A Revision of Lauraceae in Australia (excluding Cassytha)

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The studies presented in this dissertation were completed by the author while a part time post-graduate student in the Botany Department, School of Biological Sciences, James Cook University, Townsville, Queensland, Australia. I certify that the work presented in this thesis has been carried out by myself or under my direction except where other authors are specifically acknowledged. I declare the results are original and have not previously been submitted for any other degree.

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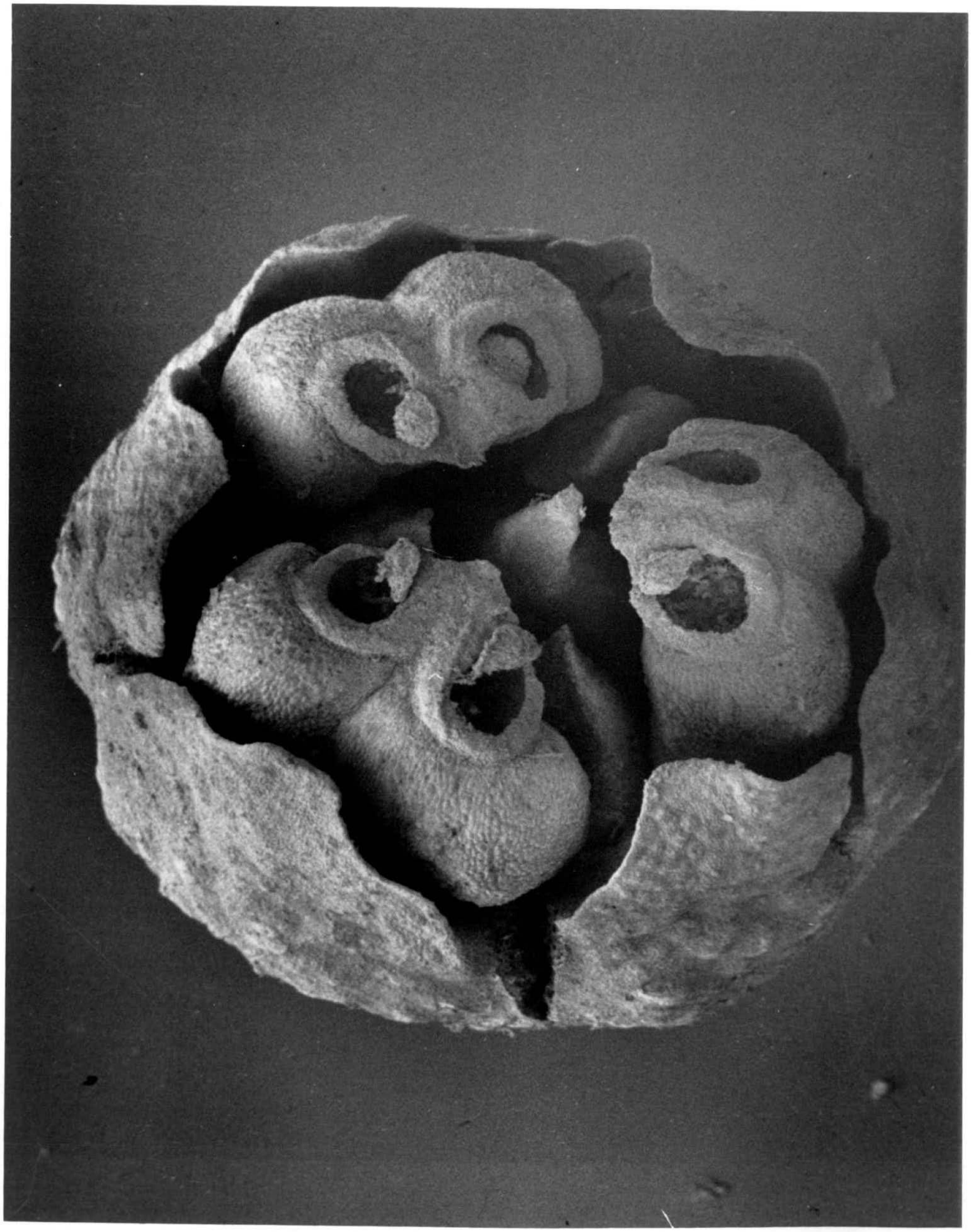

Abstract

This study deals with seven of the eight genera represented in Australia. (Cassytha is not included because it was revised by Weber (1981)). Beilschmiedia: 11 species including 6 new species, B. brunnea, B. castrisinensis, B. collina, B. peninsularis, B. recurva, B. volckii and one new combination B. tooram. Cinnamomum: 5 species. Cryptocarya: 46 species including 21 new species, C. bamagana, C. bellendenkerana, C. clarksoniana, C. claudiana, C. cocosoides, C. dorrigoensis, C. glaucocarpa, C. grandis, C. leucophylla, C. lividula, C. macdonaldii, C. melanocarpa, C. nova-anglica, C. onoprienkoana, C. putida, C. rhodosperma, C. saccharata, C. sclerophylla, C. smaragdina, C. vulgaris, C. williwilliana and two new varieties C. triplinervis var. pubens and C. triplinervis var. riparia. Endiandra: 38 species including 14 new species, E. bellendenkerana, E. bessaphila, E. collinsii, E. cooperana, E. floydii, E. grayi, E. jonesii, E. leptodendron, E. limnophila, E. monothyra, E. phaeocarpa, E. sideroxylon, E. wolfei, E. xanthocarpa and two new subspecies E. muelleri ssp. bracteata and E. monothyra ssp. trichophylla. Lindera: one new species, L. queenslandica. Litsea: 11 species including 4 new species, L. australis, L. bennettii, L. connorsii, L. granitica. Neolitsea: 3 species.

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* These are bound in Volume II.

Chapter 1. General Introduction.

This study was undertaken for a number of reasons but some of the more important ones include the following: The family Lauraceae comprises a large part of the flora of Australian rain forests. It is economically important as many species are commercial timber species; ecologically it comprises a large component of Australian rain forests. The family was in a neglected state taxonomically having been avoided by most Australian taxonomists for many years; it was therefore in urgent need of taxonomic revision.

Taxonomic Background

This revision of Australian Lauraceae includes the genera of Beilschmiedia, Cinnamomum, Cryptocarya, Endiandra, Lindera, Litsea and Neolitsea. Cassytha has not been included as it was revised by Weber (1981) who found it to consist of 14 species, 3 varieties and 5 forms. The first major treatments of Lauraceae on a world-wide basis were by Nees von Essenbeck (1836) and Meissner (1864). The first major work dealing specifically with the Australian species was by Bentham (1870), who recognized the genera Cryptocarya (9 species), Nesodaphne (1 species), Endiandra (7 species), Cinnamomum (1 species), Tetranthera (4 species), Litsea (2 species), Cassytha (11 species), Hernandia (1 species). Most of Bentham's genera are still recognized, but the species he placed in Nesodaphne is now included in Beilschmiedia; the species he placed in Tetranthera are now accomodated in Litsea; the species he placed in Litsea are now placed in Neolitsea and the genus Hernandia is now placed in the family Hernandiaceae. Thus Bentham recognized 35 species in genera which are still regarded as belonging to the family Lauraceae. As a result of

the work of Weber (1981) and this revision, 129 species are now recognized in the family in Australia.

The substantial increase in numbers of species has not resulted solely from the present revision. A number of botanists have described species as material became available, but no critical revision of the family in Australia has previously been undertaken. Kostermans, who has worked on the family for most of his life, has tried to establish a framework for a revision of the family throughout the world. However, at this stage no world-wide treatment of the family exists and although the revision of the Australian Lauraceae may appear worthwhile, it has nevertheless been a project beset with considerable difficulties.

The difficulties fall into two main categories: Firstly the perennial problem of generic delimitation, and secondly the occurrence of the same species in Australia and in neighbouring areas, and treated by different authors as different species. A world-wide review of the genera of Lauraceae is beyond the scope of this revision. Even though Kostermans has been working prodigiously on this problem, further studies are required. It is conceivable that with the data handling facilities now available, a team approach involving experts from different parts of the globe might produce a workable generic synopsis of the family upon which future detailed geographical revisions could be based. However, the available generic synopses need further refinement, and I have therefore taken a very conservative view of genera in the family, and have refrained from erecting new genera to accomodate groups of species which could perhaps be regarded as generically different by some workers. It

seems to me that there is little to be gained by erecting new genera on the evidence available from a limited number of species from a restricted geographic area, if subsequent studies over a wider area show that the conclusions cannot be justified universally.

The occurrence of the same species in Australia and in neighbouring areas is a problem which must be confronted in a regional revision such as this. I have endeavoured to do this, but some difficulties have arisen. Firstly, the descriptions of new species are scattered in the literature and there is no logical way of deciding which type specimens may be relevant. The only way to be sure, is to look at all type specimens of species described from neighbouring areas. Because of the history of colonization of Australia and neighbouring areas, and the vigour and determination of collectors and botanists both independent and associated with the various colonial powers, type specimens are scattered all over the world. Furthermore, events of the last 200 years have resulted in the destruction of some type specimens. Consequently it has been necessary to seek out and examine isotype material in some unlikely places to complete this revision.

I have tried to ensure that any species I have described is in fact new by examining type material from a large number of the world's major herbaria. If future workers find that I have not always been completely successful, I hope they will appreciate that I could only work within the limitations of the existing Lauraceae database.

This work is essentially a revision of the species occurring on mainland Australia and the associated offshore islands which are part of the continental shelf, but it does not include the oceanic islands such as Lord Howe and Norfolk etc., which are part of Australia in a

political sense only.

Biogeography and Origin

The family at present has a world-wide distribution being found on all the continents, but is particularly well represented in tropical areas. However, representatives of the family are found at high latitudes in both the northern and southern hemispheres. The family is frequently identified in fossil assemblages from various parts of the world but I agree with Kostermans (1957) when he was rather doubtful if all specimens had been correctly placed in the family. I am in very close agreement with Kostermans when he states that identification of leaves to the generic level is "unfounded guess work".

Unfortunately, the pollen of species of Lauraceae is seldom preserved in peat and similar deposits and consequently pollen analysis cannot really be used to indicate the presence or absence of the family in a particular area at various times in the past. Thus in the numerous analyses done by Kershaw in swamp and lake deposits on the Atherton Tableland of North Queensland the family is not or seldom represented. [e.g. see Kershaw (1975)].

Because lauraceous pollen is seldom found in deposits, it is not possible to use exine morphology and its variation with depth/time as a reflection of evolution.

In view of the inadequacies of the fossil record both macro and micro, it is necessary to look at the present distribution of the family or its components to get an idea of its likely origins. The distribution of the whole family suggests that it is one of the older

angiosperm families and had evolved before the ancient land masses split up into the various plates now associated with the present continental land masses. If we look at the distribution of one of the larger genera e.g. Litsea we find that it is now found on all of the continents except Africa. In addition it is found on both large (e.g. New Zealand) and small (e.g. Fiji) islands which have been separated from larger land masses by considerable distances for long periods of time. The occurrence of this genus on most of the southern land masses suggests a southern or Gondwanic origin. It could be argued that the occurrence of this genus in the northern hemisphere indicates a northern origin for the genus. I believe that the species now found in the northern hemisphere arrived there following contact with southern plates. Thus, the precursors of the solitary North American Litsea became established following contact with South America. Similarly, some of the species of Litsea now found on the Asian continent were derived from stock which arrived with the Indian subcontinent. The species of Litsea now found in Malesia could have been derived from two or more sources viz. India, Australia and perhaps from areas in the south-west Pacific which are now reduced to scattered islands. The Malesian species could in turn have invaded the Asian mainland or vice versa. Thus, I would expect to find the greatest diversity to be exhibited by Malesian species both because of the diversity of the parent stock and the apparent long term stability of the climate favourable to rainforests. At present the data to support a southern origin for Litsea and the rest of the Lauraceae are inadequate, but I believe further studies particularly with the analysis of leaf oils and isozymes, could yield the data which would be adequate to test this hypothesis.

Chapter 2. Taxonomy

Terminology

Some unusual terms used in the descriptions are defined as follows:

Cataphylls: Bract-like leaves produced above the cotyledons and before the first fully developed leaves.

Nondescript bark: This is the most common bark type found on Australian rain forest trees. It is difficult to define in positive terms. It is ± smooth but not glassy smooth like a gum-barked eucalypt, but at the same time it will not fit into any of the following categories: Fissured, tessellated, papery or flaky.

Outer blaze: The section of bark exposed by cutting with a knife or similar instrument. It is the outer part of the living bark.

Pedicel: The stalk of the flower. In this revision it is restricted to the flower stalk distal to the last pair of bracts.

Ruminate: A condition in the cotyledons of some species of Cryptocarya where the testa intrudes into the cotyledons. I have previously used this term to describe the cotyledons of Acmena, Acmenosperma and Waterhousea (Hyland 1983) where the nature of the intrusion was less clear.

Generic Concepts

As indicated in the introduction, the genera treated here usually have wide geographic ranges outside Australia. Despite the work done in the last 150 years, there are still problems of generic

delimitation in the family. Because I am only dealing with a small segment of the whole family, I have endeavoured (as far as possible) to accept the generic concepts of recent workers viz. C. K. Allen, R. T. Baker, K. Domin, W. D. Francis, D. G. Frodin, A. J. G. H. Kostermans, J. H. Maiden, E. D. Merrill, L. S. Smith & C. T. White. Despite this approach, I have found it necessary to reject the views of some workers or to modify generic concepts to accomodate some species.

Beilschmiedia in its typical form is a genus in which the flowers contain 9 fertile stamens and the fruit is superior, while in Endiandra the flowers contain only 3 fertile stamens and the fruit is also superior. However, there are species in which the flowers usually contain 6 stamens and produce superior fruits. When Stapf (1905) encountered such species in Africa he did not regard them as being particularly remarkable and both six and nine-stamened species were included in the genus Afrodaphne. (Subsequent authors have generally agreed that Afrodaphne is a synonym of Beilschmiedia). However, when Allen (1942) encountered a six-stamened species in collections made in southern New Guinea she erected the new genus Brassiodendron based on B. fragrans, apparently unaware that the same species also occurred in Australia and had earlier been described by C.T. White as Endiandra montana.

Superficially Brassiodendron appears to be a distinct and easily recognized genus. However, Kostermans (1952) did not accept it as a valid genus, and made the combination Endiandra fragrans (Allen) Kostermans; he also being unaware of the significance of the name Endiandra montana C. White. In fact there are 6 species in Australia

which often have 6 stamens in each flower and develop superior fruits. However, they do not constitute a natural group and although they share a common number of stamens, the species belong in two different genera viz. Endiandra and Beilschmiedia. It could be argued that with linking species such as these, the genera Endiandra and Beilschmiedia should be united. However, the 6-stamened species can be placed in one or the other genus on the basis of certain features of flower morphology, and the two genera can then be sustained as distinct entities.

The following species often have 6 stamens but I have chosen to place them either in Beilschmiedia or Endiandra for the reasons given:

Beilschmiedia castrisinensis (Figs 3, 68 C-D).

The anthers open inwards and/or sideways and clearly belong to a uniform series. The staminodes inside the stamens are not uniform as 3 are long and 3 are short. Three of the staminodes were derived from the inner whorl of stamens. This species appears to be a recent segregate from the original Beilschmiedia stock.

Beilschmiedia oligandra (Fig. 69 A-B).

The anthers open inwards and/or sideways and although there is some size variation, they probably belong to the one series. Usually there are 3 staminodes closer to the centre (sometimes there are more) each with 2 gland-like structures near the base. This suggests that these staminodes were recently derived from stamens and the occasional occurrence of additional staminodes indicates that this species is probably a recent segregate from the original Beilschmiedia stock.

Beilschmiedia tooram (Fig. 69 C-D).

This species was originally described by Bailey as Endiandra tooram. The type specimen bears fruit only and Bailey could not know that the number of anthers would differ from that found in Endiandra sensu stricto. The anthers open inwards and/or sideways and as they are of similar size they probably belong to the one series. Sometimes the number of anthers may be reduced, but perfect flowers have 6 anthers. There are 3 staminodes but there are no glands. It seems most probable that the anthers of the inner series were lost. Consequently this species appears to be derived from the original Beilschmiedia stock, but segregated earlier than any of the species mentioned above.

Beilschmiedia volckii (Figs 7, 69 E-F).

The anthers open inwards, are of similar size and clearly belong to the one series. The staminodes inside the stamens are not uniform as 3 are long and 3 are short. The 3 stamens of the inner series have been converted into staminodes. This species appears to be a recent segregate from the original Beilschmiedia stock.

Endiandra montana (Fig. 81 C-D).

The anthers in this species are rather variable, usually opening outwards and sideways but sometimes inwards and sideways. The anthers are often rather variable in size (3 small + 3 larger). Glands are present, 2 per anther, but there are no staminodes. Thus, in this species, 3 of the anthers are derived by reversal from staminodes to bring the total number of anthers to 6. Therefore, this species is thought to be a segregate from the original Endiandra stock.

Endiandra globosa (Fig. 45, 76 E-F).

The anthers in this species open outwards or sideways and are variable in size. The numbers of stamens and staminodes tend to be complementary such that the total approximates 6; Thus, there may be 3 stamens and 3 staminodes or up to 6 stamens and 0 staminodes. However, the number of glands is usually more or less constant at 6 per flower. Therefore, in this species, some of the anthers (up to 3) are derived from staminodes. It appears to be a segregate from the original Endiandra stock.

It appears, therefore, that these 6-anthered species do not constitute a natural group. They are probably derived from two quite different stocks and should not be united in one genus. It could be argued that the phylogenies which I have suggested are based on slender evidence, but it would be much more difficult to reconcile the morphological evidence with a phylogeny which depends on a common ancestor for all 6 species.

Despite the reasoning just outlined, it must be acknowledged that Endiandra and Beilschmiedia have many similarities and if we accept that evolutionary processes usually involve the gradual reduction and suppression of whorls of organs then it is distinctly possible that Endiandra evolved from Beilschmiedia and species such as Endiandra montana and E. globosa are species which may have been caught halfway. The alternative explanation i.e. the reversal of the "normal" evolutionary processes such as the conversion of staminodes into stamens (although holding little appeal for traditional evolutionists) is (in my opinion) a process which should not be

excluded.

Further work such as the analysis of chemical data may give us a better understanding of the relationships of the six-stamened species and until these studies are completed, I prefer to keep an open mind on the subject. Mors et al. (1959) have shown that chemical data and traditional evolutionary theory are compatible and it will be interesting to see if this also proves to be the case with the Australian species. However, at this stage of the taxonomy of the family it will cause less confusion to place the six-stamened species into only two genera until we have a better understanding of the phylogeny.

The Australian species of Cinnamomum are rather distinct and all are obviously correctly placed in the genus. All species belong to the one section of the genus. (sect. Malabathrum Meissn.).

The Australian species of Cryptocarya could be grouped in a number of ways. One of the more obvious subdivisions would be on the basis of the presence or absence of ruminate cotyledons. This distinction also corresponds rather well with a floral feature, possession of foetid flowers. Species with ruminate cotyledons always have foetid flowers but the converse is not invariable. The Australian species with ruminate cotyledons resemble species placed in the genus Ravensara (a Madagascan endemic). But this genus is distinguished not only by the ruminate cotyledons but also by the septa which are intrusions from the ovary wall and perhaps from the perianth tube. Therefore, I have retained the Australian species with ruminate cotyledons in the genus Cryptocarya.

The genus Lindera is a new generic record from Australia. It is generally regarded as being closely related to Litsea, but recent work by Li Hsi-wen (1985) suggests that the relationship may not be as close as originally thought and the similarities between Litsea and Lindera may have resulted from parallel evolution. The phytogeographic implications of the occurrence of Lindera in Australia are considerable because Lindera is a relatively large genus and is now known to occur on all the major continents except Africa.

For the practising taxonomist it is easy to distinguish Lindera and Litsea if male flowers are available. The anthers in Lindera are 2-celled while those of Litsea are 4-celled. If only female flowers or fruits are available the task is somewhat more difficult and on a world-wide basis may be almost impossible.

While trying to match Australian material of Lindera with specimens collected from neighbouring regions, I was struck by the similarities between Lindera queenslandica B. Hyland sp. nov. and specimens from New Guinea identified as Litsea irianensis Kosterm. However, the specimen which is the type of both L. irianensis and Dehaasia novoguineensis Kosterm, belongs to a different taxon altogether which is not congeneric with Lindera. Thus the occurrence of the genus Lindera in New Guinea may have been previously unrecognized. There is a distinct possibility that one New Guinean species may be Lindera queenslandica, but confirmation must await better material.

There is a further difficulty in assigning New Guinean material even when male flowers are available. The number of anther locules appears to be variable, some anthers even having 3 locules. More work and better specimens may lead to a solution for this problem, or may

widen the problem of generic affinities.

The problems associated with the delimitation of the next two genera became apparent during the construction of keys to the genera and keys to the species of Litsea in Australia. At that stage I had accepted Neolitsea as a valid genus and considered that Litsea glutinosa fell naturally in Litsea. However, it became apparent that the differences between Neolitsea and Litsea sens. lat. were no greater than the differences between Litsea glutinosa and the rest of the Australian species of Litsea. It is difficult to define a character which distinguishes Litsea as a generic group but does not exclude L. glutinosa. If Neolitsea is accepted as a valid generic segregate of Litsea then Litsea glutinosa also may have to be accepted as a distinct genus. The only alternative would be to reunite Neolitsea and Litsea. However, as this treatment deals only with a small segment of the total Litsea-Neolitsea complex it seems preferable to preserve the current generic concepts of authors who have studied a wide range of species in the genus Litsea.

Consequently, I have accepted Litsea and Neolitsea as valid genera but have recognized that Litsea glutinosa differs significantly from other species of Litsea. Litsea glutinosa cannot be accomodated by resurrecting the old generic name Sebifera, as L. glutinosa is conspecific with L. chinensis Lam., the type species of the genus Litsea (nom. conserv.). The proposal to conserve Litsea Lam. was made at the Vienna Congress of 1905. The name Litsea Lam. as a conserved name first appeared in Verhandlungen des Internationalen Botanischen Kongressess in Wien 1905 (1906). The substance of the committee discussions are not available. However, it is known that the

Committee wished to conserve the genus Litsea against Malapoenna. To do this they had little choice but to select the earliest name under Litsea, which is L. chinensis Lam. = Sebifera glutinosa Lour. I now find myself in the unfortunate position of believing that the type species of the genus differs generically from the broader generic concept which has developed subsequently. Thus, if I wish to recognize, Litsea glutinosa as generically different then I must transfer the other Australian species to a different genus. This should not be done without a study of the genus as a whole, because there may be other generic segregates or there may be forms which link L. glutinosa with Litsea sens. lat. Thus, any transfer now, could be followed in a few years, by a transfer in the opposite direction. Therefore, I have recognized that there is a generic problem in Australia and whilst two groups can be segregated, I have retained all species under Litsea. If further work on a broader scale supports my current views, then it will be necessary to submit a proposal to the Committee for the International Code of Botanical Nomenclature for the name Litsea to be conserved, but to be based on a different type. This could be a long and involved process and until the proposal is submitted and accepted, it would be desirable to use the generic name Litsea in a broad sense but recognize that there could be distinct generic elements within it. This should only be regarded as an interim measure, until the entire Litsea-Neolitsea complex is revised, throughout the world, and a better understanding of the whole group is achieved.

Species Relationships

The species in each genus are listed below in groups. I believe each group contains closely related species. In most cases the relationships are fairly obvious and can be substantiated by obvious morphological similarities but in other cases the similarities are not obvious and some of my groupings are somewhat intuitive.

Beilschmiedia

1a.	B. castrisinensis B. volckii	{6 Anthers + 6 staminodes {per flower.
b.	B. oligandra B. tooram	{6 Anthers + 0-3 {staminodes per flower.
2.	B. collina B. elliptica B. obtusifolia B. peninsularis	{Flowers unpleasantly {perfumed. {9 anthers & 3 staminodes {per flower.
3.	B. bancroftii B. brunnea B. recurva	{9 anthers & 3 staminodes {per flower. {Not related to one {another but differing {from previous groups.

Cinnamomum

1.	C. oliveri C. virens	{Leaves generally ± {penninerved.
2.	C. baileyanum C. laubatii C. propinquum	{Leaves generally ± {triplinerved. {

Cryptocarya

1.	C. bamagana C. bellendenkerana C. cocosoides C. cunninghamii C. foetida C. foveolata C. grandis C. hypospodia C. lividula C. melanocarpa	{Ruminate cotyledons {and foetid flowers. { { { { { { { {

	C. obovata	{
	C. smaragdina	{
2.	C. laevigata	{Ribbed endocarp?
	C. meissneriana	{
	C. pleurosperma	{
3.	C. erythroxylon	{Seedlings with cataphylls
	C. onoprienkoana	{and opposite first leaves.
	C. rhodosperma	{
	C. rigida	{
4.	C. burckiana	{Triplinerved adult leaves
	C. exfoliata	{and similar seedlings.
	C. triplinervis	{Flowers faintly but
	C. williwilliana	{pleasantly perfumed.
5.	C. brassii	{Adult leaves with
	C. mackinnoniana	{strongly reticulate
	C. murrayi	{venation, flowers foetid.
	C. putida	{
6.	C. bidwillii	{Flowers faintly but
	C. clarksoniana	{pleasantly perfumed.
	C. claudiana	{Cataphylls absent on
	C. floydii	{the seedlings.
	C. microneura	{Leaves penninerved.
	C. sclerophylla	{
7.	C. leucophylla	{Foetid flowers, leaves
	C. vulgaris	{white or glaucous on
		{the underside.
8.	C. angulata	{Saccharum type blaze
	C. corrugata	{odour.
	C. glaucescens	{Seedlings without
	C. saccharata	{cataphylls.
9.	C. dorrigoensis	{Small leaved
	C. nova-anglica	{mountain species.
10.	C. densiflora	{Not related to one
	C. endiandraefolia	{another but with no
	C. glaucocarpa	{obvious relationship
	C. macdonaldii	{with the other groups
	C. oblata	{either.

Endiandra

1.	E. anthropophagorum	{Urceolate ± closed
	E. insignis	{flowers.
	E. pubens	{Seedlings with a carrot-
	E. virens	{like tap root.
		{Fruits large.
2.	E. bellendenkerana	{Glands fused or partly

	E. floydii	{fused to form a disk.
	E. glauca	{
	E. grayi	{
	E. hypotephra	{
	E. longipedicellata	{
	E. wolfei	{
3.	E. bessaphila	{Flowers small, leaves
	E. cowleyana	{with foveoles.
	E. discolor	{
	E. limnophila	{
4.	E. introrsa	{Anthers introrse.
	E. jonesii	{Staminal glands absent.
5.	E. monothyra	{Anthers 1-celled.
	E. monothyra ssp. trichophylla	{
6.	E. globosa	{Anthers up to 6 per
	E. montana	{flower.
7.	E. hayesii	{Flowers not opening
	E. leptodendron	{widely at anthesis.
	E. muelleri	{Staminal glands &
	E. muelleri ssp. bracteata	{staminodes present. {Fruits black.
8.	E. phaeocarpa	{Radicle below the apex
	E. xanthocarpa	{of the cotyledons. {Anther openings small {± pore-like.
9.	E. impressicosta	{Radicle lateral. {Staminal glands and {staminodes absent.
10.	E. acuminata	{Not closely related to
	E. collinsii	{one another but not
	E. compressa	{showing any real
	E. cooperana	{relationship with
	E. crassiflora	{previous groups.
	E. dichrophylla	{
	E. dielsiana	{
	E. microneura	{
	E. palmerstonii	{
	E. sankeyana	{
	E. sideroxylon	{
	E. sieberi	{

Litsea

1.	L. australis	{Cotyledons purple.
	L. bennettii	{
	L. breviumbellata	{
	L. connorsii	{
	L. leefeana	{

2. L. reticulata, L. fawcettiana — {Cotyledons cream, {twig hairs appressed.

3. L. bindoniana, L. granitica, L. macrophylla — {Cotyledons cream, {twig hairs erect. {

Abbreviations

LA, Logging Area; DBH, Diameter Breast High; NPR, National Park Reserve; Porn, Portion (a cadastral unit describing a parcel of land); RFK, Rain Forest Key (collections for the construction of a key to the rainforest trees of Queensland); SFR, State Forest Reserve; TR, Timber Reserve; VCL, Vacant Crown Land; Wood S.G., Wood Specific Gravity.

Collections Examined

See Appendix 6.

Index to Collections

See Appendix 7.

Specimens Cited

All specimens cited have been seen by the author unless a statement to the contrary is made in the text of the revision.

Systematic Treatment

Lauraceae*

Evergreen trees, shrubs or parasitic vines (Cassytha) usually monoecious, (Lindera, Litsea and Neolitsea dioecious). Stem with or without buttresses. Bark usually nondescript, occasionally flaky, rarely fissured or corky, outer blaze usually granular in texture. Twigs terete, angular or fluted, usually hairy when young but sometimes glabrous at maturity, hairs straight and/or tortuous, appressed and/or erect. Leaves: Simple, petiolate, exstipulate, usually spirally arranged, sometimes opposite or pseudowhorled, minutely oil-dotted, margins entire, very rarely lobed. Underside usually green, sometimes glaucous or white, sometimes glabrous, but often clothed in hairs when young, becoming almost glabrous at maturity. Inflorescence often paniculate and pseudo-terminal but umbellate and axillary in Lindera, Litsea and Neolitsea. Bracts persistent or deciduous usually small and inconspicuous but large and completely enclosing the inflorescence in the umbellate genera. Flowers usually cream or pale yellow rarely green or reddish, actinomorphic, usually bisexual, (unisexual in Lindera, Litsea and Neolitsea, usually 3-merous (rarely 2 or 4-merous), perianth segments partly united usually with 6 segments in 2 whorls. Stamens epitepalous, usually 3-12 per flower, rarely reduced to 2, but up to 12-20 in Lindera and Litsea. Stamens in whorls, the innermost whorl often reduced to staminodes. Stalked glands usually attached to the filaments of some anthers. Anthers basifixed, 2-4-locular, usually the outer whorl introrse and the inner whorl extrorse (all introrse Lindera, Litsea and Neolitsea). Ovary superior, 1-locular, ovule solitary, pendulous, style terminal, stigma usually small, (thallose

in Lindera, Litsea and Neolitsea). Fruits baccate, mesocarp usually succulent, sometimes leathery, endocarp usually developed, sometimes thick and hard but often thin and closely associated with the testa. Fruits often on a bare pedicel, but sometimes the perianth persists as a swollen receptacle at the base or encloses part or the whole of the fruit. Seed solitary, testa thin, cotyledons frequently uniform in texture, sometimes ruminate. Seedlings cryptocotylar, cataphylls present or absent, leaves usually spirally arranged occasionally opposite or pseudo-whorled.

* Family charcters of Australian species

Keys to the Genera *

Flowering Material

1a. Flowers male or hermaphrodite 2

b. Flowers female 11

2a. Anthers 2-locular (rarely 1). 3

b. Anthers 4-locular. 8

3a. Inflorescence umbellate, the umbels completely enclosed in hemispherical decussate bracts before anthesis. . . . . .Lindera

b. Inflorescence paniculate or racemose, the flowerbuds not enclosed in hemispherical decussate bracts. 4

4a. Fertile stamens 3 (rarely 2) . . . . . Endiandra

b. Fertile stamens 6-9 5

5a. Fertile stamens 9. 6

b. Fertile stamens fewer than 9. 7

6a. Flowers hypogynous, the ovary not surrounded by the perianth tube, with a significant part of the ovary projecting beyond the top of the perianth tube . . . . . .Beilschmiedia

b. Flowers epigynous or perigynous, the ovary closely surrounded by the perianth tube with only the stigma, style and perhaps the top of the ovary projecting beyond the top of the perianth tube . . . . . .Cryptocarya

7a. Anthers opening inwards & sideways. . . . . .Beilschmiedia

b. Anthers opening outwards & sideways. . . . . Endiandra

8a. Inflorescence paniculate, the flower buds not enclosed in hemispherical bracts . . . . . .Cinnamomum

b. Inflorescence umbellate, the umbels completely enclosed in hemispherical decussate bracts before anthesis 9

9a. Tepals nil or vestigial. Flowers 6-14 per umbel. Glands not attached to

the anther filaments. . . . . Litsea glutinosa

b. Tepals 4-6, perfectly developed.
Flowers 2-7 per umbel.
Glands attached to the anther filaments. 10

10a. Leaves often triplinerved.
Flowers usually 2-merous
T 2+2, A 4+2.
Umbels sessile or very
shortly pedunculate.
Leaves often in pseudo-whorls
or tight spirals on sections of
the twigs, while other sections of
the twigs are devoid of fully
developed leaves. . . . . .Neolitsea

b. Leaves penninerved.
Flowers usually 3-merous
T 3+3 (or 6), A 6-16.
Umbels distinctly pedunculate.
Leaves spirally arranged &
uniformly distributed on the twigs. . . .Litsea sens. lat.

11a. Tepals nil or poorly developed.
Flowers 9-12 per umbel. 12

b. Tepals 4-6, perfectly developed.
Flowers 1-6 per umbel. 13

12a. Glands attached to the staminodes.
Pedicel 2.6-4 mm long. . . . . Lindera

b. Glands not attached to the staminodes.
Pedicel 1.3-2.6 mm long. . . . . .Litsea glutinosa

13a. Leaves often triplinerved.
Flowers predominantly 2-merous.
Leaves often in pseudo-whorls or
tight spirals on sections of the twigs,
while other sections of the twigs are
devoid of fully developed leaves. . . . . .Neolitsea

b. Leaves penninerved.
Flowers predominantly 3-merous.
Leaves spirally arranged & uniformly
distributed on the twigs. . . . . .Litsea sens. lat.

Fruiting Material

1a. Fruit base embedded in a cupule or seated on an obviously fleshy, swollen receptacle 2

b. Fruit base not embedded in a cupule or seated on a fleshy receptacle 6

2a. Leaves opposite or sub-opposite . . . . . Cinnamomum

b. Leaves spirally arranged or in pseudo-whorls 3

3a. Leaves often triplinerved.
Leaves often in pseudo-whorls or tight spirals on sections of the twigs while other sections of the twigs are devoid of fully developed leaves. . . . . .Neolitsea

b. Leaves penninerved.
Leaves spirally arranged and uniformly distributed on the twigs. 4

4a. Fruiting carpel seated in a cupule, like an egg in an egg cup, the apex of the receptacle obviously dished i.e.. concave. . . . . .Litsea sens. lat.

b. Fruiting carpel attached to the apex of a swollen receptacle but the base of the carpel not enclosed by the receptacle, the apex of the receptacle ± flat. 5

5a. Ripe fruits red.
Mature twigs ± glabrous (sometimes puberulous) . . . . . Lindera

b. Ripe fruits black.
Mature twigs clothed in tortuous, erect and appressed hairs. . . . . .Litsea glutinosa

6a. Fruits inferior with the remnants of the perianth lobes persisting at the apex of the fruit or the apex marked by a conspicuous scar . . . . . Cryptocarya

b. Fruits superior with the remnants of the perianth lobes usually persisting at the base of the fruit . . . . . .Beilschmiedia
Endiandra
(See next key)

*See figures (71 D,E & F) for illustrations of hair types.

Keys to the species of Beilschmiedia and Endiandra

Fruiting Material

1a. Fruits more than 30 mm long. 2

b. Fruits up to 30 mm long. 47

2a. Radicle basal, central or lateral. 3

b. Radicle apical. 10

3a. Fruits black, blue-black or purplish black.
Radicle lateral or almost lateral. . . . .E. impressicosta

b. Fruits pink, red, orange-red, brown or yellow.
Radicle basal or central. 4

4a. Older leaves glabrous on the underside. 5

b. Older leaves pubescent on the underside. 9

5a. Fruits globular. 6

b. Fruits ellipsoid or allantoid (sausage shaped). 7

6a. Seeds 22-36 mm diam. . . . . E. anthropophagorum

b. Seeds about 40 mm diam. . . . . .E. virens

7a. Fruits scurfy brown when ripe. . . . . E. phaeocarpa

b. Fruits yellow or orange when ripe. 8

8a. Mesocarp + exocarp 2.5-3.5 mm thick.
Midrib depressed on the upper surface. . . .E. xanthocarpa

b. Mesocarp + exocarp 4-5 mm thick.
Midrib raised on the upper surface. . . . . .E. microneura

9a. Fruits 40-75 mm diam.
Mesocarp + exocarp 4-8 mm thick.
Southern Queensland and northern New South Wales. . . . . E. pubens

b. Fruits 50-100 mm diam.
Mesocarp + exocarp 7-17 mm thick.
Northern Queensland . . . . . .E. insignis

10a. Fruits yellow, orange, orange-brown or scurfy brown when ripe. 11

b. Fruits black, blue-black or purplish black when ripe. 18

11a. Fruits globular. 12

b. Fruits ellipsoid or allantoid (sausage shaped). 15

12a. Endocarp 1.5-2.5 mm thick. Fruits dull coloured usually, green, yellow, brown or orange-brown. 13

b. Endocarp 0.5-1.5 mm thick. Fruits brightly coloured usually yellow or orange rarely maroon. 14

13a. Endocarp with a mucro at each pole. . . . . .B. bancroftii

b. Endocarp without a mucro or with one only. . . . . .E. palmerstonii

14a. Mesocarp + exocarp 4.0-6.0 mm thick. Cotyledons pink when freshly cut. Primary veins 5-7 pairs on mature leaves. . . . . .E. cooperana

b. Mesocarp + exocarp 1.5-3.5 mm thick. Cotyledons cream when freshly cut. Primary veins 6-14 pairs on mature leaves. . . . . .E. montana

15a. Fruits scurfy brown. . . . . E. phaeocarpa

b. Fruits not scurfy. 16

16a. Endocarp more than 1.0 mm thick. Midrib depressed on the upper surface. . . .E. xanthocarpa

b. Endocarp up to 1.0 mm thick. Midrib raised on the upper surface. 17

17a. Radicle at the apex of the seed. Mesocarp + exocarp 1.5-3.5 mm thick. . . . . .E. montana

b. Radicle about 10-15 mm from the apex of the seed. Mesocarp + exocarp 4.0-5.0 mm thick. . . . . E. microneura

18a. Fruits globular, depressed globular, wider than long, (rarely slightly longer than wide) sometimes laterally compressed. 19

b. Fruits ellipsoid, pyriform, cylindrical

or longer than wide, sometimes laterally compressed. 26

19a. Cotyledons burgundy in colour when freshly cut. . . . . .B. volckii

b. Cotyledons cream, orange or apricot when freshly cut. 20

20a. Cotyledons orange when freshly cut. Mature leaves hairy on the underside. . . . . E. sankeyana

b. Cotyledons cream or yellowish when freshly cut. Mature leaves glabrous, rarely shortly tomentose on the underside. 21

21a. Leaves green on the underside even when young. 22

b. Leaves slightly glaucous on the underside, particularly when young. 23

22a. Fruits ± circular in cross section. . . . . E. globosa

b. Fruits oval or elliptical in cross section i.e. laterally compressed. . . . . .E. compressa

23a. Fruits ± circular in cross section. Northern New South Wales. . . . . .E. introrsa

b. Fruits laterally compressed. Northern Queensland. 24

24a. Margin of the lamina usually recurved. . . . . .E. jonesii

b. Margin of the lamina flat. 25

25a. Primary veins 11-19 pairs. Cotyledons cream to slightly yellowish. . . . . B. castrisinensis

b. Primary veins 8-12 pairs. Cotyledons orange or apricot. . . . . B. oligandra

26a. Fruits laterally compressed, ± oval in transverse section. 27

b. Fruits not laterally compressed, ± circular in transverse section. 30

27a. Primary veins depressed on the upper surface. . . . . .E. sankeyana

b. Primary veins raised or flush with the upper surface. 28

28a. Twig hairs tortuous, erect & brown. . . . . .B. tooram

b. Twig hairs straight, appressed & pale brown. 29

29a. Seed 29-48 mm diam. Margin of the lamina usually recurved. . . . . .E. jonesii

b. Seed 16-23 mm diam. Margin of the lamina usually flat. . . . . .E. sideroxylon

30a. Foveoles present on the underside of some or most leaves. 31

b. Foveoles not present on the underside of any leaves. 33

31a. Lamina glaucous on the underside (particularly when young). . . . . .E.limnophila

b. Lamina green on the underside. 32

32a. Surface of the foveoles projecting beyond the level of the midrib on the underside of the lamina. Lamina of a typical leaf 5.5-9.0 x 2.0-4.0 cm. . . . . E. cowleyana

b. Surface of the foveoles not projecting beyond the level of the midrib on the underside of the lamina. Lamina of a typical leaf 6.5-17.0 x 2.5-8.0 cm . . . . . E. bessaphila

33a. Midrib depressed on the upper surface or in a channel in the lamina. 34

b. Midrib raised on the upper surface or flush with the upper surface. 38

34a. Primary veins 8-15 pairs. Lamina of a typical leaf 5.0-9.0 cm wide. . . E. sankeyana

b. Primary veins 3-9 pairs. Lamina of a typical leaf 2.0-5.5 cm wide. 35

35a. Leaves green on the underside. . . . . .E. monothyra

b. Leaves glaucous on the underside, particularly when young. 36

36a. Young twigs clothed in tortuous, ± erect, rusty hairs. . . . . E. grayi

b. Young twigs clothed in straight, appressed, white or pale brown hairs. 37

37a. Primary veins 3-6 pairs.
Margin of the lamina usually flat. . . . . .E. acuminata

b. Primary veins 8-13 pairs.
Margin of the lamina usually recurved. . . . . .E. jonesii

38a. Young twigs clothed in tortuous, ±
erect, dark brown or rusty hairs. 39

b. Young twigs clothed in straight,
appressed, pale brown hairs. 40

39a. Fruits 15-25 mm diam. . . . . .E. longipedicellata

b. Fruits 35-50 mm diam. . . . . E. grayi

40a. Cotyledons pink-burgundy when
freshly cut. 41

b. Cotyledons cream, orange to apricot
when freshly cut. 43

41a. Fruits 30-65 mm diam.
Seed 20-50 mm diam. . . . . E. globosa

b. Fruits 20-30 mm diam.
Seed 15-25 mm diam. 42

42a. Endocarp about 0.5 mm thick.
Leaf margin often recurved.
Lamina often glaucous on the
underside. . . . . .E. dielsiana

b. Endocarp 0.8-1.1 mm thick.
Leaf margin flat.
Lamina green on the underside. . . . . .E. sideroxylon

43a. Fruits 30-35 mm long. . . . . E. acuminata

b. Fruits 35-55 mm long. 44

44a. Cotyledons orange or apricot
in colour. . . . . .B. oligandra

b. Cotyledons cream to yellowish. 45

45a. Fruits 20-30 mm diam.
Seed 15-25 mm diam. . . . . E. sideroxylon

b. Fruits 30-65 mm diam.
Seed 20-50 mm diam. 46

46a. Lamina 1.5-2.6 cm wide.
Margin usually recurved. . . . . .E. jonesii

b. Lamina 2.7-7.5 cm wide.

Margin flat. . . . . .E. globosa

47a. Foveoles present on the underside of some or most leaves. 48

b. Foveoles not present on the underside of any leaves. 57

48a. Mature fully developed leaves green on the underside. 49

b. Mature fully developed leaves glaucous on the underside. 53

49a. Surface of the foveoles projecting beyond the level of the midrib on the underside of the lamina. . . . . .E. cowleyana

b. Surface of the foveoles not projecting beyond the level of the midrib on the underside of the lamina. 50

50a. Hairs on the underside of the leaf blade straight and appressed. 51

b. Hairs on the underside of the leaf blade straight and tortuous, appressed and erect. 52

51a. Fruits 20-25 mm long. Primary veins 4-6 pairs. . . . . .E. collinsii

b. Fruits 26-34 mm long. Primary veins 6-11 pairs. . . . . .E. bessaphila

52a. Twig hairs straight, appressed. . . . . .E. muelleri

b. Twig hairs straight and tortuous, appressed and erect. . . . . .E. muelleri ssp. bracteata

53a. Fruits less than 19 mm long. Seeds less than 16 mm long. . . . . .E. discolor

b. Fruits more than 19 mm long. Seeds more than 16 mm long. 54

54a. Foveole opening ± pore-like & raised above the underside of the lamina. . . . . E. cowleyana

b. Foveole opening ± semicircular the diameter coinciding with the underside of the lamina. 55

55a. Apex of the leaf blade obtuse

to rounded.
Primary veins 6-11 pairs. . . . . .E. bessaphila

b. Apex of the leaf blade obtuse
to acuminate.
Primary veins 4-8 pairs. 56

56a. Fruits 25-35 mm long.
Seed 20-30 mm long.
Petiole 8-17 mm long. . . . . .E. limnophila

b. Fruits 20-25 mm long.
Seed 15-20 mm long.
Petiole 4-11 mm long. . . . . E. collinsii

57a. Fruits yellow, orange, orange-red or
maroon at maturity. . . . . E. montana

b. Fruits black or blue-black at maturity. 58

58a. Midrib raised or flush with the
upper surface of the lamina. 59

b. Midrib depressed on the upper
surface of the lamina or in a
channel in the lamina. 82

59a. Fruits 17-40 mm diam. 60

b. Fruits 8-17 mm diam. 61

60a. Hairs on young twigs tortuous,
erect, brown or rusty brown. . . . . E. longipedicellata

b. Hairs on young twigs straight,
appressed, pale brown. 63

61a. Primary veins up to 5 pairs. 62

b. Primary veins 6-11 pairs 65

62a. Hairs on the underside of the
leaf blade erect and tortuous. . . . . .E. bellendenkerana

b. Hairs on the underside of the leaf
blade straight and appressed. . . . . B. brunnea

63a. Leaf margin mainly flat, but
recurved near the base just prior
to its junction with the petiole. . . . . B. recurva

b. Leaf margin flat through out. 64

64a. Fruits 17-21 mm diam.
Primary veins 3-6 pairs. . . . . .E. acuminata

b. Fruits 33-60 mm diam.

Primary veins 6-11 pairs. . . . . E. globosa

65a. Cotyledons pink, red or purplish when freshly cut 66

b. Cotyledons cream when freshly cut. 68

66a. Leaves green on the underside. Stem bark corky. . . . . .E. sieberi

b. Leaves glaucous on the underside. Stem bark not corky. 67

67a. Perianth remnants, more than 7 mm diam. . . .E. hypotephra

b. Perianth remnants, less than 7 mm diam. . . . . .E. wolfei

68a. Lamina glaucous on the underside. 69

b. Lamina green on the underside. 75

69a. Twig hairs tortuous. 70

b. Twig hairs straight. 72

70a. Lamina underside clothed in straight appressed hairs. . . . . E. glauca

b. Lamina underside clothed in tortuous erect hairs. 71

71a. Older leaves becoming almost glabrous on the underside, the hairs persisting on the midrib and primary veins. . . . . .E. crassiflora

b. Older leaves ± villose on the underside. . . . . E. bellendenkerana

72a. Primary veins up to 5 pairs. . . . . .B. brunnea

b. Primary veins 6 or more pairs. 73

73a. Leaf margin mainly flat but recurved near the base just prior to its junction with the petiole. Seeds 12-17 mm diam. . . . . .B. recurva

b. Leaf margin flat. Seeds 8-13 mm diam. 74

74a. Mesocarp + exocarp more than 1.0 mm thick. Seeds 15-19 mm long.

Primary vein angle about 30°. . . . . B. collina

b. Mesocarp + exocarp up to 1.0 mm thick.

Seeds 20-26 mm long.

Primary vein angle about 50° . . . . . E. dichrophylla

75a. Leaf margin mainly flat but recurved near the base just prior to its junction with the petiole. . . . . .B. recurva

b. Leaf margin flat. 76

76a. Primary veins slightly depressed on the upper surface of the lamina. 77

b. Primary veins raised or flush with the upper surface. 78

77a. Seed 13-18 mm long.
Twig hairs straight and tortuous, appressed and erect. . . . . E. leptodendron

b. Seed 20-23 mm long.
Twig hairs tortuous and erect. . . . . .E. bellendenkerana

78a. Primary veins 4-6 pairs. 79

b. Primary veins 6-13 pairs. 80

79a. Twigs clothed in tortuous, erect hairs. . . . . .E. bellendenkerana

b. Twigs glabrous or clothed in straight, appressed hairs. . . . . .E. collinsii

80a. Primary vein angle usually 30-55°.
Primary veins curving inside the blade margin without conspicuous forks and not forming conspicuous loops.
Older twigs (i.e. just below the leafy twigs) with numerous obvious raised lenticels. . . . . B. obtusifolia

b. Primary vein angle usually 45-70°.
Primary veins forking towards the margin of the lamina and the branches forming conspicuous loops.
Older twigs without numerous raised lenticels. 81

81a. Fruits 12 mm diam.
Northern New South Wales and southern Queensland. . . . . .B. elliptica

b. Fruits 13-15 mm diam.
Northern Queensland. . . . . B. peninsularis

82a. Lamina green on the underside. 83

b. Lamina glaucous on the underside. 88

83a. Petiole channelled on the upper surface. 84

b. Petiole flat on the upper surface. 86

84a. Fruits 20-25 mm long. Hairs on the underside of the leaf blade straight and appressed. . . . . E. collinsii

b. Fruits 25-35 mm long. Hairs on the underside of the leaf blade straight and tortuous, appressed and erect. 85

85a. Twig hairs straight, appressed. . . . . .E. muelleri

b. Twig hairs straight and tortuous, appressed and erect. . . . . .E. muelleri ssp. bracteata

86a. Northern New South Wales and southern Queensland. . . . . .E. hayesii

b. Northern Queensland. 87

87a. Fruits 20-26 mm long. . . . . E. bellendenkerana

b. Fruits 27-40 mm long. . . . . E. monothyra

88a. Cotyledons red, sometimes pink or purplish when freshly cut. 89

b. Cotyledons cream, sometimes pink when freshly cut. 90

89a. Perianth remnants, more than 10 mm diam. on fresh fruits. . . . . E. hypotephra

b. Perianth remnants, less than 10 mm diam. on fresh fruits. . . . . E. wolfei

90a. Twig hairs tortuous. Twig hairs erect or appressed. 91

b. Twig hairs straight. Twig hairs appressed. 94

91a. Primary vein angle >40°.
Lamina arched between the lateral veins on the upper surface.
Northern New South Wales and southern Queensland. . . . . .E. crassiflora

b. Primary vein angle <40°.
Lamina ± flat on the upper surface.
Northern Queensland (central Queensland?). 92

92a. Hairs on the underside of the lamina appressed.
Primary veins not or scarcely impressed on the upper surface of the lamina. . . . . E. glauca

b. Hairs on the underside of the lamina erect.
Primary veins conspicuously impressed on the upper surface of the lamina. 93

93a. Leaves very glaucous or almost white on the underside. . . . . .E. wolfei

b. Leaves only slightly glaucous on the underside. . . . . E. bellendenkerana

94a. Primary veins 7-11 pairs. . . . . .E. dichrophylla

b. Primary veins 3-6 pairs. 95

95a. Fruits more than 27 mm long. . . . . .E. acuminata

b. Fruits less than 27 mm long. . . . . .E. collinsii

1. Beilschmiedia Nees

Beilschmiedia Nees in Wallich, Pl. Asiat. rar. 2:61 and 69 (1831).
Lectotype: B. roxburghiana Nees [Kostermans, Recueil Trav. Bot. Neerl. 35:839 (1938)].
Nesodaphne Hook. f., Fl. nov.-zel. 1:217 (1853)
Type: Not designated.

[For extra-Australian synonyms see Kostermans (1957)]

Trees, often quite large. Twigs usually ± sericeous (at least when young); rarely completely glabrous. Leaves petiolate, minutely oil-dotted, mainly penninerved, spirally arranged. Inflorescence usually paniculate, occasionally racemose, axillary, often pseudoterminal. Flowers bisexual, 3-merous, tepals 3 + 3, stamens 6 introrse or 6 introrse + 3 extrorse, 2-locular, staminodes 0-6, ovary usually sessile, stigma inconspicuous (Figs 68, 69). Fruits superior, often quite large (up to 70 mm diam.), pedicel not swollen or cup-like, mesocarp usually fleshy, sometimes leathery, endocarp thin in small fruited, but thick in large fruited species. Seed often quite large (up to 60 mm diam.), radicle apical or close to the apex, cotyledons distinct from one another, uniform in texture. Seedling leaves spirally arranged, cataphylls present.

Distribution

A pantropic genus of more than 200 species occurring in Africa, Asia, Malesia, Australia, Pacific Islands, New Zealand, South and Central America.

Keys to the Species of Beilschmiedia*

Flowering Material

1a. Stamens 6 or fewer in each flower. 2

b. Stamens 9 in each flower 5

2a. Staminodes 6 in each flower. 3

b. Staminodes 0-3 in each flower. 4

3a. Leaf blade 12-27 cm long.
Underside green.
Larger staminodes 1.0-1.2 mm long. . . . . .B. volckii

b. Leaf blade 7-13 cm long.
Underside glaucous.
Larger staminodes 0.5-0.9 mm long. . . . B. castrisinensis

4a. Staminodes about 1.8-2.5 mm long.
Outer tepals 2.0-2.5 mm long. . . . . B. oligandra

b. Staminodes about 0.5-0.8 mm long.
Outer tepals 0.6-1.0 mm long. . . . . B. tooram

5a. Staminodes not differentiated,
cylindrical or clavate.
Ovary conspicuously stalked. . . . . B. bancroftii

b. Staminodes differentiated, i.e.
consisting of a head, which is
± cordate or sagittate and a filament.
Ovary sessile or very shortly stalked 6

6a. Primary veins up to 5 pairs.
Outer tepals more than 2.0 mm long . . . . . .B. brunnea

b. Primary veins 6 or more pairs.
Outer tepals seldom exceeding
2.0 mm in length. 7

7a. Flowers pleasantly perfumed.
Leaf margin mainly flat, but recurved
near the base just prior to its
junction with the petiole. . . . . .B. recurva

b. Flowers unpleasantly perfumed.
Leaf margin ± flat throughout

(occasionally slightly recurved about the middle) 8

8a. Lamina glaucous on the underside . . . . . .B. collina

b. Lamina green on the underside 9

9a. Primary vein angle usually 45-70°. Primary veins forking towards the margin of the lamina and the branches forming rather conspicuous loops 10

b. Primary vein angle usually 30-55°. Primary veins curving inside the blade margin usually without conspicuous forks and not forming conspicuous loops 11

10a. Outer tepals more than 1.5 mm long . . . . . .B. elliptica

b. Outer tepals less than 1.5 mm long . . . . B. peninsularis

11a. Apex of the inner anthers obtuse, very shortly tomentose. Tepals 1.1-1.5 mm long . . . . . .B. obtusifolia

b. Apex of the inner anthers acute, aristate. Tepals 1.5-1.8 mm long . . . . . .Cryptocarya oblata

* Cryptocarya oblata has been included because the flowers can appear similar in structure to those of Beilschmiedia (See note in the C. oblata species description).

