0.5 mm. *Calyx* fulvous-sericeous; upper lip 10--11 mm long, sinus 7--8 mm deep; lower lip 10--12 mm long, lobes 4--6 mm long, united apically, medial lobe linear. *Corolla* yellow becoming russet with age; standard obovate, 10--12 x 9--11 mm, adaxial surface densely sericeous, base cuneate, claw 1 mm; wings oblong to obovate, 10--11 x 4--4.5 mm, with vestigial, lunate sculpturing in the upper basal and upper central zones, claw 1 mm, apex sericeous; keel narrowly cymbiform, 9--10 x 4--4.5 mm, claw 1 mm, abaxial suture sparsely sericeous. *Stamens*



monadelphous, sheath split above almost to the base. *Ovary* narrowly oblong; 7--8 mm long; style 3.5--4.5 mm long. *Fruit* sericeous, sub-torulose, 30-45 x 5 mm. *Seed* not seen.

This species is limited to serpentine soils around Barberton in North-Eastern Mountain Sourveld and Lowveld Sour Bushveld (Figure 51). It is closely allied to *A. fischeri* of Tropical Africa from which it is distinguished by its short petioles. It occupies similar habitats to *A. fischeri*, usually in scrubby vegetation and often along forest margins.

19

2530 (Lydenburg): Kaapsche Hoop, (--DB), *Van Jaarsveld 1105* (MO, PRE).
 2531 (Komatiapoort): Agnes Mine, Barberton, (--CC), *Buitendag 479* (MO, NBG, PRE); *Codd 9551* (PRE); Barberton, (--CC), *Rogers 23984* (J); *Rogers 14222* (BOL); *Thorncroft 11183* (PRE); *Van Dam s.n.* (BR, PRE); Saddleback Mts above Barberton, (--CC), *Edwards 1116* (NU). 2631 (Mbabane): Mkomozana River, (--AB), *Compton 31989* (NBG, PRE); Mbabane, (--AC), *Dlamini s.n.* (PRE); Mankaiana, Mhlatane River, (--CA), *Compton 27700* (NBG); Hlatikulu, (--CD), *Stewart 126* (SAM).

6. *Argyrolobium transvaalense* Schinz in Bulletin de L'Herbier Boissier 7: 33

Figure 49

Argyrolobium frutescens. A. Flowering branch (bar = 20 mm); B. calyx (bar = 2 mm); C. standard (bar = 2 mm); D. bract & bracteoles (bar = 2 mm); E. keel (bar = 2 mm); F. wing (bar = 2 mm). Voucher: *Edwards 1116*.

(1899); Burt Davy: 392 (1926). Type: Transvaal, Makapansberge (Streypoort), *Rehmann* 5553 (B†, BM!, lecto. selected here), Houtbosch, *Rehmann* 6264 & 6263 (B†, syn.).

Argyrolobium lancifolium Burt Davy, A manual of the flowering plants and ferns of the Transvaal with Swaziland, South Africa, 392 (1926), *synon. nov.* Type: eastern Transvaal, Lydenburg, between Pilgrims Rest and Sabie, *Rogers* 18237 (K!, syn.), *Rogers* 14351 (PRE!, syn.), *Rogers* 23225 (BM!, lecto. selected here; J!, PRE!, isolecto.).

Suffrutex, up to 0.7 m tall, erect, well branched, stems sericeous, becoming glabrous. *Leaves* sericeous to sparsely sericeous beneath, glabrescent above; leaflets oblong-obovate to broadly obovate, 20--50(--65) x 10--35 mm, apex rounded, apiculate; petiole 2--4 mm long; stipules lanceolate to ovate, 1--5 x 0.5--1.5 mm. *Inflorescence* racemose, 3--30-flowered, terminal or axillary; peduncle densely sericeous; bracts linear to lanceolate, 2--4 x 0.5 mm; bracteoles lanceolate, 1--3 x 0.5 mm. *Calyx* fulvous-sericeous; upper lip 5--7 mm long, sinus 3--4 mm deep, sometimes incompletely split; lower lip 6--10 mm long, lobes 0.5--2 mm long, medial lobe linear. *Corolla* yellow becoming russet with age; standard broadly ovate to suborbicular, 11--16 x 10--18 mm, adaxial surface sericeous, base obtuse, claw 2.5--3 mm long; wings oblong to obovate, 9--14 x 4--6 mm, with lunate or lunate-lamellate sculpturing in the upper basal and upper central zones, claw 1.5--2 mm long; keel narrowly cymbiform, 8--11 x 4--5 mm, claw

1--2 mm long. *Stamens* monadelphous, sheath split more deeply above. *Ovary* narrowly oblong, 7--13 mm long; style 3 mm long. *Fruit* sericeous, compressed, 40--65 x 4--5 mm. *Seed* irregular, 2.5--3 x 2--3 mm.

A. transvaalense is closely allied to *A. muddii* but is a taller, virgate species with smaller flowers and is widely distributed in the Transvaal. *A. muddii* only occurs in afro-montane grassland where it forms many-stemmed clumps seldom exceeding 0.4 m in height. *A. lancifolium* is reduced to synonymy with *A. transvaalense* because variation of leaflet shape, vestiture and flower size is not disjunct.

The species occurs mainly in Sour Bushveld, North-Eastern Mountain Sourveld and Lowveld Sour Bushveld (Figure 51).

2230 (Messina): Palmaryville, (--CD), *Van der Berg* 2 (PRE); Tshififi, (--DC), *Mugwedi* 1536 (J, PRE). 2329 (Pietersburg): Loius Trichardt, (--BB), *Rogers* 21650 (SAM); Pietersburg, (--CD), *Aerek* 586 (S); *Prosser* 1822 (J, PRE); Ramatula, (--DB), *Moss & Rogers* 951 (J); Houtsboschberg, (--DD), *Bolus* 11061 (BOL); *Schlechter* 4457 (B, BR, C, E, PRE); *Grobbelaar* 1597 (PRE); Haenertsberg, (--DD), *Rogers* 19024 (BOL); *Pott* 13325 (PRE); *Reynolds* 5778 (PRE); *Acocks & Hafstron* 599 (PRE); Houtbosh, (--DD), *Rehmann* 6269 (BM). 2330 (Tzaneen): Elim, Soutpansberg, (--AA), *Germishuizen* 3449 (C); *Schlechter* 4822 (B, BR, E, GRA); *Junod* 1515 (G); *Obermeyer* 496 (PRE); Duiwelskloof,

(--CA), *Galpin 11372* (C, PRE); *Scheepers 474* (BM, MO); *Mogg s.n.* (PRE); Mokeetsi, (--CA), *Schweickerdt 1030* (PRE); Madjadge's Kraal, (--CB), *Watt 3637* (J); Tzaneen, (--CC), *Rogers 12466* (BOL); *Balsinhas 2780* (MO, PRE); *Rogers 12474* (BOL); *Rogers 12404* (BOL, GRA); *Phillips 3264* (E, PRE); Thabina River, (--CD), *Pole-Evans s.n.* (PRE); Letaba, (--CD), *Codd & de Winter 3082* (PRE); *Crawford 321* (MO). 2427 (Thabazimbi): *Kransberg*, (--BC), *Westfall 861* (PRE); *Waterberg*, (--BD), *Smuts & Gillett 3332 & 3363* (PRE); *Galpin s.n.* (BOL); *Van der Schiff 6623* (PRE); *Germishuizen 797* (PRE). 2428 (Nylstroom): *Warmbaths*, (--CA), *Reid 469* (MO); *Nylstroom*, (--CB), *Mogg 16612* (NH); west of *Warmbaths*, (--CD), *Wilson 1* (J); *Leendertz 7584* (PRE). 2429 (Zebediela): *Potgietersrus*, (--AA), *Mogg 31821* (J); *Rogers 334* (GRA); *Galpin s.n.* (PRE); *Potgietersrus, farm Rietvaley*, (--AA), *Burger 505* (PRE); *Portugal*, (--AA), *Maguire 80 & s.n.* (J); *Makapansberge, Streydpoort*, (--AA), *Rehmann 5553* (BM); *Makapaan Valley, Potgietersrus*, (--AA), *Maguire 456* (J); *Maguire 916* (NBG). 2430 (Pilgrims Rest): *The Downs*, (--AA), *Rogers 22069* (PRE); 40 km west of *Ofcolaco*, (--AA), *Edwards 3354* (MO, PRE); *Steelpoort*, (--CA), *Edwards 4136* (PRE); *Codd 6701* (PRE); *Codd & Dyer 7717* (PRE, UPS); *Story 4074* (GRA); *Ohrigstad Nature Reserve*, (--CC), *Jacobsen 1294* (LYD, PRE); *Jacobsen 1830* (LYD); *Pilgrims Rest*, (--DD), *Galpin 644* (BOL, PRE); *Edwards 568, 573 & 652* (NU); *Rogers 15995* (PRE); *Stuurman 193* (E, NU); *Rogers 23225* (BM, J); *Munro s.n.* (PRE); *Germishuizen 3518* (PRE); *Van Jaarsveld 63* (NBG, PRE); *Rogers 18237* (J, K); *Graskop*, (--DD), *Holland s.n.*



(BOL); Bourkes Luck Mine, (--DD), *Stirton 9792* (PRE); farm Ledovine, (--DD), *Raal 918* (PRE); *Schrire 644* (NH, PRE); *Galpin s.n.* (BOL). 2530 (Lydenburg): Nooitgedacht, (--AB), *Strey 3821* (BM); Lydenburg, (--AB), *Morris 63* (PRE); Schoemanskloof, Lydenburg, (--AD), *Young 31* (G); *Young s.n.* (G, PRE); Machadodorp, (--CB), *Davidson s.n.* (J); Kaapsehoop, Stella Mine, (--DB), *Van Jaarsveld 1105* (PRE). 2531 (Komatipoort): Hazyview, (--AA), *Schrire 652* (NH); *Nel 244* (MO, NBG, PRE); *Edwards 672* (NU). 2629 (Bethal): Breyten, (--BD), *Steyn 994* (NBG).¹

7. *Argyrolobium muddii* Dümmer in Kew Bull. 1912: 271 (1912); Burt Davy: 392 (1926). Type: Transvaal, summit of Mt. MacMac, *Mudd s.n.* (K!, holo.).

Suffrutex, forming many-stemmed clumps, up to 0.4 x 0.6 m, stems erect, sericeous to villose, becoming glabrous, often flowering precociously. *Leaves* moderately sericeous to sparsely villose; leaflets broadly obovate, 20--40 x 9--25 mm, apex rounded; petiole 3--9 mm long; stipules lanceolate to ovate, 3--12 x 0.5--3 mm. *Inflorescence* racemose, 3--17-flowered, terminal; peduncle sericeous; bracts linear-lanceolate to oblanceolate, 4--7 x 1--2 mm; bracteoles linear, 2--4 x 0.5 mm. *Calyx* fulvous-sericeous; upper lip 12--14 mm long, sinus 10 mm deep,

Figure 50

Argyrolobium transvaalense. A. Flowering branch (bar = 20 mm); B. androecium (bar = 2 mm); C. keel (bar = 2 mm); D. wing (bar = 2 mm); E. standard, abaxial surface (bar = 2 mm); F. calyx with subtending bracts and bracteoles (bar = 2 mm). Voucher: *Edwards 573*.

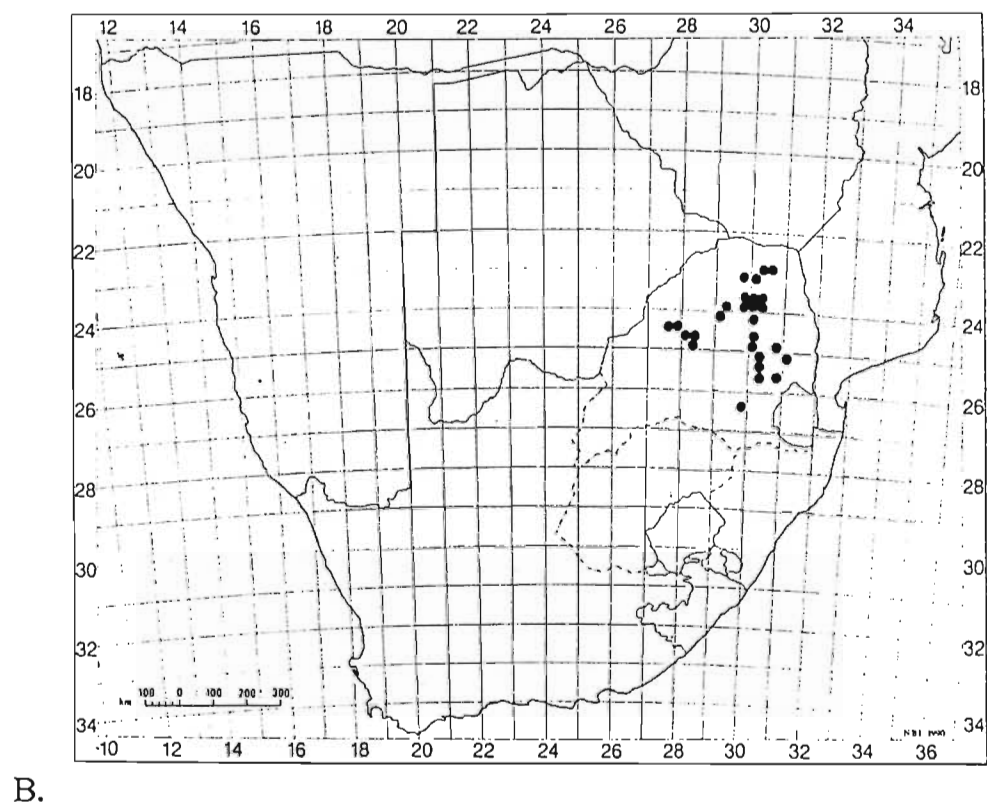
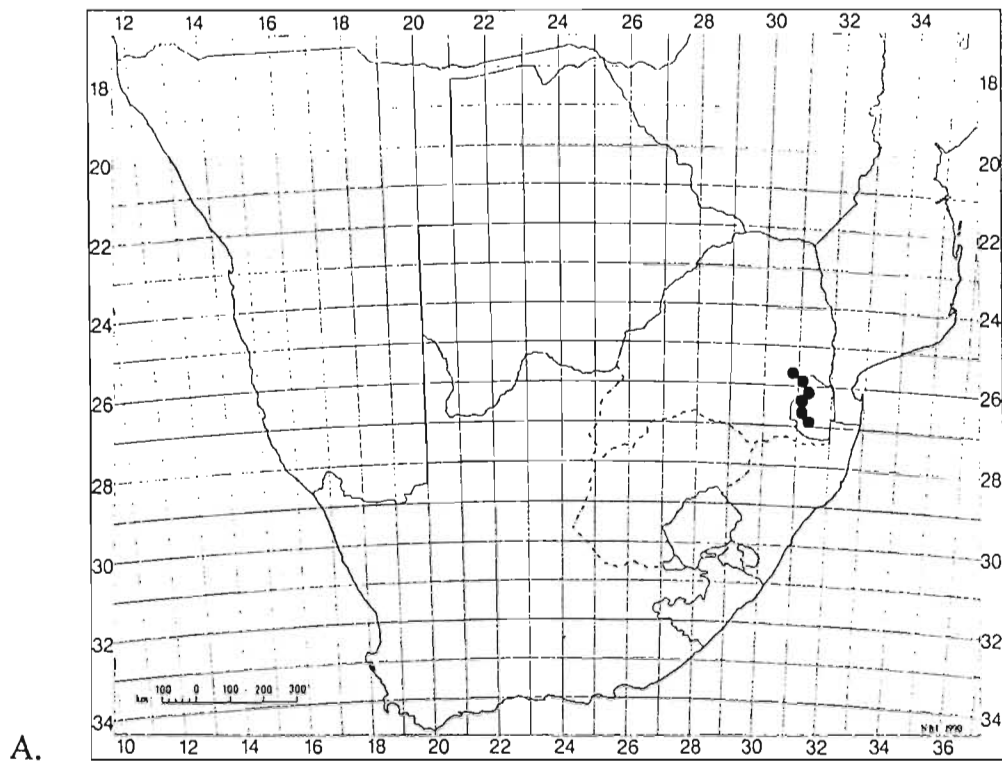


Figure 51. Recorded distribution of A. *A. frutescens* & B. *A. transvaalense*.

sometimes incompletely split; lower lip 14--17 mm long, lobes 3--5 mm long, medial lobe linear. *Corolla* yellow becoming russet with age; standard broadly ovate to suborbicular, 18--21 x 17--21 mm, adaxial surface sericeous, base obtuse, claw 2 mm long; wings oblong to obovate, 14--17 x 5--6 mm, without sculpturing, claw 2--3 mm long; keel narrowly cymbiform, 13--17 x 5--6 mm, claw 2 mm long. *Stamens* monadelphous, sheath split more deeply above. *Ovary* narrowly oblong; 9--12 mm long; style 4--5 mm long. *Fruit* sericeous, compressed, 50--85 x 6--7 mm. *Seed* shape irregular, 2--3 x 2--3 mm.

This species is occasionally confused with *A. transvaalense*. It is distinguished by its shorter stature and many-stemmed clumps, by the occurrence of considerable vestiture on the adaxial leaflet surfaces, by its prominent petioles and stipules and by its larger flowers. The absence of petal sculpturing is not a reliably diagnostic because the character is unstable within *A. transvaalense*.

A nexus of species exists in the eastern Transvaal including: *A. muddii*, *A. transvaalense*, *A. lancifolium*, *A. frutescens* and *A. megarrhizum*. Of these *A. muddii* bears the largest flowers and occupies one of the narrowest distributional ranges (Figure 54). Its habitat comprises mistbelt grassveld along the escarpment and consequently its distribution is disjunct. The species is common in North-Eastern Mountain Sourveld.



2329 (Pietersburg): Ramothola ("Ramatula"), northern Transvaal, (--DB), *Moss* 951 (BM); Dap Naude Dam, (--DD), *Stirton* 5738 & 5741 (PRE); Haenertsburg, (--DD), *Swierstra s.n.* (PRE); *Sidey* 1295 (PRE); *Rogers* 19024 (J); *Van der Merwe* 52 (PRE); Veerkraal, near Haenertsburg, (--DD), *Van der Merwe* 52 (PRE). 2330 (Tzaneen): Woodbush Mountains, (--CC), *Moss* 15483 (BM, J); Magoebaskloof, (--CC), *Schweicherdt* 1673 (B). 2429 (Zebediela): Wolkberg, (--BB), *McCallum, Balkwill & Cadman* 3009 (J, NU). 2430 (Pilgrims Rest): Graskop near Natural Bridge, (--DD), *Hilliard & Burt* 18457 (E, PRE); *Galpin* 14545 (B, BOL); *Germishuizen* 3509 (PRE); *Kluge* 1957 (PRE); *Galpin s.n.* (BOL); *Edwards* 654 (NU).^u

8. *Argyrolobium wilmsii* Harms in Engl. Jahrb. 26: 283 (1899); Burt Davy: 393 (1926). Type: eastern Transvaal, near Lydenburg, *Wilms* 257 (K!, lecto. selected here; BM!, E!, G!, isolecto.).

Argyrolobium nitens Burt Davy: 393 (1926), *synon. nov.* Type: eastern Transvaal, between Pilgrims Rest and Lydenburg, *Rogers* 23111 (BOL!, lecto. selected here; PRE!, isolecto.).

Suffrutex, 0.3--0.9 m tall, prominently branched above, stems velutinous. *Leaves* often deciduous before anthesis; leaflets broadly obovate to oblong-elliptic, 10--55

Figure 52

Argyrolobium muddii. A. Habit (bar = 20 mm); B. calyx (bar = 2 mm); C. androecium (bar = 2 mm); D. standard, abaxial surface (bar = 2 mm); E. keel (bar = 2 mm); F. wing (bar = 2 mm). Voucher: *Edwards* 654.

x 4--36 mm, velutinous, apex rounded occasionally emarginate, apiculate, petiole 2--6 mm long; stipules often caducous, linear-lanceolate, 3--5 x 0.5--1 mm. *Inflorescence* 2--20 (--30)-flowered, densely racemose occasionally paniculate, terminal; bracts linear-lanceolate, 4--8 x 0.5--1 mm; bracteoles linear-lanceolate, 2--6 x 0.5 mm. *Calyx* velutinous, upper lip 9--12 mm long, sinus 5--7 mm deep; lower lip 11--13 mm long, lobes 2--3 mm long. *Corolla* yellow; standard suborbicular, 12--14 x 11--15 mm, adaxial surface sparsely sericeous, base obtuse, claw 1--1.5 mm long; wings obovate to oblong, 11--13 x 4--5 mm, sculpturing lunate-lamellate in the upper basal zone, claw 1--1.5 mm long; keel cymbiform, 9--11 x 3--4 mm, often sparsely ciliate along the lower suture, claw 1--2 mm long. *Stamens* monodelphous fused adaxially. *Ovary* 6--7 mm long, densely sericeous; style 4--6 mm long. *Fruit* velutinous, compressed, 40--55 x 5--6 mm. *Seed* red-brown, orbicular or irregular, 3 x 2.5 mm.

Burt Davy (1926) distinguished *A. nitens* on the basis of its smaller flowers, slender branches and closely appressed pubescens. Our research has shown that the type specimen (*Rogers 23111*) falls well within the range of variation of *A. wilmsii* and *A. nitens* is therefore reduced to synonymy.

A. wilmsii is a distinctive species characterised by its silver leaves and floriferous nature. Some confusion is apparent in the tentative identification of herbarium specimens and this is often due to the inconsistent defoliation of plants before

anthesis. The species is common in Piet Retief Sourveld and North-Eastern Mountain Sourveld (Figure 54).

2329 (Pietersburg): Haenertsberg, (--DD), *Meeuse* 9822 (PRE). 2428 (Nylstroom): Makapaans Valley, (--AA), *Maguire* 918 & 947 (J); *Maguire* 920 (BOL, NBG, PRE). 2429 (Zebediela): Potgietersrus, (--AA), *Rogers* 2384 (PRE); Donkerkloof, Chuniespoort, (--BA), *Vahrmeijer* 2427 (MO, PRE); Ashmole Dales, (--BB), *Pole-Evans s.n.* (PRE). 2430 (Pilgrims Rest): The Downs, (--AA), *Rogers* 20155 (BOL). 2529 (Witbank): Stoffberg, Monsterlus, (--BA), *Obermeyer s.n.* (BOL, NH, PRE). 2530 (Lydenburg): Komati Bridge, (--AA), *Compton* 26044 (NBG); farm Livagershoek, (--AB), *Obermeyer* 196 (PRE); Lydenburg, (--AB), *Wilms* 257 (BM, E, G); *Wilms* 5795 (PRE); *Wilms* 254 (BM); *Edwards* 562 (NU); *Germishuizen* 438 (PRE); *Evans s.n.* (PRE); *Repton* 702 (BOL, NH); *Codd* 538 (PRE); farm De Kuilen, (--AB), *Anderson s.n.* (PRE); Spekboom River, *Young s.n.* (NH); between Orighstad & Pilgrims Rest, (--AB), *Rauh & Schlieben* 9651 (PRE); between Lydenburg & Pilgrims Rest, (--AB), *Rogers s.n.* (PRE); *Rogers* 23111 (BOL, PRE); Crocodile River, (--BC), *Schlechter* 3904 (BOL, BR, C, E, G, GRA, NH); Rosehaugh, (--BD), *Mogg* 13961 (PRE); Lowveld Botanic Gardens, Nelspruit, (--BD), *Buitendag* 167 (NBG); Nelspruit, (--BD), *Prosser* 1288 (NBG); *Prosser* 1488 (J, NBG); *Van Jaarsveld* 34 (NBG, PRE); *Britten* 4796 (PRE). 2531 (Komatipoort): 8 km from Lydenburg on rd. to Orighstad, (--AB), *Schrire* 638 (NH); White River, (--AC), *Galpin* 14557 (BOL, PRE);



Plastron, (--AC), *Holt 197* (NH, PRE); Barberton, (--CC), *Smith 7065* (PRE); *Galpin 551* (PRE); *Rogers 14214* (BOL); *Liebenberg 2635* (PRE). 2631 (Mbabane): Komati Bridge, (--AA), *Compton 26985* (NBG, PRE).²²

8. *Argyrolobium megarrhizum* H. Bol. in Journ. Linn. Soc. 24: 175 (1887); Burt Davy: 392 (1926). Type: Transvaal, around Pretoria, *MacLea s.n.* (BOL!, lecto. selected here; BM!, K!, SAM!, isolecto.).

Suffrutex, up to 0.6 m tall, erect, well branched, stems sericeous, becoming glabrous. *Leaves* sericeous to sparsely sericeous beneath, glabrescent above; leaflets linear-lanceolate to oblong-obovate, 10--30 x 2--5 mm, apex rounded, apiculate; petiole 3--7 mm long; stipules linear to subulate or absent. *Inflorescence* racemose, 3--6-flowered, terminal; peduncle densely sericeous; bracts linear 3-4 x 0.5 mm; bracteoles linear to subulate, 2--3 x 0.5 mm. *Calyx* fulvous-sericeous; upper lip 6--8 mm long, sinus vestigial; lower lip 7--10 mm long, lobes vestigial. *Corolla* yellow; standard broadly ovate to suborbicular, 15--18 x 13--17 mm, adaxial surface sparsely sericeous apically, base obtuse, claw 2.5--3 mm long; wings oblong to obovate, 11--14 x 5--6 mm, with prominent lunate-lamellate

Figure 53.

Argyrolobium wilmsii. A. Flowering branch (bar = 20 mm); B. calyx (bar = 2 mm); C. keel (bar = 2 mm); D. wing (bar = 2 mm); E. androecium (bar = 2 mm); F. standard, abaxial surface (bar = 2 mm); G. standard, lateral view (bar = 2 mm). Voucher: *Edwards 562*.

sculpturing in the upper basal and upper central zones, claw 1.5--2 mm long; keel narrowly cymbiform, 11--13 x 4--6 mm, claw 2--3 mm long. *Stamens* monadelphous, sheath split deeply above. *Ovary* narrowly oblong; ovary 8--9 mm long; style 3--5 mm long. *Fruit* sericeous, compressed, 40--100 x 4--5 mm. *Seed* shape irregular, 3--5 x 3--4 mm.

Argyrolobium megarrhizum is closely allied to *A. transvaalense* and *A. muddii* but its calyx lobes are vestigial. Other characters which distinguish *A. megarrhizum* from *A. transvaalense* are its prominently petiolate leaves and its clumping habit. It is distinguished from *A. muddii* by its narrow leaflets and its prominent wing sculpturing.

A. megarrhizum occurs in Mixed Bushveld and Sourish Mixed Bushveld around Pretoria (Figure 54).

2528 (Pretoria): Rust de Winter Dam, (--AB), *Pole Evans s.n.* (PRE); Pretoria, Magaliesberg, (--CA), *McLea 161* (SAM); *McLea 163* (BM); *McLea 5635* (BM, BOL, SAM); between Pretoria & Witnek, Cullinan, (--CB), *Grobbelaar 2515* (PRE); Trichardtspoort, Rhenosterkop, (--DA), *Obermeyer s.n.* (GRA, PRE); Bronkhorstspruit on Rd. to Rust de Winter, (--DA), *Clarke 411* (MO, PRE); Rd. to army radar tower, Bronkhorstspruit to Verena, (--DB), *Grobbelaar 1667* (MO).

2529 (Witbank): between Verena & Bronkhorstspruit, (--AB), *Mauve & Venter*

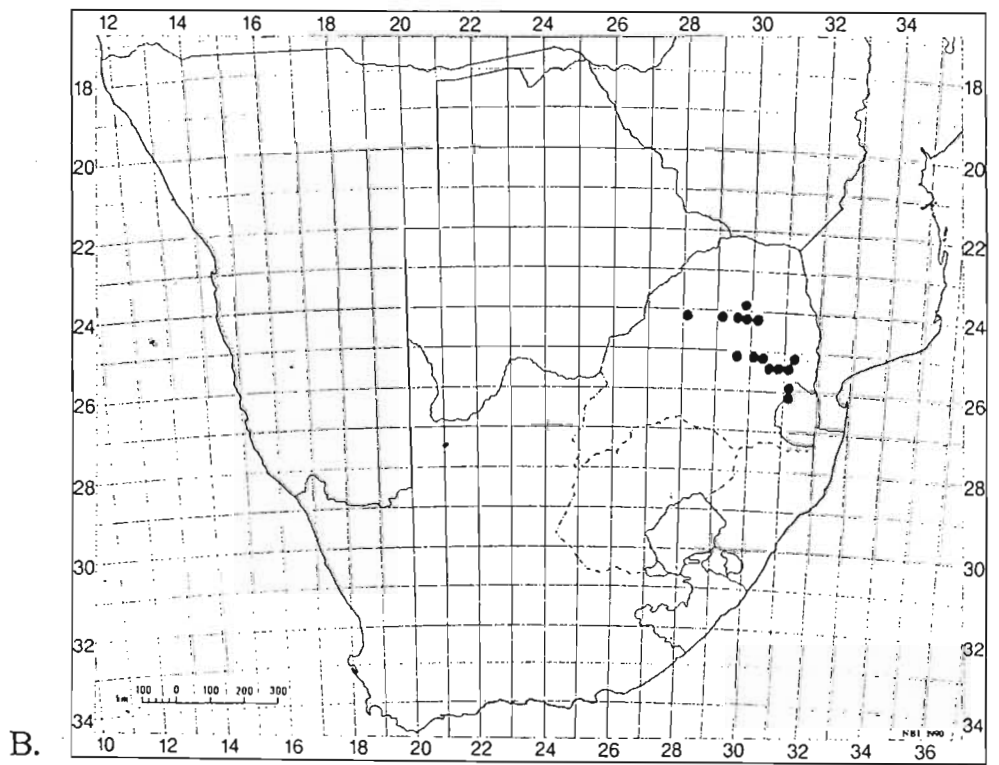
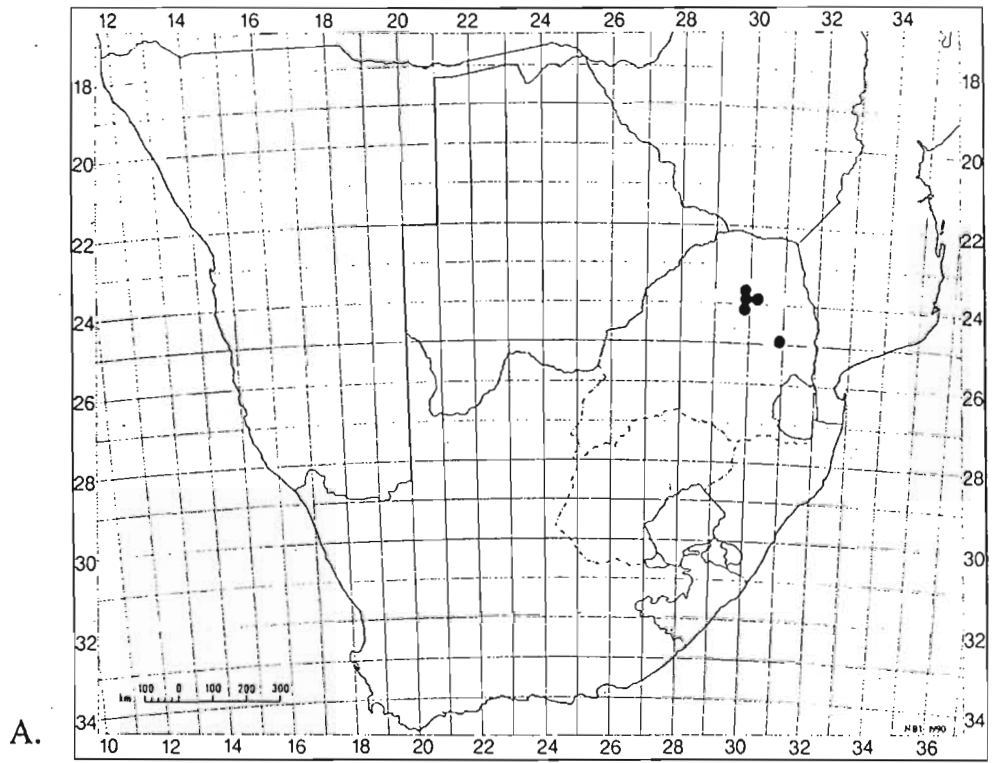


Figure 54. Recorded distribution of *A. A. muddii* & *B. A. wilmsii*.

5025 (MO, PRE); Buffelshoek Farm between Verena en Groblersdal, (--AB), *Grobbelaar 606* (PRE); 1 km from Verena on rd. to Bronkhorstspuit, (--AC), *Van Eyssen 11* (PRE); *Acocks 23345* (PRE); Loskop Dam Nature Reserve, Weltevreden, (--AD), *Pettifer 191* (PRE); *Prosser 1898* (PRE); Mapochsdrif, Klein Olifantsrivier, (--CB), *du Plessis 1009* (PRE).

9. *Argyrolobium longifolium* (Meisn.) Walp. Repert. Bot. Syst. 2: 844 (1843); Harv.: 69 (1862); Edwards: 42 (1994). Type: Natal, summit of Table Mountain, *Krauss 214* (TCD!, lecto. selected here; G!, K!, MO!, PRE!, W!, isolecto.).

Chasmone longifolia Meisn.: 74 (1843). Type: as above.

Argyrolobium natalense Dümmer: 272 (1912). Type: Natal, *Wood 861* (K!, lecto. selected here; BOL!, K!, PRE!, SAM!, isolecto.).

Virgate suffrutex, up to 1.5 m tall, erect; stems sparingly branched below, well branched above, sparsely sericeous, becoming glabrous; lignotuber well developed. *Leaves* glabrous adaxially, sparsely sericeous abaxially; dimorphic in mature plants, upper leaflets oblanceolate to linear, conduplicate, lower leaflets broadly oblanceolate to elliptic, 30--70 x 4--16 mm, caducous, apex acute or rounded, apiculate; seedling leaflets suborbicular, 10--30 x 8--25 mm; petiole 15--30 mm long; stipules sericeous abaxially, lanceolate in mature plants, minute in seedlings. *Inflorescence* racemose, subsecund, up to 20-flowered, terminal, often subtended by axillary inflorescences; bracts linear, up to 6 x 1 mm, bracteoles

minute. *Calyx* sericeous, deeply bilabiate; upper lip incipiently bidentate, 9--12 mm long, lower lip 10--14 mm long. *Corolla* lemon yellow, becoming black in dried specimens; standard 10--13 x 10--12 mm, broadly suborbicular, adaxial surface sparsely sericeous, base canaliculate, claw 2--3 mm long; wings oblong to obovate, 10--12 x 3--4.5 mm, with lunate-lamellate sculpturing in the basal and upper central zones, claw vertical, 2--3 mm long; keel acutely cymbiform, 7--9 x 3--4 mm, claw vertical, 2.5--3 mm long. *Stamens* monadelphous, sheath split adaxially. *Ovary* narrowly oblong, 9--10 mm long, style 3--4 mm long. *Fruit* linear, up to 60 x 4 mm, sparsely sericeous, compressed between the seeds. *Seed* red-brown, 2--3 mm in diameter, slightly compressed.

Meisner's original description of this species overlooked the occurrence of dimorphic anthers, often with flattening of the five short filaments. This, together with habit and unusual inrolling of the standard base, indicates a close alliance between *A. baptisioides* Eckl. & Zeyh. and *A. longifolium*. On drying these species turn black.

Dümmer's description of *A. natalense* has led to confusion. His species concept is based on the "glabrescent character and more slender racemes" of *A. natalense*. The current investigation has found no evidence to support the recognition of two species. Raceme stature depends on the part of the plant from which the collection was made, axillary racemes are frequently slender while terminal racemes tend to



be robust. Vestiture in this species is also variable, young growth is invariably hairy but mature growth tends to be glabrescent. For these reasons *A. natalense* was reduced to synonymy.²³

Examination of herbarium material shows that *A. longifolium* and *A. tuberosum* are frequently confused. Live material is easily distinguished on the basis of flower colour and habit. The combination of russet and yellow in fresh flowers of *A. tuberosum* (discussed under *A. pseudotuberosum*) is unique within the genus. In addition *A. tuberosum* is a slender poorly branched herb seldom exceeding 500 mm in height. Unfortunately herbarium specimens of *A. longifolium* are often derived from simple axillary branches which superficially resemble whole plants of *A. tuberosum*.

A. longifolium is usually encountered in Ngongoni Veld, Highland Sourveld and Dohne Sourveld (Figure 105).

2930 (Pietermaritzburg): Dargle, (--CA), Wood 11620 (BOL); between Camperdown and Maritzburg, (--DA), Gerrard & Mc Ken 2127 (TCD); Wood 11079 (NU, PRE); Edwards 353, 402 & 827 (NU); Tafelberg, (--DA), Krauss

Figure 55

Argyrolobium longifolium. A. Flowering branch (bar = 20 mm); B. calyx, inner surface (bar = 2 mm); C. standard, abaxial surface (bar = 2 mm); D. standard, lateral view (bar = 2 mm); E. pistil, longitudinal section (bar = 2 mm); F. androecium (bar = 2 mm); G. wing (bar = 2 mm); H. fruits (bar 20 mm); I. keel (bar = 2 mm). Voucher: Edwards 402.

214 (BM, G, K, MO, PRE, TCD, W); *Krauss 1841* (G); Nagle Dam, (--DA), *Wells 1852* (MO, NU); Itafamasi, (--DB), *Wood 861* (BOL, PRE, SAM); between Hammarsdale and Inchanga, (--DC), *Germishuizen 1852* (PRE); Ismont, (--DC), *Strey 8384* (NU, PRE); Northdene, (--DD), *Wood 724* (BOL, MO, SAM); *Wood 4969* (MO, W); *Wood 12550* (NH, UPS); *Wood 10088* (MO, NU). 2931 (Stanger): Tugela, (--BA), *Gerrard & Mc Ken 1760* (TCD). 3030 (Port Shepstone): Fairfield, (--AC), *Bayer 391* (NU); Highflats, (--AD), *Schrire 440* (NH); *Acocks 13303* (PRE); *Germishuizen 1805* (PRE); Dumisa, (--AD), *Rudatis 809* (E).

10a. *Argyrolobium speciosum* Eckl. & Zeyh. subsp. ***speciosum***, Enum. Pl. Afr. Austr. 2: 187 (1836); Walp.: 506 (1839); Walp.: 630 (1843); Harv.: 68 (1862). Type: Winterberg near Phillipstown, *Ecklon & Zeyher 1320* (K!, lecto. selected here; C!, G!, MO!, NY!, O!, P!, S!, TCD!, isolecto.).

Chasmone diversifolia E. Mey.: 71 (1836). Types: in grassland, Katberg 3000--3500', *Drège s.n.* (P!, lecto. selected here; G!, PRE!, S!, TCD!, isolecto.); between Zandplaat & Komga 2400', *Drège s.n.* (P!, syn.).
Incorrectly as *Chasmone heterophylla* in Harv.: 68 (1862).

Herb 0.15--0.3 m tall, erect, sparingly branched; stems annual, cylindrical in section, pilose, becoming glabrous. *Leaves* glaucous, slightly fleshy, glabrescent

but often abaxially sericeous when young; leaflets narrowly obovate or elliptical to broadly obovate or elliptical, 30--70 x 15--20 mm, apex rounded or acute; petioles 5--26 mm long, canaliculate; stipules often abaxially sericeous at first, trapezoid, base broadly cuneate, apex acute. *Inflorescence* racemose, 2--25-flowered, up to 270 mm tall, terminal, rarely becoming leaf-opposed; peduncle 50--220 mm, glabrescent, sericeous or pilose; bracts linear, 6--15 x 0.75--1.25 mm, bracteoles setaceous, 2--3 x 0.5 mm. *Calyx* sparsely to densely sericeous, lateral sinuses 7--10 mm; upper lip 8--12 mm long, lobes acute, 3--9 x 1.7--2 mm; lower lip 8--13 mm long, lobes acute, 1.5--5 x 0.75--2 mm. *Corolla* bright to mustard yellow, standard veins red; standard lamina suborbicular, 7--13 x (6--11)--13 mm, adaxial surface sparsely sericeous centrally, claw 2.5--4 mm long; wing laminae obovate to slightly cymbiform, 8--11 x 3--6 mm, with lunate-lamellate sculpturing in the upper basal and upper central zones, claw 2--3.5 mm long. *Fruit* linear, compressed, erect, sparsely sericeous, 60--85 mm long. *Seed* irregular to suborbicular, compressed, 2--3 mm, sometimes recalcitrant, testa light brown, hilum slightly raised.

The variation in leaf dimensions within this species is remarkable and some correlation with inflorescence structure and provenance exists. Two subspecies are recognised to accommodate this variation. Plants of the northern subspecies are robust with large leaflets and reduced petioles. The type subspecies, from the eastern Cape is smaller with short, lower internodes and thus the leaves are in basal clusters. The leaflets are both shorter and narrower than their northern

relatives. A correlated trend occurs in the peduncle development which is accentuated in the typical subspecies, allowing the flowers to be held above the surrounding vegetation despite the reduced vegetative stature of the plants (Figure 56). A stronger tendency towards leaf dimorphism is also apparent in southern subspecies, with broad lower leaflets and narrow upper leaflets.

The typical subspecies occurs mainly in Highland and Dohne Sourveld.

Without precise locality: *Barber s.n.* (TCD). 3226 (Fort Beaufort): Winterberg not far from Phillipstown, (--AC), *Ecklon & Zeyher 1320* (C, G, MO, NY, O, P, S, SAM, TCD); *Barber 46* (TCD); Kouga Mountains, (--CA), *Fitchett 5008* (PRE); Katberg, (--DA), *Drège s.n.* (BM, G, P, PRE, S, SAM, TCD); *Young 15363* (J); *Ecklon & Zeyher s.n.* (SAM); *Hutton s.n.* (TCD, UPS); *Hutchinson 1676* (BM, BOL, PRE); *Sole 380* (PRE); *Dyer 1788* (GRA); *Garabestian s.n.* (PRE, SAM); Seymour, (--DB), *Giffen s.n.* (PRE); *Scully 595* (BM, BOL, G, UPS); Gaika's Kop, (--DB), *Phillipson & Hutchings 50* (KEI, MO, PRE, UFH). 3227 (Stutterheim): Happy Valley, Cathcart, (--AC), *Barker 900* (BOL, NBG); Fort Cunynghame, (--AD), *Schonland 89* (GRA); Keiskama Hoek, Cato Forest Reserve, (--CA), *Story 3337* (PRE); Evelyn Valley, (--CB), *Taylor 4226* (NBG); Pirie Forest, King Williams Town, (--CD), *Flanagan 2198* (GRA, MO, PRE, SAM); *Rattray 354* (BOL); Muden Dam, King Williams Town, (--CD), *Wehmeyer 17* (PRE); Pirie, (--CD), *Sim 19465* (NH); between Zandplaat &

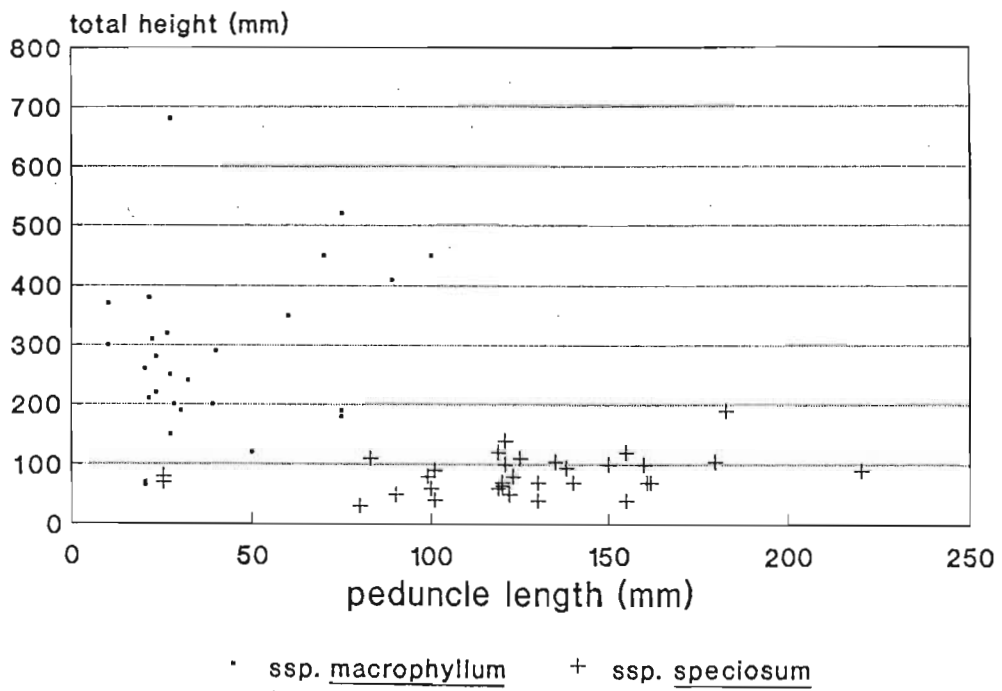


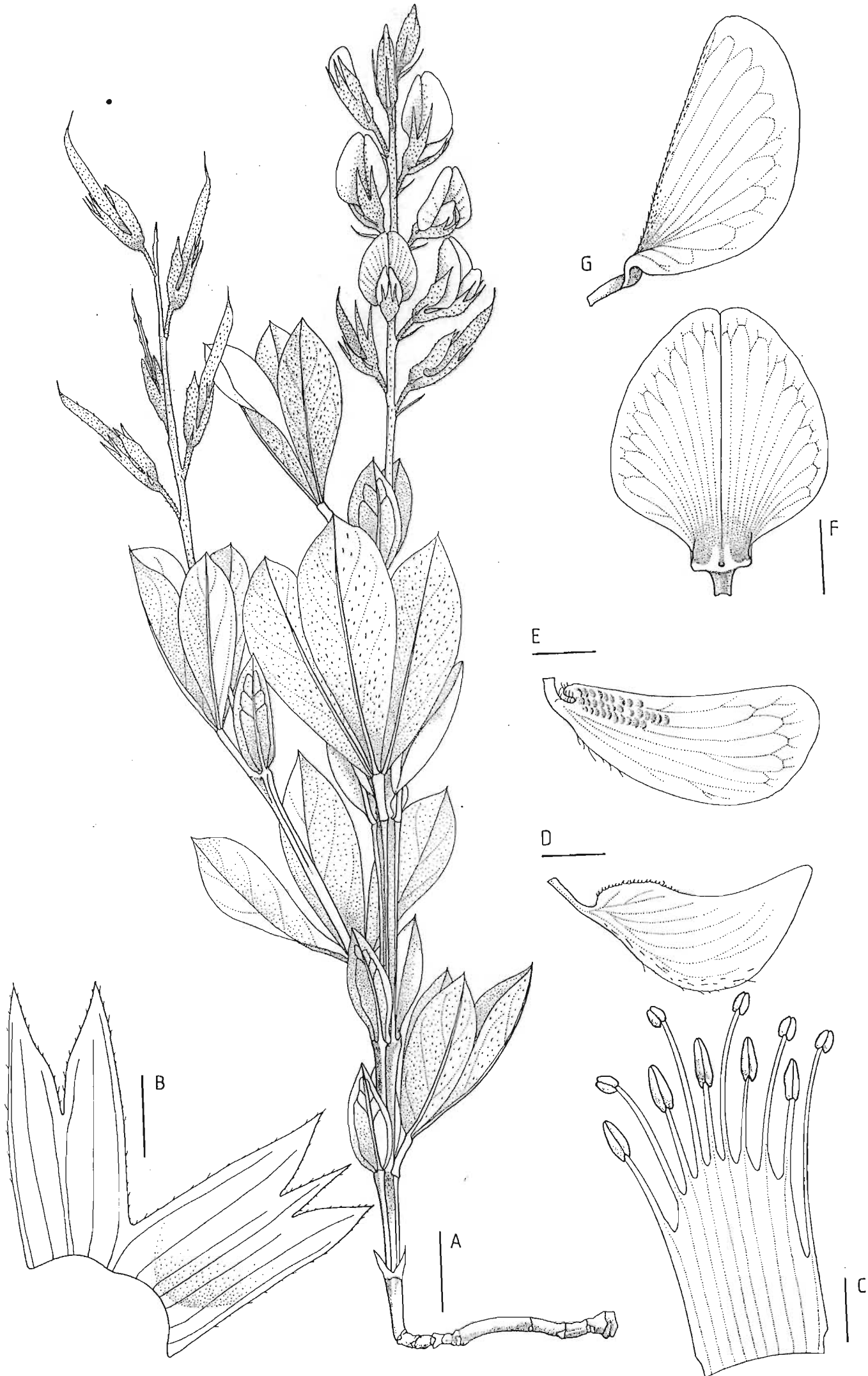
Figure 56. Scattergram of peduncle length vs. plant height for *A. speciosum* *ssp. macrophyllum* and *A. speciosum ssp. speciosum*.

Komga, (--DB), *Drège s.n.* (P). 3228 (Butterworth): Kentani, (--AD), *Pegler 121* (PRE).

10b. *Argyrolobium speciosum* Eckl. & Zeyh. subsp. *macrophyllum* T.J. Edwards subsp. nov. differt a subspecie *specioso* foliis magnis, habitu robusto, infloresceniis multifloris.

Typus: eastern Transvaal, Barberton, *Thorncroft 19158* (PRE!, holo.; BOL!, C!, GRA!, J!, M!, SAM!, UPS!, iso.).

Herbaceous suffrutex, 0.3--0.75 m tall, erect, sparingly branched; stems annual, triangular in section, pilose, becoming glabrous. *Leaves* glaucous, slightly fleshy, glabrescent but often abaxially sericeous when young; leaflets narrowly obovate or elliptical to broadly obovate or elliptical, 50--170 x 20--80 mm, apex rounded or acute; petioles 15--40 mm long, canaliculate; stipules often abaxially sericeous at first, trapezoid, base broadly cuneate, apex acute. *Inflorescence* racemose, 20--62-flowered, up to 400 mm tall, terminal, rarely becoming leaf-opposed; peduncle 10--100 mm, glabrescent, sericeous or pilose; bracts linear, 6--15 x 0.75--1.25 mm, bracteoles setaceous, 2--3 x 0.5 mm. *Calyx* sparsely to densely sericeous, lateral sinuses 7--10 mm; upper lip 8--12 mm long, lobes acute, 3--9 x 1.7--2 mm; lower lip 8--13 mm long, lobes acute, 1.5--5 x 0.75--2 mm. *Corolla* bright to mustard yellow, standard veins red; standard lamina suborbicular, 7--13 x (6--11--13 mm, adaxial surface sparsely sericeous centrally, claw 2.5--4 mm long; wing



laminae obovate to slightly cymbiform, 8--11 x 3--6 mm, with lunate-lamellate sculpturing in the upper basal and upper central zones, claw 2--3.5 mm long. *Fruit* linear, compressed, erect, sparsely sericeous, 60--85 mm long. *Seed* irregular to suborbicular, compressed, 2--3 mm, sometimes recalcitrant, testa light brown, hilum slightly raised.

Diagnostic aspects are discussed under the typical subspecies. *A. speciosum* ssp. *macrophyllum* occurs commonly in Highland Sourveld, Dohne Sourveld and Ngongoni Veld (Figure 105).²⁴

Without precise locality: *Cooper 1064* (BOL, TCD); Tugela, *Gerrard & McKen 1758 & 1759* (TCD); Between Umgeni & York, *Gerrard & McKen 2123* (TCD); Swaziland, *Stewart 8860* (PRE); *Cooper 116* (BM, SAM, TCD). 2228 (Maasstroom): Magaliesberg, Crocodile River, (--CC), *Burke s.n.* (NY); *Zeyher 360* (BM, G, P, SAM). 2426 (Mochudi): Mochudi, (--AA), *Harbour 6507* (BOL). 2430 (Pilgrims Rest): Mt. Sheba Nature Reserve, (--DC), *Kerfoot s.n.* (J); Graskop, (--DD), *Galpin s.n.* (BOL); Pilgram's Rest, (--DD), *Rogers 14352* (PRE); *Rogers 14695* (J); Causeway, Bushbuck Ridge, Pilgram's Rest, (--DD), *Smuts & Gillett 2355* (PRE); between Pilgram's Rest & Sabie, (--DD), *Rogers*

Figure 57

Argyrolobium speciosum ssp. *macrophyllum*. A. Habit (bar = 20 mm); B. calyx (bar = 3 mm); C. androecium (bar = 3 mm); D. keel (bar = 3 mm); E. wing (bar = 3 mm); F. standard (bar = 3 mm); G. standard, lateral view (bar = 3 mm). Voucher: *Edwards 575*.

23164 (PRE); Graskop, (--DD), *Holland s.n.* (BOL); Mac-Mac Nature Reserve, (--DD), *Kluge 1972* (PRE); *Barker 10051* (NBG); *Edwards 575* (NU); Stanley Bush Kop, (--DD), *Raal 1074* (LYD). 2527 (Rustenburg): Magaliesrivier, (--DC), *Burke & Zeyher 366* (SAM). 2528 (Pretoria): Pretoria, (--CA), *McLea 3078* (BM, BOL, MO, SAM). 2529 (Witbank): Loskopdam, (--AD), *Rogers 24278* (PRE). 2530 (Lydenburg): 20 km N. of Sabie on road to Graskop, (--BB), *Codd & de Winter 3312* (PRE); Langverwag, Sabie, (--BB), *Louw 2440* (STE); 17 km from Brondal on the road to Witrivier, (--BD), *Buitendag 732* (NBG); *Coetzer 779* (PRE); Waterval Boven, (--CB), *Roberts s.n.* (J); Helvetia, (--CB), *Young s.n.* (PRE); Thorncroft Flora Reserve, (--DB), *Venter 9121* (LYD); Kaapsehoop, (--DB), *Codd 5746* (PRE). 2531 (Komatipoort): Bushman Rock Hotel, (--AA), *Schrire 662* (NH); Sabie, (--AC), *Stirton 7285* (PRE); Witrivier Kloof, Pretoriakop, (--AC), *Gillett 1033* (PRE); Eerste Geluk No.6, (--CA), *Stirton 1750* (MO, PRE); *Barberton*, (--CC), *Balkwill, Cadman & Morrey 3722* (J); *Edwards 629* (NU); *Acocks & Hafstron 109* (PRE); *Smith 7040* (PRE); *Galpin 551* (PRE); *Holland s.n.* (BOL); *Thorncroft 2012* (PRE); *Thorncroft 19158* (BOL, C, GRA, J, M, PRE, SAM, UPS); *Murphy 107* (PRE). 2628 (Johannesburg): Johannesburg, (--AA), *Leendertz 6093* (PRE); *Moss 8886* (J); Frankenwald, (--AA), *Lucas s.n.* (J); *Phillips 367* (J); *Pelletier s.n.* (J); Melville Koppies, (--AA), *Lucas s.n.* (J); *McMurtry 2747* (PRE); *Cain s.n.* (J); Forest Town, (--AA), *Moss 8380* (BM, J); Belgravia, (--AA), *Gilfillan 259* (PRE); Linden, (--AA), *Dahlstrand 1047* (C); Bryanston, (--AA), *Van Rhynswyk s.n.* (J); Doornfontein,

(--AA), *Prosser s.n.* (J, NBG, PRE); Benoni, (--AB), *Taat 177* (C); *Bradfield 238* (PRE); Heidelberg, (--AD), *Acocks 20853* (PRE); Struben's Valley, (--BB), *Mogg 22387* (J). 2630 (Carolina): Athole Research Station, (--CB), *Norval 78* (PRE); *Preller 150* (PRE); Spitskop, (--CB), *Pott 5066* (PRE); Iswepe, (--DC), *Sidey 1499* (MO). 2631 (Mbabane): Forbes Reef, (--AA), *Prosser 1961* (PRE); Ukutula, (--AA), *Compton 24618* (NBG); *Compton 24619* (PRE, SAM); *Compton 25231* (NBG, PRE); Black Imbuluzi Valley, (--AA), *Compton 28065* (NBG); Komati Pass, (--AA), *Compton 29349* (PRE); *Compton 31110* (NBG); Mbabane, (--AC), *Bayliss 1770* (G, MO, SAM); *Kemp 1001* (MO, PRE); *Rogers 11459* (PRE); *Compton s.n.* (PRE); *Compton 24836* (NBG); Bremersdorp, (--AD), *Bolus 11787* (BOL, PRE); Usutu Forest, (--CA), *Dlamini s.n.* (NBG); Hlatikulu, (--CD), *Compton 29252* (NBG, PRE). 2729 (Volksrust): Newcastle, (--DD), *Bayliss 1703* (G, MO, SAM); Ingogo, (--DD), *Schweickerdt 970* (PRE). 2730 (Vryheid): Kwa-Mandlangampisi, Groothoek Farm, (--BA), *Du Toit 21 & 84* (PRE); Piet Retief, (--BB), *Galpin 9620* (PRE); Mooihoek, (--BB), *Devenish 30* (PRE); Natal Spa, (--BD), *Schrire 1316* (NH); Paulpietersburg, (--BD), *Germishuizen 2370* (PRE); Utrecht, Donderhoek, (--CB), *Devenish 957* (PRE); Utrecht, Retirement, (--CB), *Devenish 2114* (NU); 23 km from Vryheid on the road to Kranskop, (--DD), *Schrire 1524* (NH). 2731 (Louwsberg): Itala Nature Reserve, (--AC), *Brown & Shapiro 304* (PRE); 11 km from Kongolwane on the Rd. to Louwsburg, (--CA), *Schrire 1132* (NH); *Germishuizen 2183* (MO); Nongoma, (--DC), *Gerstner 4658* (PRE, SAM). 2828 (Bethlehem): Bergville, Royal Natal National

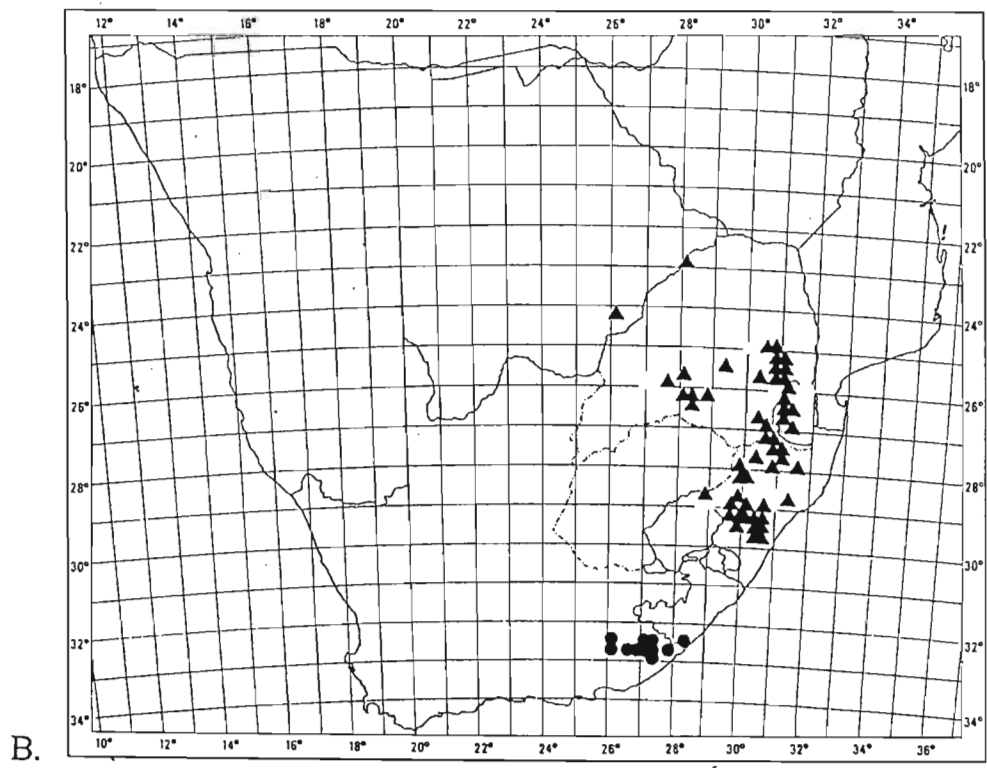
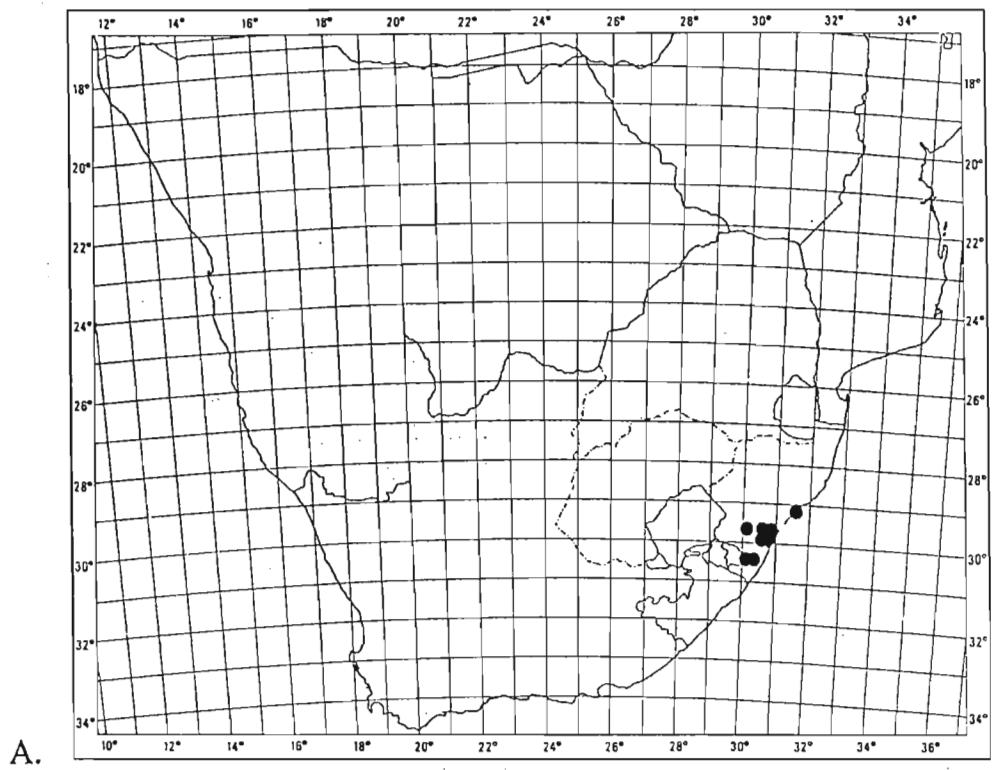


Figure 58. Recorded distribution of *A. A. longifolium* & *B. A. speciosum*.

Park, (--DB), *Trauseld 103* (PRE); *Green 250* (NH). 2829 (Harrismith): Fort Mistake, (--BB), *Shirley 134* (NU); *Shirley 135* (NU); Pepworth, Ladysmith, (--DB), *Edwards 629* (NU); Elandslaagte, (--DB), *Randles 50* (NU); Ladysmith, (--DB), *Rogers 688* (GRA); *Rogers 2958* (PRE); Winterton, (--DC), *Rayburn s.n.* (NH). 2830 (Dundee): hill above Dundee Reservoir, (--AA), *Edwards 1087* (NU); Kelvin Grove, (--AA), *Wood 5727* (G, MO); Impati, (--AA), *Shirley s.n.* (NU); Weenen, (--CC), *Sutherland s.n.* (TCD); *Rudatis 1578* (BM); *Wood 3524* (BOL, NH); Greytown, (--DC), *Stirton 1320 & 5081* (PRE). 2831 (Nkandla): Melmoth, (--CB), *Strey 11288* (NH); *Mogg 6106* (PRE); *Codd 1815* (PRE). 2929 (Underberg): Tabamhlope, (--BA), *Wylie s.n.* (BM, MO, PRE); *Gordon-Gray 5053* (NU); Griffins Hill, Estcourt, (--BB), *Marsh 81* (PRE); *Dyer 4863* (PRE); Moor Park Nature Reserve, (--BB), *Trauseld 1094* (PRE); Spioenkop, (--BD), *Van Rensburg s.n.* (NU). 2930 (Pietermaritzburg): Mooirivier, Meteor Ridge, (--AA), *Mogg 3237* (PRE); Farm "The Hook", (--AA), *Borquin 24* (NU); Mooirivier, (--AA), *Webb s.n.* (PRE); *Wood s.n.* (BM, GRA); Rietvlei, Greenwich Farm, (--AB), *Fry 2782* (PRE); Albert Falls, (--AD), *Commins 298* (NU); Greytown, (--BA), *Wylie s.n.* (MO); New Hanover, (--BC), *Moll 1964* (NU, PRE); *Bayer 6 & 7* (NU); Ferncliff, Pietermaritzburg, (--CB), *Strey 11288* (NH); Table Mountain, (--DA), *Hilliard 3993* (NU).

11. *Argyrolobium baptisioides* (E. Mey.) Walp. in *Linnaea* 13: 506 (1839);

Walp.: 630 (1843); Harv.: 69 (1862). Type: Katberg, in grassland, 3500--4000', *Drège s.n.* (P!, lecto. selected here; BM!, K!, G!, MO!, OXF!, S!, TCD!, isolecto.).

Chasmone baptisioides E. Mey.: 71 (1836).

Argyrolobium sandersonii Harv.: 594 (1862), *synon. nov.*; Wood: 228 (1902). Type: Natal, flats between Field's and Botha's Hills, *J. Sanderson 99* (TCD!, lecto. selected here; K!, PRE!, isolecto.).

Argyrolobium sutherlandii Harv.: 594 (1862), *synon. nov.* Type: Natal, near Pietermaritzburg, 2--3000', *Dr. Sutherland s.n.* (TCD!, lecto.; iso. K!, isolecto.).

Argyrolobium speciosum Eckl. & Zeyh. var. *glaberrimum* Harv.: 594 (1862), *synon. nov.* Type: Kreili's Country, *H. Bowker 280* (TCD!, lecto. selected here).

Argyrolobium comanthum Vogel nom. non rite public. mss. in Hb. Reg. Berol.

Suffrutex, up to 0.7 m tall, erect; stems well branched below, annual, glabrous to densely pilose; lignotuber well developed. *Leaves* glabrous adaxially, sparsely sericeous to pilose abaxially; oblanceolate, elliptic or broadly obovate, 28--45 (90) x 5--20 (40) mm, apex acute or rounded, apiculate; petiole 3--8 (11) mm long, canaliculate; stipules sericeous abaxially, lanceolate to trapezoid, 6--25 x 2--5 mm, base broadly cuneate, apex acute, commonly the basal leaves are reduced

to amplexicaule stipules. *Inflorescence* racemose, erect, 5--80-flowered, terminal, often subtended by axillary inflorescences; bracts elliptic to lanceolate, up to 3--14 x 0.5--2 mm, bracteoles setaceous to elliptic, 2--10 x 0.3--2 mm. Calyx sericeous, lateral sinuses 1--3 mm; upper lip 6--10 (--12) mm long, lobes acute, 2--3 mm; lower lip 8--15 mm long, lobes acute, 1--3 mm long. *Corolla* bright to mustard yellow, becoming black in dried specimens; standard 10--13 x 10--12 mm, obovate, adaxial surface sparsely sericeous, base cuneate, perpendicular to lamina, claw 2--5 mm long; wings obovate to cymbiform, 8--15 x 3.5--5 mm, with lunate-lamellate sculpturing in the upper basal and upper central zones, claw vertical, 1.5--3.5 mm long; keel acutely cymbiform, 7--9 x 3--4 mm, claw 2.5--3 mm long. *Stamens* monadelphous, sheath split adaxially. *Ovary* oblong 5--7 mm long, style 3--4 mm long. *Fruit* linear, compressed, erect, (30--) 40--60 (--80) x 4--5.5 mm, sparsely sericeous. *Seed* 2--3 mm in diameter, slightly compressed.

The profusion of synonyms listed under this species is due to the variability associated with its habit, indumentum and leaf shape. Extensive field work reveals that populations often include broad-leaved, glabrescent and narrow-leaved, pilose individuals. In populations of the eastern Cape the narrow-leaved, pilose forms predominate. Flowering of the morphs is simultaneous and considerable independent floral variation exists, especially with reference to the width of the standard. Occasional specimens (*Flanagan 569 & Scully 135*) display peculiar inflorescence structure where the terminal racemes resume vegetative growth at their apices.



Around Camperdown mixed populations of *A. baptisioides* and *A. longifolium* occur and here putative hybrids have been recorded (Edwards 586). The contracted flowering period of *A. baptisioides* begins in early spring and only late flowering individuals hybridise with *A. longifolium* which flowers throughout summer. *A. baptisioides* inhabits sourveld areas where grass cover is sparse while *A. longifolium* often occurs where grass cover is dense. Both occur in Ngongoni Veld, Highland Sourveld and Dohne Sourveld (Figure 107).

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Without precise locality: *Gerrard & McKen 1067* (TCD); Kreilis County, *Bowker 280* (TCD). 2930 (Pietermaritzburg): Fort Nottingham Commonage, Lion's River, (--AC), *Wright 1621* (E, NU); Howick, (--AC), *Hutchinson 1849* (BOL); Pietermaritzburg, (--CB), *Goossens 162* (BM); *Wilms 1992* (BM); Alexandra Park, (--CB), *Fisher 501* (MO); *Bond 1472* (NBG); World's View, (--CB), *Stirton 9039* (PRE); Town Hill, (--CB), *Sidey 3006* (NU, S); Zwaartkop, (--CB), *Wood 10114* (E); Thornville, (--CB), *Shirley s.n.* (NU); Hawthorn's Hill, (--CB), *Allsopp 521* (NU); Krantzklouf, (--CC), *Schlechter 3207* (B, BR, BOL, C, E, G, GRA, PRE); 15km from Thornville to Eston, (--CD), *Stirton 5439* (MO, PRE); Table Mountain, (--DA), *Singh 23* (NU); Botha's Hill, (--DA), *Wood s.n.* (G, GRA); *Wood 537* (BM, BOL); *Wood 2411* (NH); *Wood 5006* (G, MO, PRE);

25

Figure 59

Argyrolobium baptisioides. A. flowering branch (bar = 20 mm); B. standard, abaxial surface (bar = 2 mm); C. standard, lateral view (bar = 2 mm); D. wing (bar = 2 mm); E. keel (bar = 2 mm); F. calyx (bar = 2 mm); G. androecium (bar = 2 mm); H. leaf (bar = 2 mm). Voucher: *Edwards 434*.

Schelppe 2949 & 2950 (BM); Inchanga, (--DA), *Acutt s.n.* (NH); Umlaas Rd., (--DA), *Edwards 434* (NU); Baynesfield, Oldfield's Farm, (--DA), *Edwards 598* (NU); Richmond/ Thornville Rd., (--DA), *Edwards 612* (NU); Richmond, Uitkyk Nursery, (--DA), *Edwards 616* (NU); Camperdown, (--DA), *Wood 762* (GRA, NH); *Edwards 828* (NU); *Gerrard & McKen 1067* (TCD); *Wood 762* (BOL, SAM); *Wood 5004* (BM, E, G, MO); *Wood 11748* (NH, PRE); *Hilliard 2905* (NU); *Wood s.n.* (NU); Mid-illovo, (--DC), *Stirton 1125* (MO); 20 km S of Shongweni, (--DC), *Edwards 531* (NU); Field's Hill, (--DC), *Wood 3303* (E, MO, NH, PRE, SAM); Hillcrest, (--DC), *Wood 7940* (NH); Gilletts, (--DC), *Wood 11550* (E, NU); *Wood 12352* (NU, PRE); flats between Field's & Botha's Hills, (-DC), *Sanderson 99* (S, TCD); Chelmsford Park, (--DC), *Hilliard 1839* (NU); Krantzklouf, (--DC), *Haygarth & Rogers 24654* (PRE). 2931 (Stanger): Durban, (--CC), *Rogers 1631* (BOL); Bluff, (--CC), *Soni 25* (NU). 3029 (Kokstad): Harding, (--DB), *Oliver 38* (NH). 3030 (Port Shepstone): Ixopo, (--AA), *Mogg 2341* (PRE); 11 km from Ixopo to Umzimkulu, road cutting, (-AA), *Stirton 5587* (MO, PRE); *Shirley s.n.* (NU). 3126 (Queenstown): Queenstown, (--DD), *Cooper 349* (BOL, TCD). 3127 (Lady Frere): Tsomo River, (--DC), *Bowker & Bowker 803* (GRA, TCD). 3225 (Somerset East): head of Bergmeu's Kloof, Stockenstroom, (--DD), *Scully 135* (PRE). 3226 (Fort Beaufort): Katberg, (--DA), *Drège* (BM, K, G, MO, OXF, P, S, TCD); *Hutton s.n.* (TCD); *Sim 19467* (PRE). 3227 (Stutterheim): Pirie, (--CB), *Flanagan 2141* (MO, SAM); Mt. Kemp, Kubusie, (--CB), *Sim 19466* (NU); King William's Town, (--CD), *Ranger*

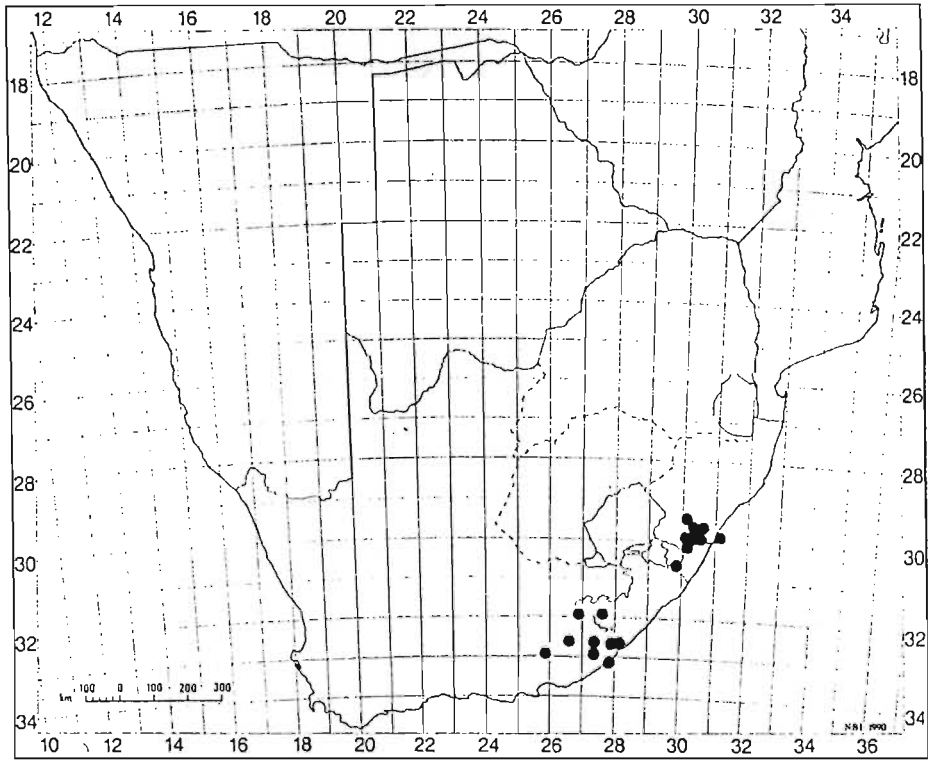


Figure 60. Recorded distribution of *A. baptisioides*.

31 (PRE); Komgha, (--DB), *Flanagan 569* (BOL, G, GRA, PRE, SAM). 3228 (Butterworth): Kentani, (--CA), *Pegler 121* (GRA, PRE). 3327 (Peddie): East London, (--BB), *Rattray 682* (GRA).

Sectio 4. Polyphyllum T.J. Edwards sect. nov. Fructices, inflorescentia racemosa vel pseudoumbellata, floribus monomorphis.

The species of this section are woody shrubs with monomorphic flowers. The section is limited to Macchia and False Macchia in the eastern Cape.

Type species: *A. polyphyllum* Eckl. & Zeyh.

Shrubs, erect, well branched, stems sericeous, becoming glabrous. *Leaves* variously sericeous; leaflets obovate to lanceolate, apex rounded, emarginate or recurvo-mucronate; stipules setaceous to subulate. *Inflorescence* racemose to pseudo-umbellate, terminal often becoming leaf-opposed; pedunculate; bracts subulate to lanceolate; bracteoles lanceolate to vestigial. *Calyx* sericeous; upper lobes sometimes connate; lower lobes usually connate. *Corolla* yellow becoming russet with age; standard orbicular, adaxial surface sericeous medially, base subcordate; wings oblong to obovate, with lunate-lamellate sculpturing in the upper basal and upper central zones; keel cymbiform. *Stamens* monadelphous, sheath sometimes split above, never to the base. *Ovary* narrowly oblong; style glabrous. *Fruit* sericeous, compressed.

12. *Argyrolobium trifoliatum* (Thunb.) Druce in Rep. Bot. Exch. Cl. Brit. Isles, 1916: 605 (1917).

Galega trifoliata Thunb.: 600 (1823). Type: South Africa, Cape Province, Thunberg s.n. sub. THUNB-UPS 17401 (UPS!, syn.) & 17402 (UPS!, lecto. selected here).

Argyrolobium sericeum (E. Mey.) Eckl. & Zeyh.: 184 (1836); Benth.: 342 (1844); Harv.: 70 (1862). Type: eastern Cape, Uitenhage, 'Vanstadensriverberge', Ecklon & Zeyher 1304 (P!, lecto. selected here; G!, GRA!, O!, TCD!, isolecto.).

Dichilus sericeus E. Mey. non Spreng. f.: 154 (1832), *nom. illegit.*

Gamochilum sericeum (E. Mey.) Walp.: 510 (1839), *non Galega sericea* Thunb. *et non Ononis sericea* Thunb.

Chasmone holosericea E. Mey.: 72 (1836), *nom. illegit.* Meisn.: 76 (1843). Type: eastern Cape, Kromrivier, Drège s.n. (K!, lecto. selected here; G!, MO!, P!, PRE!, S!, isolecto.); Van Stadensberg, Drège s.n. (G!, P!, S!, isosyn.).

Chasmone obcordata E. Mey.: 72 (1836). Type: Uitenhage, Drège s.n. (K!, lecto. selected here).

Gamochilum obcordatum (E. Mey.) Walp.: 510 (1839). Type as above.

Argyrolobium obcordatum (E. Mey.) Steud.: 130 (1841). Type as above.

Suffrutex, up to 1 m tall, erect, well branched, lower stems often villose, upper stems sericeous, becoming glabrous. Leaves slightly dimorphic, lower leaves

sparsely villose above, abaxial surface densely villose, upper leaves adaxial surface glabrous abaxial surface densely sericeous; leaflets obovate to obcordate, 10--24 x 8--20 mm, apex rounded, emarginate or recurvo-mucronate; petiole 3--10 mm long; stipules setaceous to narrowly lanceolate, 1--8 x 0.5--1(--2) mm. *Inflorescence* racemose to pseudo-umbellate, 3--12-flowered, terminal sometimes becoming leaf-opposed; peduncle sericeous; bracts subulate to lanceolate, 1--4 x 0.5--1 mm; bracteoles slightly smaller, lanceolate to setaceous. *Calyx* sericeous; upper lip 8--10 mm long, sinus vestigial; lower lip 10--12 mm long, lobes usually connate. *Corolla* yellow becoming russet; standard orbicular, 13--16 x 11--15 mm, adaxial surface sericeous medially, base obtuse, claw 1--3 mm long; wings oblong to obovate, 11--13 x 4--6 mm, with lunate-lamellate sculpturing in the upper basal and upper central zones, claw 2--3 mm; keel cymbiform, 10--12 x 4--5 mm, claw 3 mm long. *Stamens* monadelphous, sheath split above almost to the base. *Ovary* narrowly oblong, 7--9 mm long; style 3--4 mm long. *Fruit* sericeous, compressed, 40--55 x 5 mm. *Seed* dark brown, suborbicular, 2--2.5 mm in diameter.

A. incanum is the closest ally and diagnostic differences are discussed under that species, both occur in False Macchia (Figures 52 & 54). *A. trifoliatum* also shows a strong resemblance to *A. polyphyllum* both have rod-like primary stems and dimorphic leaves, although this character is more strongly developed in the latter.

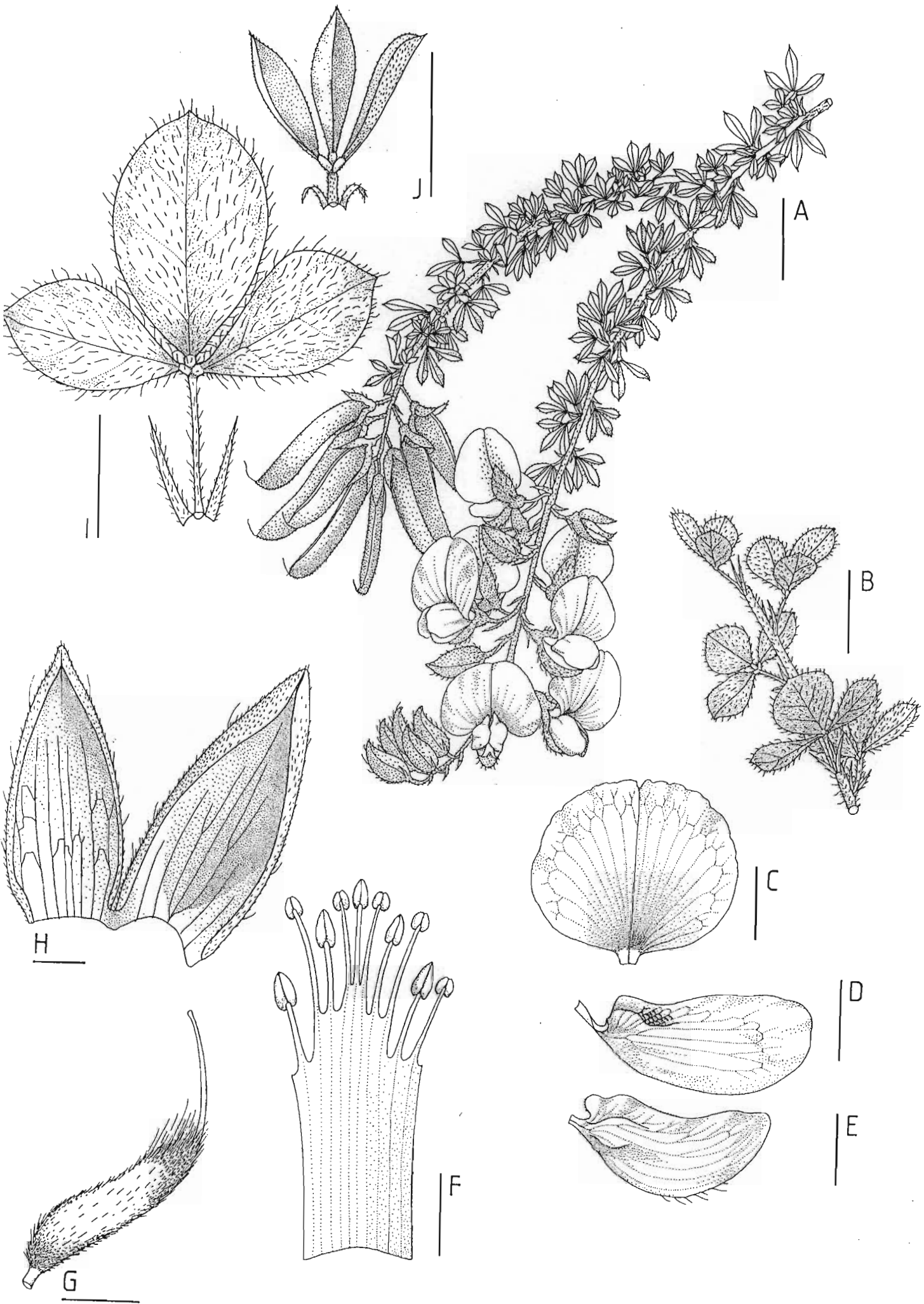
Some confusion existed over the identity of *Galega trifoliata* Thunb. which is the basionym for this name change. Thunberg described the androecium as diadelphous which does not conform with this species however the types have been seen and they undoubtedly belong to this taxon.

Without precise locality: *Drège s.n.* (O); *Masson s.n.* (BM); *Zeyher 1828* (P); *Zeyher 2800* (PRE). 3324 (Steytlerville): Assegai Bosch, Humansdorp, (--CD), *Rogers 2831* (BOL, GRA, SAM, PRE); *Fourcade 5366* (BOL, STE); Thornhill on coastal rd. to Humansdorp, (--DD), *Story 2411* (UPS); Hankey Hills, (--DD), *Barker 7848* (NBG, STE). 3325 (Port Elizabeth): Van Stadensberg, (--CC), *Drège s.n.* (G, P, S); *Ecklon 323* (BM, E, GRA, O, P, TCD); *Ecklon & Zeyher 1304* (G, GRA, O, P, S, SAM); *Bolus 1521* (BOL); Otterford, (--CC), *Fourcade 3670* (STE); Longmore Forest Reserve, (--CC), *Dahlstrand 696* (GRA, MO); *MacOwan 1031* (BM); *Urton 44* (GRA); *MacOwan s.n.* (GRA); *Stirton & Zantovska 11600* (STE); *Stirton & Zantovska 11607* (STE); *Dix 112* (BOL, GRA); *Long 67* (STE); Uitenhage, Islandsrivier, (--CD), *Zeyher 2303* (P); Uitenhage, (--DA), *Zeyher s.n.* (E); Bosjesmansrivier, Addo, (--DA), *Zeyher 1311* (P); Port Elizabeth, (--DC), *Archibald & Britten s.n.* (GRA). 3423 (Knysna): Plettenberg Bay, (--AB), *Bowie s.n.* (BM). 3424 (Humansdorp): Humansdorp, (--AB), *Thode s.n.* (NH); *Wells 2951* (GRA); Kromrivier, (--BA), *Drège s.n.* (G, MO, P, S); *Fourcade 2603* (BOL).

13. *Argyrolobium polyphyllum* Eckl. & Zeyh., Enum. Pl. Afr. Austr. 2: 184 (1836); Walp.: 506 (1839); Walp.: 631 (1843); Benth.: 342 (1844); Harv.: 69 (1862). Type: eastern Cape, Chumi and Winterberg, *Ecklon & Zeyher s.n.* (SAM!, lecto. selected here; C!, G!, K!, MO!, O!, P!, isolecto.).

Chasmone cuneifolia E. Mey.: 71 (1836). Type: eastern Cape, Katberg, *Drège s.n.* (G!, lecto. selected here; K!, P!, PRE!, S!, isolecto.).

Shrub, 0.75--2 m tall, prominently branched above, stems sericeous. *Leaves* dimorphic; juvenile and primary leaflets often caducous, narrowly to broadly obovate, 17--45 x 7--20 mm, glabrescent, sparsely sericeous or sparsely pilose, apex rounded, apiculate, petiole 8--20 mm long; stipules falcate to lanceolate, 3--8 x 1--1.5 mm; upper leaflets narrowly obovate to elliptic, 5--9(--17) x 2--4 mm, adaxially glabrous to sparsely sericeous, apex rounded to acute, apiculate, petiole 2--6 mm long; stipules subulate to setaceous, 2--7 x 0.25--1 mm. *Inflorescence* 5--20 (--25)-flowered, densely racemose, terminal; bracts linear-lanceolate, 3--8 x 0.25--1 mm; bracteoles linear lanceolate, 2--5 x 0.5--1 mm. *Calyx* sericeous, upper lip 7.5--10 mm long, sinus 5--7 mm deep, lobes often fused; lower lip 9--12 mm long, lobes 0--1.5 mm long. *Corolla* yellow; standard suborbicular, 11--15 x 10--17 mm, adaxial surface sparsely sericeous, base obtuse, claw 1--1.5 mm long; wings obovate to oblong, 9--14 x 4--7 mm, sculpturing lunate-lamellate in the upper basal zone, claw 0.75--1.5 mm long; keel cymbiform, 5--8 x 3--4 mm, claw 1--2 mm long. *Stamens* monodelphous fused adaxially. *Ovary* narrowly



oblong, 5--7 mm long, densely sericeous; style 6--7 mm long. *Fruit* velutinous, compressed, 40--50 x 5--6 mm. *Seed* red-brown to green-brown sometimes speckled, orbicular or irregular, 2--3 x 2--2.5 mm.

A. polyphyllum is very distinctive due to the upper ramification of short branches. These branches have dense foliage and bear terminal inflorescences. The small-leaved axillary branches are however absent from seedlings and coppicing specimens (*Britten 5654, Bokelmann s.n.*). In addition rejuvenated specimens bear erect inflorescences with well developed bracts while in moribund specimens inflorescences have small bracts and are often pendent and secund.

The species usually occurs on forest margins in Alexandria Forest and Highland Sourveld (Figure 64).²⁶

Without precise locality: *Ecklon & Zeyher 1302* (MO); *MacOwan 1405* (SAM); Kaffraria, *Murray s.n.* (BOL). 3225 (Somerset East): Stockenstroom, (--DD), *Scully 119* (BM, PRE); Bergman's Kloof, (--DD), *Scott Elliot s.n.* (E). 3226 (Fort Beaufort): Fort Beaufort, (--BC), *Cooper 257* (BM, BOL, E, G, NY, P); Old Katberg Pass, (--DA), *Acocks 12148* (BOL); *Drège s.n.* (G, P, PRE, S); *Sole 416* (PRE); *Galpin 1728* (BOL); *Ecklon & Zeyher s.n.* (PRE); Rabula, Amatola

Figure 61

Argyrobium polyphyllum. A. Flowering branch (bar = 20 mm); B. lower leaves (bar = 20 mm); C. standard, abaxial view (bar = 2 mm); D. wing (bar = 2 mm); E. keel (bar = 2 mm); F. androecium (bar = 2 mm); G. pistil (bar = 2 mm); H. calyx (bar = 2 mm); I. juvenile leaf (bar = 10 mm); J. upper adult leaf (bar = 2 mm). Voucher: *Edwards 491*.

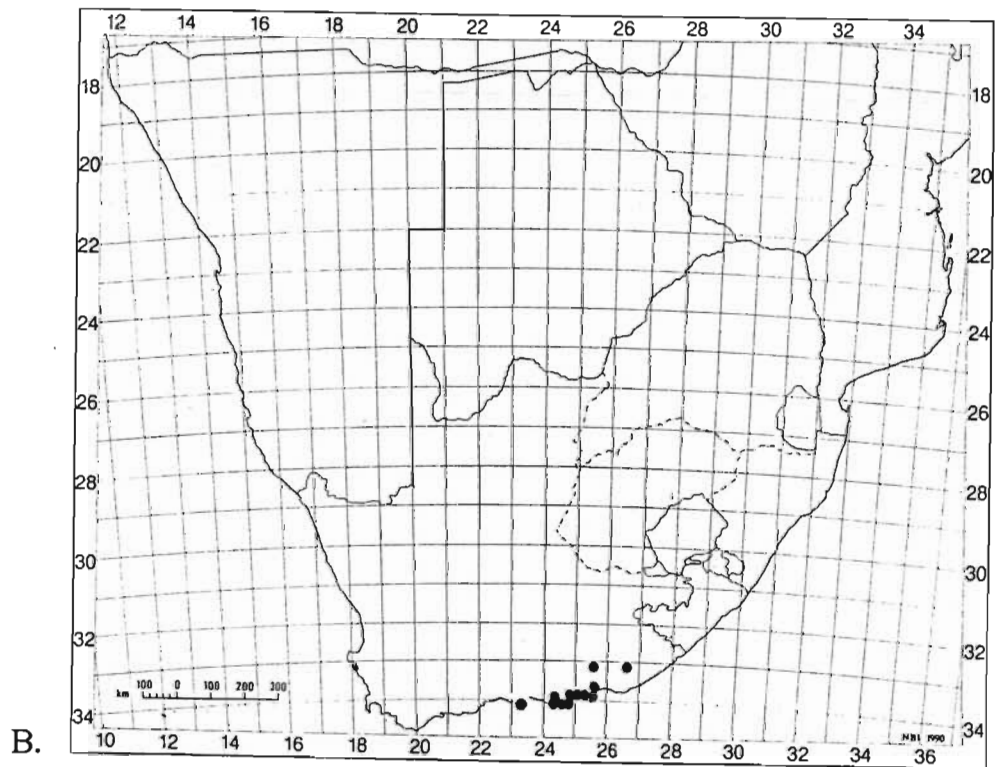
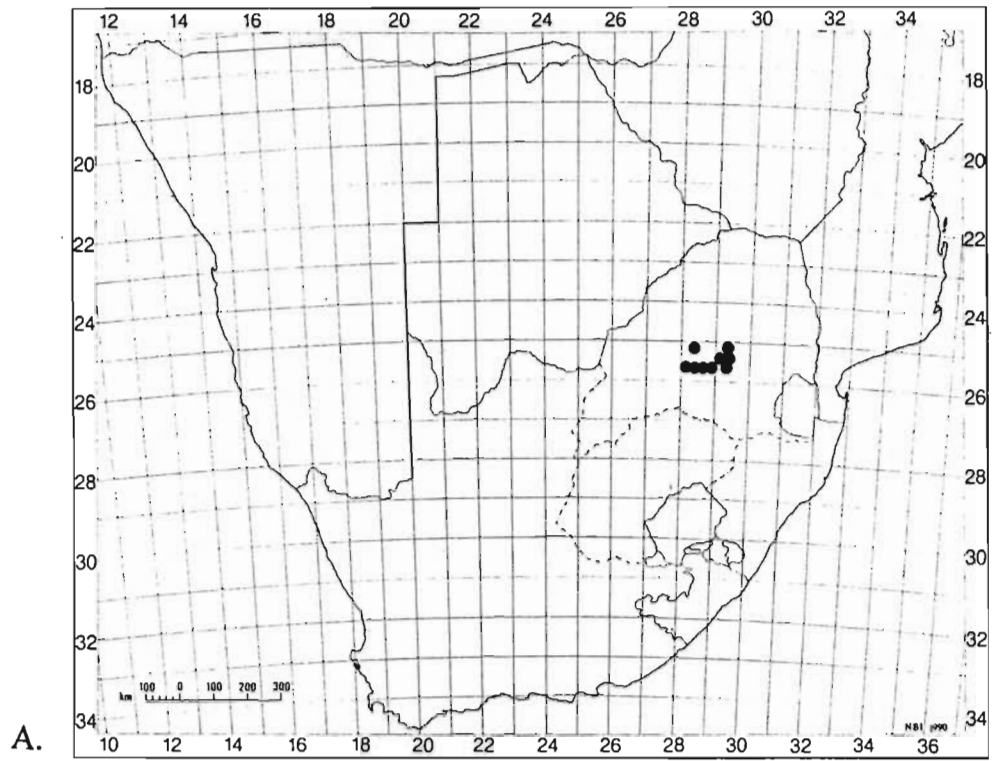


Figure 62. Recorded distribution of A. A. *megarrhizum* & B. A. *trifoliatum*.

Mountains, (--DB), *Leighton s.n.* (BOL); Chumie Valley, (--DB), *Tyson s.n.* (SAM); Bergvaldungen and Chumiesberg, (--DB), *Ecklon & Zeyher s.n.* (S); Mountain sides Chumiesberg and Winterberg, (--DB), *Ecklon & Zeyher 1302* (C, G, O, P, SAM). 3227 (Stutterheim): Dohne, (--CB), *Durban 25* (TCD); Pirie, (--CC), *Sim 1197* (PRE); Stutterheim, top of Frankfort Hill, (--CD), *Comins 1424* (GRA); *Comins 1719* (GRA); *Edwards 491* (NU); Mt. Coke, (--CD), *Galpin 7842* (PRE); *Tyson 3061* (SAM). 3324 (Steytlerville): Otterford Forest Reserve, (--DB), *Dahstrand 769* (MO). 3326 (Grahamstown): Bathurst, (--DB), *Sidey 4078* (PRE); Kowie, (--DB), *Britten 5654* (GRA, PRE); *Dyer 2009* (GRA); Bathurst, (--DB), *Sidey 3169* (PRE). 3327 (Peddie): between the Buffelsrivier and the Kei, (--AA), *Drège s.n.* (BM, E, G, MO, O, P); East London, (--BB), *Bokelmann s.n.* (NBG); *Booyesen 1* (PRE); *Compton 2447* (NBG); *Smith 3849* (PRE); Amalinda, (--BB), *Flanagan 1772* (BOL, PRE, SAM); Kleinmond, (--CA), *MacOwan 1069* (BOL); *White s.n.* (GRA); *MacOwan 1405* (BOL); *White 948* (GRA).

14. ***Argyrolobium crassifolium*** (E. Mey.) Eckl. & Zeyh., Enum. Pl. Afr. Austr. 2: 184 (1836); Walp.: 506 (1839); Walp.: 631 (1843); Benth.: 342 (1844); Harv.: 70 (1862). Type: Uitenhage, Elandsriver Mountains, *Ecklon & Zeyher s.n.* (TCD!, neo. selected here; BM!, GRA!, PRE!, S!, SAM!, isoneo.). [Original type: eastern Cape, Zwelldam (Swelldam) below 500 ft., *Ecklon s.n.*].

Dichilus crassifolius E. Mey.: 154 (1832). Type: as above.

Chasmone crassifolia (E. Mey.) E. Mey.: 72 (1836). Type: as above.

Chasmone goodioides Meisn.: 75 (1843) *synon. nov.* Type: Wintershoekberge, 2000 ft. *Krauss 929* (G!, lecto. selected here; MO!, W!, isolecto.).

Argyrolobium goodioides (Meisn.) Walp.: 845 (1843) *synon. nov.* Type: as above.

Shrub, up to 1 m tall, erect, well branched, stems sericeous, becoming glabrous. *Leaves* glabrous above, sparsely sericeous below; leaflets 6--12 x 3--8 mm, broadly obovate, apex rounded to emarginate, apiculate; petiole 3--6 (--9) mm long; stipules 0.5--2 x 0.5 mm, setaceous or lanceolate. *Inflorescence* racemose, 1--4-flowered, terminal, becoming leaf-opposed; peduncle 7--15 (--20) mm long; bracts 1--2 x 0.5 mm, linear, bracteoles 0.5--1.5 x 0.25--0.5 mm. *Calyx* pilose, deeply bilabiate; upper lobes often united, 4--6 mm long; lower lip 6--7 mm long, lobes vestigial. *Corolla* yellow; standard suborbicular, 9--12 x 8--10 mm, adaxial surface sparsely sericeous, base rounded, claw 1--1.5 mm long; wings oblong to obovate, 10--11 x 4--4.5 mm, with lunate-lamellate sculpturing in the upper basal and upper central zones, claw 1--2 mm long; keel cymbiform, 9--10 x 4--4.5 mm, claw 1--3 mm long. *Stamens* monadelphous, sheath completely fused above. *Ovary* narrowly oblong, 6--8 mm long; style 3--4 mm long. *Fruit* sparsely sericeous, compressed, only immature fruits seen. *Seed* not seen.

In habit *A. crassifolium* resembles *A. parviflorum* but these species are easily separated on leaf vestiture, leaf venation and floral characters. Both species are limited to False Macchia but *A. crassifolium* occurs coastally (Figure 66).

The typification of this species is confusing. Meyer's (1832) original description was of an Ecklon specimen, presumably collect during the expedition undertaken in 1829 to Algoa Bay (Gunn & Codd 1981). The original description cites only the district Uitenhage. Meyer (1836) transferred the species to *Chasmone* and cited a more precise locality, 'Zwellendam'. Neither of these specimens were located and it is likely both were destroyed at B during World War II. Ecklon and Zeyher (1836) cite a different collection as the type and in the absence of Meyer's type material this was chosen as the neotype.

3324 (Steytlerville): Hankey, nr. Harmonie, (--DD), *Cowling* 823 (GRA). 3325 (Port Elizabeth): Elandsrivierberge, (--CA), *Ecklon & Zeyher* 1305 (BM, GRA, S, SAM); Bulkrivier, (--CC), *Holland* 3857 (PRE); *Holland* 3653 (BOL); Uitenhage, (--CD), *Harvey* 931 (BM, TCD); *Krauss* 929 (G, MO); *Schlechter* 2522 (BM); *Zeyher* 2303 (G, P, PRE, S, SAM); Addo Bush, (--CD), *Story* 2760 (PRE); Backens River, (--DC), *Long* 285 (PRE); Redhouse, (--DC), *Paterson* 601 (BOL, GRA, PRE); Port Elizabeth, (--DC), *Salter* s.n. (BM). 3424 (Humansdorp): Geelhoutrivier, (--BB), *Fourcade* 2288 (BOL, PRE).

15. *Argyrolobium incanum* Eckl. & Zeyh., Enum. Pl. Afr. Austr. 2: 185 (1836); Harv.: 70 (1862). Type: eastern Cape, Bothasberg nr. Grahamstown, *Ecklon & Zeyher s.n.* (PRE!, lecto. selected here; SAM!, isolecto.).

Chasmone holosericea E. Mey. var. *incana* Meisn.: 76 (1843). Type: eastern Cape, Baviaanskloof, mountain sides, Dec. 1838, *Krauss s.n.* (B†).

Shrub, up to 2 m tall, erect, well branched, stems sericeous, becoming glabrous. *Leaves* sericeous; leaflets obovate to obcordate, 5--15 x 4--10 mm, apex rounded, emarginate or recurvo-mucronate; petiole 3--12 mm long; stipules setaceous to subulate, 0.5--4 x 0.2--1 mm. *Inflorescence* racemose to pseudo-umbellate, (1--) 3--5 (--8)-flowered, terminal, becoming leaf-opposed; peduncle sericeous; bracts subulate to lanceolate, 1--3 x 0.5--1 mm; bracteoles lanceolate, 1--3 x 0.25--1 mm. *Calyx* sericeous; upper lip 10--12 mm long, sinus 4--6 mm deep, lobes sometimes connate; lower lip 10--13 mm long, lobes usually connate. *Corolla* yellow becoming russet with age; standard orbicular, 11--15 x 10--14 mm, adaxial surface sericeous medially, base obtuse, claw 2 mm long; wings oblong to obovate, 10--14 x 4--6 (--7) mm, with lunate-lamellate sculpturing in the upper basal and upper central zones, claw 2--3 mm; keel cymbiform, 9--12 x 4--5 mm, claw 2--3 mm long. *Stamens* monadelphous, sheath split above almost to the base. Ovary narrowly oblong, 8--10 mm long; style 3--4 mm long. *Fruit* sericeous, compressed, 40--60 x 4--5 mm. *Seed* yellow, irregular, 2--3 mm in diameter.

A. crassifolium, *A. trifoliatum* are often misidentified as *A. incanum*. The features which separate *A. crassifolium* relate to its diminutive leaves and flowers. In addition its leaflets are sparsely hairy abaxially and usually glabrous adaxially. The distinction of *A. trifoliatum* is based on the absence of trichomes on the adaxial leaflet surfaces. *A. trifoliatum* frequently produces basal coppices with long internodes and villose indumentum no similar growth has been observed in *A. incanum*.

A. parviflorum, was previously lumped with *A. incanum* however it is easily distinguished by its prominent abaxial leaf ribs and smaller flowers.

Coastal forms of *A. incanum* from Humansdorp are less than 600 mm tall and have small leaflets. Inland forms from the Baviaanskloof Mountains are taller (c. 2 m) and virgate with large leaves (Figure 64). Both forms occur in False Macchia.

3323 (Willowmore): Joubertina, Dwaas River, Kouga, (--DA), *Manson 217* (PRE); Joubertina, heights S of Kouga River, (--DD), *Fourcade 5085* (BOL, MO, PRE, STE). 3324 (Steytlerville): Mountain rd. near Patensie, (--CA), *Taylor 1286* (PRE); Baviaanskloof, 50 km from Patensie, (--CA), *Edwards & Ackermann 477 & 478* (NU); Stuurmanskraal, next to road to Opkoms, (--CC), *Vlok 900* (PRE); Cambria Pass, (--DA), *Compton 24087* (NBG). 3325 (Port Elizabeth): Loerie, (-

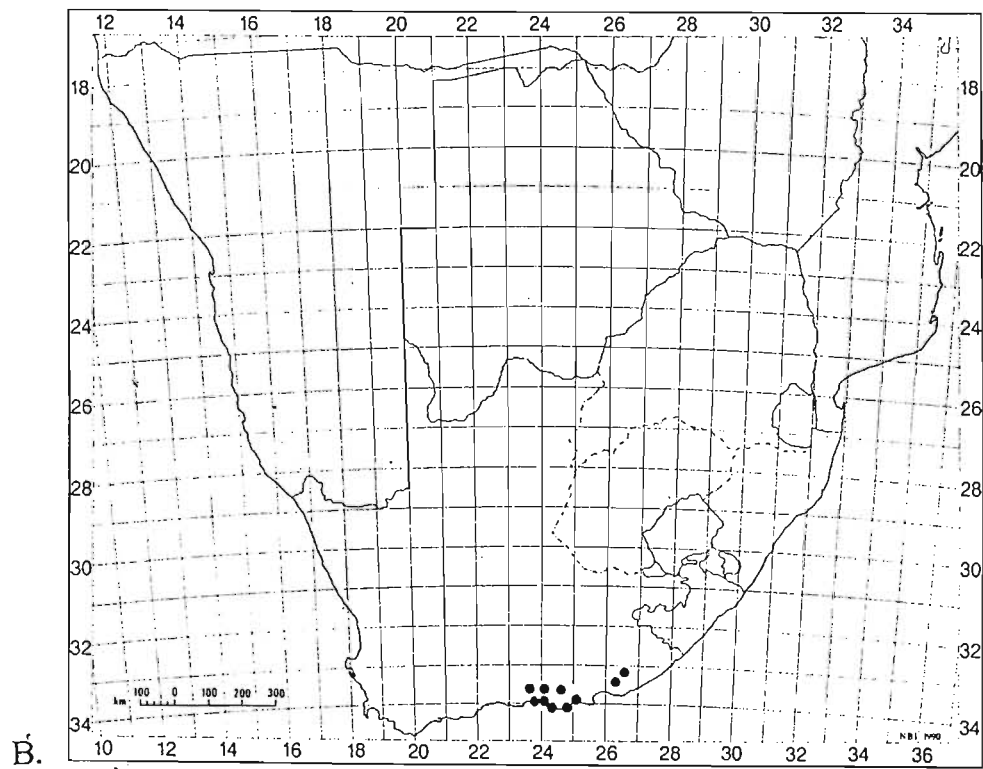
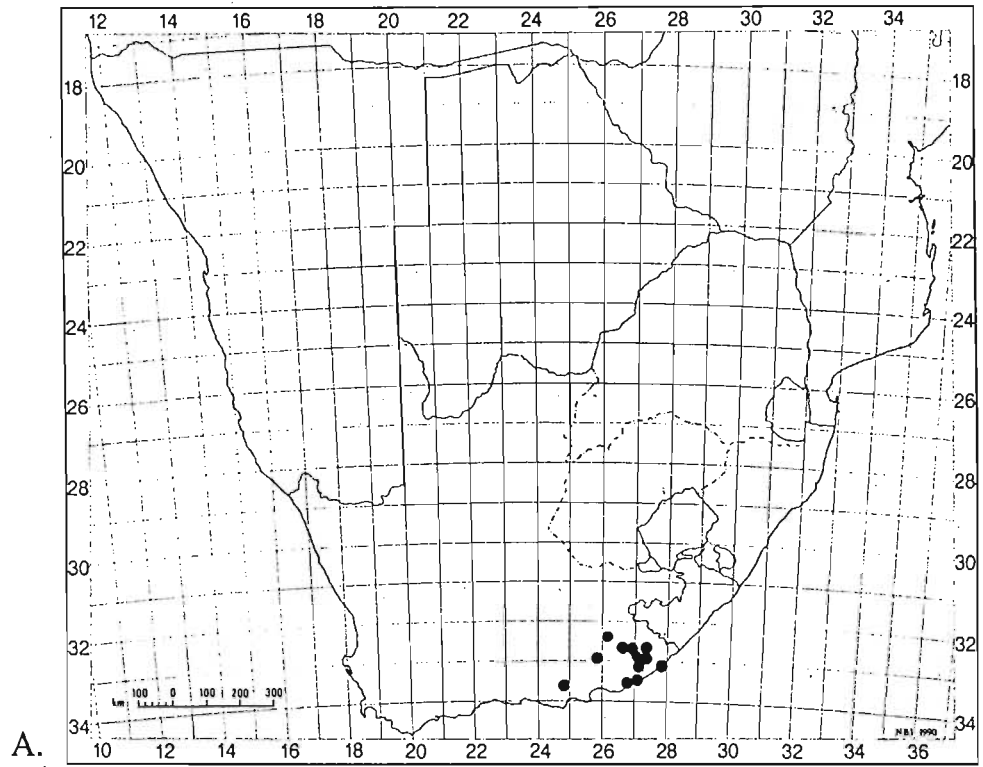
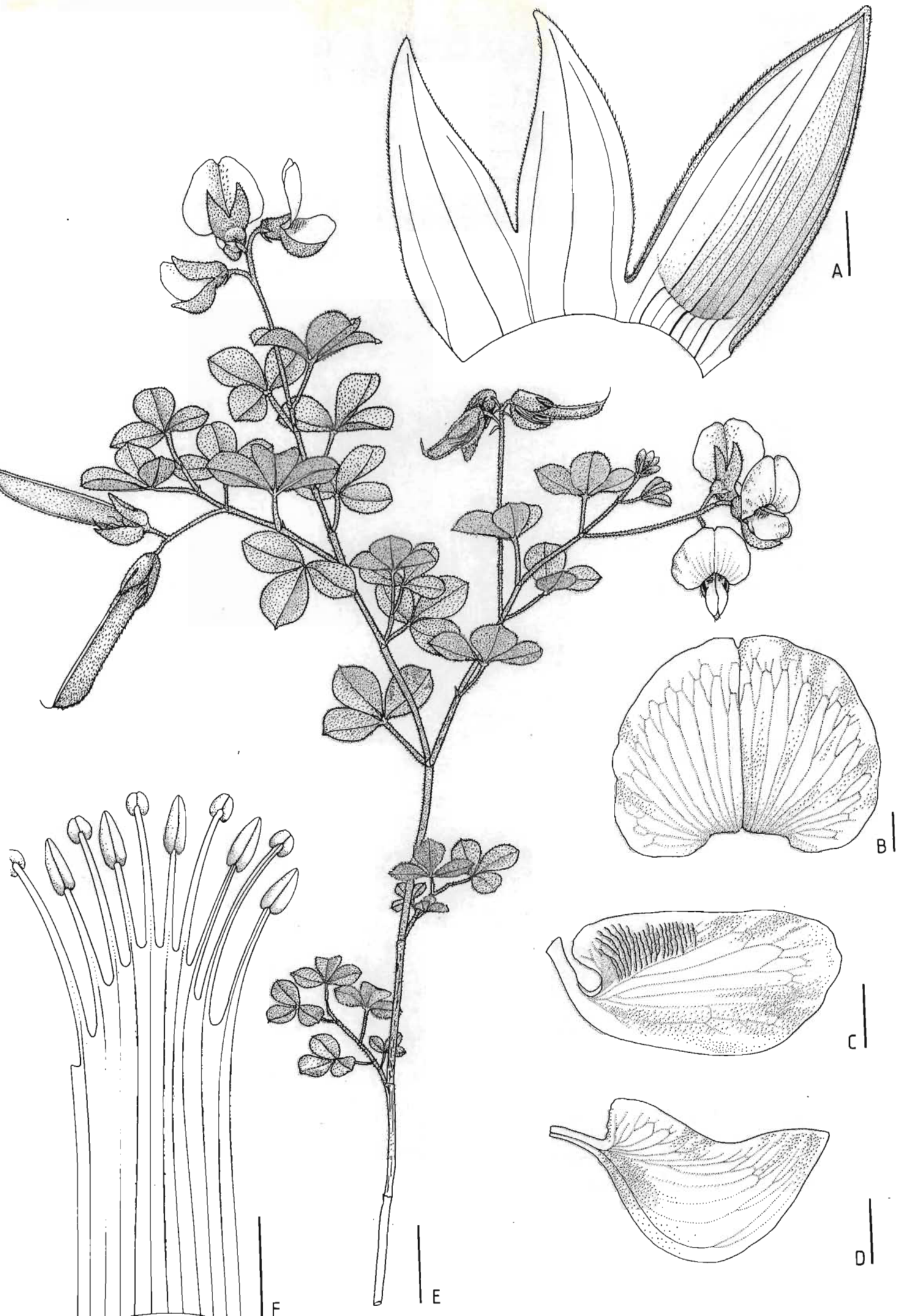


Figure 64. Recorded distribution of *A. A. polyphyllum* & *B. A. incanum*.