Fruiting Material

1a. Fruits more than 30 mm diam. 2

b. Fruits less than 30 mm diam. 6

2a. Cotyledons burgundy in colour when freshly cut. . . . . .B. volckii

b. Cotyledons cream, orange or apricot when freshly cut. 3

3a. Fruits wider than long. Fruits slightly bilobed & laterally compressed. . . . . .B. castrisinensis

b. Fruits longer than wide (occasionally about as long as wide). Fruits not bilobed though sometimes laterally compressed. 4

4a. Fruits brownish or orange-brown when ripe. Endocarp usually 2.0-2.5 mm thick (rarely thinner). . . . . .B. bancroftii

b. Fruits black, blue-black or purplish black when ripe. Endocarp 0.6-2.0 mm thick. 5

5a. Young twigs clothed in straight, appressed, brown or pale brown hairs. . . . . B. oligandra

b. Young twigs clothed in tortuous, erect, brown hairs. . . . . B. tooram

6a. Primary veins up to 5 pairs . . . . . B. brunnea

b. Primary veins 6 or more pairs 7

7a. Seeds 12 mm or more in diameter. 8

b. Seeds up to 12 mm diameter. 9

8a. Young twigs clothed in straight, pale brown, appressed hairs. Leaf margin mainly flat, but recurved near the base just prior to its junction with the petiole. . . . . B. recurva

b. Young twigs clothed in tortuous, brown, erect hairs. Leaf margin flat throughout. . . . . B. tooram

9a. Lamina glaucous on the underside . . . . . .B. collina

b. Lamina green on the underside 10

10a. Primary vein angle usually 30-55°.
Primary veins curving inside the
blade margin without conspicuous
forks and not forming conspicuous loops . . B. obtusifolia

b. Primary vein angle usually 45-70°.
Primary veins forking towards the
margin of the lamina and the branches
forming conspicuous loops 11

11a. Fruits 12 mm diam. . . . . B. elliptica

b. Fruits 13-15 mm diam. . . . . B. peninsularis

1. **Beilschmiedia bancroftii** (Bailey) C. White, Queensl. Dept. Agric., Bot. Bull. 20:17 (1918); Francis, Austral. Rain-Forest Trees ed.2:403 (1951).
Cryptocarya bancroftii Bailey, Queensl. Dept. Agric., Bot. Bull. 2:16 (1891); Bailey, Queensl. fl. 4:1302 (1901).
Lectotype (here designated): T.L. Bancroft, Johnstone River (BRI 10069).
Syntype: F.M. Bailey (Bellenden Ker Expedition) (BRI 10070, MEL 565785, K).
B. lachnostemonea F.Muell., Victorian Naturalist 9:11 (1892); Bailey, Queensl. fl. 4:1303 (1901).
Type: W. Sayer, Russell River.
(MEL 565786-7, BRI 10071, NSW s.n., K, syntypes).

Tree to 30 m tall x 120 cm dbh, usually large and well formed. Stem usually buttressed. Bark nondescript or flaky, rarely otherwise, outer blaze usually cream or brown, sometimes pink or reddish, granular in texture. Twigs terete or angular, clothed in straight, white or pale brown, appressed hairs when young but glabrous when older. Leaves: Underside green or slightly glaucous, clothed in straight, white or pale brown, appressed hairs when young but almost glabrous at maturity. Leaf blade lanceolate, apex acuminate, base cuneate or attenuate, 7.0-15.5 x 2.0-3.0 cm (mean 10.7 x 3.8); penninerved, primary veins 6-12 pairs (mode 8), midrib raised on the upper surface; petiole 5-16 mm long (mean 10.2), flat or channelled on the upper surface. Inflorescence paniculate, approximating or exceeding the leaves, axillary and pseudoterminal; bracts linear or triangular, about 0.9-1.0 mm long, deciduous, absent at anthesis. Flowers green, creamy green or greenish brown, pleasantly or unpleasantly perfumed, opening widely, the tepals becoming reflexed and hanging like a skirt around the pedicel after anthesis. Pedicel 0.9-4.6 x 0.7-0.8 mm. Perianth tube difficult to distinguish, 0.0-0.2 x 0.9-1.3 mm, outer tepals, 2.1-2.8 x 1.2-1.7 mm, inner larger,

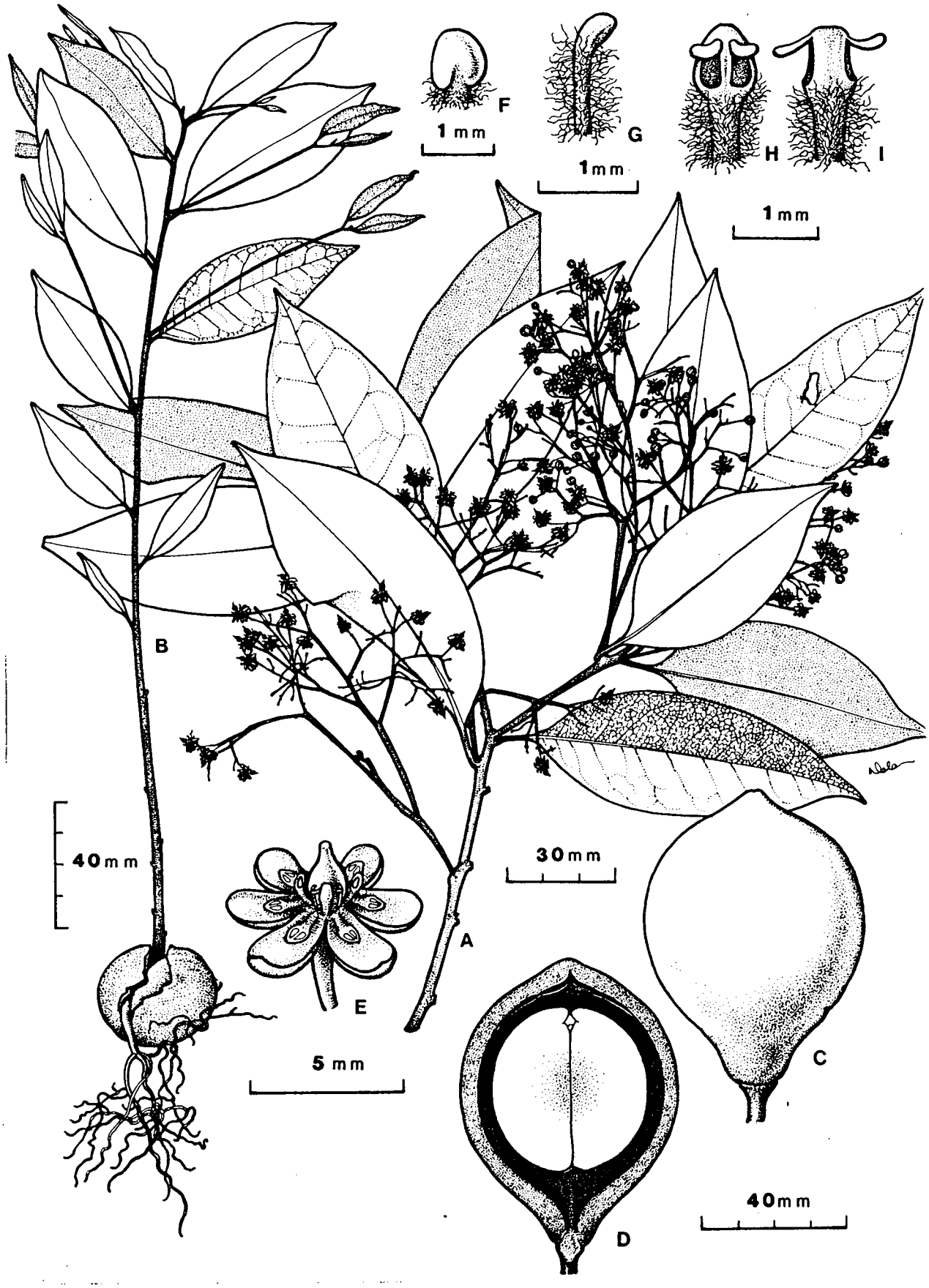

Fig.1. Beilschmiedia bancroftii. A Habit Hyland 6755; B seedling, C fruit, D fruit (LS) Irvine 435; E flower, F gland (adaxial view), G staminode (adaxial view), H stamen (outer whorl, adaxial view), I stamen (inner whorl, adaxial view) Hyland 6755.

2.3-3.5 x 1.2-1-7 mm, all tepals pubescent on the outer surfaces and at least partly pubescent on the inner surfaces. Outer anthers glabrous, 0.6-0.8 x 0.6-0.9 mm, filaments villous, 1.0-1.7 mm long; glands absent. Inner anthers glabrous, 0.6-0.8 x 0.5-0.8 mm, filaments villous, 1.2-2.1 mm long; each filament with two stalked glands at the base. Gland heads glabrous, 0.5-1.0 x 0.4-0.6 mm, stalks usually villous, at least towards the base, 0.1-0.6 mm long; staminodes usually villous (sometimes glabrous towards the apex), undifferentiated, cylindrical or clavate, 1.1-1.7 mm long. Ovary distinctly stalked, stalk 0.3-1.2 mm long, ovary glabrous, 0.9-1.1 x 0.7-1.0 mm, style glabrous, 0.8-1.1 mm long. Fruits green, brownish or orange-brown when ripe, globular, 65-75 x 50-60 mm, mesocarp + exocarp 3.0-4.5 mm thick, endocarp 2.0-2.5 mm thick. Seed 35-45 x 34-42 mm, testa 0.4-1.2 mm thick, radicle apical. Cotyledons cream. Seedling leaves green on the underside. (Fig. 1)

Distribution (Fig. 88, Map 3)

Ecology

Rain forests of northern Queensland on soils derived from a variety of rock types. Altitudinal range: Sea level to 1200 m.

Uses

This species produces millable logs and the sawn timber and veneer is marketed as Yellow Walnut, a useful structural and decorative timber. Wood S.G. 0.64-0.75.

Notes and Observations

Flowers have been collected in December, January, February, March,

May, June and August, while ripe fruits have been collected each month from December to March and also in August. Seedling germination period 140-2070 days.

The seeds of B. bancroftii lie on the forest floor until eaten by rats. The testa is hard and quite durable and the seeds can be mistaken for those of Endiandra palmerstonii. The seeds of B. bancroftii can usually be distinguished by the presence of a projection at each pole (at least one of which is sharp), while those of E. palmerstonii lack such projections, or have one blunt projection only.

Specimens Examined (96 collections examined)

2. Beilschmiedia brunnea B. Hyland sp. nov.
Differt a speciebus ceteris venis lateralibus paucis et tepalis plus quam 2.0 mm longis.
Typus: B. Hyland 12473: State Forest Reserve 310, Windin Logging Area, 24.i.1983 (holotypus QRS).
Differs from other species in the small number of lateral veins and the tepals more than 2.0 mm long.

Tree to 35 m tall x 100 cm dbh, usually medium to large and well formed. Stem usually buttressed. Bark nondescript, outer blaze pink, brown or sometimes cream, granular in texture. Twigs terete or angular, clothed in straight, pale brown, appressed hairs when young but glabrous when older. Leaves: Underside slightly glaucous, clothed in short, straight, white or pale brown appressed hairs. Leaf blade broadly ovate, ovate or elliptical, apex obtuse to acuminate, base cuneate to attenuate, 7.0-12.5 x 2.5-7.0 cm (mean 9.3 x 4.7); penninerved but sometimes tending towards triplinerved, primary veins 4-5 pairs, midrib flush with the upper surface; petiole 13-26 mm long (mean 18.6), flat or channelled on the upper surface. Inflorescence

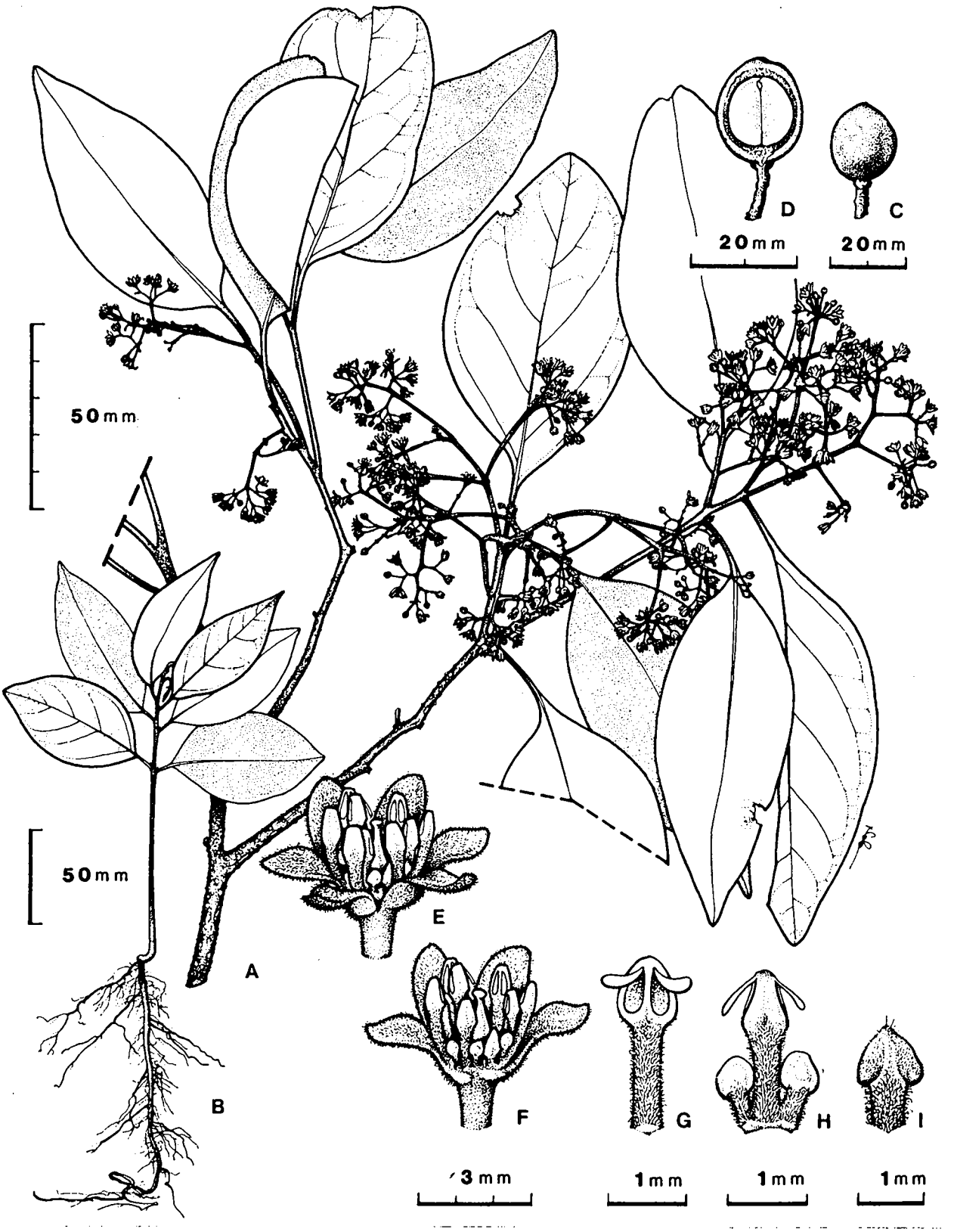

Fig.2. Beilschmiedia brunnea. A Habit Hyland 12473; B seedling, C fruit, D fruit (LS) Gray 1837; E flower (oblique view), F flower (oblique view, 2 tepals and 2 anthers removed), G stamen (outer whorl, adaxial view), H stamen (inner whorl, abaxial view, showing glands), I staminode (adaxial view) Hyland 12473.

paniculate, approximating or exceeding the leaves, axillary and pseudoterminal; bracts linear, triangular or lanceolate 0.8-1.3 mm long, deciduous, absent at anthesis. Flowers green, greenish cream, brownish cream or pale brown, pleasantly or unpleasantly perfumed, opening quite widely, the tepals becoming almost horizontal at or after anthesis. Pedicel 1.3-1.9 x 0.8-1.1 mm. Perianth tube 0.3-1.0 x 1.8-2.3 mm, outer and inner tepals of similar dimensions but the inner tending to be slightly longer, outer tepals 2.4-3.0 x 1.5-1.7 mm, inner tepals 2.6-3.2 x 1.4-1.7 mm, all tepals densely hairy on both the inner and outer surfaces. Outer anthers glabrous at the apex but hairy towards the base on the abaxial surface, 0.8-1.3 x 0.7-0.9 mm, filaments villous, 1.0-1.4 mm long; glands absent. Inner anthers hairy adaxially, at least towards the base, 0.8-1.1 x 0.6-0.7 mm, filaments villous, 1.0-1.7 mm long; each filament with two shortly stalked glands at the base. Gland head mainly glabrous, 0.6-0.9 x 0.7-0.8 mm, stalks villous, 0.4-0.6 mm long; staminodes differentiated, head mainly glabrous adaxially but hairy abaxially, 0.8-1.0 mm long, filaments villous, very short, 0.4-0.6 mm long. Ovary usually hairy, sessile or very shortly stalked (0.2 mm), ovary 0.5-1.0 x 0.7-0.8 mm, style usually hairy, 0.9-1.9 mm long. Fruits black when ripe, ellipsoid or globular, 20-22 x about 17 mm, mesocarp + exocarp 0.9-1.0 mm thick, endocarp 0.7-0.9 mm thick. Seed about 14 x 13-14 mm, testa 0.1 mm thick, radicle apical. Cotyledons yellowish or cream. Seedling leaves slightly glaucous on the underside. (Figs 2, 68 A-B)

Distribution (Fig. 89, Map 7)

Ecology

Rain forests of northern Queensland on soils derived from granite and basalt. Altitudinal range: 500-1100 m.

Uses

This species produces millable logs and the sawn timber is sold as Brown Walnut although this is not the Standard Trade Name. This anomaly appears to result from B. brunnea being confused with Endiandra subtriplinervis C. White & Francis, now regarded as a synonym of E. acuminata C. White & Francis. Wood S.G. 0.6-0.7.

Notes and Observations

Flowers have been collected in December, January and February, while ripe fruits have been collected in October, November and December. Seedling germination period 30-40 days.

This appears to be a fast growing, vigorous species but is difficult to identify under rain forest conditions and appears to have been largely overlooked by the timber industry.

B. dilmyana Kosterm. of New Guinea is superficially similar but appears to be specifically distinct.

Etymology

The specific epithet was chosen because the species has been known as Brown Walnut for many years.

Specimens Examined (32 collections examined)

3. Beilschmiedia castrisinensis B. Hyland sp. nov.
Differt a B. volckii laminis minoribus et staminodiis longis.

Typus: B. Hyland 12861: National Park Reserve 164 Noah, 10.xi.1983 (holotypus QRS).
Differs from B. volckii in the smaller leaves and longer staminodes.

Tree to 30 m tall x 80 cm dbh, usually medium sized and well formed. Stem usually buttressed. Bark nondescript or flaky, outer blaze pink or red, occasionally brown, granular in texture. Twigs slightly fluted, clothed in straight, pale brown, appressed hairs. Leaves: Underside glaucous, clothed in straight, pale brown, appressed hairs when young but almost glabrous at maturity. Leaf blade lanceolate, apex acute or bluntly pointed, base attenuate, 7.3-12.6 x 2.3-3.7 cm (mean 9.7 x 3.0); penninerved, primary veins 11-19 pairs (mode 13), midrib raised or flush with the upper surface; petiole 8-19 mm long (mean 13.3), flat on the upper surface. Inflorescence paniculate, not exceeding the leaves, axillary; bracts lanceolate or triangular 1.0-1.4 mm long, persistent, present at anthesis. Flowers cream or cream-green, faintly but pleasantly perfumed or without perfume, not opening very widely, the tepals remaining bent inwards, forming a sheath which ± encloses everything except the tips of the anthers and the style. Pedicel 1.2-3.2 x 0.7-1.0 mm. Perianth tube 0.8-1.5 x 2.2-2.8 mm, outer and inner tepals of similar dimensions, 0.5-1.0 x 0.8-1.5 mm, all tepals at least partly pubescent on both the inner and outer surfaces. Anthers 6, glabrous, uniform, about 0.4-0.6 x 0.6-0.9 mm, opening inwards and sideways, filaments glabrous or hairy, 0.1-0.3 mm long; glands absent, staminodes undifferentiated, 6, hairy, outer 0.5-0.9 mm long, inner 0.3-0.7 mm long. Ovary glabrous, 0.4-0.8 x 0.4-0.7 mm, style glabrous, 0.2-1.2 mm long. Fruits black when ripe but brownish before maturity, wider than long, 45-65 mm long and 48-71 x 36-55 mm along the longer and shorter horizontal axes, mesocarp + exocarp 1.5-5.5 mm thick, endocarp 1.8-3.5 mm thick. Seed

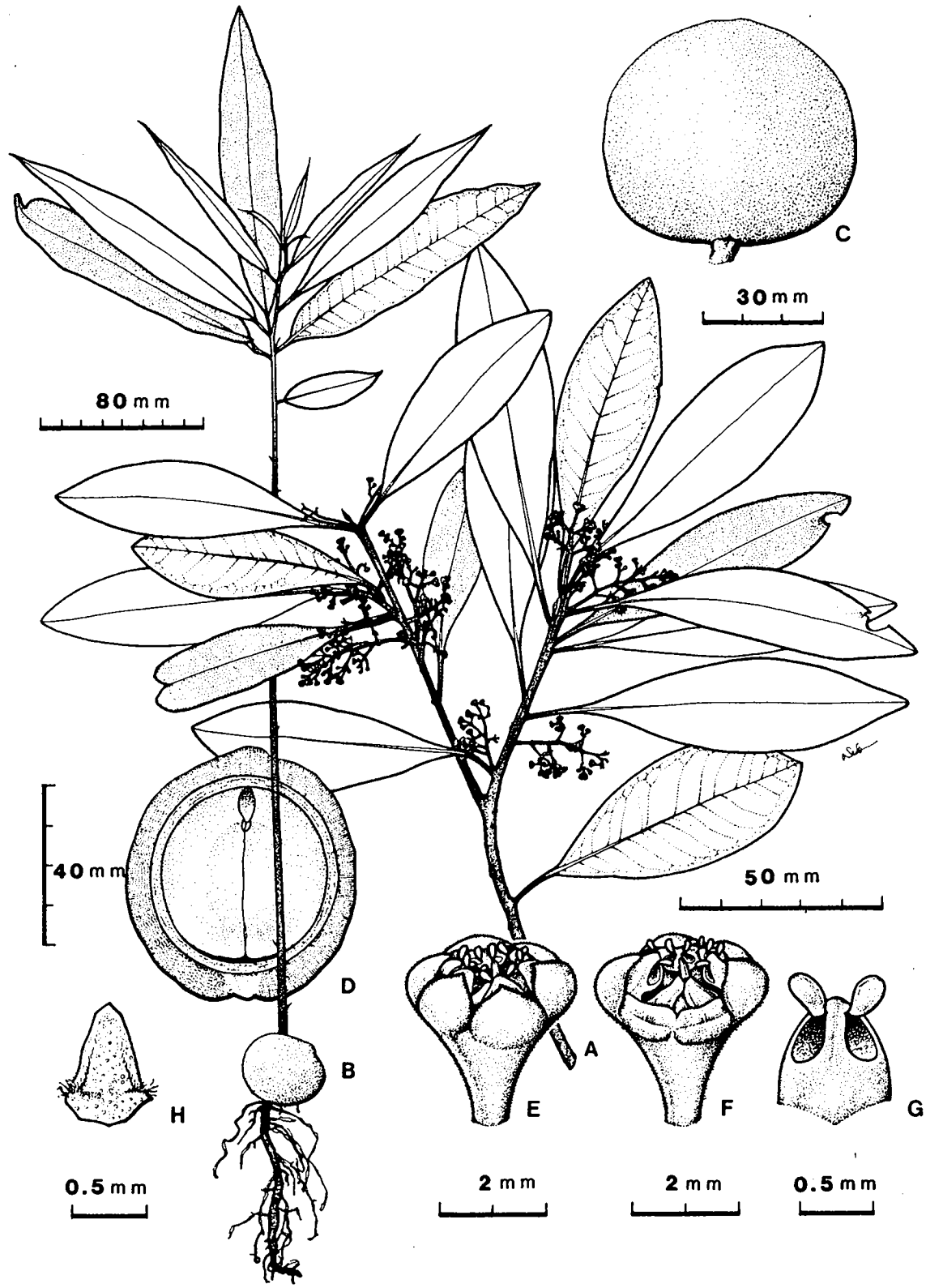

Fig.3. Beilschmiedia castrisinensis. A Habit Hyland 12861; B seedling, C fruit, D fruit (LS) Gray 3210; E flower, F flower (side view with 2 tepals and 2 anthers removed), G anther (adaxial view), H staminode Hyland 12861.

33-45 mm long and 39-60 x 28-40 mm along the longer and shorter horizontal axes, testa 0.1-1.0 mm thick, radicle apical or almost at the apex. Cotyledons cream, sometimes slightly yellowish. Seedling leaves glaucous on the underside. (Figs 3, 68 C-D)

Distribution (Fig. 89, Map 7)

Ecology

Rain forests of northern Queensland, generally on soils derived from metamorphic rocks. Altitudinal range: Sea level to 660 m.

Uses

This species has only recently been distinguished and has not been recognized commercially. Wood S.G. 0.87.

Notes and Observations

Flowers have been collected in September, November and December, while ripe fruits have been collected in June, August, September, November and December. Seedling germination period 17-50 days.

Etymology

The specific epithet was chosen because this species was first collected near an old mining area called China Camp.

Specimens Examined (21 collections examined)

4. Beilschmiedia collina B. Hyland sp. nov.
Differt a B. obtusifolia laminis subtus albis vel glaucis.
Typus: B. Hyland 9186: State Forest Reserve 144, 18.xi.1976 (holotypus QRS).
Differs from B. obtusifolia in the leaves being white or glaucous on the underside.

Tree to 30 m tall x 80 cm dbh, usually medium sized and well formed. Stem usually without buttresses, but occasionally buttressed in larger size classes. Bark flaky or nondescript, rarely fissured, outer blaze usually cream or brown, rarely pink, granular in texture. Twigs terete or angular in section, clothed in straight, pale brown, appressed hairs when young but almost glabrous when older. Leaves: Underside glaucous, clothed in straight, pale brown, appressed hairs. Leaf blade lanceolate or narrowly obovate, apex obtuse, acute or acuminate, base attenuate, 5.0-15.0 x 1.5-4.5 cm (mean 9.6 x 3.1); penninerved, primary veins 6-10 pairs (mode 8), midrib raised or flush with the upper surface; petiole 6-23 mm long (mean 11.7), channelled on the upper surface. Inflorescence paniculate, approximating or exceeding the leaves, axillary and pseudoterminal; bracts linear, about 1.0 mm long, deciduous, absent at anthesis. Flowers cream, creamy green, unpleasantly perfumed, opening quite widely but the tepals remaining ± erect at anthesis. Pedicel 0.5-2.9 x 0.5-0.9 mm. Perianth tube 0.0-0.6 x 1.3-2.2 mm, outer and inner tepals of similar dimensions, 1.1-1.5 x 0.7-1.0 mm, all tepals pubescent on both their inner and outer surfaces. Outer anthers pubescent, particularly abaxially, 0.5-0.8 x 0.5-0.7 mm, filaments villous, 0.2-0.5 mm long; glands absent. Inner anthers pubescent, particularly adaxially, 0.5-0.6 x 0.4-0.5 mm, filaments villous, 0.5-0.8 mm long; each filament with 2 very shortly stalked glands at the base. Gland heads mainly glabrous, 0.4-0.5 x 0.4-0.5 mm, stalk villous, 0.2-0.3 mm long; staminodes differentiated, head cordate, pubescent abaxially, particularly towards the base, less pubescent adaxially, 0.5-0.8 mm long, filament villous, 0.1-0.3 mm long. Ovary glabrous, sessile or very shortly stalked, 0.4-0.8 x about 0.5-0.6 mm, style glabrous,

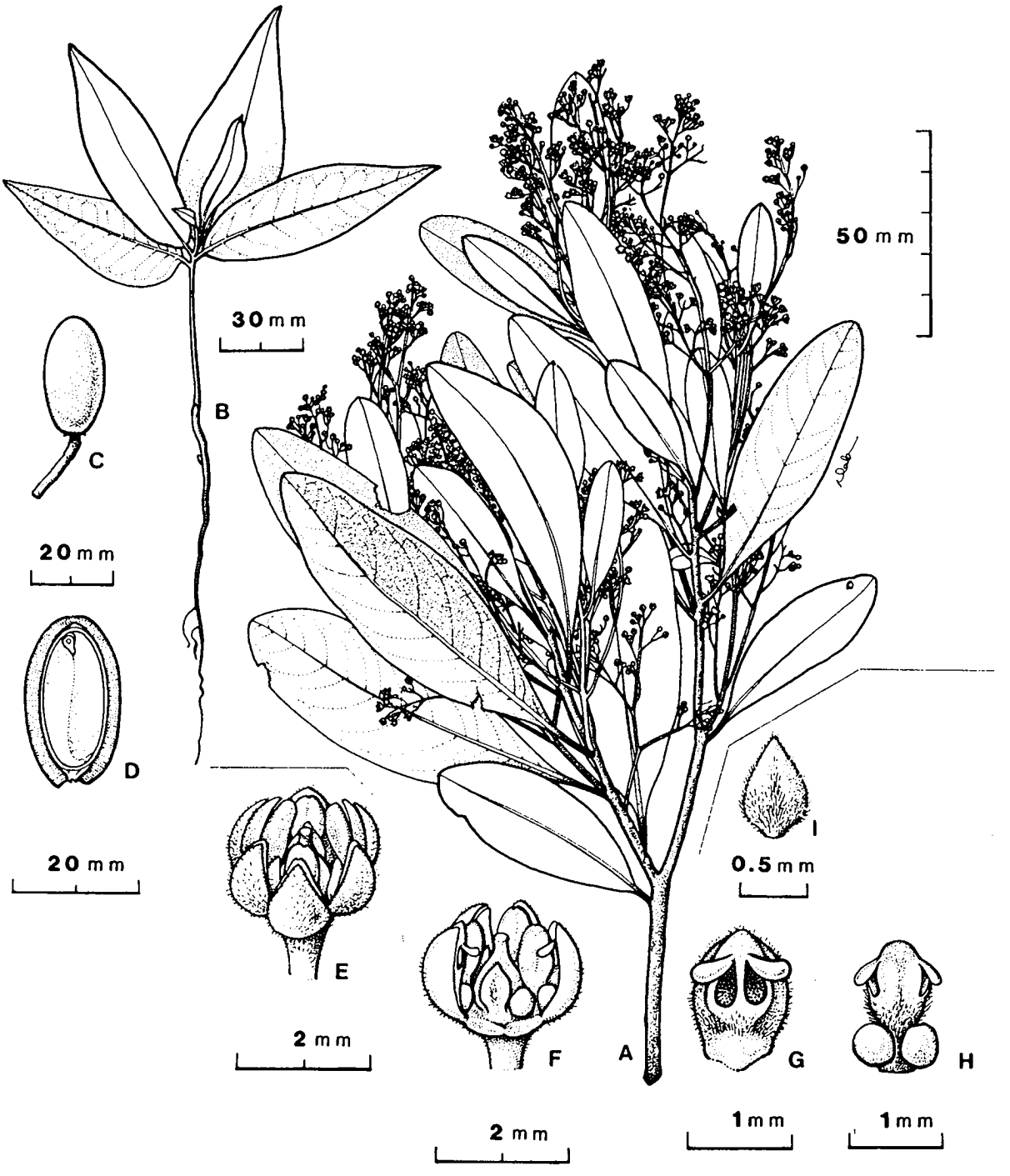

Fig.4. Beilschmiedia collina. A Habit Hyland 9186; B seedling, C fruit, D fruit (LS) Irvine 399; E flower, F flower (side view, 2 tepals and 2 anthers removed), G stamen and tepal (outer whorl, adaxial view), H stamen (inner whorl, abaxial view), I staminode (abaxial view) Hyland 5715.

0.1-0.5 mm long. Fruits black or purplish black when ripe, ellipsoid, 20-23 x 12-13 mm, mesocarp + exocarp 1.2-1.8 mm thick, endocarp 0.3-0.4 mm thick. Seed 15-19 x 9-13 mm, testa 0.1-0.5 mm thick, radicle apical. Cotyledons cream. Seedling leaves glaucous on the underside. (Figs 4, 68 E-F)

Distribution (Fig. 88, Map 6)

Ecology

Rain forests of northern and central Queensland, particularly in mountain rain forests, on soils derived from granite. Altitudinal range: 350-1200 m.

Uses

This species produces millable logs but they are seldom harvested as this species is not highly regarded in the timber trade. Standard Trade Name - Blush Walnut. Wood S.G. 0.9.

Notes and Observations

Flowers have been collected in November and December, while ripe fruits have been collected in August, November, December and January, but mostly in November. Seedling germination period 20-55 days.

Etymology

The specific epithet was chosen because this species is most frequently found in mountain rain forests.

Specimens Examined (85 collections examined)

5. **Beilschmiedia elliptica** C. White & Francis, Queensl. Dept. Agric. Bot. Bull. 22:28 (1920); Francis, Austral. Rain-Forest Trees ed.2:123 (1951); Floyd N.S.W. Rainforest Trees Part 1, ed.2:15 (1979); Stanley & Ross, Flora of south-eastern Queensland 1:164 (1983).
Lectotype (here designated): W.D. Francis, Kin Kin (BRI 10068); (A, BRI 291001, K, MEL 565989, QRS, isotypes).
Syntypes: W.R. Petrie, Fraser Island (BRI 10066).
C.T. White, Kin Kin (BRI 10067).

Tree to 35 m tall x 90 cm dbh, usually medium sized and well formed. Stem buttressed in the larger but not the smaller size classes. Bark nondescript, rarely flaky, outer blaze cream or brown, usually the latter on larger trees, granular in texture. Twigs terete, clothed in straight, pale brown, appressed hairs when young but becoming almost glabrous when older. Leaves: Underside green, clothed in straight, white or pale brown, appressed hairs when young but soon becoming almost completely glabrous. Leaf blade ovate, elliptical or lanceolate, apex acuminate or acute, base attenuate or cuneate, 8.0-13.0 x 2.0-4.0 cm (mean 9.4 x 3.1); penninerved, primary veins 6-10 pairs (mode 8), midrib usually raised on the upper surface; petiole 5-11 mm long (mean 6.4), channelled on the upper surface. Inflorescence paniculate, approximating the leaves, axillary and pseudoterminal; bracts lanceolate, about 0.9-1.0 mm long, deciduous, absent at anthesis. Flowers cream?, perfume unknown, opening fairly widely but the tepals remaining ± erect at anthesis. Pedicel about 1.2 x 0.7-0.8 mm. Perianth tube 0.4-0.6 x 1.3-1.8 mm, outer tepals 1.8-2.0 x 1.2-1.3 mm, inner tepals 2.3-2.4 x 1.2-1.4 mm, all tepals pubescent on both their inner and outer surfaces. Outer anthers glabrous, 0.7-0.9 x about 0.7 mm, filaments hairy, 0.7-0.8 mm long; glands absent. Inner anthers glabrous, 0.5-0.7 x 0.4-0.5 mm, filaments hairy, 0.8-0.9 mm long; each filament with 2 stalked glands at the base. Gland heads glabrous, 0.4-0.5 x about 0.6 mm, stalk

hairy, 0.2- 0.4 mm long; staminodes differentiated, head glabrous, rhomboidal or cordate, 0.5-0.6 mm long, filament hairy, 0.2-0.3 mm long. Ovary glabrous, sessile, about 0.9 x 0.7-0.8 mm, style glabrous, 0.8-1.0 mm long. Fruits glaucous over a black epidermis when ripe, globular, about 12 mm diam., exocarp, mesocarp and endocarp thicknesses unknown. Seed 8-10 mm diam., testa thickness and radicle position unknown. Cotyledon colour unknown. Seedling characteristics unknown.

Distribution (Fig. 88, Map 1)

Ecology

Rain forests of northern New South Wales and southern Queensland. Altitudinal range: Sea level to 300 m.

Uses

This species grows large enough to produce millable logs but it is of infrequent occurrence and is seldom utilized. Standard Trade Name - Grey Walnut. Wood S.G. 0.82.

Notes and Observations

Flowers have been collected in September and Floyd (1979) has recorded the flowering period as August to October and the fruiting period from February to April. Seedling germination period unknown.

Specimens Examined (46 collections examined)

6. Beilschmiedia obtusifolia (F. Muell. ex Meissner) F. Muell., Syst. census Austral. pl. 3 (1882); Bailey, Queensl. fl. 4:1303 (1901); Francis, Austral. Rain-Forest Trees ed.2:123 (1951); Floyd, N.S.W. Rainforest Trees Part 1, ed.2:18

(1979); Stanley & Ross, Flora of south-eastern Queensland 1:164 (1983).

Cryptocarya obtusifolia F. Muell. ex Meissner in DC., Prodr. 15(1):508 (1864).

Nesodaphne obtusifolia (F. Muell. ex Meissner) Benth., Fl. austral. 5:299 (1870).

Type: F. Mueller (probably H. Beckler), Clarence River (G-DC holotype) (H. Beckler 18 MEL 582460, MEL 1517120-1, K, isotypes?).

Cryptocarya glaucescens var. reticulata Meissner in DC., Prodr. 15(1):73 (1864) syn. nov..

Type: C. Moore 5, New South Wales (K).

Tree to 35 m tall x 80 cm dbh, frequently medium sized and well formed. Stem sometimes buttressed in the larger size classes, but without buttresses in the smaller. Bark usually flaky or nondescript, occasionally fissured, outer blaze cream, pink or brown, usually granular in texture. Twigs terete, clothed in straight, pale brown, appressed hairs when young but glabrous when older. Leaves: Underside green and glabrous, clothed in straight, white or pale brown, appressed hairs, only when very young. Leaf blade lanceolate or narrowly obovate, apex acute to obtuse, base attenuate, 7.0-17.0 x 2.0-6.0 cm (mean 11.5 x 4.0); penninerved, primary veins 8-13 pairs (mode 10), midrib raised or flush with the upper surface; petiole 5-22 mm long (mean 10.2), flat or channelled on the upper surface. Inflorescence paniculate, exceeding the leaves, axillary and pseudoterminal; bracts triangular, linguiform or linear 0.5-1.0 mm long, present or absent at anthesis. Flowers usually described as cream, occasionally creamy green or yellowish, unpleasantly perfumed, opening quite widely but the tepals remaining ± erect at anthesis. Pedicel 0.2-1.8 x 0.5-0.7 mm. Perianth tube 0.5-0.9 x 1.4-2.0 mm, outer tepals 1.1-1.5 x 1.0-1.4 mm, inner tepals usually longer, 1.1-1.7 x 1.1-1.5 mm, all tepals pubescent on both the inner and outer surfaces. Outer anthers pubescent, 0.6-0.9 x 0.7-1.0 mm, filaments villous, 0.3-0.6 mm long; glands absent. Inner anthers pubescent,

0.4-0.8 x 0.5-0.7 mm, filaments villous, 0.5-0.8 mm long; each filament with 2 extremely shortly stalked glands at the base. Gland head glabrous, 0.5-0.9 x 0.5-0.8 mm, stalk villous, from less than 0.1 mm to 0.3 mm long; staminodes differentiated, pubescent, particularly abaxially, towards the base, 0.6-0.9 mm long, filament villous, 0.2-0.4 mm long. Ovary glabrous, sessile, 0.5-0.9 x 0.5-0.8 mm, style glabrous, 0.5-0.8 mm long. Fruits black when ripe, sometimes glaucous, ellipsoid, 18-24 x 11-15 mm, mesocarp + exocarp 0.4-2.1 mm thick, endocarp 0.3-0.7 mm thick. Seed 14-20 x 8-10 mm, testa from less than 0.1 mm to 0.3 mm thick, radicle apical. Cotyledons cream. Seedling leaves green on the underside.

Distribution

Eastern Australia (Fig. 88, Map 2), also in New Guinea.

Ecology

Rain forests of eastern Australia from New South Wales to Cape York, on soils derived from a variety of rock types but reaching its best development in gallery forests on alluvium. Altitudinal range: Sea level to 800 m.

Uses

This species produces millable logs and the sawn timber is marketed as Blush Walnut, a useful general purpose timber. Wood S.G. 0.69-0.77.

Notes and Observations

Specimens at QRS show that flowers have been collected in November

and each month from February to June, while ripe fruits have been collected each month from July to November, but mostly in October.

However, Floyd (1979) who studied New South Wales trees, concluded that the main flowering period was in October and November and that fruits ripened in the period between January and July. Seedling germination period 20-65 days.

Beilschmiedia obtusifolia appears to extend into New Guinea but has been identified as B. morobensis Kosterm. or B. aruensis Kosterm. Other possible synonyms include B. acutifolia Teschn.

Specimens Examined (154 collections examined)

7. Beilschmiedia oligandra L.S. Smith, Proc. Roy. Soc. Queensland 70:28 (1959).
Type: K.J. White 1288, State Forest Reserve 310 Gadgarra, Swiper's Logging Area (BRI holotype, A, AFO, K, isotypes).

Tree to 30 m tall x 70 cm dbh, usually medium sized and well formed. Stem usually buttressed. Bark nondescript, sometimes flaky, outer blaze usually pink, occasionally cream or brown, granular in texture, rarely fibrous. Twigs terete, glabrous, clothed in straight, appressed, brown or pale brown hairs only when very young. Leaves: Underside green or slightly glaucous, glabrous or clothed in straight, appressed, pale brown hairs. Leaf blade elliptical, lanceolate, apex acute or bluntly pointed, base attenuate, 7.5-12.2 x 2.7-4.8 cm (mean 9.9 x 4.0); penninerved, primary veins 8-12 pairs (mode 10), midrib raised or flush with the upper surface; petiole 8-24 mm long (mean 15.6), flat on the upper surface. Inflorescence racemose, paniculate,

not exceeding the leaves, axillary; bracts lanceolate, 0.8-1.1 mm long, deciduous, absent at anthesis. Flowers cream to cream-green, without any obvious perfume, opening widely, the outer tepals becoming almost horizontal at anthesis. Pedicel 0.7-1.6 x 0.8-1.0 mm. Perianth tube 0.2-0.6 x 2.5-3.2 mm, outer tepals 2.0-2.5 x 2.1-2.8 mm, inner tepals of similar length but narrower 1.8-2.2 x 1.5-1.8 mm, hairs usually present on the inner surface but the outer surface of all tepals often glabrous. Anthers glabrous, ± uniform in length but the outer usually wider, outer 0.7-0.9 x 1.1-1.6 mm, inner 0.7-1.0 x 1.0-1.4 mm, opening inwards and sideways, filaments glabrous, 0.8-1.4 mm long; anther glands absent; staminodes undifferentiated, usually 3, glabrous, 2.0-2.5 mm long, 2 gland-like structures normally present at the base of each staminode, each about 0.4-0.9 x 0.5-0.8 mm; additional staminodes (if present), about 1.8 mm long. Ovary glabrous, sessile, 1.0-1.3 x 0.9-1.2 mm, style glabrous, 0.6-1.0 mm long. Fruits black, sometimes blue-black or purplish black, usually globular, sometimes ellipsoid, wider than long or laterally compressed, 37-54 x 34-42 mm diam., or 50 mm wide in the case of laterally compressed fruits, mesocarp + exocarp 1.0-4.9 mm thick, endocarp 0.6-2.0 mm thick. Seed 30-45 x 25-34 mm diam., or 38 mm wide in the case of laterally compressed fruits, testa 0.1-0.9 mm thick, radicle apical. Cotyledons orange or apricot in colour. Seedling leaves green or glaucous on the underside. (Fig. 69 A-B)

Distribution (Fig. 89, Map 8)

Ecology

Rain forests of northern Queensland, on soils derived from a variety of rock types. Altitudinal range: 60-720 m.

Uses

This species produces millable logs and the timber is marketed as Ivory Walnut. Wood S.G. 0.75-0.85.

Notes and Observations

Flowers have been collected in October and November, while fruits have been collected each month from June to October. Seedling germination period 26-55 days.

Specimens Examined (36 collections examined)

8. Beilschmiedia peninsularis B. Hyland sp. nov.
Differt a B. elliptica tepalis minus quam 1.5 mm longis.
Typus: B. Hyland 11572: Tozers Gap, 23.i.1982 (holotypus QRS).
Differs from B. elliptica, the tepals being less than 1.5 mm long.

Tree to 20 m tall x 70 cm dbh, usually medium sized and well formed. Stem without buttresses. Bark flaky or nondescript, outer blaze usually pink or red, occasionally brown, granular in texture. Twigs terete, glabrous. Leaves: Underside green, clothed in straight, white or pale brown, appressed hairs when young, but glabrous at maturity. Leaf blade lanceolate, elliptical, obovate or narrowly obovate, apex obtuse or acute, base attenuate, 6.0-13.0 x 2.0-4.0 cm (mean 7.6 x 2.8); penninerved, primary veins 7-13 pairs (mode 9), midrib raised on the upper surface; petiole 3-11 mm long (mean 6.5), flat or channelled on the upper surface. Inflorescence paniculate, approximating or exceeding the leaves, axillary and pseudoterminal; bracts linear, triangular or lanceolate 0.7-1.1 mm long, deciduous, absent at anthesis. Flowers cream, unpleasantly perfumed, opening

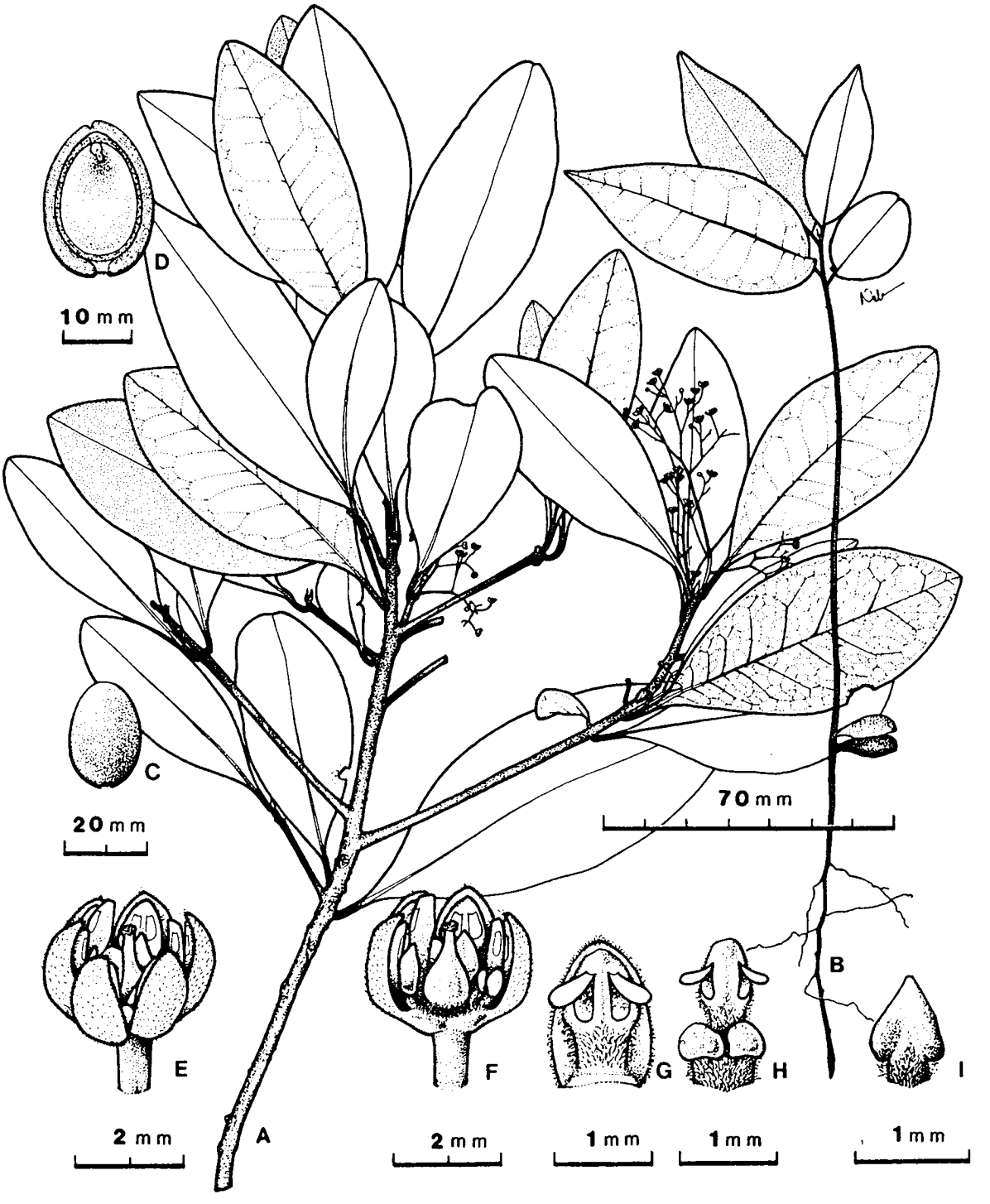

Fig.5. Beilschmiedia peninsularis. A Habit Hyland 11572; B seedling, C fruit, D fruit (LS) Hyland 3611 RFK; E flower (oblique view), F flower (oblique view, 2 tepals and 2 stamens removed), G stamen and tepal (outer whorl, adaxial view), H stamen (inner whorl, showing glands, abaxial view), I staminode (adaxial view) Hyland 11572.

quite widely but the tepals remaining ± erect at anthesis. Pedicel 2.4-3.1 x 0.5-0.6 mm. Perianth tube 0.4-0.6 x 1.4-2.0 mm, outer tepals 1.1-1.4 x about 0.9 mm, inner tepals wider,1.2-1.4 x about 1.1 mm, all tepals pubescent on both their inner and outer surfaces. Outer anthers pubescent, particularly towards the base, 0.6-0.7 x 0.6-0.7 mm, filaments villous, about 0.5 mm long; glands absent. Inner anthers pubescent, particularly abaxially, 0.5-0.6 x about 0.4 mm, filaments villous, 0.6-1.0 mm long; each filament with 2 shortly stalked glands at the base. Gland head mainly glabrous, 0.4-0.8 x 0.4-1.2 mm, stalk villous, 0.3-0.7 mm long; staminodes differentiated, head ± sagittate, pubescent, particularly abaxially and towards the base, about 0.6 mm long, filament villous, 0.2-0.4 mm long. Ovary glabrous, sessile, 0.6-0.8 x 0.6-0.7 mm, style glabrous, 0.5-0.7 mm long. Fruits blue-black or glaucous black when ripe, ellipsoid, 20-28 x 13-15 mm, mesocarp + exocarp 0.4-1.2 mm thick, endocarp 0.5-0.6 mm thick. Seed 16-20 x 11-12 mm, testa 0.1 mm thick, radicle apical. Cotyledons cream. Seedling leaves green on the underside. (Fig. 5)

Distribution (Fig. 89, Map 8)

Ecology

Rain forests of Cape York Peninsula, particularly on soils derived from granite. Altitudinal range: Sea level to 600 m.

Uses

This species grows large enough to produce millable logs, but because it grows in remote areas the timber has never been utilized and has not been given a Standard Trade Name. Wood S.G. 0.96-0.98.

Notes and Observations

Flowers have been collected in January and March, while ripe fruits have been collected in October and November. Seedling germination period about 20-50 days.

This species is closely related to B. elliptica but the two are separated by a gap of more than 10^{o} in latitude.

Etymology

This species has only been found in a few localities on Cape York Peninsula and the specific epithet was chosen because of this.

Specimens Examined (28 collections examined)

9. Beilschmiedia recurva B. Hyland sp. nov.
Differt a speciebus ceteris margine foliae basi recurvata.
Typus: B. Gray 276: Massey Ck, Ravenshoe-Millaa Millaa Rd, 1.ii.1977 (holotypus QRS).
Differs from other species, the margin being recurved at the base.