-CC), *Urton 44* (GRA). 3326 (Grahamstown): Nuwejaarsdrif Farm, Alicedale, (-AD), *Jacot Guillarmod 7995* (GRA); Bothasberg, (--BA), *Ecklon & Zeyher 1306* (SAM); *MacOwan 799* (mixed collection with *A. collinum*) (BOL, GRA, NY, SAM); Brakkloof, (--BA), *White 31* (GRA). 3424 (Humansdorp): Clarkson, (--AB), *Thode s.n.* (NH); Kabeljauws Post Office, (--BB), *Acocks 13668* (E, PRE); between Jeffrey's Bay and Kabeljauws, (--BB), *Fourcade 5912* (BOL, STE); Humansdorp, (--BB), *Barker 7858* (NBG); *Acocks 20319* (PRE).²⁷

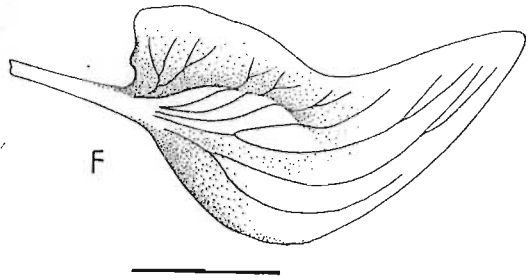
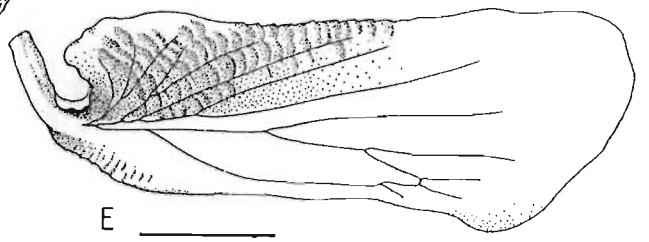
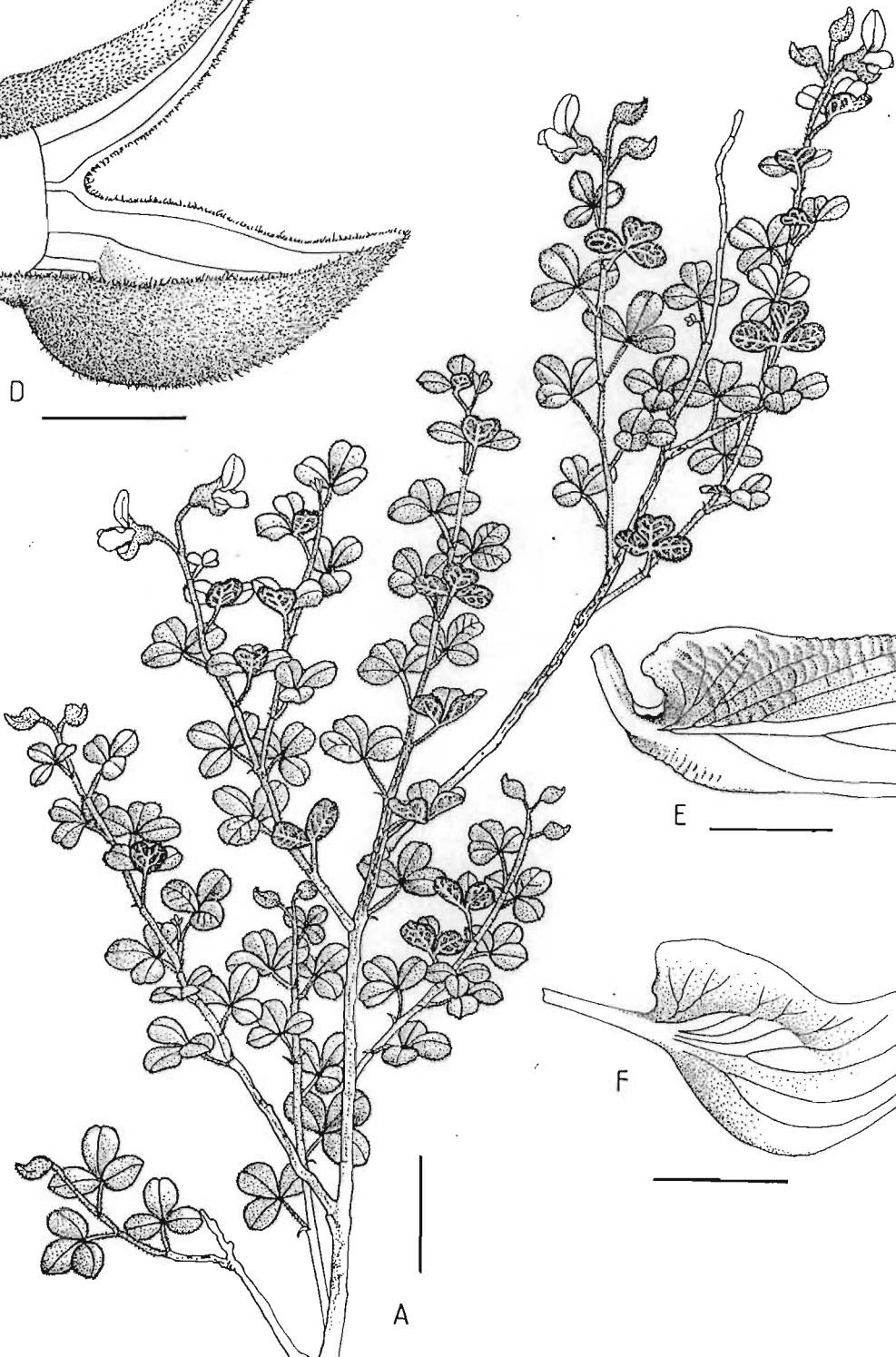
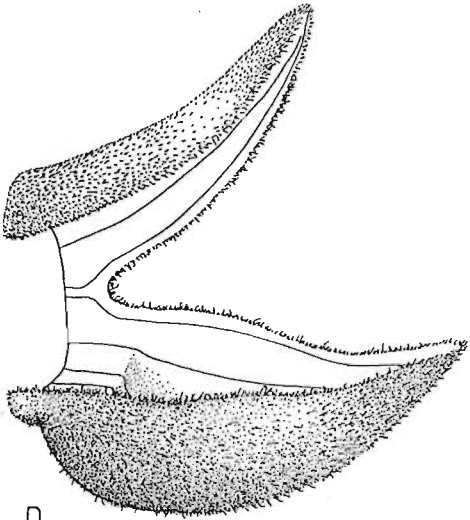
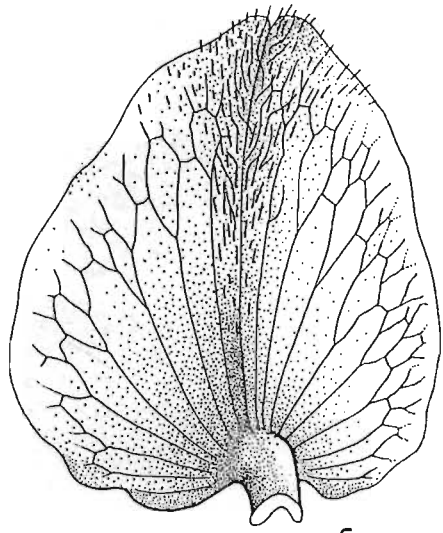
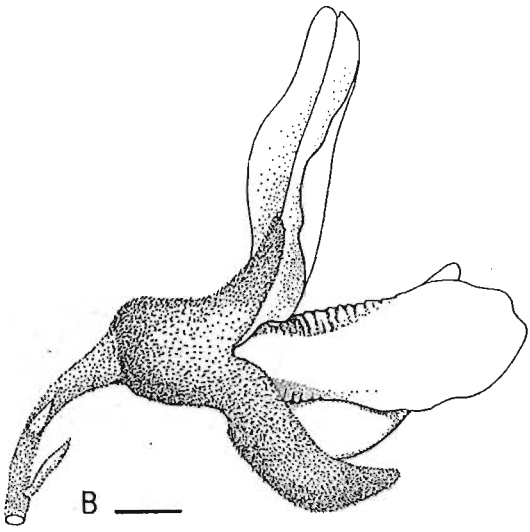
16. *Argyrolobium parviflorum* T.J. Edwards in S. Afr. J. Bot. 59: 296 (1993).

Type: eastern Cape, Steytlerville, Baviaanskloof, Enkeldoorn track, Klein Rivier, *Snijman 338* (NBG!, holo.; PRE!, iso.).

Shrub, up to 1 m tall, erect, well branched; stems velutinous, becoming glabrous. *Leaves* velutinous; leaflets, broadly obovate, 5--9 x 4--6 mm, abaxial costae prominent, reticulate, apex rounded to emarginate, apiculate; petiole 1.5--6 mm long; stipules 0.25--2 x 0.25--0.5 mm, setaceous or lanceolate, caducous. *Inflorescence* pseudo-umbellate, 1--4-flowered, terminal, becoming leaf-opposed; peduncle 4--5(--9) mm long; bracts 1--1.5 x 0.25--0.5 mm; bracteoles narrowly ovate to linear, 0.5--1 x 0.25 mm. *Calyx* velutinous, deeply bilabiate; upper lobes

Figure 63

Argyrolobium incanum. A. Calyx (bar = 2 mm); B. standard, abaxial surface (bar = 2 mm); C. wing (bar = 2 mm); D. keel (bar = 2 mm); E. flowering branch (bar = 20 mm); F. androecium (bar = 2 mm). Voucher: *Edwards & Ackermann 478*.



5--6 mm long, upper sinus vestigial; lower lip 7--8 mm long, lobes vestigial. *Corolla* yellow; standard suborbicular, 8--9 x 7.5--8.5 mm, adaxial surface sericeous apically, base rounded; claw 1.5--2 mm long; wings oblong to obovate, 9--9.5 x 3--3.5 mm, with lunate-lamellate sculpturing in the basal and upper central zones; claw 1--2 mm long; keel acutely cymbiform, 6.5--7 x 3 mm; claw 1--2 mm long. *Stamens* monadelphous, sheath completely fused above. *Ovary* narrowly oblong, 5--6 mm long; style 3 mm long. *Fruit* velutinous, compressed (only immature fruits seen). *Seeds* not seen.

The reticulate costae of the abaxial leaf surfaces and the small flowers make *A. parviflorum* a distinctive species. With respect to flower size it approximates *A. crassifolium* which differs in its vegetative indumentum and the absence of costae from the abaxial leaf surfaces. *A. parviflorum* is only recorded from False Macchia on the Baviaanskloof Mountains (Figure 66).

28

3324 (Steytlerville): Enkeldoorn Track, Klein Rivier, lower Baviaanskloof Mts., (--CB), *Snijman* 338 (NBG, PRE); pass between Cambria and Combrink, Baviaanskloof, (--DA), *Lewis* 66037 (SAM); Cambria, (--DA), *Compton* 23483 (NBG).

Figure 65

Argyrolobium parviflorum. A. Flowering branch (bar = 20 mm); B. flower, lateral view (bar = 2 mm); C. standard, adaxial surface (bar = 2 mm); D. calyx, lateral view (bar = 2 mm); E. wing (bar = 2 mm). Voucher: *Snijman* 338.

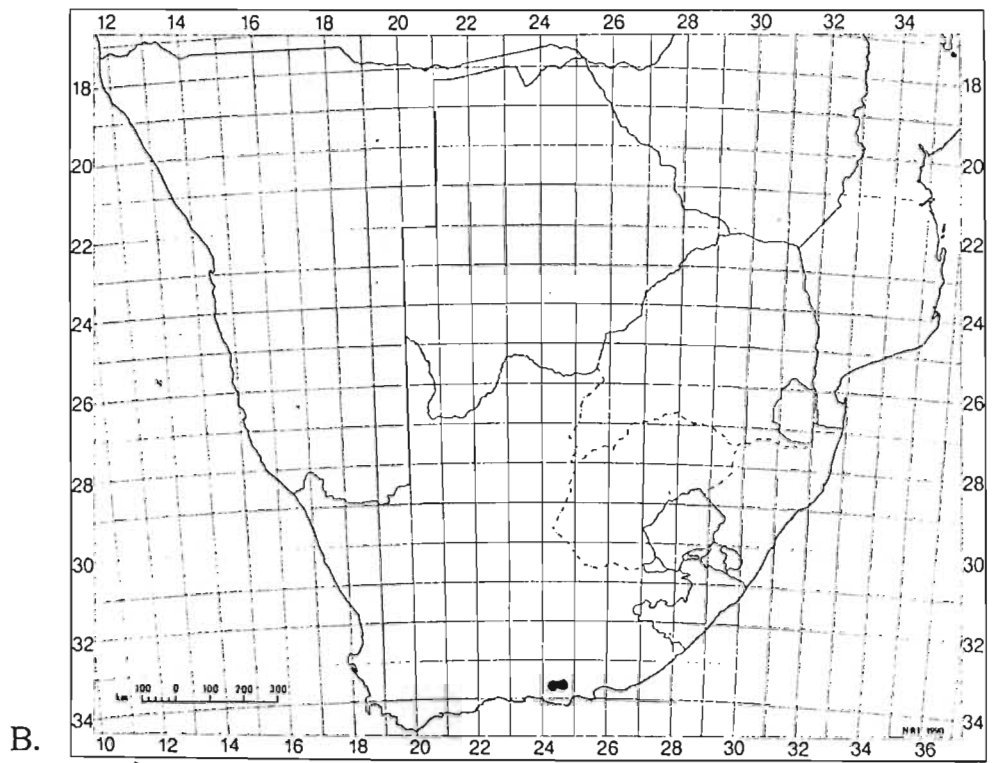
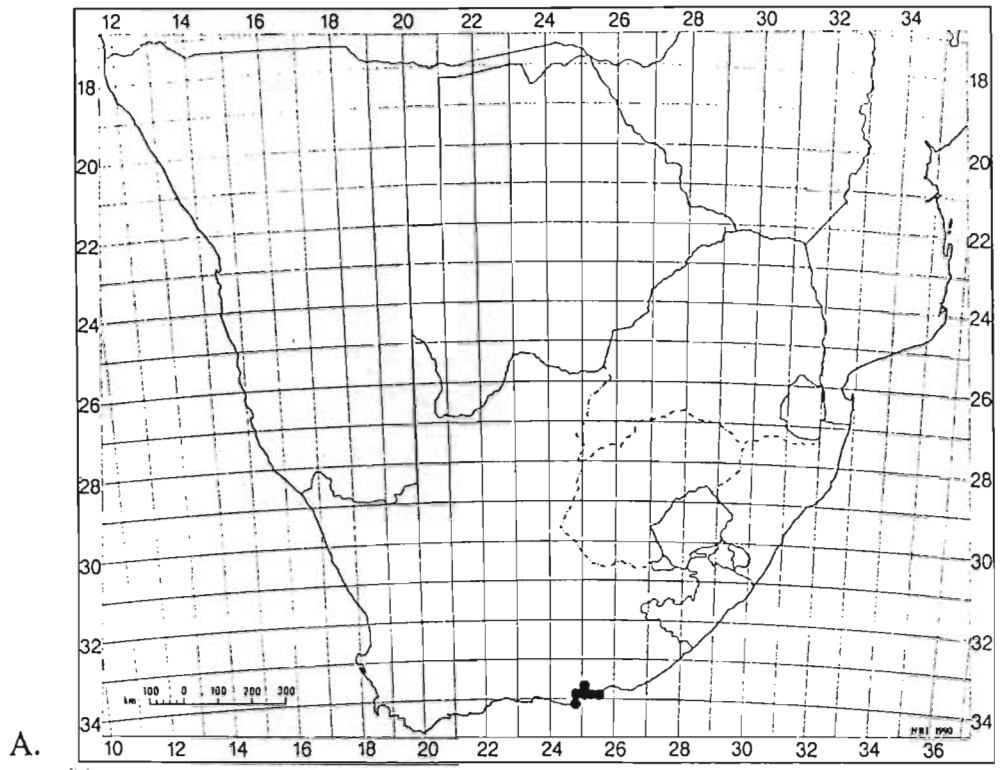


Figure 66. Recorded distribution of A. *A. crassifolium* & B. *A. parviflorum*.

Sectio 5. *Argyrolobium*

Suffrutices, frutices et herbae infirme perennes, floribus dimorphis, foliis infirme dimorphis, foliis superis numquam filiformibus.

Type species: *A. argenteum* (Jacq.) Eckl. & Zeyh.

Herbs, suffrutices or shrubs, erect, decumbent or scandent; stems well branched, weakly perennial, sericeous to pilose, becoming glabrous; roots ligneous, perennial. *Leaves* variously sericeous to pilose; leaflets, ovate, obovate to suborbicular; apex acute to rounded, apiculate; stipules setaceous to ovate. *Inflorescence* sessile or pedunculate, racemose or rarely pseudoumbellate; leaf-opposed or rarely terminal; bracts linear to ovate, bracteoles setaceous to ovate. *Flowers* dimorphic. *Calyx* sericeous; deeply divided. *Corolla* bright yellow fading to russet; standard suborbicular to obovate, adaxial surface sericeous; wings obovate to oblong, glabrous or distally sericeous, often with lunate-lamellate sculpturing in the upper basal and upper central zones; keel cymbiform, glabrous or pilose along the lower margin. *Stamens* monadelphous or pseudodiadelphous, sheath fused above. *Ovary* narrowly oblong, style glabrous. *Fruit* pilose, compressed. *Seed* with asymmetric funicular tongue or symmetrical aril.

This section includes the most widespread species which embrace a wide range of forms. The production of cleistogamous flowers is limited to section

Argyrolobium. The former includes herbs with lignotubers and filiforme leaves.

We have recognised a number of very similar, sympatric species because they maintain their identity in mixed populations. This is especially true of *A. rupestre* and its allies. The section will need expansion to incorporate tropical entities.

17. *Argyrolobium tomentosum* (Andr.) Druce in Rep. Bot. Exch. Cl. Brit. Is. 1916: 605 (1917); Burt Davy: 394 (1926); Wilczek: 277 (1953); Polhill: 162 (1968); Ross: t. 1602 (1970). Type: t. 237 in Andrew's Botanical Repository 4 (1802), from cultivated plants at Hammersmith Nursery, London, seed from Cape Province.

Cytisus tomentosus Andr.: t. 237 (1802). Type: as above.

Tephrothamnus tomentosus (Andr.) Sweet: 126 (1830). Type: as above.

Chasmone andrewsiana E. Mey.: 74 (1836), *nom. illegit.* Type: Natal, between Omcomas and Port Natal, *Drège s.n.* (K!, syn.); near Enon, *Drège s.n.* (syn.).

Chasmone andrewsiana E. Mey. var. *umbellata* E. Mey.: 74 (1836), *nom. illegit.* Type: Port Natal, near the Bay, *Drège s.n.* (not traced).

Argyrolobium andrewsianum (E. Mey.) Steud.: 129 (1840); Benth.: 348 (1844); Harv.: 75 (1862); Harms: 178 (1917); Bak.f.: 64 (1926).

Argyrolobium andrewsianum var. *racemosum* Harv.: 75 (1862), *nom. nud.*

Argyrolobium tomentosum var. *racemosum* (Harv.) Burt Davy: 394 (1926)
nom. nud.

Argyrolobium andrewsianum var. *pauciflorum* Harv.: 75 (1862), *nom. nud.*

Argyrolobium andrewsianum var. *helvolum* Harv.: 75 (1862). Type: Natal,
Gueinzius s.n. (G!, lecto. selected here).

Dichilus ciliatum Spreng.f.: 20 (1828). Type: Without precise locality,
 Zeyher 273 (*not traced*).

Trichasma ciliatum Walp.: 510 (1839); Walp.: 630 (1843). Type: as above.

Argyrolobium shireense Taub.: 207 (1895); Bak.f.: 68 (1926); Wilczek: 279
 (1953). Type: Malawi, Shire Highlands, *Buchanan 466, 481 & Last s.n.* (K!,
 isosyn.).

Argyrolobium stuhlmannii Taub.: 207 (1895); Bak.f.: 65 (1926); Wilczek:
 278 (1953). Type: Rwanda/Uganda border, W. Mpororo, *Stuhlmann 3108* (B†).

Argyrolobium angustistipulatum De Wild.: 518 (1924); Bak.f.: 67 (1926).
 Type: Congo Republic, Kivu Province, Boswenda, *Bequaert 6088* (BR!, holo.).

Suffrutex, 0.1--1 m tall, prominently branched, stems perennial, sparsely
 sericeous. *Leaves* monomorphic; leaflets ovate, elliptic or obovate, 10--50 x 7--30
 mm, glabrescent to sparsely sericeous, apex rounded, apiculate, petiole 5--38 mm
 long; stipules subulate to lanceolate, 1--9 x 0.25--2 (--3) mm. *Inflorescence* 1--25
 (--30)-flowered, racemose to pseudoumbellate, leaf-opposed; bracts linear-
 lanceolate to lanceolate, 1--6 x 0.25--1 mm; bracteoles minute 1--3 x 0.25 mm.

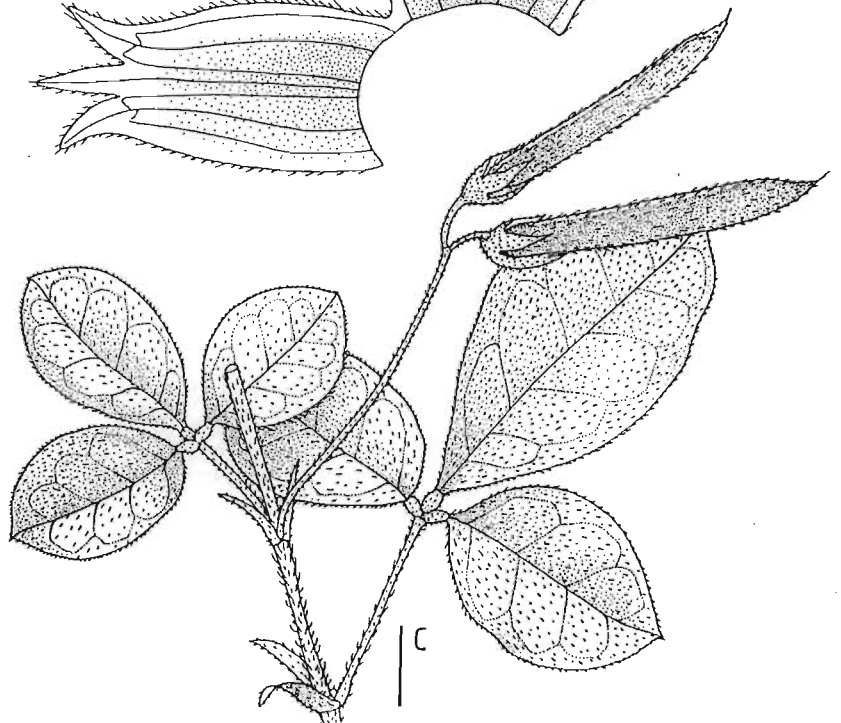
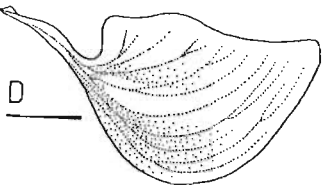
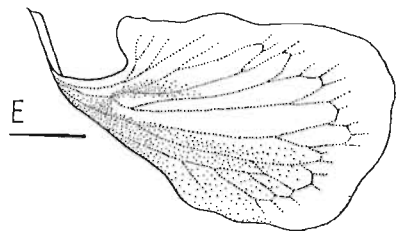
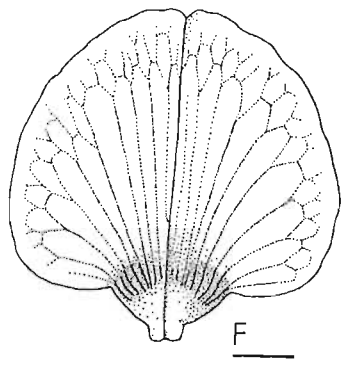
Flowers dimorphic. *Calyx* sericeous, upper lip 5--10 mm long, sinus 3--7 mm deep; lower lip 6--10 mm long, lobes 1--2 mm long, medial lobe linear. *Corolla* yellow, becoming russet; standard suborbicular, 8--15 x 11--15 mm, adaxial surface sparsely sericeous, base cordate, claw 1--1.5 mm long; wings obovate, 8--12 x 5--7 mm, lacking sculpturing, often sericeous distally, claw 0.75--1.5 mm long; keel cymbiform, 5--8 x 3--4 mm, claw 1--2.5 mm long. *Stamens* monodelphous split adaxially. *Ovary* narrowly oblong, 4--6 mm long, densely sericeous; style 3--5 mm long. *Fruit* sericeous, compressed, linear, 30--50 x 4--5 mm. *Seed* red-brown to black, orbicular or irregular, 2 x 2.5 mm.

A. tomentosum is widespread in temperate woodlands, its disjunct afro-montane distribution suggests antiquity (Figure 67). Considerable variability in plant size and indumentum has resulted in the complex synonymy which was rationalised by Polhill (1968). In southern Africa this species could be confused with *A. frutescens* which however, lacks cleistogamous flowers, has obovate standard petals and shortly petiolate leaves.

Without precise locality: *Cooper 1178* (E); *Junod 1721* (G); *Gueinzus 315* (G); *Burchell 5217* (E, G); *Drège s.n.* (G); *Zeyher 456* (G); *Drège s.n.* (O); *Ecklon & Zeyher s.n.* (G); *Zeyher 2298* (G). 2030 (Fort Victoria): Matiwa Lookout near Sibasa, (--CD), *Davidson s.n.* (J, NU). 2229 (Waterpoort): Soutpansberg, Devil's Gully, (--DD), *Galpin s.n.* (BOL); Soutpansberg, (--DD), *Schlechter 4599* (BR,

C, G, PRE); *Meeuse 10168* (G); Wylies Poort, (--DD), *Hardy 953* (G); *Page s.n.* (J). 2230 (Messina): Messina, (--AC), *Hemm 84* (J). 2329 (Pietersburg): Louis Trichardt, (--BB), *Young 14567* (J, PRE); Houtbosdorp turn off from Messina, (--DD), *Clarke 1225* (PRE). 2330 (Tzaneen): Entabeni State Forest, (--AA), *Balkwill 1603* (J, NU); *Codd 4207* (BR, PRE); *Weintraub & Roberts s.n.* (J); Duiwelskloof, (--CA), *Scheepers s.n.* (PRE); Woodbush Nature Reserve, (--CC), *Van Vuuren 1464* (PRE); *Moss 15482* (J, PRE); Tzaneen, (--CC), *Maguire s.n.* (J); Tzaneen, (--CC), *Rogers 18884* (J); Letaba, (--CD), *Scheepers 351* (BR); *Scheepers 339* (G). 2430 (Pilgrims Rest): The Downs, (--AA), *Stirton 8022* (PRE); Mariepskop Reserve, (--DB), *Van Son s.n.* (BR, PRE); Ohrigstad Dam Nature Reserve, (--DC), *Jacobsen 2720* (PRE); *Smith 55* (LYD); Mt. Sheba, (--DC), *Mogg 36613* (J); *Kerfoot s.n.* (J); *Hearne & de Jager s.n.* (J); *Mogg 36599* (J); Belvedere, (--DD), *Davidson 179* (J); Graskop, (--DD), *Raal 1541* (LYD); Pilgrims Rest, (--DD), *Germishuizen 205* (LYD); *Moss 18519* (J); *Rogers 18567* (J). 2530 (Lydenburg): Sabie, (--BB), *Galpin s.n.* (BOL); *Cunliff 3318* (J); Buffelskloof Nature Reserve, (--BC), *Burrows 4556* (J); Witklip, (--BD), *Kluge 570* (PRE); between Nelspruit & Barberton, (--DB), *Balsinhas 2989* (MO). 2531 (Komatipoort): Uitkyk, (--CA), *Stirton 1751* (BR); Pigg's Peak, Havelock, (--CC), *Compton 29991* (PRE); Barberton, (--CC), *Loock s.n.* (PRE). 2631 (Mbabane): Malolotja Nature Reserve, (--AA), *Heath 500* (PRE); Mbabane, (--AC), *Compton s.n.* (PRE); Mdzimba Hills, (--AC), *Prior 462* (PRE); Hlatikulu Forest, (--CD), *Compton 28957* (PRE). 2730 (Vryheid): Utrecht, Retirement,

(--AD), *Devenish* 2125 (NU); Paulpietersburg, (--BC), *Glen* 2357 (NU). 2732 (Ubombo): Ingwavuma, (--AA), *Ward* 2369 (PRE). 2829 (Harrismith): Qudeni, (--DC), *Acocks* 12322 (PRE); *Edwards* 443 (NU). 2830 (Dundee): Weenen, (--CC), *Wylie* 6723 (G); Muden, (--CD), *Edwards* 2780 (B, PRE). 2831 (Nkandla): Nkandla, (--CA), *Wylie s.n.* (G); *Reekmans* 259 (MO); Eshowe, (--CD), *Gerstner* 2214 (MO, PRE); *Lambinon & Reekmans* 259 (BR, PRE); *Goetghebeur* 4446 (BR). 2929 (Underberg): Bulwer, Sunset Farm, (--BC), *Vos* 47 (NU); Cobham, Emerald Vale, (--CB), *Hilliard & Burt* 18313 (E, NU); Bulwer, (--DD), *Bardenhuizen* 380 (J); Bulwer, (--DD), *Bayer* 380 (E). 2930 (Pietermaritzburg): Lidgetton, (--AC), *Moll* 970 (PRE); Karkloof, (--AC), *Edwards* 510 & 512 (NU); Ehlatini Forest, (--AC), *Moll* 2869 (PRE); *Moll* 3439 (BR); Mbona Estate, (--AC), *Wirringhaus* 929 (NU); Two Streams Farm, (--AC), *Wirringhaus* 735 (NU); *Wirringhaus* 821 (NU); Lion's River, (--AC), *Wright* 1434 (E); Mt. Alida, (--AD), *Ross* 2080 (PRE); Richmond, (--CD), *Wood* 9864 (J, PRE); Shongweni Dam, (--DA), *Morris* 899 (PRE); Inanda, (--DB), *Wood* 975 (E); Botha's Hill, (--DC), *Wood s.n.* (G); *Wood* 938 (E). 3029 (Kokstad): Kokstad, (--CB), *Tyson* 1255 (G); *Tyson* 1204 (G); Weza State Forest, (--DA), *Edwards* 504 (NU); Ingeli Forest, (--DA), *Balkwill, Cadman & Boik* 2828 (J); *Coleman* 324 (PRE); *Getliffe* 1209 (NU); *Nicholas* 1801 (NU); *Boik, Cadman & Balkwill* 2829 (J, NU). 3030 (Port Shepstone): Dumisa, (--AD), *Rudatis* 307 (BR, E, G); Oribi Gorge, (--CB), *Germishuizen* 899 (PRE); *Vassilatos & Mantell* 949 (J). 3129 (Port St. Johns): Port St. Johns, (--DA), *Denley s.n.* (J). 3225



(Somerset East): Stockenstroom, (--DD), *Scott Elliot 212* (E). 3226 (Fort Beaufort): Bedford, (--CA), *Scott Elliot 667* (E); Hogsback, (--DB), *Dahlstrand 2895* (J). 3227 (Stutterheim): Hogsback, (--CA), *Stirton 6237* (PRE); *Lucas s.n.* (J); *Bayliss 7250* (BR); Pirie, (--CC), *Sim 4011* (PRE); *Young s.n.* (J); 13 km to Keiskamahoek from Alice, (--CC), *Stirton 6281* (PRE); *Kotsokoane 241* (J). 3228 (Butterworth): Kentani, (--AD), *Pegler 456* (MO). 3323 (Willowmore): Tsitsikama, (--DC), *Krauss 29* (G). 3325 (Port Elizabeth): Zuurberg, (--AD), *Long 1264* (PRE); Uitenhage, (--CD), *Schlechter 2522* (BM, BR, C, UPS); forests of Krakakamma, (--CD), *Ecklon 533* (O). 3326 (Grahamstown): Grahamstown, (--BC), *MacOwan 235* (NYBG); Belmont Valley, (--BC), *Booi 27* (MO). 3423 (Humansdorp): Buffelsnek, (--AA), *Bayliss 1391* (G, PRE).²⁹

18. *Argyrolobium humile* Phillips in Ann. S. Afr. Mus. 9: 120 (1913). Type: Griqualand East, Mt. Malowe, *Tyson 1259* (BM!, lecto. selected here; BOL!, G!, UPS!, isolecto.).

Herb, up to 0.25 m tall, erect to decumbent; stems sparingly branched, glabrescent to pilose, becoming glabrous; roots ligneous, perennial. Leaves pilose to sericeous on both surfaces; leaflets, broadly obovate to broadly elliptic, 15--28 x 8--16 mm; petiole sericeous to pilose, 1--2 (--4) mm long; apex rounded,

Figure 67

Argyrolobium tomentosum. A. Flowering branch (bar = 20 mm); B. calyx (bar = 2 mm); C. fruits (bar = 4 mm); D. keel (bar = 2 mm); E. wing (bar = 2 mm); F. standard, abaxial surface (bar = 2 mm). Voucher: *Edwards 443*.

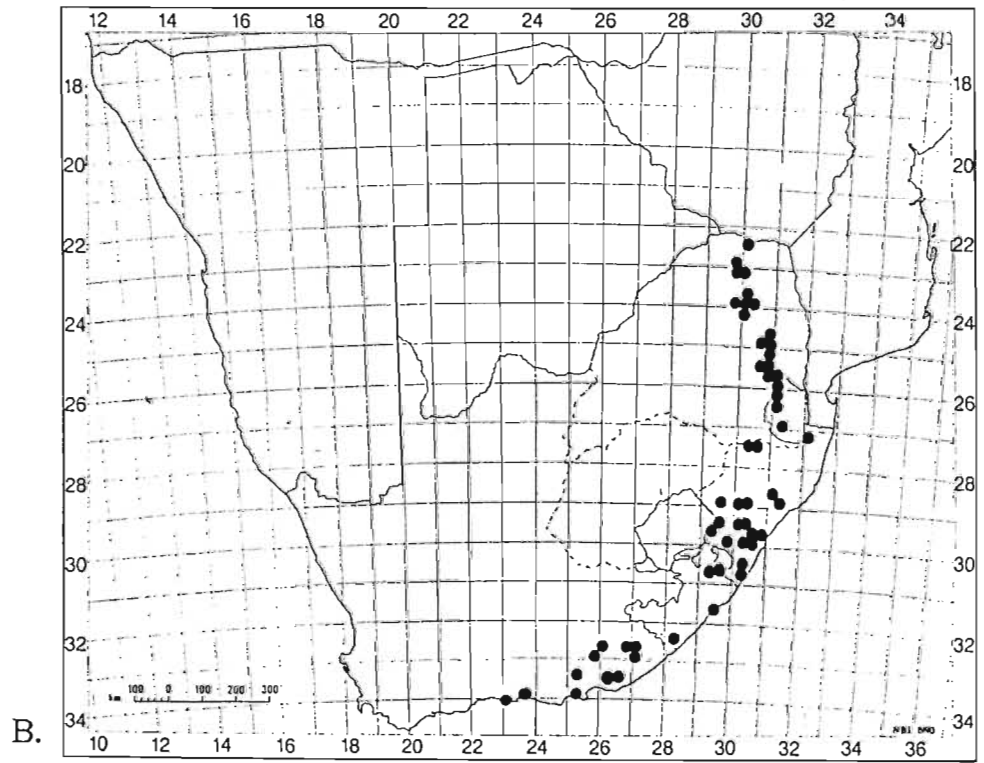
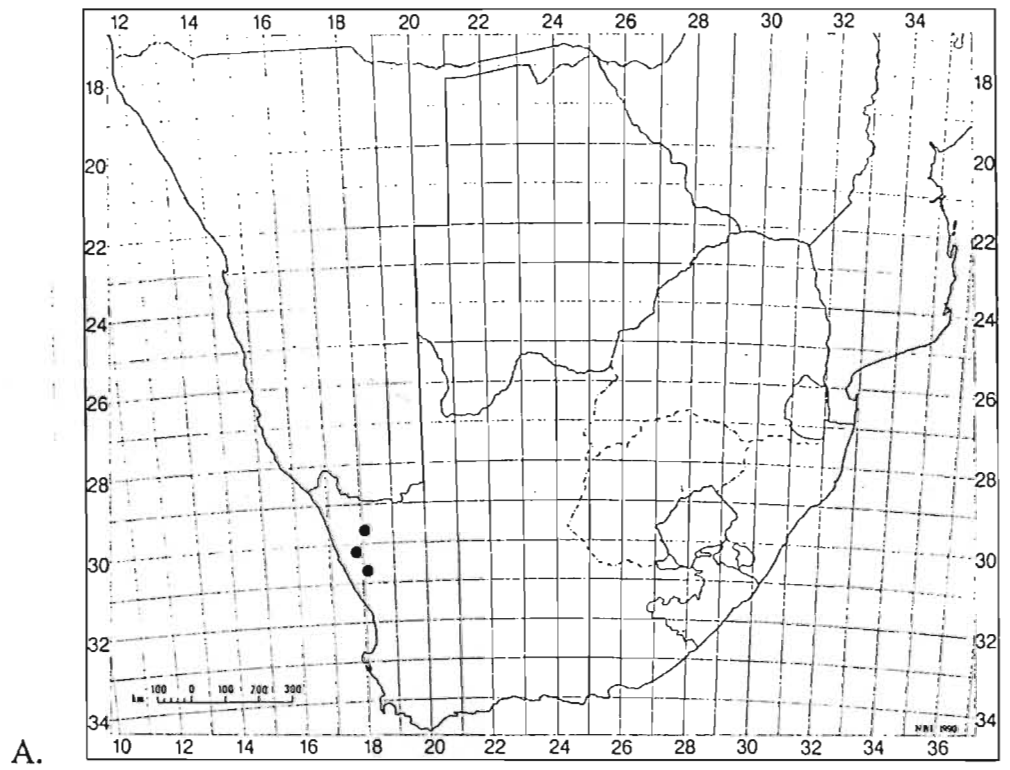
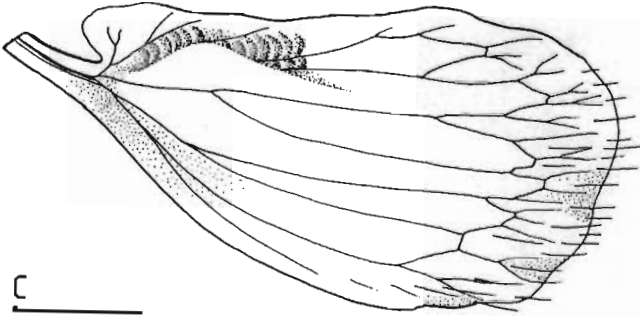


Figure 68. Recorded distribution of A. *A. petiolare* & B. *A. tomentosum*.

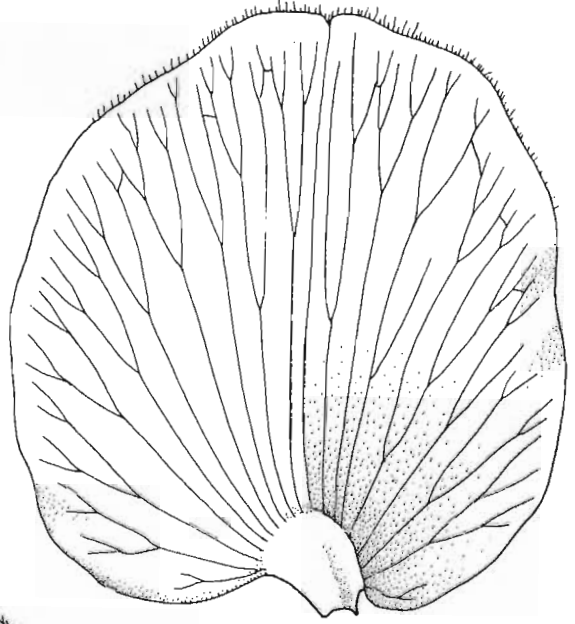
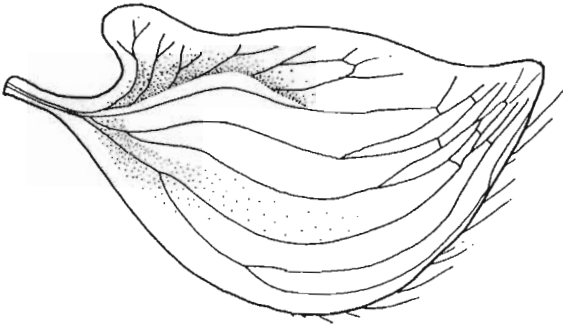
apiculate; stipules lanceolate to narrowly ovate, (2--) 4--8 x 1--3 mm. *Inflorescence* 1--2 (--4)-flowered, initially terminal but becoming leaf-opposed; peduncle (20--) 30--45 mm long; bracts ovate, 2.5--5 x 0.75--1 mm, bracteoles, linear, 1.5--3 x 0.25--0.5 mm. *Flowers* dimorphic. *Calyx* pilose or rarely sericeous, deeply bilabiate; upper lobes 9--12 mm long, upper sinus 7--10 mm, lower lip 9--12 mm long, lobes 4--6 mm long. *Corolla* bright yellow fading to russet; standard suborbicular, 13--16 x 13--18 mm, adaxial surface sparingly sericeous, base cordate, claw 1--2 mm long; wings oblong to obovate, 10--13 x 4--5 mm, sparingly sericeous, claw 1--2 mm long, with 3--4 rows of lunate-lamellate sculpturing in the upper basal zone; keel cymbiform, 8--11 x 5--6 mm, glabrous or sparsely sericeous along the suture, claw 1--2 mm long. *Stamens* monadelphous, sheath fused adaxially. *Ovary* narrowly oblong, 5--7 mm long; style 4--5 mm long. *Fruit* sparsely pilose, up to 45 x 5 mm. *Seed* suborbicular, laterally compressed, 1.75--2 x 2 mm, light to dark brown, hilar rim raised, hilar tongue white, asymmetrical.

A. humile is sometimes difficult to distinguish from *A. rupestre* and *A. ascendens*, diagnostic differences are discussed under the latter. The three are sympatric in parts of Natal and the Transkei but no evidence of hybridisation has been found. Near Pietermaritzburg populations of almost exclusively cleistogamous *A. humile* occur (Edwards 696 & 829). The minimal reduction of cleistogamous inflorescences in *A. humile* is cogent with species status. Cleistogamous flowers

D



C



A



of *A. rupestre*, *A. ascendens* and *A. rotundifolium* always have diminutive calyces.

This species is common in moist grassland of the eastern Cape and Natal occurring mainly in Highland and Dohne Sourveld (Figure 74).³⁰

Without precise locality: *Gerrard 1763* (BM); Zululand, *Gerrard & McKen 1763* (BM). 2730 (Vryheid): Paulpietersburg, (--BD), *Stirton 1356* (PRE); Hlobane, (--DB), *Johnstone 523* (NU). 2731 (Louwsburg): Tabankule Coal Mine, (--CC), *Germishuizen 3189* (PRE); Ngome State Forest, (--CD), *Buthelezi 105* (NH); 10 km from Ngome Forest Station on Vryheid Rd, (--CD), *Germishuizen 2114* (PRE). 2831 (Nkandla) Ngoye Forest, (--DC), *Hilliard 2681* (NU); *Venter 2365* (PRE). 2929 (Underberg): Mooi River, Bray Hill, (--BB), *Hilliard & Burt 19086* (E, NU); Mukangane Ridge above Carter's Nek, (--BC), *Hilliard & Burt 17640* (E, K, NU); 17 km east of Mooiriver, Hlatikulu Rd., (--BC), *Manning & Balkwill 341* (NU); Kamberg, Gladstone's Nose, (--BD), *Edwards 752* (NU); Kamberg, (--BD), *Wright 2289 & 1970* (NU); Sani Pass, (--CB), *Hilliard & Burt 18017* (E, K, NU, PRE, S); Mpendle, Tillietudlem, (--DB), *Huntley 411* (MO, PRE). 2930 (Pietermaritzburg): Howick, Twin Falls Farm, (--AC), *Grove 118* (NU); Lions River, (--AC), *Moll 3459* (PRE); Howick, (--AC), *Morris 119* (NU); Greytown, (--BA), *Wylie 6* (NH); Dalton Bridge, (--BC), *Mogg 57* (PRE); New Hanover,

Figure 69

Argyrolobium humile. A. Habit (bar = 20 mm); B. calyx, inner surface (bar = 2 mm); C. keel (bar 2mm); D. wing (bar = 2 mm). Voucher: *Hilliard & Burt 19086*.

farm Newlands, (--BD), *Balkwill & Balkwill 4974* (J); Boulder Hill Game Farm, (--CB), *Edwards 829 & 696* (NU); Thornville, (--CB), *Solomon s.n.* (NH); Richmond Rd., (--DB), *Barker 4399* (NBG); Euberton, (--DB), *Schlechter 3229* (B, BOL, BR, C, E, G); Inanda, (--DB), *Wood 1369* (BOL, NH, PRE); *Wood 6534* (G); Camperdown, Cato Ridge, (--DC), *Stirton 12189* (NU). 3029 (Kokstad): Ngeli Peak, (--DA), *Hilliard & Burt 3456* (E, NH); *Balkwill & Cadman 2709* (J, NU); *Stirton 10420* (NH); Weza, Mpetyne Forest, (--DA), *Hilliard 2000* (NU); Weza, (--DA), *Stirton 10382* (NH). 3030 (Port Shepstone): Mt. Malowe, near Umzimkulu, (--CB), *Tyson 1259* (BM, BOL, G, UPS). 3128 (Umtata): Mhlahlane Forestry Station, (--BC), *Hutchings 1315* (KEI). 3129 (Port St. Johns): Mkambati Nature Reserve, (--BD), *Shackelton 345* (KEI, PRE). 3130 (Port Edward): Mkambati Nature Reserve, (--AC), *Nicholas & Smook 2364* (PRE).

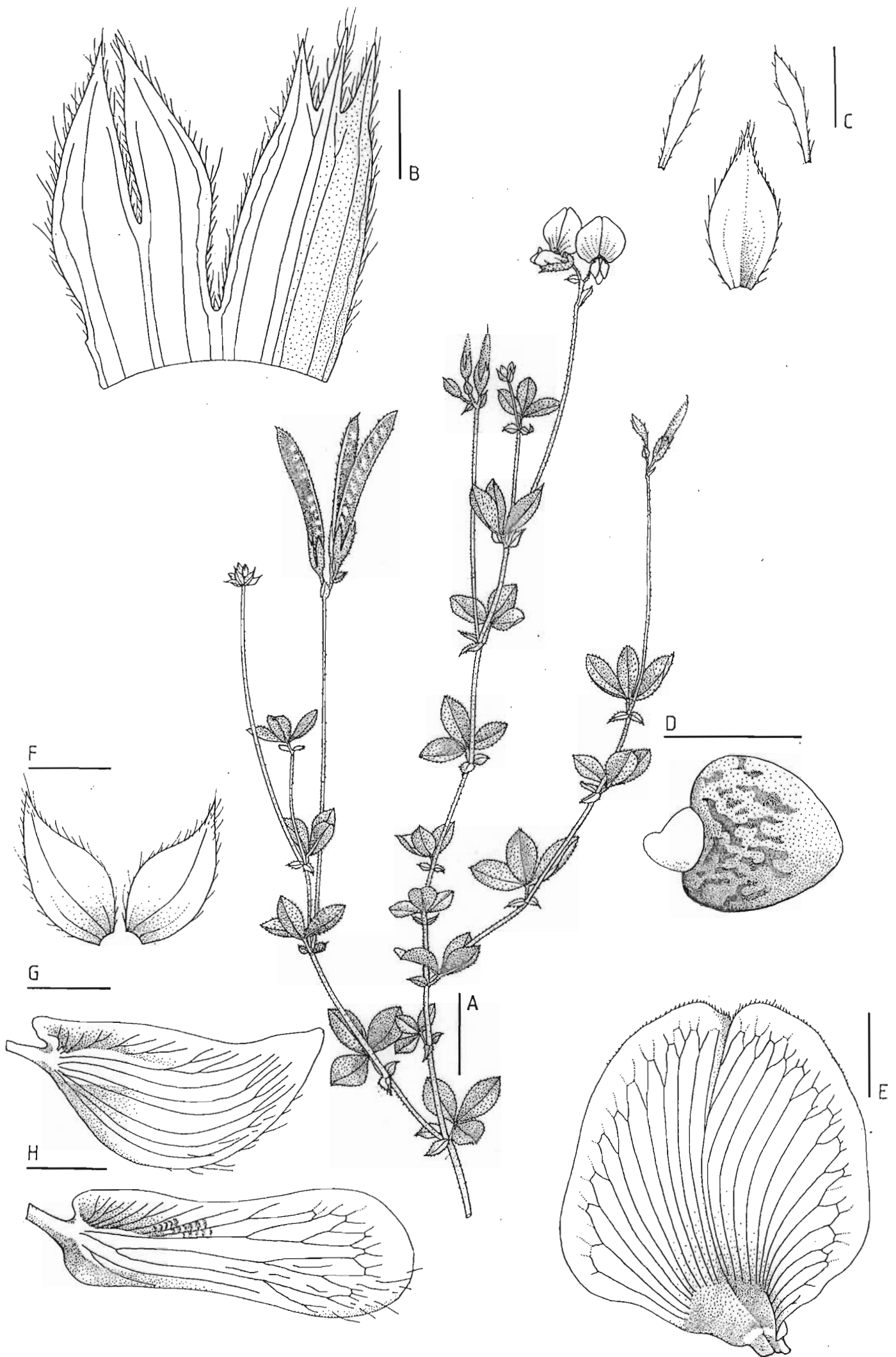
19. *Argyrolobium ascendens* (E. Mey.) Walp. in *Linnaea* 13: 507 (1839); Walp.: 631 (1843); Harv.: 75 (1862). Type: Natal, in grassland, between Omcomas (Nkomanzi River) and Omblas, below 500', *Drège* (Vc, 24) (K!, lecto. selected here; G!, MO!, P!, TCD!, S!, isolecto.).

Chasmone ascendens E. Mey.: 73 (1836). Type: as above.

Argyrolobium longipes N.E. Br.: 254 (1897), *synon. nov.* Type: Transvaal, Berea Ridge, Barberton, *Galpin 1305* (BOL!, K!, PRE!, isosyn.); Natal, Tugela, *Gerrard & McKen 1764, 1765* (K!, lecto. selected here; BM!, K!, TCD!, W!,

isolecto.).

Herb, up to 0.4 m tall, decumbent or scandent; stems weakly perennial, well branched, sericeous, becoming glabrous; roots ligneous, perennial. *Leaves* sericeous on both surfaces; leaflets, narrowly obovate to elliptic, 8--27 x 2--11 mm; petiole sericeous, (1--) 3--5 (--7) mm long; apex acute, apiculate; stipules lanceolate to ovate, (2--)3--5 (--10) x (0.5--) 1--3 (--4) mm, apex attenuate. *Inflorescence* pseudo-umbellate, 2--6-flowered, terminal but becoming leaf-opposed; peduncle 60--150 mm long; bracts ovate, 3--7 x 1--3 mm, bracteoles, linear, 1--5 x 0.5--1 mm. *Flowers* dimorphic. *Calyx* sericeous, deeply bilabiate; upper lobes 5--7 mm long, upper sinus 5 mm, lower lip 5--7.5 mm long, lobes 2.5--3 mm long. *Corolla* bright yellow fading to russet; standard broadly obovate, 11--14 x 9--10 mm, adaxial surface sparingly sericeous, base cuneate, claw 1--2 mm long; wings oblong to obovate, 9--11 x 3--4 mm, sparingly sericeous, sculpturing vestigial, claw 1--2 mm long; keel cymbiform, 9--11 x 4--5 mm, glabrous to sparsely sericeous along the suture, claw 1--2 mm long. *Stamens* monadelphous, sheath fused adaxially. *Ovary* narrowly oblong, 5--7 mm long; style 4--5 mm long. *Fruit* sparsely sericeous, up to 45 x 4--5 mm. *Seed* suborbicular, laterally compressed, 1.75--2 x 3 mm, light to dark brown, often speckled, aril white.



A. ascendens is distributed from southern Natal into the eastern Transvaal. Plants are slightly variable in leaf size but these differences manifest themselves within single populations. The prominent, symmetrical aril is diagnostic for this species (Figure 71).

A. ascendens is closely related to *A. rupestre* and material lacking seed is sometimes difficult to place. The flowers of *A. ascendens* are smaller and are borne atop longer peduncles, its petioles are shorter and its stipules are larger. The leaflets of this species are usually elliptic with acute apices while those of *A. rupestre* are usually obovate with rounded apices. *A. humile* is also commonly confused with *A. ascendens*. It can be distinguished by its fewer, larger flowers, pilose indumentum and larger rounded leaflets.

This species occurs commonly in Ngongoni Veld but extends into a variety of grassland types (Figure 74).

Without precise locality: Tugela, *Gerrard & McKen 1765 & 1764* (BM, TCD).
2529 (Witbank): Middelburg, (--CD), *Kassner 101* (BR). 2530 (Lydenburg):
Elandspruitbergen, (--AA), *Schlechter 3839* (B, BOL, BR, C, E, G, PRE);

Figure 70

Argyrolobium ascendens. A. Flowering branch (bar = 20 mm); B. calyx, inner surface (bar = 2 mm); C. bracts and bracteoles (bar = 2 mm); D. arillate seed (bar = 2 mm); E. standard, abaxial surface (bar = 2 mm); F. stipules (bar = 2 mm); G. keel (bar = 2 mm); H. wing (bar = 2 mm). Voucher: *Edwards 506*.

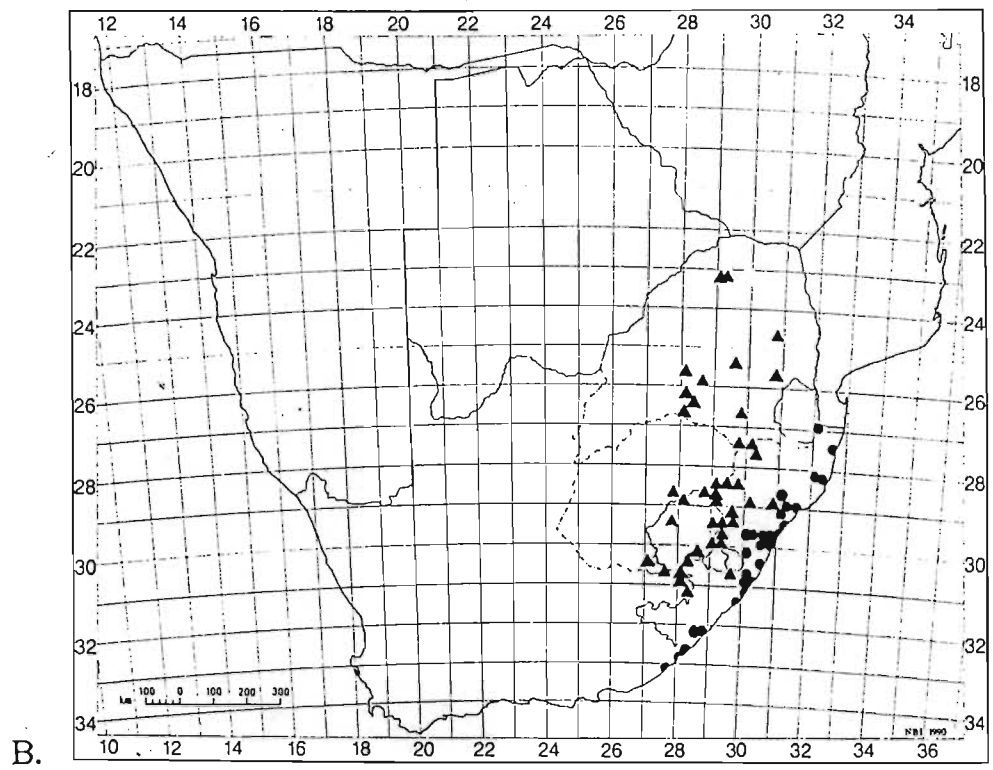
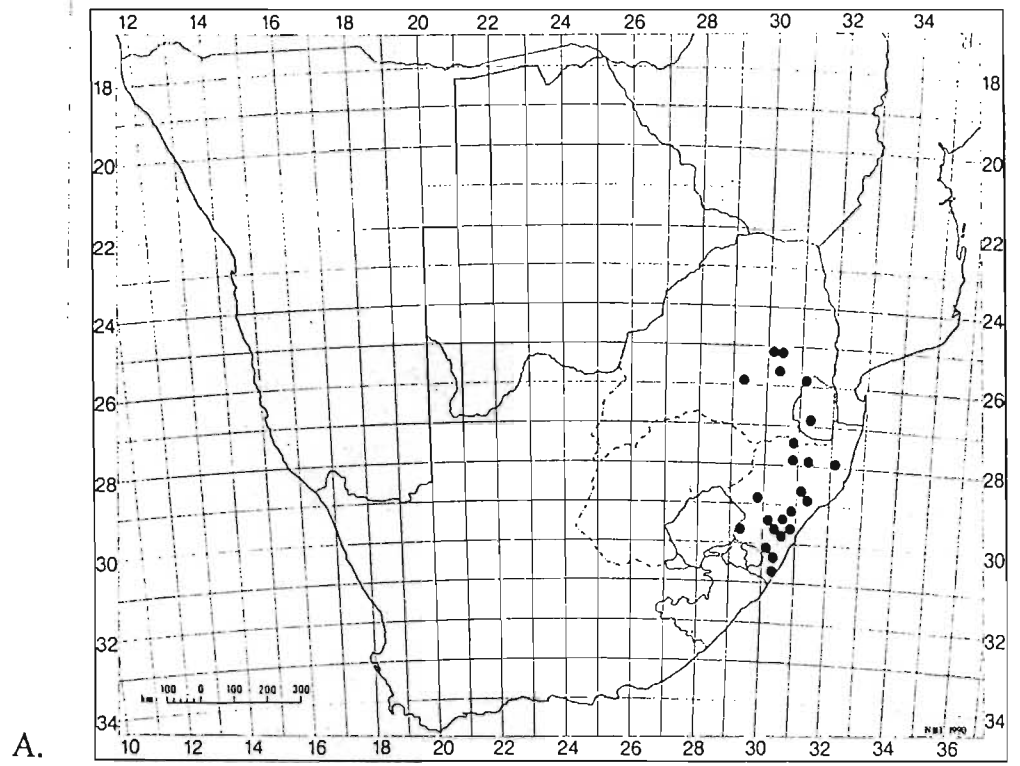


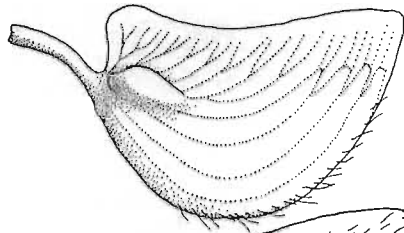
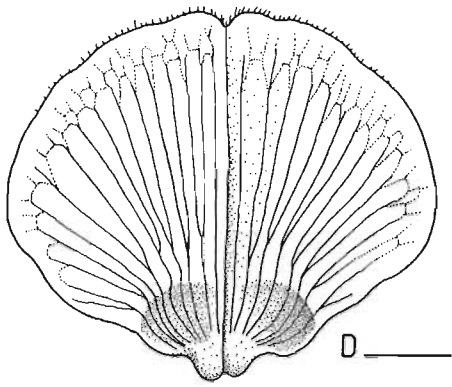
Figure 71. Recorded distribution of A. *A. ascendens* & B. *A. rotundifolium* (●),
A. rupestre (▲).

Lydenburg, (--AB), *Wilms* 283 (E); Waterval Boven, (--CB), *Rogers* 22621 (PRE, SAM). 2531 (Komatipoort): Barberton, (--CC), *Galpin* 1305 (BOL); *Rogers* 25377 (BOL, S). 2631 (Mbabane): Hlatikulu, (--CD), *Stewart* 122 (SAM). 2730 (Vryheid): 5 km from Paulpietersburg, (--BD), *Stirton* 1356 (PRE); Lancaster Hill, (--DD), *Burt-Davy* 11485 (PRE). 2731 (Louwsburg): 10 km from Ngome Forest Station on Vryheid Rd., (--CD), *Buthlezi* 105 (NH). 2829 (Harrismith): Van der Merwe's Kraal, (--DD), *Green* 410 (NH). 2831 (Nkandla): Nkandla Forest Reserve, (--CA), *Venter* 3459 (PRE); Entumeni (Ntumeni), (--CD), *Wood* 9336 (E, MO, NU). 2832 (Mtubatuba): Hluhluwe Game Reserve, (--AA), *Hitchins* 797 (E, NH, NU). 2929 (Underberg): Sunset Farm, Bulwer, (--CB), *Rennie* 1424 (E, NU); *Rennie* 449 (NU). 2930 (Pietermaritzburg): Howick, (--AC), *Ellis* 2 (NU); Elandskop, (--BB), *Laidlaw* 6 (NU); Dalton Bridge, (--BC), *Acocks* 13451 (PRE); Boulder Hill Game Farm, (--CB), *Stirton* 106 (PRE); Hela Hela Nature Reserve, (--CC), *Edwards* 807 (NU); Inanda, (--DB), *Wood* 5319 (MO); *Wood* 1369 (BOL, NH, PRE); Drummond, Botha's Hill, (--DC), *Edwards* 24 (E, NU); *McClellan* 132 (PRE); *Wood* 8032 (E, J, NU); *Wood* s.n. (E, G, MO); *Shinger* 25 (NU); Inchanga, Old Main Rd., (--DC), *Edwards* 506 (NU); Catholic Mission, Old Main Rd., (--DC), *Edwards* 535 (NU). 3030 (Port Shepstone): Ixopo, (--AA), *Acocks* 13292 (PRE); *Schlechter* 6675 (B, BOL, BR); Dumisa Station, (--AD), *Rudatis* 1350 (BM, E); Amanzimtoti, (--BB), *Wood* 3115 (NU); between Omcomas (Umkomaas River) and Omblas, *Drège* s.n. (G, K, MO, P, S, TCD).

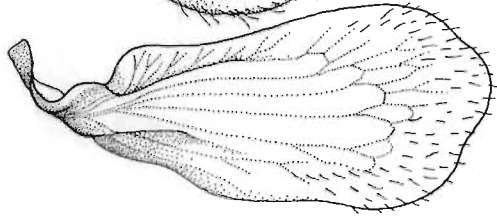
20. **Argyrolobium rotundifolium** T. J. Edwards in *Bothalia* 23: 77 (1993a).

Type: Pietermaritzburg, between Peacevale & Drummond, *Edwards & Ackermann* 329 (NU!, holo.; K!, E!, PRE!, iso.).

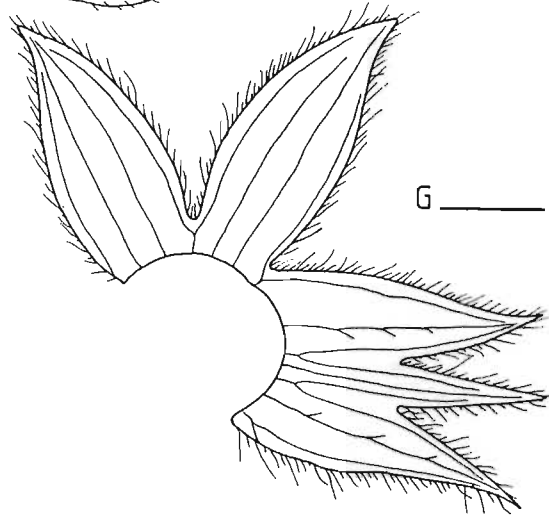
Herb, up to 0.15 m tall, but usually prostrate; stems well branched, weakly perennial, shortly rufous-tomentose, becoming glabrous; roots ligneous. *Leaves* moderately tomentose adaxially, densely tomentose abaxially; leaflets broadly obtuse to rounded, 14--32 x 10--25 mm, apiculate; margins densely rufous-tomentose; stipules free, setaceous to lanceolate, 3--10 x 1.5 mm. *Inflorescence* pseudo-umbellate, 1--4 (--6)-flowered, initially terminal but becoming leaf-opposed; peduncle (30--) 40--150 mm long; bracts linear or narrowly elliptic, up to 6 x 1 mm, bracteoles linear, up to 3 mm long. *Flowers* dimorphic. *Calyx* sparsely to densely pilose; upper lobes 8--10 mm long, lower lip 8--11 mm long, lobes 3--4 mm long. *Corolla* bright yellow becoming russet; standard suborbicular, 11--14 x 12--14 mm, adaxial surface sericeous, base cordate, claw 1--1.5 mm long; wings obovate, 9--12 x 4.5--6 mm, without sculpturing, distally pilose, claw 1.5--2 mm long; keel cymbiform, 8--10 x 4.5--5.5 mm, pilose on the lower margin, claw 1.5--2.5 mm. *Stamens* monadelphous, sheath fused adaxially. *Ovary* narrowly oblong, 6--8 x 1--2 mm; style 3--4 mm long. *Fruit* rufous-pilose, compressed, 30--45 x 5 mm. *Seed* suborbicular, slightly compressed, 2--3 mm in diameter, yellow to light brown, hilar rim raised, hilar tongue white,



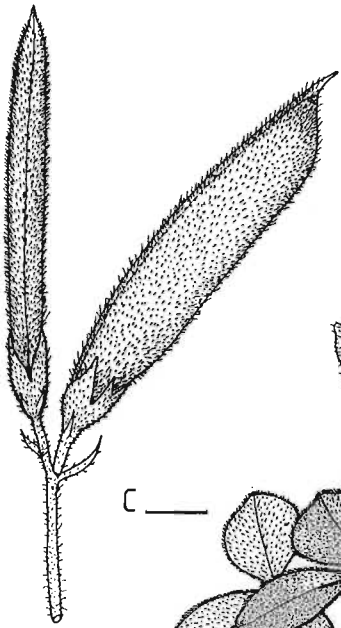
E _____



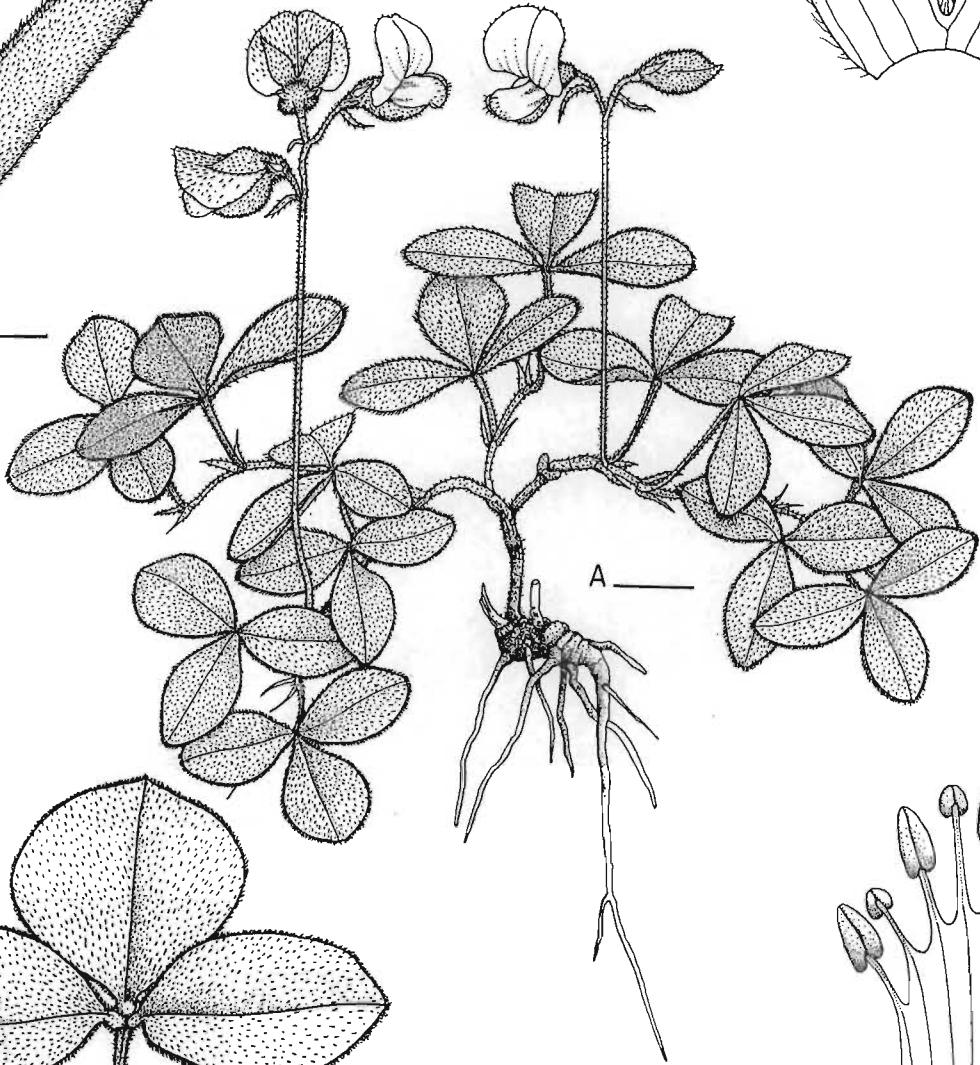
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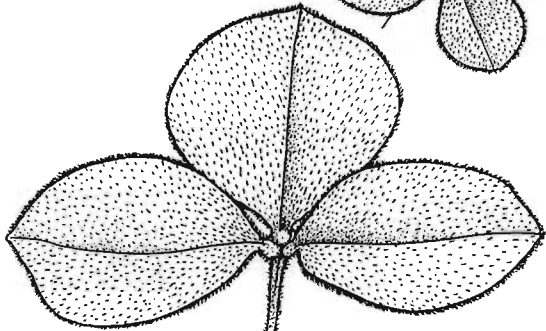
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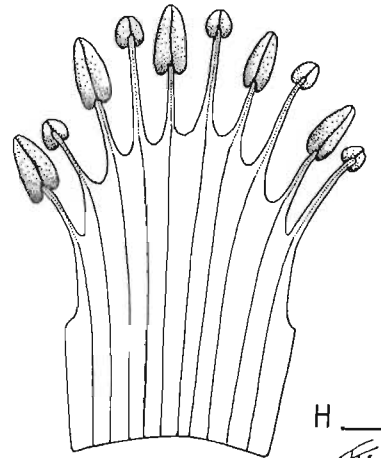
C _____



A _____



B _____



H _____

FE

asymmetrical. ³²

A. rotundifolium is allied to *A. rupestre* but is distinguished by its consistently prostrate habit (*A. rupestre* is better described as ascending or decumbent), broadly elliptical to orbicular leaflets, shortly rufous-tomentose indumentum and the lack of sculpturing on its wing petals. This species is predominantly coastal in distribution while *A. rupestre* is limited to inland areas (Figure 74). In southern Natal *A. rupestre* approaches the coast on the high lying areas around Kokstad and Harding however no contact zones with *A. rotundifolium* have been recorded.

Without precise locality: *Flanagan 3675* (PRE); *Gerrard 178* (BM); *Wood 11411* (NH). 2632 (Bela Vista): between Ingwavuma and Manyanseni, (--CC), *Moll 4561* (PRE). 2732 (Ubombo): northern arm of Lake Sibaya, (--BC), *Ward 546* (NH). 2831 (Nkandla): Itala Nature Reserve, (--CA), *Schrire 1180* (NH); *Germishuizen 2232* (PRE); Eshowe, (--CD), *Grobbelaar 2328* (PRE); Ngoye, (--DC), *Huntley 852* (NU); *Stirton 454* (PRE). 2832 (Mtubatuba): Hluhluwe Game Reserve, Mbhombe, (--AA), *Hitchins 598* (PRE); Mngqabatheki, (--AB), *Scott-Smith 41* (NH, NU). 2930 (Pietermaritzburg): Phoenix, (--CA), *Schlechter 3128* (B, BR, GRA); Town Hill, (--CB), *Fisher 335* (NU); *Hilliard 8209* (E, NU); *Huntley 87* (E, NU); Lagerfarm, KwaSangwane Hill, (--DA), *Balkwill 4613*

Figure 72

Argyrobium rotundifolium. A. Habit (bar = 10 mm); B. leaf (bar = 5 mm); C. fruits (bar = 4 mm); D. standard, abaxial surface (bar = 2 mm); E. keel (bar = 2 mm); F. wing (bar = 2 mm); G. calyx (bar = 4 mm). Voucher: *Edwards & Ackermann 329*.

(J); south of Wartberg, Ekuthuleni, (--DA), *Balkwill 4665* (J); Inchanga Hill, (--DA), *Codd & Dyer 2806* (PRE); *Borquin 129* (NU); 35 km from Wartbergon, Noodsberg Rd., (--DA), *Edwards 3000* (NU, PRE); Camperdown, Shongweni, (--DA), *Ross 1284* (NU); Table Mountain, (--DA), *Killick 741* (NU); Botha's Hill, (--DB), *Schelpe 2944* (BM); Inanda, (--DB), *Wood 699* (BM, BOL); Key Ridge, (--DC), *Stirton 5543* (PRE); between Peacevale and Drummond, (--DC), *Edwards & Ackermann 329* (E, K, NU, PRE); Bluff Ridge, Wentworth, (--DD), *Ward 8613* (NU, PRE); Krantzkloof, (--DD), *Haygarth s.n.* (PRE); Gillets, Chelmsford Park, (--DD), *Hilliard 1899* (NU); *Hilliard 1604* (NU); Krantzkloof, (--DD), *Schlechter 3178* (BM, G, GRA, PRE, SAM); Pinetown, (--DD), *Wood 5817* (BM, BOL, E, MO, PRE). 2931 (Stanger): Mapumulo, Thring's Post, (--AA), *Moll 2234* (NU, PRE); *Moll 2238* (NU); Nonoti lagoon, (--AD), *Ward 9121* (PRE); Groutville, (--AD), *Grobbelaar 1805* (PRE); *Moll 2487* (NU, PRE); *Moll 2526* (NU, PRE); Durban, (--CC), *Gerrard 425* (TCD). 3030 (Port Shepstone): Ixopo, (--AA), *Edwards 689* (NU); *Hilliard 1140* (NU); Vernon Crookes Nature Reserve, (--BC), *Balkwill & Cadman 1999* (J); *Balkwill & Cadman 1973, 2056 & 2709* (J, NU); *Balkwill & Manning 821* (E, NU); *Edwards 259* (NU); *Konstant 160* (NU); *Nuttall 15* (NU); *Germishuizen 23* (NU); Park Rynie, (--BC), *Strey 6831* (B, J, NU); Oribi Gorge, Riverview, (--CA), *van Wyk 5064* (PRE); Oribi Gorge, Inkonka Point, (--CA), *Balkwill & Crankshaw 80* (J); *Kerfoot s.n.* (J); Oribi Gorge, (--CA), *Hilliard 1877* (NU); Umtamvuna Nature Reserve, (--CC), *Abbott 364* (PRE); Margate, (--CD), *Acocks & Hafstrom 721* (PRE); Southbroom,

(--CD), *Stirton 5634* (BR, MO); Roselands, (--CD), *Stirton 5654* (PRE); Port Shepstone, (--CD), *Rogers 543* (GRA); Uvongo, (--CD), *Nicholson 199* (PRE); Shelly Beach, (--CD), *Strey 7663* (NH, PRE); Marina Beach, (--CD), *Strey 5954* (NH). 3129 (Port St. John's): Umsikaba, (--BD), *Tyson 2631 & 2361* (SAM); Mkambathi, (--BD), *Venter 826* (PRE). 3130 (Port Edward): Umtamvuna River, (--AA), *Germishuizen 1744 & 1746* (PRE); *Stirton 8066* (PRE); Umtamvuna Nature Reserve, (-AA), *Edwards 610* (NU); Sea Front, (--AA), *Lennox s.n.* (NU); *Grobblaar 276* (PRE); 8 km from Port Edward, Izingolweni Rd., (--AA), *Hilliard 1738* (NU). 3228 (Butterworth): The Haven, Bashee River, (--BA), *Gordon-Gray 557* (GRA); *Gordon-Gray 504* (E); Hill near Kei Mouth, (--CB), *Flanagan 1070* (BOL, GRA, PRE); Haga Haga, (--CC), *Clarke 463* (PRE). 3229 (Talemofu): Hole-in-wall, (--AA), *Germishuizen 1860* (PRE). 3327 (Peddie); Potter's Pass, (--BB), *Jacot Guillarmod & Brink 65* (GRA).

21. *Argyrolobium rupestre* (E. Mey.) Walp. ssp. ***rupestre*** in *Linnaea* 13: 508 (1839); Benth.: 345 (1844); Harv.: 73 (1862); Bak. f.: 63 (1926); Polhill: 157 (1968). Type: Cape Province, Stormberg, 5000-6000', *Drège s.n.* (K!, lecto.; BM!, K!, isolecto.).

Chasmone rupestris E. Mey.: 74 (1836). Type: as above.

Argyrolobium rhodesicum Bak. f.: 64 (1926). Type: Zimbabwe, Umtali, *Rogers 4029* (K!, holo.; BM!, iso.).

Argyrolobium tysonii Harms: 181 (1917), *synon. nov.* Type: Natal,

Kokstad, *Tyson 455* (BOL!, holo.; G!, K!, SAM!, UPS!, W!, iso.).

Argyrolobium rogersii N.E. Br. in Burt Davy: 394 (1926), *synon. nov.*

Type: Transvaal, Pietersburg, the Downs, *Rogers 22061* (K!, lecto. selected here; PRE!, isolecto.).

Herb or suffrutex up to 0.3 m tall, decumbent or scandent; stems well branched, weakly perennial, sericeous to pilose, becoming glabrous. *Leaves* sparsely to densely sericeous on both surfaces; leaflets 10--30 x 3--17 mm, narrowly or broadly ovate to obovate; petiole sericeous to pilose, 5--16 mm long; apex acute to rounded, mucronate; stipules 2--5 x 0.5--2 mm, setaceous to lanceolate. *Inflorescence* pseudo-umbellate, 1--5-flowered, initially terminal but becoming leaf-opposed; peduncle 5--12 mm long; bracts linear, 2--3.5 x 0.5 mm, bracteoles 1--2 x 0.5 mm. *Flowers* dimorphic. *Calyx* sparsely to densely sericeous; upper lobes 5--9 mm long; lower lip 5--10 mm long, lobes 2.5--4 mm. *Corolla* bright yellow fading to russet; standard suborbicular, 10--14 x 8--12 (--15) mm, adaxial surface sericeous, base cordate, claw 1 mm long; wings obovate, 8--11 x 3--5 mm, glabrous, with lunate sculpturing in the upper basal and upper central zones, claw 1--2.5 mm long; keel cymbiform, 7--9 x 4--5 mm, glabrous, claw 1--2 mm long. *Stamens* monadelphous, sheath fused above. *Ovary* narrowly oblong, 5--6 mm long; style 2.5--3 mm long. *Fruit* sparsely pilose, compressed, up to 20 x 5 mm. *Seed* suborbicular, slightly compressed, 2--3 mm in diameter, speckled dark brown, hilar rim raised, hilar tongue asymmetrical.

A. rupestre is widespread and perhaps best treated as a species complex. Polhill (1968) in his revision of *Argyrolobium* for Tropical Africa recognised four subspecies. He included all the southern African material within the type subspecies. *A. rupestre* is usually associated with afro-montane vegetation. *A. tysonii* is indistinguishable and is reduced to synonymy.

A. rupestre is frequently misidentified as *A. ascendens* which differs in its upright habit and very short petioles, the stipules are also usually broader than those of *A. rupestre*. In *A. ascendens* the funicle develops into a prominent symmetrical aril while in *A. rupestre* only an asymmetrical tongue of funicular tissue remains attached to the seed.

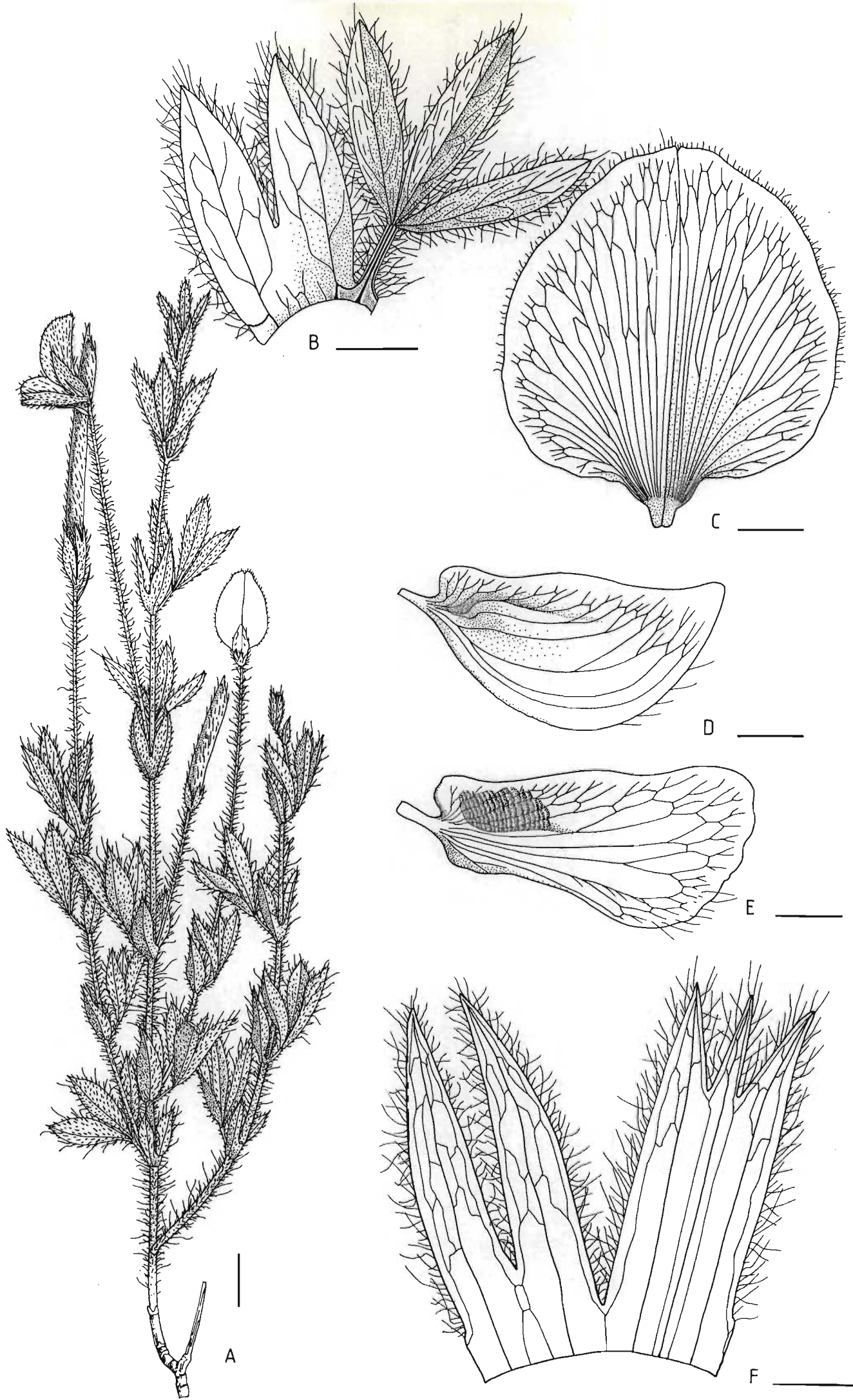
2329 (Pietersburg): Blouberg, (--AA), Vos 222 (NU); Louis Trichardt, (--AB), Breyer s.n. (PRE); Cyprus Point, (--AB), Junod 4345 (PRE); Soutpansberg, farm Rustfontein, (--AB), Schlieben 7129 (BR); Schlieben 7647 (B, BR, G). 2430 (Pilgrims Rest): Mariepskop, (--DB), van der Schyff 4820 (PRE). 2528 (Pretoria): Hornsnek, (--CA), Schlieben 7740 (BR); Beukeushout Kloof, Magaliesberg, (--DC), Repton 622 (PRE). 2529 (Witbank): Middelburg, (--BC), Balkwill 749 (J). 2530 (Lydenburg): Kaapsehoop, (--DB), Codd 5752 (PRE); Venter 4441 (PRE). 2628 (Johannesburg): Grove-Bex Valley, (--AA), Strang s.n. (J); Nigel, (--AD), Mogg 22596 (J); Heidelberg, Suikerbosrand Nature Reserve, (--CA), Lambrechts

225 (PRE); Kareekloof, (--CA), *Bredenkamp 152* (PRE); Suikerbosrand, Blesboklaagte, (--CA), *Bredenkamp 1052* (PRE); *Mogg 25393* (J). 2629 (Bethal): Ermelo, Farm Nooitgedacht, (--DB), *Henrici 1120 & 1009* (PRE). 2729 (Volksrust): Buffalo Valley, (--BD), *Wood 4770* (NH). 2730 (Vryheid): Wakkerstroom, (--AC), *Beeton 71* (SAM); *Devenish 737* (PRE); Utrecht, Naauwhoek, (--CB), *Devenish 1161* (PRE). 2827 (Senekal): Franshoek, nr. Ficksburg, (--DB), *Boddam-Whetham 95* (PRE). 2828 (Bethlehem): Leribe, (--CC), *Dieterlen 652* (BM, NH, PRE, SAM). 2828 (Bethlehem): Bestersvlei, (--DB), *Bolus 8147* (BM, NBG, SAM); Basuto Gate, (--DB), *Hilliard & Burt 17693* (NU, PRE). 2829 (Harrismith): Queen's Hill, (--AC), *Jacobsz 1079* (NBG, PRE); Platberg, (--AC), *Jacobsz 3013* (NBG, PRE); Rensburgskop, (--AD), *Jacobsz 264* (NBG, PRE); Tugela Valley, (--CA), *Trauseld 111* (PRE); *Bayer & McClean 229* (PRE); Cathedral Peak, nDedema Gorge, (--CC), *Edwards 1101* (NU); Cathedral Peak Forestry Station, (--CC), *Killick 1906 & 1183* (PRE). 2830 (Dundee): Weenen, Umhlumba Mt., (--CC), *Acocks 13868* (PRE); Kranskop, (--DD), *Manning 276* (E, NH). 2927 (Maseru): Mountain Rd. to Marakabei, (--BD), *Schmitz 6906* (PRE); Bushman Pass, (--BD), *Schmitz 8484* (PRE); *West 1668* (NH). 2929 (Underberg): Phutha, (--AC), *Compton 21641* (NBG); Mokhotlong, (--AC), *Guillarmod 1062* (PRE); *Ruch 2420* (PRE); Giant's Castle, (--AD), *Symons 91* (PRE); *Trauseld 875* (PRE); Tabamhlope, (--BA), *West 89* (PRE); Highmoor, headwaters of Elandshoek River, (--BC), *Hilliard & Burt 16161* (E, NU); Sunset Farm, (--BC), *Vos 38* (NU); Sani Pass, (--CB), *Hilliard*

959 (E); *Hilliard & Burt* 15544 & 15543 (E); upper tributaries South of Mkomazi River, (--CB), *Hilliard & Burt* 15729 (E); headwaters of Mlahlangubo River, (--CB), *Hilliard & Burt* 15177 (E); Chameleon Cave, Castle View Farm, (--CB), *Hilliard & Burt* 17747 (E, PRE); *Hilliard & Burt* 17857 (E, PRE); Sehlabathebe, (--CC), *Beverly* 328 (PRE); *Schmitz* 8796 (PRE); *Hoener* 1679 (PRE); Tarn Cave above Bushman's Nek, (--CC), *Hilliard & Burt* 16855 (E); Drakensberg Gardens, (--CD), *Schrire* 802 (NH). 3027 (Lady Grey): Zastron, (--AC), *Ried* 192 (PRE); Wittebergen, Beddgelert, (--DA), *Hilliard & Burt* 14582 (E, NH, PRE). 3028 (Matatiele): Thaba Chitja, (--AD), *Granger* 3692 (PRE); Ongeluks Nek, (--AD), *Hilliard & Burt* 18704 & 18695 (E); Qachasnek, (--BA), *Gordon-Gray* 4044 (NU, PRE); Kloppershoek Valley, N.E. of Rhodes, (--CA), *Hilliard & Burt* 16635 (E); Naude's Nek, Dunley, (--CC), *Hilliard & Burt* 16628 (E, PRE). 3029 (Kokstad): Ngeli Mt., (--DA), *Coleman* 798 (PRE); *Tyson* 1099 (BM, GRA, NH, SAM); *Tyson* 455 (BOL, G, UPS, SAM). 3128 (Umtata): Maclear, (--AB), *Acocks* 12190 (PRE); *Story* 501 (PRE).

22. *Argyrolobium campicola* Harms in Ber. Deutsch. Bot. Ges. 35: 182 (1917); Edwards: 296 (1993). Type: Transvaal, highveld between the Drakensberg and Pretoria, *Wilms* 271 (B[†], holo.; BM!, icono.).

Herb 0.1--0.3 m tall, erect or decumbent; stems, weakly perennial, pilose; *roots*



ligneous, perennial. *Leaves* pilose on both surfaces; leaflets 8--24 x 3.5--9 mm, obovate to elliptic; apex acute to rounded, mucronate; petiole pilose, 2--5 mm long; stipules foliaceous, connate in the lower half, 6--20 x 2--8 mm. *Inflorescence* 1-flowered, initially terminal but becoming leaf-opposed; peduncle 30--65 mm long; bracts linear or setaceous 3--9 x 0.25--2 mm; bracteoles linear or setaceous 1--5 x 0.25--1 mm. *Flowers* dimorphic. *Calyx* pilose, deeply bilabiate; upper lobes 8.5--11 mm long, upper sinus 6--9 mm; lower lip 9--11 mm long, lobes 3--4 mm long. *Corolla* bright yellow fading to russet; standard suborbicular, 11--16 x 8.5--14 mm, adaxial surface sparingly sericeous, base cordate; claw 1--2 mm long; wings oblong to obovate, 8--11 x 3.5--4 mm, sparingly sericeous; claw 1--2 mm long, with vestigial sculpturing; keel cymbiform, 8--10 x 4--5 mm, sometimes sparingly sericeous along the lower suture; claw 1--2 mm long. *Stamens* monadelphous, sheath fused adaxially. *Ovary* narrowly oblong, 4--5 mm long; style 3--4 mm long. *Fruit* sparsely pilose, 30--55 x 3.5--4 mm. *Seeds* suborbicular, laterally compressed, 1.75--2.5 mm, light to dark brown. ³³

A. campicola was described in 1917 but the name has not received widespread recognition. The destruction of the type material in Berlin and the relative paucity of collections have probably contributed to this. Collections of *A. campicola* have

Figure 73

Argyrolobium campicola. A. Habit (bar = 10 mm); B. leaf and connate stipules, adaxial surface (bar = 3 mm); C. standard, abaxial surface (bar = 2 mm); D. keel (bar = 2 mm); E. wing (bar = 2 mm); F. calyx (bar = 2 mm). Voucher: Shirley s.n.

been confused with *A. pauciflorum* Eckl. & Zeyh. The former is easily distinguished by its large basally connate stipules and short petioles.

The species occurs in Highland and Dohne Sourveld (Figure 74).

Without precise locality: Transvaal highveld between the Drakensberg and Pretoria, *Wilms 271* (BM [drawing of the type]). 2528 (Pretoria): Bronkhorstspuit, Pienaarsriver, (--CA), *De Winter 5978* (PRE); Onderstepoort, (--CA), *Dr. Theiler's Lab. 14819* (PRE); Pretoria University, (--CA), *Kies 344* (BOL, PRE); Queenswood, (--CB), *Ried 1175* (PRE); Pienaar's River, Silverton, (--CB), *Merxmuller 177* (BR). 2628 (Johannesburg): Germiston, Roodekop Station, (--AA), *Codd 3630* (PRE); Geduld, Witwatersrand, (--AB), *Moss 16025* (BM). 2727 (Kroonstad): Leeuspruit & Vredefort, (--AB), *Bartlett-Hamilton s.n.* (BM); Heilbron, (--BD), *Wallace s.n.* (GRA). 2828 (Bethlehem): Bethlehem, (--AB), *Bolus 8145* (BOL); *Flanagan 2072* (GRA, PRE). 2830 (Dundee): Thornbury, (--AA), *Shirley s.n.* (NU).

23. *Argyrolobium sericoseminum* Harms in Ber. Deutsch. Bot. Ges. 35: 181 (1917). Types: Natal, Weenen, 1300-1700 m, *Wood 5453* (B†; BM!, BOL!, E!, PRE!, isosyn.); *Wood 7194* (B†; BM!, lecto. selected here; E!, NBG!, PRE!, isolecto.).

Herb up to 0.4 m tall, decumbent or scandent; stems well branched, weakly perennial, sericeous to pilose, becoming glabrous; roots ligneous, perennial. *Leaves* sericeous to pilose on both surfaces; leaflets, narrowly obovate to elliptical, 10--36 x 4--12 mm, strongly conduplicate, reflexed; apex acute to rounded, apiculate; petiole sericeous to pilose, 4--12 (--18) mm long; stipules glabrous above, ovate to lanceolate, 4--12 x 1.5--5 (--8) mm, apex attenuate. *Inflorescence* pseudo-umbellate, 1--6-flowered, initially terminal but becoming leaf-opposed; peduncle 10--45 mm long; bracts narrowly ovate to setaceous, 2.5--7 x 0.5--1.5 mm, bracteoles linear to setaceous, 1--5 x 0.5--1 mm. *Flowers* dimorphic. *Calyx* sericeous to pilose, deeply bilabiate; upper lobes 9--10 mm long, upper sinus 5.5--8 mm, lower lip 10--12 mm long, lobes 3--5.5 mm long. *Corolla* bright yellow fading to russet; standard broadly obovate, 11--13 x 9--12 mm, adaxial surface densely sericeous, base rounded, claw 1--1.5 mm long; wings oblong to obovate, 8--10 x 3.75--5 mm, sparingly sericeous, with lunate-lamellate sculpturing in the upper basal and upper central zones, claw 1--2 mm long; keel cymbiform, 8--9 x 4.5--5 mm, sericeous along the lower suture, claw 1--2 mm long. *Stamens* pseudodiadelphous, vexillary filament fused basally for 1--2 mm. *Ovary* narrowly oblong, 6--8 mm long; style 4--5.5 mm long. *Fruit* pilose, compressed, 18--35 x 5--6 mm. *Seed* suborbicular, laterally compressed, 1.75--2 x 2--3 mm, light to dark brown.

A. sericosemium is closely allied to *A. marginatum* but the leaflets are

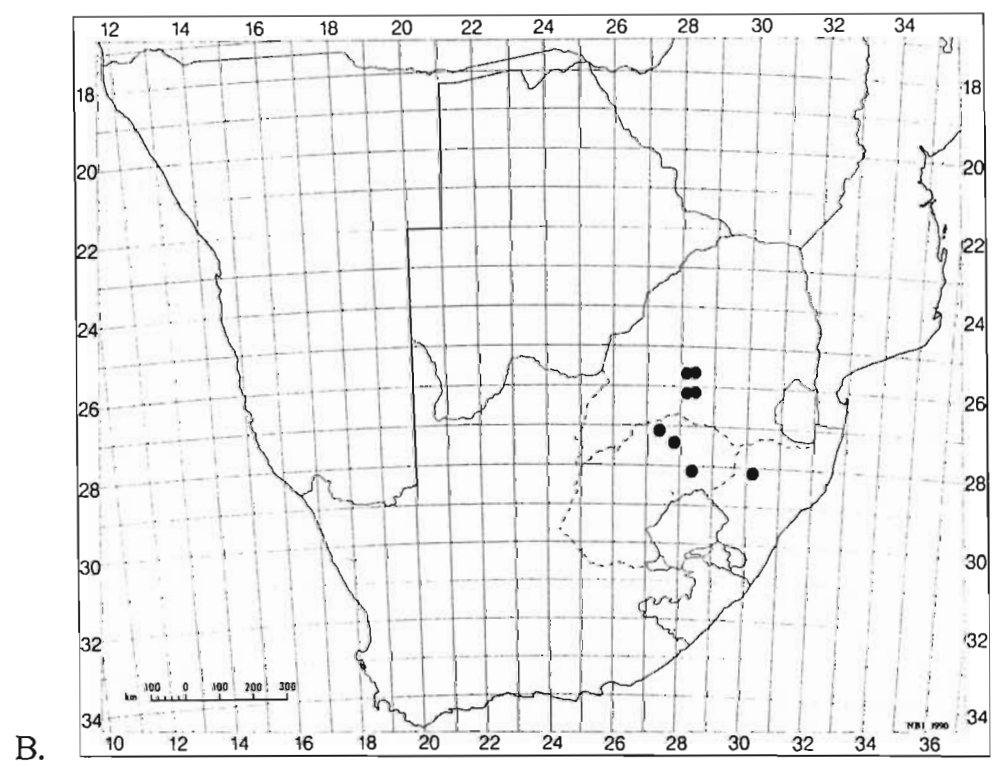
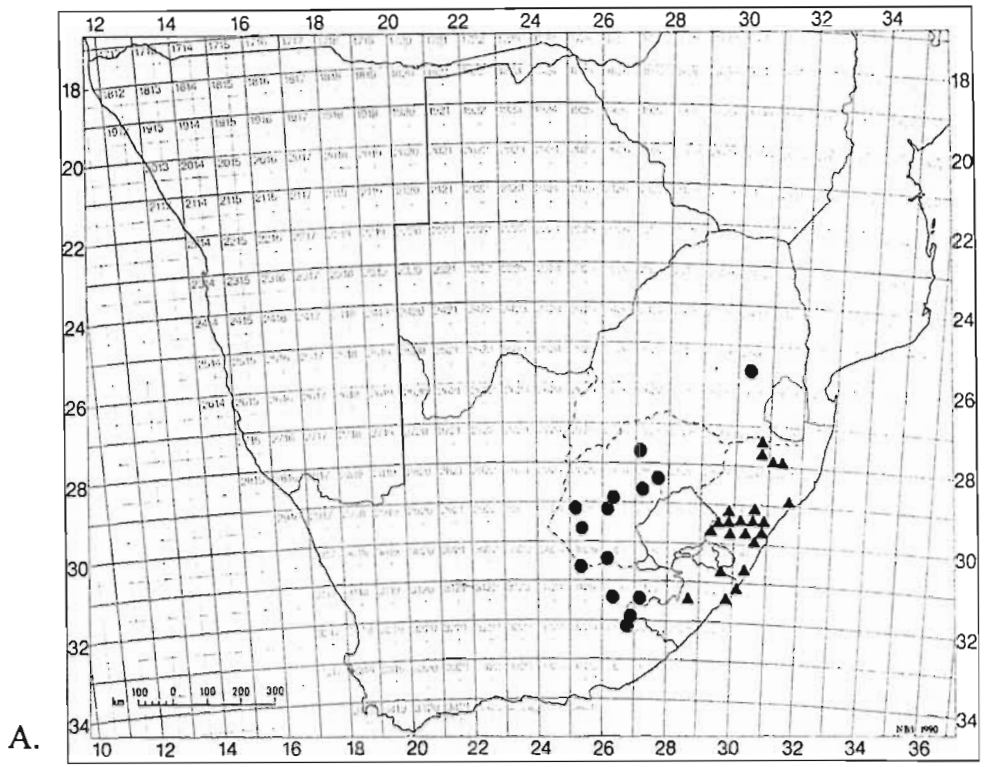
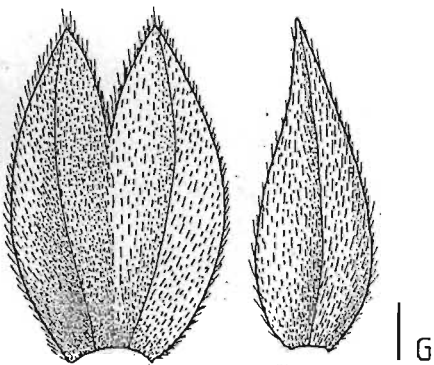
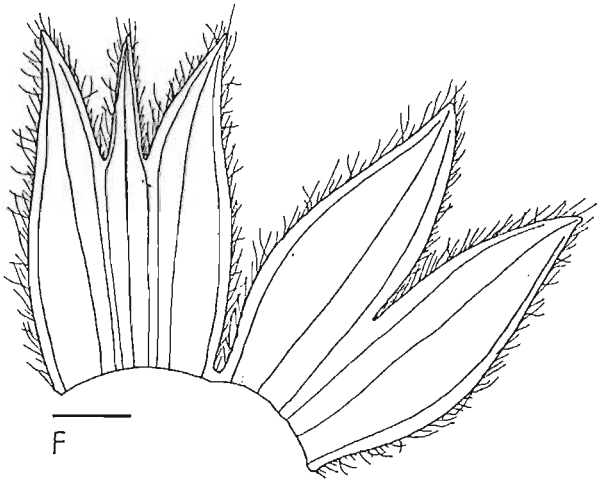
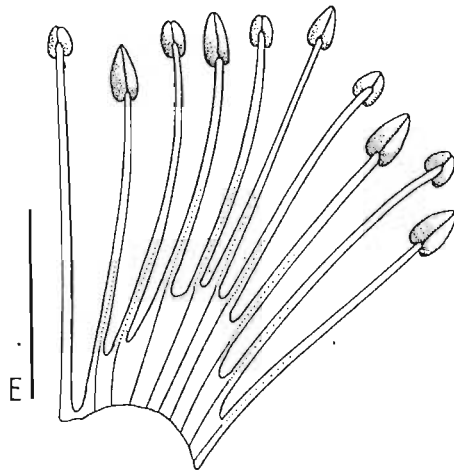
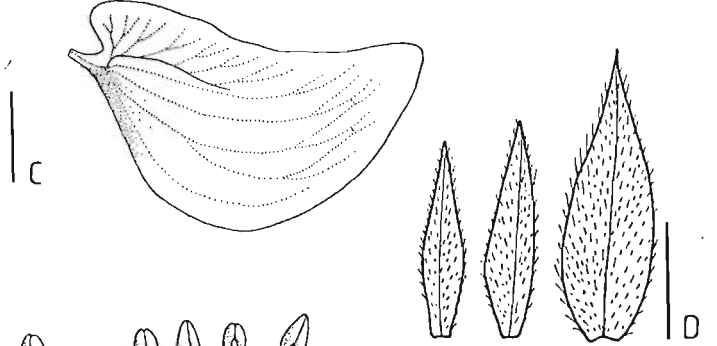
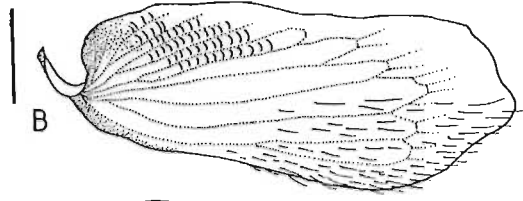
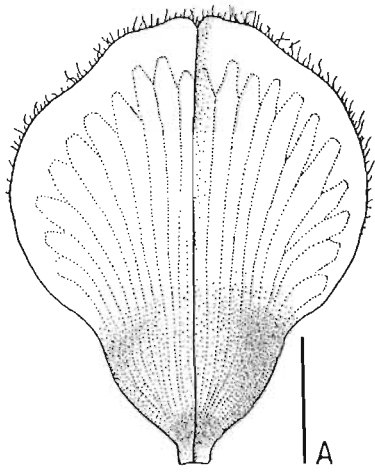


Figure 74. Recorded distribution of A. *A. humile* ▲ and A. *pauciflorum* ● & B. *A. campicola*.

conduplicate and pendant and the inflorescences are few-flowered. Populations on Bulwer Mountain display individuals of this facies mixed with individuals of *A. marginatum* and further field studies may necessitate the sinking of these taxa. Staminal fusion of *A. sericosemium* is highly unstable but tends towards diadelphly although the vexillary filament is fused basally.

The species is restricted to the Natal Drakensberg in Highland and Dohne Sourveld (Figure 76).

2929 (Underberg): Weenen, (--BB), *Wood 5453* (BM, E, PRE, BOL); *Wood 7194* (BM, NBG, PRE); Mooi River, Bray Hill, (--BB), *Hilliard & Burtt 19083* (E, NU); Bulwer Mountain, (--BC), *Edwards 1092* (NU); Mpendhle Ridge above Carter's Nek, (--BC), *Hilliard & Burtt 17588* (E, F, K, MO, PRE, S); Kamberg, (--BD), *Gibson s.n.* (NU); Gladstone's Nose, (--BD), *Edwards 747* (NU); Storm Heights, (--BC), *Hilliard & Burtt 11723* (NU); Sani Pass, (--CB), *Gillies 101* (NU); Cobham Forest Reserve, Lakes Cave, (--CB), *Manning, Hilliard & Burtt 15972* (E, K, NU, PRE); Marwaqa, Vulture Kranz, (--CB), *Rennie 319* (NU); Bamboo Mountain, (--CB), *Grice s.n.* (NU); *Hilliard & Burtt 15572* (E, K, NU, PRE, S); *Hilliard & Burtt 15600* (E, K, NU); upper Polela Cave, (--CB), *Hilliard & Burtt 9277* (E, MO, NU); Gxalingenwa Valley, (--CB), *Hilliard & Burtt 17215* (E, F, K, MO, PRE, S); Chameleon Cave, (--CB), *Hilliard & Burtt 17744* (E, K, PRE, S); *Hilliard & Burtt 17829* (E, K, PRE); Lundy's Hill, (--DD), *Stirton 1143*



(PRE, MO); Deepdale, (--DD), *Shirley s.n.* (NU). 2930 (Pietermaritzburg): 35 km N.E. of Mooiriver on the Middlerus Rd., (--AB), *Balkwill & Manning 910* (NU); Ross, Umgeni Poort, Lions River, (--AC), *Moll 1387* (NU, PRE); Nottingham Road, (--AC), *Wood 7194* (E); Howick, (--AC), *Wood 8387* (SAM); Lion's River, Mbona Mountain Estate, (--AC), *Nuttall 54* (NU); Fort Nottingham Commonage, (--AC), *Edwards 337* (NU). 3029 (Kokstad): Ngeli Mountain, (--DA), *Burt & Hilliard 3474* (NU); *Balkwill & Cadman 2688* (J); *Mac Devette 1270* (PRE).³⁴

24. *Argyrolobium marginatum* H. Bol. in J. Linn. Soc. (Bot.) XXV: 161 (1889). Type: East Griqualand, Mt. Malowe near Clydesdale, *Tyson 2054* (K!, lecto., selected here; BOL!, PRE!, SAM!, isolecto.); Natal, Illovo, *Wood 1852* (NH!, PRE!, isosyn.); Orange Free State, Nelson's Kop, *Cooper 872* (BOL!, syn.).

Argyrolobium sankeyi Dümmer: 273 (1912), *synon. nov.* Type: Orange Free State, Harrismith, *Sankey 43* (K!, holo.).

Herb up to 0.5 m tall, decumbent or scandent sometimes erect; stems well branched, weakly perennial, sericeous to densely villous, becoming glabrous;

Figure 75

Argyrolobium sericosemium. A. Habit (bar = 20 mm); B. wing (bar = 2 mm); C. keel (bar = 2 mm); D. bract and bracteoles (bar = 2 mm); E. androecium (bar = 2 mm); F. calyx, inner surface (bar = 2 mm); G. fused and free stipules (bar = 2 mm). Voucher: *Edwards 337*.

roots ligneous, perennial. *Leaves* pilose adaxially, densely pilose to tomentose abaxially and along the margin; leaflets, narrowly obovate to elliptical, 15--35 x 8--17 (--24) mm, apex acute to rounded, apiculate; petiole pilose to densely tomentose, 3-13 mm long; stipules glabrous above, ovate to lanceolate, usually partially fused basally, 6--12 x 1.5--3 mm, apex attenuate. *Inflorescence* pseudo-umbellate, 6--10 (--16)-flowered, terminal but sometimes becoming leaf-opposed; peduncle 4--50 mm long; bracts narrowly ovate to ovate, 5.5--10 x 1.5--3 mm, bracteoles narrowly ovate to linear, 4--7 x 0.75--1.75 mm. *Flowers* dimorphic. *Calyx* pilose, deeply bilabiate; upper lobes (7--) 8--12 (--15) mm long, upper sinus 5--10 mm, lower lip (10--) 12--18 mm long, lobes 5--10 mm long. *Corolla* bright yellow fading to russet; standard suborbicular, 10--15 x 10--16 mm, adaxial surface densely sericeous, base rounded, claw 1.5--2 mm long; wings oblong to obovate, 9--13 x 4--5.5 mm, sparingly sericeous, with lunate-lamellate sculpturing in the upper basal and upper central zones, claw 1--2 mm long; keel cymbiform, 8--11 x 4--5.5 mm, sericeous along the lower suture, claw 1--2 mm long. *Stamens* monadelphous. *Ovary* narrowly oblong, 6--7.5 mm long; style 5--6.5 mm long. *Fruit* pilose, 13--26 x 4--5 mm. *Seed* suborbicular, laterally compressed, 1.5--2 mm in diameter, light to dark brown sometimes speckled, hilar rim asymmetrical.

A. marginatum is the most robust member of the *A. rupestre* alliance and produces well developed, congested racemes. Partial fusion of the foliaceous stipules is

distinctive but is absent in northern specimens. Here the species approaches *A. rupestre* in form but the stipules are broadly lanceolate and the plants have larger leaves. The type collection of *A. sankeyi* is from these northern limits and this may explain Dümmer's recognition of a new species. A broad species concept is taken in this revision due to the continuity of the variation in *A. marginatum*. It is most closely allied to *A. sericosemium* and diagnostic characters are discussed under that species.

The species occurs across a range of altitude and vegetation types but is restricted to sourveld (Figure 76).

Without precise locality: Port Natal, *Gerrard & McKen 1762 & 2125* (TCD). 2829 (Harrismith): Nelson's Kop, (--AB), *Cooper 872* (BOL, E); Cathedral Peak, catchment 13, (--CC), *Buthlezi 422* (NH). 2929 (Underberg): Bulwer Mountain, (--BC), *Edwards 1091* (NU); Bamboo Mountain, (--CB), *Grice s.n.* (NU); Sani Pass, (--CB), *Manning, Hilliard & Burt 17286* (NU, PRE); *Killick & Vahrmeyer 3784* (PRE); Cobham Forest Reserve, Sipongweni, (--CB), *Hilliard & Burt 14025* (NU); Castle View Farm, Headwaters Mlahlangubo River, (--CB), *Hilliard & Burt 15197* (E, NU); Tarn Cave above Bushman's Nek, (--CC), *Hilliard & Burt 17484* (NU); Glengariff, Prosperity, (--DC), *Rennie 300* (NU). 2930 (Pietermaritzburg): Greytown, (--BA), *Wylie 11* (NH, PRE); Hela Hela, (--CC), *Strey 10869* (PRE); Richmond, (--CD), *Schlechter 6719* (BOL, GRA); *Martin 6*

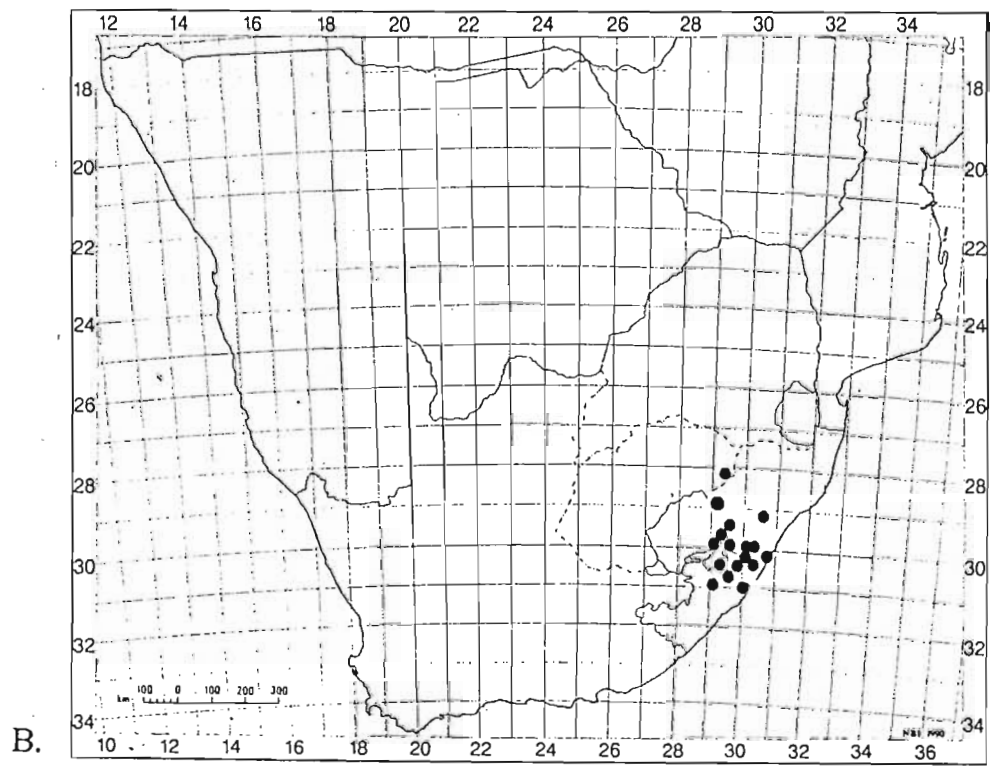
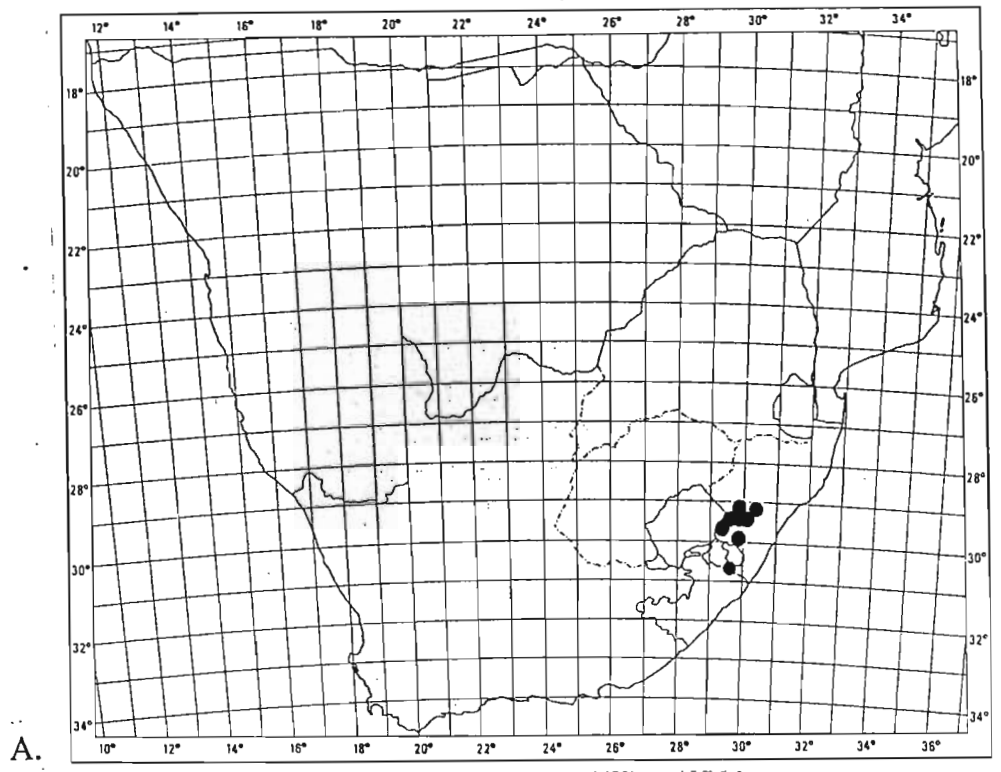


Figure 76. Recorded distribution of *A. A. sericosemium* & *B. A. marginatum*.

(NU). 3029 (Kokstad): Mount Currie, (--AD), *Tyson 1431* (BOL, GRA, SAM); Clydesdale, (--BD), *Tyson 2054* (BOL, PRE, SAM); Mount Malowe, (--BD), *Tyson 1257* (BM, BOL, G, GRA, PRE, SAM, UPS); Insizwa Mountain, (--CC), *Schlechter 3334* (PRE); *Schlechter 6436* (B, BR, BOL, E, PRE); Ngeli Mountain, Mpetyne Forest, (--DA), *Burt & Hilliard 3506* (E, NU); *Balkwill & Cadman 2710* (E, J, MO, NU); *Hilliard 1303 & 2506* (NU); Zuurberg, (--DA), *Hilliard & Burt 7671* (E, K, MO, NU); *Hilliard & Burt 8064* (NU). 3030 (Port Shepstone): Port Edward, (--AA), *Hilliard 1685* (NU); Dumisa, (--AD), *Rudatis 888* (BM, E, G, W); Illovo, (--BB), *Wood 1852* (NH); Umtamvuna Nature Reserve, (--CC), *Edwards 784* (NU).

25. *Argyrolobium molle* Eckl. & Zeyh., Enum. Pl. Afr. Austr. 2: 187 (1836); Walp.: 507 (1839); Walp.: 631 (1843); Benth.: 347 (1844); Harv.: 73 (1862); Harms: 180 (1917). Type: Cape Province, Winterberg not far from Philipstown, *Ecklon & Zeyher 1319* (K!, lecto. selected here; C!, G!, MO!, O!, P!, S!, SAM!, TCD!, isolecto.).

Galega sericea Thunb.: 134 (1794), pro parte. Type: Cape Province, *Thunberg s.n. sub THUNB-UPS 17395* (UPS!).

Argyrolobium patens Eckl. & Zeyh.: 185 (1836); Walp.: 508 (1839); Walp.: 632 (1843); Benth.: 347 (1844); Harv.: 75 (1862); Harms: 180 (1917), *synon. nov.* Type: Cape Province, Uitenhage, Zwartkopsrivier, *Ecklon & Zeyher*

1309 (G!, lecto. selected here; C!, G!, K!, MO!, P!, TCD!, UPS!, isolecto.).

Chasmone venosa E. Mey.: 73 (1836). Type: Cape Province, Albany, Drège s.n. (K!, lecto. selected here; G!, MO!, P! isolecto.).

Chasmone venosa var. *obscura* E. Mey.: 73 (1836). Type: Cape Province, Katberg, Drège s.n. (K!, lecto. selected here; P!, PRE!, S! isolecto.).

Chasmone apiculata E. Mey.: 73 (1836), *pro parte*. Type: Ado, in grassland, Drège Va, 2 (K!, lecto. selected here; MO!, P!, isolecto.).

Argyrolobium nanum Burt Davy: 393 (1926) *nom. illegit.*, non Walp. ex Harms, *synon. nov.* Types: Transvaal, farm Burttholm, Davy 17750 (syn.); Standerton, Rogers 14792 (PRE!, syn.); Standerton, Rogers 18450 (PRE!, syn.).

Herbaceous perennial, up to 0.25 m tall, erect or decumbent, sparingly to moderately branched, stems sericeo-pilose, weakly perennial. *Roots* ligneous, perennial. *Leaves* often slightly dimorphic, sericeous, weakly or markedly conduplicate, adaxial surface sparingly sericeous to glabrous; leaflets, linear to obovate, 7--40 x 2--10 mm, with prominent venation; petiole sericeous, prominent below, reduced above, 1--8 mm long; apex acute to rounded, apiculate; stipules linear-lanceolate, 4--10 x 0.5--1 mm, apex attenuate. *Inflorescence* fascicled, 1--2(--3)-flowered, terminal but becoming leaf-opposed; peduncle 20--40 mm long; bracts linear, 2.5--5 x 0.5 mm, bracteoles, setaceous or absent. *Flowers* dimorphic. *Calyx* sericeous, deeply bilabiate; upper lobes 5--7 mm long, upper sinus 3.5--5 mm, lower lip 6.5--8 mm long, lobes 2--3.5 mm long. *Corolla* bright

yellow fading to russet; standard broadly obovate to suborbicular, 9--12 x 10--12 mm, adaxial surface sericeous, base cuneate, claw 0.5--1 mm long; wings oblong to obovate, 7--10 x 3--3.5 mm, sparingly sericeous, with ill defined sculpturing in the upper basal and upper central zones, claw 0.5--1.5 mm long; keel cymbiform 7--9 x 3.5--4 mm, glabrous, claw 0.5--1.5 mm long. *Stamens* monadelphous, sheath fused adaxially. *Ovary* narrowly oblong, 4--6 mm long; style 3--4 mm long. *Fruit* sparsely sericeous, 25--45 x 3--4.5 mm. *Seed* suborbicular, laterally compressed, 2.5 x 2--3 mm, red-brown to dark brown.