Tree to 35 m tall x 90 cm dbh, usually medium to large and well formed. Stem usually buttressed in the larger but not the smaller size classes. Bark flaky or nondescript, often pale brown in colour, outer blaze cream, brown or pink in colour, usually granular in texture. Twigs angular in section, clothed in straight, pale brown, appressed hairs when very young, but glabrous when mature. Leaves: Underside green or slightly glaucous, clothed in straight, white or pale brown, appressed hairs when young but almost glabrous at maturity. Leaf blade oblong or elliptical, apex obtuse to shortly acuminate, base truncate to attenuate, margin usually recurved close to the base, 6.9-12.7 x 2.7-5.3 cm (mean 10.4 x 4.1); penninerved,

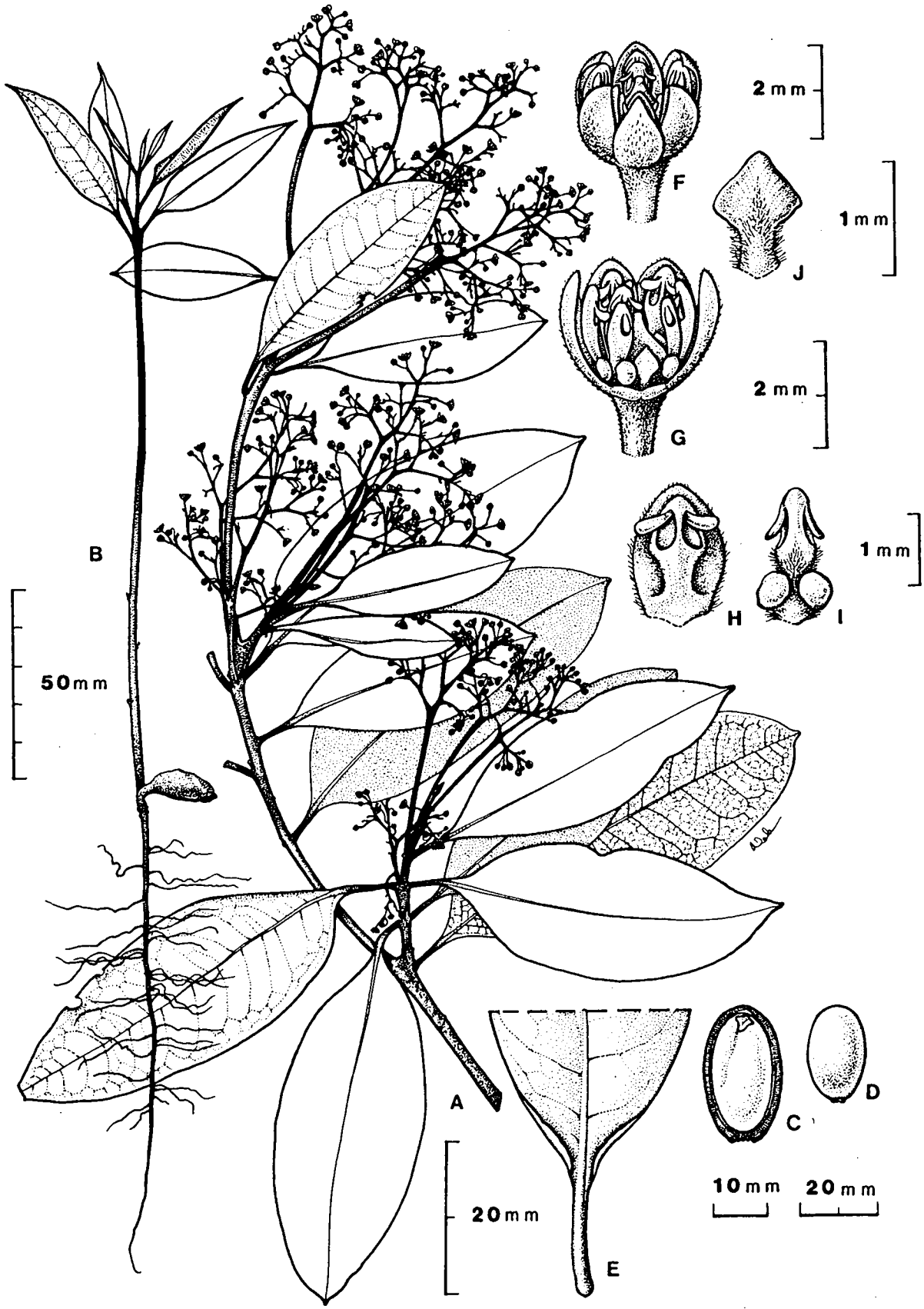

Fig.6. Beilschmiedia recurva. A Habit Gray 276; B seedling, C fruit (LS), D fruit Gray 643; E leaf base showing recurved margins, F flower (oblique view), G flower (side view, 2 tepals and 2 stamens removed), H stamen and tepal (outer whorl, adaxial view), I stamen and glands (inner whorl, abaxial view), J staminode (abaxial view) Gray 276.

primary veins 7-12 pairs (mode 10), midrib raised or flush with the upper surface; petiole 8-22 mm long (mean 13.9), channelled on the upper surface. Inflorescence paniculate, exceeding the leaves, axillary and pseudoterminal; bracts triangular, 0.4-1.0 mm long, deciduous, absent at anthesis. Flowers cream, yellowish or pale green, perfumed, odour variable, pleasant or unpleasant, flowers not opening very widely, the tepals remaining ± erect at anthesis. Pedicel 1.1-2.4 x 0.7-0.8 mm. Perianth tube 0.3-0.8 x 1.7-2.0 mm, outer tepals 1.1-1.8 x 0.9-1.4 mm, inner tepals of similar length but slightly wider, 1.2-1.8 x 1.0-1.6 mm, all tepals pubescent on the outer surface and usually also on the inner. Outer anthers glabrous at the apex but hairy towards the base, 0.7-0.9 x 0.5-0.8 mm, filaments villous, 0.4-0.7 mm long; glands absent. Inner anthers glabrous at the apex but hairy towards the base, 0.6-0.8 x 0.4-0.6 mm, filaments villous, 0.5-1.0 mm long; each filament with 2 stalked glands at the base. Gland head mainly glabrous, 0.4-0.6 x 0.5-0.7 mm, stalks usually villous, 0.2-0.5 mm long; staminodes differentiated, head mainly glabrous but hairy towards the base, (apex mucronate), staminodes 0.3-0.5 mm long, filament villous, about 0.3-0.6 mm long. Ovary sessile, glabrous, 0.6-0.8 x 0.7-1.0 mm, style glabrous, 0.3-0.7 mm long. Fruits black when ripe, usually ellipsoid, rarely globular, 23-32 x 15-21 mm, mesocarp + exocarp 0.4-0.7 mm thick, endocarp 0.6-0.9 mm thick. Seed 20-26 x 12-17 mm, testa 0.1-0.4 mm thick, radicle apical. Cotyledons cream. Seedling leaves green or slightly glaucous on the underside. (Fig. 6)

Distribution (Fig. 88, Map 5)

Ecology

Rain forests of northern Queensland, on soils derived from a variety of rock types. Altitudinal range: 150-1200 m.

Uses

This species produces millable logs but they are seldom harvested as the species is not highly regarded in the timber trade. Standard Trade Name - Ivory Walnut. Wood S.G. 0.58-0.66.

Notes and Observations

Flowers have been collected in January, February and March, while ripe fruits have been collected each month from August to December. Seedling germination period 12-40 days.

Beilschmiedia recurva may extend into New Guinea although it might have been confused with specimens of the closely related B. acutifolia Teschn.

Etymology

The specific epithet refers to the section of recurved margin usually found on the lamina, distal to its junction with the petiole.

Specimens Examined (67 collections examined)

10. Beilschmiedia tooram (Bailey) B. Hyland comb. nov.
Endiandra tooram Bailey, Queensl. fl. 4:1308 (1901)
basionym.
Type: J.F. Bailey, Middle Tully River (BRI 8802 holotype).

Tree to 30 m tall x 40 cm dbh, usually small to medium sized and well formed. Stem buttressed in the larger, but not the smaller size classes. Bark nondescript, occasionally flaky, outer blaze red,

sometimes pink or brown, granular in texture. Twigs terete, clothed in tortuous, erect, brown hairs. Leaves: Underside green or slightly glaucous, clothed in tortuous, erect, brown hairs when young but almost glabrous when older. Leaf blade elliptical, lanceolate, obovate to almost spathulate, apex acute, bluntly pointed, rounded, base narrowly cuneate, 6.5-21.0 x 2.5-7.0 cm (mean 13.3 x 4.1); penninerved, primary veins 7-16 pairs (mode 12), midrib raised on the upper surface; petiole 6-18 mm long (mean 10.8), flat or ridged on the upper surface. Inflorescence paniculate, not exceeding the leaves, axillary and pseudoterminal; bracts lanceolate 0.8-1.7 mm long, deciduous, usually absent at anthesis. Flowers cream, greenish yellow or creamy green, without any obvious perfume, flowers quite broad (wider than long without the pedicel) but not opening very widely, the tepals ± clasping the anthers at anthesis. Pedicel 0.8-3.6 x 0.4-0.6 mm. Perianth tube 0.3-0.9 x 1.4-1.9 mm. Outer and inner tepals of similar dimensions, 0.5-1.0 x 0.7-1.3 mm, glabrous outside but hairs sometimes present on the inner surface. Anthers glabrous, sessile, (6 in perfect flowers but sometimes reduced to 4 or 5 in other flowers), opening inwards and sideways, 0.5-0.9 x 0.7-1.2 mm. Glands absent. Staminodes usually 3, undifferentiated, 0.5-0.8 mm long, margins ciliate. Ovary glabrous, sessile, 0.5-1.0 x 0.4-0.9 mm, style glabrous, 0.5-1.0 mm long. Fruits black or blue-black when ripe, globular, laterally compressed, 36-55 mm long and 35-55 x 22-35 mm along the longer and shorter horizontal axes, mesocarp + exocarp 2.2-5.1 mm thick, endocarp 0.6-2.0 mm thick. Seed 25-33 mm long and 30-35 x 17-22 mm, along the longer and shorter horizontal axes, testa 0.1-0.3 mm thick, radicle apical or near the apex. Cotyledons cream or orange. Seedling leaves green? on the underside. (Fig. 69 C-D)

Distribution (Fig. 88, Map 4)

Ecology

Rain forests of northern Queensland on soils derived from a variety of rock types. Altitudinal range: 60-1080 m.

Uses

This species scarcely grows large enough to produce millable logs but it has been included with a few other species under the Standard Trade Name of Brown Walnut. Wood S.G. 0.85-0.97.

Notes and Observations

Flowers have been collected each month from November to February, while ripe fruits have been collected each month from August to December. Seedling germination period 18-22 days.

Specimens Examined (59 collections examined)

11. Beilschmiedia volckii B. Hyland sp. nov.
Differt a B. castrisinensis, laminis majoribus et staminodiis brevis.
Typus: A. K. Irvine 464: Boonjee, Timber Reserve 1230, 15.ii.1973 (holotypus QRS).
Differs from B. castrisinensis, leaves larger and staminodes short.

Tree to 35 m tall x 120 cm dbh, usually large and well formed. Stem usually buttressed in all size classes, occasionally without buttresses. Bark nondescript, occasionally slightly flaky, outer blaze pink, red, brown, rarely cream, granular in texture. Twigs ± terete, clothed in straight, appressed, pale brown hairs when young but almost glabrous when older. Leaves: Underside green and glabrous,

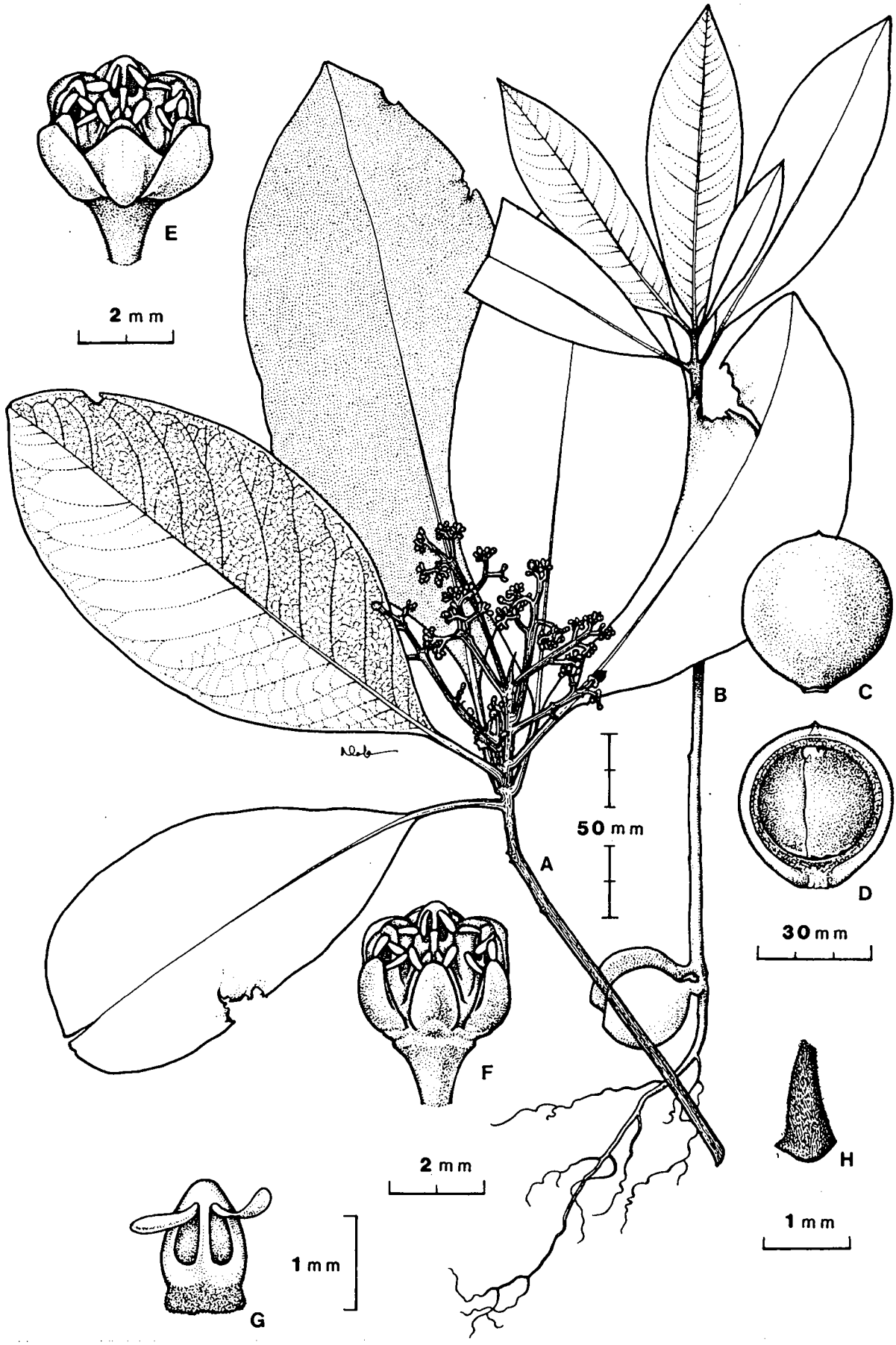

Fig.7. Beilschmiedia volckii. A Habit Irvine 464; B seedling, C fruit, D fruit (LS) Irvine 411; E flower, F flower (side view, 3 tepals removed), G stamen (adaxial view), H staminode (abaxial view) Irvine 464.

clothed in straight, appressed, pale brown hairs only when young. Leaf blade lanceolate, elliptical, obovate, apex acute to rounded, base attenuate, 12.0-27.0 x 6.5-11.0 cm (mean 17.8 x 8.4); penninerved, primary veins 8-14 pairs (mode 11), midrib slightly depressed or flush with the upper surface; petiole 11-38 mm long (mean 23.6), flat on the upper surface. Inflorescence paniculate, axillary and pseudoterminal; bracts navicular, 1.3-1.9 mm long, deciduous, absent at anthesis. Flowers cream, pale green or brownish green, pleasantly perfumed or without any obvious perfume, opening fairly widely, but the tepals remaining ± erect at anthesis. Pedicel 0.7-2.5 x 0.8-1.0 mm. Perianth tube 0.5-1.0 x 1.9-2.5 mm. Outer and inner tepals of similar dimensions, 0.7-1.3 x 1.5-1.9 mm, densely hairy on both the inner and outer surfaces. Anthers 6, usually glabrous, or with hairs on the abaxial surface, 0.6-0.9 x 0.5-0.8 mm, opening inwards, filaments hairy, 0.1-0.3 mm long; glands absent; staminodes 6, undifferentiated, dimorphic, densely hairy, large staminodes 1.0-1.2 mm long, smaller staminodes 0.5-0.7 mm long. Ovary glabrous, sessile, 0.7-1.0 x 0.7-1.0 mm, style glabrous, 0.8-1.3 mm long. Fruits black or purplish black, globular, 45-67 x 43-65 mm, mesocarp + exocarp 2.3-7.5 mm thick, endocarp 1.7-2.7 mm thick. Seed 32-55 x 32-44 mm, testa (not clearly defined, difficult to distinguish from the endocarp) 0.2-0.4 mm thick, radicle apical. Cotyledons purplish or burgundy in colour. Seedling leaves green on the underside. (Figs 7, 69 E-F)

Distribution (Fig. 88, Map 1)

Ecology

Rain forests of northern Queensland, mainly on soils derived from

basalt. Altitudinal range: 300-700 m.

Uses

This species produces millable logs and the sawn timber is of high quality and is marketed as Boonjee Blush Walnut, a useful cabinet timber. Wood S.G. 0.53-0.56.

Notes and Observations

Flowers have been collected in December, January and February, while ripe fruits have been collected in October, November and December. Seedling germination period 18-65 days.

Etymology

It gives me great pleasure to name this species after Mr H.E. Volck, formerly Silvicultural Research Officer with the Queensland Department of Forestry, at Atherton.

Specimens Examined (33 collections examined)

2.Cinnamomum Schaeffer (nom. cons.)

Cinnamomum Schaeffer, Bot. Exped. 74 (1760).
Type: C. zeylanicum Garcin. ex Blume, Bijdr. 568 (1826).
[According to Howard (1981) and Backer & Bakhuizen van den Brink (1968), C. zeylanicum is antedated C. verum J.S. Presl, Priroz. Rostlin. 2:36, 37-44, t.7 (1825).]

[For extra-Australian synonyms see Kostermans (1957 & 1986)].

Trees, sometimes large. Twigs usually ± sericeous (at least when young), occasionally completely glabrous. Leaves opposite, petiolate, minutely oil-dotted, often triplinerved (at least near the base). Inflorescence paniculate, axillary and pseudoterminal. Flowers

bisexual, 3-merous, tepals 3 + 3 (sometimes ± persistent on the fruit), stamens 6 introrse + 3 extrorse, 4-locular, staminodes 3, ovary ± sessile, stigma cumuloid or infundibuliform (Fig. 70). Fruits superior, seated in a cup which surrounds the lower part of the fruit, mesocarp fleshy, endocarp thin. Seed: Testa thin, radicle apical, cotyledons distinct from one another, uniform in texture. Seedling leaves spirally arranged, cataphylls present.

Distribution

A genus of about 250 species occurring in Asia, Malesia, Australia, Pacific Islands and perhaps in South and Central America.

Keys to the Species of Cinnamomum

Flowering Material

1a. Leaves mostly triplinerved 2

b. Leaves mostly penninerved 4

2a. Leaves green on the underside . . . . . .C. baileyanum

b. Leaves glaucous or slightly glaucous on the underside 3

3a. Leaf blade more than 3 times as long as wide . . . . . .C. laubatii

b. Leaf blade less than 3 times as long as wide . . . . . .C. propinquum

4a. Tepals more than 4mm long . . . . . .C. virens

b. Tepals less than 4mm long . . . . . C. oliveri

Fruiting Material

1a. Cup obviously lobed at the apex 2

b. Cup entire at the apex 3

2a. Bark and twigs emitting a strong peppery odour when cut. All leaves obviously triplinerved . . . . . .C. propinquum

b. Bark and twigs emitting an odour like a mixture of sarsaparilla and menthol or a spicy odour but seldom peppery. Some leaves not obviously triplinerved . . . C. baileyanum

3a. Cup longitudinally ribbed near the apex. Carpels less than 12 mm diam. when ripe . . . . .C. virens

b. Cup without longitudinal ribs near the apex. Carpels more than 12 mm diam. when ripe 4

4a. Leaves triplinerved and usually slightly glaucous on the underside. Bark and twigs emitting a peppery odour when cut . . . . . C. laubatii

b. Leaves penninerved and green on the underside. Bark and twigs emitting a fragrant odour when cut . . . . . .C. oliveri

1. **Cinnamomum baileyanum** (F. Muell. ex Bailey) Francis, Austral. Rain-forest Trees ed.2:118 (1951); Stanley & Ross, Flora of south-eastern Queensland 1:162 (1983); Kosterm., Ginkgoana 6:158 (1986).
Persea baileyana F. Muell. ex Bailey, Syn. Queensl. fl. Suppl. 2:51 (1888); Bailey, Queensl. fl. 4:1310 (1901).
Type: H. St John Wood, Frazer's Island (MEL 80306 holotype, MEL 80307 isotype, BRI 222165 isotype?).

Tree to 20 m tall x 40 cm dbh, usually small and well formed. Stem buttressed in the larger but not the smaller size classes. Bark flaky or nondescript, often marked by conspicuous lenticels, outer blaze usually pink or reddish, fibrous or granular in texture, emitting a conspicuous odour when cut, the odour often being described as a mixture of sarsaparilla and menthol but other odours also recorded e.g. pepper, cinnamon, aniseed and nutmeg. Twigs 4-angled and clothed in straight, white or pale brown appressed hairs when young but terete and glabrous at maturity. Leaves: Underside green, clothed in straight, white or pale brown, appressed hairs when young but almost glabrous at maturity. Leaf blade narrowly elliptical, elliptical or oblong, apex acute, obtuse or rounded, base cuneate, 5.0-13.0 x 2.0-5.2 cm (mean 9.5 x 3.4); usually 3-veined, primary veins 3-8 pairs (mode 5), midrib ± flush with the upper surface; petiole 6-15 mm long (mean 9.7), channelled on the upper surface. Inflorescence paniculate, approximating the leaves, axillary and terminal; bracts navicular, 0.8-2.7 mm long, deciduous, absent at anthesis. Flowers cream, faintly but pleasantly perfumed, opening quite widely but the tepals remaining ± erect at anthesis. Pedicel 5.5-5.7 x 0.8-0.9 mm. Perianth tube 1.3-1.9 x 2.4-2.6 mm, outer and inner tepals of similar dimensions, 4.5-5.3 x 2.3-2.8 mm, all tepals densely sericeous on both the inner and outer surfaces. Outer anthers mainly glabrous, except for hairs towards the base, about 1.5 x

1.0-1.3 mm, opening inwards, filaments sericeous, 1.5-2.1 mm long, glands absent. Inner anthers glabrous at the apex but sparsely sericeous towards the base, 1.3-1.4 x 0.8-1.0 mm, opening outwards and sideways, filaments sparsely sericeous, 1.5-2.7 mm long, each filament with 2 glands near the base. Gland heads glabrous, 0.9-1.3 x 0.8-0.9 mm, stalks hairy, 0.4-0.6 mm long. Staminodes differentiated, head ± sagittate, 0.7-0.9 mm long, mainly glabrous, filament 0.7-1.1 mm long, glabrous adaxially but sericeous abaxially. Ovary sessile, glabrous, about 1.3-1.9 x 1.1 mm, style glabrous, about 3.0 mm long, stigma ± cumuloid. Fruits: Carpel black or glaucous black when ripe, ellipsoid, 18-20 x 10-13 mm, pericarp 1.9-2.1 mm thick. Cup 14-20 x 9.5-12.5 mm, lobed at the apex. Seed 13-14.5 x 7.3-8.5 mm, testa 0.8-0.9 mm thick, radicle close to the apex. Cotyledons cream. Seedling leaves usually spirally arranged.

Distribution (Fig. 89, Map 10)

Ecology

Rain forests of southern and northern Queensland, but not known from central Queensland. Found on soils derived from a variety of rock types but generally on the poorer soils. Altitudinal range: Sea level to 550 m.

Uses

This species seldom grows large enough to produce millable logs and as it is of infrequent occurrence, has seldom been utilized. However, it has been given the Standard Trade Name of Brown Bollywood. Wood S.G. 0.56-0.70.

Notes and Observations

Collections of this species are few in number and generally of poor quality. Flowers have been collected in March and May, but mature fruits are seldom collected, the only collections which I have examined, being from cultivated trees which were fruiting in November and December.

Some specimens in RSA, collected in Luzon and labelled C. mercadoi Vid., have similar leaves and fruiting calyces.

It is possible that the northern and southern forms differ at the species level, but better material of both forms is needed before this can be definitely established. Until this material becomes available I prefer to place all specimens in C. baileyanum.

Specimens Examined (33 collections examined)

2. Cinnamomum laubatii F. Muell., Fragm. Phytogr. Austral. 5:165 (1866); Francis, Austral. Rain-Forest Trees ed.2:401 (1951); Kosterm., Ginkgoana 6:159 (1986).
Type: J. Dallachy, Rockingham Bay (MEL 80321 holotype, A, BO, K, MEL 80320, isotypes).
[C. tamala auct. non Nees (1836): Benth., Fl. austral. 5:303 (1870); Bailey, Queensl. fl. 4:1309 (1901).]

Tree to 35 m tall x 80 cm dbh, usually medium sized and well formed. Stem usually buttressed in all but the smallest classes. Bark usually flaky or nondescript, outer blaze cream, pink or brown, usually granular in texture, occasionally fibrous, emitting a conspicuous peppery odour when cut. Twigs 4-angled when young but terete when older, clothed in straight, white or pale brown, appressed hairs when young but glabrous when older. Leaves: Underside slightly glaucous, clothed in straight, white or pale brown, appressed hairs.

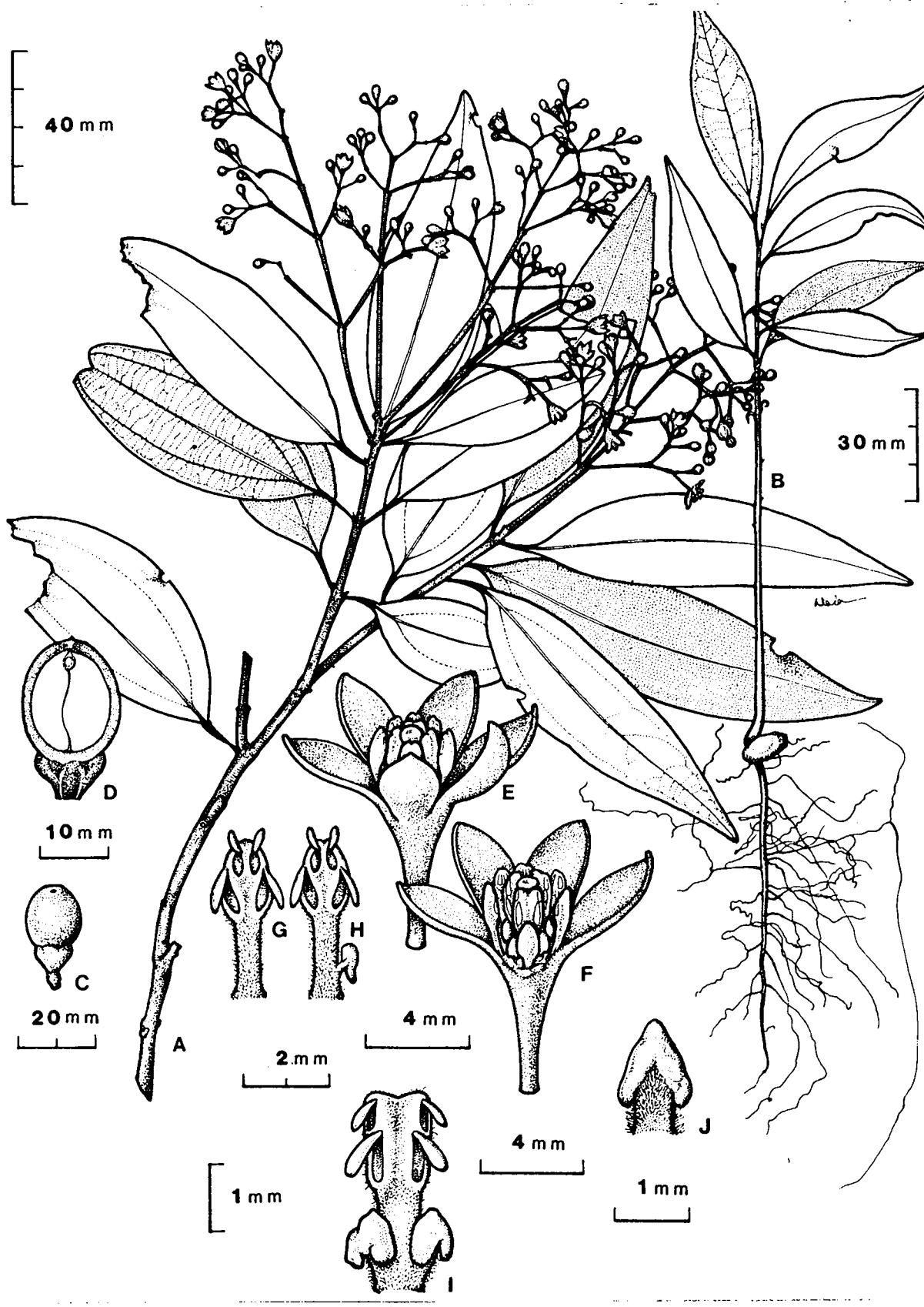

Fig.8. Cinnamomum laubatii. A Habit Gray 315; B seedling, C fruit, D fruit (LS) Stocker 1596; E flower, F flower (side view, 2 tepals removed), G stamen (outer whorl, adaxial view), H stamen (outer whorl showing a single gland), I stamen (inner whorl, abaxial view), J staminode (adaxial view) Gray 315.

Leaf blade lanceolate, apex acuminate, base cuneate, attenuate or shortly attenuate, 8.0-14.5 x 2.0-4.0 cm (mean 11.1 x 3.0); 3-veined, primary veins 3-6 pairs (mode 5), midrib flush with the upper surface; petiole 5-15 mm long (mean 9.9), flat or channelled on the upper surface. Inflorescence paniculate, approximating or exceeding the leaves, axillary and pseudoterminal; bracts triangular to navicular, about 2.0 mm long, deciduous, absent at anthesis. Flowers cream or pale green, pleasantly perfumed, opening quite widely, the tepals becoming ± horizontal at anthesis. Pedicel 4.5-7.0 x 0.9-1.3 mm. Perianth tube about 2.0-2.4 x 2.8-3.3 mm, outer and inner tepals of similar dimensions, 3.5-4.8 x 2.4-2.9 mm, all tepals densely sericeous on both the inner and outer surfaces. Outer anthers sericeous on both surfaces, 1.5-1.8 x 1.0-1.3 mm, opening inwards, filaments sericeous, 1.0-1.8 mm long, with or without 1 or 2 glands near the base. Inner anthers sericeous on both surfaces, 1.3-1.5 x 0.8-0.9 mm, opening outwards and sideways, filaments sericeous, 1.1-1.8 mm long, each filament with 2 glands near the base. Inner anther gland heads glabrous, 0.9-1.0 x 0.7-0.9 mm, stalks sericeous, 0.5-0.8 mm long. Staminodes differentiated, head sagittate, 1.0-1.2 mm long, sericeous abaxially, filament sericeous, 0.7-1.0 mm long. Ovary sessile, glabrous, 1.6-1.7 x 1.3-1.5 mm, style glabrous, 2.2-3.0 mm long, stigma infundibuliform. Fruits: Carpel black when ripe, ellipsoid, 16-22 x 13-14 mm, pericarp 1.4-1.7. mm thick. Cup 8-13 x 9-11 mm, entire at the apex. Seed 13-17 x 10-11 mm, testa about 0.1 mm thick, radicle close to the apex. Cotyledons white or cream. Seedling leaves spirally arranged, slightly glaucous on the underside. (Figs 8, 70 A-B)

Distribution (Fig. 89, Map 11)

Ecology

Rain forests of northern Queensland on soils derived from a variety of rock types. Altitudinal range: Sea level to 1200 m.

Uses

This species produces millable logs and the sawn timber is marketed as Pepperwood, a useful general purpose timber. Wood S.G. 0.46-0.48.

Notes and Observations

Flowers have been collected in February, March, April and June, while ripe fruits have been collected in September, October and November. Seedling germination period 19-34 days.

Specimens Examined (70 collections examined)

3. Cinnamomum oliveri Bailey, Queensl. Dept. Agric., Bot. Bull. 5:24 (1892); Bailey, Queensl. fl. 4:1308 (1901); Francis, Austral. Rain-Forest Trees ed.2:113 (1951); Beadle et al., Flora of the Sydney Region 152 (1972); Floyd, N.S.W. Rainforest Trees Part 1, ed.2:21 (1979); Stanley & Ross, Flora of south-eastern Queensland 1:162 (1983); Kosterm., Ginkgoana 6:150 (1986).
Type: F.M. Bailey?, J.D. Low?, Maroochie (BRI 23599 holotype).
Cryptocarya glaucescens var. camphorata Meissner in DC., Prodr. 15(1): 73 (1864).
Cryptocarya camphorata (Meissner) Domin, Biblioth. Bot. 89:121 (1925).
Type: W. Macarthur 201, Illawarra (K holotype).

Tree to 25 m tall x 80 cm dbh, usually medium sized and well formed. Stem usually buttressed, occasionally without buttresses. Bark flaky or nondescript, rarely otherwise, outer blaze cream or brown, usually granular in texture, occasionally fibrous, usually emitting a conspicuous odour when cut. Twigs terete, glabrous.

Leaves: Underside green or glaucous, glabrous. Leaf blade lanceolate, apex acuminate, acute or obtuse, base attenuate or shortly attenuate, 8.5-17.0 x 2.0-5.2 cm (mean 11.5 x 3.2); penninerved, primary veins 6-15 pairs (mode 9), midrib raised on the upper surface; petiole 4-13 mm long (mean 8.5), flat or channelled on the upper surface. Inflorescence paniculate, usually exceeding the leaves, axillary and pseudoterminal; bracts lanceolate to navicular, 1.5-1.9 mm long, deciduous, absent at anthesis. Flowers cream?, pleasantly perfumed, opening widely, the tepals becoming ± horizontal at anthesis. Pedicel 4.4-5.0 x about 1.0 mm. Perianth tube 2.1-2.3 x 2.6-2.9 mm, outer and inner tepals of similar dimensions, 3.0-4.1 x 2.2-2.3 mm, all tepals ± sericeous adaxially and tomentose abaxially. Outer anthers mainly glabrous with a few hairs towards the base, 1.3-1.4 x about 0.9 mm, opening inwards, filaments tomentose, 1.2-2.2 mm long, glands absent. Inner anthers mainly glabrous abaxially but ± villous adaxially particularly towards the base, about 1.1-1.4 x 0.8-0.9 mm, opening outwards and sideways, filaments ± villous, 1.2-2.9 mm long, each filament with 2 glands near the base. Gland heads glabrous, 0.9-1.0 x about 0.8 mm, stalks ± villous, about 0.6-1.1 mm long. Staminodes differentiated, head sagittate adaxially, about 0.8-1.1 mm long, glabrous, filaments villous, 0.6-1.1 mm long. Ovary sessile, glabrous, 1.3-1.5 x 0.9-1.0 mm, style glabrous, 2.3-2.9 mm long, stigma infundibuliform. Fruits: Carpel black or blue-black when ripe, ellipsoid, about 18 x 14 mm, pericarp about 1.0 mm thick. Cup about 13 x 10 mm, entire at the apex. Seed about 14 x 11 mm, testa about 0.2 mm thick, radicle apical. Cotyledons cream. Seedling leaves spirally arranged, green or slightly glaucous on the underside.

Distribution (Fig. 89, Map 9)

Ecology

Rain forests of eastern Australia from southern New South Wales to Cape York Peninsula in Queensland on soils derived from a variety of rock types. Altitudinal range: Sea level to 1000 m.

Uses

This species produces millable logs and the sawn timber is marketed as Camphorwood, a useful general purpose timber. Wood S.G. 0.56-0.66.

Notes and Observations

Flowers have been collected in October, while ripe fruits have been collected in October, November and December. However, Floyd (1979) in studying the southern populations found that the main fruiting time was in March. Seedling germination period 24-40 days.

Specimens Examined (85 collections examined)

4. Cinnamomum propinquum Bailey, [Queensl. Dept. Agric., Bot. Bull. 5:25 (1892) (nomen provisorium)]; Bailey, Queensl. fl. 4:1309 (1901); Kosterm., Ginkgoana 6:156 (1986).
Type: S. Johnson, Mount Bartle Frere (BRI 11116 holotype, K, MEL 80315-6, isotypes).

Tree to 12 m tall x 30 cm dbh, usually a small and stunted tree. Stem usually without buttresses. Bark flaky or nondescript, outer blaze pink, occasionally reddish, usually granular in texture, emitting a conspicuous peppery odour when cut. Twigs 4-angled when young but terete when older, clothed in straight, white or pale brown hairs when young, but glabrous when older. Leaves: Underside slightly glaucous, clothed in straight, white or pale brown appressed hairs

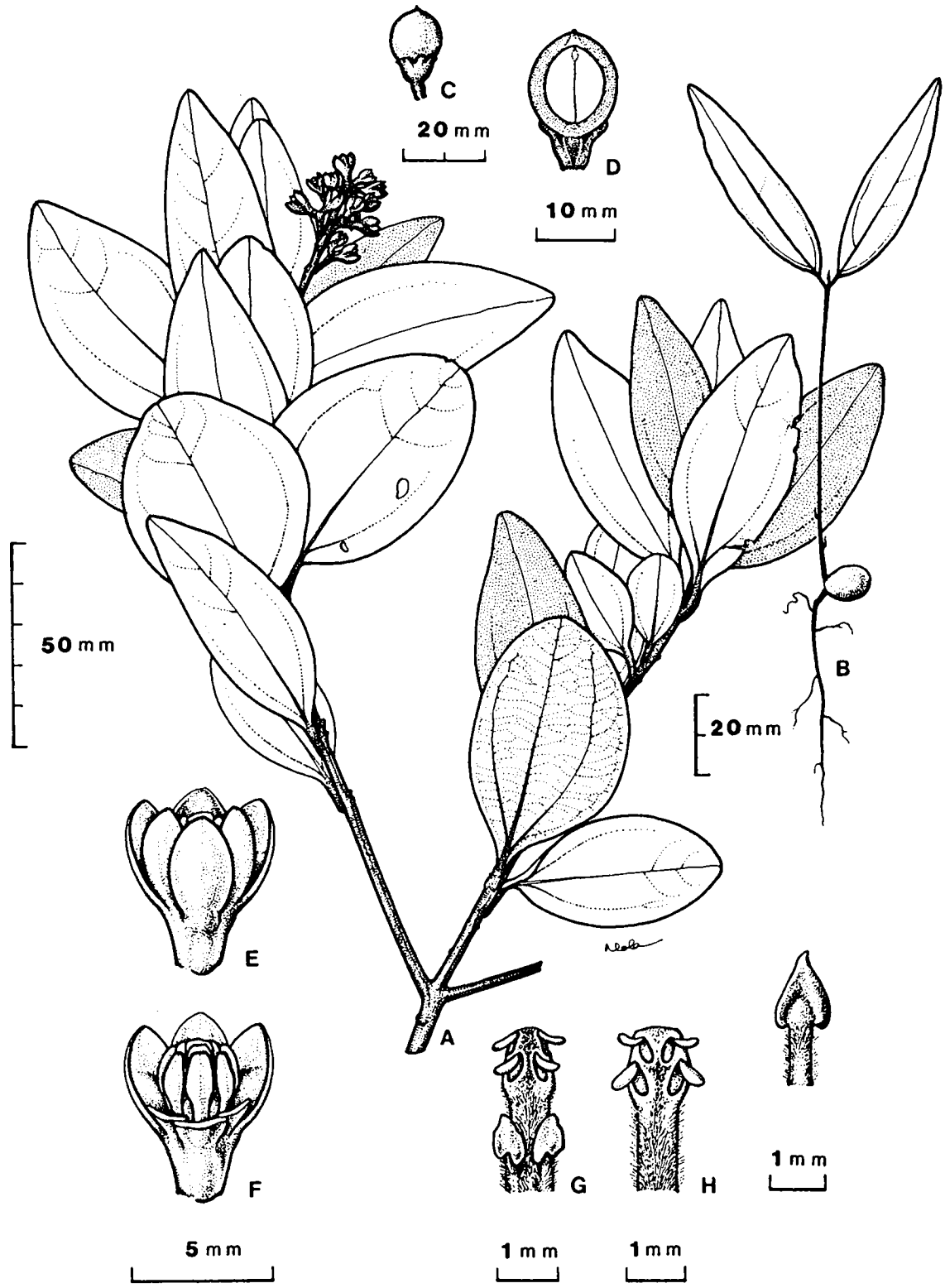

Fig.9. Cinnamomum propinquum. A Habit Hyland 6577; B seedling, C fruit, D fruit (LS) Gray 921; E flower, F flower (side view, 3 tepals removed), G stamen (inner whorl, abaxial view showing glands), H stamen (outer whorl, adaxial view), I staminode (adaxial view) Hyland 6577.

when young but eventually becoming almost glabrous. Leaf blade ovate, apex acute, base shortly attenuate, 5.0-9.5 x 2.0-3.5 cm (mean 6.6 x 2.5); 3-veined (at least at the base), primary veins 3-7 pairs (mode 5), midrib raised on the upper surface; petiole 5-10 mm long (mean 7.7), flat or channelled on the upper surface. Inflorescence paniculate, approximating or exceeding the leaves, axillary and pseudoterminal; bracts navicular, 2.0-2.5 mm long, deciduous, absent at anthesis. Flowers cream or creamy green, pleasantly perfumed, opening widely but the tepals remaining ± erect at anthesis. Pedicel 3.0-3.5 x about 1.3 mm. Perianth tube 0.7-0.9 x about 3.0 mm, outer and inner tepals of similar dimensions, 3.5-5.0 x 2.1-3.5 mm, all tepals sericeous on both their inner and outer surfaces. Outer anthers sericeous on both surfaces (more so abaxially), 1.4-1.9 x about 1.2 mm, opening inwards, filaments sericeous, 1.6-1.7 mm long, glands absent. Inner anthers sericeous adaxially but almost glabrous abaxially, 1.1-1.8 x 0.9-1.0 mm, opening outwards and sideways, filaments sericeous, 1.6-2.3 mm long, each filament with 2 glands halfway between the base and the apex. Gland heads glabrous, 1.1-1.2 x 0.8-1.0 mm, stalks sericeous, 0.4-0.9 mm long. Staminodes differentiated, head ± sagittate, about 1.4 mm long, partly sericeous abaxially, filament sericeous, 0.8-0.9 mm long. Ovary sessile, glabrous, 1.6-1.7 x 1.2-1.4 mm, style glabrous, 2.0-2.6 mm long, stigma cumuloid. Fruits: Carpel blue-black or purplish black when ripe, globular or ellipsoid, about 13.5 x 11.5 mm, pericarp about 1.7 mm thick. Cup about 7 x 9.5 mm, lobed at the apex. Seed about 9 x 7 mm, testa about 0.15 mm thick, radicle apical or close to the apex. Cotyledons white. Seedling leaves slightly glaucous on the underside. (Fig.9)

Distribution (Fig. 89, Map 10)

Ecology

A rare species found only on the summit regions of Mt Bartle Frere and Mt Bellenden Ker, growing in stunted montane rain forest on soils derived from granite. Altitudinal range: 1450-1550 m.

Uses

This species does not grow large enough to produce millable logs and consequently has no commercial value. Wood S.G. 0.85.

Notes & Observations

Flowers have been collected in October and November, while ripe fruits have been collected in March. Very few fertile collections have been made and it is possible that the flowering and fruiting times will be extended as a result of further collecting. Seedling germination period about 20-25 days.

The limited observations made to date indicate that the populations on top of Bartle Frere and Bellenden Ker flower at slightly different times. Kostermans has included two specimens from the Lake Wissel region of New Guinea in this species. The specimens certainly resemble C. propinquum closely and, if correctly placed, extend the species range considerably.

Specimens Examined (31 collections examined)

5. **Cinnamomum virens** R. Baker, Proc. Linn. Soc. New South Wales 22:282 (1897); Francis, Austral. Rain-Forest Trees ed.2:118 (1951); Floyd, N.S.W. Rainforest Trees Part 1, ed. 2:24 (1979); Stanley & Ross, Flora of south-eastern

Queensland 1:162 (1983); Kosterm., Ginkgoana 6:153 (1986).
Lectotype (here designted): W. Baeuerlen, Tintenbar (NSW), (BRI 222405, MEL 80329, 80330 , K, L, isotypes).
Syntypes: W. Baeuerlen, Dunoon (NSW 137927).
W. Baeuerlen, Mullumbimby (n.v.)
W. Baeuerlen, Gonellah (n.v.)

Tree to 30 m tall x 60 cm dbh, usually medium sized and well formed. Stem usually without buttresses. Bark usually nondescript, outer blaze pink, granular in texture, emitting a peppery? odour. Twigs ± terete, clothed in mainly straight, white or pale brown, appressed and erect hairs when young but glabrous when older. Leaves: Underside green, clothed in straight, white or pale brown, appressed hairs when very young but glabrous at maturity. Leaf blade ovate, narrowly elliptical, apex acute, base truncate to shortly attenuate, 4.5-9.0 x 1.5-3.0 cm (mean 7.2 x 2.3), predominantly penninerved (often slightly triplinerved at the base), primary veins 5-11 pairs (mode 9), midrib depressed or flush with the upper surface; petiole 4-7 mm long (mean 5.4), channelled on the upper surface. Inflorescence paniculate, approximating or exceeding the leaves, axillary and pseudoterminal; bracts navicular, 2.1-2.8 mm long, deciduous, absent at anthesis. Flowers pale green, strongly perfumed, opening fairly widely, but the tepals remaining ± erect at anthesis. Pedicel 0.0-1.9 x 1.2-1.3 mm. Perianth tube 1.0-2.1 x 2.8-3.0 mm. Outer and inner tepals of similar dimensions, about 5.0-6.0 x 1.5-2.6 mm, all tepals densely sericeous on both the inner and outer surfaces. Outer anthers sparsely sericeous on both surfaces, 1.3-1.7 x 0.9-1.0 mm, opening inwards, filaments sericeous, 0.8-2.0 mm long, glands absent. Inner anthers ± glabrous abaxially but sericeous adaxially, 1.3-1.5 x 0.8-0.9 mm, opening outwards and sideways, filaments sericeous, 1.3-2.4 mm long, each filament with 2 glands near the base. Gland heads glabrous, about 1.0 x 0.8-0.9 mm, stalks

sericeous, 0.5-1.2 mm long. Staminodes differentiated, head ± sagittate, 1.0-1.1 mm long, filament sericeous, 0.7-1.2 mm long, with or without 1-2 glands near the apex. Ovary sessile, glabrous, 1.4-1.9 x 1.2-1.4 mm, style mainly glabrous (sparsely hairy towards the apex), 1.7-3.0 mm long, stigma cumuloid. Fruits: Carpel black when ripe, ellipsoid, 12-15 x 9.5-11.0 mm, pericarp 1.6-1.8 mm thick. Cup 11-12 x 10-11 mm, entire at the apex. Seed 9.0-10.5 x 5.5-8.0 mm, testa 0.05-0.1 mm thick, radicle apical. Cotyledons white or cream. Seedling leaves green on the underside.

Distribution (Fig. 89, Map 11)

Ecology

Rain forests of northern New South Wales and the southernmost parts of Queensland on soils derived from a variety of rock types. Altitudinal range: Sea level to 1400 m.

Uses

This species produces millable logs and the sawn timber is marketed as Camphorwood, a useful general purpose interior wood. Wood S.G. 0.56.

Notes & Observations

Flowers have been collected in March, while ripe fruits have been collected in August. However, Floyd (1979) in his studies of Lauraceae has recorded flowering from February to July and ripe fruits from August to November. Seedling germination period 15-30 days. Tree dimensions are from Floyd (1979).

Specimens Examined (53 collections examined)

3.Cryptocarya R. Br.

Cryptocarya R. Br., Prodr. 402 (1810).
Lectotype: C. glaucescens R. Br. (vide Kostermans, Not. Syst. 8:112 (1939)).
Caryodaphne Blume ex Nees, Syst. laur. 225 (1836).
Lectotype: C. laevigata (Blume) C.G.D. Nees (vide Kostermans, J. Sci. Res. (Jakarta) 1:122 (1952)).
Pseudocryptocarya Teschner, Bot. Jahrb. Syst. 58:411 (1923).
Type: P. pauciflora (Lauterbach et K. Schumann) Teschner.

[For further extra-Australian synonyms see Kostermans (1957)].

Trees, often quite large or occasionally down to shrub size. Twigs ± sericeous to villous or glabrous. Leaves petiolate, minutely oil-dotted, penninerved or triplinerved, spirally arranged. Inflorescence usually paniculate and pseudoterminal, sometimes racemose or almost cymose and axillary. Flowers bisexual, 3-merous, tepals 3 + 3, stamens 6 introrse + 3 extrorse, 2-locular, staminodes 3, ovary ± sessile, stigma usually inconspicuous (Figs 70, 71). Fruits inferior, variable in size, up to 50 mm diameter, pedicel not swollen or cup-like, mesocarp usually fleshy, endocarp usually thin but occasionally thick and woody particularly in the larger fruited species. Seed: Radicle usually apical, occasionally lateral, cotyledons either ruminate and as a consequence ± fused or uniform in texture and distinct from one another. Seedling: First pair of leaves opposite or spirally arranged, cataphylls present or absent.

Distribution

A pantropic genus of 200-250 species occurring in Africa, Asia, Malesia, Australia, Pacific Islands, and South America.

Keys to the Species of Cryptocarya

Flowering Material

1a. Foveoles present, quite conspicuous on the underside of the lamina . . . . . .C. foveolata

b. Foveoles absent 2

2a. Perianth tube short, 0.3-0.7 mm long. Perianth not enclosing the ovary . . . . . C. oblata

b. Perianth tube long, 0.8-2.7 mm long. Perianth tube enclosing the ovary 3

3a. Lower half of the perianth tube pubescent on the inner surface. 4

b. Lower half of the perianth tube glabrous on the inner surface 44

4a. Leaves triplinerved 5

b. Leaves penninerved 15

5a. Flowers emitting an unpleasant odour. 6

b. Flowers without an odour or emitting a pleasant odour. 8

6a. Style pubescent. Ovary pubescent. . . . . C. smaragdina

b. Style glabrous. Ovary glabrous. 7

7a. Leaf blade 3.4-5.4 cm long. Young twigs clothed in straight and tortuous, erect and appressed hairs. . . . . .C. bellendenkerana

b. Leaf blade 6.5-15.5 cm long. Young twigs clothed in straight, appressed hairs. . . . . .C. grandis

8a. Lamina glaucous on the underside 9

b. Lamina green on the underside 10

9a. Midrib depressed or flush with the upper surface of the lamina. . . . . C. densiflora

b. Midrib raised on the upper surface . . . . . .C. exfoliata

10a. Primary veins (not the basal pair) subtend an angle of more than 45^{o} with the midrib. . . . . C. pleurosperma

b. Primary veins (not the basal pair) subtend an angle of less than 45^{o} with the midrib. 11

11a. Mature twigs glabrous (or almost glabrous). . . . . .C. clarksoniana

b. Mature twigs hairy. 12

12a. Twig hairs all erect. . . . . .C. triplinervis var. pubens

b. Twig hairs appressed (occasionally some also erect). 13

13a. Perianth tube 1.0-1.4 mm long. . . . . .C. exfoliata

b. Perianth tube 1.4-2.7 mm long. 14

14a. Underside of the lamina clothed in straight, white, appressed hairs when young but often glabrous at maturity. . . . . C. triplinervis var. riparia

b. Underside of the lamina clothed in straight, white, appressed, persistent hairs. . . . C. triplinervis var. triplinervis

15a. Midrib raised on the upper surface 16

b. Midrib depressed or flush with the upper surface 22

16a. Flowers malodorous 17

b. Flowers pleasantly perfumed or without any obvious perfume. 18

17a. Twig hairs straight and appressed. Hairs on the underside of the leaf blade straight and appressed. . . . . .C. lividula

b. Twig hairs tortuous and erect. Hairs on the underside of the leaf

blade straight and appressed. . . . . C. obovata

18a. Primary vein angle more than 45°.
Primary veins forking and forming
definite loops well inside the blade margin. 19

b. Primary vein angle less than 45°.
Primary veins curving inside the
blade margin but not forming definite loops. 20

19a. Petiole 5-13 mm long.
Cape York Peninsula. . . . . .C. claudiana

b. Petiole 4-6 mm long.
Southern Queensland. . . . . C. sclerophylla

20a. Outer tepals 1.1-1.4 mm long. . . . . .C. clarksoniana

b. Outer tepals 1.5-2.1 mm long. 21

21a. Ovary 0.7-0.9 mm long. . . . . .C. exfoliata

b. Ovary 1.0-1.4 mm long. . . . .C. triplinervis var. riparia

22a. Lamina green on the
underside 23

b. Lamina white or glaucous
on the underside. 29

23a. Tepals glabrous on the abaxial surface
(somtimes sparsely hairy). . . . . C. meissneriana

b. Tepals obviously pubescent on the
abaxial surface 24

24a. Twig hairs straight. 25

b. Many twig hairs tortuous. 27

25a. Flowers unpleasantly perfumed. . . . . C. lividula

b. Flowers without any obvious
odour. 26

26a. Outer tepals 1.5-2.1 mm
long.
Mature twigs pubescent. . . . C. triplinervis var. riparia

b. Outer tepals 1.1-1.4 mm long.
Mature twigs almost glabrous. . . . . .C. clarksoniana

27a. Underside of the lamina
clothed in erect hairs. . . . .C. triplinervis var. pubens

b. Underside of the lamina
clothed in appressed hairs. 28

28a. Twigs fluted.
Style glabrous or sparsely pubescent . . . . C. hypospodia

b. Twigs angular
Style pubescent . . . . . .C. angulata

29a. Tepals glabrous on the
abaxial surface . . . . . .C. meissneriana

b. Tepals pubescent on the abaxial
surface 30

30a. Inflorescence hairs more than
0.4 mm long. 31

b. Inflorescence hairs less than
0.4 mm long. 32

31a. Petiole 7-14 mm long.
Primary veins 5-10 pairs.
Inflorescence approximating or exceeding
the leaves. . . . . .C. putida

b. Petiole 4-7 mm long.
Primary veins 3-4 pairs.
Inflorescence not exceeding
the leaves. . . . . C. bellendenkerana

32a. Abaxial surface of the tepals
clothed in erect, tortuous hairs 33

b. Abaxial surface of the tepals
clothed in appressed, usually
straight, occasionally tortuous hairs. 36

33a. Reticulate veins not raised on the
underside of the lamina.
Lateral veins 4-9 pairs 34

b. Reticulate veins conspicuously raised
on the underside of the lamina.
Lateral veins 6-14 pairs 35

34a. Leaf blade oblong or obovate, apex
obtuse or rounded.
Floral bracts 0.6-1.5 mm long, present
or absent at anthesis.
Inner surface of the perianth tube
pubescent from the base to the apex . . . . . C. obovata

b. Leaf blade elliptical or ovate, apex
acute or obtuse.
Floral bracts 0.4-0.6 mm long, absent
at anthesis.
Inner surface of the perianth tube
pubescent only near the apex . . . . . C. hypospodia

35a. Style 1.1-1.4 mm long.
Petiole 7-13 mm long. . . . . C. brassii

b. Style 0.7-1.2 mm long.
Petiole 11-21 mm long . . . . . C. mackinnoniana

36a. Twig hairs erect 37

b. Twig hairs appressed 39

37a. Leaves more than 8.0 cm long.
Inflorescence paniculate, exceeding
the leaves . . . . . .C. brassii

b. Leaves 3.0-6.0 cm long.
Inflorescence racemose (sometimes
paniculate), not exceeding the leaves 38

38a. Flowers emitting an unpleasant odour.
Primary veins 3-4 pairs.
Primary vein angle $<45^{o}$. . . . . .C. bellendenkerana

b. Flowers without an obvious odour.
Primary veins 5-8 pairs.
Primary vein angle $>45^{o}$. . . . . C. dorrigoensis

39a. Vestigial styles present.
(Figs 70 F, 71 A).
Flowers emitting an unpleasant odour. 40

b. Vestigial styles absent.
Flowers without any obvious perfume. 42

40a. Old leaves sericeous on the underside. . . . C. smaragdina

b. Old leaves almost glabrous on the
underside. 41

41a. Leaves almost white on the underside.
Midrib depressed on the upper surface. . . .C. leucophylla

b. Leaves glaucous on the underside
(sometimes green).
Midrib raised or flush with
the upper surface. . . . . C. lividula

42a. Midrib raised or flush with the
upper surface.
Inflorescence paniculate, many flowered. . . . C. lividula

b. Midrib depressed on the upper surface.
Inflorescence usually cymose or racemose,
occasionally paniculate. 43

43a. Leaf blade broadest towards the base.

Older twigs pubescent.
Inflorescence paniculate or cymose. . . . . .C. rigida

b. Leaf blade broadest near the middle.
Older twigs glabrous.
Inflorescence usually racemose,
sometimes paniculate. . . . . .C. nova-anglica

44a. Leaves triplinerved 45

b. Leaves penninerved 52

45a. Twigs clothed in persistent,
mostly tortuous, erect hairs 46

b. Twigs clothed in straight,
appressed hairs when young
but soon becoming almost glabrous 47

46a. Underside of the lamina clothed in
mainly straight, appressed hairs. . . . . C. burckiana

b. Underside of the lamina
clothed in mainly erect,
tortuous hairs. . . . . .C. triplinervis var. pubens

47a. Domatia (tufts of hairs)
present in the axils of the
basal pair of primary veins
on younger leaves (sometimes
more difficult to see on older
leaves). . . . . .C. grandis

b. Domatia not present in the axils
of the basal pair of primary
veins on any leaves. 48

48a. Tepals glabrous on the outer surface.
Inflorescence racemose or paniculate. . . . . C. laevigata

b. Tepals pubescent on the outer surface.
Inflorescence paniculate 49

49a. Mature twigs clothed in
persistent hairs. . . . . C. triplinervis var. riparia

b. Mature twigs almost glabrous. 50

50a. Inflorescence exceeding the
leaves.
Inflorescence bracts about 1.0 mm
long, persistent or deciduous,
present or absent at anthesis. . . . . .C. bidwillii

b. Inflorescence not exceeding the leaves.
Inflorescence bracts about 0.4-0.8 mm
long, deciduous, absent at anthesis. 51

51a. Primary veins (not the basal pair) subtend an angle of more than 45^{o} with the midrib. . . . . C. pleurosperma

b. Primary veins (not the basal pair) subtend an angle of less than 45^{o} with the midrib. . . . . C. clarksoniana

52a. Leaves green on the underside 53

b. Leaves glaucous on the underside 76

53a. Leaf blade less than 4.5 cm long . . . . .C. williwilliana

b. Leaf blade more than 4.5 cm long 54

54a. Freshly broken twigs or stem bark emitting a strong odour (perhaps resembling coconut) 55

b. Freshly broken twigs or stem bark not emitting a strong odour (any odour detected being either faint or not resembling coconut). 56

55a. Primary veins 3-4 pairs.
Apex of the leaf blade acuminate.
Leaf blade usually broadest below the middle.
Lateral veins usually depressed on the upper surface of the leaf blade.
Mountain rainforests of northern Queensland. . . . . .C. cocosoides

b. Primary veins 4-8 pairs.
Apex of the leaf blade obtuse or rounded, rarely shortly acuminate.
Leaf blade broadest near the middle.
Lateral veins flush with the upper surface.
Lowland rainforests of northern Australia from northern Queensland to the Kimberleys. . . . . .C cunninghamii

56a. Tepals glabrous on the abaxial surface.
Reticulate veins not visible on the upper surface of the leaf blade . . . . . .C. meissneriana

b. Tepals pubescent on the abaxial surface.
Reticulate veins visible on the upper surface of the leaf blade 57

57a. Leaf blade broadest below the middle 58

b. Leaf blade broadest near the middle (rarely below the middle). 61

58a. Style 0.6-1.2 mm long. . . . . C. clarksoniana

b. Style 1.1-1.8 mm long. 59

59a. Twigs clothed in
erect hairs. . . . . C. triplinervis var. pubens

b. Twigs clothed in appressed
hairs. 60

60a. Pedicel 0.3-0.6 mm long. . . .C. triplinervis var. riparia

b. Pedicel 1.5-2.0 mm long. . . . . .C. floydii

61a. Style pubescent 62

b. Style glabrous 65

62a. Midrib raised on the upper surface
of the leaf blade . . . . . .C. microneura

b. Midrib depressed or flush
with the upper surface
of the leaf blade 63

63a. Underside of the lamina
clothed in erect hairs. . . . .C. triplinervis var. pubens

b. Underside of the lamina
clothed in appressed hairs. 64

64a. Twigs fluted.
Inflorescences more than 70 mm long.
Older twigs pubescent . . . . . C hypospodia

b. Twigs angular.
Inflorescences less than 70 mm long.
Older twigs glabrous . . . . . C. angulata

65a. Twig hairs erect 66

b. Twig hairs appressed 69

66a. Twig hairs pale brown.
Pedicel 0.3-1.0 mm long.
Primary veins forming loops inside
the blade margin. . . . . C. foetida

b. Twig hairs dark brown.
Pedicel nil or up to 0.6 mm long.
Primary veins not forming loops
inside the blade margin. 67

67a. Underside of the lamina
clothed in persistent,
straight & tortuous, erect

hairs. . . . . C. triplinervis var. pubens

b. Underside of the lamina clothed in persistent, appressed hairs or if erect then not persistent. 68

68a. Midrib depressed or grooved on the upper surface of the leaf blade.
Ovary 0.6-0.9 mm long.
Style 1.1-1.4 mm long. . . . . .C. endiandraefolia

b. Midrib flush with the upper surface of the leaf blade.
Ovary 0.9-1.2 mm long.
Style 1.1-1.4 mm long. . . . . C. hypospodia

69a. Twigs clothed in brown or dark brown hairs which persist on mature twigs 70

b. Twigs clothed in brown or pale brown hairs which do not (or scarcely) persist on mature twigs 71

70a. Midrib depressed or grooved on the upper surface of the leaf blade.
Ovary 0.6-0.9 mm long.
Style 0.8-0.9 mm long. . . . . .C. endiandraefolia

b. Midrib flush with the upper surface of the leaf blade.
Ovary 0.9-1.2 mm long.
Style 1.1-1.4 mm long. . . . . C. hypospodia

71a. Pedicel nil i.e. flowers sessile . . . . . .C. macdonaldii

b. Pedicel 0.3-1.0 mm long 72

72a. Flowers emitting an unpleasant odour. 73

b. Flowers without an odour or faintly but pleasantly perfumed. 74

73a. Leaf blade 6.0-9.5 cm long.
Primary veins forming definite loops, well inside the blade margin.
Primary vein angle more than 40^{o} . . . . . .C. foetida

b. Leaf blade 8.0-11.5 cm long.
Primary veins gradually decreasing in size and curving inside the blade margin or forming inconspicuous loops.
Primary vein angle less than 40^{o}. . . . . .C. lividula

74a. Primary vein angle more than 45°. . . . . C. claudiana

b. Primary vein angle less than 45°. 75

75a. Ovary 1.3-1.4 mm long.
Style about 1.6 mm long. . . . . C. microneura

b. Ovary 0.7-1.1 mm long.
Style 0.9-1.4 mm long. . . . . .C. bidwillii

76a. Twig hairs erect 77

b. Twig hairs appressed 87

77a. Freshly broken twigs emit a
strong coconut odour. . . . . C. cocosoides

b. Freshly broken twigs do not emit a
strong coconut odour. 78

78a. Twig hairs mostly more than 0.4 mm long.
Flowers sessile or shortly pedicellate. 79

b. Twig hairs mostly less than 0.4 mm long.
Flowers usually pedicellate 81

79a. Inflorescence hairs dark brown.
Mature leaves almost glabrous on the
underside, scattered hairs on the midrib
and primary veins only. . . . . .C. putida

b. Inflorescence hairs pale brown.
Mature leaves pubescent at least along
the midrib and primary veins on the underside 80

80a. Primary veins 8-19 pairs.
Flowers sessile. . . . . .C. murrayi

b. Primary veins 4-7 pairs.
Flowers sessile or with a pedicel
to 0.3 mm long. . . . . C. rhodosperma

81a. All hairs straight and appressed on the
abaxial surface of the tepals 82

b. Many hairs tortuous and erect on
the abaxial surface of the tepals 83

82a. Leaf blade 3.0-5.5 cm long.
Tepals 1.7-2.2 mm long . . . . . .C. bellendenkerana

b. Leaf blade 6.0-13.5 cm long.
Tepals 1.3-1.8 mm long . . . . . .C. melanocarpa

83a. Leaf blade almost white on
the underside . . . . . C. onoprienkoana

b. Leaf blade green or glaucous on the underside 84

84a. Inflorescence hairs more than 0.4 mm long. . . . . C. rhodosperma

b. Inflorescence hairs less than 0.4 mm long. 85

85a. Flowers emitting an unpleasant odour. . . . .C. hypospodia

b. Flowers pleasantly perfumed or without any obvious odour. 86

86a. Lamina arched between the primary veins on the upper surface. Secondary veins (arising from the midrib) ± at right angles to the midrib. Leaves broadest about the middle. . . . . C. corrugata

b. Lamina ± flat between the primary veins on the upper surface. Secondary veins not obviously at right angles to the midrib. Leaves broadest below the middle . . . . . C. saccharata

87a. Tepals glabrous on the abaxial surface . . C. meissneriana

b. Tepals pubescent on the abaxial surface 88

88a. Floral bracts spathulate, present at anthesis . . . . . .C. erythroxylon

b. Floral bracts linear, lanceolate, navicular or triangular, bracts usually absent at anthesis, occasionally present 89

89a. Twig hairs tortuous or at least a significant proportion tortuous 90

b. Twig hairs straight or nearly straight 92

90a. Leaf blade 3.0-5.5 cm long. Primary veins 3-4 pairs . . . . . C. bellendenkerana

b. Leaf blade 5.5-25 cm long. Primary veins 3-9 91

91a. Leaf blade broadest below the middle. Outer tepals larger than the inner tepals . .C. saccharata

b. Leaf blade broadest near the middle. Outer tepals narrower than the inner tepals but of similar length . . . . . C. hypospodia

92a. Flowers without any obvious odour. 93

b. Flowers emitting an obnoxious odour. 94

93a. Midrib depressed on the upper surface.
Inflorescence not or scarcely exceeding
the leaves. . . . . C. glaucescens

b. Midrib raised on the upper surface.
Inflorescence exceeding the leaves. . . . . .C. microneura

94a. Leaves almost white on the underside. 95

b. Leaves glaucous on the underside. 96

95a. Floral bracts linear.
Midrib raised or flush with the
upper surface. . . . . C. bamagana

b. Floral bracts triangular, navicular
or lanceolate.
Midrib depresssed on the upper surface. . . .C.leucophylla

96a. Inflorescences exceeding the leaves.
Style 0.9-1.3 mm long.
Outer tepals 1.0-1.4 mm long. . . . . .C. vulgaris

b. Inflorescences not exceeding the leaves.
Style 1.3-1.9 mm long.
Outer tepals 1.5-2.1 mm long . . . . . C. lividula

Fruiting Material

1a. Cotyledons ruminate i.e. with a number of intrusions of the testa into each cotyledon, not only between the faces of the cotyledons. 2

b. Cotyledons uniform i.e. not ruminate (On rare occasions there may be a narrow intrusion of the testa between the faces of the cotyledons but the cotyledons proper are not penetrated) 15

2a. Foveoles present and quite conspicuous on the underside of the lamina . . . . . C. foveolata

b. Foveoles absent on the underside of the lamina 3

3a. Leaf blade not glaucous on the underside, usually green or the colour completely obscured by hairs 4

b. Leaf blade glaucous on the underside 7

4a. Freshly broken twigs and stem bark emitting an odour like that of coconut, coconut ice or coconut and apricots. 5

b. Freshly broken twigs and stem bark not emitting an odour like that of coconut, coconut ice or coconut and apricots. 6

5a. Apex of the leaf blade acuminate.
Leaf blade broadest below the middle.
Primary veins 3-4 pairs.
Mountain rainforests of northern Queensland. . . . . C. cocosoides

b. Apex of the leaf blade obtuse, rounded or shortly acuminate.
Leaf blade broadest near the middle
Primary veins 4-8 pairs.
Lowland rainforests of northern Australia from northern Queensland to the Kimberleys. C. cunninghamii

6a. Reticulate veins prominent and raised on the underside of dried leaves.
Fruits 8-13 mm long. . . . . C. foetida

b. Reticulate veins not prominent, not or scarcely raised on the underside of dried leaves.
Fruits 13-18 mm long. . . . . C. hypospodia

7a. Leaves triplinerved 8

b. Leaves penninerved 9

8a. Fruits 13-20 mm long.
Older leaves puberulous to almost
glabrous on the underside . . . . . .C. grandis

b. Fruits 9-10 mm long.
Older leaves sericeous on the underside . . . C. smaragdina

9a. Twig hairs straight 10

b. Twig hairs tortuous 12

10a. Older leaves sericeous on the
underside.
Primary veins conspicuously raised
on the underside of the leaf blade . . . . . .C. smaragdina

b. Older leaves glabrous or sparsely
pubescent on the underside.
Primary veins scarcely raised on the
underside of the leaf blade 11

11a. Fruits 11.5-14.0 mm long.
Seed 9.0-12.0 mm long.
Petiole 4-8 mm long.
Midrib raised or flush with the
upper surface . . . . . C. lividula

b. Fruits 9-10 mm long.
Seed 6-7 mm long.
Petiole 7-12 mm long.
Midrib flush with the upper surface. . . . . .C. bamagana

12a. Infructescence 1-5 cm long. 13

b. Infructescence 6-20 cm long. 14

13a. Primary veins 3-4 pairs.
Leaf blade 3.4-5.5 cm long . . . . . C. bellendenkerana

b. Primary veins 4-6 pairs.
Leaf blade 6.5-13.5 cm long . . . . . .C. melanocarpa

14a. Leaf blade oblong or obovate,
apex obtuse or rounded.
Seed 8.0-8.5 mm long. . . . . .C. obovata

b. Leaf blade elliptical or ovate,
apex acute or obtuse.
Seed 8.5-16.0 mm long. . . . . .C. hypospodia

15a. Fruits more than 30 mm long.
Fruits pink, red or orange when ripe 16

b. Fruits less than 30 mm long.

Fruits usually black or glaucous
black, rarely red or orange when ripe. 17

16a. Leaves triplinerved.
Endocarp longitudinally ribbed . . . . . .C. pleurosperma

b. Leaves not triplinerved.
Endocarp without longitudinal ribs . . . . . .C. oblata

17a. Fruits less than 15 mm long. 18

b. Fruits more than 15 mm long. 50

18a. Leaves glaucous on the underside
at least when young. 19

b. Leaves green on the underside
at all stages. 31

19a. Twig hairs erect and tortuous 20

b. Twig hairs appressed and mainly straight. 23

20a. Leaves almost white on the underside,
particularly when young.
Endocarp 0.3-0.5 mm thick. . . . . C. onoprienkoana

b. Leaves slightly glaucous on the
underside.
Endocarp 0.4-0.9 mm thick. 21

21a. Fruits ovoid, occasionally globular.
Reticulate veins not or scarcely raised
on the underside of the leaf blade . . . . . .C. putida

b. Fruits ellipsoid.
Reticulate veins conspicuously raised
on the underside of the leaf blade 22

22a. Young twigs with hairs more
than 0.4 mm long . . . . . C. murrayi

b. Young twigs with hairs less
than 0.4 mm long . . . . . C. brassii

23a. Leaves triplinerved 24

b. Leaves penninerved 25

24a. Fruits depressed globular.
Fruits longitudinally ribbed.
Midrib depressed or flush with
the upper surface . . . . . C. densiflora

b. Fruits globular or ellipsoid.
Fruits without longitudinal ribs.
Midrib usually raised on the upper

surface . . . . . .C. exfoliata

25a. Fruits laterally compressed.
Fruits distinctly wider than long.
Midrib depressed on the upper surface . . . .C. glaucescens

b. Fruits not laterally compressed.
Fruits usually longer than wide,
rarely wider than long.
Midrib raised, flush with or depressed
on the upper surface 26

26a. Fruits pyriform (occasionally depressed
globular) 27

b. Fruits globular, ellipsoid or ovoid 28

27a. Fruits about 20-25 mm long.
Leaf blade 6.5-14.5 cm long.
Petiole 8-19 mm long. . . . . C. erythroxylon

b. Fruits about 12-15 mm long.
Leaf blade 5.5-7.5 cm long.
Petiole 5-8 mm long. . . . . .C. nova-anglica

28a. Leaf blade distinctly glaucous or
whitish on the underside.
Midrib depressed or flush with the
upper surface 29

b. Leaf blade only slightly glaucous on
the underside.
Midrib raised on the upper surface 30

29a. Fruits 13-17 mm long.
Hairs inconspicuous but persisting
on the underside of old leaves. . . . . .C. leucophylla

b. Fruits 8-13 mm long.
Underside of old leaves sparsely
pubescent or almost glabrous . . . . . .C. vulgaris

30a. Fruits 12-14 mm diam.
Northern New South Wales
and southern Queensland. . . . . .C. microneura

b. Fruits 9-11 mm diam.
Northern Queensland and Northern
Territory . . . . . .C. exfoliata

31a. Radicle lateral. 32

b. Radicle apical. 35

32a. Leaves triplinerved 33

b. Leaves penninerved 34

33a. Older twigs pubescent.
Twig hairs tortuous . . . . . .C. burckiana

b. Older twigs ± glabrous.
Young twigs clothed in
appressed hairs . . . . . .C. exfoliata

34a. Primary vein angle >45° . . . . . C. sclerophylla

b. Primary vein angle <45° . . . . . .C. exfoliata

35a. Leaf blade 2.5-3.5 cm long. . . . . .C. williwilliana

b. Leaf blade 5.5-16.5 cm long. 36

36a. Midrib depressed on the upper surface 37

b. Midrib raised or flush with the upper
surface 41

37a. Older twigs pubescent 38

b. Older twigs ± glabrous 40

38a. Underside of mature leaves
almost glabrous. . . . . C. endiandraefolia

b. Underside of mature leaves
clothed in persistent hairs. 39

39a. Twig hairs more than 0.4 mm long.
Underside of mature leaves clothed
in tortuous, erect hairs. . . . . .C. murrayi

b. Twig hairs less than 0.4 mm
long.
Underside of mature leaves
clothed in straight,
appressed hairs. . . . . .C. triplinervis var. triplinervis

40a. Fruits very glaucous
when ripe.
Infructescence axillary
or below the leaves . . . . . .C. glaucocarpa

b. Fruits black when ripe (occasionally
slightly glaucous)
Infructescence pseudoterminal . . . . . .C. macdonaldii

41a. At least some twig hairs tortuous. 42

b. Twig hairs straight only. 45

42a. Underside of the lamina clothed in
erect hairs. 43

b. Underside of the lamina mainly clothed in appressed hairs (sometimes with a few erect hairs). 44

43a. Leaf blade 4.5-13.0 cm long. Primary veins 2-6 pairs . . . . C. triplinervis var. pubens

b. Leaf blade 11.5-30.0 cm long. Primary veins 8-19 pairs . . . . . C. murrayi

44a. Twig hairs erect. Lamina 4.5-8.0 cm wide. . . . . .C. burckiana

b. Twig hairs appressed & erect. Lamina 1.5-5.0 cm wide. . C. triplinervis var. triplinervis

45a. Oil dots variable in shape, some ± circular in shape, but others elongated, ± streaky when viewed from the upper surface with transmitted light. Leaf blade broadest towards the base. . . . . C. floydii

b. Oil dots ± circular when viewed from the upper surface with transmitted light. Leaf blade broadest about the middle, sometimes broadest towards the base. 46

46a. Mature twigs pubescent. . . . .C. triplinervis var. riparia

b. Mature twigs glabrous or almost glabrous. 47

47a. Leaf blade broadest towards the base. 48

b. Leaf blade broadest about the middle. 49

48a. Testa about 0.3 mm thick. . . . . .C. bidwillii

b. Testa about 0.1 mm thick. . . . . C. clarksoniana

49a. Primary veins 6-12 pairs. Seed 11-12 mm long. . . . . .C. claudiana

b. Primary veins 4-8 pairs. Seed 6-9 mm long. . . . . C. microneura

50a. Leaves glaucous on the underside 51

b. Leaves green on the underside 68

51a. Twig hairs straight 52

b. Twig hairs tortuous 59

52a. Fruits laterally compressed.
Fruits wider than long . . . . . C. glaucescens

b. Fruits circular in cross section.
Fruits usually longer than wide 53

53a. Cotyledons pink or purplish . . . . . .C. rhodosperma

b. Cotyledons white, yellow or cream 54

54a. Infructescence (excluding the
fruits) less than 20 mm long. 55

b. Infructescence (excluding the
fruits) more than 20 mm long. 56

55a. Endocarp longitudinally ribbed.
Fruits ellipsoid or ovoid. . . . . .C. meissneriana

b. Endocarp without longitudinal ribs.
Fruits ± broadly pyriform . . . . . C. nova-anglica

56a. Outer surface of the fruit marked by
numerous pale lenticel-like spots,
readily visible to the naked eye
from a distance of 2 metres.
Leaf blade 13-35 cm long.
Reticulate veins conspicuously
raised on the underside of
the leaf blade . . . . . C. mackinnoniana

b. Outer surface of the fruit
without spots.
Leaf blade 6.0-14.0 cm long.
Reticulate veins not or scarcely
raised on the underside of the
leaf blade 57

57a. Fruits pyriform. . . . . .C. erythroxylon

b. Fruits globular or ellipsoid. 58

58a. Fruits 13-17 mm long.
Seed 9-11 mm long . . . . . .C. leucophylla

b. Fruits 17-24 mm long.
Seed 11-20 mm long . . . . . .C. rigida

59a. Fruits wider than long.
Fruits bilobed . . . . . C. corrugata

b. Fruits longer than wide or
length = diameter.
Fruits not bilobed 60

60a. Cotyledons pink or purplish . . . . . .C. rhodosperma

b. Cotyledons white, cream or yellow 61

61a. Pericarp marked by numerous, pale, lenticel-like spots readily visible to the naked eye from a distance of 2 metres . . . . . C. mackinnoniana

b. Pericarp without spots 62

62a. Midrib of older leaves hairy on the upper surface 63

b. Midrib of older leaves glabrous on the upper surface 65

63a. Leaf blade 3.5-6.0 cm long. Infructescence (excluding the fruits) less than 5 cm long . . . . . C. dorrigoensis

b. Leaf blade 10-30 cm long. Infructescence (excluding the fruits) more than 5 cm long 64

64a. Young twigs with hairs more than 0.4 mm long . . . . . .C. murrayi

b. Young twig with hairs less than 0.4 mm long . . . . . .C. brassii

65a. Fruits ovoid or globular. Leaf blade broadest about the middle. Lamina obtuse or rounded, sometimes acute at the apex. . . . . .C. putida

b. Fruits ellipsoid or pyriform. Leaf blade usually broadest below the middle. Lamina acuminate or acute at the apex. 66

66a. Endocarp 0.5-0.8 mm thick. Hairs on the underside of the lamina (between the lateral veins) mainly erect. . . . . C. saccharata

b. Endocarp 0.2-0.5 mm thick. Hairs on the underside of the lamina (between the lateral veins) mainly appressed. 67

67a. Twig hairs mainly appressed. Twig hairs straight and tortuous. . . . . C. rigida

b. Twig hairs mainly erect. Twig hairs tortuous. . . . . C. onoprienkoana

68a. Endocarp longitudinally ribbed, the ribs being conspicuously raised and forming part of the endocarp. 69

b. Endocarp without longitudinal ribs or with inconspicuous ribs which are not raised and don't form part of the endocarp. 70

69a. Leaves triplinerved. Fruits 17-38 mm diam. . . . . .C. laevigata

b. Leaves penninerved. Fruits 10-15 mm diam. . . . . C. meissneriana

70a. Fruits red or orange when ripe. Fruits 35-46 mm wide . . . . . C. oblata

b. Fruits black or glaucous black when ripe. Fruits 8-20 mm wide 71

71a. Leaves triplinerved 72

b. Leaves penninerved 74

72a. Older twigs pubescent. Twig hairs tortuous . . . . . .C. burckiana

b. Older twigs ± glabrous. Young twigs clothed in appressed hairs 73

73a. Testa about 0.1 mm thick . . . . . .C. clarksoniana

b. Testa about 0.3 mm thick . . . . . C. bidwillii

74a. Midrib raised on the upper surface of the leaf blade 75

b. Midrib depressed or flush with the upper surface of the leaf blade. 77

75a. Radicle lateral . . . . . C. sclerophylla

b. Radicle apical 76

76a. Leaf blade broadest below the middle . . . .C. clarksoniana

b. Leaf blade broadest near the middle . . . . . .C. claudiana

77a. Fruits more than 20 mm long. Seed more than 15 mm long . . . . . C. angulata

b. Fruits less than 20 mm long. Seed less than 15 mm long 78

78a. Midrib depressed on the upper surface of the leaf blade 79

b. Midrib flush with the upper surface of the leaf blade 82

79a. Infructescence axillary or below the leaves.
Fruits very glaucous when ripe . . . . . C. glaucocarpa

b. Infructescence pseudoterminal.
Fruits not or only slightly glaucous when ripe 80

80a. Mesocarp + exocarp 0.2-0.3 mm thick.
Leaf blade usually broadest below the middle . . . . . C. bidwillii

b. Mesocarp + exocarp about 0.8 mm thick.
Leaf blade broadest about the middle 81

81a. Mature twigs almost completely glabrous . . .C. macdonaldii

b. Mature twigs clothed in tortuous, erect hairs . . . . . .C. murrayi

82a. Leaf blade broadest towards the base.
Oil dots variable in shape some ± circular but others elongated, ± streaky when viewed from the upper surface with transmitted light . . . . . .C. floydii

b. Leaf blade broadest about the middle.
Oil dots ± circular when viewed from the upper surface with transmitted light 83

83a. Mature twigs clothed in tortuous, erect hairs . . . . . .C. murrayi

b. Mature twigs almost completely glabrous 84

84a. Testa about 0.1 mm thick . . . . . .C. clarksoniana

b. Testa about 0.3 mm thick . . . . . C. bidwillii

1. **Cryptocarya angulata** C. White, Contr. Arnold Arbor. 4:33 (1933); Francis, Austral. Rain-Forest Trees ed.2:408 (1951).
Type: S.F. Kajewski 1069, Gadgarra (A holotype, B,BO, BRI, K, NSW, isotypes).

Tree to 30 m tall x 80 cm dbh, usually medium sized and well formed. Stem usually without buttresses, rarely otherwise. Bark usually nondescript, occasionally flaky, outer blaze cream or brown, usually granular in texture, often emitting an odour like freshly cut sugarcane. Twigs angular in section, clothed in tortuous, brown, erect and appressed hairs when young but glabrous at maturity. Leaves: Underside green, clothed in straight and tortuous, brown, appressed hairs when young, but almost glabrous at maturity. Leaf blade lanceolate, elliptical or ovate, apex acuminate, acute or obtuse, base attenuate or shortly attenuate, 4.7-14.2 x 2.5-6.0 cm (mean 8.8 x 3.9); penninerved, primary veins 4-8 pairs (mode 6), midrib depressed or flush with the upper surface; petiole 4-13 mm long (mean 6.9), channelled on the upper surface. Inflorescence paniculate, scarcely exceeding the leaves, axillary and pseudoterminal; bracts linear or triangular, 0.5-0.8 mm long, deciduous, absent at anthesis. Flowers pale green, green or creamy green, perfumed, the odour often unpleasant, opening quite widely, but the tepals remaining ± erect at anthesis. Pedicel 0.1-0.9 x 0.5-0.8 mm. Perianth tube 0.9-1.8 x 1.3-1.8 mm, inner surface hairy towards the apex, lower half usually glabrous, occasionally hairy, outer and inner tepals of similar dimensions, 1.3-1.7 x 0.7-1.1 mm, all tepals pubescent on both the inner and outer surfaces. Outer anthers usually glabrous adaxially, but usually pubescent abaxially, 0.5-0.7 x 0.5-0.7 mm, filaments pubescent, 0.5-0.7 mm long; gland heads glabrous, about 0.3-0.5 x 0.4-0.5 mm, stalks pubescent, 0.3-0.5 mm long. Inner

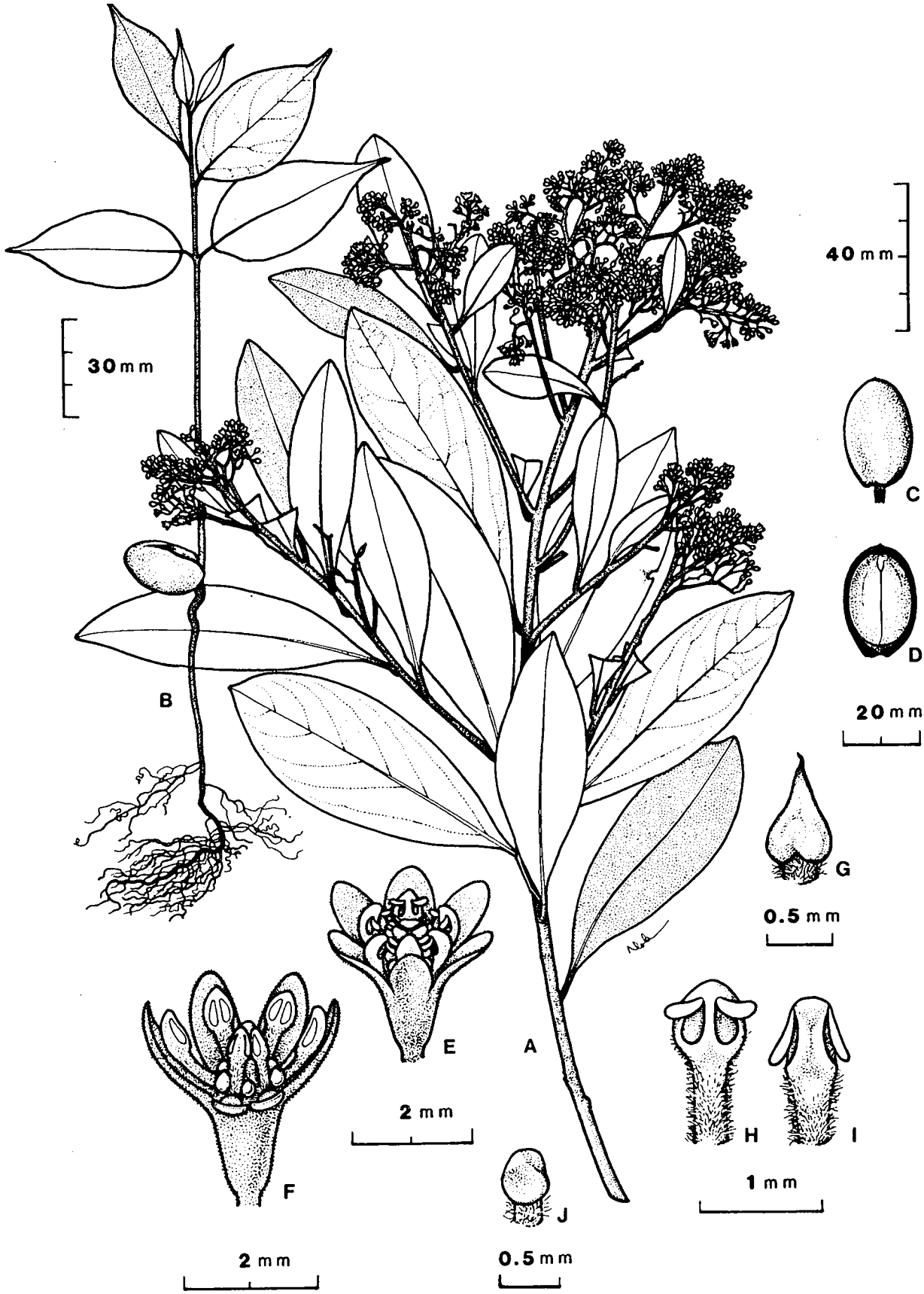

Fig.10. Cryptocarya angulata. A Habit Hyland 9231; B seedling, C fruit, D fruit (LS) Irvine 389; E flower, F flower (side view, 2 tepals and 2 stamens removed), G staminode (adaxial view), H stamen (outer whorl, adaxial view), I stamen (inner whorl, abaxial view), J gland (adaxial view) Hyland 9231.

anthers glabrous adaxially, but usually pubescent abaxially, 0.6-0.7 x 0.4-0.5 mm, filaments pubescent, 0.5-0.9 mm long. Staminodes differentiated, head cordate, usually glabrous adaxially but pubescent abaxially, 0.7-0.9 mm long, filament pubescent, 0.2-0.5 mm long. Ovary glabrous towards the base but sometimes pubescent at the apex, 0.8-1.1 x 0.4-0.6 mm, style pubescent, 1.2-1.5 mm long. Fruits blue-black or black, often dull black when ripe, ellipsoid, 24-30 x 14-20 mm, mesocarp + exocarp 0.5-0.8 mm thick, endocarp 0.1-0.3 mm thick. Seed 19-25 x 14-18 mm, testa 0.1-0.25 mm thick, radicle apical. Cotyledons usually cream, (sometimes pink near the periphery), uniform in texture. Seedling leaves green on the underside, cataphylls absent, first pair of leaves opposite. (Fig. 10)

Distribution (Fig. 92, Map 27)

Ecology

Rain forests of northern and central Queensland, on soils derived from a variety of rock types. Altitudinal range: Sea level to 1250 m.

Uses

This species produces millable logs but they are seldom harvested as the species is not highly regarded by the timber trade. The reasons for this are not clear. Standard Trade Name - Ivory Laurel. Wood S.G. 0.75-0.80.

Notes and Observations

Flowers have been collected in November, December and January,

while ripe fruits have been collected each month from July to December, but mostly in November. Seedling germination period 16-57 days.

The testa and endocarp are almost fused and very difficult to distinguish on some specimens.

Specimens Examined (95 collections examined)

2. Cryptocarya bamagana B. Hyland sp. nov.
Differt a speciebus ceteris laminis subtus albis et cotyledonibus ruminatis.
Typus: B. Hyland 25037 RFK: Bamaga, 8.xii.1982 (holotypus QRS)
Differs from other species, the lamina white on the underside and the cotyledons ruminate.

Tree to 15 m tall x 20 cm dbh, usually small and well formed. Stem with or without buttresses, often with coppice shoots at the base. Bark nondescript, outer blaze cream or brown, granular in texture, often emitting an odour resembling that of cinnamon. Twigs terete or fluted, clothed in straight, brown or pale brown, appressed hairs which persist to some extent even on old twigs. Leaves: Underside glaucous, (almost white), clothed in straight, pale brown, appressed hairs when young, but eventually becoming almost glabrous. Leaf blade lanceolate or elliptical, apex acuminate or acute, base attenuate or cuneate, 8.0-14.0 x 3.0-5.0 cm (mean 11.6 x 3.9); penninerved, primary veins 4-7 pairs (mode 5), midrib flush with the upper surface; petiole 7-12 mm long (mean 9.2), flat or channelled on the upper surface. Inflorescence paniculate, scarcely exceeding the leaves, mainly pseudoterminal but also axillary; bracts linear, 1.2-1.7 mm long, persistent or deciduous, present or absent at anthesis. Flowers

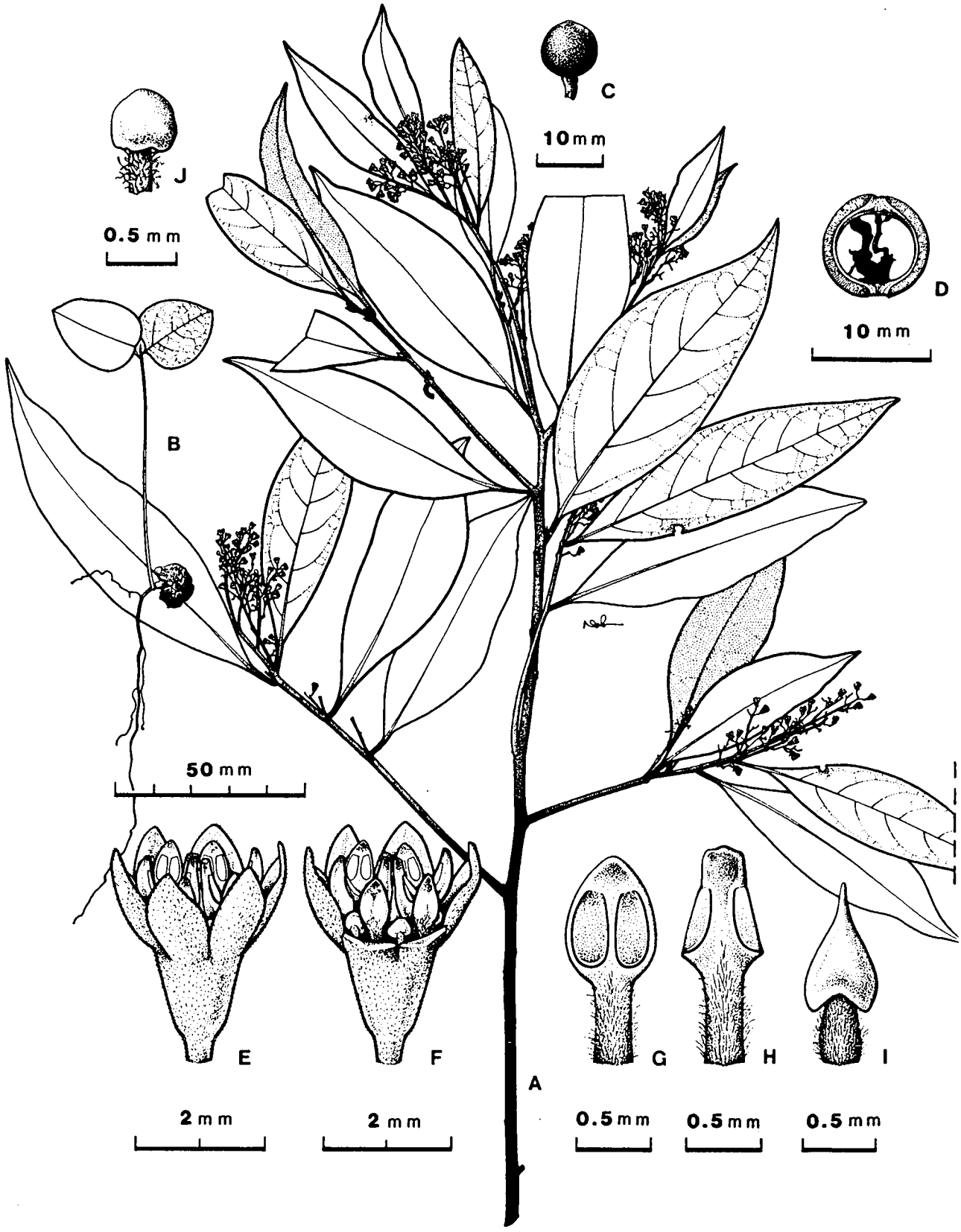

Fig.11. Cryptocarya bamagana. A Habit, B seedling, C fruit, D fruit (LS), E flower, F flower (side view, 2 tepals removed), G anther (outer whorl, adaxial view), H anther (inner whorl, abaxial view), I staminode (adaxial view), J gland (adaxial view) Hyland 25037 RFK.

cream, unpleasantly perfumed, opening quite widely but the tepals remaining ± erect at anthesis. Pedicel about 0.2 x 0.4 mm. Perianth tube about 1.3 x 1.0 mm, inner surface mainly glabrous, pubescent only towards the apex. Outer and inner tepals of similar dimensions, 1.6-1.7 x about 1.0 mm, all tepals pubescent on both their inner and outer surfaces. Outer anthers glabrous adaxially but pubescent near the base and along the midline on the abaxial surface, about 0.8 x about 0.6 mm, filaments pubescent, about 0.5 mm long; gland heads glabrous, about 0.4 x 0.4 mm, stalks pubescent, about 0.4 mm long. Inner anthers mainly glabrous or with a few hairs near the base on the adaxial surface, about 0.7 x about 0.5 mm, filaments pubescent, about 0.7 mm long. Staminodes differentiated, head cordate (apex attenuate), glabrous, about 0.8 mm long, filament pubescent, about 0.3 mm long. Ovary glabrous, about 1.1 x 0.4 mm, style glabrous, about 1.1 mm long, usually with 1 or 2 very short rudimentary styles at the base. Fruits black when ripe, globular, 9-10 x 9.5-10.0 mm, mesocarp + exocarp 0.5-0.6 mm thick, endocarp 0.3-0.5 mm thick. Seed 6-7 x 7.0-7.5 mm, testa 0.1-0.2 mm thick, radicle apical. Cotyledons white or cream, ruminate. Seedling leaves glaucous on the underside, cataphylls absent, first pair of leaves opposite. (Fig. 11)

Distribution (Fig. 90, Map 14)

Ecology

Rain forests of Cape York Peninsula, usually in moist, creekside situations on alluvial soils. Altitudinal range: 20-100 m.

Uses

This species has no commercial value as it does not grow large

enough to produce millable logs and it does not have a Standard Trade Name. Wood S.G. 0.72.

Notes and Observations

Flowers have been collected in November and December while, ripe fruits have been collected from a good crop in September and a few from a poor crop in December. Seedling germination period about 40 days.

C. enervis J. D. Hook., a peat swamp species from Malaya and Borneo, may be closely related, but further work is needed to confirm this.

Etymology

The specific epithet was applied to this species because it was first recognized as a distinct species from specimens collected near Bamaga.

Specimens Examined (7 collections examined)

3. Cryptocarya bellendenkerana B. Hyland sp. nov.
Differt a C. smaragdina laminis ad maturitatem subtus glabris.
Typus: B. Gray 2868: State Forest Reserve 143, North Mary L.A. 2.xii.1982 (holotypus QRS).
Differs from C. smaragdina the leaf blades glabrous below at maturity.

Tree to 25 m tall x 40 cm dbh, usually small and poorly formed. Stem without buttresses in the smaller size classes but sometimes buttressed in the larger. Bark usually nondescript, occasionally flaky. Outer blaze cream or brown, usually granular in texture, often emitting a noticeable odour, difficult to describe. Twigs fluted and

clothed in straight and tortuous, brown, erect and appressed hairs when young, eventually becoming almost glabrous. Leaves: Underside glaucous, clothed in mainly straight, white or brown, appressed hairs when young but eventually becoming almost glabrous. Leaf blade lanceolate, ovate, apex acuminate, acute, obtuse, base cuneate, truncate; 2.5-5.4 x 1.6-3.2 cm (mean 4.6 x 2.4); penninerved or somewhat triplinerved, primary veins 3-4 pairs, midrib depressed on the upper surface; petiole 4-7 mm long (mean 5.1), channelled on the upper surface. Inflorescence paniculate or almost reduced to racemose, not exceeding the leaves; axillary and pseudoterminal; bracts navicular, 1.0-4.0 mm long, persistent or deciduous, present or absent at anthesis. Flowers cream, creamy-green, unpleasantly perfumed, opening quite widely but the tepals remaining ± erect at anthesis. Pedicel nil or up to 0.8 x 0.5-0.6 mm. Perianth tube 0.9-1.6 mm long x 1.3-1.7 mm diam., inner surface hairy towards the apex, lower half usually glabrous, occasionally hairy; outer and inner tepals of similar dimensions, 1.7-2.2 x 1.1-1.6 mm, all tepals pubescent on both their inner and outer surfaces. Outer anthers glabrous adaxially but often slightly pubescent abaxially, 0.7-0.8 x 0.5-0.8 mm, filaments pubescent, 0.5-0.9 mm long; gland heads glabrous, 0.4-0.6 x 0.4-0.7 mm, stalks pubescent, 0.4-0.5 mm long. Inner anthers glabrous, 0.7-0.9 x 0.5-0.6 mm, opening sideways, filaments pubescent, 0.6-0.9 mm long. Staminodes differentiated, head cordate, glabrous adaxially, sometimes with a few basal hairs on the abaxial surface; 0.9-1.0 mm long, filament pubescent 0.3-0.5 mm long. Ovary usually glabrous, 0.9-1.4 x 0.5-0.6 mm, style glabrous, 1.2-1.5 mm long. Fruits black when ripe, globular, 10-11 x 11-12.5 mm, mesocarp + exocarp 0.4-0.8 mm thick, endocarp 0.3-0.5 mm thick. Seed

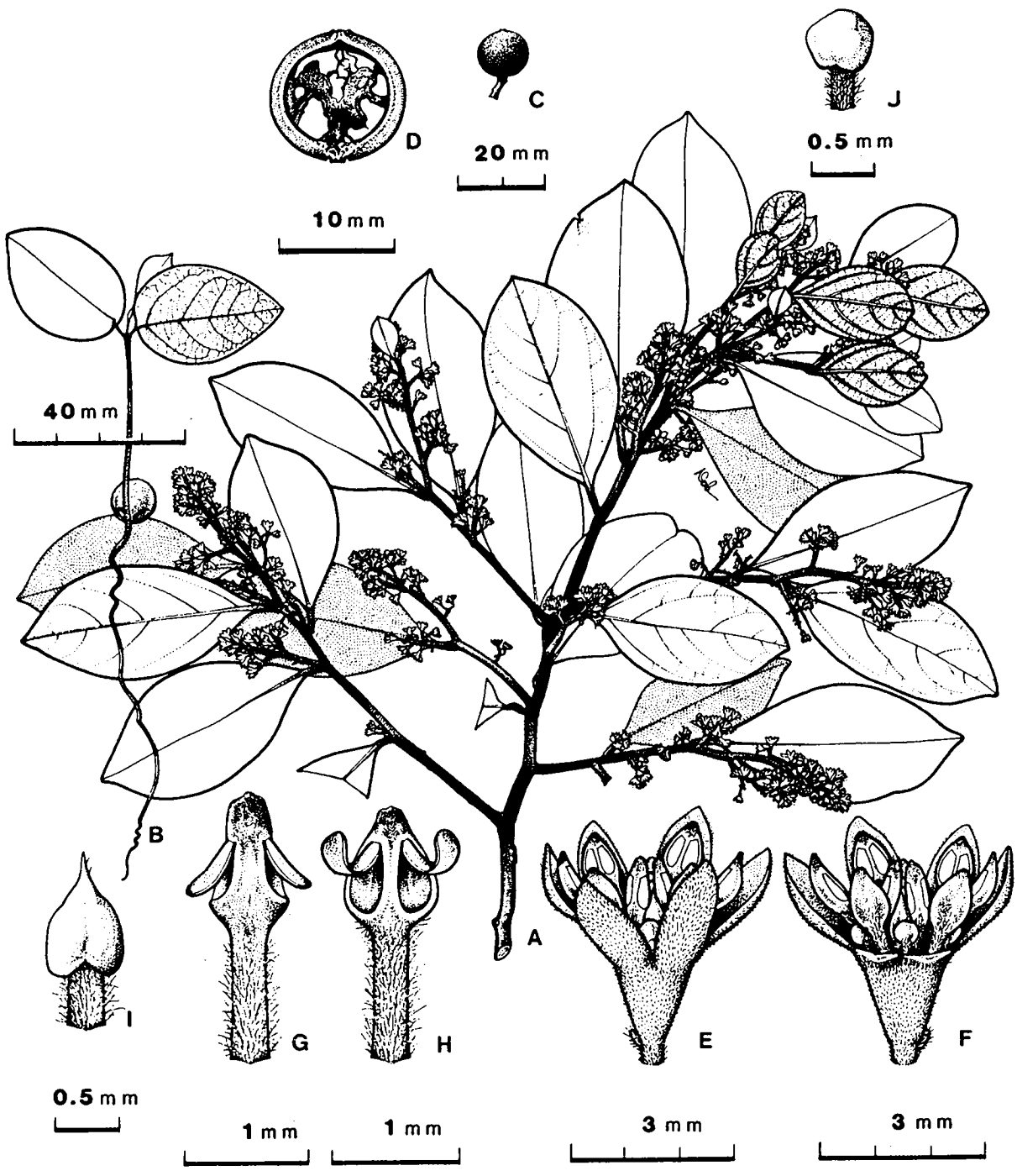

Fig.12. Cryptocarya bellendenkerana. A Habit Gray 2868; B seedling, C fruit, D fruit (LS) Gray 3299; E flower, F flower (side view 2 tepals removed), G anther (inner whorl, abaxial view), H anther (outer whorl, adaxial view), I staminode (adaxial view), J gland (adaxial view) Gray 2868.

7.5-9.0 x 9-10 mm, testa 0.1-0.3 mm thick, radicle apical. Cotyledons cream, ruminate. Seedling leaves glaucous on the underside, cataphylls absent, first pair of leaves opposite. (Fig. 12)

Distribution (Fig. 90, Map 15)

Ecology

Mountain rain forests of northern Queensland on soils derived from granite. Altitudinal range: 1100-1500 m.

Uses

This species has no commercial value as it is a restricted species and it seldom grows large enough to produce millable logs. This species does not have a Standard Trade Name. Wood S.G. 0.88.

Notes and Observations

Flowers have been collected in June, September, October, December and January, while ripe fruits have been collected in January, June and October. Seedling germination period 30-100 days.

Etymology

The specific epithet was applied to this species because it was first recognized as a distinct entity from specimens collected on Mt Bellenden Ker.

Specimens Examined (40 collections examined)

4. **Cryptocarya bidwillii** Meissner in DC., Prodr. 15(1): 74 (1864); Frodin, Telopea 1(3):217 (1976); ibid. 1(3):223 (1976); Floyd, N.S.W. Rainforest Trees Part 1 ed.2:27 (1979); Stanley & Ross, Flora of south-eastern

Queensland 1:161 (1983).
Type: J.C. Bidwill 38, Wide Bay (K).

Tree to 20 m tall x 50 cm dbh, usually small and fairly well formed. Stem usually without buttresses, often with coppice shoots at the base. Bark usually nondescript, rarely flaky, outer blaze usually cream or brown, rarely pink, often layered, granular in texture, often emitting a distinct odour, perhaps resembling that of limes. Twigs ± terete, slightly fluted or angular when young, clothed in straight, pale brown, appressed hairs when young but almost glabrous at maturity. Leaves: Underside green, clothed in straight, white or pale brown, appressed hairs when young but glabrous or almost glabrous at maturity. Leaf blade elliptical, lanceolate or narrowly lanceolate, rarely almost linear, apex acuminate, base attenuate or cuneate, 6.0-13.0 x 1.0-5.0 cm (mean 9.0 x 3.3); usually penninerved, occasionally triplinerved, primary veins 3-10 pairs (mode 6), midrib usually depressed or flush with the upper surface, rarely raised; petiole 3-10 mm long (mean 6.5), flat or shallowly channelled on the upper surface. Inflorescence paniculate, usually exceeding the leaves, mainly pseudoterminal, but also axillary; bracts linear or triangular, about 1.0 mm long, persistent or deciduous, present or absent at anthesis. Flowers white or cream, perfume not recorded, opening quite widely but the tepals remaining ± erect at anthesis. Pedicel 0.1-0.8 x 0.3-0.5 mm. Perianth tube 0.9-1.2 x 1.0-1.3 mm, inner surface usually hairy towards the apex but lower half glabrous. Outer and inner tepals of similar dimensions, 1.2-1.7 x 1.0-1.3 mm, all tepals pubescent outside and at least partly so inside, except for the margins. Outer anthers glabrous adaxially, abaxial surface usually glabrous, sometimes pubescent along the midline, 0.5-0.7 x 0.5-0.6 mm, filaments pubescent, 0.4-0.7 mm long; gland heads

glabrous, 0.3-0.5 x 0.3-0.5 mm, stalks pubescent, 0.1-0.3 mm long. Inner anthers glabrous abaxially, adaxial surface usually glabrous, sometimes pubescent along the midline, 0.7-0.8 x 0.4-0.5 mm, filaments pubescent, 0.5-0.7 mm long. Staminodes differentiated, head sagittate (apex acuminate), glabrous adaxially, abaxial surface pubescent along the midline, 0.7-0.9 mm long, filaments pubescent, 0.2-0.4 mm long. Ovary glabrous, 0.7-1.1 x 0.4-0.6 mm, style glabrous, 0.9-1.4 mm long. Fruits black when ripe, ellipsoid, 11-16 x 8-12.5 mm, mesocarp + exocarp 0.2-0.3 mm thick, endocarp 0.2-0.3 mm thick. Seed 9-13 x 7-11 mm, testa about 0.3 mm thick, radicle apical. Cotyledons cream, uniform in texture. Seedling leaves green on the underside, cataphylls absent, first pair of leaves opposite.

Distribution (Fig. 90, Map 13)

Ecology

Usually in the more seasonal rain forests in drier situations in northern New South Wales, southern and central Queensland, almost extending to northern Queensland. Altitudinal range: Sea level to 1100 m.

Uses

This species seldom grows large enough to produce millable logs and consequently is seldom utilized. It does not have a Standard Trade Name, but Floyd (1979) has suggested Yellow Laurel as a suitable common name. Wood S.G. unknown.

Notes and Observations

Flowers have been collected in December, while ripe fruits have

been collected in November. Floyd (1979) concluded from his studies in New South Wales that the main flowering period was in December and January and that the fruit ripened in November. Seedling germination period 20-25 days.

Blaze layering is encountered in this species but the feature is most obvious on those trees growing in very seasonal rain forests where there is a long period of water stress each year.

Specimens Examined (58 collections examined)

5. Cryptocarya brassii Allen, J. Arnold Arbor. 23:137 (1942)
Type: L.J. Brass 7516, Middle Fly River (A holotype, BO, BRI isotypes).