The concept of *A. molle* has been broadened to include a wide variety of forms. Plant stature is influenced by environmental conditions and large differences were not apparent in cultivated plants from a wide geographic range. Herbarium specimens vary in leaflet shape, size and vestiture but this also occurs within populations and therefore is not indicative of different species. No differences were observed in cultivated plants from the eastern Cape and Natal.

A. patens is reduced to synonymy because its identity is based on its diminutive leaflets and decumbent habit. Moribund specimens of *A. molle* are decumbent with small internodes and leaflets. Precocial, cleistogamous flowering and phenotypic plasticity may explain the wide distribution of this species.

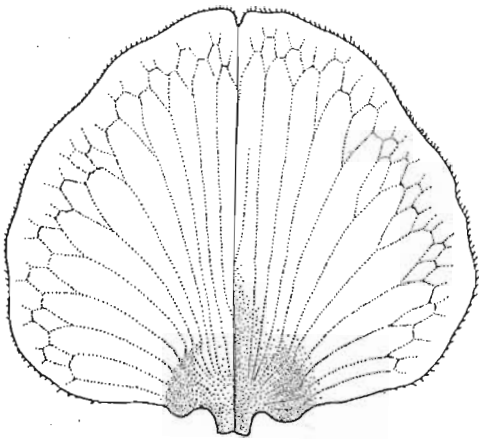
The misplacement of *Chasmone apiculata* as a synonym of *A. collinum* (Bentham

1844, Harvey 1862) is the result of the sessile cleistogamous fruits being mistaken for chasmogamous fruits. *A. collinum* is distinguished by its imbricate, subsessile leaves and solitary, subsessile chasmogamous flowers.

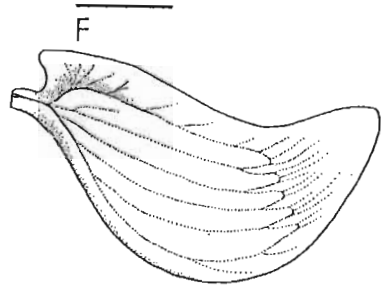
The species occurs in rocky grasslands of many vegetation types and across a range of altitudes from the Cape to southern Transvaal (Figure 70).

2627 (Potchefstroom): Nancefield, (--BD), *Moss 135030* (J); Eikenhof, Johannesburg, (--BD), *Mogg 29662* (J); Vereeniging, (--DB), *Burt Davy 9104* (PRE). 2628 (Johannesburg): Thorntree Kloof, (--AA), *Baker 10564* (J); Frankenwald, (--AA), *Raal 57* (J); Springs, Geduld, (--AB), *Blenkinson s.n.* (J). 2629 (Bethal): Bethal, (--AD), *Van Ginkel 544* (PRE); Standerton, (--CD), *Rogers 14792 & 18450* (PRE). 2727 (Kroonstad): Heilbron, (--BD), *Goossens 479* (PRE). 2728 (Frankfort): Reitz, (--CD), *Cameron s.n.* (J). 2731 (Louwsburg): nKongolone Rd. to Louwsburg, (--CA), *Schrire 1151* (NH). 2829 (Harrismith): Escourt, (--DD), *Green 187* (NH). 2929 (Underberg): Estcourt, (--BB), *Acocks 10694* (PRE). 2930 (Pietermaritzburg): Albert Falls, (--AD), *Commins 511* (PRE); Bisley Valley, (--CB), *Barker 3804* (J); *Dinkelman 14* (NU); *Stirton 356* (PRE); Pietermaritzburg (--CB), *Moll 1848* (PRE); Oribi Flats, (--CB), *Hart 15* (NU); *Keppler 13* (NU); Camperdown, (--DA), *Wood 12003* (PRE, SAM). 3030 (Port Shepstone): Brooklands, (--AC), *MacOwan 638* (GRA); Dumisa, St. Michael, (--AD), *Rudatis 1970* (NH). 3126 (Queenstown): Queenstown, (--DD),

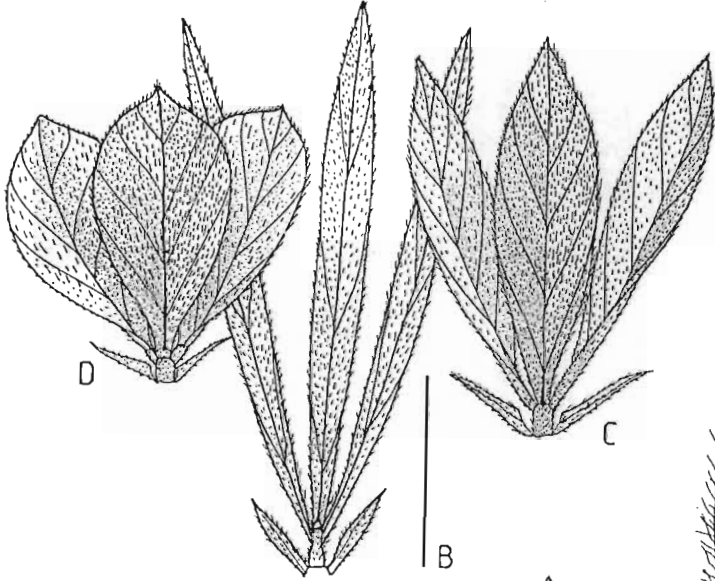
Dodd s.n. (GRA). 3225 (Somerset East): Bochberg, (--DC), *Scott Elliot 457* (E); Stockenstroom, (--DD), *Drège s.n.* (K); *Sculley 211* (GRA). 3226 (Fort Beaufort): Philipton, (--BC), *Ecklon & Zeyher 1317* (S); Winterberg, (--BC), *Ecklon & Zeyher 1319* (C, G, K, MO, O, P, S); Adelaide, (--CB), *Acocks 15713* (PRE); Katberg, (--DA), *Drège s.n.* (G, S); Seymour, Juanaberg, (--DB), *Giffen 1142* (PRE); Woburn, (--DB), *Acocks 13574* (PRE); Fort Beaufort, (--DC), *Story 1687* (GRA). 3227 (Stutterheim): Fort Cunynghame, (--AD), *Sim 4014* (GRA, PRE); Keiskhamahoeck, (--CA), *Kotsokoane 167* (J); Dohne, (--CB), *Acocks 9236* (PRE); King Williams Town, (--CD), *Tyson 2227* (SAM); *Sim 4016* (GRA); *Tyson 836* (BM, BOL, G, SAM, UPS); Perie, (--CD), *Sim 4017* (GRA); Stutterheim, (--CD), *Grobbelaar 2296* (PRE); *Theron 2121* (PRE); Perie, (--CD), *Sim 4005* (GRA); Komgha, (--DB), *Flanagan 689* (GRA, NH); Kei, rd. to Macleantown, (--DC), *Stirton 6304* (PRE). 3228 (Butterworth): Kentani, (--AD), *Pegler 144* (BOL, NH). 3324 (Steytlerville): Zwartkopsrivier, (--DB), *Ecklon & Zeyher 1309* (G, MO, P, S, TCD); *Zeyher s.n.* (P); *Zeyher 1108* (BOL, C, E, O, TCD); *Zeyher 2304* (BOL, G, P, PRE, S). 3325 (Port Elizabeth): Uitenhage, between Karroobusch and Zo, (--CD), *Drège s.n.* (E); Uitenhage, (--CD), *Drège 82* (C, E, PRE, S, UPS); Addo, (--DA), *Drège s.n.* (MO, P). 3326 (Grahamstown): Salem, Grahamstown, (--AD), *Fairall 80* (NBG); *Robertson 7695* (BOL); Hamilton Reservoir, Grahamstown, (--BA), *Gane 55* (GRA); Grahamstown, (--BA), *MacOwan s.n.* (K); *Dyer 1352 & 1384* (GRA); *Bolton s.n.* (K); Bothas Hill, (--BA), *Drège s.n.* (K); *Baker 6936* (NBG); *Dyer 1424* (PRE); *Bowie 16*



E



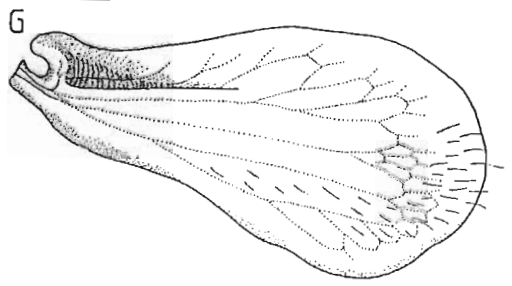
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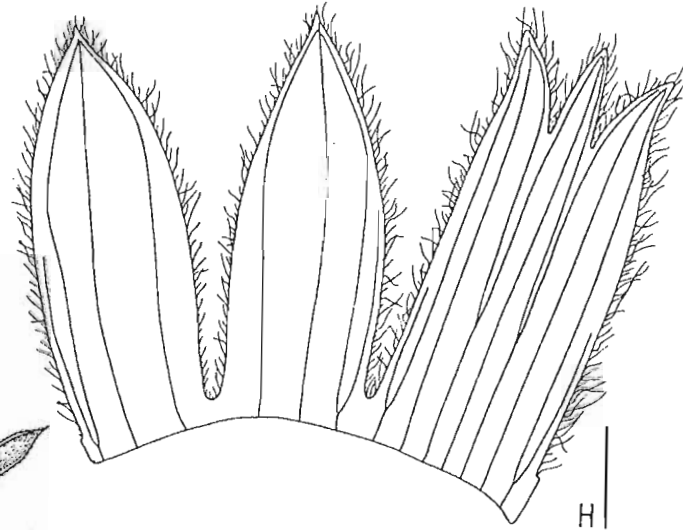
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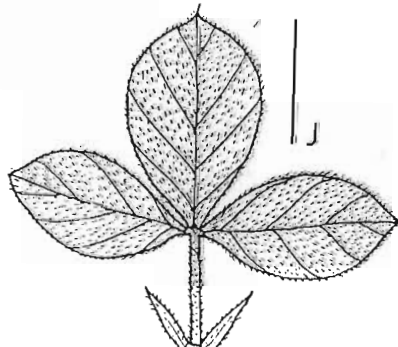
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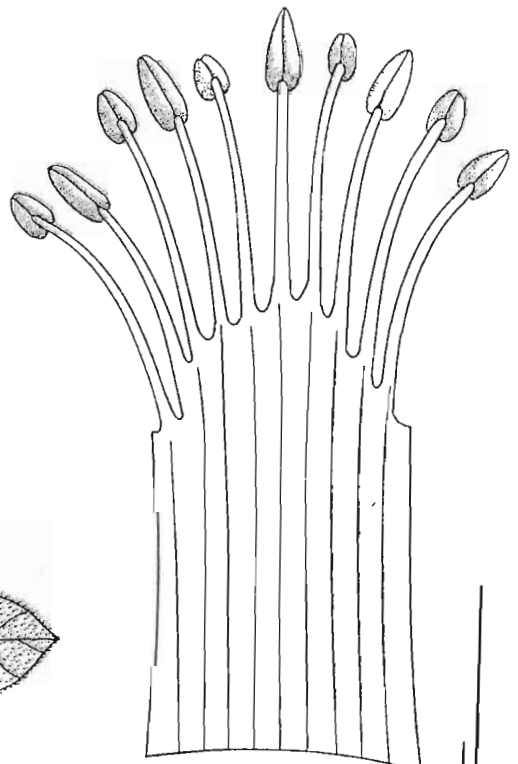
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I

(BM); *Williamson s.n.* (TCD); Trapp's Valley, (--BD), *Daly 1424* (GRA); *Edwards 484* (NU); Albany, (--BD), *Drège s.n.* (G, MO, P); Martindale, Shipton, (--BD), *Taylor 4944* (NBG); Longridge Farm, (--BD), *Taylor 5964* (NBG); Alexandria, (--CB), *Wells 4226* (PRE); *Archibald 4135 & 6120* (GRA); Olifantshoek, (--CB), *Pappe s.n.* (PRE). 3327 (Peddie): Keiskama, (--AA), *Hutton s.n.* (K); East London, (--BB), *Thode 8341* (STE); *Galpin 3296* (GRA); *Thode 6666* (STE); *Compton 2454* (NBG). 3420 (Bredasdorp): Heidelberg, (--BB), *Esterhuysen 17279* (BOL); *Van Niekerk 240* (BOL). 3421 (Riversdale): Riversdale, Colente Farm, (--AB), *Muir 73* (PRE); Albertinia, Bovenplaats, (--BA), *Muir 1375* (BOL). 3422 (Mossel Bay): Great Brak River, (--AA), *Fourcade 3849* (BOL); Christinabaai, (--BA), *Schlechter 2446* (E). 3423 (Knysna): Knysna, (--AA), *Burchell 5158* (K). 3424 (Humansdorp): Jeffreysbaai, (--BB), *Grobbelaar 2032* (PRE).³⁵

25. *Argyrolobium lotoides* Harv. in Harv. & Sond. Fl. Cap. 2: 595 (1862), non *Argyrolobium lotoides* Bunge ex Trauv.; Edwards: 77 (1993a). Type: Transkei, *Bowker 366* (TCD!, holo.; K!, PRE!, iso.).

Argyrolobium variopile N.E. Br.: 18 (1906); B-E. Van Wyk: 395 (1987).

Types: Natal, Charlestown, *Wood 5693* (BOL!, K!, NH!, PRE!, isosyn.), *Wood*

Figure 77

Argyrolobium molle. A. Habit (bar = 10 mm); B, C, D upper leaf variation (bar = 10 mm); E. standard, abaxial view (bar = 2 mm); F. keel (bar = 2 mm); G. wing (bar = 2 mm); H. calyx (bar = 2 mm); I. androecium (bar = 2 mm); J. lower leaf (bar = 10 mm). Vouchers: A-I, *Edwards 484*; J, *Flanagan 689*.

6355 (K!, lecto.; NH!, PRE!, SAM!, isolecto.).

Argyrolobium hirsuticaule Harms: 179 (1917). Type: Transkei, Zuurbergen, *Schlechter 6571* (B†; BOL!, lecto. selected here).

Argyrolobium leptocladum Harms: 180 (1917). Type: Transkei, Clydesdale, *Tyson 1256 pro parte* (B†; BM!, icono.).

Argyrolobium thodei Harms: 184 (1917). Type: Orange Free State, Witsieshoek, *Thode 20* (B†; BM!, icono.).

Lotononis magnistipulata Dümmer: 299 (1913). Type: South Africa, Faku's Territory (probably Transkei), *Sutherland s.n.* (K, holo.).

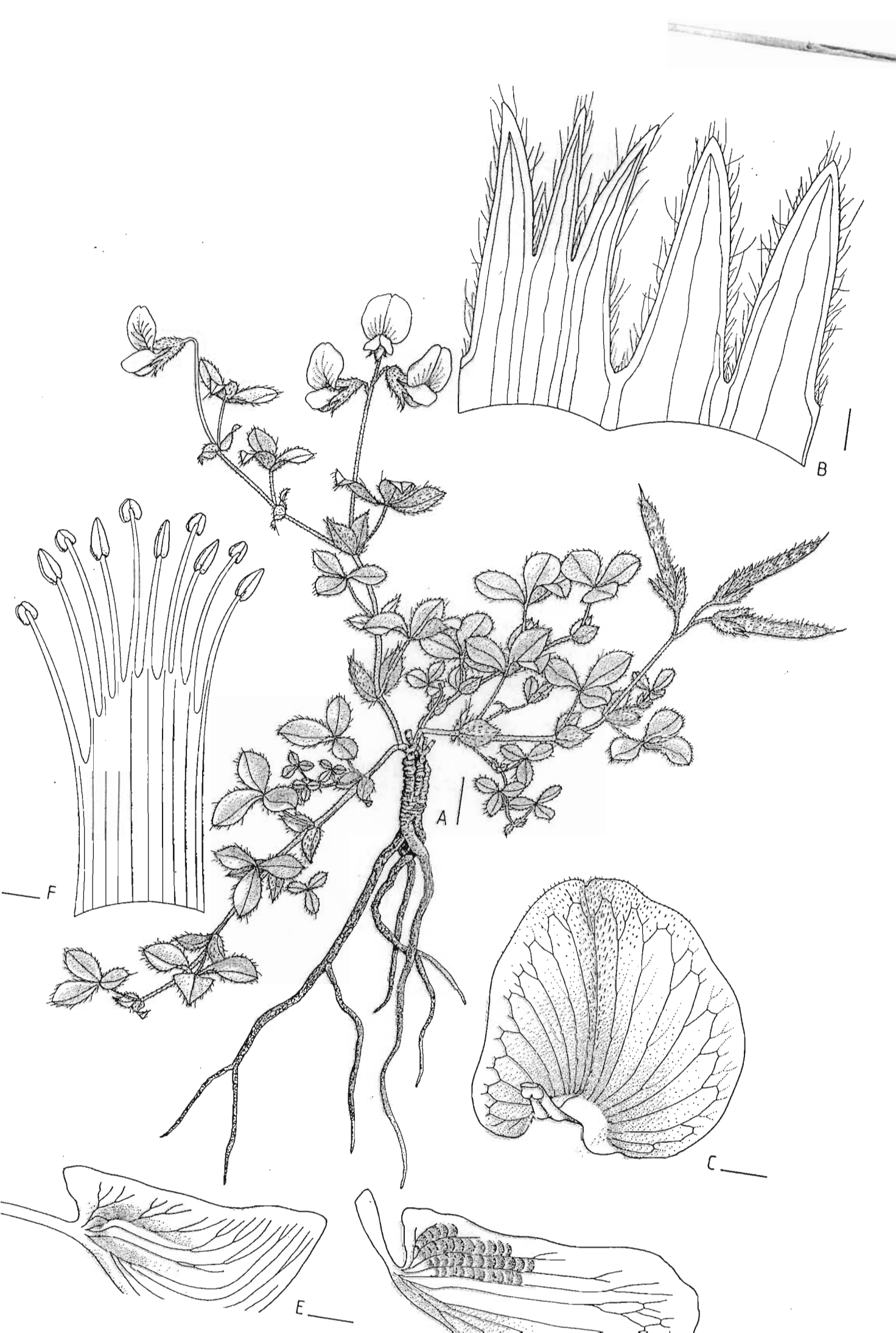
Herb, up to 0.45 m tall, becoming decumbent; stems weakly perennial, sericeous to pilose, becoming glabrous; roots ligneous, perennial. *Leaves* glabrous to sparsely pilose on both surfaces; leaflets narrowly ovate to sub-orbicular, 3--17 (--40) x 2--13 (--20) mm; petiole sericeous to pilose, 5--20 mm long; apex acute to rounded, mucronate; stipules foliaceous, narrowly ovate to broadly elliptical, 13--16 (--20) x 2--9 (--13) mm. *Inflorescence* pseudo-umbellate, 1--10 -flowered, initially terminal but becoming leaf-opposed; peduncle (5--) 15--45 (--65) mm long; bracts linear, 1.5--3 x 0.5--1 mm, bracteoles minute. *Flowers* dimorphic. *Calyx* sparsely pilose, deeply bilabiate; upper lobes 6--9 mm long, lower lip 7--9 mm long, lobes 3--4.5 x 1 mm. *Corolla* bright yellow fading to russet; standard suborbicular, 6--10 x 7--9.5 mm, adaxial surface sparingly sericeous, base cordate, claw 2--3 mm long; wings obovate, 6--8 x 3.5--4 mm, glabrous, with

lunate sculpturing in the upper basal and upper central zones, claw 2 mm long; keel cymbiform, 7--9 x 3.5--4 mm, glabrous, claw 2 mm long. *Stamens* monadelphous, split adaxially. *Ovary* narrowly oblong; 7--9 mm long; style 2--3 mm long. *Fruit* sparsely pilose, up to 35 x 3 mm. *Seed* suborbicular, laterally compressed, 2--2.5 x 1.8--2 mm, speckled dark brown, hilar rim raised.

This species displays considerable variation. The earliest collection of was made by Drège (n. 6629) and is housed at P. It bears the name *Chasmosyne pilosissima* E. Mey. but no description was traced. *A. lotoides* is the oldest published name predating the commonly used epithet *A. variopile* by nearly 50 years. The former description was published by Harvey in "Addenda and Corrigenda to the second volume" of *Flora Capensis* (1862) and may have been overlooked by subsequent researches.

A. hirsuticaule Harms was described from a Schlechter specimen collected at "Zuurbergen". This locality is in fact Zuurberg near Kokstad and not the south-eastern Cape locality.

The three names published by Harms (1917) were based on differences in vestiture and leaflet dimensions. These highly variable characters form a continuum and are thus unsuitable for delimiting species. The specimens from which *A. leptocladum* and *A. hirsuticaule* were described were destroyed at B but drawings of these



specimens are housed at BM (Edwards 1993a). The type of *A. leptocladum* is part of a mixed collection (Tyson 1256), unfortunately only specimens of *A. amplexicaule* remain from this gathering.³⁶

The homonym *A. lotoides* Bunge ex Trautv. was published in 1873, 11 years after Harvey's epithet, from material collected in Armenia.

A. lotoides occurs at high altitude along the Drakensberg in the eastern Transvaal and Natal but at lower altitudes in the eastern Cape. Plants commonly occur in Highland and Dohne Sourveld and *Themeda-Festuca* Alpine Veld (Figure 79).

Without precise locality: *Bowker* 366 (GRA, K, TCD). 2627 (Potchefstroom): Witpoortjie, (--BB), *Moss* 16180 (J). 2628: Milner Park, (--AA), *Moss* 16421 (J); Heidelberg, (--CB), *Mogg* 18541 (J). 2630 (Carolina): Chrissiemeer, (--AC), *Theron* 2383 & 2501 (PRE); *Hilliard & Burt* 6052 (E, PRE); Nootgedacht, (--CA), *Henrici* 1670 (PRE). 2729 (Volksrust): Charlestown, (--BD), *Wood* 5693 (BOL, K, NH, PRE); *Wood* 6355 (K, NH). 2730 (Vryheid): Kastrol, Wakkerstroom, (--AD), *Beeton s.n.* (PRE). 2828 (Bethlehem): Mt. Lebanon, (--AB), *Vos* 154 (NU); Fouriesburg, Dunelm Farm, (--CA), *Potts* 4981 (PRE); Leribe Plateau, (--CC), *Dieterlen* 520, 521 & 1110 (PRE); Butha Buthe, Khatibe

Figure 78

Argyrolobium lotoides. A. Habit (bar = 10 mm); B. calyx, inner surface (bar = 1 mm); C. standard, adaxial surface (bar = 1 mm); D. wing (bar = 1 mm); E. keel (bar = 1 mm); F. androecium (bar = 1 mm). Voucher: *Browning* 183.

Camp, (--CC), *Lubke* 267 (PRE); Generaalskop, (--DA), *Roberts* 3298 (PRE);
 Mont-aux-Sources, (--DD), *Schelppe* 1334 (NU, MO). 2927 (Maseru): Molimo
 Ntuse, (--BD), *Schmitz* 7248 (PRE). 2928 (Marakabei): Semonkong, (--CC),
Jacot-Guillarmod 1812 & 1814 (PRE). 2929 (Underberg): Merareng, (--AA),
Libenberg 5671 (PRE); Mokhotlong, (--AC), *Guillarmod* 1189 (PRE); Giant's
 Castle, (--AD), *Symons* 251 (PRE); Mpendhle, Highmoor, (--BC), *Hilliard &*
Burt 16171 (E, PRE); Headwaters of Mlahlangubo River, (--CB), *Hilliard &*
Burt 15220 (E); Sani Pass, (--CB), *Hilliard & Burt* 15534 (E, NU, PRE);
Browning s.n. (NU); Gxalingenwa Valley, (--CB), *Hilliard & Burt* 17201 (E);
 Chameleon Cave, (--CB), *Hilliard & Burt* 17836 (E); Sehlabathebe National
 Park, Phororong, (--CC), *Beverly* 509 (PRE); *Hoener* 1954 (PRE); *Bayliss* 47
 (MO); Bushmans Nek Police Post, (--CC), *Hilliard & Burt* 8012 (E, NU); Tarn
 Cave above Bushmans Nek, (--CC), *Hilliard & Burt* 17316 (E, NU); *Hilliard &*
Burt 17406 (E, NU, PRE); Himeville, (--DC), *Bews* 13 (PRE); *Bews s.n.* (NU).
 3027 (Lady Grey): Witteberg, farm Beddgelert, (--DA), *Hilliard & Burt* 16577
 (E, K, MAS, NU, PRE, S); Ben McDhui, (--DB), *Galpin* 6607 (PRE); *Hilliard*
& Burt 16372 (E, K, NU); *Hilliard & Burt* 16373 (E, K, NU, S). 3028
 (Matatiele): Qacha's Nek, (--BA), *Gordon-Gray* 4041 (NU); *Gordon-Gray* 4042
 & 4043 (E, NU); Kloppershoek Valley, (--CA), *Hilliard & Burt* 16634 (E, NU).
 3029 (Kokstad): Mount Currie, (--AD), *Hilliard & Burt* 7222 (E, K, MO, NU,
 PRE); *Tyson* 1765 (SAM); Zuurberg, (--BC), *Hilliard & Burt* 8070 (E, MO,
 PRE); *Smook* 543 (E); *Schlechter* 6571 (BOL); Kokstad, (--CB), *Mogg* 1893

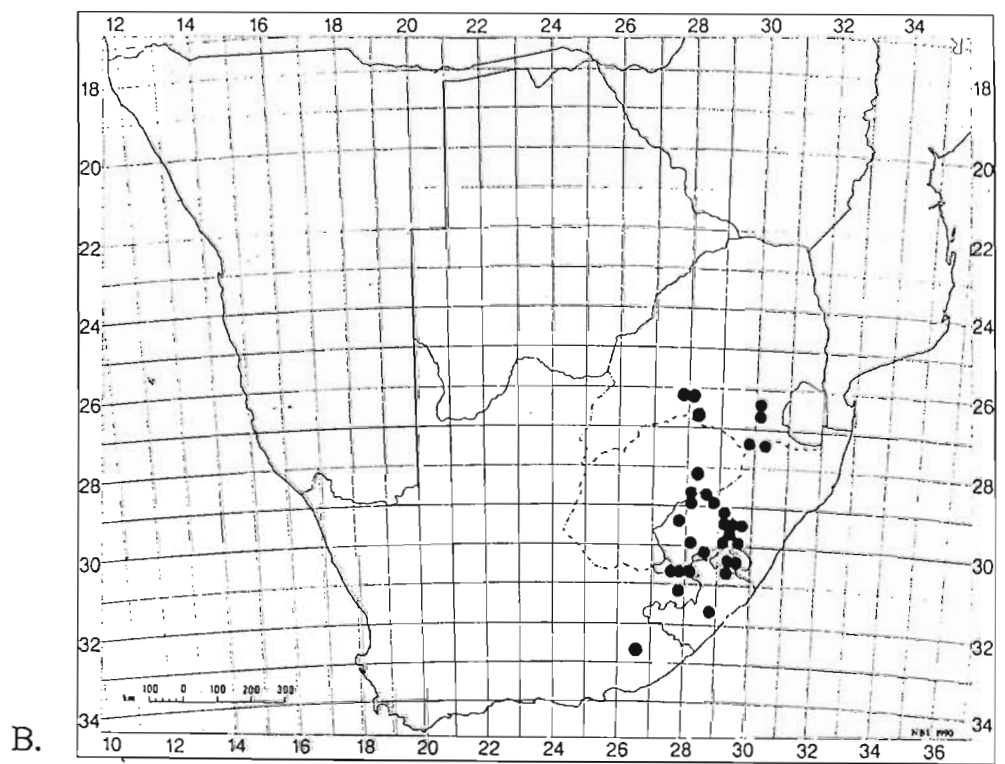
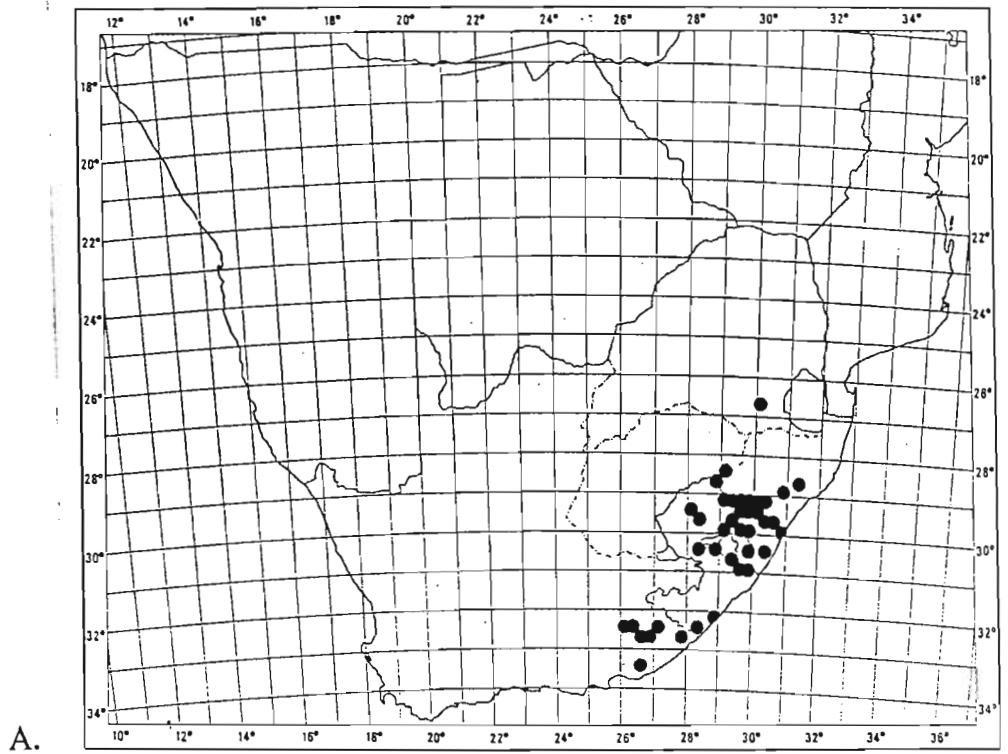


Figure 79. Recorded distribution of A. *A. stipulaceum* & B. *A. lotoides*.

(PRE); *Tyson 1254* (BM, G, UPS, W). 3127 (Lady Frere): Spitzkop, (--BB), *Rattray 7291* (PRE); boundary bastervoetpad, (--BB), *Hilliard & Burt 16699* (E, NU). 3128 (Umtata): Umtata, (--DB), *Flanagan 2857* (BOL). 3226 (Fort Beaufort): Katberg, (--DA), *Young & Moss 15406* (J).

26. *Argyrobium pauciflorum* Eckl. & Zeyh., Enum. Pl. Afr. Austr. 2: 186 (1836), non *A. pauciflorum* (Willd.) Haydek; Walp.: 507 (1839); Walp.: 631 (1843); Harv.: 74 (1862); Harms: 180-181 (1917); Burt-Davy: 393 (1926). Type: eastern Cape, Zuurepoort, Stormberg, *Zeyher s.n.* (S!, neo. selected here). [Original type: eastern Cape, Stormberg near the Kei River source, *Ecklon & Zeyher 1314* (B†)].

Argyrobium pauciflorum var. *semiglabrum* Harv.: 74 (1862), *nom. nud.*

Argyrobium biflorum Eckl. & Zeyh.: 186 (1836); Benth.: 347 (1844).

Type: Cape Province, Philipstown, Winterberg, *Ecklon & Zeyher 1317* (S!, lecto. selected here).

Chasmone stricta E. Mey.: 75 (1836). Type: Cape, between Klipplaatrivier and Swartkei, *Drège s.n.* (BM!, lecto. selected here; G!, MO!, O!, P!, isolecto.).

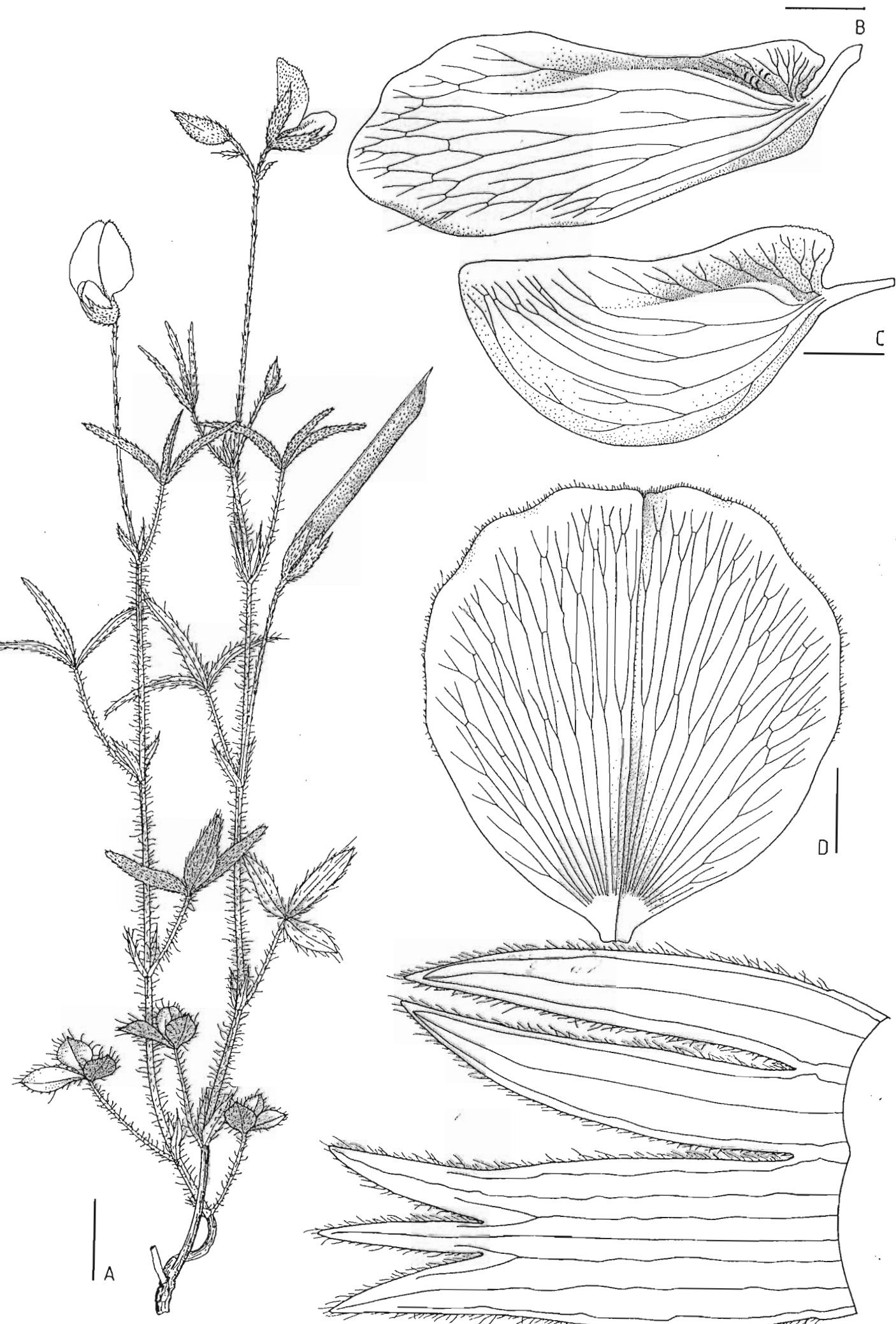
Argyrobium strictum Steud.: 130 (1840); Benth.: 346 (1844). Type: as above.

Herb 0.1--0.2 m tall, erect or decumbent; stems weakly perennial, pilose; roots

ligneous, perennial. *Leaves* pilose on both surfaces; leaflets 13--26(--35) x 4--8(--12) mm, basal leaflets narrowly ovate to elliptic, upper leaflets lanceolate, conduplicate; petiole pilose, 10--30 mm long; apex acute to rounded, mucronate; stipules lanceolate, 5--12 x 1--2 mm. *Inflorescence* 1--2-flowered, initially terminal but becoming leaf-opposed; peduncle 15--70 mm long; bracts linear or setaceous 3--9 x 0.25--0.5 mm, bracteoles setaceous 1--3 x 0.25--0.5 mm. *Flowers* dimorphic. *Calyx* pilose, deeply bilabiate; upper lobes 10--12 mm long, upper sinus 8--10 mm, lower lip 11--14 mm long, lobes 3--4 mm long. *Corolla* bright yellow fading to russet; standard suborbicular, 11--17 x 9--13 mm, adaxial surface sericeous, base cordate, claw 1--2 mm long; wings oblong to obovate, 10--14 x 3.5--4 mm, sparingly sericeous, claw 1--2 mm long, with lunate-lamellate sculpturing in the upper basal and upper central zones; keel cymbiform, 9--11 x 4--5 mm, sometimes sparingly sericeous along the lower suture, claw 1--2 mm long. *Stamens* monadelphous, sheath fused adaxially. *Ovary* narrowly oblong, 6--9 mm long; style 4--6 mm long. *Fruit* sparsely pilose, 30--60 x 4--6 mm. *Seed* suborbicular, laterally compressed, 2--3 mm, light to dark brown.

The homonym *A. pauciflorum* (Willd.) Hayek was published in 1926 for Asian material.

A. pauciflorum is allied to *A. campicola* and is distinguished by its smaller, free stipules and its long petioles. Considerable material of *A. molle* has been



misplaced under this species however the large stature of vegetative and reproductive parts, the prominent petioles and the lanceolate upper leaflets distinguish it.³⁷

The species occurs at high altitude, commonly in Highland and Dohne Sourveld (Figure 74).

Without precise locality: *Barber 71* (GRA). 2530 (Lydenburg): Machadodorp, (--CB), *Galpin s.n.* (BOL). 2727 (Kroonstad): Kroonstad, (--CA), *Pont 555* (PRE). 2826 (Brandfort): Glen Landboukollege, Bloemfontein, (--CD), *Zietsman 1374* (PRE). 2827 (Senekal): Doornkop Farm, (--BC), *Goosseus 754* (PRE); Winburg, Steynskloof, (--CA), *de Wit 4989* (PRE). 2925 (Jagersfontein): Heuwelsig, west of Dan Pienaar, (--AA), *Hanekom 569* (PRE); Fauresmith, (--CB), *Verdoorn 2318* (PRE). 2926 (Bloemfontein): Bloemfontein, (--AA), *Bolus 11060* (BOL); Sydenham Proefplaas, (--AA), *Bouwer 2200* (PRE). 3025 (Colesberg): Oviston Nature Reserve, (--CB), *Fourie 414* (PRE). 3026 (Aliwal North): Bethulie, (--AC), *Roberts 5386* (PRE). 3126 (Queenstown): Broughton, near Molteno, (--AD), *Flanagan 1575* (BOL, SAM); Queenstown, (--DD), *Bowker 58* (GRA, TCD). 3127 (Lady Frere): Cis-Garipina, Zuurepoort, Stormberg, (--AC), *Zeyher 112* (S). 3226 (Fort Beaufort): between Klipplaatrivier & Zwart Kei, (--BB),

Figure 80

Argyrolobium pauciflorum. A. Habit (bar = 20 mm); B. wing (bar = 2 mm); C. keel (bar = 2 mm); D. standard (bar = 2 mm); E. calyx (bar = 2 mm). Voucher: *Bowker 58*.

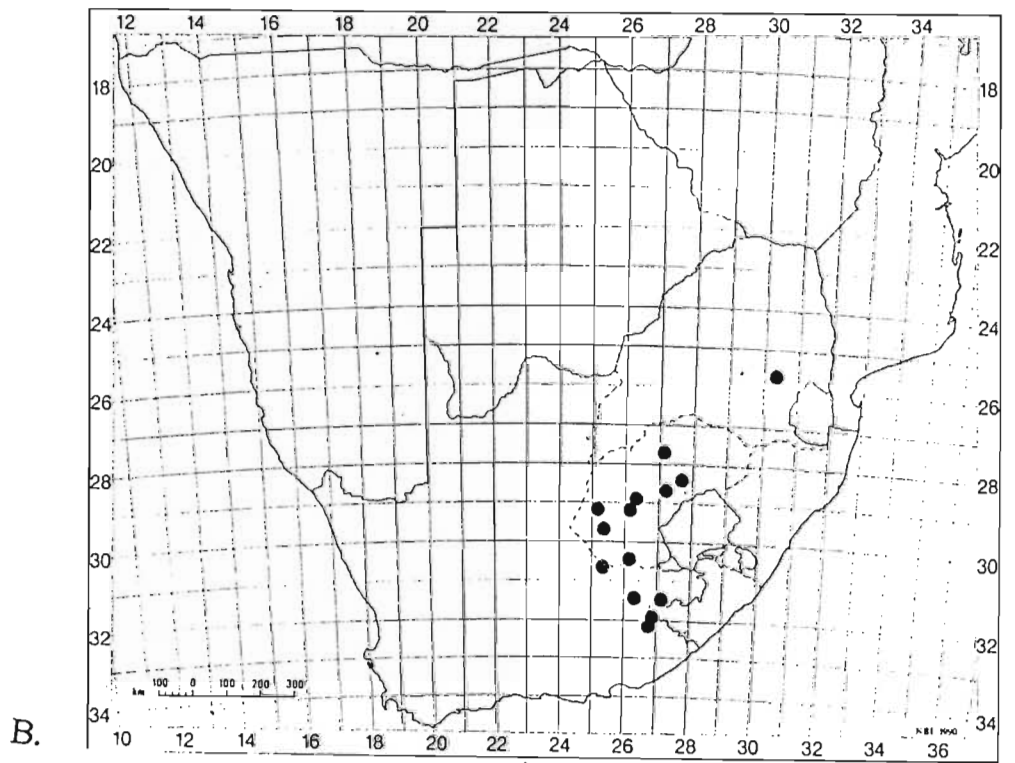
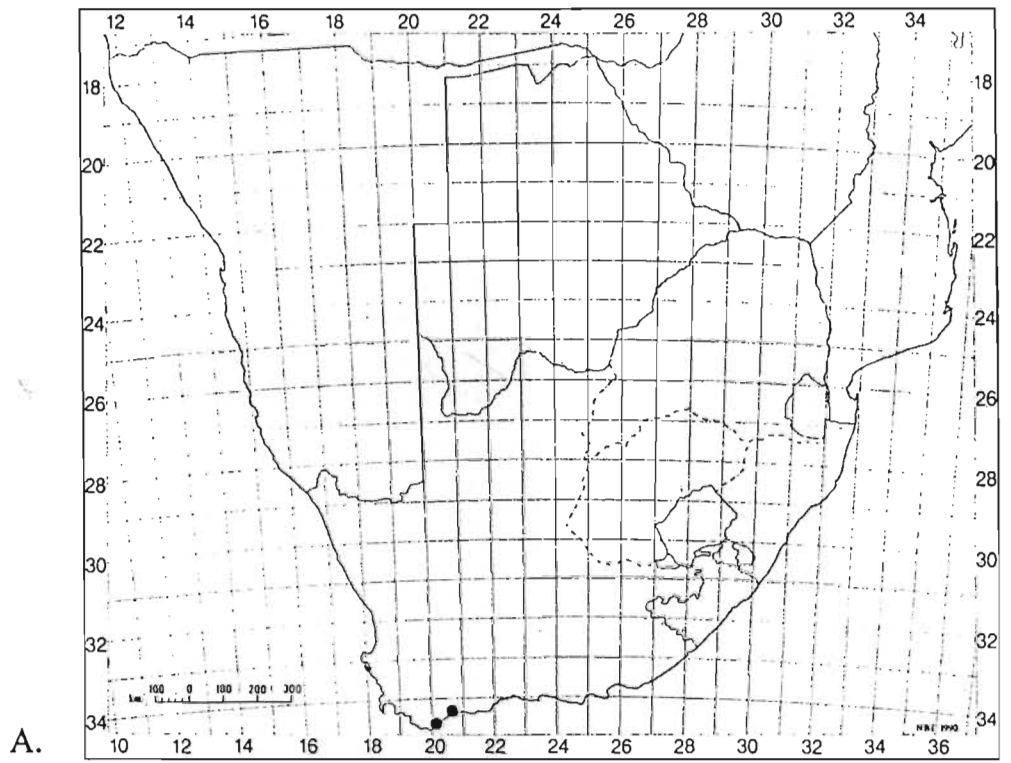


Figure 81. Recorded distribution of *A. A. harmsianum* & *B. A. pauciflorum*.

Drège s.n. (BM, G, MO, O).

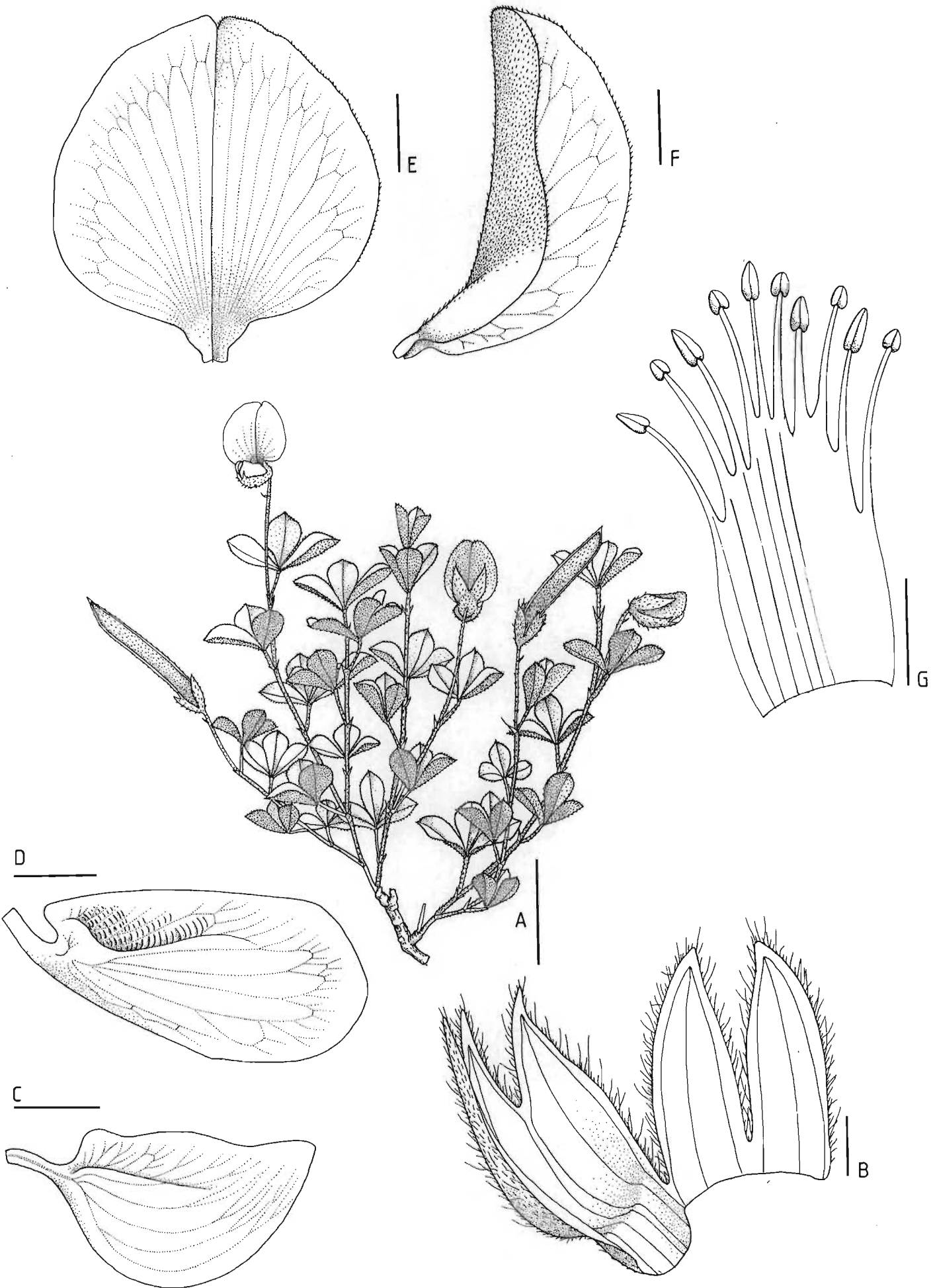
27. *Argyrolobium pumilum* Eckl. & Zeyh., Enum. Pl. Afr. Austr. 2: 185 (1836); Walp.: 508 (1839); Walp.: 632 (1843); Benth.: 346 (1844); Harv.: 75 (1862); Harms: 181 (1917). Type: Cape Province, Uitenhage, Van Stadensrivierberge, *Ecklon & Zeyher s.n.* (SAM!, lecto. selected here; C!, P!, PRE!, S!, isolecto.).

Argyrolobium venustum Eckl. & Zeyh.: 185 (1836). Type: Uitenhage, Addow (Addo), *Ecklon & Zeyher s.n.* (O!, lecto. selected here; C!, GRA!, MO!, S!, isolecto.).

Chasmone pusilla E. Mey.: 600 (1836). Type: not traced.

Galega sericea Thunb.: 134 (1794), pro parte. Type: Cape Province, *Thunberg s.n. sub THUNB-UPS 17396* (UPS!).

Herbaceous perennial, shortly erect or procumbent, usually well branched, stems densely sericeous, perennial. *Leaves* monomorphic, densely sericeous abaxially and marginally, adaxial surface glabrous; leaflets, broadly obovate to oval, (5--7--15(--20) x (3--4--10(--12) mm, central vein prominent below and grooved above; petiole densely sericeous, often longer on lower leaves, 2--10(--21) mm long; apex rounded, apiculate; stipules linear-lanceolate to subulate, often reflexed, 0.5--4 x 0.25--0.5(--1) mm, apex acute. *Inflorescence* 1(--2)-flowered, terminal but becoming leaf-opposed; peduncle 5--20(--40) mm long; bracts linear, 1--2.5 x



0.25--0.5 mm; bracteoles, setaceous or absent. *Flowers* dimorphic. *Calyx* sericeous, deeply bilabiate; upper lip 7--9 mm long, upper sinus 3.5--6 mm, lower lip 8--11 mm long, lobes 2--3.5 mm long. *Corolla* bright yellow fading to russet; standard suborbicular, 8--13.5 x 8--14 mm, adaxial surface sericeous, base obtuse, claw 1 mm long; wings oblong to obovate, 7--10 mm, sculpturing in the upper basal and upper central zones, glabrous, claw 1--1.5 mm long; keel cymbiform 7--9.5 x 3--4 mm, glabrous, claw 1--2 mm long. *Stamens* monadelphous, sheath fused adaxially. *Ovary* narrowly oblong, 4--6 mm long; style 3--4 mm long. *Fruit* sparsely sericeous, slightly inflated, 20--45 x 3.5--4 mm. *Seed* suborbicular, laterally compressed, 1.5--2 x 1.5--2.5 mm, red-brown to dark brown, sometimes speckled.

A. pumilum is a distinctive species with dark green, discoloured leaflets lined by a silver margin, plants are common on rock outcrops and areas of baked earth. The species is sometimes confused with decumbent plants of *A. molle* which are sympatric in the eastern Cape. *A. molle* is distinguished by its larger, narrower (often conduplicate) leaflets, short petioles overtopped by stipules, prominent leaf venation and inflorescences which usually bear two or more flowers.

The species is common in False Macchia grassveld (Figure 83).³⁸

Figure 82

Argyrolobium pumilum. A. Habit (bar = 20 mm); B. calyx (bar = 2 mm); C. keel (bar = 2 mm); D. wing (bar = 2 mm); E. standard, abaxial surface (bar = 2 mm); F. standard, lateral view (bar = 2 mm); G. androecium (bar = 2 mm). Voucher: Edwards 480.

3225 (Somerset East): Tandjiesberg, (--AC), *Bolus 1781* (BOL). 3324 (Graaff-Reinet): Zwartkopsrivier, (--DB), *Zeyher 88* (BOL, E, GRA, O, TCD); *Zeyher 2306* (G, P, S, SAM); Humansdorp, (--DD), *Cowling 909* (GRA). 3325 (Port Elizabeth): Olifantskop, (--BD), *Stirton 10797* (NU); Tafelberg, Elandsberg Mts, (--CA), *Stirton 10875* (NU); Van Stadensberg, (--CC), *Ecklon & Zeyher 1308* (C, P, PRE, SAM, S); Addo, (--DA), *Ecklon & Zeyher 1310* (C, GRA, MO, O, S); Port Elizabeth, (--DC), *Paterson 3416* (GRA). 3326 (Grahamstown): Riebeck East, (--AA), *Stirton 10779* (NU); Grahamstown, (--BC), *Edwards 486* (NU); *Hill 1477* (GRA) 'Faraway' (--BC), *Edwards 480* (NU); Slaai Kraal, (--BC), *Hoole s.n.* (GRA); Trappe's Valley, (--BD), *Edwards 496* (NU); Alexandria, (--CB), *Archibald 5471* (GRA, PRE); *Johnson 889* (GRA).

28. *Argyrolobium candicans* Eckl. & Zeyh., Enum. Pl. Afr. Austr. 2: 186 (1836); Walp.: 507 (1839); Walp.: 631 (1843); Benth.: 343 (1844); Harv.: 71 (1862). Type: eastern Cape, Winterberg, on the mountain sides, *Ecklon & Zeyher 1312* (S!, lecto. selected here; C!, G!, MO!, S!, SAM!, TCD!, isolecto.).

Chasmone sessiliflora E. Mey.: 72 (1836); Meisn.: 76 (1843).

Chasmone sessiliflora E. Mey. var. *interrupta* E. Mey.: 72 (1836). Type: eastern Cape, Windvogelberg, *Drège s.n.* (B†; K!, lecto. selected here).

Chasmone sessiliflora E. Mey. var. *parvifolia* E. Mey.: 72 (1836). Type: eastern Cape, Mooyplaats, *Drège s.n.* (B†; K!, lecto. selected here; G!, isolecto.);

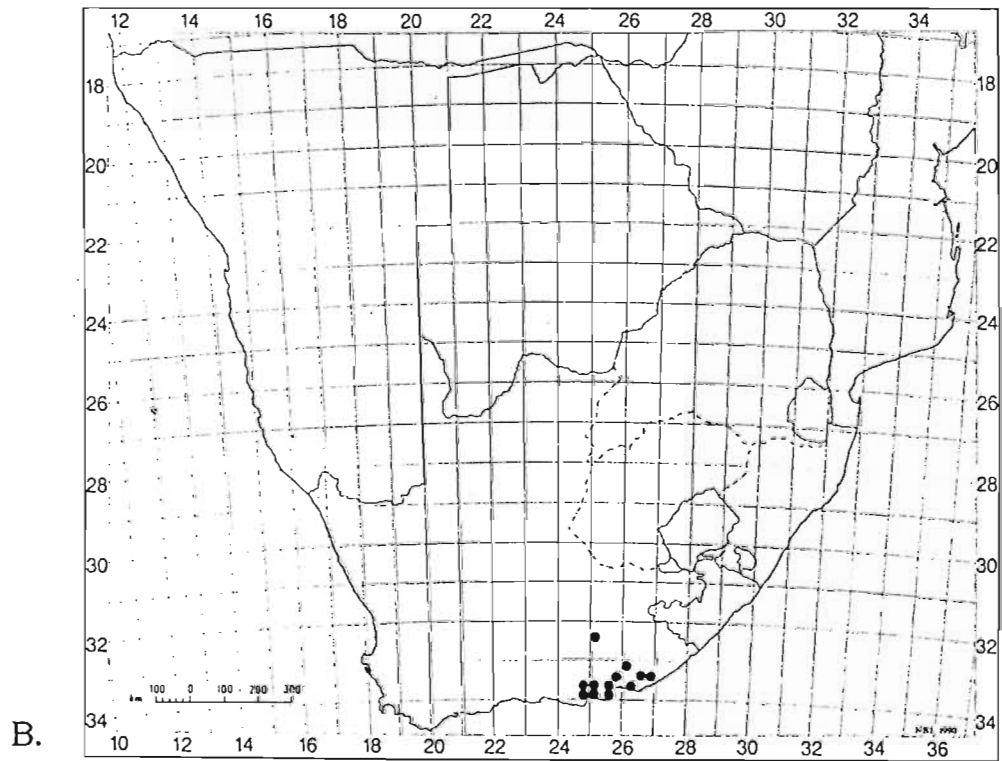
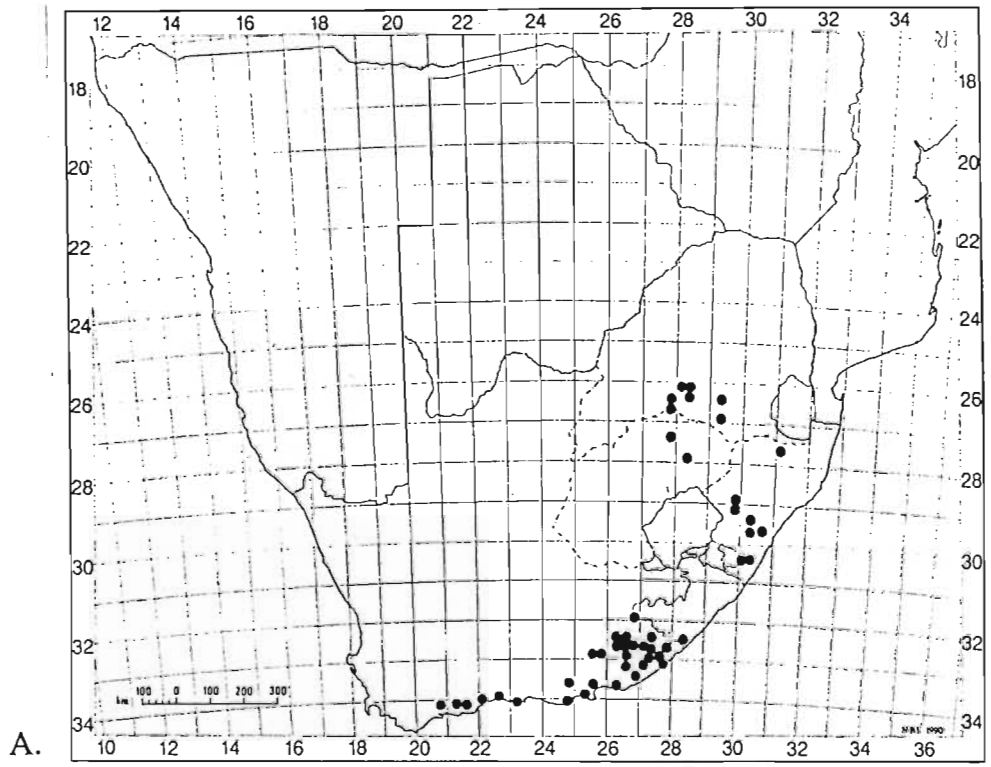


Figure 83. Recorded distribution of A. *A. molle* and B. *A. pumilum*.