Tree to 20 m tall x 40 cm dbh, usually encountered as a small, but well formed tree. Stem buttressed in the larger but not in the smaller size classes. Bark usually nondescript, rarely otherwise, outer blaze cream or brown, speckled, granular in texture, usually emitting a noticeable odour, difficult to describe. Twigs fluted, clothed in tortuous, erect, brown hairs which persist, even on old twigs. Leaves: Underside slightly glaucous, sparsely clothed in tortuous, pale brown, erect hairs even on older leaves. Leaf blade elliptical or oblong, apex usually obtuse or rounded, rarely acute or abruptly acuminate, base truncate or cuneate, 10-14 x 3.5-6.5 cm (mean 11.4 x 4.7); penninerved, primary veins 6-9 pairs (mode 7), midrib depressed on the upper surface; petiole 7-13 mm long (mean 9.7), flat, channelled or ridged on the upper surface. Inflorescence paniculate, not or slightly exceeding the leaves, axillary and pseudoterminal; bracts linear, triangular, lanceolate or navicular 1.0-1.5 mm long, persistent or deciduous, present or absent at anthesis. Flowers

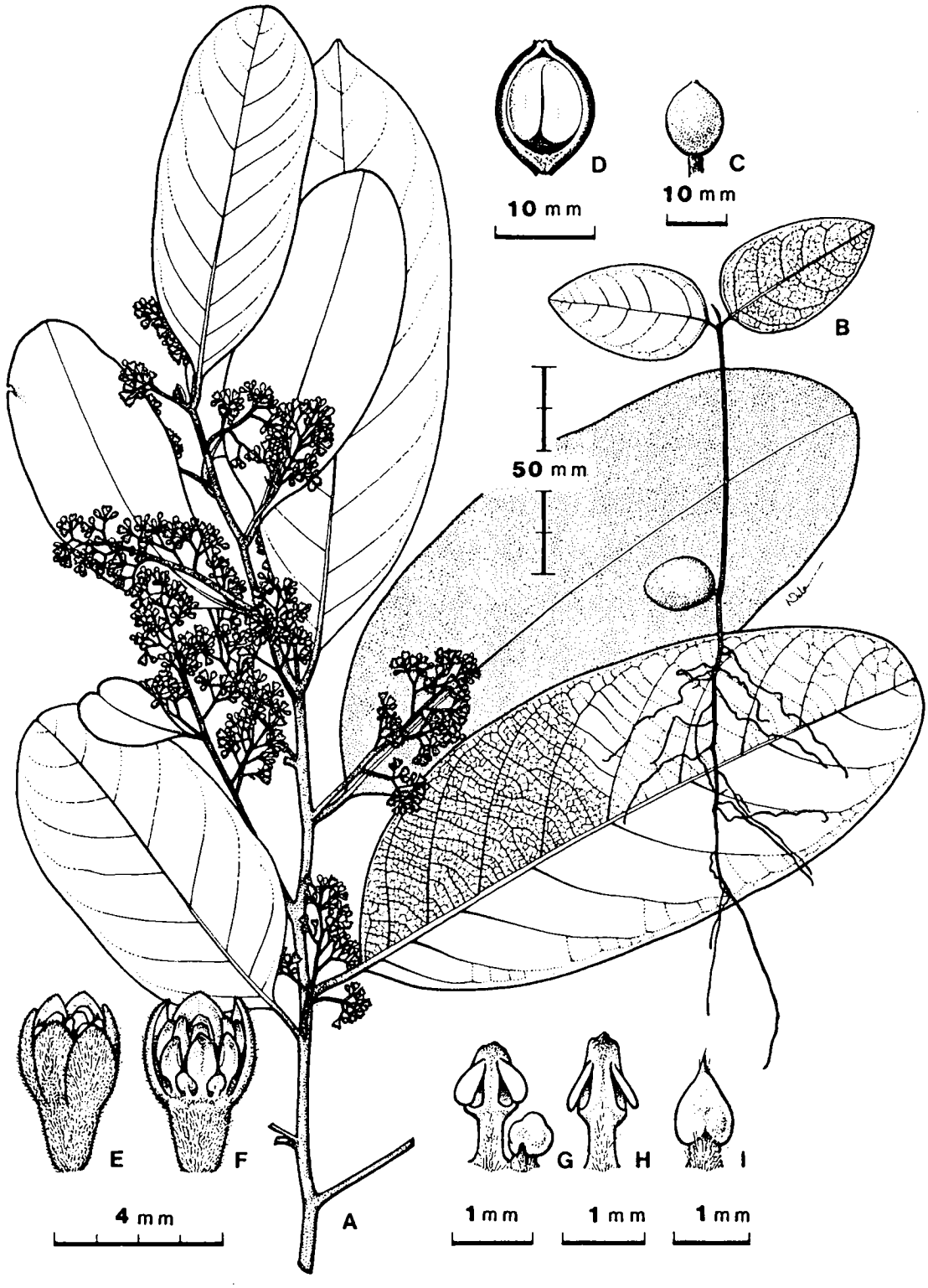

Fig.13. Cryptocarya brassii. A Habit Hyland 10038; B seedling, C fruit, D fruit (LS) Hyland 10947; E flower, F flower (side view, 3 tepals removed), G stamen (outer whorl, adaxial view showing gland), H stamen (inner whorl, abaxial view), I staminode (adaxial view) Hyland 10038.

cream, unpleasantly perfumed, not opening very widely, the tepals remaining ± erect at anthesis. Pedicel nil or up to 0.8 x 0.6-0.7 mm. Perianth tube 1.5-1.6 x 1.6-1.8 mm, inner surface pubescent throughout, outer tepals usually shorter, 1.4-1.7 x 1.1-1.4 mm, inner tepals 1.4-1.9 x 1.0-1.3 mm, all tepals pubescent on both their inner and outer surfaces. Outer anthers glabrous adaxially but usually with a few hairs near the base and sometimes also along the midline on the abaxial surface, 0.7-0.9 x 0.5-0.7 mm, filaments pubescent, 0.3-0.6 mm long; gland heads glabrous, 0.4-0.6 x 0.4-0.5 mm, stalks pubescent, 0.3-0.5 mm long. Inner anthers glabrous abaxially but pubescent at the base and along part of the midline on the adaxial surface, 0.8-1.0 x about 0.5 mm, filaments pubescent, 0.5-0.6 mm long. Staminodes differentiated, head cordate, glabrous adaxially, but pubescent along the midline on the abaxial surface, 0.8-1.1 mm long, filaments pubescent, 0.2-0.4 mm long. Ovary glabrous, 1.0-1.4 x 0.5-0.6 mm, style glabrous, 1.1-1.4 mm long. Fruits black or blue-black when ripe, ellipsoid, 14-15 x about 11 mm, mesocarp + exocarp about 0.4 mm thick, endocarp 0.5-0.6 mm thick. Seed 10.0-10.5 x 8.0-8.5 mm, testa 0.05-0.1 mm thick, radicle apical. Cotyledons cream or yellowish, uniform in texture. Seedling leaves glaucous on the underside, cataphylls absent, first pair of leaves opposite. (Figs 13, 70 C)

Distribution

Limited to Cape York Peninsula in Australia, (Fig. 90, Map 15), also found in New Guinea.

Ecology

Gallery forests of Cape York Peninsula on alluvial soils.

Altitudinal range quite small: 40-100 m.

Uses

This species has no commercial value as it seldom grows large enough to produce millable logs and furthermore it grows in remote areas where forests are little utilized. It has only recently been recognized as a distinct species and has not been given a Standard Trade Name. Wood S.G. 0.85.

Notes and Observations

Flowers have been collected in September, while ripe fruits have been collected in November and December. Seedling germination period 25-80 days.

Superficially similar to the New Guinea species C. forbesii Gamble, but specifically distinct from it.

Specimens Examined (20 collections examined)

6. Cryptocarya burckiana Warb., Bot. Jahrb. Syst. 13:315 (1891).
Type: O. Warburg 20503, Key Island (A isotype).

Tree to 10 m tall x 20 cm dbh, usually small or very small. Stem with or without buttresses. Bark nondescript, outer blaze brown, granular in texture. Twigs fluted or angular in cross section, clothed in tortuous, brown, erect hairs. Leaves: Underside green clothed in mainly straight, white or pale brown, mainly appressed hairs when young but eventually becoming almost glabrous, domatia (tufts of hair) usually visible in the axils of the main primary veins. Leaf blade ovate, lanceolate or elliptical, apex acuminate,

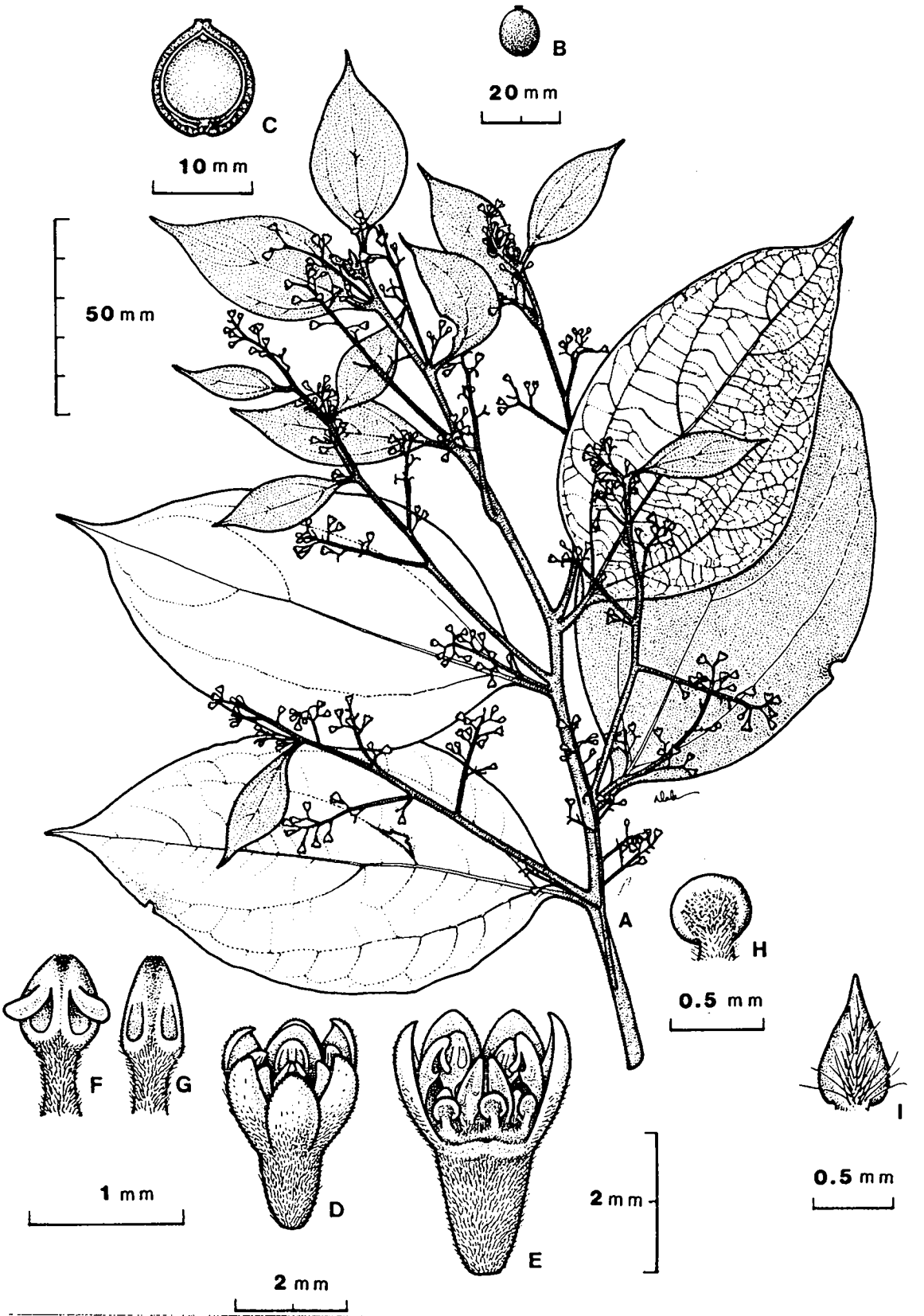

Fig.14. Cryptocarya burckiana. A Habit Hyland 6655; B fruit Hyland 6164; C fruit (LS) Hyland 3552 RFK; D flower, E flower (side view, 2 tepals and 2 stamens removed), F stamen (outer whorl, adaxial view), G stamen (inner whorl, abaxial view), H gland (abaxial view), I staminode (abaxial view) Hyland 6655.

base attenuate or shortly attenuate, 10.5-16.5 x 4.5-8.0 cm (mean 13.6 x 6.4); triplinerved, primary veins 3-5 pairs, midrib raised or flush with the upper surface; petiole 6-13 mm long (mean 8.4), flat on the upper surface. Inflorescence paniculate or sometimes almost racemose, scarcely exceeding the leaves, mainly axillary; bracts lanceolate, 0.6-1.4 mm long, sometimes persistent, present or absent at anthesis. Flowers cream, without any obvious perfume, opening quite widely but the tepals remaining ± erect at anthesis. Pedicel 0.1-0.6 x 0.5-0.6 mm. Perianth tube 1.4-2.0 x 1.4 mm, inner surface pubescent towards the apex but mainly glabrous on the lower half. Outer and inner tepals of similar dimensions, about 1.1-1.9 x 0.8-1.3 mm, all tepals pubescent on both their inner and outer surfaces. Outer anthers mainly glabrous adaxially but pubescent at the base and along the midline on the abaxial surface, 0.5-0.6 x 0.5-0.6 mm, filaments pubescent, 0.3-0.4 mm long; gland heads glabrous, 0.3-0.4 x 0.4 mm, stalks pubescent, about 0.25 mm long. Inner anthers glabrous, 0.5-0.7 x 0.4-0.5 mm, filaments pubescent, 0.3-0.6 mm long. Staminodes ± sagittate, glabrous adaxially but pubescent at the base and along the midline of the abaxial surface, 0.7-0.9 mm long, filaments hairy, 0.2-0.4 mm long. Ovary glabrous, 0.9-1.8 x 0.5-0.6 mm, style glabrous, 0.8-1.0 mm long. Fruits black when ripe, globular, 13-15 x 11-13 mm, mesocarp + exocarp 0.3-0.5 mm thick, endocarp 0.4-0.8 mm thick. Seed 9-10 x 9-10 mm, testa 0.1-0.3 mm thick, radicle usually apical, sometimes to the side. Cotyledons cream, uniform in texture. Seedling leaves green on the underside, cataphylls absent, first pair of leaves opposite. (Fig. 14)

Distribution

Limited to Cape York Peninsula in Australia (Fig. 91, Map 21), also in eastern Malesia (Key Island).

Ecology

Lowland rain forests and gallery forests of Cape York Peninsula, soil preference unknown. Altitudinal range: Sea level to 100 m.

Uses

This species has no commercial value as it does not grow large enough to produce millable logs and has not been given a Standard Trade Name. Wood S.G. 1.01.

Notes and Observations

Flowers have been collected in November, December and January, while fairly mature fruits have been collected in October and fully ripe fruits in November and December. Seedling germination period 20-40 days.

Specimens Examined (19 collections examined)

7. Cryptocarya clarksoniana B. Hyland sp. nov.
Differt a C. bidwillii et speciebus affinibus costa supra elevata et tepalis 1.1-1.4 mm longis.
Typus: B. Gray 2966: State Forest Reserve 700 Gadgarra, 3.ii.1983 (holotypus QRS).
Differs from C. bidwillii and related species, the midrib raised above and the tepals 1.1-1.4 mm long.

Tree to 19 m tall x 30 cm dbh, usually small and well formed. Stem without buttresses. Bark flaky or nondescript, outer blaze pink, red or brown, granular in texture, often emitting an odour, difficult to describe. Twigs ± terete or slightly fluted, clothed in straight,

white or pale brown, appressed hairs when young, eventually becoming almost glabrous. Leaves: Underside green, clothed in straight, white or pale brown, appressed hairs when young, but soon becoming almost completely glabrous. Leaf blade lanceolate or elliptical, apex acuminate, base attenuate, 5.5-15.0 x 2.0-5.0 cm (mean 10.0 x 3.1); usually penninerved, sometimes somewhat triplinerved, primary veins 2-10 pairs (mode 6), midrib slightly raised or almost flush with the upper surface, petiole 5-10 mm long (mean 7.4), flat or shallowly channelled on the upper surface. Inflorescence paniculate, not exceeding the leaves, axillary and pseudoterminal; bracts linear, lanceolate or triangular 0.4-0.8 mm long, deciduous, absent at anthesis. Flowers cream or creamy green, pleasantly perfumed or without any obvious perfume, opening quite widely but the tips of the tepals remaining ± erect at anthesis. Pedicel 0.4-1.5 x 0.5-0.6 mm. Perianth tube 1.1-1.5 x 1.1-1.4 mm, inner surface glabrous or sparsely pubescent throughout. Inner tepals wider than the outer, outer tepals 1.1-1.8 x 0.8-1.0 mm, inner tepals 1.2-1.7 x 1.1-1.3 mm, all tepals pubescent on both their inner and outer surfaces. Outer anthers glabrous adaxially, abaxial surface glabrous or pubescent towards the base, 0.5-0.6 x 0.5-0.6 mm, filaments pubescent, 0.4-0.7 mm long; gland heads glabrous, 0.3-0.4 x 0.3-0.5 mm, stalks pubescent, 0.2-0.5 mm long. Inner anthers glabrous, rarely pubescent along the midline on the abaxial surface, 0.6-0.7 x 0.4-0.5 mm, filaments pubescent, 0.5-0.6 mm long. Staminodes differentiated, head cordate or sagittate (apex acuminate), glabrous adaxially, but pubescent along the midline on the abaxial surface, 0.7-0.9 mm long, filaments pubescent, 0.2-0.5 mm long. Ovary glabrous, 0.9-1.2 x 0.5-0.6 mm, style glabrous, 0.6-1.3 mm long. Fruits black when ripe, globular or ellipsoid, 14-15

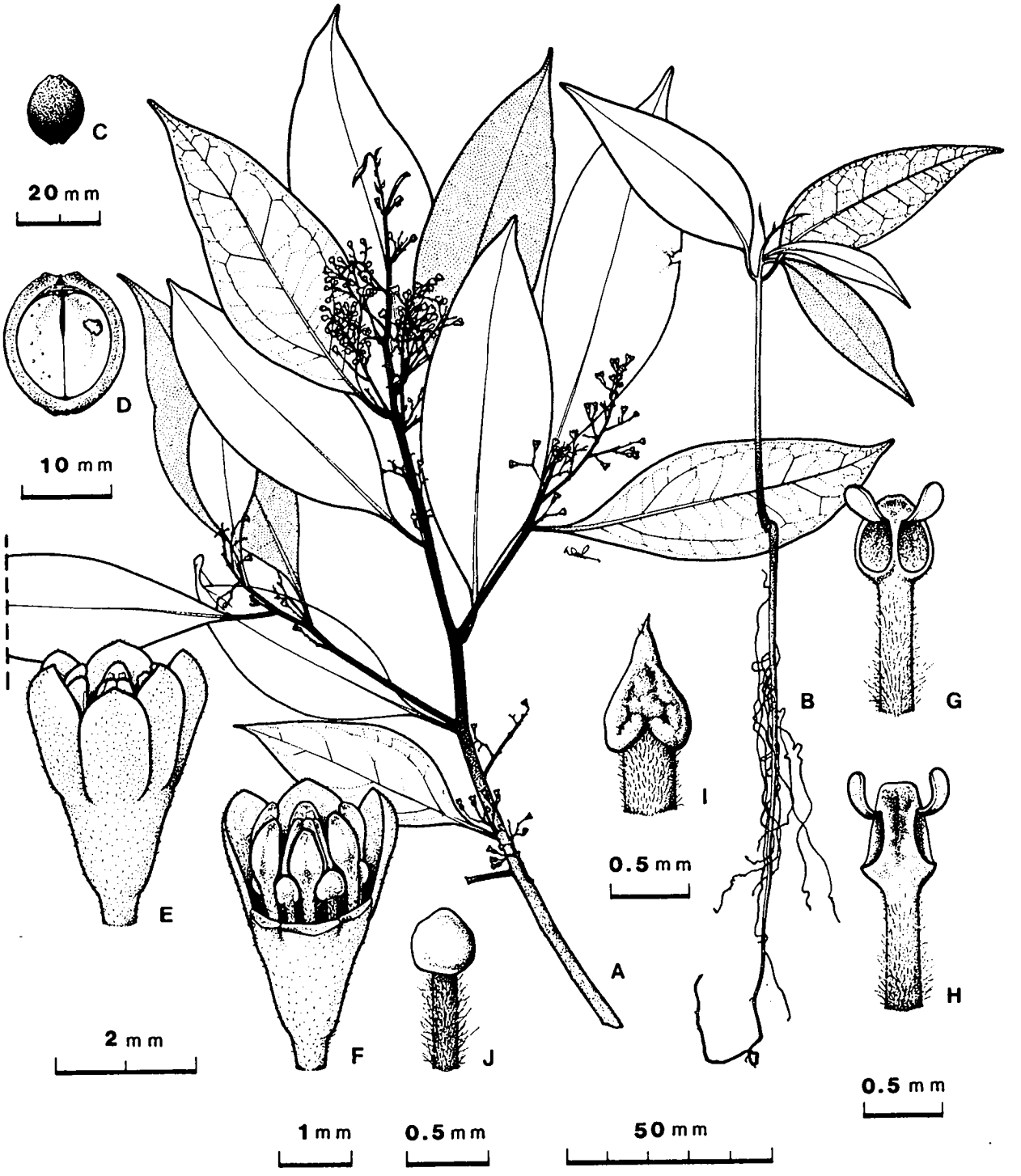

Fig.15. Cryptocarya clarksoniana. A Habit Gray 2966; B seedling, C fruit, D fruit (LS) Hyland 9638; E flower, F flower (side view, 3 tepals removed), G anther (outer whorl, adaxial view), H anther (inner whorl, abaxial view), I staminode (abaxial view), J gland (adaxial view) Gray 2966.

x 11-13 mm, mesocarp + exocarp 0.2-0.5 mm thick, endocarp 0.2-0.4 mm thick. Seed 10-12 x 9-11 mm, testa about 0.1 mm thick, radicle apical or somewhat lateral. Cotyledons cream, uniform in texture. Seedling leaves green on the underside, cataphylls absent, first pair of leaves opposite or subopposite. (Fig. 15)

Distribution (Fig. 91, Map 20)

Ecology

Rain forests of northern Queensland, particularly the more seasonal rain forests rich in Agathis robusta, on soils derived from granite. Altitudinal range: Sea level to 1100 m.

Uses

This species has no commercial value as it does not grow large enough to produce millable logs and it does not have a Standard Trade Name. Wood S.G. 0.94.

Notes and Observations

Flowers have been collected each month from December to March, while ripe fruits have been collected in January, February, July, October and December. Seedling germination period 20-350 days.

Etymology

It gives me great pleasure to name this species after Mr J.R. Clarkson, bastion of Scotch culture, who has assisted me in my botanical endeavours.

Specimens Examined (38 collections examined)

8. Cryptocarya claudiana B. Hyland sp. nov.
Differt a C. clarksoniana tubo perianthii intus basi glabro.
Typus: B. Hyland 11499: Claudie River, 20.i.1982 (holotypus QRS).
Differs from C. clarksoniana, the inner surface of the perianth tube glabrous at the base.

Tree to 10 m tall x 20 cm dbh, usually small. Stem without buttresses. Bark nondescript, outer blaze pink or brown, sometimes speckled and striped, granular in texture, sometimes emitting a noticeable odour, difficult to describe. Twigs ± terete (slightly fluted only when very young), clothed in straight, pale brown, appressed hairs when very young, but soon becoming glabrous. Leaves: Underside green, clothed in straight, white or pale brown, appressed hairs when young but soon becoming glabrous. Leaf blade lanceolate, elliptical or narrowly elliptical, apex usually abruptly acuminate or acute, base cuneate or shortly attenuate, 8.5-16.0 x 3.0-6.5 cm (mean 12.7 x 4.7); penninerved, primary veins 6-12 pairs (mode 8), midrib raised (usually raised in a depression) on the upper surface; petiole 5-13 mm long (mean 8.3), flat or shallowly channelled on the upper surface. Inflorescence paniculate, not exceeding the leaves, usually axillary, seldom pseudoterminal; bracts navicular, 0.4-0.6 mm long, deciduous, absent at anthesis. Flowers cream, creamy green or pale green, faintly perfumed or sweetly scented, opening quite widely but the tepals remaining ± erect at anthesis. Pedicel 0.3-0.6 x about 0.5 mm. Perianth tube 1.2-1.3 x 1.3-1.5 mm, inner surface pubescent throughout, sometimes only sparsely on the lower half. Outer and inner tepals of similar dimensions, 1.6-1.8 x 1.2-1.4 mm, all tepals pubescent on both their inner and outer surfaces. Outer anthers glabrous adaxially but pubescent near the base and sometimes also

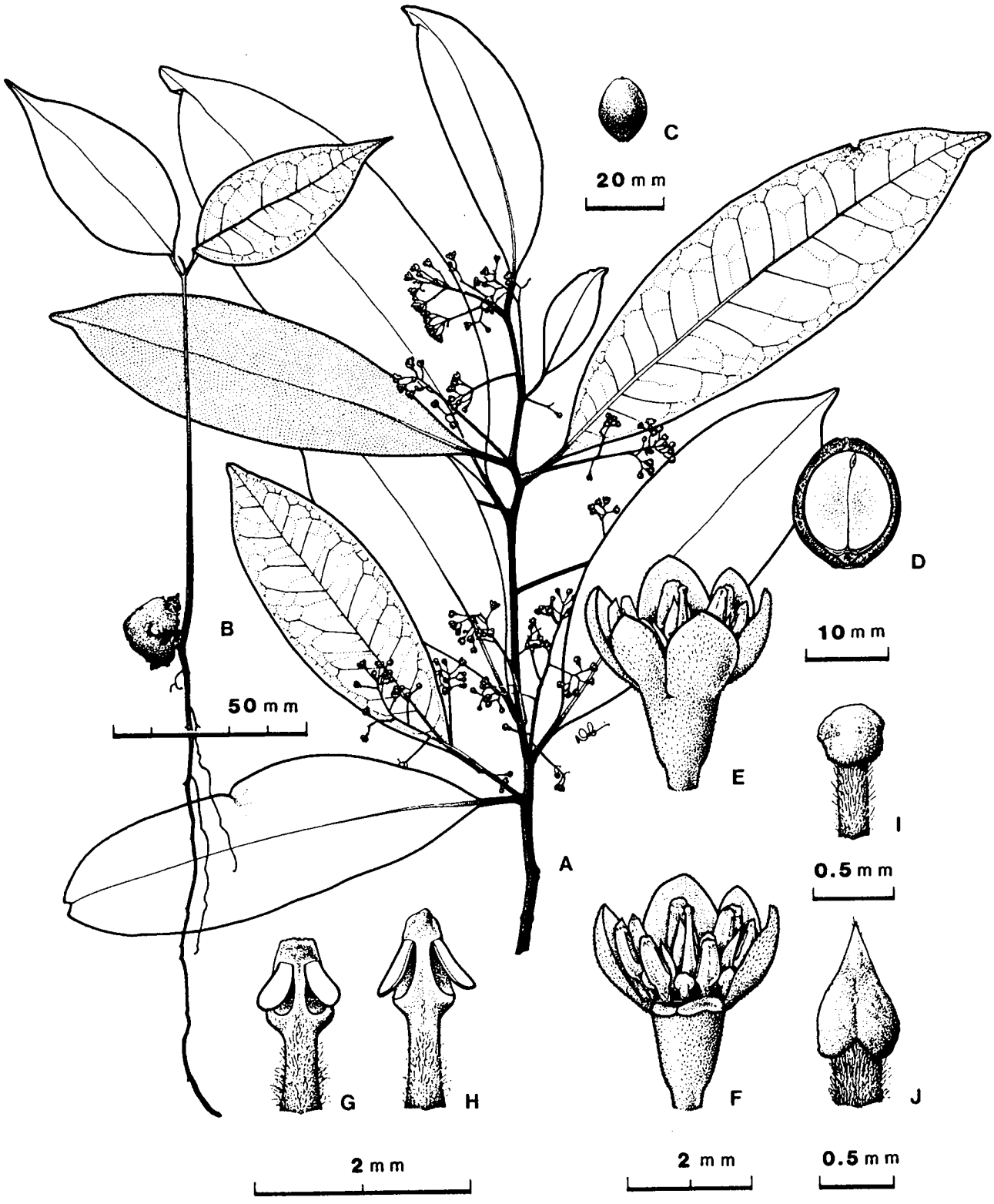

Fig.16. Cryptocarya claudiana. A Habit Hyland 11499; B seedling, C fruit, D fruit (LS) Hyland 12416; E flower, F flower (side view, 2 tepals removed), G anther (outer whorl, adaxial view), H anther (inner whorl, abaxial view), I gland (adaxial view), J staminode (adaxial view) Hyland 11499.

along the midline on the abaxial surface, about 0.7 x 0.5-0.6 mm, filaments pubescent, about 0.6 mm long; gland heads glabrous, 0.4-0.5 x 0.4-0.5 mm, stalks pubescent, 0.3-0.4 mm long. Inner anthers glabrous, 0.7-0.8 x about 0.5 mm, opening sideways, filaments pubescent, about 0.7 mm long. Staminodes differentiated, head cordate, sagittate, apex acuminate, glabrous adaxially but pubescent along the midline on the abaxial surface, 0.9-1.1 mm long, filament pubescent, about 0.3 mm long. Ovary glabrous, 0.9-1.0 x about 0.5 mm, style glabrous, 1.3-1.6 mm long. Fruits black when ripe, usually ellipsoid, sometimes globular, 14-16 x 11-13 mm, mesocarp + exocarp 0.5-0.7 mm thick, endocarp 0.4-0.6 mm thick. Seed 11-12 x 8-11 mm, testa 0.1-0.5 mm thick, radicle apical. Cotyledons cream, uniform in texture. Seedling leaves green on the underside, cataphylls absent, first pair of leaves opposite. (Fig. 16)

Distribution (Fig. 91, Map 20)

Ecology

Rain forests of Cape York Peninsula on soils derived from granite and metamorphic rocks. Altitudinal range: Sea level to 500 m.

Uses

This species has no commercial value as it does not grow large enough to produce millable logs and does not have a Standard Trade Name. Wood S.G. 0.97.

Notes and Observations

Flowers have been collected in January, while ripe fruits have been collected in December. Seedling germination period 18-21 days.

This species is related to C. clarksoniana but differs from it sufficiently to be regarded as a distinct species. In C. claudiana the leaves tend to be larger and the inner surface of the perianth tube is pubescent only near the apex and not over the entire inner surface as is the case in C. clarksoniana.

Etymology

The specific epithet was chosen for this species because it was first recognized as a distinct taxon from specimens collected on the Claudie River.

Specimens Examined (19 collections examined)

9. Cryptocarya cocosoides B. Hyland sp. nov.
Differt a C. cunninghamii laminae venis lateralibus paucioribus et apice acuminato.
Typus: B. Gray 297: State Forest Reserve 700, Gillies L.A. 16.ii.1977 (holotypus QRS).
Differs from C. cunninghamii by fewer lateral veins and acuminate leaf apex.

Trees to 30 m tall x 80 cm dbh, usually medium sized and well formed. Stem usually buttressed, except in the smaller size classes. Bark nondescript, outer blaze cream or brown, granular in texture, emitting a strong odour resembling coconut. Twigs fluted, densely clothed in tortuous, brown, erect, hairs which persist until the twigs are quite old. Leaves: Underside colour often hidden by the dense covering of straight and tortuous, brown, appressed and erect hairs when young but less so when older, when glaucousness becomes apparent. Leaf blade lanceolate or elliptical, apex acuminate, base attenuate or shortly attenuate, 7.3-15.0 x 2.5-5.5 cm (mean 9.3 x 3.5); penninerved, primary veins 3-4 pairs, midrib depressed or flush

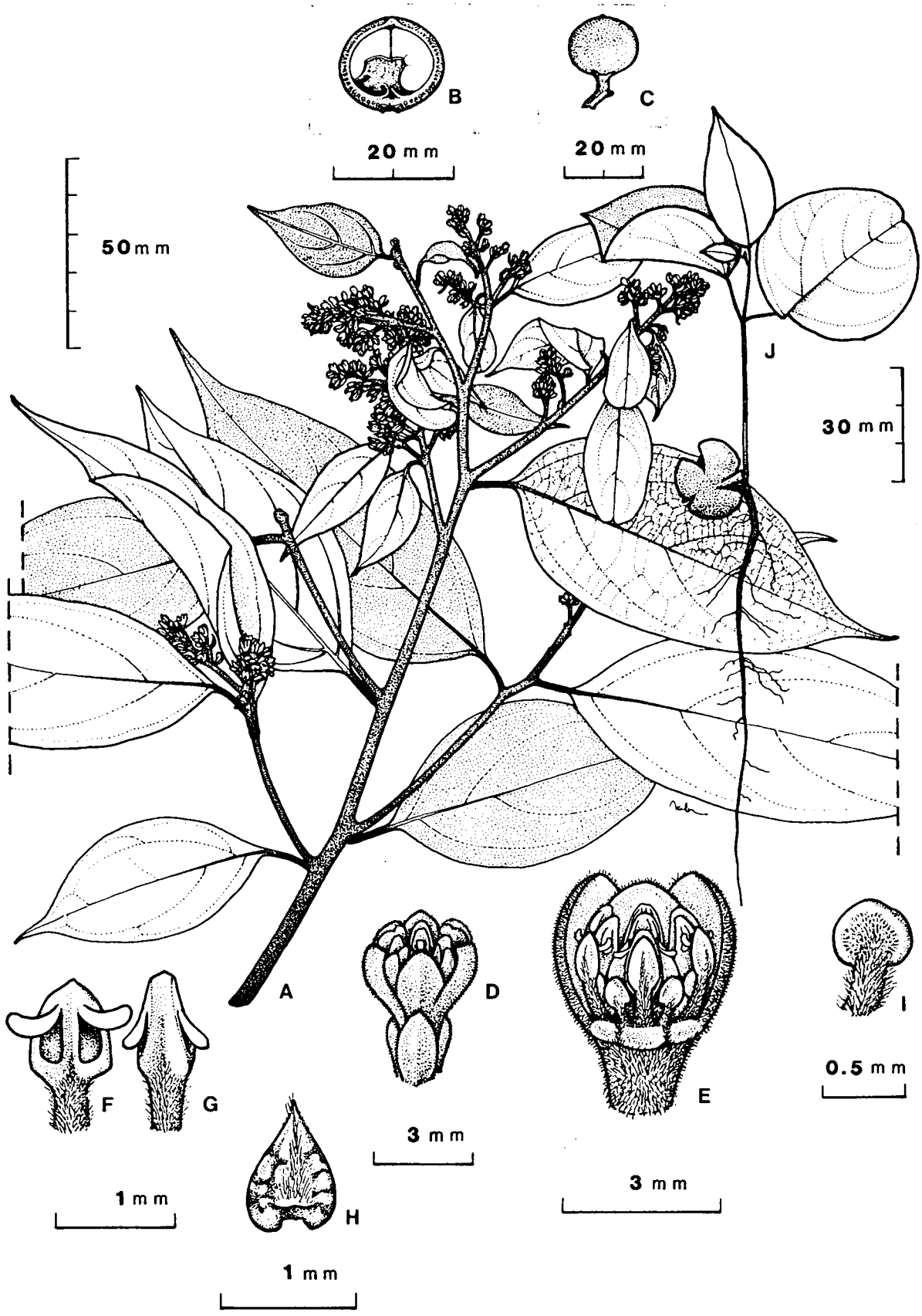

Fig.17. Cryptocarya cocosoides. A Habit Gray 297; B fruit (LS), C fruit Gray 810; D flower, E flower (side view, 3 tepals removed), F stamen (outer whorl, adaxial view), G stamen (inner whorl, abaxial view), H staminode (abaxial view), I gland (abaxial view) Gray 297; J seedling Gray 810.

with the upper surface; petiole 8-17 mm long (mean 11.7), flat or channelled on the upper surface. Inflorescence paniculate, scarcely exceeding the leaves, axillary and pseudoterminal; bracts usually lanceolate, sometimes triangular or navicular, 1.5-3.0 mm long, persistent, present at anthesis. Flowers cream to green, unpleasantly perfumed?, not opening very widely, the tepals remaining ± erect at anthesis. Pedicel absent or 0.1-0.5 x 0.6-0.9 mm. Perianth tube 1.2-2.9 x 1.7-2.0 mm, inner surface glabrous throughout, outer tepals longer, 1.8-2.5 x 1.4-1.7 mm, inner tepals 1.6-2.3 x 1.3-1.6 mm, all tepals pubescent on both their inner and outer surfaces. Outer anthers glabrous adaxially but pubescent abaxially, at least towards the base and sometimes along the midline, 0.6-0.9 x 0.6-0.8 mm, filaments pubescent, 0.5-1.0 mm long; gland heads glabrous, 0.4-0.6 x 0.4-0.5 mm, stalks pubescent, 0.4-0.8 mm long. Inner anthers pubescent along the midline adaxially but usually glabrous on the abaxial surface, 0.7-1.0 x 0.5-0.6 mm, filaments pubescent, 0.6-1.0 mm long. Staminodes differentiated, head cordate or sagittate, glabrous adaxially but pubescent along the midline of the abaxial surface, 0.8-1.3 mm long, filament pubescent, 0.4-0.6 mm long. Ovary glabrous, 0.9-1.2 x 0.5-0.7 mm, style glabrous, 1.5-1.9 mm long. Fruits purple or black when ripe, globular or depressed globular, 14-15 x 16-17 mm, mesocarp + exocarp 0.7-1.0 mm thick, endocarp 0.5-0.8 mm thick. Seed about 10 x 13-14 mm, testa 0.1-0.3 mm thick, radicle apical. Cotyledons white or cream, ruminate. Seedling leaves glaucous on the underside, cataphylls absent, first pair of leaves opposite. (Fig. 17)

Distribution (Fig. 91, Map 21)

Ecology

Mountain rain forests of northern Queensland, particularly on soils derived from granite. Altitudinal range: 750-1150 m.

Uses

This species has occasionally been logged and converted to sawn timber. Standard Trade Name - Coconut Laurel. Wood S.G. 0.65-0.75.

Notes and Observations

Flowers have been collected in January and February, while ripe fruits have been collected in September, November and December. Seedling germination period 24-46 days.

All parts of this species emit a strong odour when cut or broken. The blaze odour is usually equated with coconut but crushed leaves emit an odour like citronellal. These all pervading odours completely cloy any observers senses and it is impossible to make worthwhile notes on odours for a long period of time after handling C. cocosoides.

The flowers of C. cocosoides probably emit an obnoxious odour but it is impossible to detect it on recently collected specimens because of the very strong twig and leaf odours.

This species should be handled with care as it is suspected of causing dermatitis in some cases.

C. cocosoides may be related to C. microcos Kosterm. of the Celebes as they have a similar appearance and both appear to have ruminate cotyledons.

Etymology

The specific epithet was applied because of the strong coconut odour emitted from the freshly cut bark of this species.

Specimens Examined (37 collections examined)

10. Cryptocarya corrugata C. White & Francis, Proc. Roy. Soc. Queensland 37:165 (1926); Francis, Austral. Rain-Forest Trees ed.2:405 (1951).
Type: W.D. Francis, Eungella Range (BRI 10076 holotype, MEL 623246, K isotypes).

Tree to 35 m tall x 90 cm dbh, usually medium to large sized and well formed. Stem buttressed in the larger but not the smaller size classes. Bark usually flaky, occasionally nondescript, rarely fissured, outer blaze usually pink, occasionally red or brown, usually granular in texture, occasionally fibrous, usually emitting a conspicuous odour like that of sugarcane, sapwood surface often corrugated. Twigs fluted, clothed in tortuous, brown, erect, quite persistent hairs. Leaves: Underside slightly glaucous, clothed in tortuous, brown, erect hairs when young but eventually becoming almost glabrous. Leaf blade elliptical or ovate, apex acuminate, acute or obtuse, base shortly attenuate or truncate, 3.5-11.0 x 2.0-5.5 cm (mean 6.5 x 3.3); penninerved, primary veins 3-5 pairs (mode 4), midrib depressed on the upper surface; petiole 6-18 mm long (mean 9.6), flat or channelled on the upper surface. Inflorescence paniculate, scarcely exceeding the leaves, axillary and pseudoterminal; bracts linear to spathulate, 0.7- 1.4 mm long, deciduous, absent at anthesis. Flowers cream or greenish, slightly perfumed or without any obvious odour, opening quite widely but the

tepals remaining ± erect at anthesis. Pedicel 0.1-0.8 x 0.5-0.7 mm. Perianth tube 0.8-1.4 x 1.3-1.7 mm, inner surface glabrous throughout, outer and inner tepals of similar dimensions, 1.4-2.4 x 0.8-1.4 mm, all tepals pubescent on both their inner and outer surfaces. Outer anthers glabrous adaxially but pubescent on the abaxial surface, at least at the base but often extending along the midline, 0.6-0.8 x about 0.5-0.7 mm, filaments pubescent, 0.5-0.8 mm long; gland heads glabrous, 0.2-0.5 x 0.3-0.5 mm, stalks pubescent, 0.3-0.5 mm long. Inner anthers usually partly pubescent on both the adaxial and abaxial surfaces, rarely glabrous, 0.6-0.9 x 0.4-0.5 mm, filaments pubescent, 0.4-0.9 mm long. Staminodes differentiated, head sagittate, glabrous adaxially, pubescent along the midline of the abaxial surface, 0.7-1.2 mm long, filament pubescent, 0.3-0.6 mm long. Ovary glabrous, 0.7-1.4 x 0.5-0.7 mm, style glabrous, 0.9-1.7 mm long. Fruits black or bluish black when ripe, wider than long, sometimes bilobed, 15-22 x 22-34 mm, mesocarp + exocarp 0.3-0.7 mm thick, endocarp 0.3-0.6 mm thick. Seed 14.5-20 x 20-32 mm, testa 0.05-0.15 mm thick, radicle apical. Cotyledons yellowish, sometimes cream, uniform in texture. Seedling leaves glaucous on the underside, cataphylls absent, first pair of leaves opposite.

Distribution (Fig. 93, Map 34)

Ecology

Mountain rain forests of central and northern Queensland, on soils derived from a variety of rock types. Altitudinal range: 350-1200 m.

Uses

This species produces millable logs and the sawn timber is marketed

as Corduroy Laurel, a useful but not very popular species in the timber trade. Wood S.G. 0.69-0.80.

Notes and Observations

Flowers have been collected in November and January, while ripe fruits have been collected in June and each month from August to January. Seedling germination period 23-60 days.

Kostermans (1967) placed C. corrugata in synonymy with C. engleriana Teschn. Although they appear to be closely related, I believe they differ sufficiently to be maintained as separate species.

Specimens Examined (87 collections examined)

11. Cryptocarya cunninghamii Meissner in DC., Prodr 15(1):73 (1864).
Cryptocarya glaucescens var. cunninghamii (Meissner) Benth., Fl. austral. 5:297 (1870).
Lectotype (here designated): A. Cunningham 221, Hunter's River, Brunswick Bay (G-DC)(A, BM?, BRI 240362, K,isotypes).
Syntype: A. Cunningham 228, Hunter's River, Brunswick Bay (K).

Tree to 25 m tall x 40 cm dbh, usually small and well formed. Stem with or without buttresses. Bark usually nondescript, occasionally flaky, outer blaze cream or brown, usually granular in texture, occasionally fibrous, always emitting a strong odour resembling that of coconut. Twigs fluted when young and clothed in mainly straight, white or pale brown, mainly appressed hairs. Leaves: Underside green, clothed in straight, white, appressed hairs when young but almost completely glabrous at maturity. Leaf blade oblong or elliptical, apex usually obtuse or rounded, occasionally acuminate, base shortly

attenuate or cuneate, 6.5-13.5 x 2.4-5.6 cm (mean 9.7 x 3.7); penninerved, primary veins 4-8 pairs, midrib depressed on the upper surface; petiole 5-12 mm long (mean 8.2), channelled on the upper surface. Inflorescence paniculate, scarcely exceeding the leaves, axillary and pseudoterminal; bracts lanceolate, navicular or spathulate 1.0-1.7 mm long, persistent, present at anthesis. Flowers yellowish green, green, cream or greenish cream, unpleasantly perfumed, opening fairly widely but the tepals remaining ± erect at anthesis. Pedicel nil or up to 0.7 x 0.5-0.7 mm. Perianth tube 1.0-1.5 x 1.2-1.7 mm, inner surface pubescent at the apex but glabrous on the lower half, outer and inner tepals of similar dimensions, 1.3-2.0 x 0.9-1.1 mm, all tepals pubescent on both their inner and outer surfaces. Outer anthers glabrous on both surfaces, 0.7-0.8 x 0.5-0.6 mm, filaments pubescent, 0.4-0.7 mm long; gland heads glabrous, 0.4-0.6 x 0.3-0.5 mm, stalks pubescent, 0.2-0.5 mm long. Inner anthers usually glabrous, occasionally with a few basal hairs on the adaxial surface, filaments pubescent, 0.4-0.7 mm long. Staminodes differentiated, head ± cordate, glabrous adaxially, but pubescent along the midline on the abaxial surface, 0.7-1.0 mm long, filaments pubescent, 0.2-0.4 mm long. Ovary usually glabrous, occasionally sparsely pubescent, 0.8-1.1 x about 0.5 mm, style usually glabrous, occasionally sparsely pubescent, 0.9-1.5 mm long. Fruits black or purplish black when ripe, globular, 13-15 x 13-16 mm, mesocarp + exocarp 0.4-0.7 mm thick, endocarp 0.6-0.9 mm thick. Seed 9-12 x 9.5-13.0 mm, testa 0.1-0.3 mm thick, radicle apical. Cotyledons white or cream, ruminate. Seedling leaves green on the underside, cataphylls absent, first pair of leaves opposite.

Distribution

Northern Australia (Fig. 100, Map 70), probably also in New Guinea.

Ecology

Rain forests and monsoon forests of northern Queensland, Northern Territory and the Kimberley Region of Western Australia. Altitudinal range: Sea level to 500 m.

Uses

This species has little commercial value as it seldom grows large enough to produce millable logs, but it has been given the Standard Trade Name of Cunningham's Laurel. Wood S.G. 0.75.

Notes and Observations

Flowers have been collected in May, July, August, September and October, while ripe fruits have been collected in March and each month from June to November. Seedling germination period 50-110 days.

Care should be exercised when handling this species as the sawdust has been known to cause dermatitis, particularly in hot weather.

The fruits should also be handled with care as they can cause a burning sensation on the skin. They should never be placed in the mouth. J. Dallachy (12.ix.1867) was probably the first observer to record the effects of this species and the label on his specimen is interesting to read today. Among other things he noted: "The fruit is very hot. So is the leaves and bark. The trooper that was with me said 'Bad fellow that bit his mouth very much'. I felt the taste of it for (more?) than an hour, but he eat more of the fruit than I did" MEL 622543-4.

C. cunninghamii appears to be closely related or conspecific with a number of specimens collected from various localities on the island of New Guinea most of which should probably be referred to C. aromatica (Beccari) Kosterm (1949). However, I am not prepared to relegate the name C. aromatica (Beccari) Kosterm. to synonymy, as I have not seen the type of the basionym Massoia aromatica Beccari (1880), but it is obvious that the name C. cunninghamii would have priority. C. novo-guineensis Teschner (1923) is another probable synonym.

A very hirsute, sterile collection from the Northern Territory (C. R. Dunlop 5465) has been included in this species. It is possible that it represents a new species but it is not possible to make a reasoned judgement with the available material.

Specimens Examined (113 collections examined)

12. Cryptocarya densiflora Blume, Bijdr. Fl. Nederl. Ind. 11:556 (1826).
Type: C. Blume, Mount Salak, Java (BO).
Cryptocarya cinnamomifolia Benth., Fl. austral. 5:298 (1870); Bailey, Queensl. fl. 4:1300 (1901); Francis, Austral. Rain-Forest Trees ed.2:405 (1951).
Syntypes: J. Dallachy, Rockingham Bay (K - Two sheets, MEL 565990-2, WRSL isosyntype?).

Tree to 30 m tall and 70 cm dbh, usually small to medium sized. Stem usually buttressed in the larger but not the smaller size classes, often with coppice shoots at the base. Bark usually nondescript, occasionally flaky, outer blaze pink or red, occasionally brown, granular in texture, sapwood surface usually corrugated i.e. marked by longitudinal grooves. Twigs fluted, clothed in straight, brown, appressed hairs when young, but sometimes almost glabrous when older. Leaves: Underside usually glaucous, clothed in straight, pale

brown, appressed hairs when young but eventually becoming almost glabrous, small foveoles sometimes visible in the axils of the basal pair of primary veins. Leaf blade lanceolate, apex acuminate, base attenuate or shortly attenuate, 6.8-15.0 x 2.5-6.0 cm (mean 10.1 x 4.1); triplinerved, primary veins 2-5 pairs (mode 3), midrib depressed, occasionally flush with the upper surface; petiole 7-16 mm long (mean 11.8), channelled on the upper surface. Inflorescence paniculate, sometimes exceeding the leaves, axillary and pseudoterminal; bracts navicular, 1.0-1.4 mm long, deciduous, absent at anthesis. Flowers yellowish green, cream or pale brown, without any obvious perfume, opening fairly widely but the tepals remaining ± erect at anthesis. Pedicel nil or up to 0.5 x 0.7-0.9 mm. Perianth tube 1.0-1.6 x 1.4-1.9 mm, inner surface pubescent throughout, outer tepals usually longer and narrower than the inner tepals, outer tepals 1.9-2.7 x 0.9-1.4 mm, inner tepals 1.8-2.5 x 1.1-1.6 mm, all tepals pubescent on both their inner and outer surfaces. Outer anthers glabrous on the adaxial and usually glabrous on the abaxial surface, 0.6-0.9 x about 0.6 mm, filaments pubescent, 0.5-0.9 mm long; gland heads glabrous, 0.4-0.7 x 0.4-0.5 mm, stalks at least partly pubescent, 0.4-0.7 mm long. Inner anthers glabrous abaxially but pubescent adaxially, at least along the midline, 0.7-1.0 x about 0.5 mm, filaments pubescent, 0.5-1.0 mm long. Staminodes differentiated, head ± cordate, glabrous adaxially but with a strip of hairs on the abaxial surface, 0.8-1.1 mm long, filament pubescent, 0.2-0.5 mm long. Ovary glabrous, 0.9-1.2 x 0.5-0.6 mm, style glabrous, 1.2-2.0 mm long. Fruits reddish or maroon but black when perfectly ripe, longitudinally ribbed, depressed globular, 11-14 x 13-19.5 mm, mesocarp + exocarp 0.6-1.2 mm thick, endocarp 0.4-0.8 mm thick. Seed

7-10 x 11-15 mm, testa 0.1-0.6 mm thick, sometimes much thicker on one side of the seed than on the other, radicle apical. Cotyledons white or cream, uniform in texture, emitting a strong odour when cut. Seedling leaves glaucous on the underside, cataphylls absent, first pair of leaves opposite.

Distribution

North eastern Queensland (Fig. 93, Map 33), also in Malesia as far west as Java.

Ecology

Mountain rain forests of central and northern Queensland, most frequently encountered on soils derived from granite. Altitudinal range: 450-1200 m.

Uses

This species has little commercial value as it seldom grows large enough to produce millable logs and the peculiar structure of the wood makes the timber somewhat suspect. Standard Trade Name - Cinnamon Laurel. Wood S.G. 0.70-0.72.

Notes and Observations

Flowers have been collected each month from October to January, while ripe fruits have been collected in March, August, October and December. Seedling germination period 180-320 days.

The surface of the sapwood is usually corrugated i.e. marked by longitudinal grooves. This is not simply due to differential growth by various parts of the cambium but is associated with the production

of radically different tissues by sections of the cambium. The activity of the cambium produces ray-like markings on cross sections of the stem rather like those seen on cross sections of many proteaceous stems.

C. idenburgensis Allen (1942) is probably one of the closer relatives of this species, C. wrayi Gamble is also related but has a much larger fruit. C. tetragona Allen (1942) is also closely related and may eventually be found to be synonymous.

Specimens Examined (93 collections examined)

13. Cryptocarya dorrigoensis B. Hyland & Floyd sp. nov.
Cryptocarya sp. nov. (Dome Mtn) Floyd, N.S.W. Rainforest Trees, Part 1, ed.2:30 (1979).
Differt a C. bellendenkerana et speciebus affinis laminae costa supra pubescenti et venis lateralibus sub angulo plus quam 45° gradis patentibus.
Typus: C. T. White 7497: Dorrigo State Forest, 4.x.1930 (holotypus BRI).
Differs from C. bellendenkerana and related species by the midrib pubescent on the upper surface and the lateral veins forming an angle greater than 45° with the midrib.

Shrub or tree to 20 m tall x 10 cm dbh. Stem without buttresses, usually with coppice shoots around the base. Bark nondescript, outer blaze brown, granular in texture. Twigs terete, clothed in tortuous, pale brown, erect hairs. Leaves: Underside glaucous, clothed in straight and tortuous, white or pale brown, erect and appressed hairs. Leaf blade lanceolate, apex acuminate, base attenuate or shortly attenuate, 3.6-5.9 x 1.7-2.0 cm (mean 4.7 x 1.9); penninerved, primary veins 5-8 pairs (mode 6), midrib depressed or flush with the upper surface; petiole 4-5 mm long (mean 4.4), channelled on the upper surface. Inflorescence usually racemose (sometimes paniculate), not

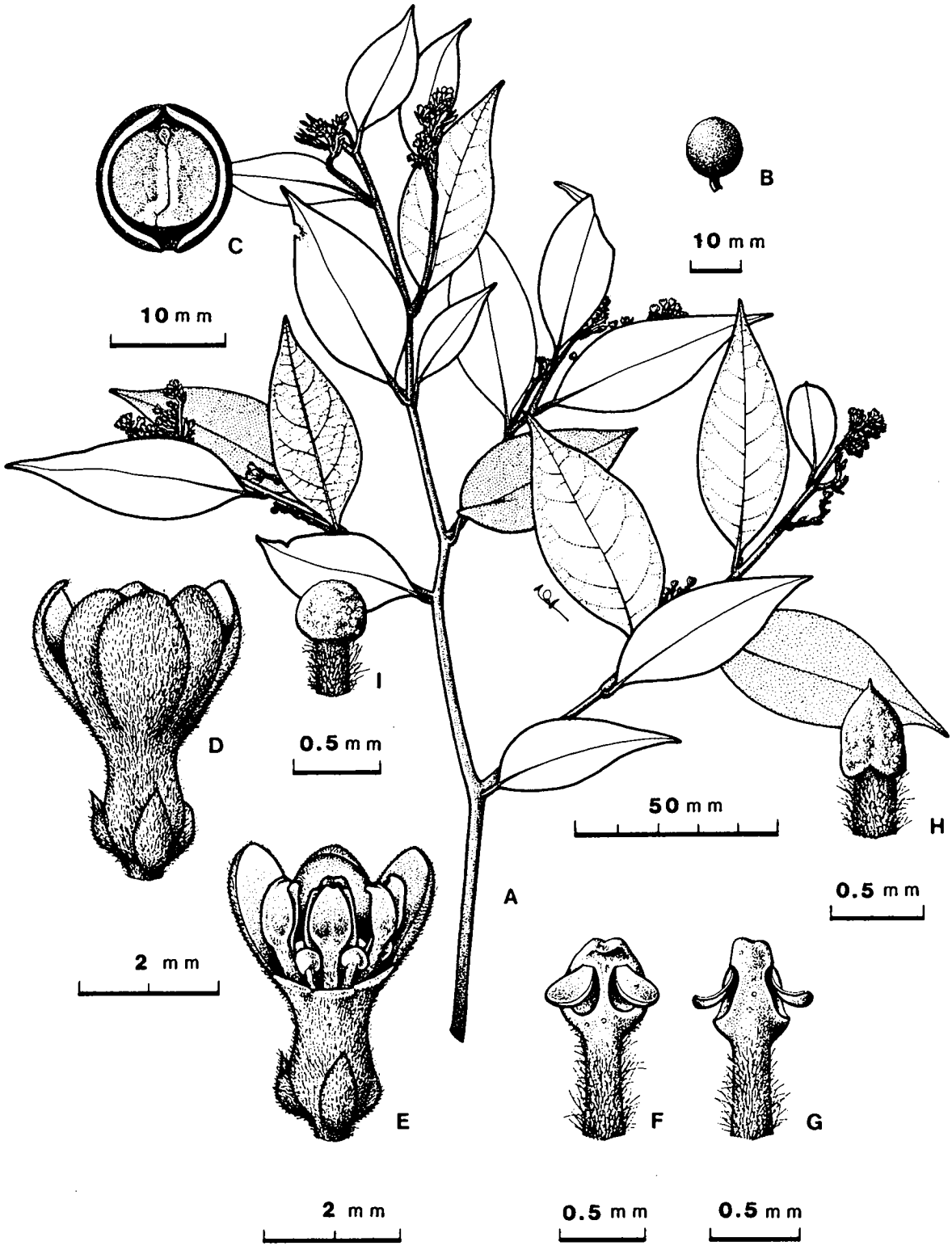

Fig.18. Cryptocarya dorrigoensis. A Habit C.T. White 7497; B fruit, C fruit (LS) Hyland 10983; D flower, E flower (side view, 3 tepals removed), F anther (outer whorl, adaxial view), G anther (inner whorl, abaxial view), H staminode (adaxial view), I gland (adaxial view) C.T. White 7497.

exceeding the leaves, axillary, rarely pseudoterminal, bracts linear or lanceolate, 1.2-1.7 mm long, deciduous, usually absent at anthesis. Flowers greenish cream, creamy yellow, without any obvious perfume?, opening fairly widely but the tepals remaining ± erect at anthesis. Pedicel about 0.3 x 0.5 mm. Perianth tube about 2.5 x 1.4 mm, inner surface pubescent throughout, outer and inner tepals of similar dimensions, about 1.6-1.8 x 1.3-1.4 mm, all tepals pubescent on both their inner and outer surfaces. Outer anthers mainly glabrous, about 0.6 x 0.5 mm, filaments pubescent, about 0.6 mm long; gland heads glabrous, about 0.4 x 0.4 mm, stalks pubescent, about 0.4 mm long. Inner anthers glabrous, about 0.8 x 0.5 mm, filaments pubescent, about 0.6 mm long. Staminodes differentiated, head ± cordate, glabrous adaxially but hairs present along the midline of the abaxial surface, about 0.6 mm long, filament pubescent, about 0.4 mm long. Ovary glabrous, about 1.3 x 0.6 mm, style glabrous, about 1.3 mm long. Fruits black or blue-black when ripe, globular or ellipsoid, about 16 x 14-14.5 mm, mesocarp + exocarp 0.9-1.0 mm thick, endocarp 0.8-1.1 mm thick. Seed 9.5-10.5 x 9.5-10.5 mm, testa 0.1-0.2 mm thick, radicle apical. Cotyledons cream?, uniform in texture. Seedling characteristics unknown. (Fig. 18)

Distribution (Fig. 90, Map 12)

Ecology

Mountain rain forests of northern New South Wales, on soils of low fertility derived from sedimentary and metamorphic rocks (Floyd 1979). Altitudinal range: 600-1000 m.

Uses

This species has no commercial value as it does not grow large enough to produce millable logs and it does not have a Standard Trade Name. Wood S.G. unknown.

Notes and Observations

Flowers have been collected in May, September, October and November, while ripe fruits have been collected in February, March and May. These times agree with the observations of Floyd (1979). Seedling germination period unknown.

Etymology

The specific epithet was originally applied to this species by David Frodin and appeared as a manuscript name on a number of specimens. David Frodin almost certainly applied the name to this species as it grows in the Dorrigo area.

Specimens Examined (19 collections examined)

14. Cryptocarya endiandraefolia Kosterm., Reinwardtia 7:306 (1968).
Type: Hoogland 5131, Madang District, New Guinea (L holotype; CANB, K, isotypes).

Tree to 13 m tall x 20 cm dbh, usually small sized and well formed. Stem usually buttressed, without buttresses only when very small. Bark nondescript, outer blaze cream, pink, or brown (rarely reddish), granular in texture, sometimes emitting quite a noticeable odour, difficult to describe. Twigs fluted or terete, clothed in tortuous, brown, mainly erect hairs which persist even on old twigs. Leaves: Underside green, clothed in straight and tortuous, white or pale brown, erect and appressed hairs when young but eventually

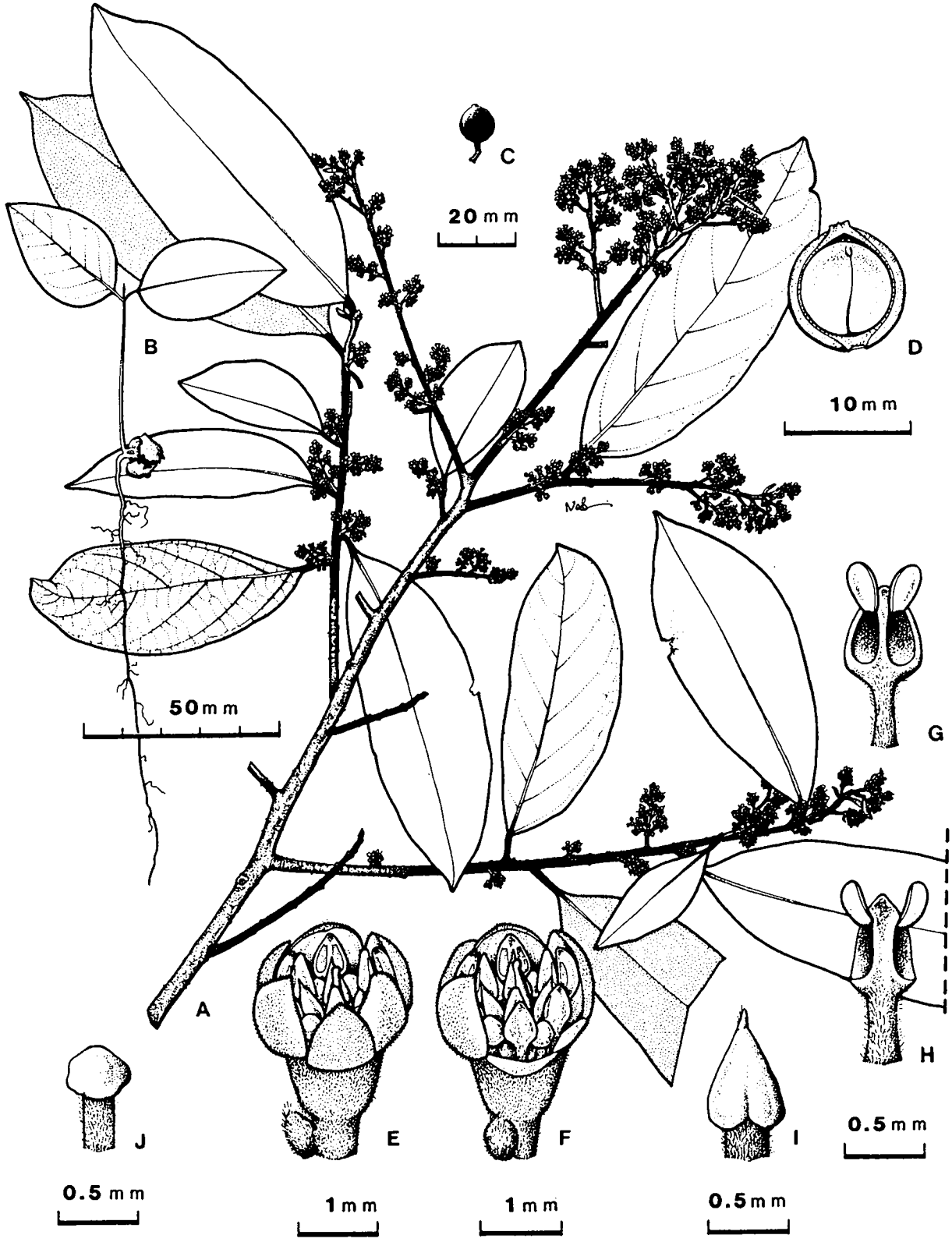

Fig.19. Cryptocarya endiandraefolia. A Habit Hyland 12368; B seedling, C fruit, D fruit (LS) Hyland 12367; E flower, F flower (side view, 2 tepals removed), G anther (outer whorl, adaxial view), H anther (inner whorl,abaxial view), I staminode (adaxial view), J gland (adaxial view) Hyland 12368.

becoming almost glabrous. Leaf blade lanceolate, elliptical or oblong, apex acuminate, acute or obtuse, base cuneate or truncate, 9.5-16.0 x 3.5-5.5 cm (mean 13.4 x 4.6); penninerved, primary veins 5-9 pairs (mode 7), midrib depressed on the upper surface; petiole 7-13 mm long (mean 8.9), channelled on the upper surface. Inflorescence paniculate, exceeding the leaves, mainly pseudoterminal but also axillary; bracts triangular, 0.5-0.7 mm long, persistent, present at anthesis. Flowers cream or pale green, unpleasantly perfumed, not opening very widely, the tepals remaining ± erect at anthesis. Pedicel nil. Perianth tube 0.9-1.0 x 0.9-1.4 mm, inner surface pubescent or glabrous towards the apex but glabrous in the lower half. Outer and inner tepals of similar dimensions, 1.0-1.5 x 0.8-1.2 mm, all tepals pubescent on both their inner and outer surfaces. Outer anthers glabrous adaxially, sometimes glabrous abaxially but usually pubescent near the base or along the midline, 0.5-0.6 x about 0.5 mm, filaments pubescent, 0.4-0.6 mm long; gland heads glabrous, 0.35-0.45 x 0.35-0.45 mm, stalks pubescent, 0.3-0.35 mm long. Inner anthers glabrous, 0.5-0.7 x about 0.4 mm, filaments pubescent, 0.4-0.6 mm long. Staminodes differentiated, head cordate (apex acuminate), glabrous adaxially but pubescent along the midline on the abaxial surface, 0.5-0.7 mm long, filaments pubescent, 0.1-0.2 mm long. Ovary glabrous, 0.6-0.9 x 0.3-0.4 mm, style glabrous, 0.8-0.9 mm long. Fruits black when ripe, globular or ellipsoid, 10-13 x 8-11 mm, mesocarp + exocarp 0.3-0.8 mm thick, endocarp 0.4-0.6 mm thick. Seed 7-8 x 7-9 mm, testa 0.1-0.3 mm thick, radicle apical. Cotyledons cream, uniform. Seedling leaves green on the underside, cataphylls absent, first pair of leaves opposite. (Fig. 19)

Distribution

Limited to Cape York Peninsula in Queensland (Fig. 93, Map 34), also in New Guinea.

Ecology

Rain forests of Cape York Peninsula, confined to gallery forests on alluvium. Altitudinal range: Sea level to 150 m.

Uses

This species has no commercial value as it does not grow large enough to produce millable logs and it does not have a Standard Trade Name. Wood S.G. 0.68.

Notes and Observations

Flowers have been collected in November and December, while ripe fruits have been collected in November and December. Seedling germination period 20-60 days.

The following species appear to be closely related, but at this stage I have not been able to compare the types to arrive at a definite conclusion: C. depressa Warburg, C. fluminensis Kosterm. and C. obliqua Blume.

Specimens Examined (22 collections examined)

15. Cryptocarya erythroxylon Maiden & E. Betche ex Maiden, Forest fl. N.S.W. 3:111 (1907); Francis, Austral. Rain-Forest Trees ed.2:134 (1951); Floyd, N.S.W. Rainforest Trees Part 1, ed.2:32 (1979); Stanley & Ross, Flora of south-eastern Queensland 1:160 (1983).
Lectotype (here designated): W. Dunn, Acacia Creek, via Killarney (NSW 129930); (BRI 286147 isotype).
Syntype: W. Dunn, Acacia Creek, via Killarney (NSW 149930).

Tree to 35 m tall x 100 cm dbh, usually large sized and well formed. Stem usually buttressed, rarely otherwise. Bark usually flaky or nondescript, sometimes ± tessellated or slightly papery, usually rather pale coloured when viewed from a distance, outer blaze pink, often speckled, granular in texture, often emitting an odour resembling that of freshly cut peach or mango skins. Twigs angular or terete, clothed in short, straight, brown, appressed hairs when young but soon becoming completely glabrous. Leaves: Underside glaucous, or almost white, clothed in short, straight, white or brown, appressed hairs which persist as a sparse covering even on old leaves. Leaf blade elliptical or lanceolate, apex acute or bluntly pointed, base attenuate, shortly attenuate, cuneate or truncate, 6.5-14.5 x 1.5-6.0 cm (mean 10.2 x 3.5); penninerved, primary veins 5-10 pairs (mode 7), midrib depressed on the upper surface; petiole 8-19 mm long (mean 13.6), channelled on the upper surface. Inflorescence paniculate, approximating the leaves, axillary and pseudoterminal; bracts spathulate, about 1.0-1.2 mm long, persistent, usually present at anthesis. Flowers cream?, perfume unknown, opening quite widely but the tepals remaining ± erect at anthesis. Pedicel about 0.5 x 0.5 mm. Perianth tube about 0.9 x 1.5 mm, inner surface glabrous or pubescent at the apex but glabrous on the lower half. Outer tepals smaller, about 1.2 x 0.8 mm, inner tepals about 1.4 x 1.0 mm, all tepals pubescent on both their inner and outer surfaces. Outer anthers glabrous adaxially, but pubescent on the abaxial surface, about 0.5 x 0.5 mm, filaments pubescent, about 0.3 mm long; gland heads glabrous, about 0.25 x 0.35 mm, stalks pubescent, about 0.15 mm long. Inner anthers pubescent to some extent on both surfaces, about 0.7 x 0.4 mm, filaments pubescent, about 0.4 mm long. Staminodes

differentiated, head cordate or sagittate, glabrous adaxially but pubescent on the abaxial surface, about 0.6 mm long, filament pubescent, about 0.2 mm long. Ovary glabrous, about 0.8 x 0.5 mm, style glabrous, about 0.7 mm long. Fruits black when ripe, pyriform, 19.5- 21 x 13-15 mm, mesocarp + exocarp 0.6-0.7 mm thick, endocarp 0.3-0.4 mm thick. Seed 13-14 x 10-12 mm, testa 0.3-0.4 mm thick, radicle apical. Cotyledons cream, uniform in texture. Seedling leaves glaucous on the underside, cataphylls present (usually 1 pair), first pair of leaves opposite.

Distribution (Fig. 93, Map 35)

Ecology

Mountain rain forests of New South Wales and southern Queensland. Altitudinal range: 500-1050 m.

Uses

This species produces millable logs and the sawn timber is marketed as Rose Maple, a very useful and quite decorative cabinet timber. Wood S.G. 0.69.

Notes and Observations

Flowers have been collected in November, while ripe fruits have been collected in March and April. Seedling germination period 25-55 days.

Very closely related to C. onoprienkoana - See notes under that species.

Specimens Examined (51 collections examined)

16. **Cryptocarya exfoliata** Allen, J. Arnold Arbor. 23:135 (1942).
Type: L.J. Brass 7655, Middle Fly River, (A holotype; BO, BRI, isotypes).

Tree to 20 m tall x 30 cm dbh, usually small sized and well formed. Stem with or without buttresses. Bark usually nondescript, occasionally flaky or almost tessellated, outer blaze pink, red or brown, marked by longitudinal stripes, granular in texture, usually emitting a distinct odour, perhaps resembling pine resin. Twigs fluted, clothed in straight, pale brown, appressed hairs which persist to some extent even on old twigs. Leaves: Underside green or slightly glaucous, clothed in straight, white, appressed hairs when young but eventually becoming almost glabrous. Leaf blade broadly lanceolate, apex acuminate or abruptly acuminate, base attenuate or cuneate, 5.0-13.0 x 1.5-5.5 cm (mean 9.4 x 3.7); usually triplinerved but sometimes penninerved even on the same specimen, primary veins 2-9 pairs (mode 4), midrib usually raised on the upper surface; petiole 3-11 mm long (mean 6.3), flat on the upper surface. Inflorescence paniculate, not or scarcely exceeding the leaves, mainly pseudoterminal, but also axillary, bracts ± lanceolate or navicular, occasionally triangular, 0.8-2.0 mm long, deciduous, absent at anthesis. Flowers green or creamy green, without perfume or faintly but pleasantly (?) perfumed, opening quite widely but the tips of the tepals remaining ± erect at anthesis. Pedicel 0.1-0.3 x 0.5-0.6 mm. Perianth tube 1.0-1.4 x 1.0-1.2 mm, inner surface pubescent throughout. Outer and inner tepals of similar dimensions, 1.7-2.1 x 1.2-1.5 mm, all tepals pubescent on the outer surface and usually the inner. Outer anthers glabrous adaxially, glabrous abaxially or with a few basal hairs, 0.7-0.9 x 0.5-0.6 mm, filaments pubescent, 0.5-0.6 mm

long; gland heads glabrous, 0.4-0.5 x 0.4-0.5 mm, stalks pubescent, 0.2-0.5 mm long. Inner anthers glabrous, 0.9-1.0 x 0.4-0.5 mm, filaments pubescent, 0.5-0.6 mm long. Staminodes differentiated, head sagittate (apex gradually acuminate), glabrous adaxially but pubescent along the midline on the abaxial surface, 0.9-1.1 mm long, filaments pubescent, 0.2-0.5 mm long. Ovary glabrous, 0.7-1.0 x 0.4-0.5 mm, style glabrous, 0.8-1.6 mm long. Fruits black when ripe, globular or ellipsoid, 10-13 x 9-11 mm, mesocarp + exocarp 0.1-0.5 mm thick, endocarp 0.4-0.8 mm thick. Seed 7.0-10.5 x 7.0-9.0 mm, testa 0.1-0.5 mm thick, radicle lateral. Cotyledons cream, mainly uniform in texture except for a narrow intrusion of the testa between the adaxial surfaces of the cotyledons. Seedling leaves green on the underside, cataphylls absent, first pair of leaves opposite.

Distribution

Northern Australia (Fig. 100, Map 71), also in New Guinea.

Ecology

Rain forests and gallery forests of northern Queensland and Cape York Peninsula on soils derived from a variety of rock types. Altitudinal range: Sea level to 450 m.

Uses

This species has no commercial value as it does not grow large enough to produce millable logs and it does not have a Standard Trade Name. Wood S.G. 0.86-0.92.

Notes and Observations

Flowers have been collected in January and March, while ripe fruits have been collected each month from July to December. Seedling germination period 18-62 days.

Specimens Examined (112 collections examined)

17. Cryptocarya floydii Kosterm., Brunonia 2:96 (1979); Floyd, N.S.W. Rainforest Trees, Part 1, ed.2:41 (1979); Stanley & Ross, Flora of south-eastern Queensland 1:161 (1983).
Type: H.C. Hayes s.n., Glenugie Peak (Mt Elaine) (L holotype; BRI 218289, NSW 121697 isotypes).

Tree to 15 m tall x 30 cm dbh, usually small and rather insignificant. Stem without buttresses. Bark usually nondescript, sometimes flaky, outer blaze brown or cream, granular in texture. Twigs terete, clothed in straight, white or pale brown, appressed hairs when young but eventually becoming almost glabrous. Leaves: Underside green, clothed in straight, white, appressed hairs when young but eventually becoming almost glabrous. Leaf blade lanceolate, or narrowly ovate, apex acute or acuminate, base attenuate or shortly attenuate, 4.2-10.0 x 1.2-3.5 cm (mean 7.8 x 2.5); penninerved, primary veins 5-14 pairs (mode 10), midrib flush with the upper surface; petiole 6-13 mm long (mean 9.1), channelled on the upper surface. Inflorescence paniculate or almost reduced to racemose, not exceeding the leaves, axillary and pseudoterminal; bracts linear, about 0.7 mm long, deciduous, absent at anthesis. Flowers pale green, greenish (or reddish?), pleasantly perfumed, opening fairly widely but the tepals remaining ± erect at anthesis. Pedicel about 1.8 x 0.6 mm. Perianth tube about 1.6 x 1.7 mm, inner surface pubescent at the apex but glabrous on the lower half. Outer tepals about 1.8 x 1.1 mm, inner tepals about 2.2 x 1.1 mm, all tepals pubescent on both their

inner and outer surfaces. Outer anthers glabrous adaxially but pubescent along the midline on the abaxial surface, about 0.7 x 0.5 mm, filaments pubescent, about 0.8 mm long; gland heads glabrous, about 0.3 x 0.3 mm, stalks pubescent, about 0.7 mm long. Inner anthers glabrous abaxially but pubescent along the midline on the adaxial surface, about 0.7 x 0.4 mm, filaments pubescent, about 0.9 mm long. Staminodes differentiated, head cordate, glabrous adaxially but pubescent along the midline on the abaxial surface, about 0.7 mm long, filaments pubescent, about 0.4 mm long. Ovary glabrous, about 1.4 x about 0.6 mm, style glabrous, about 1.7 mm long. Fruits black when ripe, globular or depressed globular, about 10-15 x 12-18 mm. Seed dimensions unknown. Cotyledons cream(?), uniform in texture. Seedling leaves green on the underside, cataphylls absent, first pair of leaves opposite. (A. Floyd pers. comm.)

Distribution (Fig. 93, Map 31)

Ecology

Drier rain forests, particularly the rocky areas, in northern New South Wales and southern Queensland. Altitudinal range: 300-1050 m.

Uses

This species does not have any commercial value as it does not grow large enough to produce millable logs and it does not have a Standard Trade Name. Wood S.G. unknown.

Notes and Observations

Flowers have been collected in February and October, while ripe fruits have been collected in March and June. Floyd (1979) notes that

the main flowering time is October-November, while fruits ripen between February and June. Seedling germination period about 60 days.

Specimens Examined (19 collections examined)

18. Cryptocarya foetida R. Baker, Proc. Linn. Soc. New South Wales 30:517 (1906) t30; Francis, Austral. Rain-Forest Trees, ed.2:35 (1951); Stanley & Ross, Flora of south-eastern Queensland 1:161 (1983).
Lectotype (here designated): W. Baeuerlen 1729, Ballina (NSW).
Syntype: A. Cunningham 130, Moreton Bay (A, K, BM).

Tree to 25 m tall x 40 cm dbh, usually small and well formed. Stem without buttresses. Bark nondescript, occasionally flaky or tessellated, outer blaze cream, granular in texture. Twigs fluted when young, clothed in straight and tortuous, pale brown, erect and appressed hairs, but almost glabrous when old. Leaves: Underside green, clothed in straight, white, appressed hairs when young but glabrous at maturity. Leaf blade oblong or elliptical, apex acute or obtuse, base attenuate or shortly attenuate, 8.0-11.5 x 3.3-4.4 cm (mean 10.0 x 3.8); penninerved, primary veins 4-8 pairs (mode 6), midrib flush with the upper surface; petiole 6-10 mm long (mean 7.7), flat or channelled on the upper surface. Inflorescence paniculate, approximating or exceeding the leaves, axillary and pseudoterminal; bracts triangular, 0.7-0.9 mm long, persistent, present at anthesis. Flowers cream, unpleasantly perfumed, opening quite widely but the tepals remaining ± erect at anthesis. Pedicel 0.3-1.0 x about 0.5 mm. Perianth tube 1.1-1.2 x 1.5-1.7 mm, inner surface glabrous throughout, outer and inner tepals of similar dimensions, 1.7-1.9 x 0.8-0.9 mm, all tepals pubescent on both their inner and outer surfaces. Outer anthers glabrous adaxially but pubescent at the base

and along the midline on the abaxial surface, 0.7-0.8 x 0.5-0.6 mm, filaments pubescent, 0.5-0.7 mm long; gland heads glabrous, 0.3-0.4 x 0.3-0.4 mm, stalks pubescent, about 0.2 mm long. Inner anthers glabrous on both surfaces, about 0.8 x 0.4 mm, filaments pubescent, 0.6-0.8 mm long. Staminodes differentiated, head cordate, glabrous adaxially but pubescent along the midline on the abaxial surface, 0.5-0.6 mm long, filaments pubescent, about 0.2 mm long. Ovary glabrous, about 1.0 x 0.5 mm, style glabrous, about 1.0 mm long. Fruits black or purplish black when ripe, globular, 8-13 x 8-15 mm, mesocarp + exocarp about 1.0 mm thick, endocarp about 0.4 mm thick. Seed about 7-9 x 7-11 mm, testa about 0.2 mm thick, radicle apical. Cotyledons cream, ruminate. Seedling leaves green on the underside(?), cataphylls absent, first pair of leaves opposite.

Distribution (Fig. 93, Map 32)

Ecology

Littoral rain forests and rain forests on old sand dunes in northern New South Wales and southern Queensland. Altitudinal range: Sea level to 150 m.

Uses

This species has no commercial value as it is of infrequent occurrence and seldom grows large enough to produce millable logs. It does not have a Standard Trade Name. Wood S.G. unknown.

Notes and Observations

Flowers have been collected in May, while ripe fruits have been collected in January. However, Floyd (1979) after more detailed

studies in New South Wales concluded that the main flowering period was in February and likewise the main fruiting period. Seedling germination period about 40 days.

When C. foetida was described, the offensive flower odour was thought to be so remarkable as to warrant inclusion in the specific epithet. However, the present studies show that this type of odour occurs in quite a number of other species of Cryptocarya and also in a number of species of Beilschmiedia. A very similar odour is obvious in the flowers of the quite unrelated rain forest shrub Geniostoma rupestre var. australianum (Loganiaceae).

Specimens Examined (28 collections examined)

19. Cryptocarya foveolata C. White & Francis, Proc. Roy. Soc. Queensland 35:75 (1924); Francis, Austral. Rain-Forest Trees ed.2:134 (1951); Floyd, N.S.W. Rainforest Trees Part 1, ed.2:38 (1979); Stanley & Ross, Flora of south-eastern Queensland 1:158 (1983).
Lectotype (here designated): F.M. Bailey 2, Mt Mistake? (BRI); (K, MEL, NSW, isotypes).
Other Syntypes: C.T. White, Roberts Plateau, Macpherson Range (BRI, MEL 1517122, NSW).
C.B. Saunders, Ranges eastward of Emu Vale (A, BRI).
W.D. Francis, Ranges eastward of Emu Vale n.v.
Cryptocarya cinnamomifolia var. parvifolia Bailey, Queensl. fl. 4:1301 (1901).
Cryptocarya parvifolia (Bailey) Domin, Biblioth. Bot. 89:122 (1925), nom. illeg. non Merr (1915).
Cryptocarya microphylla Kosterm., Reinwardtia 5:396 (1961).
Type: F. M. Bailey 2, Top of Mount Mistake Range? (BRI, K, MEL, NSW).

Tree to 40 m tall x 90 cm dbh, usually medium to large sized and well formed. Stem without buttresses in the smaller size classes but buttressed in the larger. Bark usually nondescript, occasionally flaky, outer blaze cream or brown, occasionally pink, usually marked by longitudinal stripes, sometimes speckled, usually granular in

texture, occasionally fibrous, rarely emitting an obvious odour. Twigs angular or slightly fluted and clothed in straight, pale brown, appressed hairs when young but soon becoming ± terete and glabrous. Leaves: Underside green or slightly glaucous, clothed in straight, white or pale brown, appressed hairs when very young but soon becoming glabrous, foveoles conspicuous on the underside, usually raised on the upper surface, generally about 2-4 per leaf, sometimes fewer or up to 13-15 per leaf. Leaf blade elliptical or ovate, rarely oblong, apex acute or obtuse, base attenuate, cuneate or shortly attenuate, 3.5-7.0 x 2.0-3.6 cm (mean 4.8 x 2.5); usually triplinerved, sometimes penninerved, primary veins 3-5 pairs (mode 4), midrib flush with or raised on the upper surface; petiole 4-7 mm long (mean 6.0), channelled on the upper surface. Inflorescence paniculate but often reduced to almost racemose, not exceeding the leaves, mainly axillary, sometimes pseudoterminal, bracts navicular or broadly lanceolate, 1.3-1.9 mm long, persistent or deciduous, usually absent at anthesis. Flowers cream, unpleasantly perfumed(?), opening quite widely but the tips of the tepals remaining ± erect at anthesis. Pedicel 0.6-0.7 x 0.5-0.7 mm. Perianth tube 1.5-1.6 x 1.6-1.8 mm, inner surface pubescent throughout; outer and inner tepals of similar dimensions, 1.9-2.5 x 1.0-1.5 mm, all tepals pubescent on both their inner and outer surfaces. Outer anthers glabrous adaxially but pubescent on the midline of the abaxial surface, 0.9-1.1 x 0.6-0.8 mm, filaments pubescent, about 0.5 mm long; gland heads glabrous, about 0.6 x 0.5-0.6 mm, stalks pubescent, about 0.5 mm long. Inner anthers glabrous, about 1.0 x 0.6-0.7 mm, filaments pubescent, 0.8-0.9 mm long. Staminodes differentiated, head cordate, glabrous, 0.9-1.0 mm long, filament pubescent, 0.4-0.6 mm long. Ovary glabrous or

pubescent, 1.0-1.1 x about 0.6 mm, style glabrous 1.5-1.7 mm long. Fruits black when ripe, globular, about 13-14 x 15-16 mm, mesocarp + exocarp about 0.7 mm thick, endocarp about 0.8mm thick. Seed about 10 x about 12 mm, testa about 0.1 mm thick, radicle apical. Cotyledons cream, ruminate. Seedling leaves slightly glaucous on the underside, cataphylls absent, first pair of leaves opposite.

Distribution (Fig. 93, Map 33)

Ecology

Mountain rain forests of northern New South Wales and the southernmost parts of Queensland, usually on soil derived from basalt. Altitudinal range: 600-1300 m.

Uses

This species grows large enough to produce millable logs and the sawn timber is marketed as Small-Leaved Laurel. Wood S.G. 0.53.

Notes and Observations

Flowering collections are rare (some collected in November and December), but according to Floyd (1979) the main flowering period occurs in February. Ripe fruits have been collected in March, but according to Floyd (1979) and in litt. the fruiting period extends from January to October. Seedling germination period about 30-40 days.

Specimens Examined (45 collections examined)

20. Cryptocarya glaucescens R.Br., Prodr. 402 (1810); Benth., Fl. austral. 5:297 (1870)p.p.; Bailey, Queensl.

fl. 4:1299 (1901)p.p.; Francis, Austral. Rain-Forest Trees ed.2:129 (1951)p.p.; Beadle et al., Flora of the Sydney Region 150 (1972); Frodin, Telopea 1(3):222 (1976); Floyd, N.S.W. Rainforest Trees, Part 1, ed.2:44 (1979); Stanley & Ross, Flora of south-eastern Queensland 1:160 (1983).

Lectotype: R. Brown, s.n. Hawkesbury River (BM) vide Frodin (1976);(MEL 623249 isotype).

Syntypes: R. Brown, Port Jackson & Hawkesbury River (BM, K, MEL,G-DC?).

Cryptocarya moretoniana Meissner in DC., Prodr. 15(1):74 (1864); Francis, Austral. Rain-Forest Trees ed.2:129 (1951); Frodin, Telopea 1(3):217 (1976).

Syntypes: A. Cunningham 48, Moreton Bay (K, BM).
A. Cunningham 47, Moreton Bay (K).

Cryptocarya hypoglauca var.attenuata Meissner in DC., Prodr.15(1):508 (1864).

Cryptocarya meissneri F. Muell., Fragm. 5:170 (1866).

Type: F. Mueller s.n. (Probably H. Beckler) Hastings River (G-DC holotype)

Cryptocarya glaucescens var. nitida Benth., Fl. austral. 5:297 (1870).

Syntypes: A. Cunningham 47, Moreton Bay (K).
A. Cunningham 48, Moreton Bay (K).
L. Leichhardt 199?, Archers Creek (MEL 623248).

Tree to 30 m tall x 90 cm dbh, usually medium sized and well formed. Stem usually buttressed in the larger but not the smaller size classes, sometimes with coppice shoots at the base. Bark usually flaky, occasionally nondescript, outer blaze cream, pink or brown, usually granular in texture, usually emitting an odour like that of sugarcane. Twigs angular in section, clothed in straight, pale brown, appressed hairs when very young but soon becoming glabrous. Leaves: Underside glaucous, clothed in mainly straight, pale brown, appressed hairs when young but eventually becoming almost glabrous. Leaf blade lanceolate, elliptical or narrowly elliptical, apex acuminate or acute, base attenuate or cuneate, 5.5-10.0 x 2.5-4.0 cm (mean 7.9 x 3.1); penninerved, primary veins 4-12 pairs (mode 8), midrib depressed on the upper surface; petiole 5-9 mm long (mean 6.8), channelled on the upper surface. Inflorescence paniculate, scarcely exceeding the leaves, mainly axillary, sometimes pseudoterminal, bracts navicular,

1.1-1.3 mm long, deciduous, absent at anthesis. Flowers cream or pale green, without any obvious odour, opening widely, the tepals standing at an angle of about 45° to the vertical at anthesis. Pedicel nil or up to 0.4 x 0.4-0.5 mm. Perianth tube 1.0-1.5 x 1.0-1.3 mm, inner surface glabrous throughout, rarely a few hairs at the apex. Outer and inner tepals of similar dimensions, 1.3-1.9 x 0.7-0.9 mm, all tepals pubescent on both their inner and outer surfaces. Outer anthers glabrous adaxially but pubescent along the midline and towards the base on the abaxial surface, 0.5-0.6 x 0.4-0.5 mm, filaments pubescent, 0.5-0.7 mm long; gland heads glabrous, 0.3-0.5 x 0.4-0.5 mm, stalks pubescent, 0.3-0.4 mm long. Inner anthers usually glabrous on both surfaces, sometimes pubescent along the midline on the adaxial surface, 0.5-0.6 x 0.2-0.4 mm, filaments pubescent, 0.5-0.8 mm long. Staminodes differentiated, head ± sagittate (apex aristate), glabrous adaxially but pubescent along the midline on the abaxial surface, 0.7-0.8 mm long, filaments pubescent, 0.2-0.4 mm long. Ovary glabrous, 0.8-1.0 x 0.4-0.5 mm, style glabrous, 1.1-1.4 mm long. Fruits black when fully ripe, laterally compressed, wider than long, bilobed, longitudinally ribbed, 12-21 x 13-25 mm, mesocarp + exocarp 0.4-1.1 mm thick, endocarp 0.3-0.8 mm thick. Seed 9-14 x 13-22.5 mm, testa 0.1-0.2 mm thick, radicle apical. Cotyledons usually cream, sometimes yellowish, uniform in texture. Seedling leaves glaucous on the underside, cataphylls absent, first pair of leaves opposite.

Distribution (Fig. 90, Map 17)

Ecology

Rain forest of southern New South Wales to central Queensland, usually on the poorer soils derived from sedimentary and acid volcanic

rocks. Altitudinal range: Sea level to 1000 m.

Uses

This species produces millable logs and the sawn timber is marketed as Silver Sycamore, a useful general purpose timber. Wood S.G. 0.64-0.66.

Notes and Observations

Flowers have been collected in October and November, while ripe fruits have been collected in March, April, May, June and August. Seedling germination period 30-115 days.

An undated, collection in BRI (T.L. Bancroft 29) from Stannary Hills, is about 500 km north of any other collections ever made of this species. Until this species is recollected in the Stannary Hills area, it is probably better to regard it as a dubious record.

Specimens Examined (234 collections examined)

21. Cryptocarya glaucocarpa B. Hyland sp. nov.
Differt a speciebus ceteris fructu glaucissimo.
Typus: B. Hyland 3628 RFK: Claudie River, 21.xi.1977 (holotypus QRS)
Differs from other species in the very glaucous fruit.

Tree to 10 m tall x 20 cm dbh, usually small sized and well formed. Stem buttressed even in quite small size classes, coppice shoots present at the base. Bark nondescript. Outer blaze cream or brown, marked by longitudinal stripes, granular in texture, sometimes emitting an obvious odour. Twigs ± terete or slightly angular, clothed in straight, pale brown, appressed hairs when young but soon becoming glabrous. Leaves: Underside green, clothed in straight,

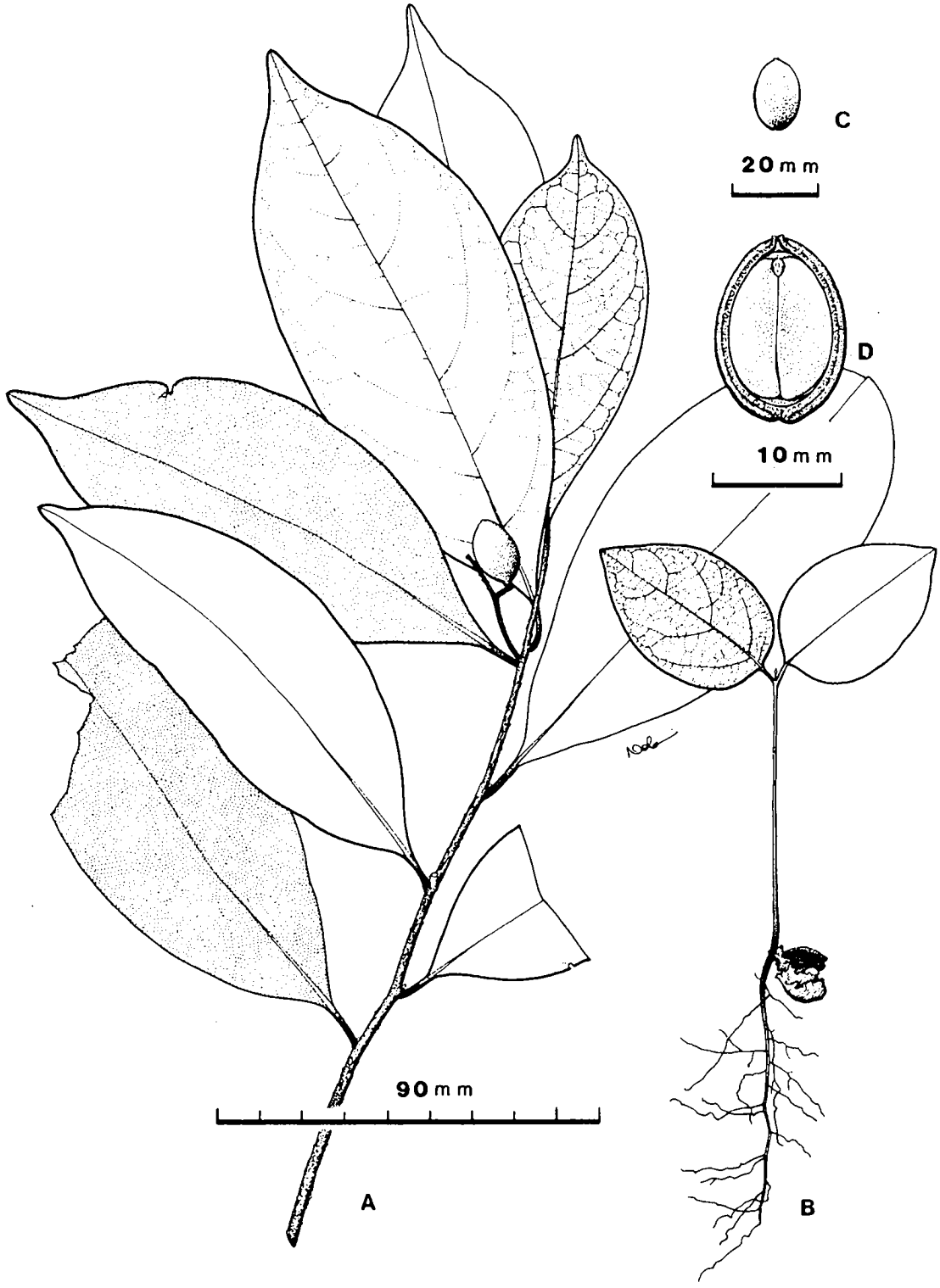

Fig.20. Cryptocarya glaucocarpa. A Habit, B seedling, C fruit, D fruit (LS) Hyland 3628 RFK.

white or pale brown, appressed hairs when very young but soon becoming glabrous. Leaf blade lanceolate or elliptical, apex acuminate or abruptly acuminate, base attenuate or cuneate, 9.0-16.0 x 3.5-6.0 cm (mean 12.8 x 4.6); penninerved, primary veins 5-8 pairs, midrib depressed on the upper surface; petiole 7-9 mm long (mean 8.1), channelled on the upper surface. Inflorescence paniculate, not exceeding the leaves, axillary and pseudoterminal; bract and flower features unknown. Fruits black or blue-black when ripe but the colour often completely obscured by an opaque, glaucous bloom, ellipsoid, 13-17 x 10-12 mm, mesocarp + exocarp 0.2-0.5 mm thick, endocarp 0.3-0.6 mm thick. Seed 10-13 x 8.5-10.0 mm, testa 0.05-0.6 mm thick, radicle apical. Cotyledons cream, uniform in texture. Seedling leaves green on the underside, cataphylls absent, first pair of leaves opposite. (Fig. 20)

Distribution (Fig. 90, Map 16)

Ecology

Rain forests of the Claudie River flood plain on alluvial soils. Altitudinal range: Sea level to 80 m.

Uses

This species has no commercial value as it does not grow large enough to produce millable logs and it does not have a Standard Trade Name. Wood S.G 0.87.

Notes and Observations

Flowers have not yet been collected but are probably produced in December. Ripe fruits have been collected in November and December.

Seedling germination period 20-50 days.

This appears to be a very rare species and all the specimens examined were collected on the Claudie River.

Etymology

The specific epithet was applied to this species because of the glaucous bloom on the fruits.

Specimens Examined (11 collections examined)

22. Cryptocarya grandis B. Hyland sp. nov.
Differt a speciebus ceteris foliis triplinervibus, floribus foetidis, cotyledonibus ruminatis.
Typus: B. Gray 1619: Timber Reserve 1230, Boonjee Logging Area, 14.i.1980 (holotypus QRS).
Differs from other species in the triplinerved leaves, foetid flowers, ruminate cotyledons.

Tree to 35 m tall x 80 cm dbh, usually medium sized and well formed. Stem with or without buttresses. Bark nondescript, rarely flaky, outer blaze cream or brown, conspicuously speckled, granular in texture. Twigs fluted, clothed in straight, white or pale brown, appressed hairs when young but soon becoming almost glabrous. Leaves: Underside slightly glaucous, clothed in short, straight, white or pale brown, appressed hairs which, although difficult to see, persist even on mature leaves. Domatia (tufts of hair) normally present in the axils of the basal pair of primary veins. Leaf blade lanceolate or elliptical, apex acuminate or acute, base attenuate or shortly attenuate, 6.5-15.5 x 3.0-7.5 cm (mean 10.3 x 4.3); triplinerved, primary veins 2-5 pairs, midrib depressed on the upper surface; petiole 6-17 mm long (mean 12.3), flat or channelled on the upper surface. Inflorescence paniculate, exceeding the leaves, axillary and

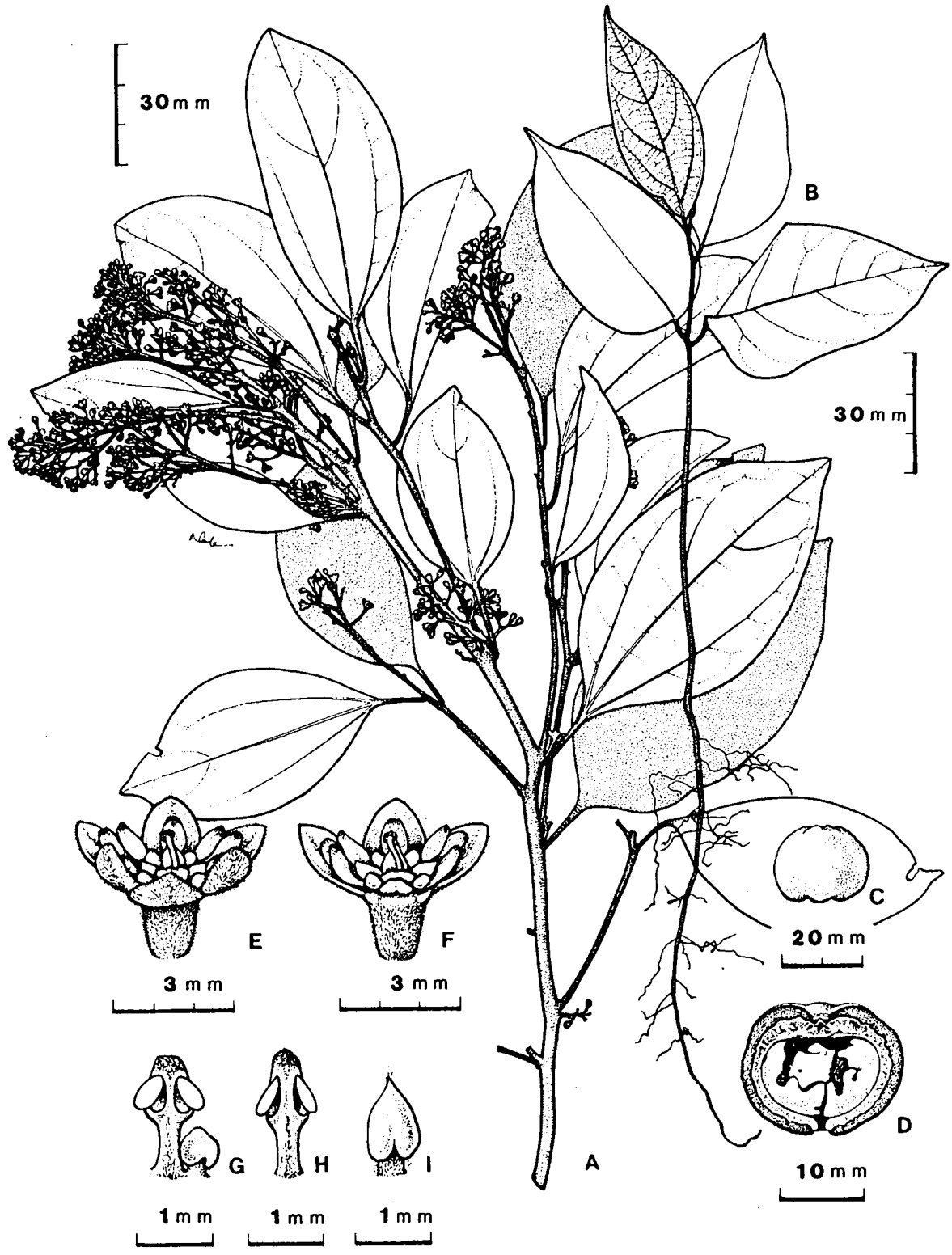

Fig.21. Cryptocarya grandis. A Habit Gray 1619; B seedling, C fruit, D fruit (LS) Stocker 1594; E flower, F flower (side view, 3 tepals removed), G stamen and gland (outer whorl, adaxial view), H stamen (inner whorl, abaxial view), I staminode (adaxial view) Gray 1619.

pseudoterminal; bracts usually navicular, sometimes lanceolate, 0.5-2.0 mm long, deciduous, absent at anthesis. Flowers cream, creamy brown or greenish cream, unpleasantly perfumed, opening quite widely, the tepals standing at an angle of about 45° to the vertical at anthesis. Pedicel nil or up to 0.7 x 0.5-0.6 mm. Perianth tube 0.9-1.6 x 1.2-1.6 mm, inner surface usually glabrous towards the base, pubescent near the apex, rarely glabrous. Outer tepals usually longer and narrower than the inner, outer tepals 1.6-2.4 x 1.0-1.3 mm, inner tepals 1.6-2.2 x 1.2-1.6 mm, all tepals pubescent on both their inner and outer surfaces. Outer anthers glabrous adaxially but pubescent near the base and along the midline of the abaxial surface, 0.6-0.8 x 0.5-0.6 mm, filaments pubescent, 0.5-1.0 mm long; gland heads glabrous, 0.4-0.6 x 0.4-0.6 mm, stalks pubescent, 0.3-0.5 mm long. Inner anthers usually glabrous on both surfaces, occasionally with a few hairs on the adaxial surface, 0.7-0.8 x 0.4-0.6 mm, filaments pubescent, 0.5-1.0 mm long. Staminodes differentiated, head cordate (apex shortly aristate), glabrous adaxially but pubescent along the midline of the abaxial surface, 0.8-1.0 mm long, filaments pubescent, 0.3-0.5 mm long. Ovary glabrous, 1.0-1.3 x 0.5-0.6 mm, style glabrous, 1.0-1.7 mm long. Fruits black when ripe, globular or depressed globular, 13-20 x 14-22 mm, mesocarp + exocarp 0.4-2.1 mm thick, endocarp 1.0-2.3 mm thick. Seed 9-13 x 11-15 mm, testa 0.05-0.2 mm thick, radicle apical. Cotyledons white or cream, ruminate. Seedling leaves glaucous on the underside, cataphylls absent, first pair of leaves opposite. (Fig. 21)

Distribution (Fig. 92, Map 28)

Ecology

Rain forests of central and northern Queensland, on soils derived from a variety of rock types. Altitudinal range: Sea level to 1000 m.

Uses

This species grows large enough to produce millable logs but is seldom utilized. However, it has been given the Standard Trade Name of Cinnamon Laurel. Wood S.G. 0.77-0.89.

Notes and Observations

Flowers have been collected each month from November to February, while ripe fruits have been collected in July, August, September, October and December. Seedling germination period 37-100 days.

Etymology

The specific epithet was applied to this species because it is usually a fine looking tree in contrast to the vegetatively quite similar C. densiflora, which has a somewhat inferior appearance.

Specimens Examined (88 collections examined)

23. Cryptocarya hypospodia F. Muell., Fragm. 5:170 (1866); Francis, Austral. Rain-Forest Trees, ed.2:129 (1951); Stanley & Ross, Flora of south-eastern Queensland 1:159 (1983).

Cryptocarya obovata var. hypospodia (F. Muell.) C. White & Francis in Francis, Aust. Rain Forest Trees, 114 (1929).

Lectotype (here designated): J. Dallachy, Rockingham Bay (MEL 623254).

Syntypes: J. Dallachy, Rockingham Bay (MEL 582511, 623253). J. Dallachy, Rockingham Bay (MEL 623250, 623251, 623252, 623255, 623256; K, NY, probable syntypes). H. Beckler, Richmond River (MEL 623347).

Cryptocarya obovata var. tropica Bailey, Queensl. fl. 4:1299 (1901).

Type: H.L. Griffith, Mackay (BRI 71773 holotype?,

MEL 623438-9 isotypes?).
Cryptocarya multicostata Domin, Biblioth. Bot. 89:121 (1926).
Type: A. Dietrich 620, Brisbane River? (PR 526705 holotype, BO, MEL 623257-261, isotypes).
Cryptocarya percrassa Kosterm., Reinwardtia 7:323 (1968).
Type: D. Fryar NGF 4051, Bulolo (A holotype, CANB isotype).

Tree to 30 m tall x 80 cm dbh, usually medium to large sized and well formed. Stem usually buttressed in all size classes, rarely otherwise. Bark usually nondescript, sometimes slightly flaky, outer blaze cream or brown, usually conspicuously speckled, granular in texture, usually emitting an odour, often described as peppery. Twigs fluted, densely clothed in short, tortuous, brown, erect and appressed hairs. Leaves: Underside green or slightly glaucous, clothed in short, straight and tortuous, white or pale brown, appressed hairs when young but eventually becoming almost glabrous. Leaf blade elliptical or ovate, apex acute or obtuse, base attenuate, cuneate or truncate, 6.5-24.5 x 2.5-13.5 cm (mean 11.3 x 4.7); penninerved, primary veins 4-9 pairs, midrib flush with the upper surface; petiole 7-17 mm long (mean 11.1), ridged, flat or channelled on the upper surface. Inflorescence paniculate, usually exceeding the leaves, mainly pseudoterminal, but also axillary; bracts triangular, 0.4-0.6 mm long, deciduous, absent at anthesis. Flowers pale brown, cream, creamy green or green, unpleasantly perfumed, opening fairly widely but the tepals remaining ± erect at anthesis. Pedicel nil or up to 0.5 x 0.6-0.7 mm. Perianth tube 1.0-1.8 x 1.3-1.5 mm, inner surface pubescent towards the apex but usually glabrous on the lower half. Outer and inner tepals of similar lengths but inner tepals wider and more spathulate, outer tepals 1.4-1.9 x 0.7-1.1 mm, inner tepals 1.4-1.9 x 1.1-1.5 mm, all tepals pubescent on both their inner and outer surfaces. Outer anthers glabrous adaxially but pubescent at the base and along the midline on the abaxial surface, 0.6-0.8 x 0.5-0.7

mm, filaments pubescent, 0.4-0.7 mm long; gland heads glabrous, 0.4-0.6 x 0.4-0.5 mm, stalks pubescent, 0.3-0.6 mm long. Inner anthers glabrous abaxially but sometimes pubescent along the midline on the adaxial surface, 0.6-0.8 x 0.4-0.6 mm, filaments pubescent, 0.5-0.7 mm long. Staminodes differentiated, head ± cordate, glabrous adaxially but pubescent along the midline on the abaxial surface, 0.7-1.0 mm long, filaments pubescent, 0.2-0.4 mm long. Ovary mainly glabrous, sometimes pubescent towards the apex, 0.9-1.2 x 0.5-0.6 mm, style glabrous or sparsely hairy, 1.1-1.6 mm long. Fruits black when ripe, globular (rarely pyriform), 13-18 x 12-17 mm, mesocarp + exocarp 0.4-1.4 mm thick, endocarp 0.4-1.1 mm thick. Seed 8.5-16 x 9.5-14.0 mm, testa 0.1-0.2 mm thick, radicle apical. Cotyledons white or cream, ruminate. Seedling leaves green or slightly glaucous on the underside, cataphylls absent, first pair of leaves opposite.

Distribution

Eastern Australia (Fig. 92, Map 29), also in New Guinea.

Ecology

Rain forests of various types but particularly gallery forests of central and northern Queensland, on soils derived from a variety of rock types. Altitudinal range: Sea level to 900 m.

Uses

This species produces millable logs and the sawn timber is marketed as Northern Laurel, a useful general purpose timber. Wood S.G. 0.60-0.68.

Notes and Observations

Flowers have been collected each month from November to May, while ripe fruits have been collected each month from September to December. Seedling germination period 19-70 days.

This species is very closely related to C. obovata, but where the ranges of the two species approach one another the two species occur in quite different ecological niches. C. hypospodia occurring in low elevation gallery forests while C. obovata occurs in high elevation mountain rain forests.

C. hypospodia is probably closely related to C. elliptica Schltr. of New Caledonia, but nevertheless specifically distinct.

I found it necessary to choose a lectotype for the name of this species because it is based on more than one collection and includes a discordant element in the syntypes viz. Beckler, Richmond River MEL 623347. This element belongs in C. obovata R. Br. (1810) and must therefore be excluded from consideration when selecting a lectotype. The choice of a lectotype was complicated because there are 8 numbered sheets of C. hypospodia in MEL but they are not isotypes as 3 different collection dates occur on Dallachy's original labels.

The type locality of C. multicostata Domin (Dietrich 620) is given as Brisbane River but all the isotype material in MEL is labelled Port Mackay and the latter appears to be the more likely locality.

Specimens Examined (159 collections examined)

24. **Cryptocarya laevigata** Blume, Bijdr. fl. Ned. Ind. 11:556 (1826).
Caryodaphne laevigata (Blume) Nees, Syst. laur. 227 (1836).