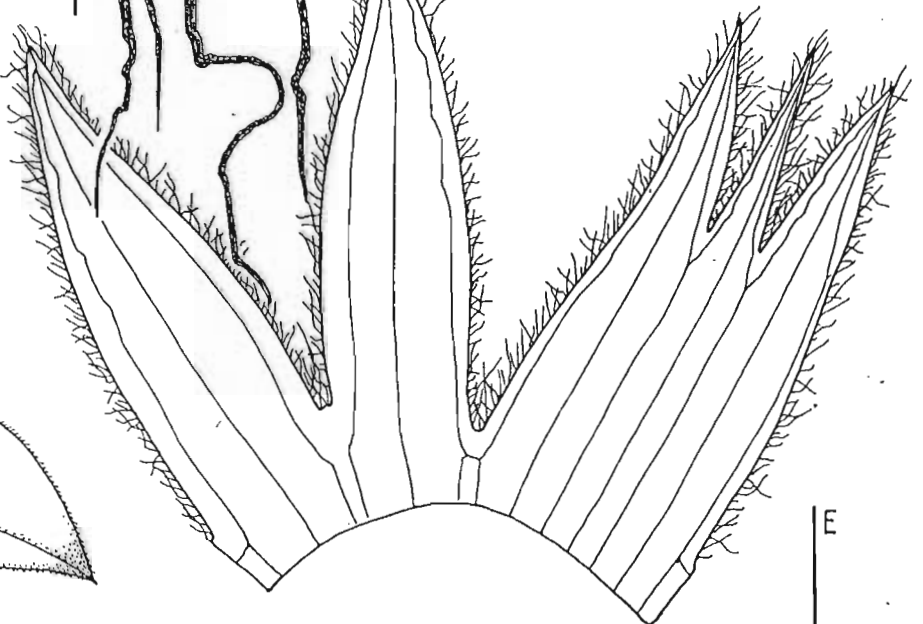
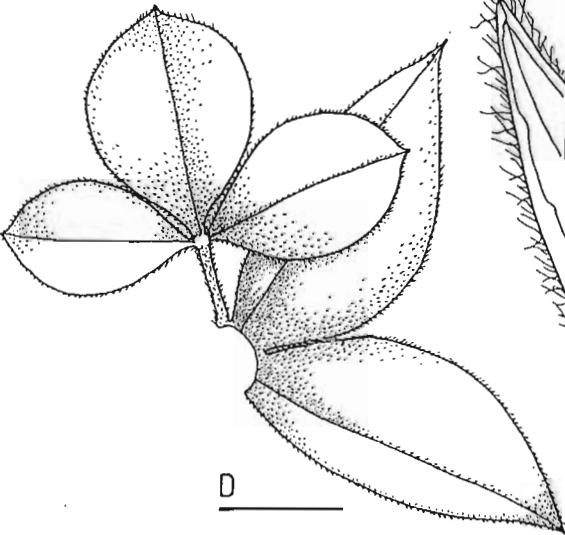
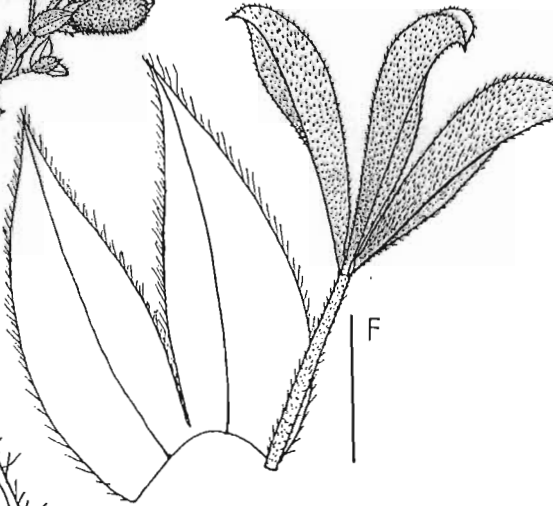
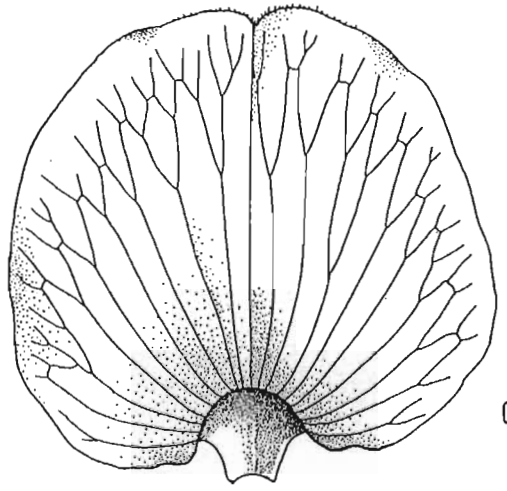
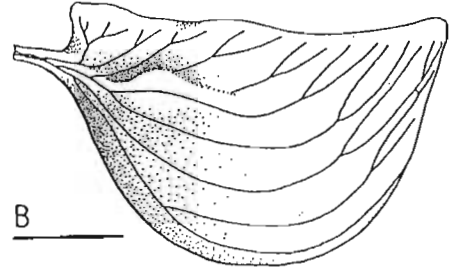
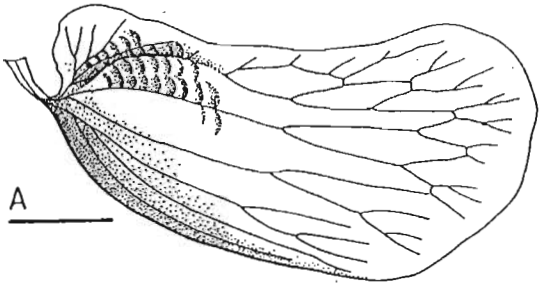
eastern Cape, Witbergen, *Drège s.n.* (B†; P!, syn.).

Incorrectly as *Chasmone sessilifolia*, Drège: 46 & 51 (1844).

Argyrolobium summomontanum Hilliard & Burt: 308 (1983), *synon. nov.*

Type: Lesotho-Natal Border, hill slopes behind escarpment south of Sani Pass, Hilliard & Burt 8871 (E!, holo.; NU!, iso.).

Herbaceous perennial, erect, sparingly branched, stems densely sericeous to shortly pilose, annual to perennial, often stoloniferous. *Leaves* monomorphic, densely sericeous abaxially and marginally, adaxial surface sparsely pilose to densely sericeous; leaflets, obovate to oblanceolate, often conduplicate, 4--9 x 2--5 mm; petiole 1--3 mm long; apex rounded, apiculate to recurvomucronate; stipules broadly, obliquely ovate, 4--10 x 3--7 mm. *Inflorescence* 1-flowered, sessile, leaf-opposed; bracts lanceolate, 2--5 x 1--2 mm; bracteoles, linear-lanceolate 2--4 x 0.5 mm. *Flowers* dimorphic. *Calyx* sericeous, deeply bilabiate; upper lip 7--10 mm long, upper sinus 5--7 mm, lower lip 7--10 mm long, lobes 3--5 mm long. *Corolla* bright yellow fading to russet; standard suborbicular, 9--12 x (8--10--12 mm, adaxial surface sericeous, base obtuse, claw 1--2 mm long; wings oblong to obovate, 9--11 x 4--5 mm, with lunate-lamellate sculpturing in the upper basal and upper central zones, glabrous to sparsely sericeous in the lower distal zone, claw 1.5--2 mm long; keel cymbiform 8--11 x 4--5 mm, glabrous, claw 1--2 mm long. *Stamens* monadelphous, sheath fused adaxially. *Ovary* narrowly oblong, 4--5 mm long; style 3--4 mm long. *Fruit* densely sericeous to pilose, inflated, 17--30 x 4--



5.5 mm. *Seed* reniform, laterally compressed, 1.5--2 mm, red-brown to dark brown. ³⁹

Hilliard and Burt (1983) described *A. summomontanum* without viewing material of *A. candicans* although they suggest an alliance between these species. The diagnostic characters they outlined refer to habit, vestiture and leaflet shape. These are variable in *A. candicans* and do not support the continued recognition of *A. summomontanum*.

Extremes of variation relate to the wide altitudinal range of *A. candicans*. The species occur mainly in Highland and Dohne Sourveld and *Themeda-Festuca* Alpine Veld but extends into Coastal Thornveld. This distributional pattern is similar to *A. stipulaceum*, a close ally (Figure 79). Coastal specimens (*Flanagan 1343*) are larger and have weakly conduplicate, broadly obovate leaflets while specimens collected at high altitude are smaller, often with strongly conduplicate leaflets.

2829 (Harrismith): Lehaha la Sekonyani, (--AD), *Guillarmod 235* (PRE). 2927 (Maseru): Mafeteng, (--CC), *Gerstner 220* (PRE); Likhoele, Mafeteng, Leikopa

Figure 84

Argyrolobium candicans. A. Wing (bar = 2 mm); B. keel (bar = 2 mm); C. habit (bar = 20 mm); D. leaf of coastal form (bar = 10 mm); E. calyx (bar = 2 mm); F. leaf of high altitude form (bar = 2 mm); G. standard, abaxial view (bar = 2 mm). Vouchers: A,B,C,E,G, *Hilliard & Burt 8871*; D, *Flanagan 1343*; F, *Edwards 728*.

Mt., (--CD), *Dieterlen 1299* (PRE, SAM); Morija, north facing scree slope, (--DA), *Schmitz 9272* (PRE). 2929 (Underberg): escarpment between Cleft Peak & Castle Buttress, (--AA), *Schelppe 477* (NU, PRE); Mokhotlong, (--AC), *Dohne 297* (PRE); upper tributaries of Mkomazi River, (--CB), *Hilliard & Burt 15699* (E, K, NU, PRE); Sani Pass, (--CB), *Hilliard & Burt 17297* (E, K, NU, PRE); *Hilliard & Burt 8871* (E, NU); Chameleon Cave, (--CB), *Hilliard & Burt 17860* (E, K, NU, PRE, S); Tarn Cave, (--CC), *Hilliard & Burt 17452* (E, F, K, NU, PRE). 3026 (Aliwal North): Mooyplaats, (--CC), *Drège s.n.* (K, G). 3027 (Lady Grey): Witbergen, (--CA), *Drège s.n.* (P); Sterkspruit, (--CB), *Hepburn 14* (GRA); Ben MacDhui, (--DB), *Hilliard & Burt* (BOL, E, K, MO, NBG, NU, PRE, S). 3124 (Hanover): Sneeuwbergen, (--DC), *Bolus 642* (BOL). 3126 (Queenstown): Jamestown, (--BB), *Grobbelaar 632* (PRE); Cis-Garipina, Zuurepoort, Stormbergen, (--BC), *Zeyher 112* (S); Fincham's Nek, (--DD), *Galpin 1594* (BOL). 3224 (Graaff-Reinet): Cave Mt., (--BC), *Bolus s.n.* (BOL). 3226 (Fort Beaufort): Winterberg, (--AD), *Ecklon & Zeyher 1312* (C, G, MO, O, S, SAM, TCD); Nico Malan Pass, Seymour, (--DB), *Edwards 728* (NU). 3227 (Stutterheim): Fairford, Cathcart, (--AC), *Cotterrell 138* (GRA); Windvogelberg, (--AC), *Drège s.n.* (K); Hogsback, (--CA), without collector (PRE); Mount Coke, 2000', (--CD), *Sim 1400* (BOL); King William's Town, Yellowwoods, (--CD), *Sim 20172* (PRE). 3228 (Butterworth): between Gekau and Basche, (--BA), *Drège s.n.* (S); Kei Mouth, (--CB), *Flanagan 1343* (BOL, GRA, NU, PRE, SAM).

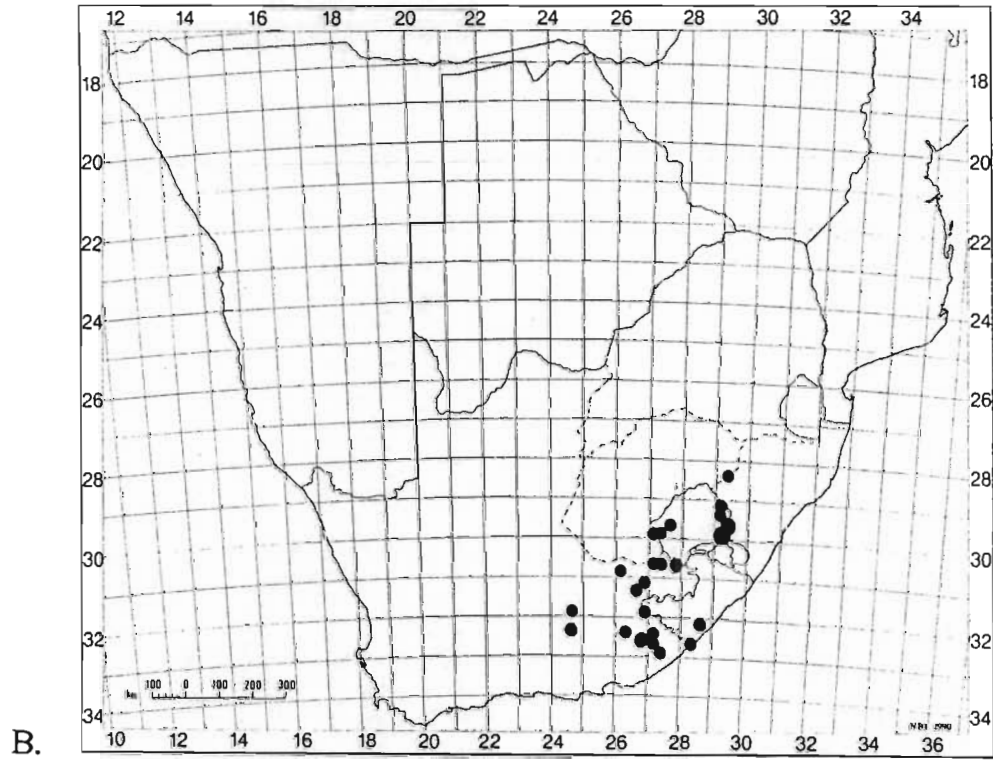
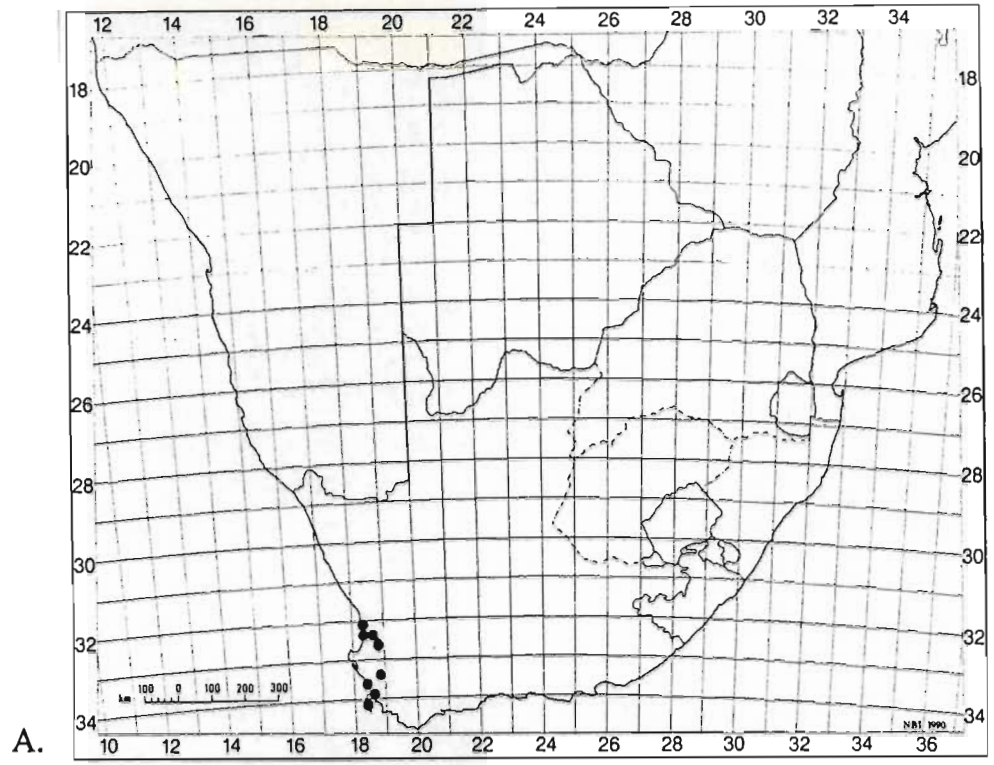
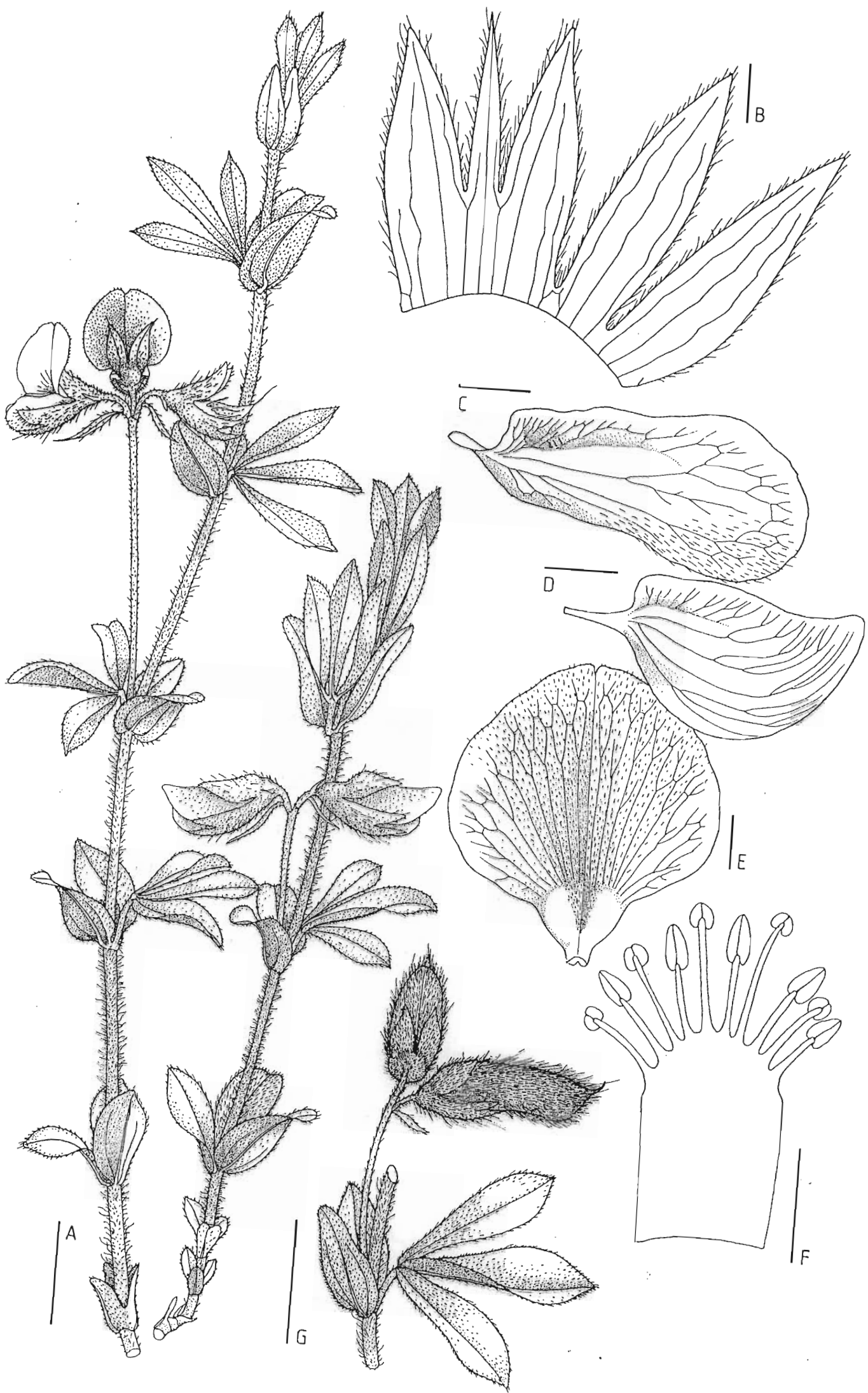


Figure 85. Recorded distribution of A. *A. velutinum* & B. *A. candicans*.

29. *Argyrolobium stipulaceum* Eckl. & Zeyh., Enum. Pl. Afr. Austr. 2: 187 (1836); Walp.: 507 (1839); Walp.: 631 (1843); Benth.: 343 (1844); Harv.: 71 (1862); Burt Davy: 393 (1926). Type: Cape Province, Winterberg near Philipstown, *Ecklon & Zeyher s.n.* (SAM!, lecto., selected here; K!, MO!, P!, OXF!, G!, isolecto.).

Chasmone verticillata E. Mey.: 72 (1836). Types: eastern Cape, Katberg Drège *s.n.* (BM!, lecto. selected here; K!, P!, S!, isosyn.); between Kei and Basche, Drège *s.n.* (P!, syn.).

Herbaceous perennial, erect, sparingly branched, stems densely sericeous to pilose, weakly perennial. *Leaves* monomorphic, densely sericeous abaxially and marginally, adaxial surface pilose to sericeous; leaflets, obovate to oblanceolate, (8--10--35(--40) x (2--4--13(--16) mm, sometimes conduplicate; petiole (0--1--7 mm long; apex rounded, apiculate; stipules broadly, obliquely ovate, 9--34 x 4--17(--20) mm. *Inflorescence* 1--6-flowered, usually congested, terminal but becoming leaf-opposed; peduncle 3--57 mm long; bracts linear to narrowly oblanceolate, 4--8 x 0.5--1 mm; bracteoles, setaceous or absent, 0--3 x 0--0.25. *Flowers* dimorphic. *Calyx* sericeous, deeply bilabiate; upper lip 9--12 mm long, upper sinus 6--9 mm, lower lip 10--15 mm long, lobes 4--8 mm long. *Corolla* bright yellow fading to russet; standard suborbicular, 13--16 x 11--15 mm, adaxial surface sericeous, base obtuse, claw 1 mm long; wings oblong to obovate, 11--15



mm, with ill-defined sculpturing in the upper basal and upper central zones, glabrous to sparsely sericeous in the lower distal zone, claw 1--1.5 mm long; keel cymbiform 9--12 x 4--5 mm, glabrous, claw 1--2 mm long. *Stamens* monadelphous, sheath fused adaxially. *Ovary* narrowly oblong, 5--7 mm long; style 3--4 mm long. *Fruit* densely sericeous to pilose, inflated, 27--39 x 8--10 mm. *Seed* reniform, laterally compressed, 2--2.5 x 2--2.5 mm, red-brown to dark brown.

40

A. stipulaceum is variable in size but consistent in morphology. It is distinguished by its very large stipules and inflated fruits. The close ally *A. candicans* differs in its diminutive stature, smaller, solitary, sessile chasmogamous flowers (rarely chasmogamous flowers are sessile in *A. stipulaceum*) and short internodes. When identifying fruiting specimens calyx size must be checked because cleistogamous flowers of *A. stipulaceum* are always sessile. *A. stipulaceum* occurs in grasslands across a wide altitudinal range. Specimens have been collected mainly in Coastal Thornveld, Dohne and Highland Sourveld and *Themeda-Festuca* Alpine Veld (Figure 79).

Without precise locality: Natal, *Gerrard & McKen 1761* (TCD); *Gueinzis s.n.*

Figure 86

Argyrolobium stipulaceum. A. Habit (bar = 20 mm); B. calyx (bar = 2 mm); C. wing (bar = 2 mm); D. keel (bar = 2 mm); E. standard, adaxial surface (bar = 2 mm); androecium (bar = 2 mm). Voucher: *Edwards 433*.

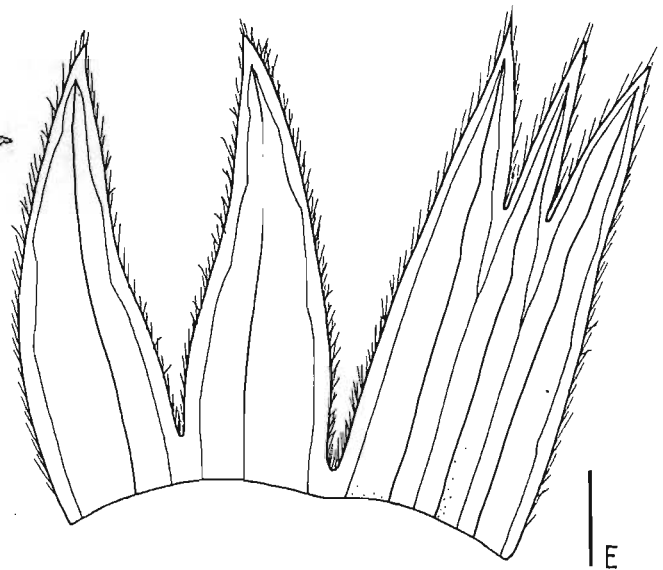
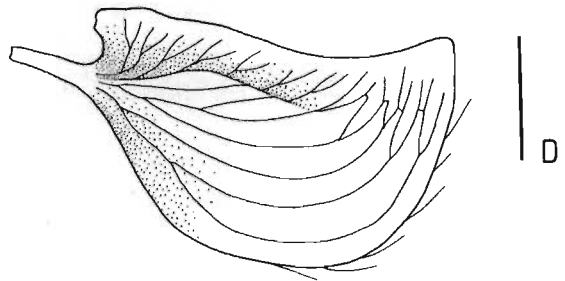
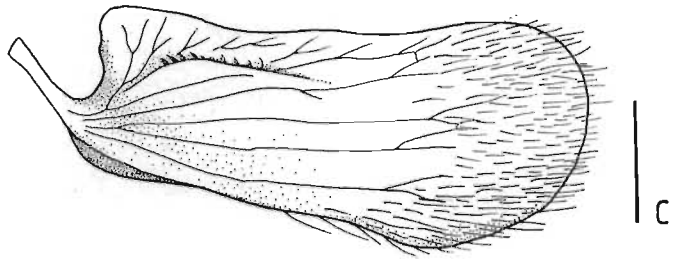
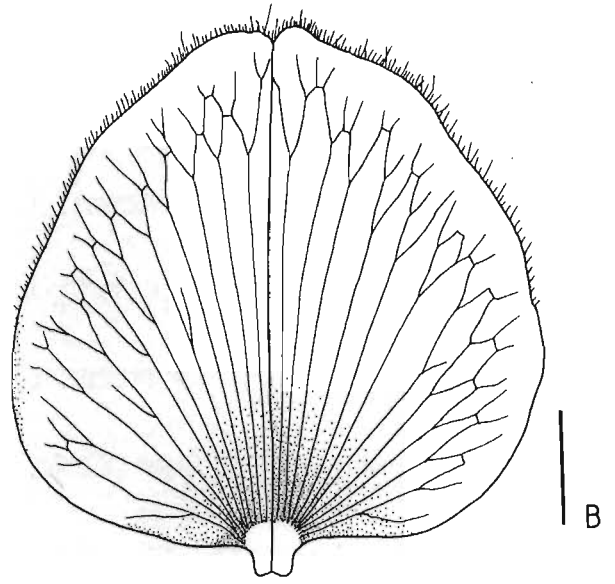
(G); Cape of Good Hope, *Drège s.n.* (G, OXF, P); Cap de Bonne-Esperance, *Ecklon & Zeyher 1318* (G); *Gerrard 1062* (BM). 2630 (Carolina): Mavieriestad, (--CA), *Pott 5068* (PRE, BOL). 2828 (Bethlehem): The Cavern, Hlolela, (--DB), *Hilliard 2014* (NU). 2829 (Harrismith): Kerkenberg, (--AC), *Jacobs 1266* (PRE); *Jacobsz 1316* (PRE). 2830 (Dundee): Kranskop, (--DD), *Edwards 459* (NU); Ntunjambili, (--DD), *Hilliard 1438* (NU). 2831 (Nkandla): Melmoth, (--CB), *Codd 1816* (PRE). 2928 (Marakabei): Mamalapi, (--AC), *Guillarmod 738* (PRE); Mokhoabong Pass, (--CB), *Killick 4254* (PRE). 2929 (Underberg): Marbelston, Mooi River, (--AA), *Mogg 3150* (PRE); *Stirton 5107* (PRE); Mokhotlong, Merareng, (--AA), *Liebenberg 5672 & 5765* (PRE); Injasuti, (--AB), *Trauseld 895* (NU); Giant's Castle Game Reserve, (--AB), *Trauseld 1016* (NU, PRE); *Trauseld 1099* (PRE); Bushman's River, (--BA), *Johnston 665* (E); Griffin's Hill, Estcourt, (--BB), *Acocks 35584* (BOL); Bray Hill, (--BB), *Hilliard & Burt 19080* (E, NU); Elandhoek River headwaters, (--BC), *Hilliard & Burt 16159* (E, K, MO, NU, PRE, S); Mulangane Ridge, above Carter's Nek, (--BC), *Hilliard & Burt 16960* (E, F, K, NU, PRE); Kamberg, Highmoor, (--BD), *Ruddock 29* (NU); Cobham Forest Reserve, Lakes Cave, (--CB), *Manning, Hilliard & Burt 16066* (E, K, NU, PRE); Glengariff, (--CB), *Rennie 116 & Rennie 837* (NU); Sani Pass, (--CB), *Hilliard & Burt 8871* (E, K, MO, NU, PRE); Cobham Forest Reserve, Upper Polela Cave, (--CB), *Hilliard & Burt 12637* (E, NU); Tarn Cave, above Bushman's Nek, (--CC), *Hilliard & Burt 16841* (E, K, NU); *Hilliard & Burt 17441* (E, K, NU, PRE); Himeville, (--DC), *Thieuel 72* (NU); Bushman's River

Valley, (--DD), *Wylie com Wood 10575* (NH). 2930 (Pietermaritzburg): Marbelston, Mooi River, (--AA), *Mogg 3150* (PRE); Mooi River, (--AA), *Johnston 55* (E); *Wood 3761* (NH); *Wood 4024* (BOL); *Webb 7012* (PRE); Greenwich Farm, Rietvlei, (--AB), *Fry 2783* (PRE); Howick, (--AC), *Schrire 442* (NH); *Moll 1028 & 1169* (NU, PRE); Nhluzane, (--AC), *Hilliard & Burt 9087* (E, NU); *Wood 5123* (BM, BOL, E, G, MO, SAM, UPS); Kaarkloof, Shelter Falls, (--AC), *Morris 238* (NU); Lincholnmead, (--CB), *Baker 20* (MO); Scottsville, (--CB), *Fisher 321* (NU); World's View, (--CB), *Stirton 9041* (PRE); Pietermaritzburg, (--CB), *Douwes-Dekker 8* (NU); *Ronsett 5* (MO); Town Bush Valley, (--CB), *Ross 392 & 429* (NU); Camperdown, (--DA), *Edwards 433* (NU); *Gerrard & McKen 1062* (TCD); Krantz-kloof, (--DD), *Schlechter 3208* (BOL, BR, C, E, GRA, Z). 3028 (Matatiele): Ongeluks Nek Pass, (--AD), *Hilliard & Burt 18737* (E); Matatiele, (--BD), *Burt & Hilliard 3782* (E, NU). 3029 (Kokstad): Clydesdale, (--BD), *Tyson 1379 & 2533* (BOL, SAM); Kokstad, (--CB), *Tyson 1329* (SAM); Ngeli Mountains, (--DC), *Stirton 10416* (NH); Bizana, (--DD), *Stirton 5596* (MO). 3030 (Port Shepstone): Dumisa, (--AD), *Rudatis 1763* (G); Victoria County, (--AD), *Wood 11382* (NU, PRE). 3226 (Fort Beaufort): Winterberg Range, (--AC), *Bowker 45* (TCD); Phillipstown, (--AD), *Ecklon & Zeyher 1318* (SAM); Katberg, (--DA), *Drège s.n.* (BM, P, S); *Hutton s.n.* (TCD); Seymour, Nico Malan Pass, (--DB), *Edwards 728* (NU); Amatole Mountains, Mitchell's Pass, (--DB), *Phillipson 1216* (MO, PRE). 3227 (Stutterheim): Cathcart, (--AC), *Le Roux 82* (GRA); Windvoegelberg, (--AC), *Drège s.n.* (P, S);

Fort Cunynghame, (--AD), *Edwards* 728 (NU); Komgha, (--DB), *Flanagan* 1089 (BOL, GRA, PRE). 3228 (Butterworth): Kentani, (--AD), *Pegler* 862 (BOL); between Gekau and Basche, (--BB), *Drège* s.n. (P). 3326 (Grahamstown): Grahamstown, (--BC), *Bolton* s.n. (TCD); *Glass* 509 (SAM); *Britten* 6482 (PRE); *MacOwan* 775 (BM, BOL, GRA, TCD); *Godfrey* s.n. (PRE).

30. *Argyrolobium velutinum* Eckl. & Zeyh., Enum. Pl. Afr. Austr. 2: 186 (1836); Walp.: 507 (1839); Walp.: 631 (1843); Benth.: 344 (1844); Harv.: 71 (1862); Harms: 182 (1917). Type: Cape, near Simonstown, *Ecklon & Zeyher* 1313 (P!, lecto. selected here; GRA!, S!, SAM!, isolecto.).

Suffrutex up to 0.1--0.5 m tall, decumbent or scandent sometimes erect; stems sparingly branched, weakly perennial, sericeous to densely villous, becoming glabrous; roots ligneous, perennial. *Leaves* sericeous to velutinous; leaflets, 9--45 x 3--14 mm, often broadly obovate below, narrowly obovate to oblanceolate above, often conduplicate, apex acute to rounded, mucronate; petiole sericeous to velutinous, 9--20 mm long; stipules, ovate to lanceolate, 2--10 x 1--4 mm. *Inflorescence*, 1--5-flowered, terminal but becoming leaf-opposed; peduncle 0--6 mm long; bracts linear, 2--5 x 0.5--1 mm, bracteoles linear or setaceous. *Calyx* villous, deeply bilabiate; upper lobes 10--12 mm long, upper sinus 8--10 mm deep, lower lip 10--13 mm long, lobes 3--4 mm long. *Corolla* bright yellow



fading to russet; standard suborbicular, 10--14 x 9--12 mm, adaxial surface densely sericeous, base rounded, claw 1 mm long; wings oblong to obovate, 10--13 x 4--5 mm, distally sericeous, with lunate-lamellate sculpturing in the upper basal and zone, claw 1--2 mm long; keel cymbiform, 9--10 x 4--5 mm, sparingly sericeous along the lower suture, claw 1--2 mm long. *Stamens* monadelphous sheath completely fused above. *Ovary* narrowly oblong, 5--6 mm long; style 3--4 mm long. *Fruit* sericeous, inflated, 24--35 x 6--7 mm. *Seed* suborbicular, slightly compressed, 2--3 mm in diameter, dark red-brown. ⁴¹

Argyrolobium velutinum produces chasmogamous flowers sparingly and is therefore seldom collected. Sessile, multi-flowered inflorescences also occur in *A. filiforme* but its small sature and compressed pods distinguish it. The inflated fruits of *A. velutinum* are unique among species from the Cape West Coast. The species grows in Macchia and Strandveld vegetation (Figure 85).

3218 (Clanwilliam): Nortier Experimental Farm, (--AB), *Boucher 2584* (STE); Langdam, Groendam, (--AB), *Stirton 9349* (PRE); Bloemendal Farm, (--AD), *Stirton 9332* (PRE); Elandsbaai, Piquetberg, (--AD), *Compton 15065* (NBG); Brandenburg, (--BC), *Zeyher s.n.* (S); Langevalei, (--BC), *Zeyher s.n.* (S, SAM); eastern slopes, Piecknier's Pass, (--DB), *Pearson 5143* (BOL). 3318 (Cape

Figure 87

Argyrolobium velutinum. A. Reproductive branches (bar = 20 mm); B. standard, abaxial surface (bar = 2 mm); C. wing (bar = 2 mm); D. keel (bar = 2 mm); E. calyx (bar = 2 mm). Voucher: *Bolus 7074*.

Town): La Fontaine, east of Riebeeck, (--BD), *Boucher 3250* (STE); Zwartland, Dornhoogde, (--BD), *Zeyher 386* (BM, E, G, P, PRE, SAM); Groenekloof, (--CB), *Bolus 4267* (BOL); Bellville, (--DC), *Barker 10352* (NBG). 3418 (Simonstown): Simonstown, (--AB), *Ecklon & Zeyher 1313* (GRA, P, S, SAM); Rapenburg, Cape Peninsula, (--AB), *Bolus 7074* (BOL).

31. *Argyrolobium argenteum* (Jacq.) Eckl. & Zeyh., Enum. Pl. Afr. Austr. 2: 184 (1836); Walp.: 632 (1843), *non A. argenteum* (L.) Willk. Type: Cape Province, *t. 220* in Jacquin, N.J. Plantarum rariorum horti caesarei schoenbrunnensis (1797).

Crotalaria argentea Jacq.: *t.220* (1797); DC.: 134 (1825), *non Cytisus argenteus* L. Type as above.

Chasmone argentea (Jacq.) E. Mey.: 75 (1836). Type: as above.

Chasmone argentea (Jacq.) E. Mey. var. *pilosa* E. Mey.: 75 (1836). Type: eastern Cape, between Gekau and Basche; Modderfontein near Brakrivier; Nieuwveld, near Gansefontein; (G!, MO!, W!; syn. without specified localities).

Argyrolobium pumilum Eckl. & Zeyh. var. *pilosum* (E. Mey.) Harv.: 74 (1862), *synon. nov.* Type: as above.

Dichilus obovatus E. Mey.: 151 (1832), *synon. nov.* Type: eastern Cape, Uitenhage, *Ecklon s.n.* (S!, lecto. selected here).

Argyrolobium obovatum (E. Mey.) Eckl. & Zeyh.: 185 (1836); Walp.: 508

(1839). Type: as above.

Argyrolobium collinum Eckl. & Zeyh. var. *seminudum* Harv.: 72 (1862),
synon. nov. Type: eastern Cape, Uitenhage, Zoutpanshoogte, Zeyher 3201 (S!,
 lecto. selected here; G!, P! isolecto.).

Argyrolobium collinum Eckl. & Zeyh. var. *angustatum* Harv.: 72 (1862),
synon. nov. Type: eastern Cape, Uitenhage, Swellendam, near Gouritzrivier,
 Ecklon & Zeyher 1303 (S!, lecto. selected here).

Shrub, well branched, stems densely sericeous, perennial. *Leaves* weakly dimorphic, sericeous to pilose abaxially and marginally, adaxial surface glabrous to sparsely sericeous; leaflets, broadly obovate to obovate, 5--16 x 3--6 mm, central vein prominent below and grooved above; petiole densely sericeous to pilose, longer on lower leaves, 2--11(--16) mm long; apex rounded, apiculate; stipules subulate, sometimes patent or reflexed, 2--3 x 0.25--0.5 mm, apex acute. *Inflorescence* 1(--2)-flowered, terminal but becoming leaf-opposed; peduncle 1--2 (--40) mm long; bracts linear, to setaceous, 1--1.5 x 0.25 mm; bracteoles, setaceous or absent. *Flowers* dimorphic. *Calyx* sericeous, deeply bilabiate; upper lip 7--9 mm long, upper sinus 3--5 mm, lower lip 8--9 mm long, lobes 2--3 mm long. *Corolla* bright yellow fading to russet; standard broadly obovate, 9--11 x 6--9 mm, adaxial surface sericeous, base cuneate, claw 1--1.5 mm long; wings narrowly obovate, 8--9 x 3--3.5 mm, with lunate-lamellate sculpturing in the upper basal and upper central zones, distally sericeous, claw 1--1.5 mm long; keel

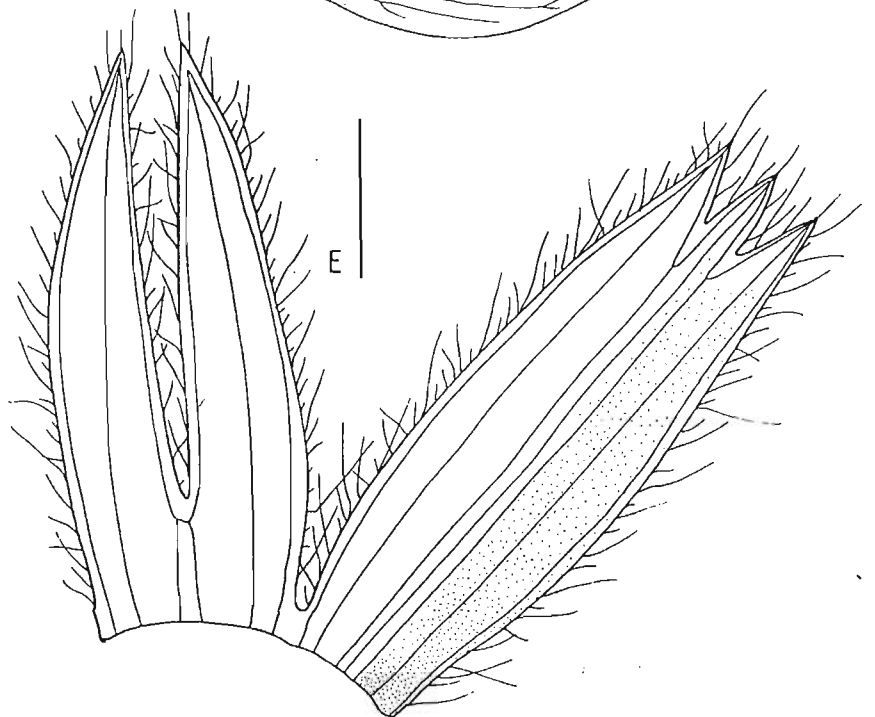
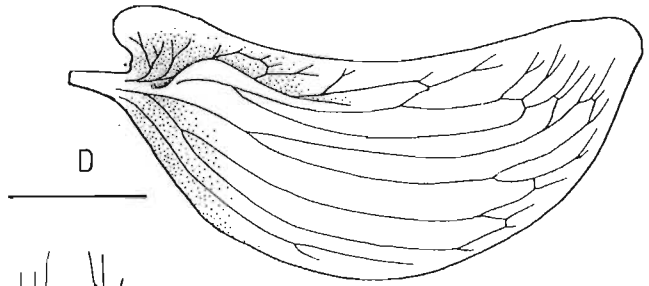
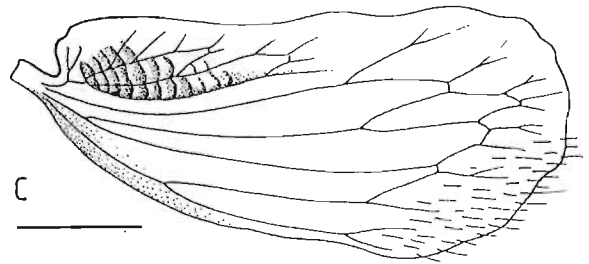
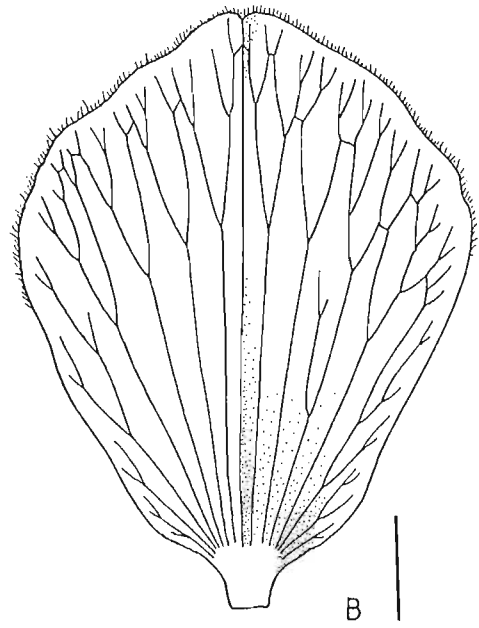
cymbiform 8.5--9 x 4 mm, glabrous, claw 1.5--2 mm long. *Stamens* monadelphous, sheath fused adaxially. *Ovary* narrowly oblong, 4--6 mm long; style 4--5 mm long. *Fruit* sparsely sericeous, slightly inflated, 20--40 x 3.5--4 mm. *Seed* suborbicular, 1.5--2 x 1.5--2.5 mm, light to dark brown.

This shrubby species occurs in dry vegetation of the interior (Figure 91) and is characterised by its densely sericeous stems and petioles. New growth is occasionally densely pilose.

A. argenteum was reduced to synonymy with *A. collinum* (Harvey 1862) due to its frequently sessile, solitary flowers. However its lax, shrubby stature, sparser indumentum and pronounced petioles clearly separate *A. argenteum*. Occasionally its flowers are borne atop elongate peduncles but in many specimens the inflorescence appears to be pedunculate due to the delayed maturation of the terminal leaf which opposes the flowers. Sometimes up to three flowers are borne per node which is reminiscent of *A. filiforme*. The species has also been confused with *A. pumilum* but has smaller, sessile flowers, narrower leaflets and is an erect shrub.

Without precise locality: *Drège s.n.* (W); *Drège s.n.* (G, MO); *Drège s.n.* (S); Klipsfontein and Boschjansrivier, *Drège s.n.* (P); *Ecklon s.n.* (W); Zoutpanshoogte, *Zeyher 2301* (G, P, S). 2822 (Glen Lyon): Hay, (--DD), *Acocks*

473 (PRE). 2823 (Griekwastad): Danielskuil, (--BA), *Wilman 2996* (BOL). 3018 (Kamiesberg): Langberg Farm, Langberg, (--AB), *Stirton 11019* (STE). 3023 (Britstown): Gordonville, (--DD), *Acocks 16565* (PRE). 3024 (De Aar): De Aar, (--CA), *Acocks 618* (PRE); *Foley 131* (PRE). 3025 (Colesberg): Phillipolis, Hendrik Verwoerd Dam, (--DA), *Bourquin 881* (PRE). 3119 (Calvinia): Nieuwoudtville Reserve, (--AC), *Perry & Snijman 2067* (NBG); Calvinia, (--BD), *Lewis 6123* (STE); Ekerdam, (--BD), *Taylor 2801* (NBG), *Thorne s.n.* (SAM). 3123 (Victoria West): Victoria West, (--AC), *Rehm s.n.* (PRE). 3125 (Steynsburg): Middelburg, Grootfontein, (--AC), *Gill 210* (BOL). 3220 (Sutherland): Roggeveld Mts, Voelfontein farm, (--AB), *Stirton 10995* (STE). 3221 (Merweville): Sterbroomhoek, (--BA), *Moffett & Steensma 4030* (STE); Fraserburg, Layton, (--BB), *Shearing 779* (PRE). 3224 (Graaff-Reinet): Graaff-Reinet, (--BC), *Bolus s.n.* (BOL); *Bolus 583* (GRA, S); Oudeberg, (--DD), *Bolus s.n.* (BOL). 3226 (Fort Beaufort): Bedford, (--CA), *Acocks 20077* (PRE). 3318 (Cape Town): Harmonie, (--DC), *Nel 253* (BOL). 3319 (Worcester): Baviaansberg, Ceres, (--BA), *Bond 1467* (NBG). 3320 (Montagu): Matjiesfontein, nr. Laingsburg, (--BA), *Compton 3303* (BOL); *Compton 4707* (BOL, NBG); *Compton 15170* (NBG); *Compton 2808* (BOL); *Compton 8532* (NBG); *Compton 6763* (NBG). 3321 (Ladismith): Grootplaats beyond Cloetespas, (--DD), *Muir 2035* (BOL, PRE). 3322 (Oudtshoorn): Prince Albert, (--AA), *Bolus 11789* (BOL); Boomplaas, Cango Valley, (--AC), *Moffett 99* (STE); Zwartbergen bei Klaarsboom, (-BC), *Drège s.n.* (P); Olifantsrivier, (--BD), *Wall 212* (S); Cango,



Oudtshoorn, (--CA), *Compton 7158* (NBG); Kendo, (--DB), *Drège s.n.* (P). 3323 (Willowmore): Uniondale, (--CA), *Esterhuysen 5654, 16781 & 16874* (BOL). 3324 (Steytlerville): Teasdale, (--DC), *Hoffman 593* (GRA); nr. Swellendam, Gauritzrivier, (--DC), *Ecklon & Zeyher 1303* (S). 3325 (Port Elizabeth): between Koega and Sundays rivers, (--CB), *Pappe s.n.* (STE). 3326 (Grahamstown): Grahamstown, (--BC), *Scott Elliot 763* (E). 3419 (Caledon): Mountains near Caledon, (--AB), *Ecklon & Zeyher 81* (S). 3420 (Bredasdorp): Bredasdorp, (--CA), *Taylor s.n.* (NBG).

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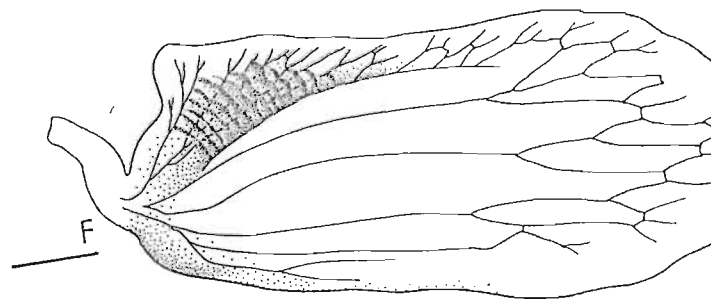
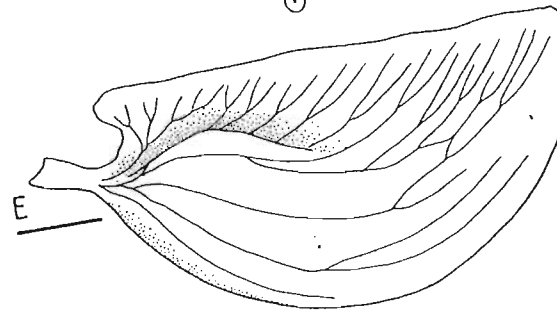
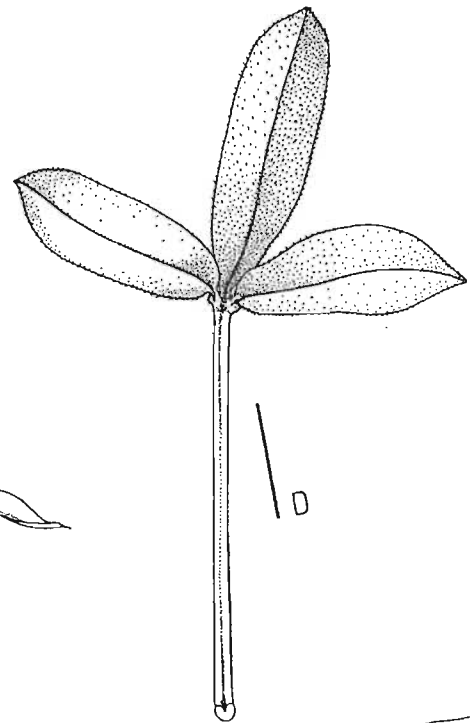
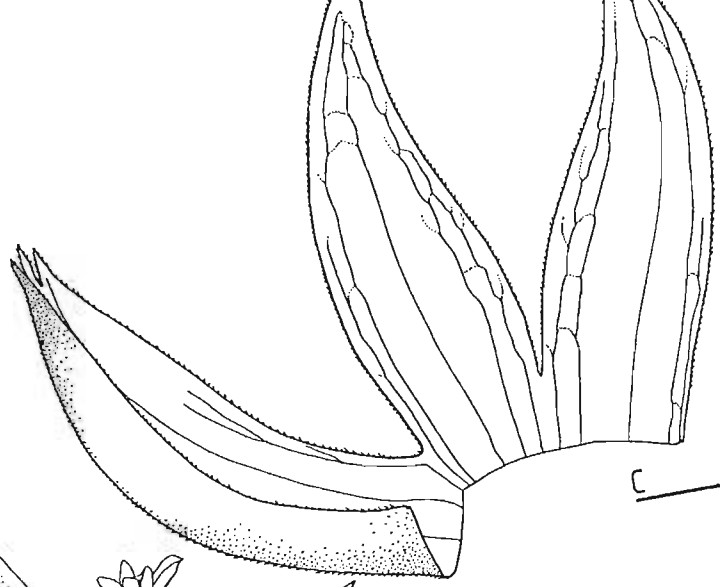
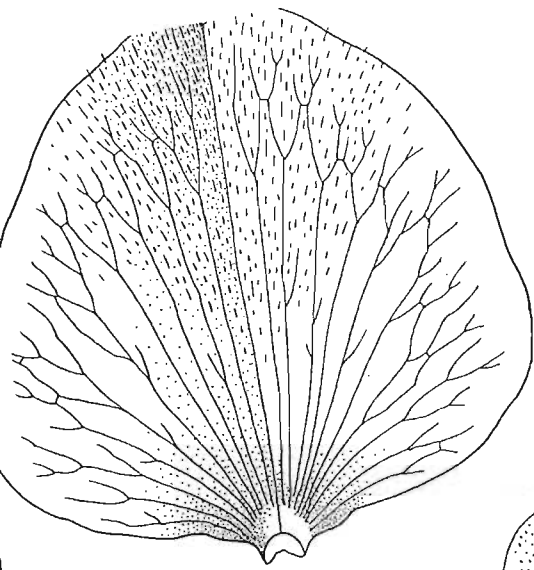
32. *Argyrolobium petiolare* (E. Mey.) Walp., Rep. 1: 632 (1843); Harv.: 72 (1862). Type: Cape Province, Kamiesberg, hills near Uitkomst, *Drège s.n.* (P!, lecto. selected here; G!, K!, MO!, O!, S!, W!, isolecto.).

Chasmone petiolaris E. Mey.: 75 (1836). Type: as above.

Shrubs 0.3--0.5 m tall, rigidly erect, well branched, stems shortly velutinous, becoming glabrous. *Leaves* shortly sericeous; leaflets narrowly oblong to oblong, 6--20 x 3--11 mm, often conduplicate, apex rounded or recurvomucronate, apiculate; petiole up to 30 mm long, adaxially canaliculate; stipules 0.8--1.5 x 0.5 mm, subulate. *Inflorescence* 1(--2)-flowered, leaf-opposed; peduncle 0--4 mm

Figure 88

Argyrolobium argenteum. A. Flowering branch (bar = 2 mm); B. standard, abaxial surface (bar = 2 mm); C. wing (bar = 2 mm); D. keel (bar = 2 mm); E. calyx, inner surface (bar = 2 mm). Voucher: *Acocks 20077*.



long; bracts narrowly oblong, 2--3 x 0.5 mm; bracteoles narrowly oblong, 2 x 0.5 mm. *Calyx* velutinous, deeply bilabiate; upper lobes 9--11 mm long, upper sinus 8.5--9 mm deep, lower lip 11--13 mm long, shallowly cymbiform, lobes acute, 1.5--2 mm long. *Corolla* yellow; standard suborbicular, 15--17 x 15--18 mm, adaxial surface sparingly sericeous, claw 1--2 mm long; wings oblong, 15.5--18 x 5--6 mm, glabrous, sculpturing lunate-lamellate, in the upper basal and central zones, claw 1--2 mm long; keel bluntly cymbiform, 13--14 x 5--6 mm, claw 2 mm long. *Stamens* monadelphous, sheath completely fused above. *Ovary* narrowly oblong, 9--11 mm long; style 4--6 mm long. *Fruit* velutinous, 45--60 x 7--8 mm. *Seed* suborbicular, 2.75--3 mm in diameter, dark brown.

A. petiolare is endemic to the Kamiesberg where it grows in Mountain Renosterbosveld (Figure 91). It is distinctive within the section due to its shrubby habit and sessile flowers.

2918 (Gamoep): Koperberg, (--CA), *Pillans 5667* (BOL). 3017 (Hondekliptaai): "Brackdamm" Kamieskroon, (--BB), *Schlechter 11107* (BM, BOL, E, G, MO, PRE, W). 3018 (Kamiesberg): Uitkomst, (--CA), *Drège 3299* (G, K, MO, O, P, S, W); Garies, (--CA), *Caporn s.n.* (BOL).⁴³

Figure 89

Argyrolobium petiolare. A. flowering branch (bar = mm); B. standard, adaxial surface (bar = 2 mm); C. calyx (bar = 2 mm); D. leaf (bar = 5 mm); E. keel (bar = 2 mm); F. wing (bar = 2 mm). Voucher: *Schlechter 11107*.

33. **Argyrolobium pachyphyllum** Schltr. in Engl. Jahrb. 24: 441 (1898). Type: Elim, on grassy hills *Schlechter 7724* (K!, lecto. selected here; BOL!, BM!, E!, G!, MO!, S!, W!, isolecto.).

Dwarf shrub 100--250 mm tall, forming clumps; stems well branched, perennial, sericeous to shortly villose, becoming glabrous. *Leaves* pilose to shortly villose below, glabrous above; leaflets 8--15 x 5--8 mm, elliptic to obovate, strongly conduplicate, arcuate, apex rounded, apiculate; petiole 3(--5) mm long, adaxially canaliculate; stipules 0.5--2 x 0.25--0.5 mm, subulate. *Inflorescence* 1 (--2)-flowered, terminal, becoming leaf-opposed; peduncle 2--7 mm long; bracts 1--1.5 x 0.5 mm, linear; bracteoles 0.75 x 0.25 mm, linear. *Calyx* sparsely sericeous to shortly villose, deeply bilabiate; upper lobes 8--11 mm long, upper sinus 7--10 mm deep, lower lip 12--14 mm long, lobes acute, 2.5--4 mm long. *Corolla* yellow; standard suborbicular, 13--18 x 10--16 mm, adaxial surface sericeous, claw 2--3 mm long; wings obovate, 10--14 x 4.5--6 mm, sculpturing in the upper basal zone, claw 1--2 mm long; keel cymbiform, 9--13 x 4--6 mm, claw 1 mm long, lower margin sparsely hairy. *Stamens* monadelphous, sheath completely fused above. *Ovary* narrowly oblong, 7--9 mm long; style 3--4 mm long. *Fruit* not seen. *Seed* not seen.