Type: "In sylvis montanis" Java? (K?).
Laurus australis Cunn. ex Hook., J.Bot. 4:436 (1842);
Laurus australis Cunn. ex Hook., Bot.Mag. No. 3931 (1842).
[L. bowiei Hook., J. Bot. 4:419, t.23 (1842) nom. inval.];
Oreodaphne bowiei Walpers, Ann.Bot. Syst. 1(3):576 (1849);
Cryptocarya australis (Cunn. ex Hook.) Benth., Fl. austral. 5:299 (1870); Bailey, Queensl. fl. 4:1301 (1901).
C. bowiei (Walpers) Druce, Bot.Exch.Club Brit.Isles Rep. for 1916 Suppl.2:618 (1917); Francis, Austral. Rain-Forest Trees, ed.2:135 (1951).
C. bowiei (Walpers) Domin, Bibl.Bot. 89:123 (1925);
C. laevigata var. bowiei (Walpers) Kosterm., Reinwardtia 7:470 (1969); Floyd, N.S.W. Rainforest Trees Part 1, ed.2:47 (1979); Stanley &Ross, Flora of south-eastern Queensland 1:159 (1983).
Type: Cultivated Royal Botanic Garden, Kew, originally from Moreton Bay.
Caryodaphne australis A. Braun , Ind. Sem. Hort. Berol. App.13 (1851) (n.v.); Meissner in DC., Prodr. 15(1):77 (1864).
Type: n.v. (May be the same as Laurus australis)

Extra-Australian synonyms probably include the following:
Pseudocryptocarya pauciflora Teschner Bot. Jahrb. Syst. 58:413 (1923).
Type?: Lauterbach 846, New Guinea (K,L, isotypes).
Cryptocarya trinervia Elmer, Philipp. Bot. 10:3754 (1939).
Syntypes?: Elmer 17395, 16749, Luzon n. v.
Cryptocarya scalariformis Allen, J. Arnold Arb. 23:135 (1942).
Type: S. F. Kajewski 2204, Bougainville Island (A holotype).

Tree to 7 m tall x 15 cm dbh, usually a shrub or small tree. Stem without buttresses, sometimes with coppice shoots at the base. Bark nondescript, sometimes almost smooth, outer blaze cream, granular in texture, the northern populations sometimes emitting a pleasant blaze odour resembling that of Red Cedar (Toona australis). Twigs ± terete (slightly fluted, only when very young), clothed in straight, white or pale brown, appressed hairs when very young but soon becoming glabrous. Leaves: Underside green and glabrous at maturity, (a few sparsely scattered straight, white or pale brown, appressed hairs visible only on very young leaves). Leaf blade lanceolate or elliptical, apex acuminate, base attenuate, 5.0-15.5 x 1.3-6.1 cm

(mean 9.4 x 3.0); triplinerved, primary veins 2-5 pairs (mode 3), midrib usually flush with the upper surface (sometimes slightly raised); petiole 2-11 mm long (mean 5.2), channelled on the upper surface. Inflorescence racemose or paniculate, not exceeding the leaves, axillary, seldom pseudoterminal; bracts linear, lanceolate, triangular or navicular 0.8-1.4 mm long, deciduous, absent at anthesis. Flowers usually white or cream, rarely pale green, pleasantly perfumed or without any obvious odour, opening very widely, the tepals often becoming almost horizontal at anthesis. Pedicel 0.2-1.3 x 0.4-0.7 mm. Perianth tube 1.1-1.8 x 1.0-2.8 mm, inner surface glabrous throughout. Outer tepals often slightly shorter than the inner, outer tepals 2.2-3.0 x 1.4-2.0 mm, inner tepals 2.3-3.2 x 1.4-2.1 mm, all tepals glabrous on both their inner and outer surfaces, rarely sparsely pubescent on the inner surface. Outer anthers glabrous, 0.7-1.2 x 0.6-0.9 mm, filaments glabrous, 0.5-1.2 mm long; gland heads glabrous, 0.3-0.8 x 0.4-0.7 mm, stalks glabrous, 0.1-0.4 mm long. Inner anthers glabrous, 0.7-1.3 x 0.4-0.7 mm, filaments glabrous, 0.7-1.4 mm long. Staminodes differentiated, head ± cordate, but rather variable in shape, glabrous, 0.6-0.9 mm long, filament glabrous, 0.3-0.7 mm long. Ovary glabrous, 0.8-1.5 x 0.6-0.9 mm, style glabrous, 0.6-1.0 mm long. Fruits yellow, orange or red when ripe, globular, depressed globular, ellipsoid or ovoid, 17-33 x 17-38 mm, mesocarp + exocarp 1.4-4.8 mm thick, endocarp 0.4-1.2 mm thick. Seed 11-24 x 10-19 mm, testa 0.08-0.2 mm thick, radicle apical. Cotyledons white or cream, uniform in texture. Seedling leaves green on the underside, cataphylls present, first pair of leaves spirally arranged. (Fig. 70 D-E)

Distribution

Eastern Australia (Fig. 90, Map 16), also widely distributed in Malesia.

Ecology

Rain forests of northern New South Wales and southern Queensland and also in northern Queensland. Occurs on soils derived from a variety of rock types. Altitudinal range: Sea level to 450 m.

Uses

This species has no commercial value as it does not grow large enough to produce millable logs and does not have a Standard Trade Name. Wood S.G. 0.86-0.91.

Notes & Observations

Flowers have been collected each month from September to December, while ripe fruits have been collected each month from December to March and also in June. Seedling germination period 40-320 days.

This species has a very disjunct distribution, occuring in two quite discrete areas (See distribution map). The gap between these two areas is about 8^{o} of latitude or about 1100 km in a direct line.

At various times in the past, the two populations have been regarded as distinct species or at least distinct varieties. However, the two populations are basically similar and I believe it is more realistic to place all the specimens in the one species and regard the differences between the two populations as being no more than that normally ascribed to geographical variation.

Cryptocarya laevigata appears to be widely distributed and specimens in KEP collected in Johore also appear to belong in this species and probably come from the western extremity of its range.

Specimens Examined (173 collections examined)

25. Cryptocarya leucophylla B. Hyland sp. nov.
Differt a C. vulgari laminis subtus albis et pubescentibus.
Typus: B. Gray 3919: State Forest Reserve 194 East Barron, Hugh Nelson Range, 21.ii.1985 (holotypus QRS).
Differs from C. vulgaris the lamina being white and pubescent on the underside.

Tree to 25 m tall x 30 cm dbh, usually small. Stem buttressed, even in small size classes. Bark nondescript, outer blaze cream or brown, granular in texture. Twigs fluted, clothed in straight, pale brown, appressed hairs when young but eventually becoming almost glabrous. Leaves: Underside glaucous, almost white, clothed in straight, pale brown, appressed hairs which, although not obvious, persist even on old leaves. Leaf blade elliptical, ovate or obovate, apex acute or obtuse, base attenuate or shortly attenuate, 6.8-13.3 x 3.0-5.0 cm (mean 9.3 x 3.7); penninerved, primary veins 3-5 pairs, midrib depressed on the upper surface; petiole 6-12 mm long (mean 8.5), flat or channelled on the upper surface. Inflorescence paniculate, not exceeding or slightly exceeding the leaves, axillary and pseudoterminal; bracts triangular to navicular, 0.5-1.4 mm long, deciduous, absent at anthesis. Flowers creamy green, unpleasantly perfumed, opening fairly widely but the tepals remaining ± erect at anthesis. Pedicel 0.1-0.6 x 0.5-0.7 mm. Perianth tube 0.9-1.3 x 1.2-1.5 mm, inner surface pubescent towards the apex and glabrous or hairy on the lower half. Outer and inner tepals of similar

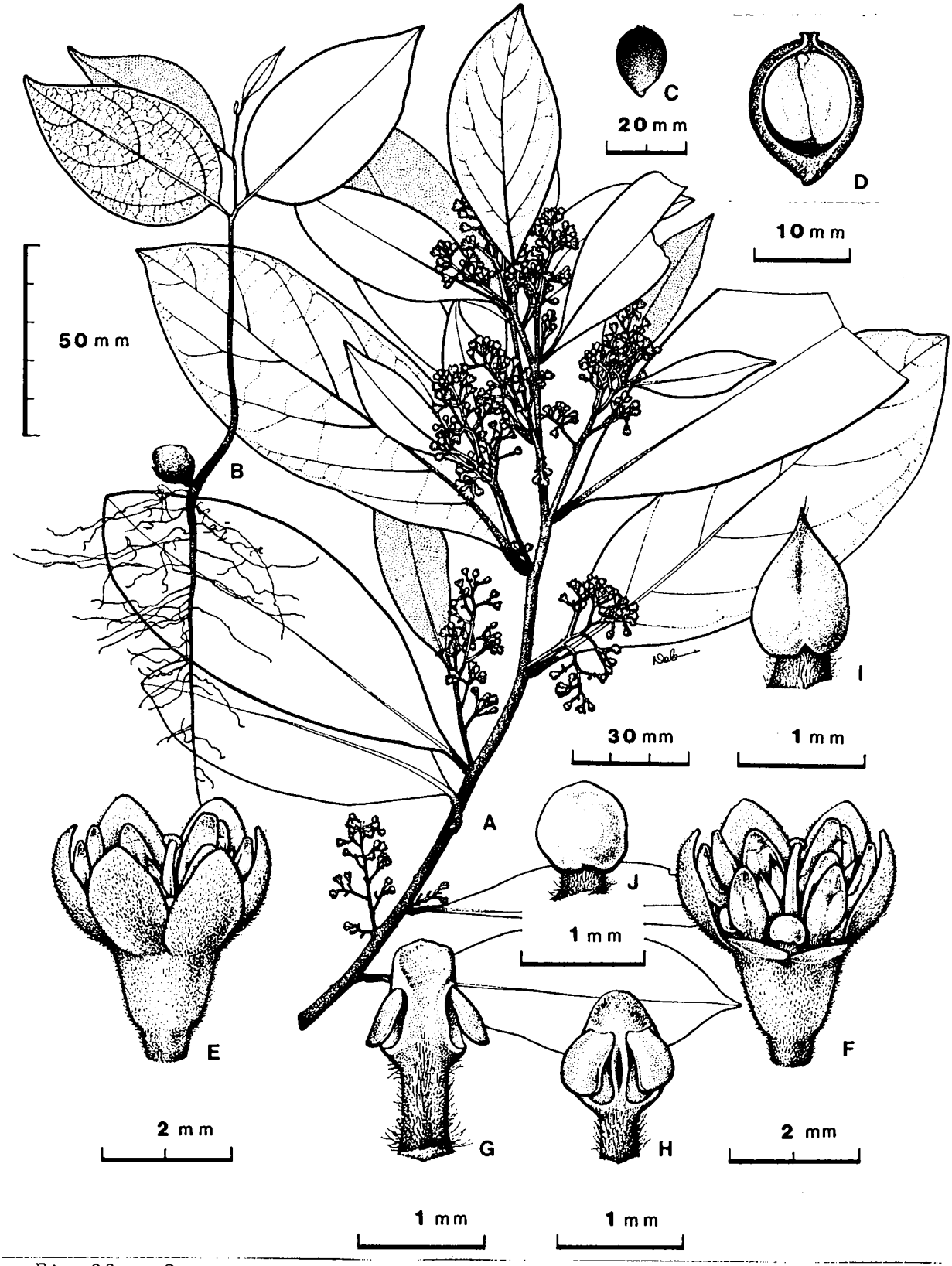

Fig.22. Cryptocarya leucophylla. A Habit Gray 3919; B seedling, C fruit, D fruit (LS) Gray 807; E flower, F flower (side view, 2 tepals removed), G anther (inner whorl, abaxial view), H anther (outer whorl, adaxial view), I staminode (adaxial view), J gland (adaxial view) Gray 3919.

dimensions, 1.4-2.1 x 1.2-1.7 mm, all tepals pubescent on the outer surface and usually the inner. Outer anthers glabrous adaxially but pubescent near the base on the abaxial surface, 0.7-0.9 x 0.6-0.7 mm, filaments pubescent, 0.4-0.7 mm long, gland heads glabrous, 0.4-0.5 x 0.4-0.6 mm, stalks pubescent, 0.3-0.6 mm long. Inner anthers usually glabrous on both surfaces, (sometimes a few hairs towards the base on the adaxial surface), 0.8-0.9 x 0.5 mm, filaments pubescent, 0.6-0.9 mm long. Staminodes differentiated, head cordate or sagittate, glabrous adaxially but pubescent along the midline on the abaxial surface, 0.8-1.0 mm long, filaments pubescent, 0.3-0.4 mm long. Ovary glabrous or sparsely hairy, 1.0-1.3 x 0.5-0.6 mm, style glabrous or pubescent towards the base, 0.9-1.5 mm long. Fruits black when fully ripe, ellipsoid or globular, 13-18 x 12-13 mm, mesocarp + exocarp 0.4-0.6 mm thick, endocarp 0.4-0.6 mm thick. Seed 9-13 x 9.5-11.0 mm, testa 0.1-0.3 mm thick, radicle apical. Cotyledons yellowish, uniform in texture. Seedling leaves glaucous on the underside, cataphylls absent, first pair of leaves opposite. (Fig. 22)

Distribution (Fig. 92, Map 26)

Ecology

Mountain rain forests of northern Queensland on soils derived from a variety of rock types. Altitudinal range: 800-1300 m.

Uses

This species does not grow large enough to produce millable logs and has not been given a Standard Trade Name. Wood S.G. 1.1.

Notes and Observations

Flowers have been collected in January, February and March, while ripe fruits have been collected in September, November, December and January. Seedling germination period 25-45 days.

This species was referred to C. hypoglauca Meissner for many years but I have examined the type of this name (A. Cunningham?, northwestern coast of Australia, G-DC) and it is obvious that it is a different taxon which I have placed in Excluded Species.

Specimens Examined (47 collections examined)

26. Cryptocarya lividula B. Hyland sp. nov.
Differt a speciebus ceteris cotyledonibus ruminatis, foliis penninervibus, stylo vestigiali.
Typus: B. Gray 1851: State Forest Reserve 310, Gillies Logging Area, 10.xii.1980 (holotypus QRS).
Differs from other species in the ruminate cotyledons, penninerved leaves, vestigial styles.

Tree to 25 m tall x 40 cm dbh, usually small to medium sized and well formed. Stem usually buttressed. Bark nondescript, sometimes flaky, outer blaze cream or brown, usually granular in texture, occasionally somewhat fibrous, often emitting a noticeable odour. Twigs fluted and clothed in straight, brown, appressed hairs, particularly when young. Leaves: Underside glaucous, rarely green, clothed in straight, pale brown, appressed hairs when young but eventually becoming almost glabrous. Leaf blade lanceolate or ovate, apex acuminate, base attenuate or truncate, 6.0-9.3 x 1.9-4.0 cm (mean 7.8 x 2.8); penninerved, primary veins 3-6 pairs (mode 5), midrib raised or flush with the upper surface; petiole 4-8 mm long (mean 6), flat or channelled on the upper surface. Inflorescence paniculate, axillary and pseudoterminal; bracts linear, lanceolate or triangular, about 0.5-0.8 mm long, persistent or deciduous, present or absent at

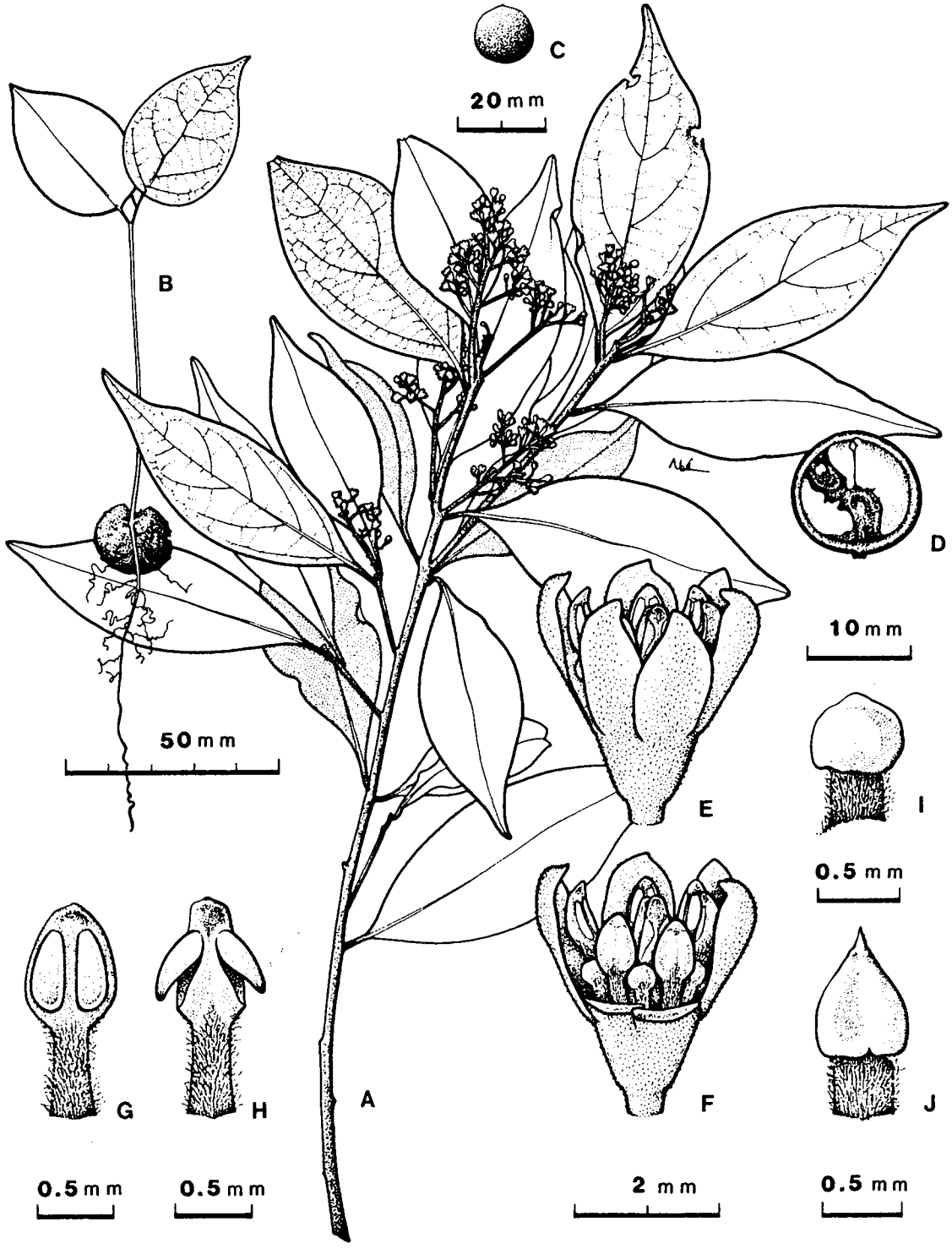

Fig.23. Cryptocarya lividula. A Habit Gray 1851; B seedling, C fruit, D fruit (LS) Gray 3285; E flower, F flower (side view, 2 tepals removed), G anther (outer whorl, adaxial view), H anther (inner whorl, abaxial view), I gland (adaxial view), J staminode (adaxial view) Gray 1851.

anthesis. Flowers cream or creamy green, unpleasantly perfumed, opening fairly widely but the tepals remaining ± erect at anthesis. Pedicel 0.2-0.5 x 0.4-0.7 mm. Perianth tube 0.8-1.6 x 1.4-1.9 mm, inner surface usually glabrous towards the base, glabrous or hairy near the apex, outer and inner tepals of similar lengths but the inner sometimes wider, outer tepals 1.5-2.1 x 0.8-1.1 mm, inner tepals 1.5-2.0 x 1.0-1.3 mm, all tepals pubescent outside and towards the base of the inner surface. Outer anthers glabrous adaxially but usually pubescent on at least part of the abaxial surface, 0.7-1.0 x about 0.6-0.7 mm, filaments pubescent, 0.3-0.6 mm long; gland heads glabrous, 0.4-0.5 x 0.4-0.5 mm, stalks pubescent, 0.2-0.4 mm long. Inner anthers usually glabrous, sometimes with a few hairs on the abaxial surface, 0.8-1.0 x 0.5-0.6 mm, filaments pubescent, 0.3-0.8 mm long. Staminodes differentiated, head narrowly sagittate, glabrous adaxially but often with a narrow strip of hairs on the abaxial surface, 0.7-1.0 mm long, filaments pubescent, 0.2-0.6 mm long. Ovary glabrous, 0.8-1.1 x 0.4-0.6 mm, style glabrous, 1.3-1.9 mm long. Fruits purplish black when ripe, globular, 11.5-14.0 x 11.5-14.0 mm, mesocarp + exocarp 0.3-0.9 mm thick, endocarp 0.2-0.5 mm thick. Seed 9-11 x 9.5-12.0 mm, testa 0.1-0.2 mm thick, radicle apical. Cotyledons cream, ruminate. Seedling leaves glaucous on the underside, cataphylls absent, first pair of leaves opposite. (Fig. 23)

Distribution (Fig. 93, Map 30)

Ecology

Rain forests of northern Queensland on soils derived from a variety of rock types. Altitudinal range: 180-1000 m.

Uses

This species has little commercial value and has seldom been converted into sawn timber. It has not been recognized in the timber trade and has not been given a Trade Name. Wood S.G. 0.93.

Notes and Observations

Flowers have been collected in November, December and January, while ripe fruits have been collected in October and November. Seedling germination period 25-55 days.

Etymology

The specific epithet was chosen because of the peculiar bluish sheen often visible on the leaves of this species, particularly on seedling regeneration.

Specimens Examined (57 collections examined)

27. Cryptocarya macdonaldii B. Hyland sp. nov.;
Cryptocarya sp. 1, Stanley & Ross, Flora of south-eastern Queensland 1:160 (1983).
Differt a speciebus ceteris floribus foetidis sessilibus.
Typus: B. Hyland 4581 RFK: Bonogin Creek Road, 5.iii.1983 (holotypus QRS).
Differs from other species in the foetid sessile flowers.

Tree to 30 m tall x 60 cm dbh, usually small to medium sized and well formed. Stem buttressed in the larger size classes but not in the smaller. Bark nondescript or flaky, if the latter, the flakes sometimes quite large, outer blaze cream or brown, usually granular in texture, rarely fibrous, sometimes emitting a pine-like odour. Twigs terete or angular in cross section, clothed in straight, pale brown,

appressed hairs when very young but soon becoming almost completely glabrous. Leaves: Underside green and glabrous, pubescent only on very young immature leaves. Leaf blade elliptical, ovate or oblong, apex acuminate or obtuse, base attenuate, shortly attenuate or truncate, 9.0-13.0 x 3.0-5.0 cm (mean 11.0 x 4.1); penninerved, primary veins 6-10 pairs (mode 7), midrib depressed on the upper surface; petiole 6-14 mm long (mean 9.0), channelled on the upper surface. Inflorescence paniculate, usually exceeding the leaves, axillary and pseudoterminal; bracts linear or triangular, 0.7-1.2 mm long, sometimes persistent, present or absent at anthesis. Flowers cream, unpleasantly perfumed, opening quite widely, the tepals being slightly above horizontal at anthesis. Pedicel nil. Perianth tube 1.1-1.3 x 1.1-1.3 mm, inner surface glabrous throughout. Outer and inner tepals of similar dimensions, 1.3-1.5 x 0.7-0.9 mm, all tepals pubescent on both their inner and outer surfaces. Outer anthers glabrous adaxially but pubescent at least at the base and along the midline on the abaxial surface, 0.5-0.6 x 0.5-0.6 mm, filaments pubescent, about 0.5 mm long; gland heads glabrous, about 0.4 x 0.3-0.4 mm, stalks pubescent, 0.2-0.5 mm long. Inner anthers glabrous, 0.6-0.7 x 0.4-0.5 mm, filaments pubescent, about 0.4 mm long. Staminodes differentiated, head cordate or sagittate (apex aristate), glabrous adaxially, but pubescent along the midline on the abaxial surface, 0.5-0.8 mm long, filaments pubescent, 0.2-0.3 mm long. Ovary glabrous, 0.7-1.2 x 0.4-0.5 mm, style glabrous, 0.9-1.2 mm long. Fruits black when ripe, ellipsoid, sometimes longitudinally ribbed, about 15 x 11 mm, mesocarp + exocarp about 0.8 mm thick, endocarp about 0.6 mm thick. Seed about 11 x 8 mm, testa about 0.2 mm thick, radicle apical. Cotyledons cream or yellowish, uniform in

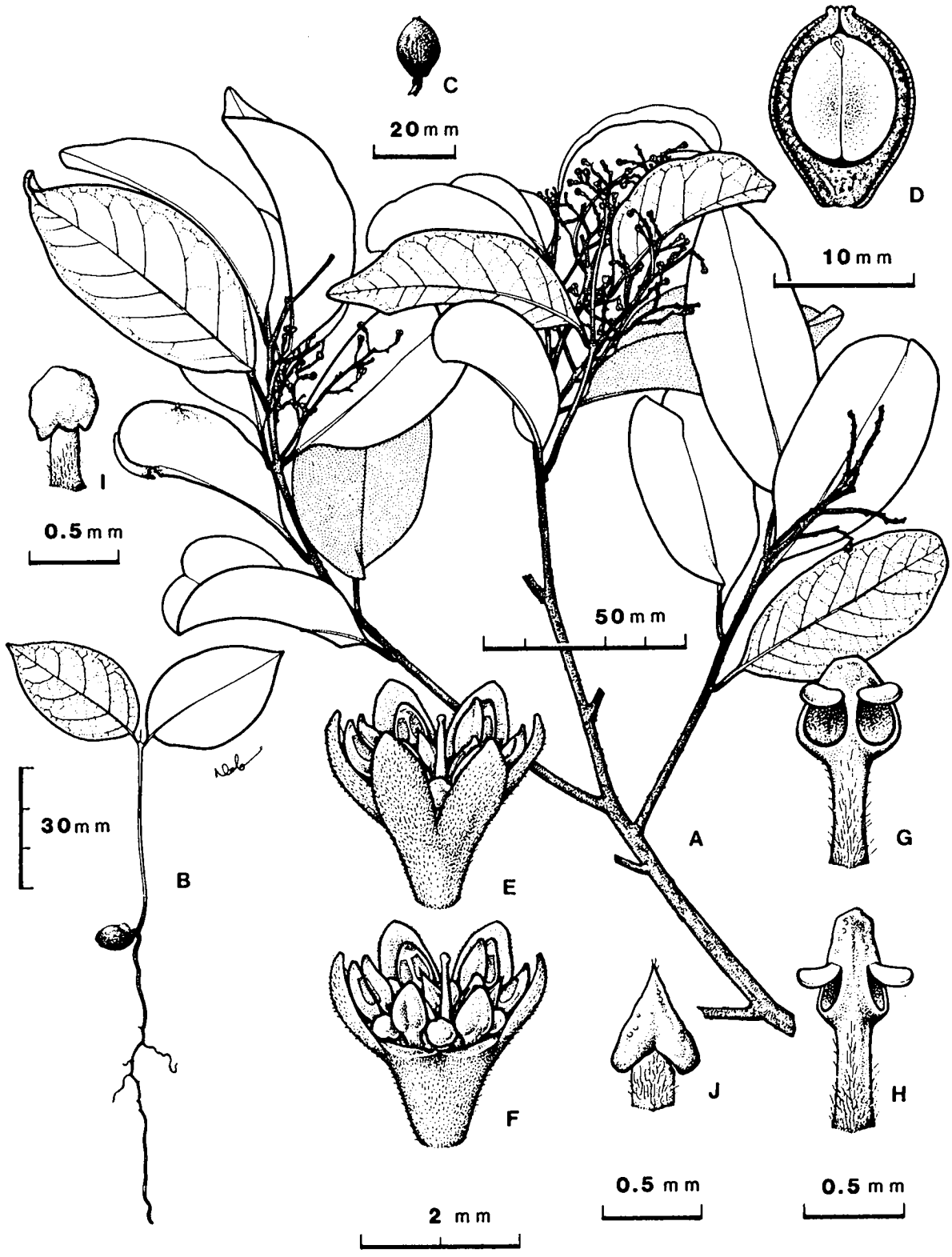

Fig.24. Cryptocarya macdonaldii. A Habit Hyland 4581 RFK; B seedling, C fruit, D fruit (LS) D.L. Jones 1284; E flower, F flower (side view, 2 tepals removed), G anther (outer whorl, adaxial view), H anther (inner whorl, abaxial view), I gland (adaxial view), J staminode (adaxial view) Hyland 4581 RFK.

texture. Seedling leaves green or slightly glaucous on the underside, cataphylls absent, first pair of leaves opposite. (Fig. 24)

Distribution (Fig. 93, Map 30)

Ecology

Rain forests of central and southern Queensland (and northern New South Wales?), on soils derived from a variety of rock types. Altitudinal range: Sea level to 1000 m.

Uses

This species grows large enough to produce millable logs but as far as I can ascertain it is seldom utilized and has not been given a Standard Trade Name. Wood S.G. 0.85.

Notes and Observations

Flowers have been collected in January and February, while ripe fruits have been collected in April. Seedling germination period about 20-100 days.

Etymology

It gives me much pleasure to name this species after Mr W.J.F. (Bill) McDonald whose ecological studies in southern Queensland have been of immense value to me in my pursuit of various species of Lauraceae.

Specimens Examined (43 collections examined)

28. Cryptocarya mackinnoniana F. Muell., Fragm. 5:169 (1866); Benth., Fl. austral. 5:296 (1870)p.p.; Bailey,

Queensl. fl. 4:1298 (1901); Francis, Austral. Rain-Forest Trees ed.2:403 (1951).
Type: J. Dallachy 171, Seaview Range, Rockingham Bay (MEL 623262 - 623263 holotype, K, WRSL isotypes?).

Tree to 25 m tall x 40 cm dbh, usually small to medium sized and well formed. Stem with or without buttresses, sometimes with coppice shoots at the base. Bark nondescript, occasionally flaky, outer blaze cream or brown, usually speckled, granular in texture, often emitting a pine-like odour. Twigs fluted, densely clothed in a mixture of hairs, some long and tortuous, others shorter and almost papillate, dark brown and pale brown, mainly erect, persisting even on quite old twigs. Leaves: Underside slightly glaucous, clothed in tortuous, brown, erect hairs. Leaf blade lanceolate, elliptical, narrowly elliptical or oval, apex acuminate, acute or obtuse, base attenuate, shortly attenuate or truncate, 13-35 x 4.5-8.5 cm (mean 19.0 x 6.4); penninerved, primary veins 6-14 pairs (mode 10), midrib depressed on the upper surface; petiole 11-21 mm long (mean 15.6), ridged, flat or channelled on the upper surface. Inflorescence paniculate, exceeding the leaves, axillary and pseudoterminal; bracts triangular to navicular, 0.6-1.0 mm long, deciduous, absent at anthesis. Flowers cream, pale brown or pale green, unpleasantly perfumed, opening quite widely but the tepals remaining ± erect at anthesis. Pedicel nil or up to 0.4 x about 0.6 mm. Perianth tube 0.8-1.3 x 1.2-1.8 mm, inner surface pubescent throughout. Outer and inner tepals of similar dimensions, 1.1-1.9 x 0.9-1.3 mm, all tepals pubescent on both their inner and outer surfaces, less so on the inner, sometimes almost glabrous. Outer anthers glabrous adaxially but pubescent near the base and along the midline of the abaxial surface, 0.6-0.8 x 0.5-0.8 mm, filaments pubescent, 0.4-0.6 mm long; gland heads glabrous, 0.3-0.6 x 0.4-0.5 mm, stalks pubescent, 0.3-0.5 mm long. Inner

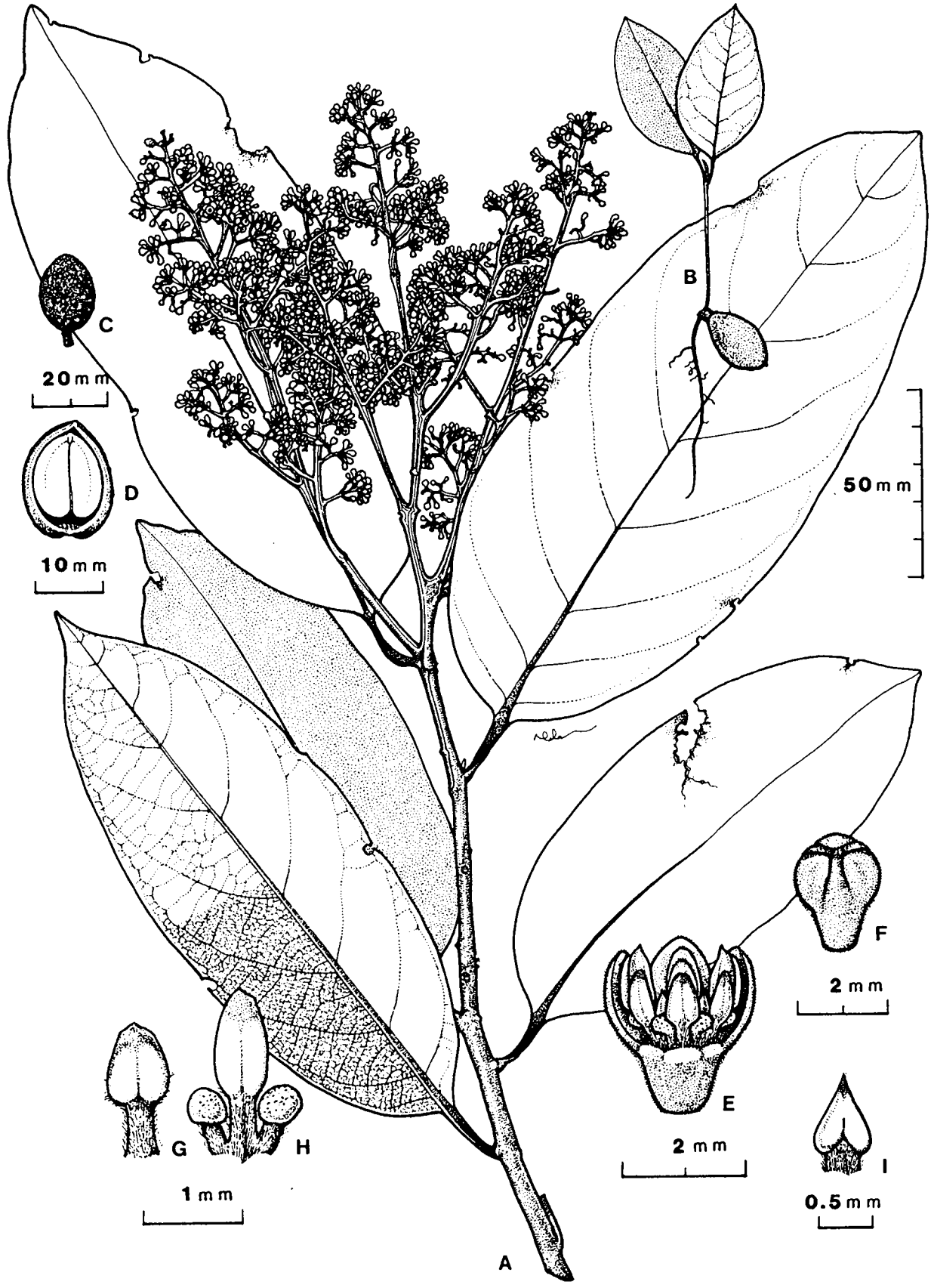

Fig.25. Cryptocarya mackinnoniana. A Habit Hyland 8652; B seedling, C fruit, D fruit (LS) Irvine 388; E flower (side view, 3 tepals removed), F flower bud, G stamen (outer whorl, adaxial view), H stamen and glands (inner whorl, abaxial view), I, staminode (adaxial view) Hyland 8652.

anthers glabrous or with a few hairs on the adaxial and/or abaxial surfaces, 0.7-0.9 x 0.4-0.5 mm, filaments pubescent, 0.4-0.6 mm long. Staminodes differentiated, head cordate, glabrous adaxially, but pubescent along the midline on the abaxial surface, 0.6-0.9 mm long, filaments pubescent, 0.2-0.4 mm long. Ovary usually glabrous, occasionally pubescent, 0.7-1.4 x 0.3-0.6 mm, style glabrous, 0.7-1.2 mm long. Fruits spotted, black, blue-black or purplish black when ripe, usually ellipsoid, sometimes ovoid or obpyriform 19-28 x 13-17 mm, mesocarp + exocarp 0.5-0.9 mm thick, endocarp 0.8-1.8 mm thick, not uniform in colour. Seed 15-19.5 x 9-11 mm, testa 0.1-0.7 mm thick, radicle apical. Cotyledons cream or yellowish, uniform in texture. Seedling leaves slightly glaucous on the underside, cataphylls absent, first pair of leaves opposite. (Fig. 25)

Distribution

North eastern Queensland (Fig. 90, Map 12), probably also in New Guinea & the Philippines.

Ecology

Rain forests of northern Queensland on soils derived from a variety of rock types. Altitudinal range: Sea level to 1100 m.

Uses

This species has little commercial value, it grows large enough to produce millable logs but it is seldom utilized as it is not popular with the sawmilling fraternity. Standard Trade Name - Rusty Laurel. Wood S.G. 0.85-0.91.

Notes and Observations

Flowers have been collected each month from October to April, while ripe fruits have been collected each month from April to November. Seedling germination period 20-85 days.

Kostermans has identified a specimen from the Philippines [J. Reillo, Bur. Sci. 15441 (NY)] as belonging to this species and I believe he could be correct. This results in a considerable extension of the range of this species.

There are a number of species in Malesia which appear to be closely related but C. clemensii Allen and C. whiteana Allen of New Guinea are probably some of the more closely related species.

Specimens Examined (97 collections examined)

29. Cryptocarya meissneriana Frodin, Telopea 1(3):223 (1976); Floyd, N.S.W. Rainforest Trees,Part 1, ed.2:50 (1979); Stanley & Ross, Flora of south-eastern Queensland 1:160 (1983).
Type: H. Beckler s.n., Hastings River near Port Macquarie (K holotype; BO, G-DC, MEL 1517123-4, NSW 121644, NY, isotypes).

Tree to 10 m tall x 25 cm dbh, usually a shrub or small tree. Stem without buttresses. Bark nondescript, occasionally flaky, outer blaze cream, usually granular in texture, occasionally fibrous. Twigs terete, clothed in straight, pale brown, appressed hairs when very young but soon becoming almost glabrous. Leaves: Underside green or slightly glaucous, clothed in straight, pale brown, appressed hairs when very young but soon becoming glabrous. Leaf blade lanceolate, apex acuminate or abruptly acuminate, base attenuate or shortly attenuate, 6.5-8.5 x 1.9-2.6 cm (mean 7.2 x 2.2); penninerved, primary veins 6-7 pairs, midrib depressed on the upper surface; petiole 6-7 mm

long (mean 6.7), channelled on the upper surface. Inflorescence racemose, sometimes partly paniculate, mainly axillary, sometimes pseudoterminal; bracts linear, triangular or lanceolate, 0.3-2.2 mm long, deciduous, absent at anthesis. Flowers cream or pale green, pleasantly perfumed or without an obvious odour, opening widely, the tepals becoming ± horizontal at anthesis. Pedicel 0.4-1.3 x 0.4-0.5 mm. Perianth tube 1.1-1.7 x 1.1-1.4 mm, inner surface pubescent throughout, rarely almost glabrous in the lower half. Outer and inner tepals of similar lengths but the inner broader, outer tepals 1.3-1.6 x 0.9-1.1 mm, inner tepals 1.4-1.9 x 1.0-1.4 mm, all tepals glabrous outside (occasionally sparsely pubescent) but pubescent on the inner surfaces. Outer anthers glabrous adaxially, abaxial surface glabrous or pubescent, 0.4-0.6 x 0.4-0.5 mm, filaments pubescent, 0.2-0.4 mm long; gland heads glabrous, 0.3-0.4 x 0.4-0.5 mm, stalks glabrous or pubescent, 0.15-0.30 mm long. Inner anthers glabrous, 0.4-0.6 x 0.3-0.5 mm, filaments pubescent, sometimes glabrous, about 0.3 mm long. Staminodes differentiated, head ± sagittate, glabrous, 0.5-0.7 mm long, filaments pubescent, 0.1-0.2 mm long. Ovary glabrous, 0.9-1.2 x 0.5-0.6 mm, style glabrous, 0.5-1.1 mm long, swollen at the base. Fruits black when ripe, fide Floyd (1979) (one or two collectors suggest red), ellipsoid or ovoid, sometimes longitudinally ribbed, about 15-17 x 12 mm, mesocarp + exocarp about 0.6 mm thick, endocarp about 0.5 mm thick. Seed about 13 x 10 mm, testa about 0.3 mm thick, radicle apical. Cotyledon colour unknown, texture uniform. Seedling characteristics unknown. (Figs 70 F, 71 A)

Distribution (Fig. 92, Map 27)

Ecology

Rain forests of New South Wales and the southern extremity of Queensland, on the poorer soils derived from sedimentary and acid volcanic rocks. Altitudinal Range: 60-900 m.

Uses

This species has no commercial value as it does not grow large enough to produce millable logs, however, it has been given the Standard Trade Name of Northern Rivers Laurel. Wood S.G. unknown.

Notes and Observations

Flowers have been collected in October, November and January, but ripe fruits are rarely collected, the only extant collection being made in March. Floyd (1979) concluded from his studies that the flowering period extended from October to January, while fruits ripened in March and April. Seedling germination period unknown.

Specimens Examined (83 collections examined)

30. Cryptocarya melanocarpa B. Hyland sp. nov.
Differt a speciebus ceteris floribus foetidis, cotyledonibus ruminatis, inflorescentia brevi.
Typus: B. Gray 2968: Gillies Highway - Boar Pocket Road Junction, 3.ii.1983 (holotype QRS).
Differs from other species in the foetid flowers, ruminate cotyledons, short inflorescences.

Tree to 20 m tall x 40 cm dbh, usually small and well formed. Stem without buttresses in the smaller size classes but usually buttressed in the larger, coppice shoots often present at the base. Bark nondescript, rarely otherwise, outer blaze cream or brown, granular in texture. Twigs fluted, clothed in mainly tortuous, brown, erect hairs which persist even on the older twigs. Leaves: Underside glaucous,

clothed in mainly straight, white or pale brown, appressed hairs which persist even on the older leaves. Leaf blade lanceolate, apex acuminate, base attenuate, 6.5-13.5 x 2.0-5.5 cm (mean 10.2 x 3.3); penninerved, primary veins 4-6 pairs, midrib depressed on the upper surface; petiole 8-16 mm long (mean 10.7), channelled on the upper surface. Inflorescence paniculate, not exceeding the leaves, mainly axillary but also pseudoterminal; bracts linear, lanceolate or triangular, 0.4-0.6 mm long, persistent, present at anthesis. Flowers cream, creamy green or green, unpleasantly perfumed, opening quite widely but the tepals remaining ± erect at anthesis. Pedicel 0.3-0.5 x about 0.4 mm. Perianth tube 1.0-1.1 x 1.0-1.4 mm, inner surface glabrous throughout. Outer and inner tepals of similar dimensions, 1.3-1.8 x 0.8-1.0 mm, all tepals pubescent on both their inner and outer surfaces. Outer anthers glabrous (sometimes with a few basal hairs on the abaxial surface), 0.5-0.7 x 0.4-0.5 mm, filaments pubescent, 0.5-0.9 mm long; gland heads glabrous, 0.3-0.4 x 0.3-0.4 mm, stalks pubescent, 0.3-0.5 mm long. Inner anthers glabrous (sometimes with a few basal hairs on the abaxial surface), 0.5-0.8 x about 0.4 mm, filaments pubescent, about 0.6 mm long. Staminodes differentiated, head cordate, glabrous adaxially, but pubescent along the midline on the abaxial surface, 0.6-0.7 mm long, filaments pubescent, 0.2-0.4 mm long. Ovary glabrous, 0.6-0.7 x about 0.4 mm, style glabrous, 1.2-1.6 mm long. Fruits black when ripe, globular or depressed globular, 8-10 x 9-10.5 mm, mesocarp + exocarp 0.3-1.0 mm thick, endocarp 0.3-0.7 mm thick. Seed 5-6.5 x 6-8 mm, testa 0.03-0.16 mm thick (the thickness varying at different points around the perimeter), radicle apical. Cotyledons white, occasionally cream, ruminate. Seedling leaves glaucous on the underside, cataphylls

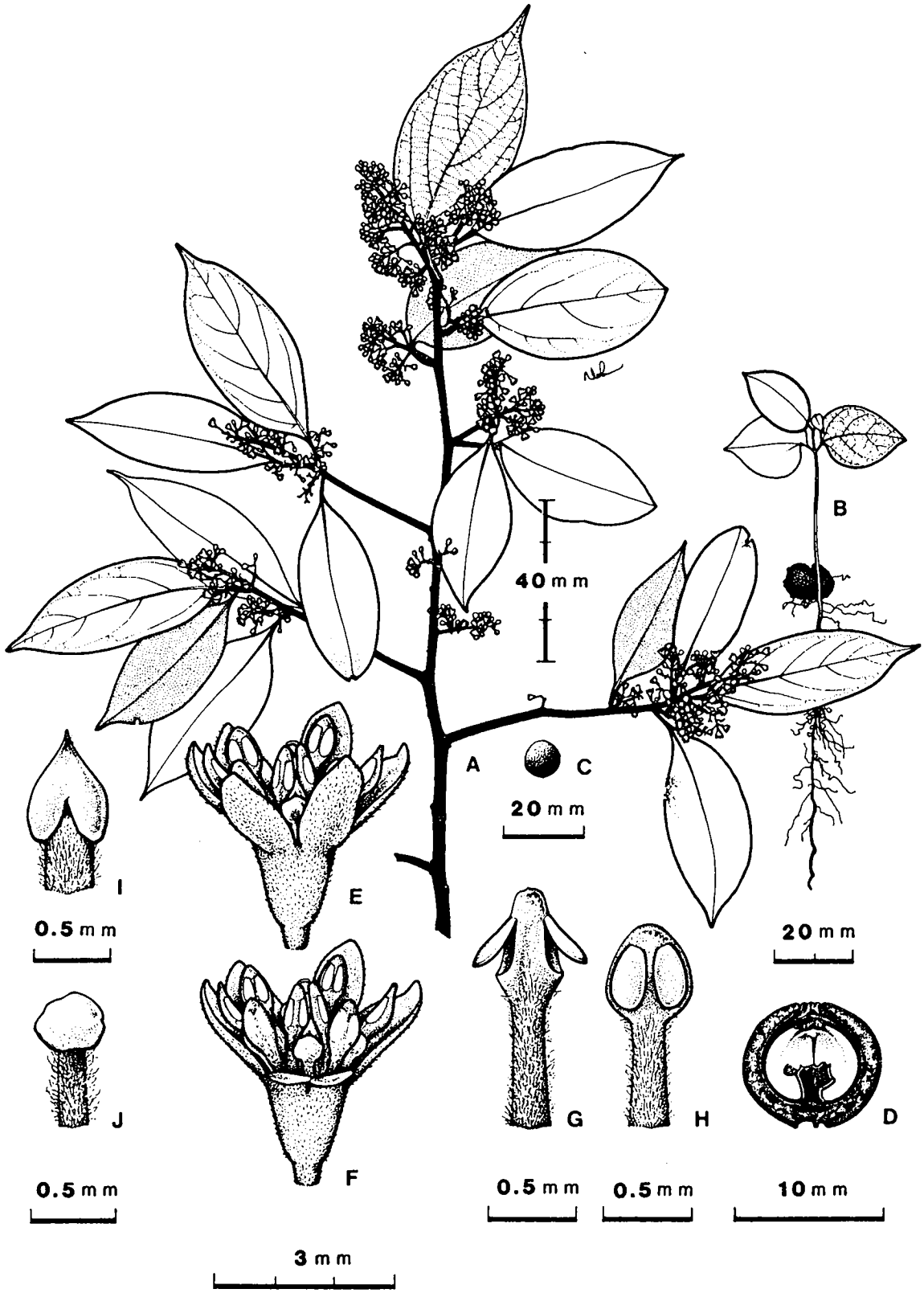

Fig.26. Cryptocarya melanocarpa. A Habit Gray 2968; B seedling, C fruit, D fruit (LS) Gray 1894; E flower, F flower (side view, 2 tepals removed), G anther (inner whorl, abaxial view), H anther (outer whorl, adaxial view), I staminode (adaxial view), J gland adaxial view) Gray 2968.

absent, first pair of leaves opposite. (Fig. 26)

Distribution (Fig. 90, Map 13)

Ecology

Rain forests of northern Queensland on soils derived from a variety of rock types. Altitudinal range: 700-1100 m.

Uses

This species scarcely grows large enough to produce millable logs and it is most unlikely that it has ever been utilized. It does not have a Standard Trade Name. Wood S.G. 0.75-0.80.

Notes and Observations

Flowers have been collected in January, February and March, while ripe fruits have been collected each month from November to February. Seedling germination period 70-300 days.

Etymology

The specific epithet was applied to this species because of the colour of the ripe fruits.

Specimens Examined (49 collections examined)

31. Cryptocarya microneura Meissner in DC., Prodr. 15(1):73 (1864); Francis, Austral. Rain-Forest Trees ed.2:129 (1951); Beadle et al., Flora of the Sydney Region 150 (1972); Frodin, Telopea 1(3):222 (1976); Floyd, N.S.W. Rainforest Trees, Part 1, ed.2:52 (1979); Stanley & Ross, Flora of south-eastern Queensland 1:159 (1983).
Lectotype: A. Cunningham, "Colony, 1819" (K), fide Frodin 1976; BRI 240361, BM, MO, isotypes?).
Other syntypes: C. Fraser South eastern Australia (K).

A. Cunningham - South eastern Australia (K).
W. Macarthur - " " " (K).
J. Backhouse - " " " (K).

Tree to 15 m tall x 20 cm dbh, usually small and well formed. Stem without buttresses. Bark sometimes nondescript, but frequently corky on small trees and flaky on larger, outer blaze usually cream, sometimes pink or brown, granular in texture. Twigs terete, clothed in straight, pale brown, appressed hairs when young, eventually becoming almost glabrous. Leaves: Underside green or slightly glaucous, clothed in straight, white or pale brown, appressed hairs when young, soon becoming almost glabrous. Leaf blade lanceolate or elliptical, apex acuminate, base attenuate or shortly attenuate, 6.5-11.5 x 2.0-4.5 cm (mean 9.7 x 3.1); penninerved, primary veins 4-8 pairs (mode 6), midrib raised on the upper surface; petiole 5-11 mm long (mean 8.3), channelled on the upper surface. Inflorescence paniculate, exceeding the leaves, axillary and pseudoterminal; bracts lanceolate, 0.7-1.0 mm long, deciduous, absent at anthesis. Flowers cream, without any obvious perfume, opening quite widely but the tepals remaining ± erect at anthesis. Pedicel 0.4-0.6 x 0.4-0.6 mm. Perianth tube 1.7-2.0 x 1.1-1.2 mm, inner surface pubescent towards the apex but glabrous on the lower half. Outer tepals generally smaller than the inner, outer tepals 1.4-1.7 x 1.0-1.1 mm, inner tepals 1.5-1.9 x 1.0-1.4 mm, all tepals pubescent on both their inner and outer surfaces, outer anthers glabrous adaxially but pubescent along the midline on the abaxial surface, 0.7-0.8 x 0.5-0.6 mm, filaments pubescent, 0.5-0.6 mm long; gland heads glabrous, 0.3-0.5 x 0.3-0.5 mm, stalks pubescent, about 0.3 mm long. Inner anthers glabrous abaxially, but pubescent along the midline on the adaxial surface, 0.6-0.8 x 0.3-0.5 mm, filaments pubescent, 0.6-0.7 mm long.

Staminodes differentiated, head ± cordate (apex acuminate), glabrous adaxially but pubescent along the midline on the abaxial surface, 0.8-1.0 mm long, filaments pubescent, 0.3-0.4 mm long. Ovary glabrous or sparsely hairy, 1.3-1.4 x about 0.7 mm, style sparsely pubescent, about 1.6 mm long. Fruits black when ripe, globular or ellipsoid, about 12-14 x 10-14 mm, mesocarp + exocarp 0.3-0.7 mm thick, endocarp 0.5-0.7 mm thick. Seed about 6-9 x 7-10 mm, testa 0.2-0.4 mm thick, radicle apical. Cotyledons cream or yellowish, uniform in texture. Seedling leaves slightly glaucous on the underside, cataphylls absent, first pair of leaves opposite.

Distribution (Fig. 92, Map 26)

Ecology

Rain forests and wet sclerophyll forests of New South Wales and southern Queensland. Usually more common on soils derived from sedimentary and acid volcanic rocks. Altitudinal range: Sea level to 600 m.

Uses

This species does not grow large enough to produce millable logs but it has been given the Standard Trade Name of Murrogun. Wood S.G. 0.80.

Notes and Observations

Flowers have been collected in September, October and November, while ripe fruits have been collected in March, April, June and July. This corresponds fairly well with the observations of Floyd (1979) who concluded that the flowering period extended from September to

November, while the fruiting period extended from December to July. Seedling germination period 50-70 days.

This species often grows in wet sclerophyll forests which are periodically burned and the corky bark on the stem is probably a response to this environmental factor. The thickness of the bark is not adequate to afford protection from major fires, but it would undoubtedly provide protection to help the tree survive light fires.

Specimens Examined (117 collection examined)

32. Cryptocarya murrayi F. Muell., Fragm. 5:170 (1866); Benth., Fl. austral. 5:295 (1870); Bailey, Queensl. fl. 4:1298 (1901); Francis, Austral. Rain-Forest Trees ed.2:405 (1951).
Lectotype: J. Dallachy, Dalrymple's Gap (MEL 1517147).
Other syntypes: J. Dallachy, Dalrymple's Gap (A, BO, K? MEL 1517146, 1517148-9, MO, WRSL).
J. Dallachy, Seaview Range (n.v.)