Schlechter (1898) suggested an alliance between *A. pachyphyllum* and *A. collinum* which both produce solitary (occasionally two) flowers atop abbreviated peduncles however in *A. collinum* the peduncles are barely visible. The young stems of *A.*

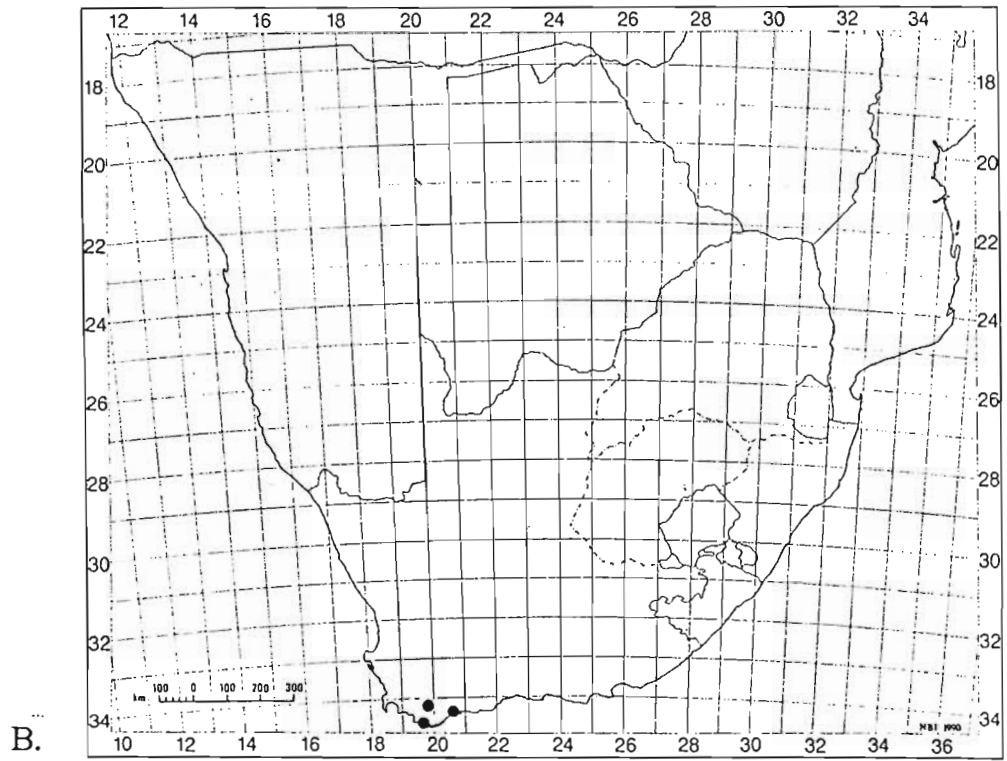
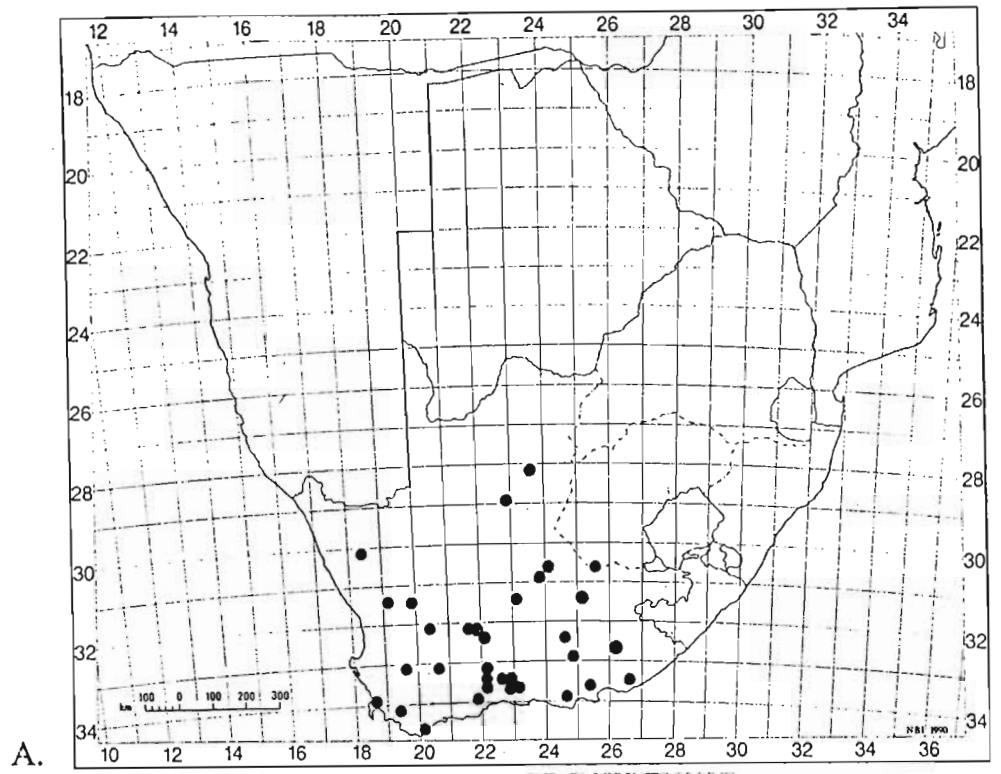
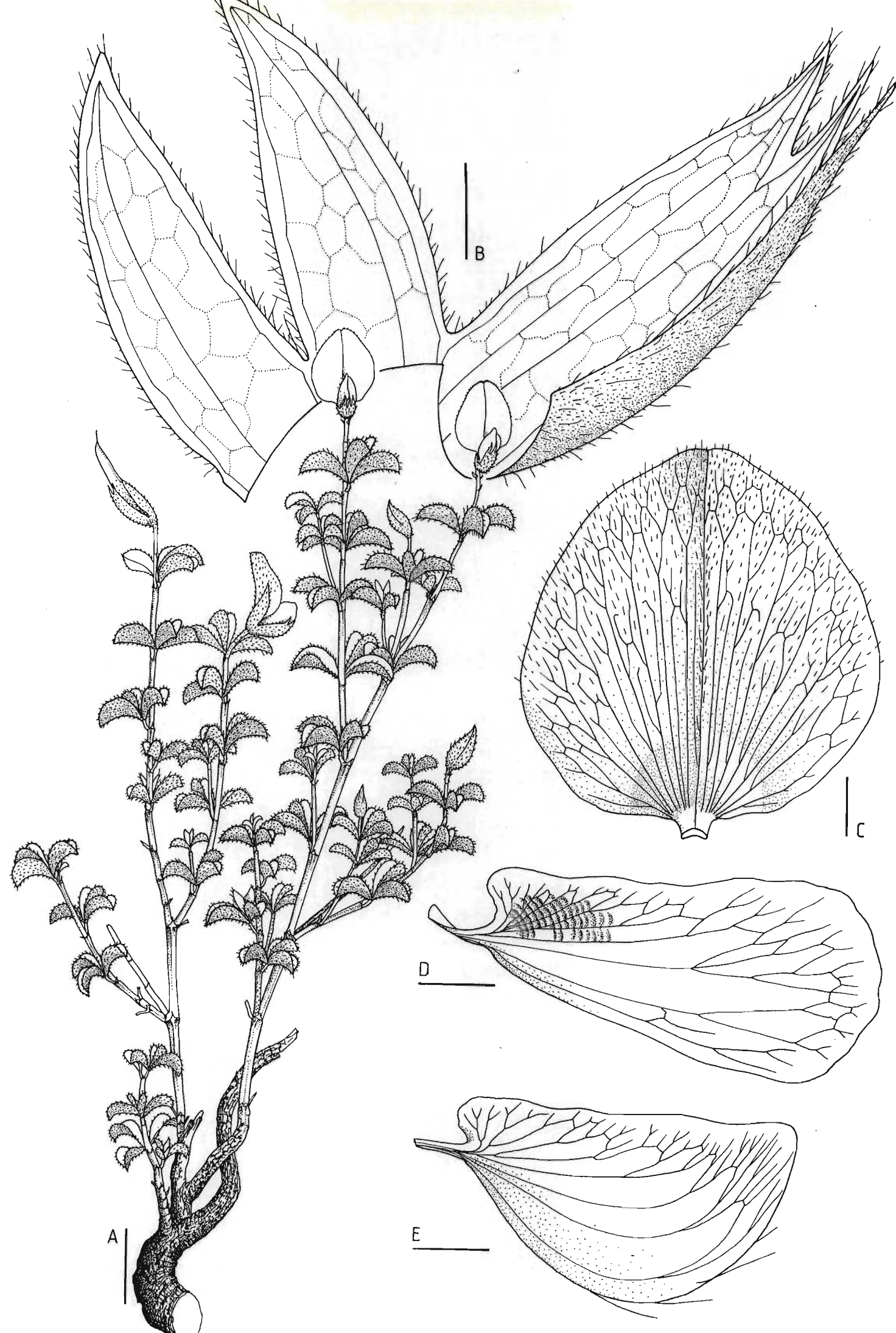


Figure 91. Recorded distribution of A. *A. argenteum* and B. *A. pachyphyllum*.



pachyphyllum are white with appressed trichomes and the plants are densely branched shrubs, characters never seen in *A. collinum* which is weakly perennial. A closer ally is *A. argenteum* which is a small shrub of the adjacent interior. It is distinguished by its membranous, weakly conduplicate leaves with pronounced petioles and its smaller flowers with narrower petals.

A. pachyphyllum is a narrow endemic around Bredasdorp in Coastal Renosterbosveld and Coastal Macchia (Figure 91).

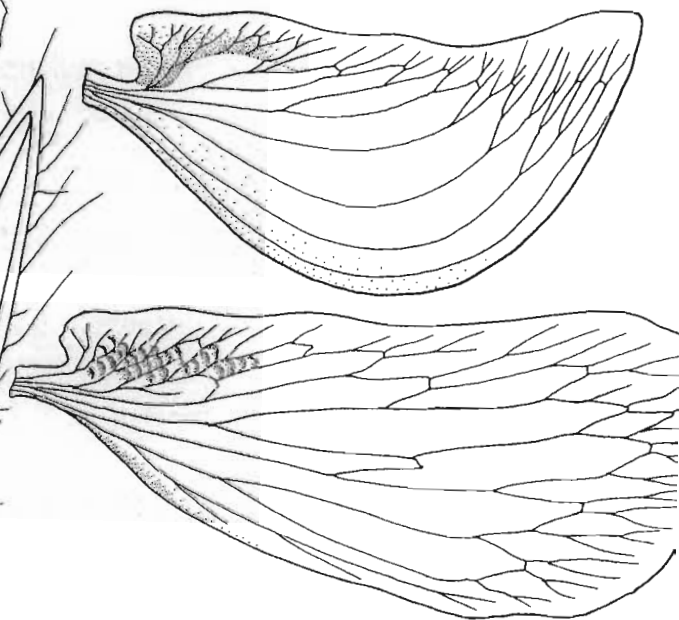
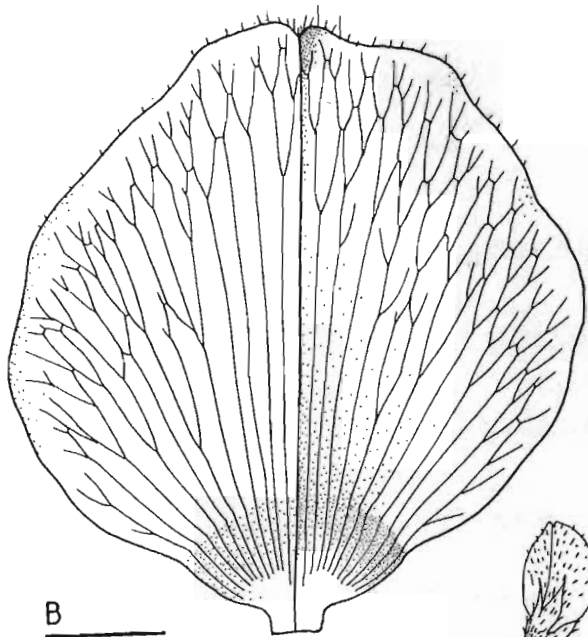
3419 (Caledon): Dasberg, Storms Vlei, (--BB), *Stokoe 61545* (SAM); Riversonderend, (--BB), *Stokoe 64904* (SAM); Caledon, (--DA), *Bolus 6477* (BOL); *Park s.n.* (NBG); farm "The Bath", (--DA), *Guthrie s.n.* (BOL); Elim, (--DA), *Bolus 8542* (NBG); *Schlechter 7724* (BM, BOL, E, G, MO, S); *Grobbelaar 2720* (PRE). 3420 (Bredasdorp): De Hoop, Potberg Nature Reserve, (--BC), *Burgers 1580* (PRE); *Barker 8440* (NBG); *Thompson 3442* (PRE).

44

34. *Argyrolobium barbatum* (Meisn.) Walp., *Repert. Bot. Syst.* 2: 845 (1843); *Harv.*: 74 (1862); *Benth.*: 345-346 (1844). Type: eastern Cape, Uitenhage, banks of the Koega River, *Krauss 928* (B†; W!, lecto. selected here).

Figure 90

Argyrolobium pachyphyllum. A. Habit (bar = 20 mm); B. calyx (bar = 2 mm); C. standard (bar = 2 mm); D. wing (bar = 2 mm); E. keel (bar = 2 mm). Voucher: *Burgers 1580*.



Chasmone barbata Meisn. :77 (1843). Type: as above.

Dwarf shrub up to 0.4 m tall, forming clumps, stems well branched, pilose, becoming glabrous. *Leaves* pilose, conduplicate; leaflets 8--12 x 4--6 mm, ovate to obovate, apex acute to recurvomucronate, apiculate; petiole 5--13 mm long; stipules 4--7 x 2--3 mm, connate in the basal third. *Inflorescence* 1--2(--3)-flowered, terminal, becoming leaf-opposed; peduncle 10--20 mm long; bracts 5--6 x 0.75--1 mm, lanceolate; bracteoles 3--4 x 0.75 mm, linear. *Calyx* pilose, deeply bilabiate; upper lobes 10--12 mm long, upper sinus 2--2.5 mm deep, lower lip 11--14 mm long, lobes acute, 2.5--3.5 mm long. *Corolla* yellow; standard suborbicular, 10--12 x 10--11 mm, adaxial surface sericeous, claw c. 1 mm long; wings oblong, 9--12 x 3--4 mm, glabrous or sparsely sericeous in the distal third, petal sculpturing lunate, in the upper basal zone, claw 1.5--2 mm long; keel cymbiform, 9--12 x 3--4 mm, claw 1--1.5 mm long. *Stamens* monadelphous, sheath completely fused above. *Ovary* narrowly oblong, 5--8 mm long; style 4--6 mm long. *Fruit* sparsely pilose, moderately compressed, 15--30 x 4.5--5 mm. *Seed* suborbicular, 3--4 mm in diameter, dark brown.

45

A. barbatum is a rare endemic in Addo Bush, a southern form of Valley Bushveld (Figure 94). Plants are distinctive with a rufous, pilose indumentum and partially

Figure 92

Argyrolobium barbatum. A. Habit (bar = 20 mm); B. standard (bar = 2 mm); C. leaf with fused stipules (bar = 2 mm); D. keel (bar = 2 mm); E. wing (bar = 2 mm); F. calyx (bar = 2 mm). Voucher: *Janus & Sidey* 733.

connate stipules. The flowers are borne singly or in pairs. In these characters the species resembles *A. campicola* which is however allopatric and distinguished by its short petioles, herbaceous habit and sparsely pilose wing petals with lamellate sculpturing.

3325 (Port Elizabeth): Sandflats, (--BD), *Sidey 733* (MO); *Acocks 13628* (PRE); *Story 2356* (GRA); Ngnaga, between Port Elizabeth & Grahamstown, (--BD), *Bond 1236* (NBG); Koegakopje, Zwartkopsjan, (--CD), *Zeyher 2305* (G, P, S, SAM, TCD); 22 km from Port Elizabeth on the rd. to Grahamstown, (--DB), *Germishuizen 1402* (PRE).

35. *Argyrolobium collinum* Eckl. & Zeyh. in Enum. Pl. Afr. Austr. 2: 186 (1836); Walp.: 507 (1839); Walp.: 631 (1843); Harv.: 72 (1862); Harms: 178 (1917). Type: eastern Cape, Uitenhage, Addo and near Bosjesmansrivier, *Ecklon & Zeyher 705* (K!, lecto. selected here; BM!, E!, TCD!, islecto.).

Argyrolobium podalyrioides Dümmer: 273 (1912), *synon. nov.* Type: Grahamstown, on grassy hills, *Mac Owan 481* (K!, lecto. selected here; BOL!, GRA!, K!, NY!, PRE!, TCD!, islecto.); Grahamstown, Bothasberg, *Tyson s.n.* (K!, syn.).

Herb 0.15--0.5 m tall, erect becoming decumbent; stems poorly branched, weakly perennial, velutinous, becoming glabrous. *Leaves* sericeous to velutinous; leaflets

narrowly to broadly obovate, 6--20 x 3--11 mm, often conduplicate, apex rounded to emarginate, apiculate; petiole 1--2.5(--4) mm long; stipules 2--4 x 0.75--1 mm, often recurved, setaceous or lanceolate. *Inflorescence* 1(--2)-flowered, leaf-opposed; peduncle 0--2 mm long; bracts narrowly linear, 0.7--1.5 mm long, bracteoles narrowly linear, 0.5--1 mm long. *Flowers* dimorphic. *Calyx* velutinous, deeply bilabiate; upper lobes 8--10 mm long, upper sinus 5.5--8 mm deep, lower lip 9--11 mm long, lobes acute, 2--4 mm long. *Corolla* yellow; standard broadly obovate to suborbicular, 10--13 x 10--11 mm, adaxial surface sericeous, base rounded, claw 1--1.5 mm long; wings oblong to obovate, 9--13 x 3--5 mm, often sparingly sericeous, with lunate-lamellate sculpturing in the basal and upper central zones, claw 1--2 mm long; keel acutely cymbiform, 8--12 x 4--5 mm, claw 1.5--2 mm long. *Stamens* monadelphous, sheath completely fused above. *Ovary* narrowly oblong, 6--7 mm long; style 4--6 mm long. *Fruit* velutinous, 25--40 x 4--5 mm. *Seed* suborbicular, 1--1.5 mm in diameter, pale yellow.

Argyrolobium collinum is herbaceous and seldom exceeds 0.4 m, plants soon become moribund in unburnt grassland. Solitary (occasionally paired), sessile, chasmogamous flowers characterise this species. Unfortunately many of the vegetatively similar species produce solitary, sessile cleistogamous flowers and this may cause some confusion in fruiting specimens. However, fruits set through cleistogamy are easily distinguished by their poorly developed calyces.

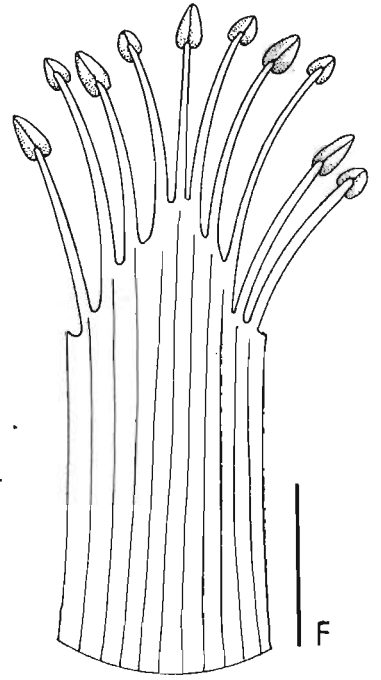
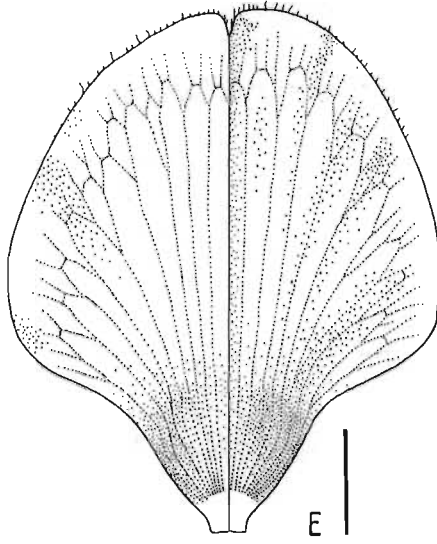
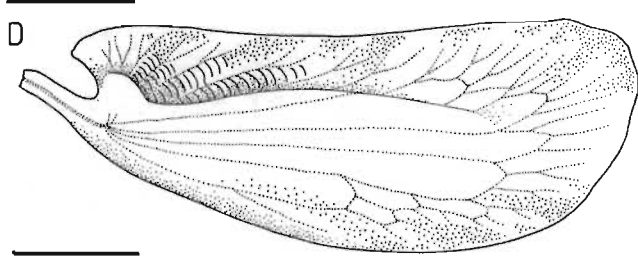
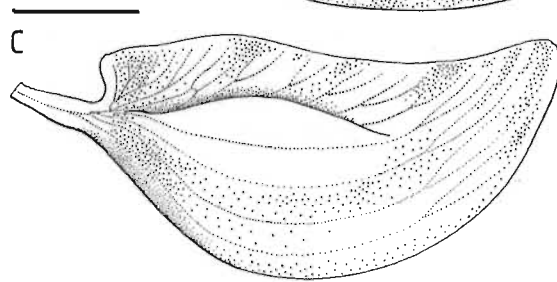
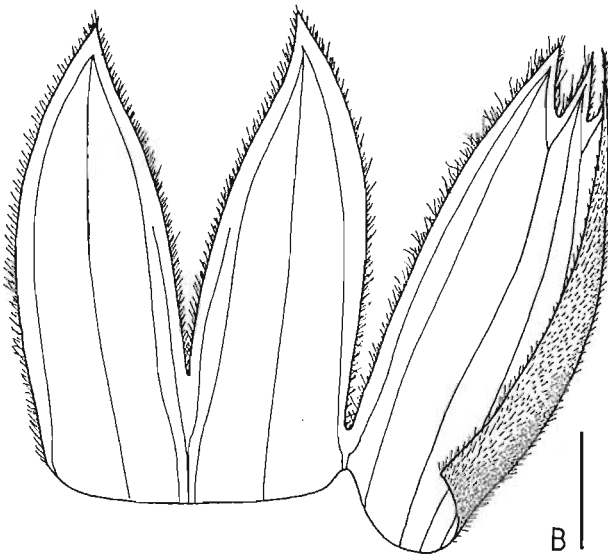
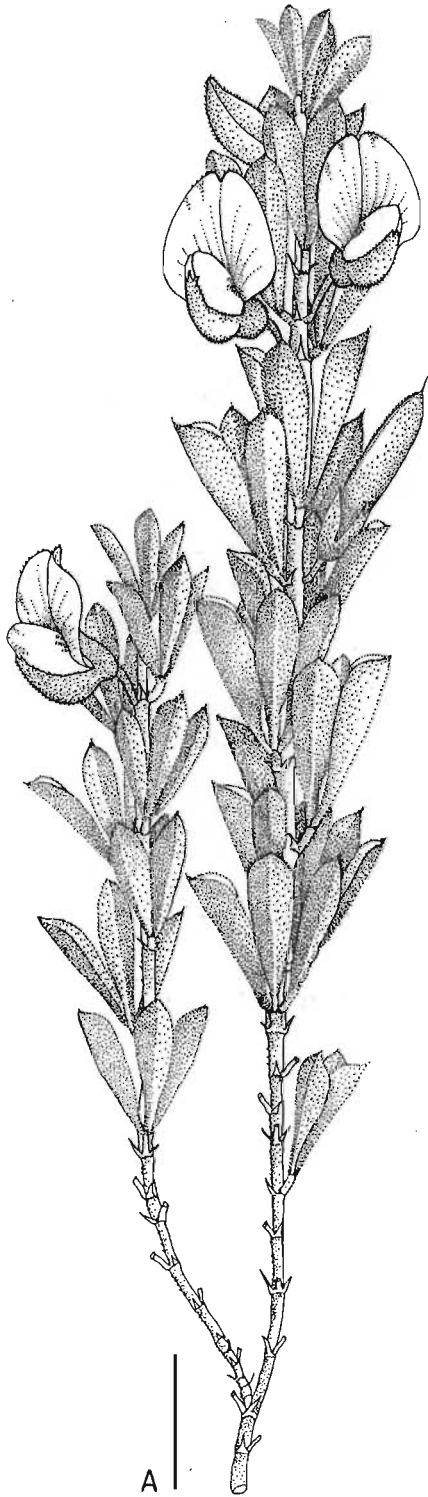
in accordance with the state of surrounding vegetation. Robust coppice growth, with broadly obovate leaflets, characterises resprouting specimens and spindly decumbent plants with narrowly obovate leaflets occur in moribund vegetation.

The reduction of *Chasmone apiculata* E. Mey. to synonymy with *A. collinum* (Benth. 1844, Harv. 1862, Walp. 1839 & 1843) is not supported. The type of *C. apiculata* was misidentified because the fruits are solitary, subsessile and leaf-opposed. These fruits were produced through cleistogamy as is evident by their diminutive calyces and therefore constitute *A. molle* (hence the clear leaflet venation).

A. harmsianum is allied to *A. collinum* producing similar chasmogamous inflorescences. It is distinguished by its oblong leaflets with glabrescent adaxial surfaces.

A. collinum commonly occurs in grasslands associated with False Macchia (Figure 94).

3322 (Oudtshoorn): Langekloof, George, (--CB), *Krauss 919* (NY). 3323 (Willowmore): Joubertina, (--DD), *Esterhuysen 21215* (BOL, PRE); *Esterhuysen 24224* (BOL); *Esterhuysen 19946* (BOL); *Edwards & Ackermann 476* (NU). 3325 (Port Elizabeth): Atalaya Valley, Zuurberg, (--AD), *Johnson 763* (BOL);



Grahamstown, (--BC), *Tyson 15373* (SAM); Van Staden's Flower Reserve, (--CC), *Drège s.n.* (S); *Dahlstrand 1951* (GRA, MO); *Dahlstrand 2567* (GRA, MO, PRE); *Salter 377* (BM); flats between Zwartkop & Van Staden's Rivers, (--CC), *Zeyher 705* (BM, E, K, TCD); Uitenhage, Koegakopjie, Zwartkopsjan, (--CD), *Zeyher 2301* (P); Addo, (--DA), *Drège s.n.* (S). 3326 (Grahamstown): Assagaaibos, (--AD), *Zeyher 2302* (BM, PRE); Faraway, near Grahamstown, (--BC), *Jacot Guillarmod 8934* (GRA); *Edwards & Ackermann 481 & 487* (NU); Grahamstown, (--BC), *Bolton s.n.* (TCD); *Schlechter 2623* (GRA); *Breyer 16859* (PRE); Gunfire Hill, (--BC), *Rennie 479* (BOL); *MacOwan 481* (BOL, GRA, NH, NY, TCD); Bothasberg, (--BC), *MacOwan 799* (NY); hill above hospital, (--BC), *Daly & Cherry 921* (GRA); Trapp's Valley, (--BD), *Compton 19111* (NBG); Alexandria, Kolsrand, (--CB), *Archibald 4084* (GRA); *Galpin 10679* (BOL, PRE); Bathurst, (--DB), *Sidey 3142* (PRE).⁴⁶

36. *Argyrolobium harmsianum* Schlechter ex Harms in Ber. Deutsch. Bot. Ges. 35: 183 (1917). Type: Southwestern Cape, on hills at Cape Agulhas, *Schlechter 10565* (G!, lecto. selected here; E!, MO!, PRE!, S!, W!, isolecto.).

Herb, up to 0.2 m tall, erect, sparsely branched, stoloniferous, stems annual, sericeous. *Leaves* sparsely sericeous abaxially or glabrescent; leaflets obovate to

Figure 93

Argyrolobium collinum. A. Flowering branch (bar = 20 mm); B. calyx (bar = 2 mm); C. keel (bar = 2 mm); D. wing (bar = 2 mm); E. standard, abaxial surface (bar = 2 mm); F. androecium (bar = 2 mm). Voucher: *Edwards & Ackermann 481*.

oblong rarely oblanceolate, 10--25 x 3--9 mm, apex rounded, usually apiculate; petiole 0--1 mm long; stipules subulate to linear, 1--3 x 0.5 mm. *Inflorescence* solitary-flowered, leaf-opposed; bracts linear 2.5--3 x 1 mm; bracteoles lanceolate, up to 3 x 1 mm. *Calyx* shortly pilose, upper lip 8--11 mm long, sinus 6--9 mm deep; lower lip 10--12 mm long, lobes 3.5--5 mm long, medial lobe linear. *Corolla* yellow; standard suborbicular, 11--14 x 10--12 mm, adaxial surface sparsely sericeous, base obtuse, claw 1--2 mm long; wings oblong to obovate, 10--12 x 4--5 mm, with lunate-lamellate sculpturing in the upper basal zone, sparsely sericeous distally, claw 1--2 mm; keel cymbiform, 10--12 x 4--5 mm, claw 2 mm. *Stamens* monodelphous. Ovary narrowly oblong, 6--9 mm long densely sericeous or laterally glabrous; style 4--5 mm long. *Fruit* densely sericeous, compressed, 25--35 x 4 mm, erect. *Seed* not seen.

The habit and solitary flowers of *A. harmsianum* are very similar to high altitude forms of *A. harveyanum* however these similarities appear to be convergent. The androecia of *A. harveyanum* are always pseudodiadelphous with the vexillary stamen largely free and this has not been observed in *A. harmsianum*. *A. collinum* is its closest ally sharing a similar habit and inflorescence structure. It is distinguished by its densely sericeous, conduplicate leaves which are usually imbricate and its glabrous wing petals.

Argyrolobium harmsianum is endemic to the limestones around Bredasdorp in

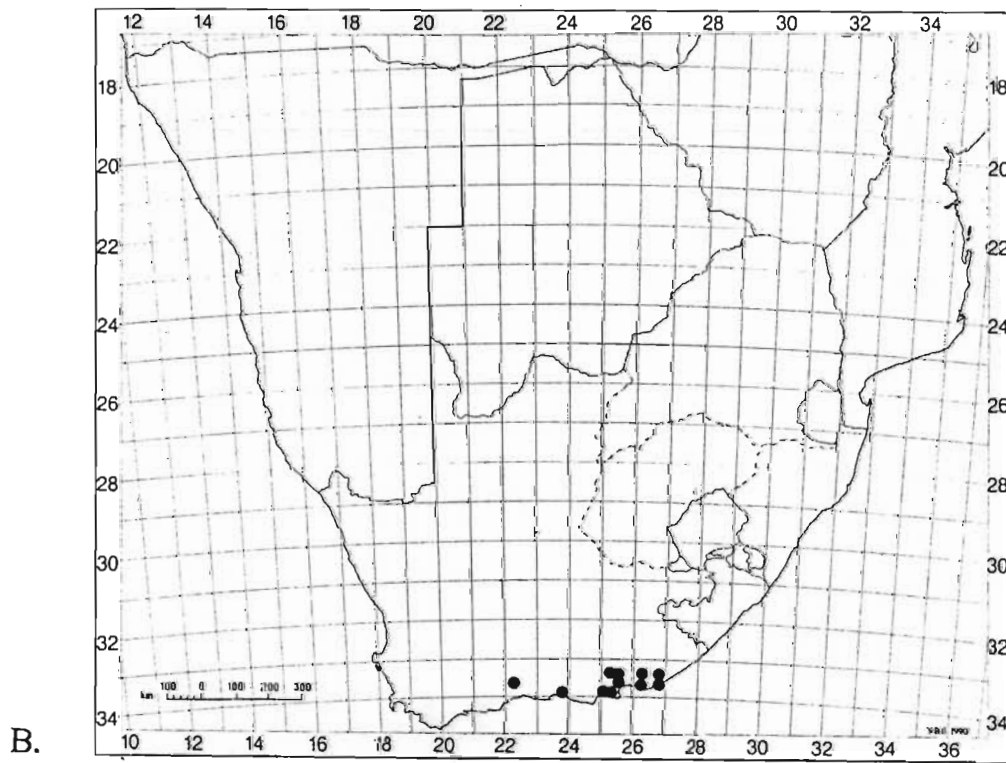
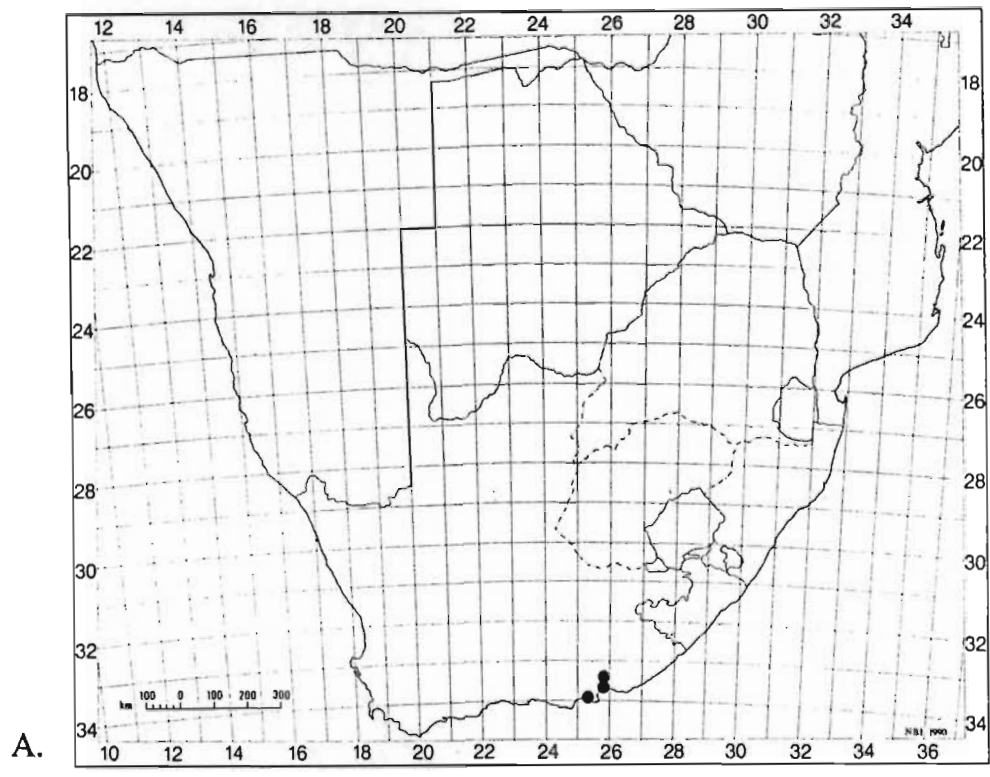
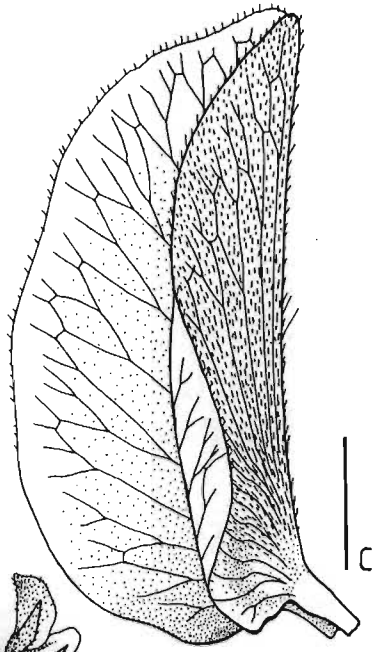


Figure 94. Recorded distribution of *A. A. barbatum* & *B. A. collinum*.



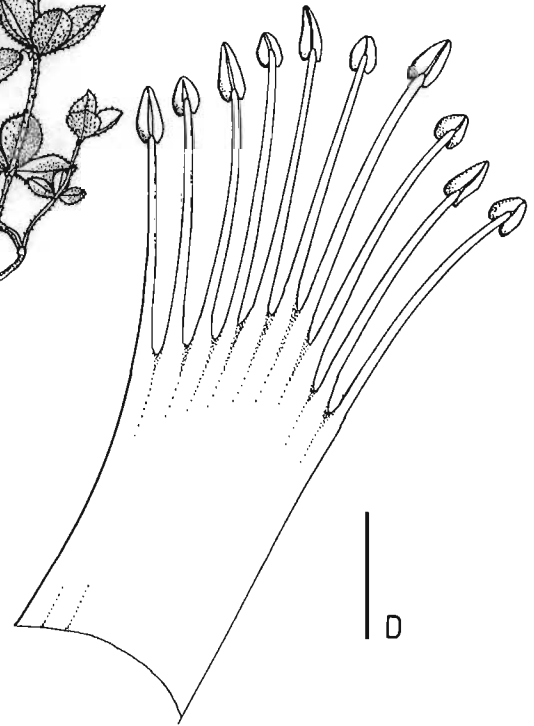
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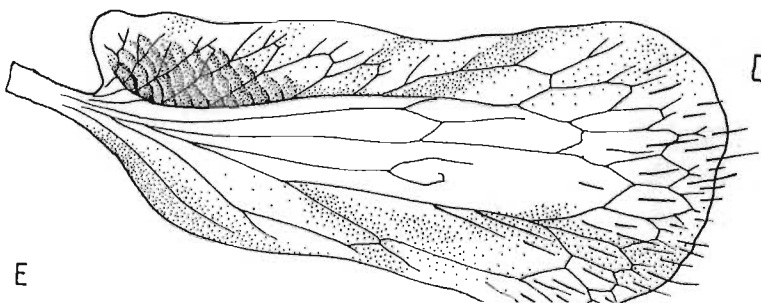
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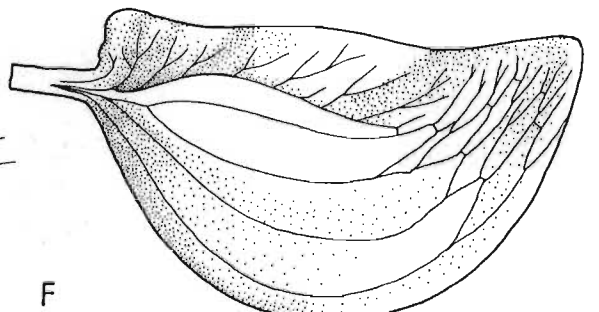
A



D



E



F

Coastal Macchia (Figure 81).

3420 (Bredasdorp): De Hoop, Hamerkop Farm, (--BC), *Van Wyk 1599* (STE); De Hoop (--BC), *Levyns 10703* (BOL); near Cape Agulhas, (--CA), *Hugo 1752* (PRE); *Pillans 8175* (BOL); *Schlechter 10565* (E, G, MO, PRE, S, W).⁴⁷

37. *Argyrolobium filiforme* (Thunb.) Eckl. & Zeyh., Enum. Pl. Afr. Austr. 2: 186 (1836); Walp.: 508 (1839); Walp.: 632 (1843); Benth.: 344--345 (1844); Harv.: 73 (1862); Harms: 178 (1917). Type: Cape, Crests of the Hottentots Holland Mountains, *Thunberg s.n. sub THUNB 17374* (UPS!, lecto. selected here).

Galega filiformis Thunb.: 133 (1800); Thunb.: 600 (1823). Type: as above.

Argyrolobium stenorrhizon Oliv.: t. 1525 (1886) *synon. nov.* Type: Cape Province, near Rondebosch, *H. Bolus 7013* (K!, lecto. selected here; BOL!, G!, NH!, PRE, isolecto.); without precise locality, *Zeyher 387* (BM!, K!, syn.).

Argyrolobium muirii L. Bol.: 127 (1915), *synon. nov.* Type: Cape Province, Bovenplaats, near Albertinia, *Muir 1374* (BOL!, lecto. selected here; PRE!, isolecto.).

Herb, 0.1--0.3 m tall, erect, sparsely branched, stems weakly perennial, sericeous to velutinous, plants solitary, tufted or forming small clumps via subterranean

Figure 95

Argyrolobium harmsianum. A. Habit (bar = 20 mm); B. calyx (bar = 2 mm); C. standard, lateral view (bar = 2 mm); D. androecium (bar = 2 mm); E. wing (bar = 2 mm); F. keel (bar = 2 mm). Voucher: *Levyns 10703*.

stolons. *Leaves* sometimes dimorphic; lower leaflets broadly obovate, elliptic, to narrowly lanceolate, 7--30 x 3--5 mm, shortly pilose to glabrescent, petiole 3--18 mm long; upper leaflets conduplicate, linear to oblanceolate, 20--40 x 2--4 mm, abaxially sericeous, apex acute, apiculate, petiole 2--15 mm long; stipules deltoid to subulate, 1--3 x 0.5 mm. *Inflorescence* 1--3(--5)-flowered, sessile, leaf-opposed; bracts linear 1--3 x 0.5 mm; bracteoles setaceous, up to 2 mm long. *Calyx* sericeous, upper lip 6--8 mm long, sinus 3--5 mm deep; lower lip 6--9 mm long, lobes 1--3 mm long, medial lobe linear. *Corolla* yellow; standard suborbicular, 8--11 x 8--12 mm, adaxial surface sparsely sericeous, base cordate, claw 1--1.5 mm long; wings oblong to obovate, 7--10 x 3--4 mm, sometimes distally sericeous, with lunate-lamellate sculpturing in the upper basal and sometimes in the lower basal zones, claw 1--1.5 mm long; keel cymbiform, 7--9 x 3.5--5 mm, claw 1--1.5 mm. *Stamens* monodelphous. Ovary narrowly oblong, 4--6 mm long, densely sericeous or laterally glabrous; style 3--4 mm long. *Fruit* sericeous, compressed, linear or arcuate, 18--45 x 3.5--4 mm, erect. *Seed* orbicular or irregular, 1.5--2 mm.

Argyrolobium filiforme and its close ally *A. aciculare* occur in the southern Cape and are replaced by *A. harveyanum* to the north. The species can be distinguished on inflorescence structure; *A. harveyanum* always has sessile, solitary flowers and *A. filiforme* has sessile, multi-flowered fascicles which appear pedunculate due to retarded apical leaf development and in *A. aciculare* the fascicles are often

pedunculate. *A. aciculare* is also distinguished from *A. filiforme* by its monomorphic, ericoid leaflets usually borne atop reduced petioles (1--3 mm). The leaves of *A. filiforme* are usually slightly dimorphic.

Past researches have included *A. angustissimum* within *A. filiforme*. However the flowers of the former are large and red-yellow which indicates a strong alliance with *A. tuberosum*. There are no intermediates which link it to *A. filiforme* in terms of floral morphology (Figure 96).

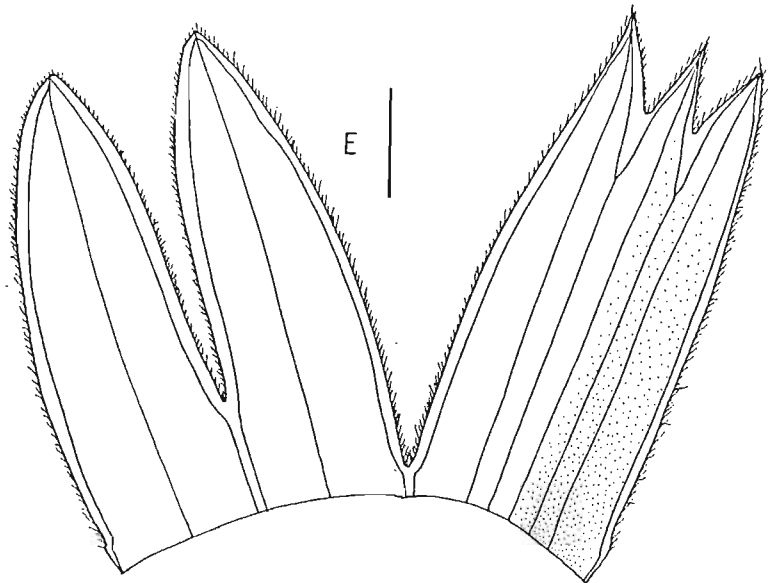
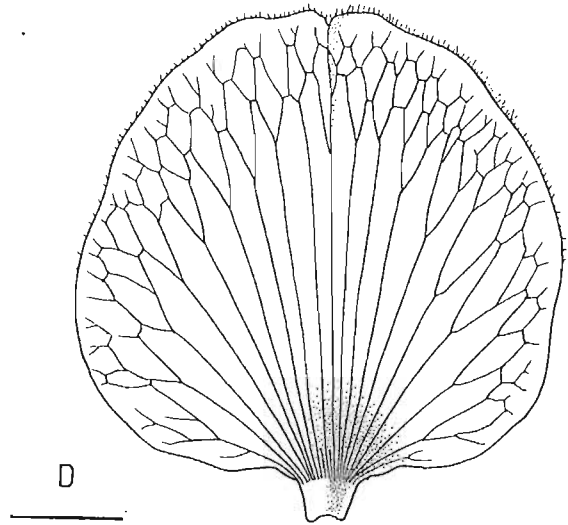
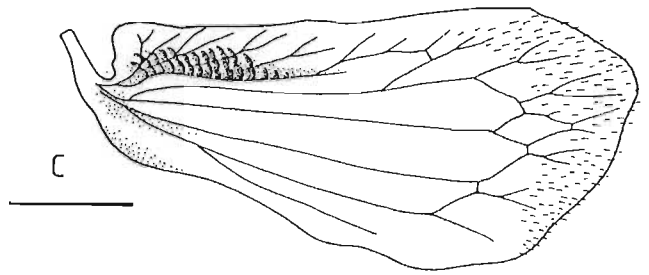
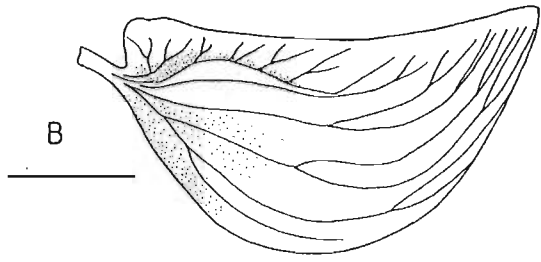
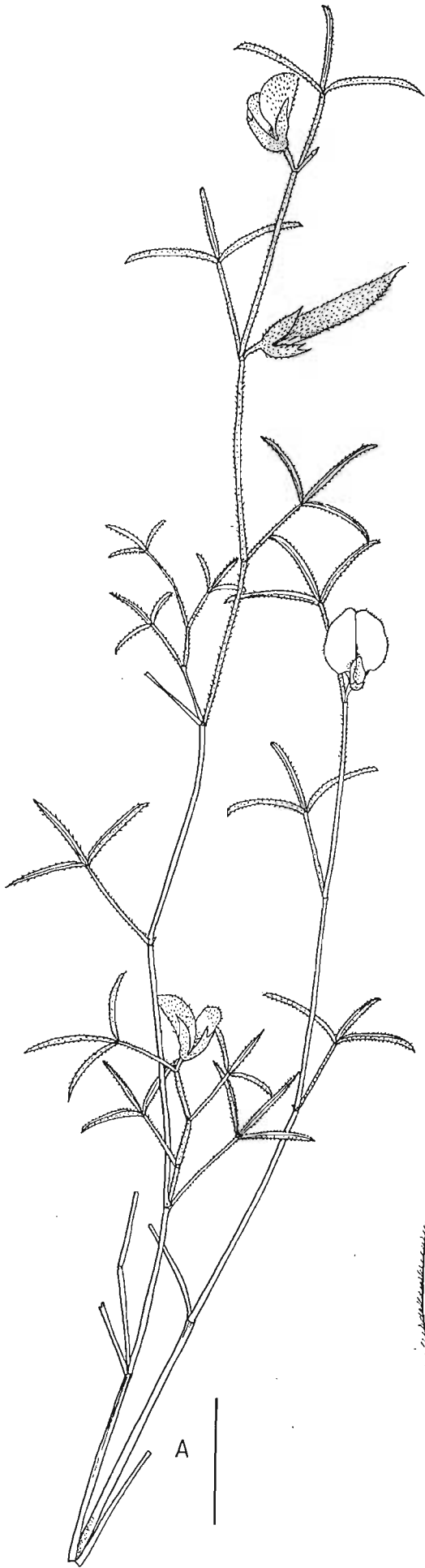
A. filiforme occurs mainly in Coastal Macchia but gatherings have also been made in Macchia and False Macchia vegetation types (Figure 97). Summer flowering predominates but this is probably induced by burning. Cleistogamy is rare in this species.

Without precise locality, *Zeyher* 387 (BM, K). 3219 (Wuppertal): Middelberg, (--AC), *Acocks* 16588 (PRE). 3318 (Cape Town): *Rondebosch*, (--CD), *Bolus* 7013 (BOL, G, K, NH, PRE); Malmsbury, Burgers Post Farm, (--DA), *Boucher & Shepherd* 4903 (STE); Kraaifontein, (--DC), *Welman* 952 (BOL). 3319 (Worcester): Romans River, (--AC), *Walgate* 399 (BOL, NBG); Bainskloof, Brederivier, (--CA), *Walters* 895 (NBG). 3418 (Simonstown): Red Hill, (--AB), *Taylor* 5249 (PRE); Chapman's Peak, (--AB), *Salter s.n.* (BM); Kommetjie, (--AB), *Salter* 7793 (BOL); Hottentots Holland Mountains, (--BB), *Thunberg s.n.*

(UPS). 3419 (Caledon): Franschoek, (--AA), *Phillips 1093* (SAM); Elgin, Palmiet River, (--AA), *Esterhuysen 8422* (BOL); Klein Hagelkraal, (--DA), *Hugo 1713* (STE); Mierkraal, (--DB), *Schlechter 10508* (E, GRA, PRE). 3421 (Riversdale): Bovenplaats, near Albertinia, (--BA), *Muir 1374* (BOL, PRE); Botteliersfontein, (--BA), *Muir 1158* (BOL, PRE).

38. *Argyrolobium rarum* Dümmer in Kew Bull.: 273 (1912). Type: Oudtshoorn, Avontuur, Uniondale, *Fourcade 2985* (BOL!, neo. selected here). [Original type: Grahamstown, Hellpoort (Helspoort), *MacOwan 946*].

Herb, up to 0.4 m tall, decumbent or scandent, sparsely branched, stems weakly perennial, shortly sericeous. *Leaves* rarely dimorphic; lower leaflets rarely broadly obovate, 6--8 x 3--4 mm, shortly pilose abaxially, glabrescent adaxially, petiole 6--8 mm long; upper leaflets conduplicate, linear, 8--23 x 2 mm, abaxially shortly sericeous, apex acute, petiole (8--) 15--25 mm long; stipules subulate, 1 x 0.25--0.5 mm. *Inflorescence* sessile, solitary-flowered, leaf-opposed; bracts linear 1--2 x 0.5 mm long; bracteoles setaceous, up to 1 mm long. *Calyx* shortly sericeous, upper lip 7--9 mm long, sinus 5--6 mm deep; lower lip 8--10 mm long, lobes 2--3 mm long. *Corolla* yellow; standard suborbicular, 9--12 x 9--12 mm, adaxial surface shortly sericeous, base obtuse, claw 1 mm; wings oblong-obovate, 9--10 x 4 mm, with lunate-lamellate sculpturing in the upper basal and upper



central zones, claw 1.5--2 mm; keel deeply cymbiform, 8--9 x 4--5 mm, claw 2 mm. *Ovary* narrowly oblong, 4--5 mm long densely sericeous or laterally glabrous; style 4--5 mm long. *Fruit* sericeous, compressed, linear or arcuate, 30--35 x 3.5--4 mm. *Seed* trapezoid or irregular, 1.5 mm, slightly compressed.

This species is closely allied to *A. harveyanum* but is distinguished by the long petioles of the upper leaves. In *A. harveyanum* these leaves are always sessile.

The long petioles and linear leaflets are similar to terete forms of *A. lunare* however the sessile, solitary flowers, and the occurrence of cleistogamy in *A. rarum* clearly distinguish it. The species occurs in False Macchia and the disjunctions of this vegetation type are reflected in its distribution (Figure 100).⁴⁸

3321 (Ladismith): Rooiberg, Mt. Ararat, (--CB), *Vlok 2087* (PRE). 3322 (Oudtshoorn): Around Prince Albert, (--AA), *Bolus s.n.* (BOL); Swartberg, northern slopes of Wabooms, (--AC), *Thompson 2764* (STE); Summit of Robinson's Pass, (--CC), *Bolus s.n.* (BOL). 3323 (Willowmore): Avontuur, Uniondale, (--CA), *Fourcade 2985* (BOL).

Figure 96

Argyrolobium rarum. A. Flowering branch (bar = 20 mm); B. keel (bar = 2 mm); C. wing (bar = 2 mm); D. standard, abaxial surface (bar = 2 mm); E. calyx, inner surface (bar = 2 mm). Voucher: *Vlok 2087*.

39. *Argyrolobium aciculare* Dümmer in Kew Bull.: 271 (1912). Type: southern Cape, Caledon, on the slopes of Houw Hoek, *Bolus 6934* (BOL, lecto.! selected here; K!, PRE!, isolecto.).

Herb, 0.1--0.25 m tall, erect, sparsely branched, stems weakly perennial, shortly sericeous, plants usually forming small clumps. *Leaves* ericoid, 10--40 x 1 mm, initially shortly sericeous but soon glabrous, except for the pulvini, apex acute, petiole 2--4 mm long, stipules deltoid, 2--4 x 0.75--1 mm. *Inflorescence* 1--3(--5)-flowered, usually pedunculate, leaf-opposed; bracts linear 3--5 x 0.5 mm; bracteoles lanceolate to deltate, up to 2.5--4 x 0.5--0.75 mm. *Calyx* shortly sericeous, upper lip 6--8 mm long, sinus 5--6 mm deep; lower lip 7--9 mm long, lobes 1--3 mm long. *Corolla* yellow; standard suborbicular, 8--11 x 10--12 mm, adaxial surface sparsely sericeous, base cordate, claw 1--1.5 mm long; wings oblong to obovate, 8--10 x 3--4 mm, sometimes distally sericeous, with lunate-lamellate sculpturing in the upper basal and sometimes in the lower basal zones, claw 1--1.5 mm long; keel cymbiform, 8--10 x 3.5--4 mm, claw 1--1.5 mm. *Stamens* monodelphous. *Ovary* narrowly oblong, 4--6 mm long, densely sericeous or laterally glabrous; style 3--4 mm long. *Fruit* shortly sericeous, compressed, linear, 20--40 x 3.5--4 mm. *Seed* orbicular or irregular, 1.5--2 mm.

A. aciculare is strongly allied to *A. filiforme* but is distinguished by its monomorphic, glabrous, ericoid leaves and its pedunculate inflorescences with



prominent bracts and bracteoles.⁴⁹

A. aciculare is limited to Macchia around Caledon (Figure 97). Cleistogamy has not been recorded in this species.

3418 (Simonstown): Kogelberg Forest Reserve, (--BD), *Boucher 1782* (STE); *Van Wilgen 106* (STE). 3419 (Caledon): Houw Hoek, *Bolus 6934* (BOL, K, PRE); Palmiet River Mouth, (--AA), *Stoke 56255 & 55964* (SAM); *Stoke 8797* (BOL); *Esterhuysen 12559* (BOL, NBG); *Esterhuysen 13704* (BOL); Onrust River Mountains, (--AC), *Esterhuysen 4241* (BOL); Kleinmond, (--AC), *De Vos 463 & 1152* (STE).

40. *Argyrolobium harveyanum* Oliv. in Hook. Icon. pl. XVI, t.1525 (1886); Harms: 178--179 (1917); Burt Davy: 393 (1926); Polhill: 152 (1968). Types: Natal, Berg River, *Zeyher s.n.*; Cape, Uitenhage, Van Stadenberg, *Zeyher s.n.*

Figure 97

Argyrolobium aciculare, *A. harveyanum*, *A. filiforme* and *A. angustissimum*. A. Habit of *A. aciculare* (bar = 20 mm); B. habit of southern form of *A. harveyanum* (bar = 20 mm); C. calyx of *A. filiforme* (bar = 2 mm); D. keel of *A. filiforme* (bar = 2 mm); E. wing of *A. filiforme* (bar = 2 mm); F. standard of *A. filiforme* (bar = 2 mm); G. calyx of *A. angustissimum* (bar = 2 mm); H. keel of *A. angustissimum* (bar = 2 mm); I. wing of *A. angustissimum* (bar = 2 mm); J. standard of *A. angustissimum* (bar = 2 mm); K. pistil of *A. angustissimum* (bar = 2 mm); L. pistil of *A. filiforme* (bar = 2 mm). Vouchers: A. *Stokoe 61544*; B. *Edwards s.n.*; C. D. E. F. & L. *Walgate 399*; G. H. I. J. K. *Drège 1419*.

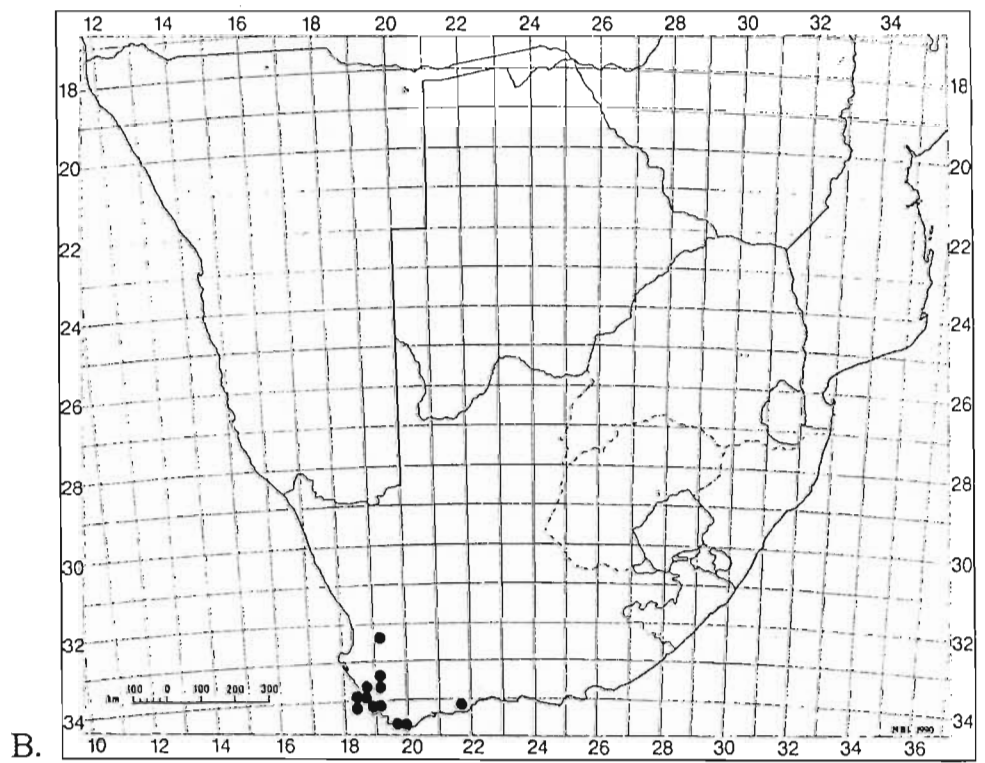
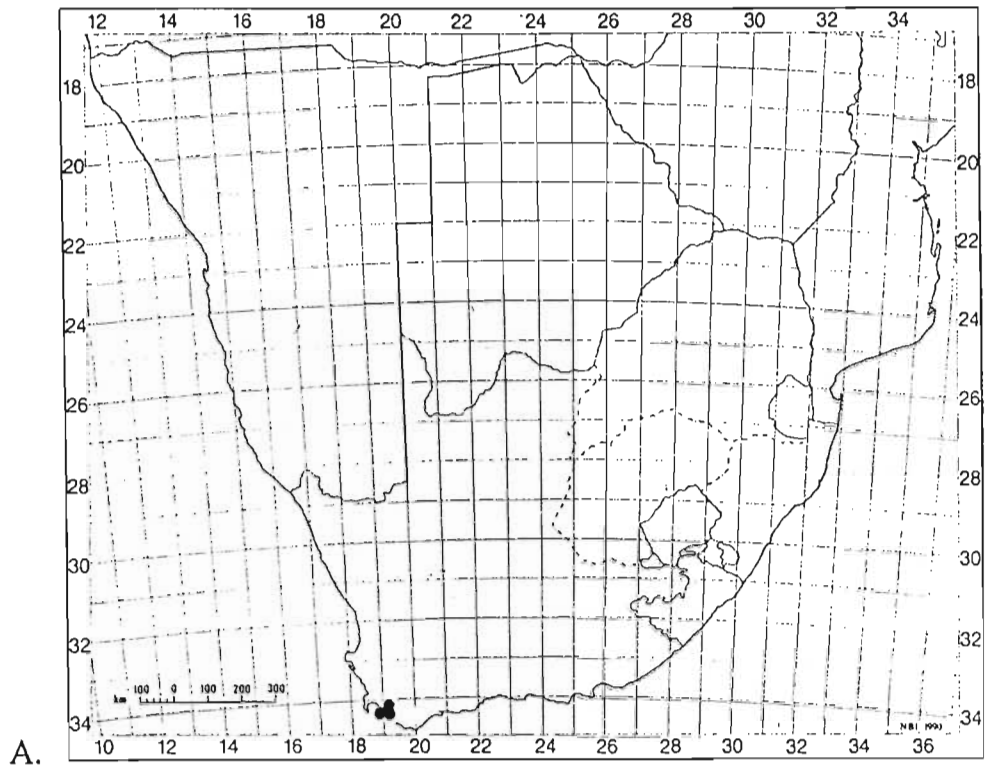


Figure 98. Recorded distribution of A. *A. aciculare* & B. *A. filiforme*.

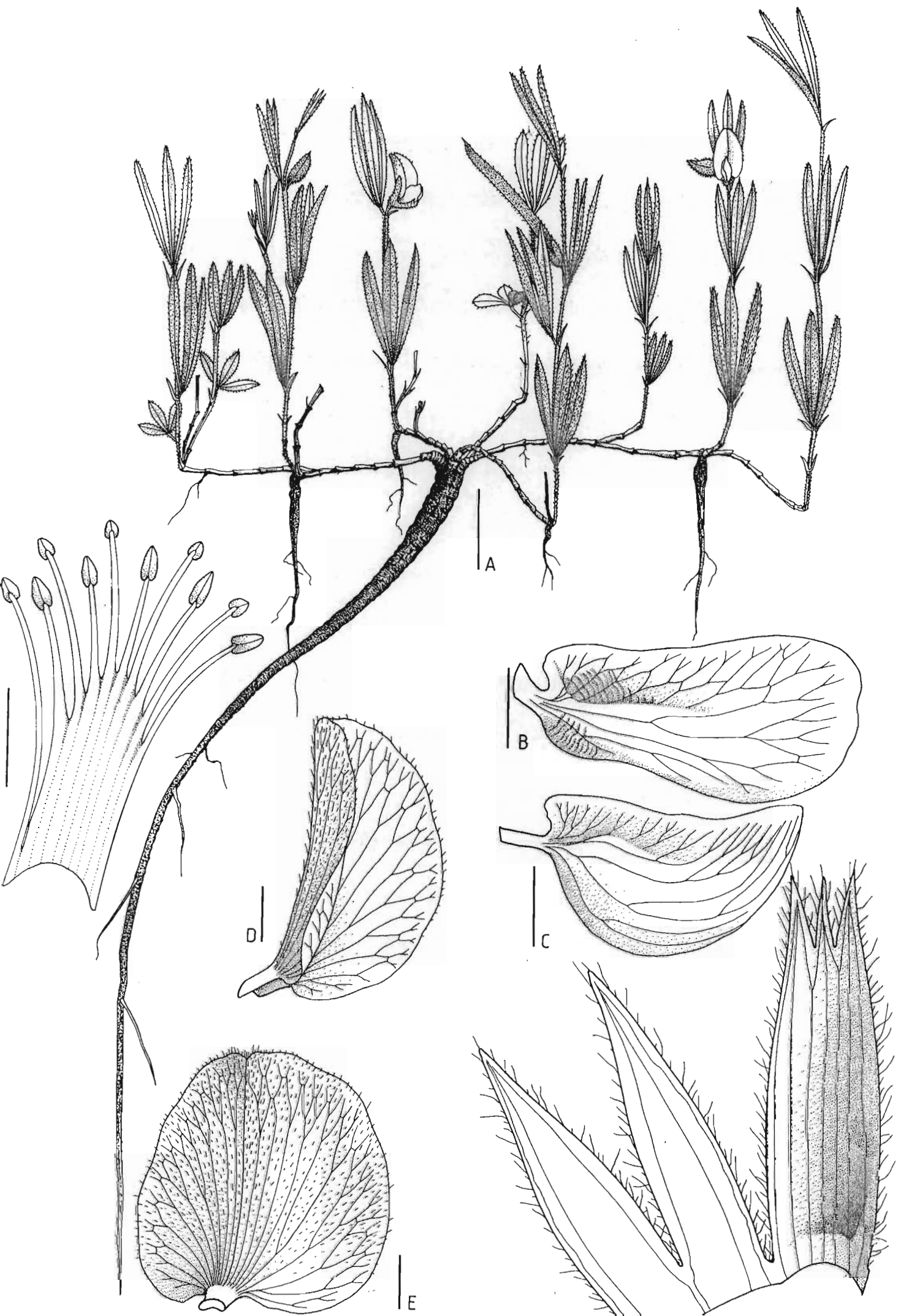
(TCD!, syn.); Albany, *Williamson & Barber s.n.* (TCD!, lecto. selected here; K!, isolecto.).

Argyrolobium uniflorum Harv.: 72 (1862); non Jaub. & Spach (1843) *nom. illegit.* Types: as above.

Argyrolobium nigrescens Dümmer in Kew Bull. 272--273 (1912). Types: Natal, Harrismith, *Sankey 56* (syn., not traced); Basutoland, *Cooper 2179* (K!, syn.); Van Reenen's Pass, 1500--1800 m, *Wood 4517* (K!, lecto. selected here; NH!, isolecto.).

Argyrolobium nanum Walp. ex Harms non Burt Davy: 393--394 (1917), *synon. nov.* Types: Natal, Van Reenen's Pass 1700--2000 m, *Wood 5875* (BOL!, lecto. selected here; E!, PRE! isolecto.) & *6602* (E!, syn.).

Herb, up to 40 mm tall, erect, sparsely branched, stems weakly perennial, sericeous to pilose, plants solitary or forming small clumps via subterranean stolons. *Leaves* strongly to weakly dimorphic; lower leaflets broadly obovate, elliptic, to lanceolate 5--15 x 3--10 mm, shortly pilose to glabrescent, petiole 3--8 mm long; upper leaflets conduplicate, linear to oblanceolate, 7--50 x 2--3 mm, abaxially sericeous, apex acute, apiculate, petiole 0--2 mm long; stipules deltoid to lanceolate, 2--5 x 0.5--1 mm. *Inflorescence* solitary-flowered, leaf-opposed; bracts linear 1--3 x 0.5 mm long; bracteoles setaceous, up to 3 mm long. *Calyx* sericeous, upper lip 8--11 mm long, sinus 7--9 mm deep; lower lip 8--10 mm long, lobes 2.5--4 mm long, medial lobe linear. *Corolla* yellow; standard

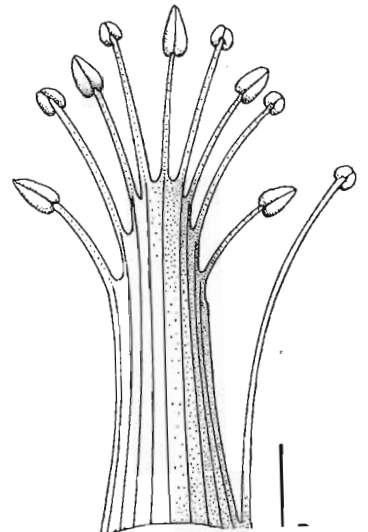
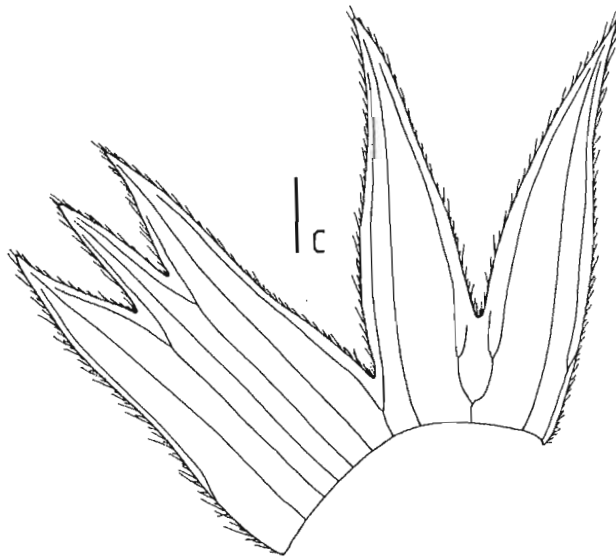
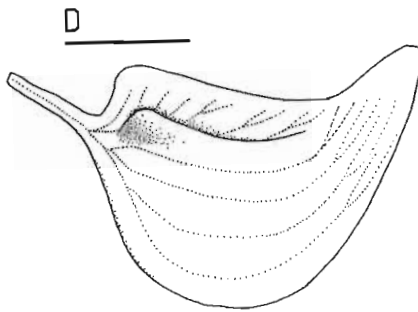
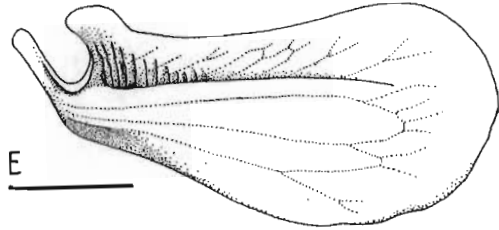
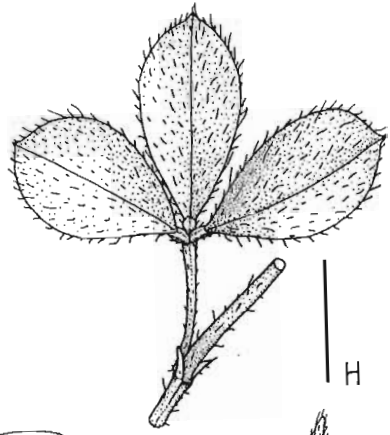
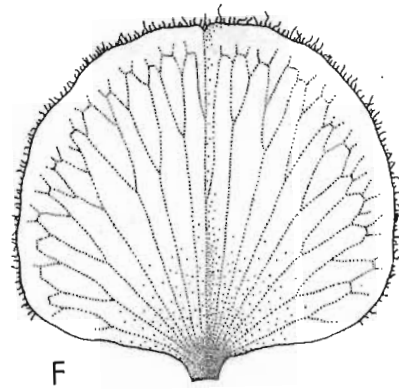


suborbicular, 8.5--13 x 10--16 mm, adaxial surface sparsely sericeous, base cordate, claw 1--2 mm; wings oblong to obovate, 8--13 x 3--4 mm, with lunate-lamellate sculpturing in the upper basal, upper central and lower basal zones, claw 1--2 mm; keel cymbiform, 7--8 x 3--4 mm, claw 2 mm. *Stamens* pseudodiadelphous, with the vexillary filament connected basally. *Ovary* narrowly oblong, 5--6 mm long densely sericeous or laterally glabrous; style 2.5-3 mm long. *Fruit* sericeous, compressed, linear or arcuate, 30--50 x 3-3.5 mm, erect. *Seed* round, trapezoid or irregular, 1.5--2 mm, slightly compressed.⁵⁰

A. nigrescens has been reduced to synonymy with *A. harveyanum* because no discontinuity exists between them. Plants formerly recognised as *A. nigrescens* tend to be short, stoloniferous and have robust tap roots. They occur at high altitudes and have weakly dimorphic, lanceolate leaflets which are glabrescent (Figure 98). Plants which fall into the typical concept of *A. harveyanum* are solitary with fairly small tuberous roots, strongly dimorphic leaves and occur at lower altitudes. These morphological differences appear to have been induced by the altitudinal range of the species. The tendency of var. *nigrescens* to dry black is inconsistent and is thus not diagnostic.

Figure 99.

Argyrolobium harveyanum, highland form. A. Habit (bar = 20 mm); B. wing (bar = 2 mm); C. keel (bar = 2 mm); D. standard, lateral view (bar = 2 mm); E. standard, adaxial surface (bar = 2 mm); F. calyx (bar = 2 mm); G. androecium (bar = 2 mm). Voucher: *Jacobsz 2003*.



A. harveyanum is widespread from coastal grasslands of the eastern Cape, Transkei and Natal into moist grasslands of the Central Natal, Orange Free State, the eastern Transvaal and the highland border between Mozambique and Zimbabwe (Figure 100). The species is common in Dohne and Highland Sourveld, Ngongoni Sourveld and *Themeda-Festuca* Alpine Veld. In the south this species is replaced by *A. filiforme* which differs in its multi-flowered inflorescence and densely sericeous wing petals.⁵¹

Without precise locality: Cape of Good Hope, *Barber s.n.* (TCD); *Gerrard 1766* (W); Eastern Dist. Cape of Good Hope, *McOwan 172* (GRA, TCD). 2330 (Tzaneen): Woodbush Mountains, (--CC), *Moss 15489* (BM, J). 2531 (Komatipoort): Barberton (--CC), *Muller 2044* (PRE); Piggs Peak, (--CD), *Karsten s.n.* (PRE). 2628 (Johannesburg): Heidelberg Kloof, (--AD), *Moss & Otley 2267* (J); Heidelberg, (--AD), *Leendertz 7734* (PRE). 2629 (Bethal): Bethal, (--AD), *Leendertz 9379* (PRE). 2730 (Vryheid): 18 km from Vryheid on the Louwsberg rd., (--DD), *Ross 1213* (NU). 2827 (Senekal): Ficksburg, Gansfontein, (--DD), *Galpin 13951* (PRE); *Fawkes 36* (NBG). 2828 (Bethlehem): Bethlehem, (--AB), *Phillips 3209* (PRE); *Scheepers 1406* (PRE); Leribe, (--CC), *Dieterlen 521* (PRE). 2829 (Harrismith): Drakensberg Botanic Gardens, (--AC),

Figure 100.

Argyrolobium harveyanum, coastal form. A. Habit (bar = 20 mm); B. androecium (bar = 2 mm); C. calyx (bar = 2 mm); D. keel (bar = 2 mm); E. wing (bar = 2 mm); F. standard, abaxial surface (bar = 2 mm); G. upper leaf (bar = 10 mm); H. lower leaf (bar = 10 mm). Voucher: *Edwards 455*.

(--AC), *Jacobsz 2003* (PRE); Queens Hill, (--AC), *Jacobsz 1084* (PRE); *Jacobsz 2187* (NBG); Platberg Botanic Garden, (--AC), *Jacobsz 2610* (NBG); Van Reenen, (--AD), *Wood 4517* (NH); *Wood 5875* (BOL, PRE); Rensburgkop, (--AD), *Jacobsz 12* (PRE); Grootvlei, Swinburne, (--AD), *Jacobsz 132* (PRE); Collin's Pass, (--BA), *Shirley s.n.* (NU); Biggarsberg, (--BB), *Vos 140* (NU, PRE); Boschhoek, Manyenyeza, (--CA), *Jacobsz 2979* (PRE); Cathedral Peak, (--CC), *Schelppe 800* (NU); Ndedema Gorge, (--CC), *Edwards 1107* (NU). 2830 (Dundee): Qudeni, (--DB), *Edwards 455* (NU); Hlolelo, (--DB), *L'ange 61* (NU). 2831 (Nkandla): Itala, (--CA), *Brown & Shapiro 44* (NU); 11 km from Eshowe to Nkandla, (--CD), *Stirton 5200* (PRE); Ngoye, (--DC), *Huntley 849* (NU). 2929 (Underberg): Lammermoor, *Stewart 1842* (E, NU); Cathkin Peak, (--AB), *Galpin 11743* (PRE); Giant's Castle Game Reserve, (--AB), *Trauseld 409* (NU); Tabamhlope, (--BA), *Wood 10574* (E, MO, NU); *Wylie 10574* (E, NU); *Gordon Gray 5054* (E, NU); Estcourt, (--BB), *West 639* (PRE); Mulangane Ridge above Carter's Nek, (--BC), *Hilliard & Burt 17653* (NU); Headwaters of the Elandshoek River, (--BC), *Hilliard & Burt 16239* (E, NU); Gladstone's Nose, Kamberg, (--BC), *Edwards 751* (NU); Glengariff, (--CB), *Rennie 254* (NU); Farm Sunset, (--CB), *Rennie 779* (NU); Cobham Forestry Reserve, (--CB), *Balkwill, Manning, Cadman 1123* (E, NU); *Edwards 1055* (NU); Castle View Farm, headwaters of Mlahlangubo, (--CB), *Hilliard & Burt 15261* (E); Bamboo Mountain, (--CB), *Grice s.n.* (NU); *Hilliard & Burt 15587* (E); Chameleon Cave, Castle View Farm, (--CB), *Hilliard & Burt 17743* (E, K, MO, NU, PRE, S);

Sani Pass, (--CB), *Hilliard & Burt* 17986 (E, K, PRE); Sehlbathebe, (--CC), *Hoener* 1888 (MO); Tarn Cave, Bushman's Nek, (--CC), *Hilliard & Burt* 16821 (E, F, K, MO, NU, PRE, S); Matsa a Mafikeng, (--CC), *Hoener* 1888 (MO); farm Sunset, (--CD), *Rennie* 126 & 850 (NU); farm Glengariff, (--CD), *Rennie* 1321 (NU). 2930 (Pietermaritzburg): Mooi River, (--AA), *Johnston* 536 & 66 (E); 20 km from Karkloof to Crammond, (--AC), *Stirton* 11737 (NU); Howick, (--AC), *Moll* 1061 (NU); Karkloof, farm Colbourne, (--AC), *Bourquin* 345 (NU); Greytown, (--BA), *Schrire* 1568 (NH); New Hanover, (--BC), *Bayer* 1 (NU); Winterskloof, (--CB), *Dicks* 32 (NU); Thornville, (--CB), *Edwards* 617 (NU); Umlaas Rd., (--CB), *Manning* 268 (NU); Sweetwaters, (--CB), *Phillips* s.n. (NU); Byrne Valley, (--CC), *Edwards* 1145 (NU); Cato Ridge, (--DB), *Fairall* 109 (NBG); Thousand Hills, (--DB), *Peter* 45296 (B); Ndwedwe, (--DB), *Hilliard* 2041 (NU); Inanda, (--DB), *Wood* 634 (BM); Botha's Hill, (--DC), *Wood* s.n. (UPS); *Hutchinson, Forbes & McClean* 82 (NH); Umbumbulu, (--DC), *Wood* 6482 (BM, E); Gillits, (--DD), *Wood* 5796 (E, W); *Hilliard* 1603 (NU); Clairmont, (--DD), *Schlechter* 2972 (B, BR); *Wood* 7678 (MO); Hillcrest, (--DD), *Wood* 7941 (NH); Emberton, (--DD), *Schlechter* 3227 (B, BR, E, G, GRA, PRE, TCD); Krantzkloof, (--DD), *Haygarth* 216 (STE). 2931 (Stanger): Thring's Post, (--AA), *Moll* 2235 (NU, PRE); Tugela, (--BA), *Gerrard & McKen* 1766 (TCD). 3027 (Lady Grey): Witteberg Farm, 'Beddgelert', (--DA), *Hilliard & Burt* 14648 (E, K, PRE, S); *Hilliard & Burt* 16586 (E, K, NU, S); Ben Mcdhui, (--DB), *Hilliard & Burt* 16409 (E, K, NU). 3028 (Matatiele): Mafube Mission, (--BB),

Jacottet 70 (G); Farm "Harmony", Matatiele, (--BD), *Hilliard & Burt 3786* (E, NU). 3029 (Kokstad): between Franklin & Swartberg, (--AB), *Ward 306* (NH); Cedarville, Mvenyani, (--AC), *Bandert 79* (GRA); Zuurberg, (--BC), *Tyson 1861* (PRE, SAM); Malowe, (--BD), *Tyson 1259* (W); Clydesdale, (--BD), *Tyson 1296* (GRA, SAM); Weza, (--DA), *Schrire 764* (NH); Ingeli Mt., (--DA), *Hilliard 1770* (NU); Mpetyne Forest, (--DA), *Hilliard 2519* (NU); 'Rooi Vaal' Harding, (--DB), *Lennox s.n.* (NU); Harding, (--DB), *Balkwill & Cadman 2748* (NU); *Oliver 31* (NH); Bizana Mt., (--DD), *Esterhuysen 29259* (BOL); Bizana, (--DD), *Story 586* (E, PRE). 3030 (Port Shepstone): Ixopo, (--AA), *Mogg 2348* (PRE); *Whiting 8017* (PRE); Port Edward on rd. to Izigolweni, (--AA), *Stirton 8066* (PRE); St. Michaels on Sea, (--AB), *Strey 6877* (PRE); 'Melbourne' Dumisa, (--AD), *Huntley 40* (MO); *Rudatis 694* (BM, E, G, W); Mgayi, (--BC), *Ward 6367* (NU); Vernon Crookes Nature Reserve, (--BC), *Edwards 1132* (NU); *Balkwill & Manning 806* (NU); *Balkwill & Cadman 3338* (J); *Balkwill et al. 992* (NU); Beacon Hill, Umtamvuna Nature Reserve, (--CC), *Van Wyk 6129* (PRE); *Stirton 10975* (NH); *Edwards 609* (NU); *Edwards 614* (NU). 3127 (Lady Frere): "Morrison" above Barkly Pass, (--BB), *Acocks 20223* (PRE). 3128 (Umtata): Qumbu & Shawbury, (--BB), *Schonland 4119* (GRA). 3129 (Port St. Johns): Ntsubane Forestry Station, Frasers Falls, (--BC), *Venter & Vorster 122* (MO, PRE); Lusikisiki, Magwa Tea Estate, (--BC), *Balkwill et al. 1867* (NU). 3130 (Port Edward): Port Edward, (--AA), *Hilliard 1650* (NU). 3226 (Fort Beaufort): Amatole Basin, (--DB), *Acocks 15720* (PRE). 3227 (Stutterheim): Cathcart, (--

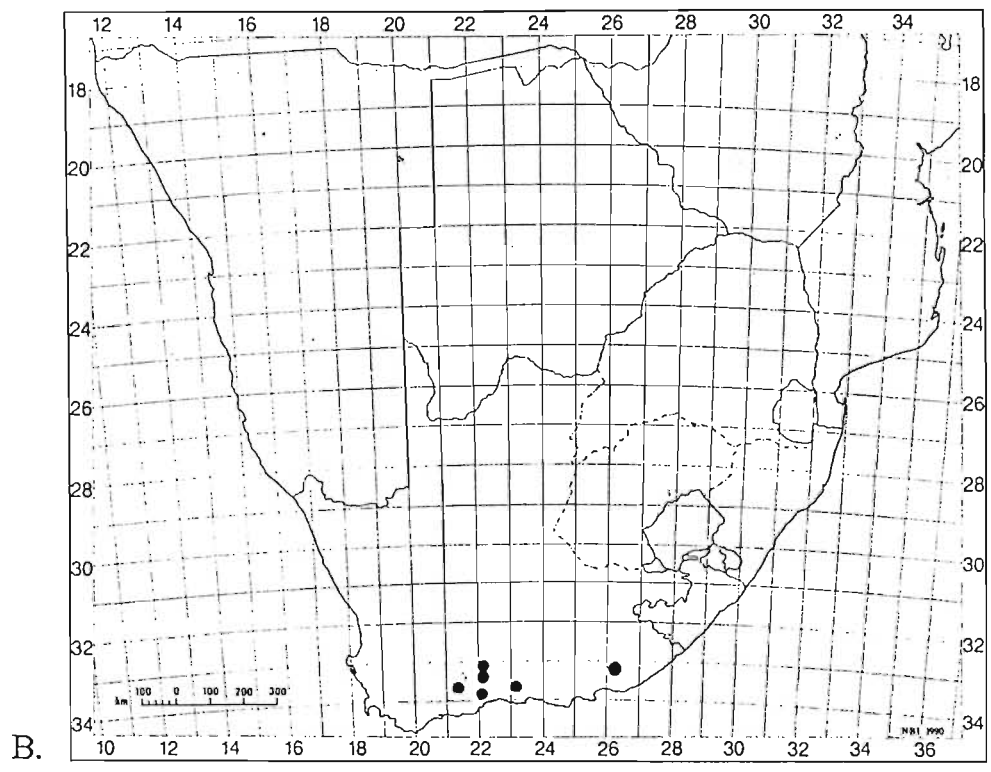
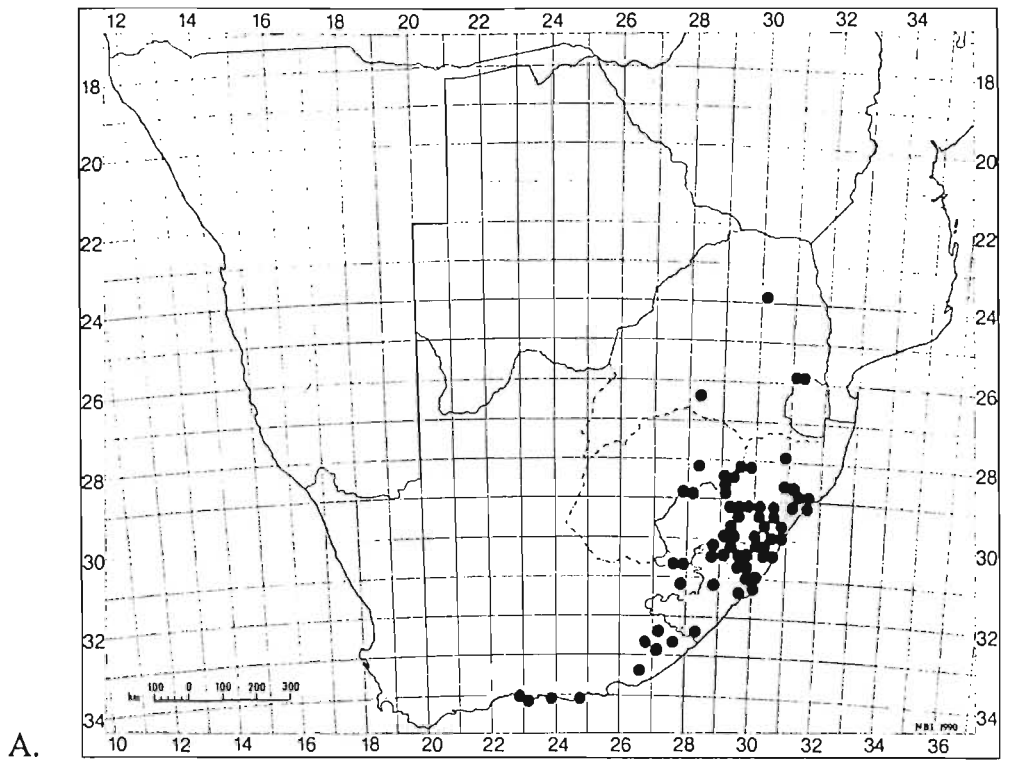


Figure 101. Recorded distribution of A. *A. harveyanum* & B. *A. rarum*.

AC), *Cotterell 179* (GRA); summit of Pirie, (--CC), *Flanagan 2160* (PRE); *Sim 1186* (NU); Amabele, (--DA), *Defries 60* (GRA). 3228 (Butterworth): Kentani, (--AD), *Pegler 124* (GRA, PRE). 3325 (Port Elizabeth): Uitenhage, Van Stadensberg, (--CC), *Zeyher 717* (TCD). 3326 (Grahamstown): Featherstone's Kloof, (--BC), *Galpin 252* (GRA); Grahamstown, (--BC), *Baur 527* (BOL); *Mac Owan 615* (BM, BOL); *Schlechter 2649* (B, BR, GRA); *Schlechter 2752* (B, BR, C, E); Grovenors Kop near Grahamstown, (--BC), *Baker 574* (NBG). 3422 (Mossel Bay): Belvidere, (--BB), *Duthie 785* (BOL). 3423 (Knysna): Garden of Eden Pass, (--AA), *Edwards & Ackermann 472* (NU); Stormsriver Bridge, (--BB), *Edwards & Ackermann 479* (NU). 3424 (Humansdorp): Humansdorp, (--BB), *Compton 21707* (BOL, NBG).

41. *Argyrolobium pseudotuberosum* T.J. Edwards in S. Afr. J. Bot. 60(1): 40 (1994). Type: Transvaal, Lydenburg, Buffelskloof Nat. Res., in seepage grasslands above the kloof, near the ranger's homestead, *Edwards & Burrows 1019* (NU!, holo.).

Herb, 0.12--0.6 m tall, erect; stems triangular, sparingly branched, weakly perennial, sericeous, becoming glabrous; lignotubers turbinate. *Leaves* sparsely sericeous; leaflets oblanceolate to narrowly obovate, 20--60 x 3--8 mm, apex



acute, apiculate; petioles 6--20 mm long on lower leaves, 2--3 mm long above; stipules lanceolate, 8--16 x 0.5--2 mm. *Inflorescence* racemose, rarely pseudoumbellate, often lax, 1--7-flowered, terminal, becoming leaf-opposed; peduncle 5--50 mm long; bracts narrowly ovate to lanceolate, 5--8 x 0.5--0.75 mm, bracteoles narrowly ovate to linear, 3--6 mm long. *Calyx* sericeous, deeply bilabiate; upper lip 8.5--11 mm long, lobes 5--6.5 mm long, lower lip 10--12 mm long, lobes 4--5.5 mm. *Corolla* yellow; standard with black flecks in the medial basal region, broadly obdeltoid, 9--12 x 11--13 mm, adaxial surface sparsely sericeous, base canaliculate, claw 2--3 mm long; wings oblong to obovate, 9--11 x 3--6 mm, with lunate-lamellate sculpturing in the basal and upper central zones, claw vertical, 2--2.5 mm long; keel acutely cymbiform, 7--8 x 4--5 mm, claw vertical, 2.5--3 mm long. *Stamens* monadelphous, sheath completely fused above. *Ovary* 4--5 mm long, often laterally glabrous; style 3--4 mm long. *Fruit* sericeous, compressed, only immature fruits seen. *Seed* not seen. ⁵²

Herbarium specimens of *A. pseudotuberosum* are easily mistaken for *A. tuberosum* because flower colour is not preserved in pressings. The flower colour of *A. tuberosum* is anomalous within the genus, the adaxial surface of the standard is russet while the abaxial surface is creamy yellow. The wing petals are pale basally

Figure 102

Argyrolobium pseudotuberosum. A. Habit (bar = 20 mm); B. calyx, inner surface (bar = 2 mm); C. keel (bar = 2 mm); D. wing (bar = 2 mm); E. standard abaxial surface (bar = 2 mm); F. standard, lateral view (bar = 2 mm). Voucher: *Edwards & Burrow 1019*.

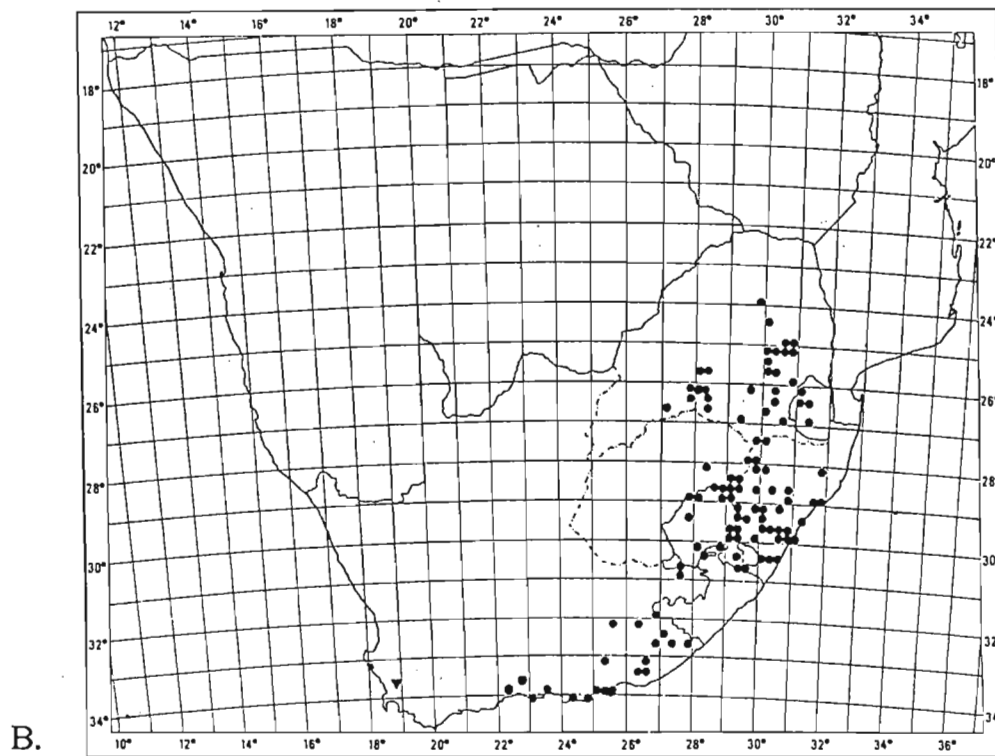
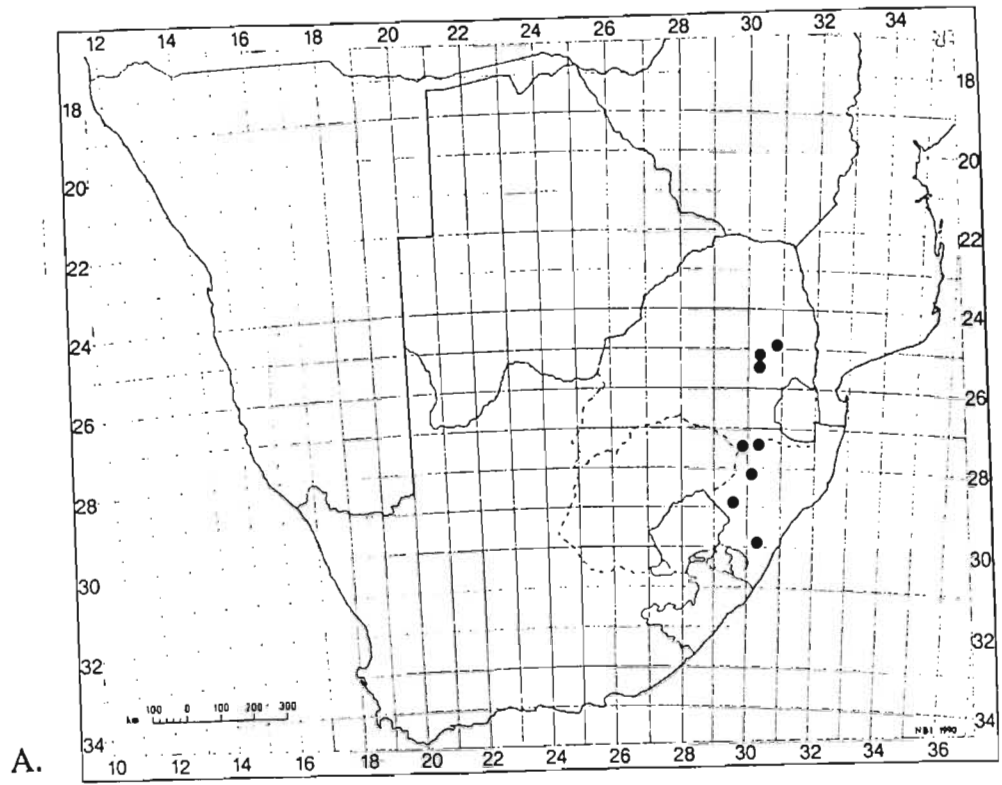


Figure 103. Recorded distribution of A. *A. pseudotuberosum* & B. *A. tuberosum*

(●), *A. angustissimum* (▼).

but are russet distally and the keel is creamy yellow. Flowers of *A. pseudotuberosum* are consistently lemon yellow with black flecks medially on the standard. While the distributional range of *A. tuberosum* overlaps with that of this species, mixed populations have never been recorded. All populations of *A. pseudotuberosum* have been recorded from moist grassland, mainly in North-Eastern Mountain Sourveld or Dohne and Highland Sourveld (Figure 103). *A. tuberosum* is common in drier habitats.

2430 (Pilgrims Rest): Stanley Bush Kop, (--DD), *P. & G. Raal 1063* (TPA). 2530 (Lydenburg): Lydenburg, (--AB), *Wilms 294* (BM); Buffelskloof Nature Reserve, (--AD), *Edwards & Burrows 1019* (NU). 2729 (Volksrust): Charlestown, (--BD), *Wood 5161* (BOL). 2730 (Vryheid): Naauwhoek, Utrecht, (--AD), *Devenish 1305* (PRE). 2829 (Harrismith): Qudeni Forest, (--DC), *Edwards 445* (NU). 2830 (Dundee): Mpati Mt., (--AA), *Shirley s.n.* (NU); Kelvin Grove nr. Glencoe, Biggarsberg, (--AA), *Wood 5138* (MO). 2930 (Pietermaritzburg): Richmond, Arnold's Hill, (--CD), *Wylie s.n.* (NH).

41. *Argyrolobium angustissimum* (E. Mey.) T. J. Edwards *stat. nov.* Type: Cape, Paarlberg, 1000--2000', *Drège s.n.* (G!, lecto. selected here; BM!, E!,

MO!, OXF!, P!, S!, W!, isolecto.).

Chasmone angustissima E. Mey.: 75 (1836). Type: as above.

Herb, 0.2--0.3 m tall, erect, sparsely branched, stems weakly perennial, shortly sericeous, plants solitary, or forming small clumps. *Leaves* adaxially glabrous, abaxially shortly sericeous, linear, 25--45 x 1--1.5 mm, conduplicate, apex acute, petiole 1.5--3 mm long; stipules deltoid to linear, 2--4 x 0.5--1 mm. *Inflorescence* pseudoumbellate, 1--6-flowered, pedunculate, leaf-opposed; bracts linear, 4--5 x 0.75--1 mm; bracteoles linear, 3.5--5 x 0.75 mm. *Calyx* shortly sericeous, upper lip 14--15 mm long, sinus 12--14 mm deep; lower lip 15--17 mm long, lobes 4--5 mm long, medial lobe linear. *Corolla* yellow; standard obovate, 16--18 x 10--12 mm, adaxial surface sparsely sericeous, base cuneate, claw 1--2 mm long; wings narrowly oblong to obovate, 14--15 x 3.5 mm, with lunate-lamellate sculpturing in the upper basal zone, claw 1--1.5 mm long; keel cymbiform, 7--9 x 3.5--5 mm, distally sericeous, claw 1--1.5 mm. *Stamens* monodelphous; anthers very weakly dimorphic. Ovary weakly arcuate, c. 10 mm long, densely sericeous; style 3--4 mm long, basally hairy. *Fruit* not seen. *Seed* not seen.

A. angustissimum is formerly recognised on the basis of its robust habit and large distinctive flowers (Figure 96). It is closely allied to *A. tuberosum* which has similar leaf morphology and flower colour but differs in the size and morphology of the flowers. The species are allopatric and *A. angustissimum* is known from a

single Drège collection (Figure 103). It occurred in Macchia vegetation of the Paarlberg and is probably extinct.

3318 (Cape Town): Paarlberg, (--DB), *Drège s.n.* (E, G, MO, O, P, S).

42. *Argyrolobium tuberosum* Eckl. & Zeyh., Enum. Pl. Afr. Austr. 2: 188 (1836); Walp.: 508 (1839); Walp.: 632 (1843); Meisn.: 73 (1843); Benth.: 341 (1844); Harv.: 69 (1862); Burt Davy: 393 (1926); Polhill: 152 (1968). Type: eastern Cape; Uitenhage, Krakakamma, *Ecklon & Zeyher 1322* (B†; K!, lecto. selected here).

A. angustifolium Eckl. & Zeyh.: 188 (1836); Walp.: 506 (1839); Walp.: 630 (1843). Type: Cape Province, Winterberg, *Ecklon & Zeyher s.n.* (B†; TCD!, lecto. selected here).

Chasmone tuberosa Meisn.: 73 (1843). Type: as above.

Argyrolobium woodii Dümmer: 274 (1912), *synon. nov.* Type: Natal, Liddesdale, *Wood 3937* (K!, lecto. selected here).

Argyrolobium lydenburgense Harms: 183 (1917), *synon. nov.* Type: eastern Transvaal, between Lydenburg and Spitzkop, *Wilms 291* (BM!, lecto. selected here; E!, G!, isolecto.)

Argyrolobium glaucum Schinz: 225 (1921), *synon. nov.* Type: Transvaal, Elandspruitberg, *Schlechter 3841* (BOL!, lecto. selected here; B!, BR!, GRA!,

PRE!, isolecto.).

Herb, 0.1--0.7 m tall, erect, sparingly branched, stems weakly perennial, sparsely sericeous, plants solitary. *Leaves* sometimes dimorphic; lower leaflets broadly obovate, elliptic, to narrowly lanceolate, 10--50 x 3--6 mm, shortly pilose to glabrescent, petiole 8--60 mm long; upper leaflets usually conduplicate, linear to oblanceolate, 25--70 x 1.5--6 mm, abaxially sericeous, apex acute, apiculate, petiole 2--15 mm long; stipules subulate below deltate above, 2--15 x 0.5--1 mm. *Inflorescence* 2--14-flowered, racemose to pseudoumbellate, leaf-opposed; bracts linear-lanceolate, 2--6 x 0.25--0.5 mm; bracteoles setaceous, up to 3 mm long. *Flowers* dimorphic. *Calyx* sericeous, upper lip 6--8 mm long, sinus 3--5 mm deep; lower lip 7--9 mm long, lobes 2--4 mm long, medial lobe linear. *Corolla* russet and lemon yellow; standard suborbicular, 9--15 x 10--15 mm, adaxial surface sparsely sericeous and russet, abaxial surface lemon yellow, base cordate, claw 1--1.5 mm long; wings oblong to narrowly cymbiform, 8--13 x 3--5 mm, proximally lemon yellow distally russet, usually with lunate-lamellate sculpturing in the upper basal and upper central zones, occasionally in the lower basal zone, claw 0.75--1.5 mm long; keel cymbiform, 7--9.5 x 3--5 mm, lemon yellow, claw 1--2.5 mm long. *Stamens* monodelphous split adaxially. *Ovary* narrowly oblong, 6--8 mm long, densely sericeous or laterally glabrous; style 3.5--5 mm long. *Fruit* sericeous, compressed, linear, 25--50 x 2--3 mm, erect. *Seed* orbicular or irregular, 1.5--2 mm.

A. tuberosum is widespread (Figure 103) but easily distinguished from sympatric species by its multi-coloured flowers. There is considerable variation in vegetative and floral characters however we could find no means of discerning more than one species. The flowers of *A. angustissimum* (Figure 97) are similar in colour to those of *A. tuberosum* but differ in size and morphology.

Without locality: *Zeyher 384* (P). Without precise locality: Riet Vlei, Natal, *Gower 45* (NU); slopes of Drakensberg, *Wood 627* (BM, MO); Magaliesberg, *Zeyher & Burke 384* (E, MO, S, SAM). 2329 (Pietersburg): Haenertsburg, (--DD), *Murray 15* (PRE). 2430 (Pilgrims Rest): Dullstroom Nature Reserve, (--AC), *Fourie 2926* (LYD); *Krynauw 1079* (LYD); Ohrigstaddam Nature Reserve, (--DC), *Jacobsen 2302* (LYD); Mt. Sheba Nature Reserve, (--DC), *Forrester & Gooyer 6* (J, MO); *Munday 1070* (J); *Kerfoot, Gooyer & Eastman 177* (J); Graskop, (--DD), *Kluge 1471* (PRE). 2528 (Pretoria): Pretoria, (--CA), *Scott Elliot 1517* (E); *Codd 3622* (PRE); Baviaanspoort, (--CB), *Smith 1078* (MO). 2530 (Lydenburg): Elandspruitberg, (--AA), *Schlechter 3836* (B, BOL, C, E, G, NH); Lydenburg, (--AB), *Kassner 138* (BR); *Wilms 294* (E, G); Steenkampsberg Nature Reserve, (--AC), *Bloem 243* (PRE); Dullstroom, (--AC), *Berry 51* (PRE); 5 km from Vermont, (--AC), *Germishuizen 1066* (PRE); De Kuilen farm 9 km from Lydenburg, (--BA), *Anderson s.n.* (PRE); Spitzkop, (--BB), *Pott 5067* (BM, PRE); *Wilms 291* (BM, E, G); Belfast, (--CA), *Burt Davy 1278* (PRE); *Prosser 1773* (PRE); *Burt Davy 3568* (GRA); Machadadorp, (--CB), *Galpin 12957* (BOL, NY, PRE); Barberton, (--DD), *Codd 8121* (PRE);

Thorncroft Flora Reserve, (--DD), *Venter 9126* (LYD); Agnes Mine, (--DD),
Balkwill & Cadman 3630 (J). 2627 (Potchefstroom): Witpoortjie Kloof, (--BB),
Moss 3581, 6755, 7167 & 8340 (J); Krugersdorp, (--BB), *Jenkins 10030* (PRE);
 Nancefield, (--BD), *Moss 14128* (J); Frederichstad, (--CA), *Louw 1304* (PRE).
 2628 (Johannesburg): Kempton Park, (--AA), *Hutchinson & Gillett 9674* (BM,
 BOL); Mondeor, (--AA), *Lucas 384* (J); Mount Arabel, (--AA), *Mogg 33676* (J);
 Linden, (--AA), *Dahlstrand 1531* (C); Johannesburg, (--AA), *Jenkins 10314*
 (PRE); Cloverdene, (--AB), *Moss 141083* (BM, J); Boksburg, (--AB), *Breyer s.n.*
 (PRE); Heidelberg, (--AD), *Mogg 33676* (UPS); *Repton 4330* (PRE); Witbank,
 (--CB), *Rogers 18782* (PRE). 2629 (Bethal): Keitkuil, (--BA), *Moss 16329* (J);
 Standerton, (--CD), *Leendertz 4067* (PRE). 2630 (Carolina): Spioenkop, (--AB),
Burt Davy 9340 (PRE); Knock Dhu Farm, (--AD), *Germishuizen 2849* (PRE);
 Ermelo, (--CA), *Henrici 1536* (G); *Leendertz 3059* (PRE); *Collins 9346* (PRE);
Collins 13449 (PRE); *Steyn 850* (NBG); *Codd 6382* (PRE); *Burt Davy 5689*
 (GRA); *Belsinhas 2945* (PRE); Iswepe, (--DC), *Sidey 2046* (PRE). 2631
 (Mbabane): Forbes Reef, (--AA), *Compton 31964* (NBG); *Compton 31246*
 (NBG); Komati Pass, (--AC), *Compton 29641* (PRE); *Compton 25653* (NBG);
 Ukutula, (--AC), *Compton 25314* (NBG, PRE); Dalriach, (--AC), *Bolus 11790*
 (BOL); Bremersdorp, Lock Moy, (--AD), *Bolus s.n.* (BOL); Hlatikulu, (--CD),
Stewart 2616 (SAM). 2729 (Volksrust): Volksrust, (--BD), *Jenkins 9297* (PRE);
 Mullerspas, (--DC), *Hilliard 2332* (NU); Newcastle, (--DD), *Wilms 1948* (BM).
 2730 (Vryheid): Wakkerstroom, (--AC), *Beeton 206* (SAM). 2827 (Senekal):

Ficksburg, (--DD), *Fawkes 101* (NBG). 2828 (Bethlehem): Annandale, (--AB), *Werger 143* (PRE); Bethlehem, (--AB), *Liebenberg 7529* (PRE); Leribe Plateau, (--CC), *Phillips 669* (SAM); *Dieterlen 590* (NH, PRE); Golden Gate, (--DA), *Fenn 4* (NU); Royal Natal National Park, (--DB), *Irwin 9* (NU); Witsieshoek, (--DB), *Flanagan 1930* (SAM); Mont Aux Sources, (--DD), *Sidey 2081* (SAM). 2829 (Harrismith): Platberg, (--AC), *Jacobsz 2257* (PRE); *Putterill s.n.* (PRE); Drakensberg Botanic Gardens, (--AC), *Jacobsz 2187* (NBG, PRE); Bester's Vlei Harrismith, (--AC), *Bolus 8146* (BM, BOL, NBG); Van Reenen, (--AD), *Bews 186* (NU); *Graham 41* (NU); Rensburgskop, (--AD), *Jacobsz 273* (PRE); Fort Mistake, (--BB), *Shirley s.n.* (NU); Oliviershoekpas, (--CA), *Wood s.n.* (NH); Geluksburg, (--CB), *Stirton 38* (NU); Cathedral Peak, (--CC), *Killick 1289* (PRE); Grobbelaars Kloof, near Colenso, (--DB), *Acocks 10013* (NH). 2830 (Dundee): Hattingspruit, (--AA), *Johnstone 265* (MO, NU); Pomeroy, (--CB), *Ram s.n.* (NU); Hlolelo, (--DB), *d'Ange 83* (NU); Railway siding 25 km from Kranskop, (--DD), *Edwards 462* (NU). 2831 (Nkandla): Hlabisa, (--BB), *Strey 5489* (NH); Umhlatuzi River, (--DC), *Codd 1368* (PRE); Ngoye, (--DC), *Strey 6108* (NH); Umlalazi, (--DD), *Wood 9315* (E). 2927 (Maseru): Blue Mountain Pass, (--BD), *Schmitz 9158* (PRE). 2929 (Underberg): Giant's Castle Game Reserve, (--AB), *Symons 319* (PRE); *Bruyns-Haylett 39* (E, MO); *McKeown 125* (E, NU); *Trauseld 315* (PRE); Sehlabathebe, (--AD), *Bayliss 5441* (C, MO); Mpendhle, path from Loteni, (--AD), *Hilliard & Burt 16108* (E); Loteni Nature Reserve, (--AD), *Jacobsz 3950* (PRE); Estcourt, Broadmoor Vlei, (--BB), *Downing 265* (PRE);

Gladstone's Nose, Kamberg, (--BC), *Wright 2081* (NU); *Edwards 760 & 778* (NU); Headwaters Elandshoek River, (--BC), *Hilliard & Burt 16158* (E, K, NU, PRE); Farm, Lanner Veane, (--BC), *Manning & Balkwill 345* (NU); Mpendhle, Highmoor Forest Station, (--BC), *Killick & Vahrmeyer 3561* (PRE); *Hilliard & Burt 16170 & 16238* (E); Garden Castle Reserve, (--CA), *Hilliard & Burt 14870* (E, NU); Hidden Valley, (--CA), *Hilliard & Burt 7950* (E, K, MO, NU); Lower Bamboo Mt., (--CB), *Grice s.n.* (NU); Cobham, Lakes Cave, (--CB), *Hilliard & Burt 15899 & 15948* (E, NU); Sani Pass, (--CB), *Brophy 54* (NU); *Hilliard & Burt 17987* (E); *Hilliard & Burt 17918* (E, K, NU, PRE); *Hilliard, Burt & Manning 17285* (E, F, K, NU, PRE, S); *Bamps 7162* (BR); Headwaters of Mlahlangubo River, (--CB), *Hilliard & Burt 15273* (E); *Hilliard & Burt 15324* (E, K, NU); Mlambonja Valley, (--CB), *Hilliard & Burt 15027* (E, NU, PRE); Gxalingenwa Valley, (--CB), *Hilliard & Burt 17188* (E, K, NU); Tarn Cave above Bushman's Nek, (--CC), *Hilliard & Burt 17325* (E, K, NU); *Hilliard & Burt 17435* (E, K, NU, PRE); Sehlabathebe, (--CC), *Guillarmod, Getliffe, Mz 152* (GRA, MO, PRE); Umzimvubu River, (--CC), *Hilliard & Burt 18995* (NU); Drakensberg Garden Forest Reserve, (--CD), *Stirton 10450* (NH); *Lambinon & Reekmans 82* (BR, MO, PRE); Bulwer, Sunset, Glengariff Ridge, (--DD), *Rennie 417 & 304* (NU); *Vos 40* (NU). 2930 (Pietermaritzburg): Mooi River, (--AA), *Johnston 425, 533, 895 & 910* (E); Lidgetton, (--AC), *Mogg 825* (PRE); 17 km from Greytown on the Muden Rd., (--BA), *Hilliard 1947* (NU); Boston, Impendhle, (--CA), *Randles 86* (NU); Dargle, Lions River, (--CA), *Hilliard 2165*

(NU); Hawthorn's Hill, (--CB), *Allsopp 705* (NU); Table Mountain, (--DA), *Kassner 1157* (E); Inanda, (--DB), *Wood 689* (BM); *Wood 1159* (BM, GRA, NBG); *Gerrard & McKen 2126* (TCD); Botha's Hill, (--DC), *McOwan 479* (BM, TCD); Gillitts, Chelmsford Park, (--DD), *Hilliard 1840* (NU). 2931 (Stanger): Groutville, (--AD), *Moll 2503* (NU, PRE); Port Natal, (--CC), *Gueinzius 208* (S). 3027 (Lady Grey): Witteberg, Beddgelert Farm, (--DA), *Hilliard & Burt 14649 & 16585* (E, K, NU); Barkly East, (--DC), *Bolus s.n.* (BOL). 3028 (Matatiele): Mount Austen, (--AA), *Archibald 511* (GRA); Ongeluk's Nek, (--AD), *Hilliard & Burt 18656* (NU); Ramatsiliso's Gate, (--BB), *Boardman 3* (PRE). 3029 (Kokstad): Mt. Currie, (--AD), *Taylor 5496* (NBG); Kokstad, (--CB), *Tyson 1881* (BOL, SAM); *Tyson 1884* (BOL); Weza State Forest, Ingeli contour path, (--DA), *MacDevette 1595* (PRE); *Balkwill & Cadman 2711* (J, NU). 3030 (Port Shepstone): Farm "Rooiwal", Harding, (--AC), *Balkwill & Cadman 2364* (J); Farm "Bedford", Harding, (--AC), *Balkwill 2754* (J, NU); Dumisa, (--AD), *Rudatis 1470* (BM, E, G); *Rudatis 1347* (BM); Liebenberg's Cottage, (--BC), *Gordon-Gray 6213* (NU). 3126 (Queenstown): Fincham's Nek, (--DD), *Galpin 1787* (PRE). 3225 (Somerset East): Cradock, (--BA), *Barber 47* (TCD). 3226 (Fort Beaufort): Tarkastad, (--AB), *Acocks 17962* (PRE); Gaika's Kop, (--DB), *Phillipson 1295* (MO, PRE); Menziesberg, (--DB), *Phillipson 1163* (MO); *Phillipson 1237* (MO, PRE). 3227 (Stutterheim): Gaika, (--AC), *Rattray 271* (GRA); Cathcart, (--AC), *Edwards & Ackermann 492* (NU); Frankfort, (--CB), *Sim 4013* (GRA); Pirie, (--CB), *Sim 1356* (PRE); Mt. Kemp, (--CB), *Leighton*

2741 (BOL); Komga, (--DB), *Flanagan 512* (NU, SAM). 3322 (Oudtshoorn): George Flats, (--CD), *Susan s.n.* (NBG); Kammanassie Mountains, (--DB), *Vlok 773* (STE). 3323 (Willowmore): Tsitsikama, (--DC), *Fourcade 557* (BOL, PRE). 3325 (Port Elizabeth): Zuurberg, (--AB), *Long 1245* (GRA, PRE); Van Stadensberg, (--CC), *Ecklon & Zeyher s.n.* (GRA); Uitenhage, (--CD), *Ecklon & Zeyher 717* (BM); Sydenham, (--DC), *Wood 10708* (E, MO, NU). 3326 (Grahamstown): Howieson's Poort, (--AD), *Hutton s.n.* (TCD); *Scott Elliot 776* (E); Botha's Hill, (--BA), *MacOwan 479* (NH, SAM); Grahamstown, (--BC), *Britten 6483* (PRE). 3423 (Knysna): Knysna, (--AA), *Zeyher s.n.* (SAM). 3424 (Humansdorp): Clarkson, (--AB), *Thode s.n.* (NH, PRE); Humansdorp, (--BB), *Britten 1034* (GRA, PRE).

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