Tree to 30 m tall x 55 cm dbh, usually small to medium sized and well formed. Stem buttressed. Bark usually nondescript, rarely flaky, outer blaze usually cream, occasionally brown, granular in texture, sometimes emitting a pine-like odour. Twigs terete, clothed in tortuous, brown, erect hairs, which persist even on old twigs. Leaves: Underside slightly glaucous, occasionally green, clothed in tortuous, pale brown, erect hairs which persist even on old leaves. Leaf blade lanceolate, elliptical or oblong, apex acuminate, acute or obtuse, base attenuate, cuneate or truncate, 11.5-30.0 x 4.5-10.5 cm (mean 19.5 x 7.0); penninerved, primary veins 8-19 pairs (mode 11), midrib depressed or flush with the upper surface; petiole 8-19 mm long (mean 12.4), channelled on the upper surface. Inflorescence paniculate, exceeding the leaves, axillary and pseudoterminal; bracts

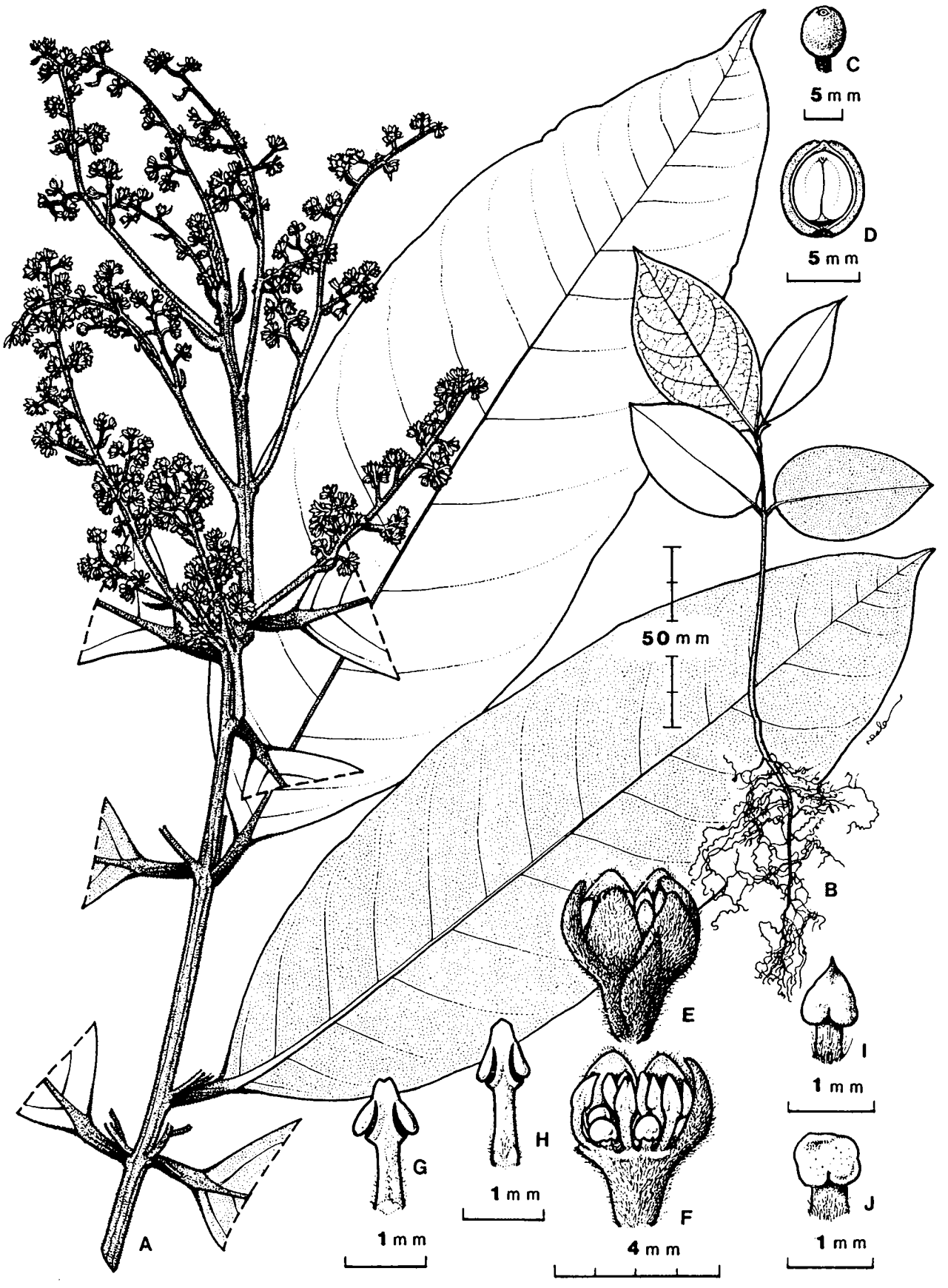

Fig.27. Cryptocarya murrayi. A Habit Hyland 8644; B seedling, C fruit, D fruit (LS) Irvine 385; E flower, F flower (side view, 3 tepals removed), G stamen (outer whorl, adaxial view), H stamen (inner whorl, abaxial view), I staminode (adaxial view), J gland (adaxial view) Hyland 8644.

linear or lanceolate, 2.0-3.5 mm long, persistent, present at anthesis. Flowers cream, unpleasantly perfumed, opening fairly widely but the tepals remaining ± erect at anthesis. Pedicel nil. Perianth tube 0.8-1.9 x 1.5-2.1 mm, inner surface, usually pubescent towards the apex but glabrous in the lower half. Outer tepals usually slightly larger, 1.4-2.7 x 1.2-1.6 mm, inner tepals 1.4-2.6 x 0.9-1.7 mm, all tepals pubescent on both their inner and outer surfaces. Outer anthers glabrous adaxially but usually pubescent near the base on the abaxial surface, 0.6-0.8 x 0.5-0.7 mm, filaments pubescent, 0.4-0.7 mm long; gland heads glabrous, 0.5-0.7 x 0.5-0.8 mm, stalks pubescent, 0.2-0.5 mm long. Inner anthers glabrous, 0.6-0.9 x 0.5-0.7 mm, filaments pubescent, 0.5-0.9 mm long. Staminodes differentiated, head cordate, glabrous, sometimes sparsely pubescent abaxially, 0.5-1.1 mm long, filaments pubescent, 0.2-0.6 mm long. Ovary glabrous, 1.2-1.5 x 0.5-0.6 mm, style glabrous, occasionally sparsely pubescent, 0.8-1.4 mm long. Fruits black when ripe, ellipsoid, globular, 13-18 x 12-15 mm, mesocarp + exocarp 0.7-1.1 mm thick, endocarp 0.4-0.5 mm thick. Seed 8-14 x 8.5-13.0 mm, testa 0.04-0.35 mm thick, radicle apical. Cotyledons white or cream, uniform in texture. Seedling leaves slightly glaucous on the underside, cataphylls absent, first pair of leaves opposite. (Fig. 27)

Distribution (Fig. 92, Map 24)

Ecology

Rain forests of central and northern Queensland on soils derived from a variety of rock types. Altitudinal range: Sea level to 750 m.

Uses

This species grows large enough to produce millable logs but it is seldom utilized and it does not have a Standard Trade Name. Wood S.G. 0.75-0.82.

Notes and Observations

Flowers have been collected in December, January, March, April, June and July, while ripe fruits have been collected in August, September, October and November. Seedling germination period 21-65 days.

Some of the closer relatives of this species include C. crassinervia Miq. and C. griffithiana Wight, all larger-flowered and larger-fruited species of south east Asia. Kostermans (1968) regarded C. murrayi as a synonym of C. infectoria (Bl.) Miq., but I prefer to keep them as distinct species at this stage.

Specimens Examined (81 collections examined)

33. Cryptocarya nova-anglica B. Hyland & Floyd sp. nov.; Cryptocarya sp. nov. (New England N.P.) Floyd, N.S.W. Rainforest Trees, Part 1.ed.2:54 (1979).
Differt a speciebus ceteris inflorescentia racemosa et laminis subtus glaucis cum venis lateralibus 5-6.
Typus: L. J. Webb & J. G. Tracey 8074: Point Lookout, New England National Park, .i.1965 (holotypus BRI).
Differs from other species in the racemose inflorescence, lamina glaucous on the underside with 5-6 lateral veins.

Tree to 20 m tall x 45 cm dbh, usually small and well formed. Stem without buttresses but often with coppice shoots at the base. Bark nondescript, occasionally flaky, outer blaze usually pink, occasionally brownish, usually granular in texture, occasionally fibrous, emitting a strong odour like that of fish oil. Twigs orange-yellow when fresh, fluted, clothed in straight, pale brown,

appressed hairs when young, eventually becoming almost glabrous; emitting an odour when freshly broken, like that of the blaze. Leaves: Underside glaucous, clothed in straight, white or pale brown, appressed hairs when young but eventually becoming almost glabrous. Leaf blade lanceolate, apex acuminate or acute, base attenuate or shortly attenuate, 5.7-7.4 x 2.0-2.5 cm (mean 6.3 x 2.2); penninerved, primary veins 5-6 pairs, midrib depressed on the upper surface; petiole 5-8 mm long (mean 6.7), channelled on the upper surface. Inflorescence usually racemose, sometimes paniculate, not exceeding the leaves, mostly axillary; bracts linear, about 1.0 mm long, deciduous, absent at anthesis. Flowers cream-green, with pink suffusions (Floyd pers. comm.), flower odour unknown, opening fairly widely but the tepals remaining ± erect at anthesis. Pedicel about 0.7 x 0.9 mm. Perianth tube about 2.0 x 1.5 mm, inner surface pubescent throughout. Outer tepals about 2.4 x 1.4 mm, inner tepals about 2.3 x 1.6 mm, all tepals pubescent on both their inner and outer surfaces. Outer anthers glabrous adaxially but pubescent towards the base on the abaxial surface, about 0.9 x 0.6 mm, filaments pubescent, about 0.9 mm long; gland heads glabrous, about 0.5 x 0.5 mm, stalks pubescent, about 0.5 mm long. Inner anthers glabrous abaxially but pubescent along the midline near the base on the adaxial surface, about 0.9 x 0.5 mm, filaments pubescent, about 0.9 mm long. Staminodes differentiated, head ± sagittate, glabrous adaxially but pubescent along the midline on the abaxial surface, about 0.7 mm long, filaments pubescent, about 0.4 mm long. Ovary glabrous, about 1.1 x 0.6 mm, style glabrous, about 2.0 mm long. Fruits black when ripe, globular to pyriform, 12.5-15.0 x 13.0-13.5 mm, mesocarp + exocarp 0.7-0.8 mm thick, endocarp about 0.6 mm thick. Seed 6.5-7.0 x

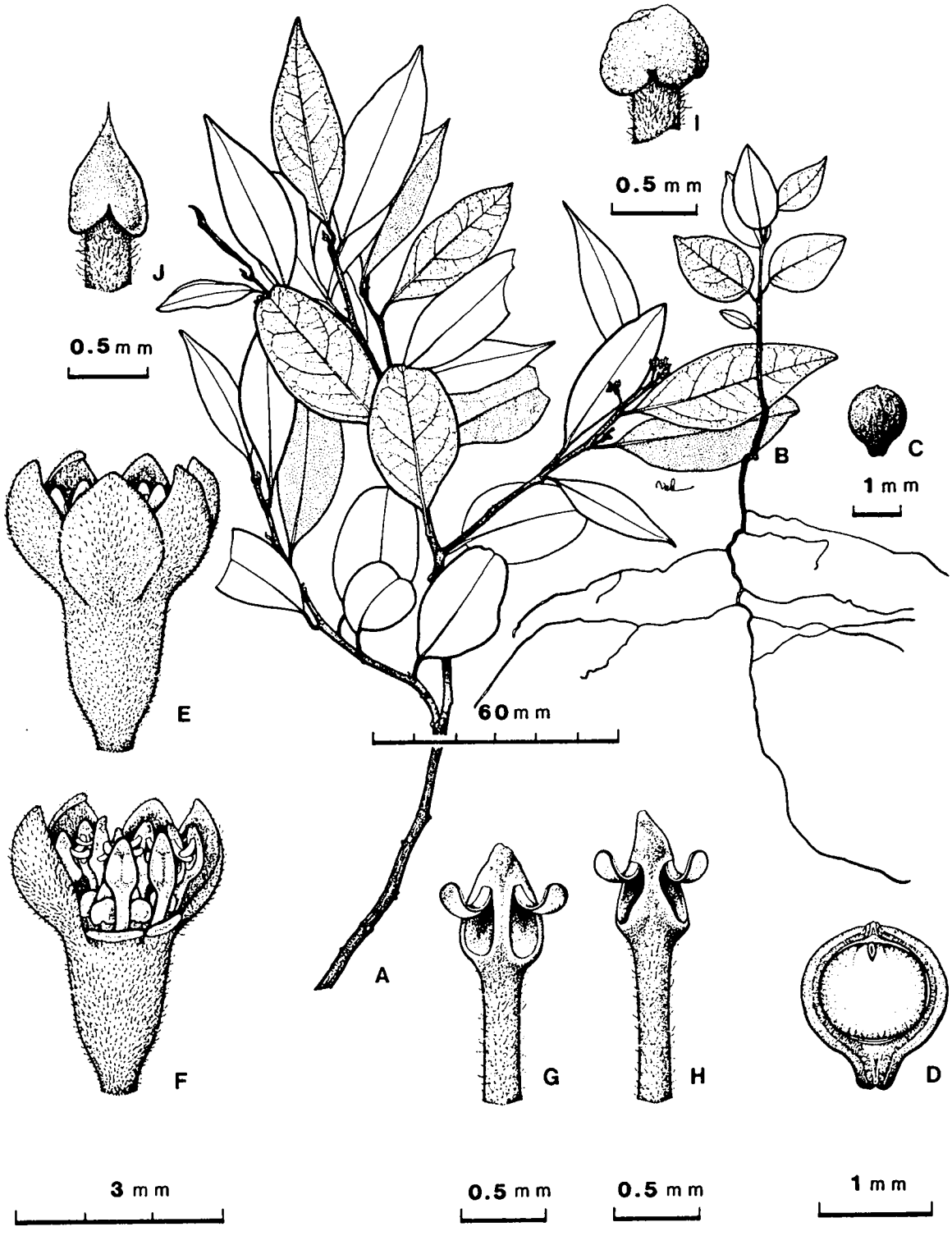

Fig.28. Cryptocarya nova-anglica. A Habit L.J. Webb & J.G. Tracey 8074; B seedling, C fruit. D fruit (LS) Hyland 4399 RFK; E flower (side view), F flower (side view, 2 tepals removed), G anther (outer whorl, adaxial view), H anther (inner whorl, abaxial view), I gland (adaxial view), J staminode (adaxial view) L.J. Webb & J.G. Tracey 8074.

9.0-11.0 mm, testa 0.1-0.4 mm thick, radicle apical. Cotyledons white or cream, uniform in texture. Seedling leaves alternate, glaucous on the underside, cataphylls present (1 or 2 pairs). (Fig. 28)

Distribution (Fig. 92, Map 25)

Ecology

Mountain rain forests of northern New South Wales. Altitudinal range: 1100-1350 m. Usually associated with Nothofagus moorei

Uses

This species has no commercial value as it is doubtful if it grows large enough to produce millable logs. It does not have a Standard Trade Name. Wood S.G. unknown.

Notes and Observations

Flowers have been collected in December and January, while ripe fruits have been collected in March. These records agree with the findings of Floyd (1979) who came to similar conclusions but also observed ripe fruits in April. Immature fruit collections made in September and December indicate that the flowering-fruiting cycle may be about 15 months and not 3 months as suggested by the flowering and ripe fruit collections. Seedling germination period 250-270 days.

Etymology

The specific epithet was applied to this species because it occurs in the New England district of New South Wales.

Specimens Examined (11 collections examined)

34. **Cryptocarya oblata** Bailey, Queensl. Dept. Agric., Bot. Bull. 9:11 (1894); Bailey, Queensl. fl. 4:1301 (1901). Type: E. Cowley 7, Daintree River (BRI 9987 holotype; K isotype).

Tree to 35 m tall x 90 cm dbh, usually medium to large sized and well formed. Stem usually buttressed, buttresses absent only on very small trees. Bark usually nondescript, occasionally flaky. Outer blaze pink or red, rarely cream on small trees, usually granular in texture, often emitting a noticeable odour, difficult to describe. Twigs angular in section, clothed in straight and tortuous, pale brown, appressed hairs when young, eventually becoming almost glabrous. Leaves: Underside green, clothed in straight, pale brown, appressed hairs when very young but soon becoming almost completely glabrous. Leaf blade lanceolate, often slightly oblique towards the base, apex acuminate, base shortly attenuate, 7.5-14.0 x 2.9-5.7 cm (mean 10.4 x 3.8); penninerved, primary veins 4-9 pairs (mode 6), midrib flush with the upper surface; petiole 7-14 mm long (mean 9.3), flat on the upper surface. Inflorescence paniculate, not exceeding the leaves, mainly axillary (also pseudoterminal); bracts linear, lanceolate or occasionally spathulate, about 0.8 mm long, persistent, present at anthesis. Flowers pale green, greenish or cream, faintly, but pleasantly perfumed or without any obvious perfume, opening fairly widely but the tepals remaining ± erect at anthesis. Pedicel 0.4-1.0 x 0.5-0.8 mm. Perianth tube 0.3-0.7 x 1.4-2.2 mm, inner surface usually pubescent throughout, rarely glabrous in the lower half. Outer and inner tepals of similar dimensions, 1.5-2.0 x 0.9-1.4 mm, all tepals pubescent on both their inner and outer surfaces. Outer anthers pubescent on both surfaces, 0.6-0.9 x 0.6-0.8 mm, filaments pubescent, 0.3-0.6 mm long; gland heads glabrous, 0.3-0.4 x 0.4-0.6

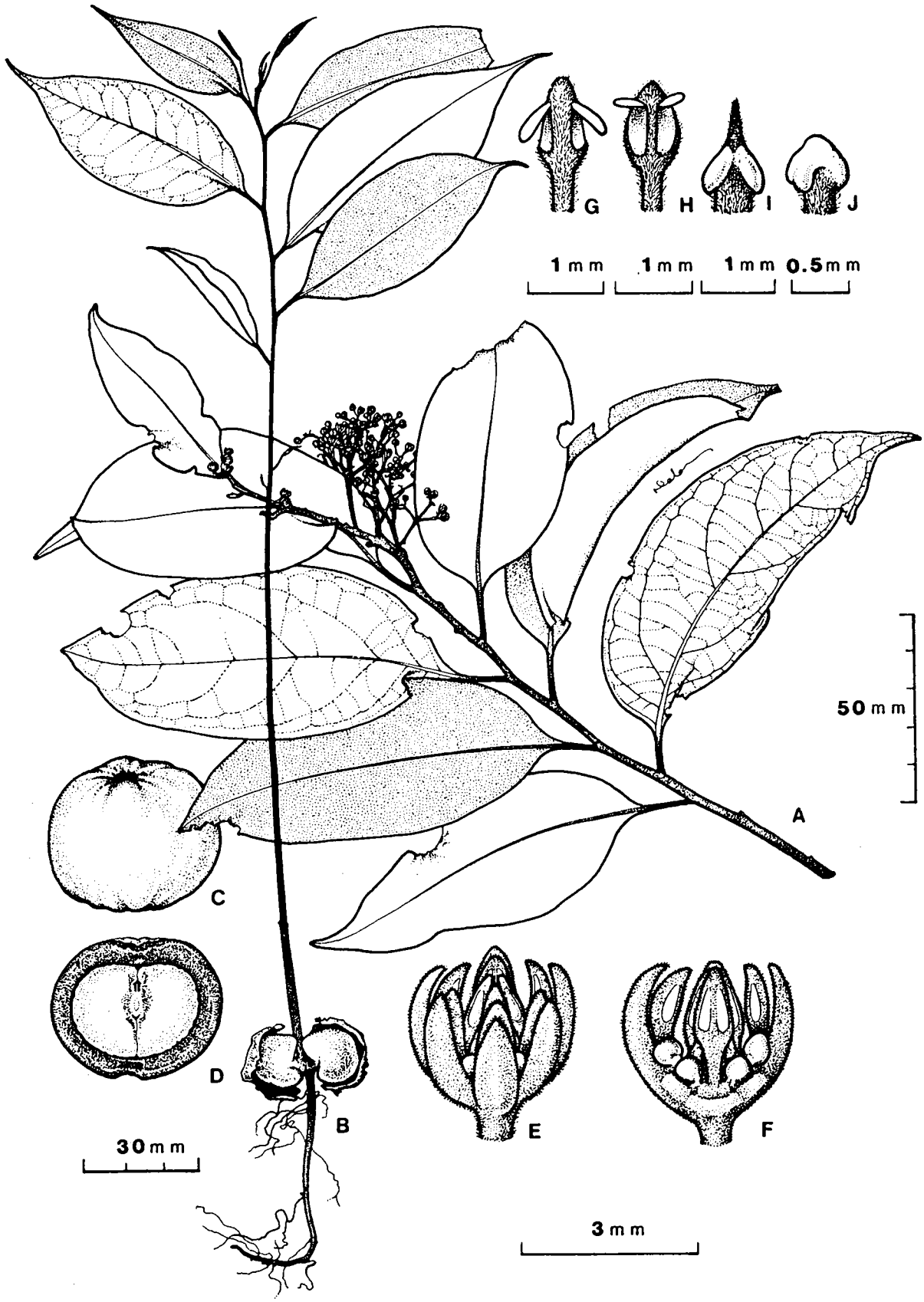

Fig.29. Cryptocarya oblata. A Habit Gray 900; B seedling, C fruit, D fruit (LS) Hyland 8574; E flower, F flower (side view, 3 tepals and 3 outer stamens removed), G stamen (inner whorl, abaxial view), H stamen (outer whorl, adaxial view), I staminode (adaxial view), J gland (adaxial view) Gray 900.

mm, stalks pubescent, 0.2-0.4 mm long. Inner anthers pubescent on both surfaces, 0.7-0.9 x 0.5-0.6 mm, filaments pubescent, 0.4-0.7 mm long. Staminodes differentiated, head ± sagittate (apex aristate), glabrous adaxially but pubescent along the midline on the abaxial surface, 0.8-1.1 mm long, filaments hairy, 0.2-0.5 mm long. Ovary glabrous, 0.6-1.1 x 0.6-0.8 mm, style glabrous, 0.5-1.0 mm long. Fruits red, orange-red, pinkish orange or orange when ripe, wider than long or laterally compressed, occasionally pyriform or bilobed, 29-38 mm long x 32-47 mm and 25-38 mm along the longer and shorter axes, mesocarp + exocarp 2.0-5.0 mm thick, endocarp 0.4-1.0 mm thick. Seed 19-26 mm long x 27-38 mm and 17-29 mm along the longer and shorter axes, testa 0.05-0.2 mm thick, radicle apical or slightly below the apex. Cotyledons white or cream, uniform in texture. Seedling leaves green on the underside, cataphylls present, first leaves spirally arranged. (Fig. 29)

Distribution (Fig. 93, Map 31)

Ecology

Rain forests of northern Queensland, on soils derived from a variety of rock types. Altitudinal range: Sea level to 1150 m.

Uses

This species produces millable logs and the sawn timber is marketed as Bolly Silkwood, a very useful and popular timber used for a variety of purposes, including cabinet work. Wood S.G. 0.53-0.56.

Notes and Observations

Flowers have been collected in November, December and February,

while ripe fruits have been collected each month from June to December. Seedling germination period 30-65 days.

The flowers differ somewhat from other species of Cryptocarya as the ovary is not closely surrounded by the perianth tube and in fact resemble those of Beilschmiedia.

Specimens Examined (78 collections examined)

35. Cryptocarya obovata R.Br., Prodr. 402 (1810); Benth., Fl. austral. 5:296 (1870)p.p.; Bailey, Queensl. fl. 4:1299 (1901)p.p.; Francis, Austral. Rain-Forest Trees ed.2:128 (1951); Floyd, N.S.W. Rainforest Trees, Part 1, ed.2:56 (1979); Stanley & Ross, Flora of south-eastern Queensland 1:159 (1983).
Type: R. Brown 3016, Port Jackson - Hunter River (BM holotype).
Tetranthera ferruginea var. lanceolata Meissner in DC., Prodr. 15(1):192 (1864).
Syntypes: C. Moore 15, Brisbane River (K).
W. Macarthur 153, Sydney (K).
Litsea ferruginea var. lanceolata (Meissner) Bailey, Syn. Queensl. fl. 427 (1883).
(Apparently Bailey did not see the syntypes and assumed that Meissner's variety was a form of Litsea ferruginea (R. Br.) Bailey, nom. illeg.)

Tree to 40 m tall x 100 cm dbh, usually medium to large sized and well formed. Stem with or without buttresses. Bark usually nondescript, rarely flaky, outer blaze cream, occasionally brown, granular in texture, sometimes emitting a peppery odour. Twigs fluted, densely clothed in short, tortuous, brown, erect and appressed hairs. Leaves: Underside usually slightly glaucous, clothed in short, tortuous, white or pale brown, erect hairs which persist even on old leaves. Leaf blade oblong or obovate, apex obtuse or rounded, base attenuate, cuneate or truncate, 5.0-10.5 x 2.0-4.0 cm (mean 8.5 x 3.1); penninerved, primary veins 5-9 pairs (mode 6), midrib depressed, flush with or raised on the upper surface; petiole 4-14 mm long (mean

8.9), channelled on the upper surface. Inflorescence paniculate, approximating or exceeding the leaves, axillary and pseudoterminal; bracts usually triangular, 0.6-1.5 mm long, persistent or deciduous, present or absent at anthesis. Flowers cream, creamy green, or green, unpleasantly perfumed, opening quite widely but the tepals remaining ± erect at anthesis. Pedicel 0.2-0.5 x 0.6-0.7 mm. Perianth tube 1.0-1.6 x 1.4-1.7 mm, inner surface pubescent throughout. Outer and inner tepals of similar lengths but the outer usually narrower, outer tepals 1.8-2.0 x 0.9-1.3 mm, inner tepals 1.7-2.0 x 1.2-1.5 mm, all tepals pubescent on both their inner and outer surfaces; outer anthers glabrous adaxially but pubescent near the base and along part of the midline on the abaxial surface, 0.7-0.9 x 0.6-0.7 mm, filaments pubescent, 0.4-0.7 mm long; gland heads glabrous, 0.3-0.5 x 0.4-0.5 mm, stalks pubescent, 0.4-0.5 mm long. Inner anthers glabrous or pubescent on the abaxial surface but pubescent at least along the midline on the adaxial surface, 0.8-0.9 x 0.5-0.7 mm, filaments pubescent, 0.6-0.9 mm long. Staminodes differentiated, head cordate, glabrous adaxially but pubescent along the midline on the abaxial surface, 0.7-0.9 mm long, filaments pubescent, 0.3-0.5 mm long. Ovary glabrous or pubescent, 1.0-1.1 x 0.4- 0.5 mm, style usually pubescent, 1.2-1.6 mm long. Fruits black when ripe, globular, about 12 x 11-13 mm, mesocarp + exocarp 0.5-0.6 mm thick, endocarp 0.8-1.0 mm thick. Seed 8.0-8.5 x 8-10 mm, testa 0.02-1.8 mm thick, radicle apical. Cotyledons white or cream, ruminate. Seedling leaves glaucous on the underside, cataphylls absent, first pair of leaves opposite.

Distribution (Fig. 92, Map 24)

Ecology

Rain forests of northern New South Wales and southern Queensland, on soils derived from a variety of rock types but frequently on alluvial soils. Altitudinal range: Sea level to 1050 m.

Uses

This species produces millable logs and the sawn timber is marketed as White Walnut, a useful general purpose timber. Wood S.G. 0.64.

Notes and Observations

Flowers have been collected in January, February, March and May, while ripe fruits have been collected in January, March and May. This corresponds quite well with the observations of Floyd (1979) who concluded that the main flowering period was between February and May, while the main fruiting period was between March and May. Seedling germination period 70-140 days.

Specimens Examined (79 collections examined)

36. Cryptocarya onoprienkoana B. Hyland sp. nov.
Differt a C. erythroxylon pilis ramunculorum erectis tortuosis et tepalis 1.7-1.8 mm longis.
Typus: B. Gray 3286: Reserve 353, Parish of Barron 11.xi.1983 (holotypus QRS).
Differs from C. erythroxylon the twig hairs erect, tortuous and the tepals 1.7-1.8 mm long.]
[C. rigida auct. non Meissner (1864): Francis, Austral. Rain-Forest Trees ed.2:128 (1951); Stanley & Ross, Flora of south-eastern Queensland 1:159 (1983)p.p.]

Tree to 35 m tall x 80 cm dbh, usually medium to large sized and well formed. Stem buttressed in nearly all size classes. Bark nondescript, often rather pale in colour when viewed from a distance, outer blaze pink, rarely brownish, often speckled, sometimes striped, granular in texture, usually emitting a conspicuous odour resembling

that of peach or perhaps mango skins. Twigs slightly fluted, densely clothed in tortuous, rusty brown, erect hairs which persist even on old twigs. Leaves: Underside glaucous or almost white, when young the midrib clothed in tortuous, rusty brown, erect hairs and the body of the leaf clothed in straight, white, appressed hairs, older leaves similarly clothed but rather sparse; domatia, tufts of hair, sometimes present in the axils of the primary veins. Leaf blade lanceolate or elliptical, apex acuminate or acute, base cuneate or truncate, often unequal sided, 8.0-15.5 x 2.5-7.0 cm, (mean 11.8 x 4.4); penninerved, primary veins 3-8 pairs, (mode 5), midrib depressed on the upper surface; petiole 7-19 mm long (mean 11.3), flat or channelled on the upper surface. Inflorescence paniculate, not exceeding the leaves, mainly axillary, occasionally pseudoterminal, bracts linear, 0.7-1.3 mm long, persistent or deciduous, often present at anthesis. Flowers cream or greenish, pleasantly perfumed, opening quite widely but the tepals remaining ± erect at anthesis. Pedicel 0.3-0.8 x 0.5-0.6 mm. Perianth tube 0.7-2.0 x 1.3-1.8 mm, inner surface usually pubescent near the apex but glabrous on the lower half. Outer tepals smaller, 1.7-1.9 x 0.8-1.0 mm, inner tepals 1.8-2.6 x 1.0-1.1 mm, all tepals pubescent on both their inner and outer surfaces. Outer anthers usually glabrous adaxially, occasionally pubescent, but pubescent on the abaxial surface, at least near the base and along the midline, 0.7-0.9 x 0.6-0.8 mm, filaments pubescent, 0.3-0.7 mm long; gland heads glabrous, 0.3-0.4 x 0.5-0.6 mm, stalks pubescent, 0.3-0.4 mm long. Inner anthers pubescent along the midline of both the adaxial and abaxial surfaces, 0.7-0.9 x 0.5-0.6 mm, filaments pubescent, 0.4-0.8 mm long. Staminodes differentiated, head cordate or sagittate (apex acuminate), pubescent, the hairs projecting beyond the apex, ±

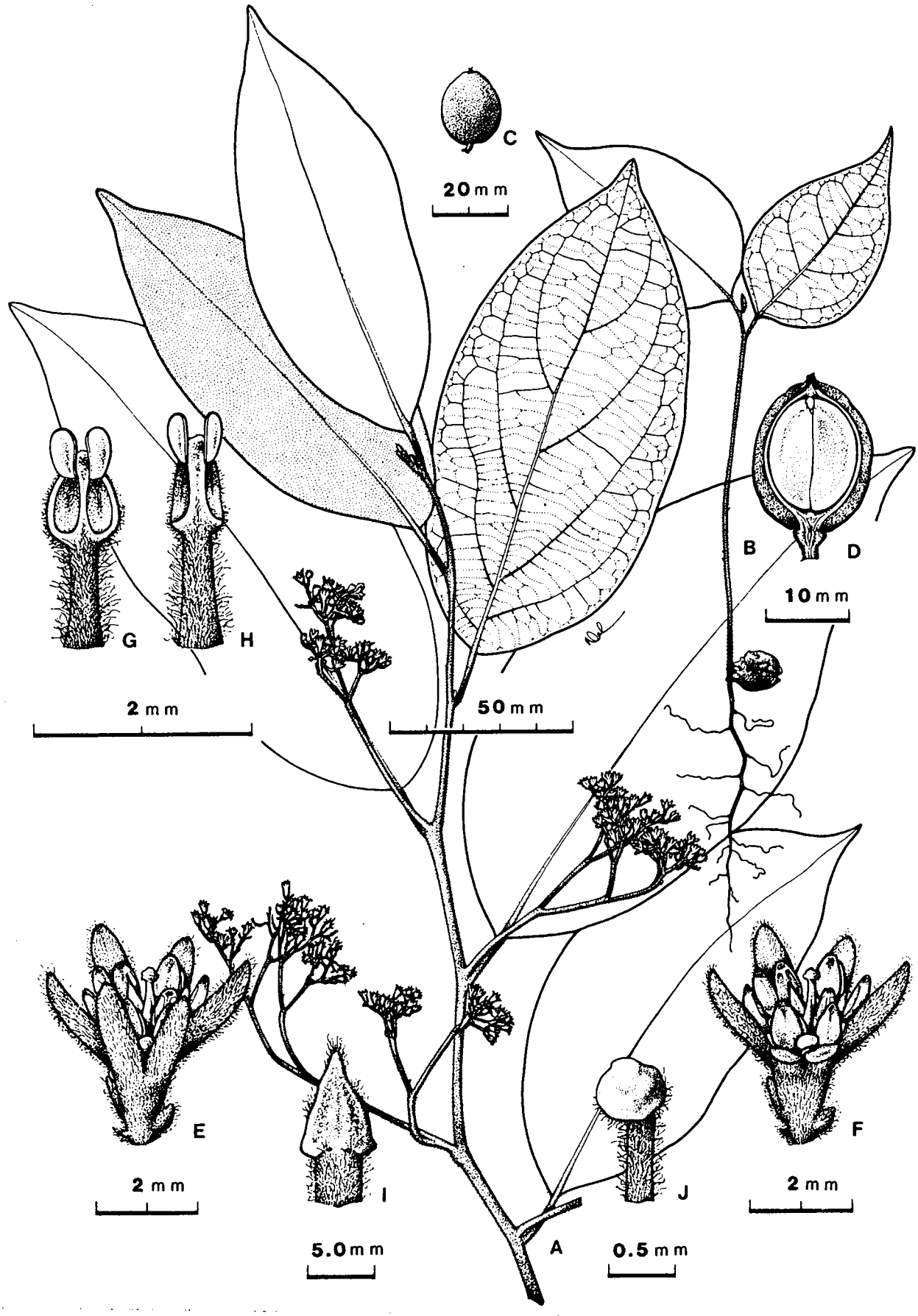

Fig.30. Cryptocarya onoprienkoana. A Habit Gray 3286; B seedling, C fruit, D fruit (LS) Gray 3263; E flower, F flower (side view, 2 tepals removed), G anther (outer whorl, adaxial view), H anther (inner whorl, abaxial view), I staminode (adaxial view), J gland (adaxial view) Gray 3286.

glabrous adaxially but pubescent on the abaxial surface, 0.7-0.9 mm long, filaments pubescent, about 0.3 mm long. Ovary glabrous, 1.0-1.2 x 0.5-0.6 mm, style glabrous, about 0.9-1.0 mm long. Fruits purple, black or blue-black when ripe, ellipsoid, 15-22 x 11-15 mm, mesocarp + exocarp 0.3-1.7 mm thick, endocarp 0.3-0.5 mm. Seed 13-16 x 10-12.5 mm, testa 0.2-0.3 mm thick, radicle apical. Cotyledons white or cream, uniform in texture. Seedling leaves glaucous on the underside, cataphylls present (usually 1), first pair of leaves opposite. (Fig. 30)

Distribution (Fig. 92, Map 25)

Ecology

Rain forests of central and northern Queensland often in drier or somewhat marginal situations frequently found on soils derived from granite or acid volcanic rocks. Altitudinal range: 50-1000 m.

Uses

This species produces millable logs and the sawn timber is marketed as Rose Maple, a useful and quite decorative cabinet timber. Wood S.G. 0.72-0.77.

Notes and Observations

Flowers have been collected in September, October and December, while ripe fruits have been collected each month from April to October. Seedling germination period 25-80 days.

This species is very closely related to C. erythroxylon but the two species can be distinguished by the following features:

	C. erythroxylon	C. onoprienkoana
Twig Indumentum	Short straight, appressed, brown hairs	Tortuous, erect, rusty brown hairs
Outer tepals	About 1.2mm long	About 1.7-1.8mm long
Fruits	Pyriform	Elliptical

C. invasiorum Kosterm. of Malesia appears to be closely related but at this stage I believe it to be sufficiently different to be maintained as a separate species. At this stage it appears likely that C. onoprienkoana is more closely related to C. rhodosperma sp. nov. than any other species.

Etymology

Named in honour of the late Patrick (Paddy) Onoprienko, unofficial Mayor of Mt Carbine, tin scratcher, bushman and raconteur whose knowledge of the Mt Spurgeon and Windsor Tableland areas was of great value in my botanical collecting.

Specimens Examined (50 collections examined)

37. Cryptocarya pleurosperma C. White & Francis, Proc. Roy. Soc. Queensland 35:77 (1924); Francis, Austral. Rain-Forest Trees ed.2:405 (1951).
Type: C.T. White 1287, Bellenden Ker (BRI holotype) (MEL isotype).
Cryptocarya glabella Domin, Biblioth. Bot. 89:122 (1926).
Syntypes: K. Domin XII, Russell River (PR 4092).
K. Domin I, Harveys Creek (BO, PR 4093).

Tree to 30 m tall x 50 cm dbh, usually medium sized and well formed. Stem buttressed in the larger but not the smaller size classes. Bark nondescript, usually marked by sinuous, longitudinal

lines of lenticels, outer blaze cream or brown, granular in texture. Twigs terete, clothed in straight, pale brown, appressed hairs when young but soon becoming glabrous. Leaves: Underside green, sparsely clothed in straight, white, appressed hairs only when very young, soon becoming glabrous. Leaf blade oblong or elliptical, apex acuminate or obtuse, base attenuate or cuneate, 7.2-16.0 x 3.5-7.0 cm (mean 11.5 x 5.0); triplinerved, primary veins 2-4 pairs, midrib flush with the upper surface; petiole 5-11 mm long (mean 8.6), flat or channelled on the upper surface. Inflorescence paniculate but often reduced to racemose, not exceeding the leaves, mainly axillary, seldom pseudoterminal; bracts navicular, triangular, 1.0-1.8 mm long, deciduous, absent at anthesis. Flowers cream or creamy white, without any obvious perfume, opening quite widely but the tepals remaining ± erect at anthesis. Pedicel 0.4-0.7 x 0.7-0.8 mm. Perianth tube 1.2-1.6 x 1.8-2.4 mm, inner surface pubescent at the apex and also in the lower half, but not to the base; outer and inner tepals of similar dimensions, 1.7-2.9 x 1.0-1.6 mm, all tepals pubescent on both their inner and outer surfaces. Outer anthers glabrous adaxially but pubescent on the midline or at least the base of the abaxial surface, 0.6-0.8 x 0.6-0.8 mm, filaments pubescent, 0.4-1.2 mm long; gland heads glabrous, 0.4-0.5 x 0.4-0.6 mm, stalks pubescent towards the base but glabrous towards the apex, 0.4-0.6 mm long. Inner anthers glabrous abaxially but sometimes partly pubescent on the adaxial surface, 0.8-0.9 x 0.5-0.6 mm, filaments pubescent, 0.5-1.1 mm long. Staminodes differentiated, head elongated cordate, drawn out into a point at the apex, mainly glabrous,(sometimes a few hairs near the base on the abaxial surface), 1.2-1.4 mm long, filaments glabrous or sparsely hairy, 0.3-0.7 mm long. Ovary glabrous, about 0.8-1.5 x

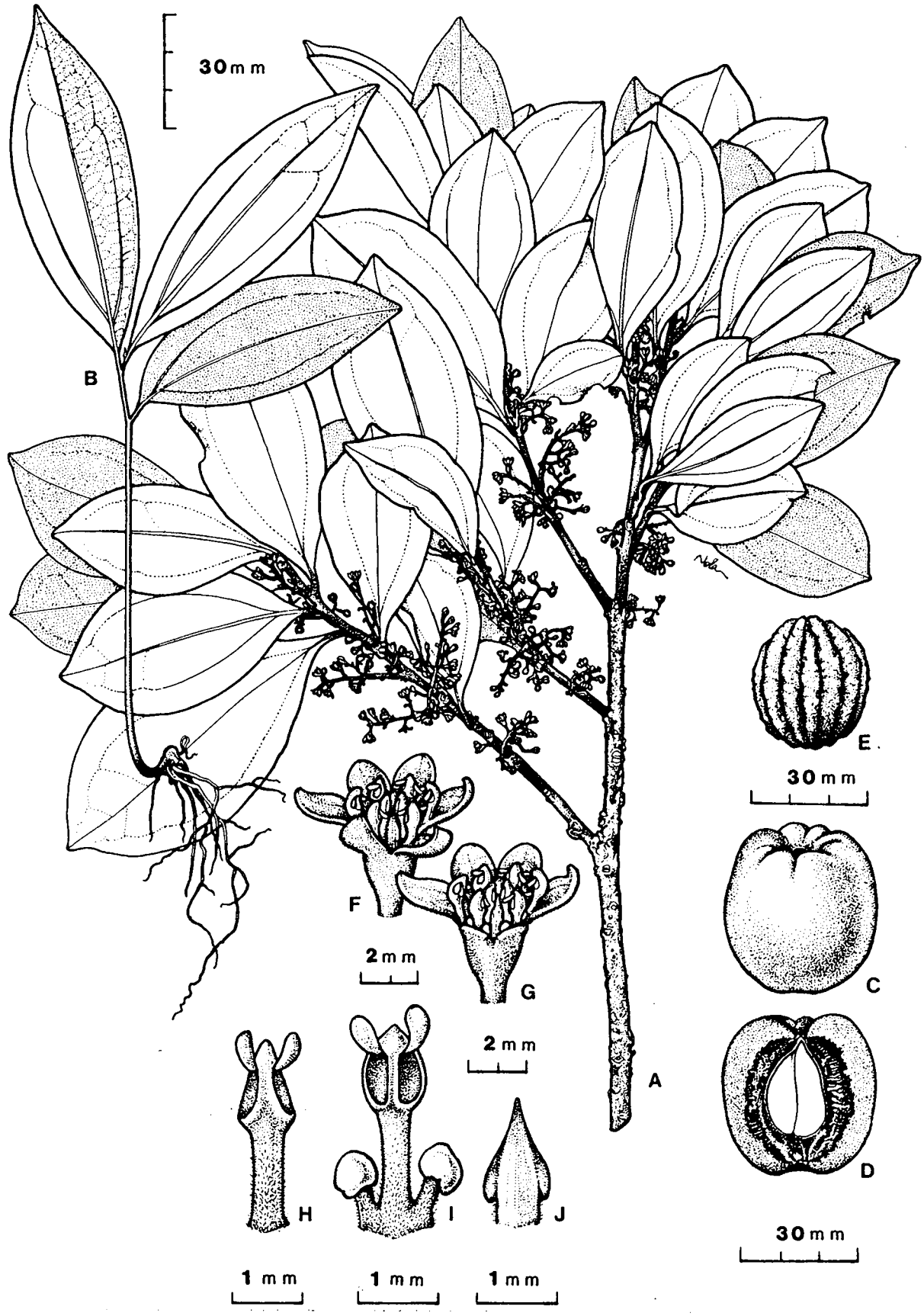

Fig.31. Cryptocarya pleurosperma. A Habit Gray 908; B seedling, C fruit, D fruit (LS), E outside view of testa Irvine 1215; F flower, G flower (side view, 2 tepals and 2 anthers removed), H stamen (inner whorl, abaxial view), I stamen and glands (outer whorl, adaxial view), J staminode (abaxial view) Gray 908.

0.5-0.6 mm, style glabrous, 1.0-1.7 mm long. Fruits pink or red when ripe, usually globular, sometimes ellipsoid or slightly pyriform, often longitudinally ribbed, 41-62 x 27-49 mm, mesocarp + exocarp 2.3-9.0 mm thick, endocarp 2.9-7.6 mm thick, longitudinally ribbed. Seed 25-35 x 16-24 mm, testa 0.1-0.4 mm thick, radicle apical. Cotyledons cream, uniform in texture. Seedling leaves green on the underside, cataphylls present, first pair of leaves spirally arranged. (Fig. 31)

Distribution (Fig. 93, Map 32)

Ecology

Rain forests of northern Queensland on soils derived from a variety of rock types. Altitudinal range: Sea level to 700 m.

Uses

This species grows large enough to produce millable logs but is seldom utilized because of the health hazards discussed in the next section. Standard Trade Name - Poison Laurel. Wood S.G. 0.6-0.7.

Notes & Observations

Flowers have been collected in January, February and March, while ripe fruits have been collected in October, November, December and March. Seedling germination period 280-490 days.

This species is generally known as Poison Walnut by most people working in the rain forests of northern Queensland. As the name implies, it is regarded as a poisonous species and is treated with considerable respect. Everist (1974) lists some of the alkaloids

which have been isolated from it while Webb (1948) reported on the symptoms exhibited by sawmill workers and the quite severe symptoms exhibited by people gathering bark for phytochemical investigations who thought they had taken adequate precautions.

Specimens Examined (59 collections examined)

38. Cryptocarya putida B. Hyland sp. nov.
Differt a speciebus ceteris pilis ramunculorum erectis tortuosis plus quam 0.4 mm longis et laminis subtus glaucis.
Typus: B. Gray 1170: State Forest Reserve 607, Bridle Logging Area, 1.xii.1978 (holotypus QRS).
Differs from other species, the twig hairs being erect, tortuous, more than 0.4 mm long and the lamina glaucous on the underside.

Tree to 25 m tall x 40 cm dbh, usually small and well formed. Stem usually buttressed, lacking buttresses only on very small trees. Bark nondescript, rarely flaky, outer blaze cream or brown, rarely pink or reddish, usually conspicuously speckled, granular in texture, sometimes emitting a piney odour. Twigs terete or fluted, densely clothed in tortuous, rusty brown, erect hairs when young but eventually becoming almost glabrous. Leaves: Underside slightly glaucous, clothed in tortuous, rusty brown, erect hairs when young but soon becoming almost glabrous. Leaf blade elliptical, narrowly elliptical, oblong, narrowly oblong or narrowly obovate, apex acute, obtuse or rounded, base attenuate, cuneate or truncate, 6.0-21.0 x 2.0-8.0 cm (mean 11.0 x 3.8); penninerved, primary veins 5-10 pairs (mode 7), midrib depressed on the upper surface; petiole 7-14 mm long (mean 11.5), channelled on the upper surface. Inflorescence paniculate, approximating or exceeding the leaves, axillary and pseudoterminal; bracts linear, lanceolate or navicular, 0.9-1.6 mm

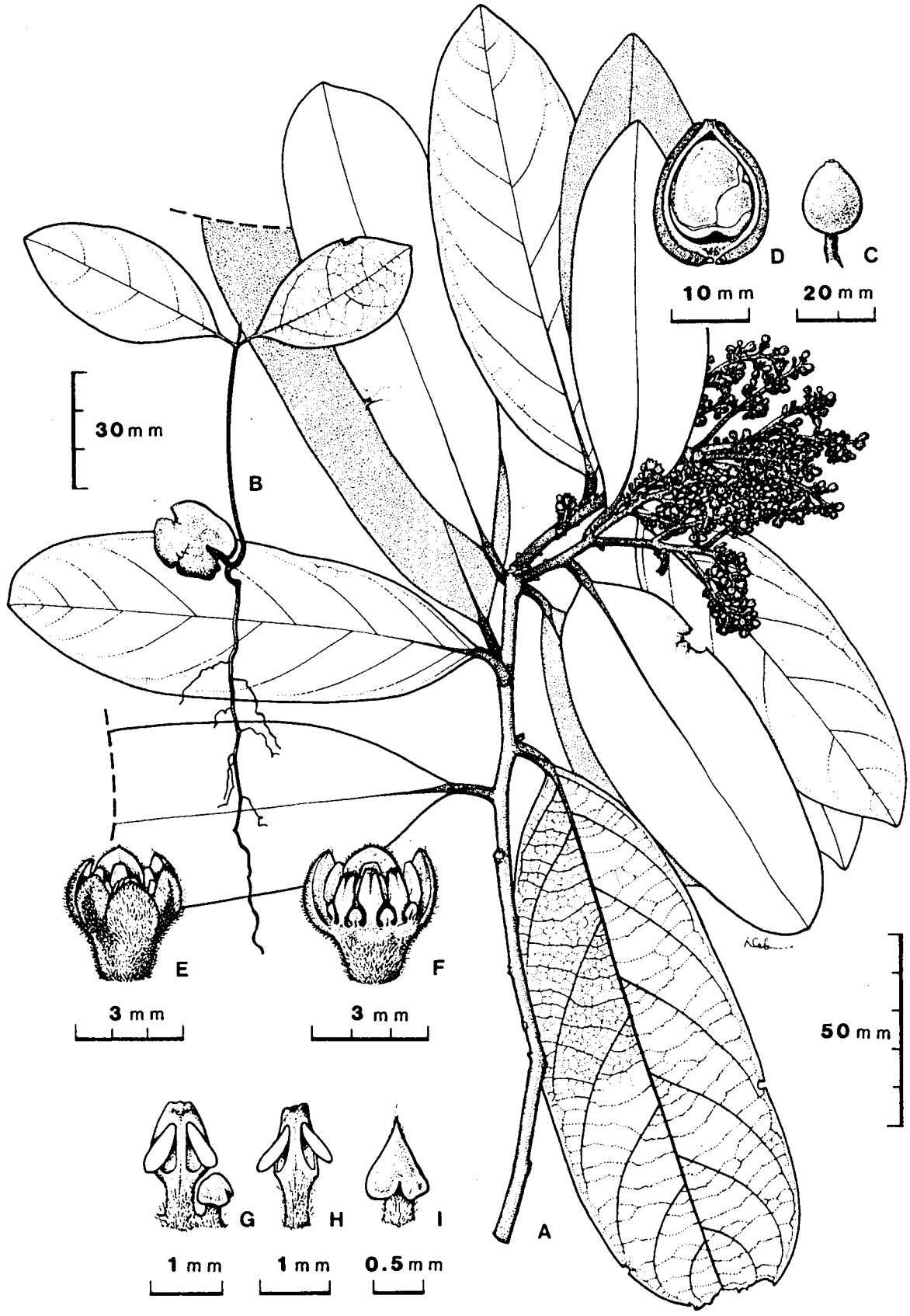

Fig.32. Cryptocarya putida. A Habit Gray 1170; B seedling, C fruit, D fruit (LS) Gray 905; E flower, F flower (side view, 3 tepals removed), G stamen and single gland (outer whorl, adaxial view), H stamen (inner whorl, abaxial view), I staminode (adaxial view) Gray 1170.

long, persistent or deciduous, present or absent at anthesis. Flowers brownish cream, creamy green or green, unpleasantly perfumed, not opening very widely, the tepals remaining ± erect at anthesis. Pedicel nil. Perianth tube 1.1-1.6 x 1.4-1.8 mm, inner surface pubescent towards the apex but glabrous on the lower half. Outer and inner tepals of similar dimensions, 1.6-2.1 x 1.3-1.6 mm, all tepals pubescent on both their inner and outer surfaces. Outer anthers glabrous adaxially but pubescent at the base and along the midline on the abaxial surface, 0.7-1.0 x 0.7-0.8 mm, filaments pubescent, 0.5-0.6 mm long; gland heads glabrous, 0.4-0.5 x 0.4-0.5 mm, stalks pubescent, 0.3-0.5 mm long. Inner anthers usually completely glabrous, sometimes basally pubescent on both surfaces or along the midline on the abaxial surface, 0.8-1.2 x 0.5-0.7 mm, filaments pubescent, 0.6-0.7 mm long. Staminodes differentiated, head ± cordate (apex acuminate), glabrous adaxially but pubescent along the midline on the abaxial surface, 0.8-1.0 mm long, filaments pubescent, 0.3-0.5 mm long. Ovary glabrous,0.9-1.3 x 0.6-0.7 mm, style glabrous, 1.0-1.4 mm long. Fruits black or purplish black when ripe, ovoid, occasionally globular, 14-20 x 12-15 mm, mesocarp + exocarp 0.4-0.9 mm thick, endocarp 0.6-0.9 mm thick. Seed 10-13 x 9-12 mm, testa 0.2-0.6 mm thick but usually much thicker at the base (up to 3.0 mm), radicle apical. Cotyledons cream or yellowish, uniform in texture. Seedling leaves glaucous on the underside, cataphylls absent, first pair of leaves opposite. (Fig. 32)

Distribution (Fig. 93, Map 35)

Ecology

Rain forests of northern Queensland and perhaps also in central

Queensland, probably occurring more frequently on soils derived from granite. Altitudinal range: 600-1100 m.

Uses

This species has no commercial value as it seldom grows large enough to produce millable logs and it does not have a Standard Trade Name. Wood S.G. 0.97.

Notes and Observations

Flowers have been collected in November and December while, fruits have been collected in February, September and November. Seedling germination period 35-300 days.

Etymology

The specific epithet was applied to this species because of the unpleasant odour of the flowers.

Specimens Examined (40 collections examined)

39. Cryptocarya rhodosperma B. Hyland sp. nov.
Differt a speciebus ceteris cotyledonibus roseis vel purpureis et pilis inflorescentiae plus quam 0.4 mm longis.
Typus: B. Gray 3077: State Forest Reserve 310 Gadgarra, 25.v.1983 (holotypus QRS).
Differs from the other species, the cotyledons pink or purplish and the inflorescence hairs more than 0.4 mm long.

Tree to 25 m tall x 60 cm dbh, usually small and well formed. Stem usually buttressed even in small size classes, sometimes with coppice shoots at the base. Bark nondescript, outer blaze pink, sometimes speckled, usually marked by longitudinal stripes, usually granular in texture, sometimes fibrous, often emitting a conspicuous odour,

perhaps resembling that of peaches. Twigs fluted and clothed in straight and tortuous, pale brown, erect hairs which persist to some extent, even on old twigs. Leaves: Underside glaucous, clothed in straight and tortuous, white and pale brown, erect hairs when young but eventually becoming almost glabrous. Leaf blade lanceolate or elliptical, apex acuminate or acute, base shortly attenuate or truncate, often unequal sided, 8.0-14.5 x 3.0-8.0 cm (mean 10.3 x 4.4); penninerved, primary veins 4-7 pairs (mode 5), midrib usually depressed, sometimes almost flush with the upper surface; petiole 8-16 mm long (mean 11.8), flat or channelled on the upper surface. Inflorescence paniculate, approximating or exceeding the leaves, axillary and pseudoterminal; bracts linear, 0.6-1.0 mm long, persistent or deciduous, often present at anthesis. Flowers greenish, faintly but unpleasantly (?) perfumed, opening fairly widely but the tepals remaining ± erect at anthesis. Pedicel nil or up to 0.5 x about 0.6 mm. Perianth tube 0.8-1.1 x 1.2-1.9 mm, inner surface pubescent or glabrous towards the apex but glabrous in the lower half. Outer and inner tepals of similar dimensions, 1.5-2.1 x 1.0-1.2 mm, all tepals pubescent on both their inner and outer surfaces. Outer anthers glabrous adaxially, abaxial surface glabrous or with a few hairs along the midline, 0.6-0.8 x 0.4-0.6 mm, filaments pubescent, 0.3-0.7 mm long; gland heads glabrous, 0.2-0.3 x 0.4-0.5 mm, stalks pubescent, 0.2-0.4 mm long. Inner anthers glabrous abaxially and adaxially or with a few hairs towards the base on each surface, or along the midline on the adaxial surface, 0.7-0.8 x 0.4-0.5 mm, filaments pubescent, 0.5-0.7 mm long. Staminodes differentiated, head sagittate, (apex acuminate), glabrous adaxially, but pubescent along the midline on the abaxial surface, 0.8-1.0 mm

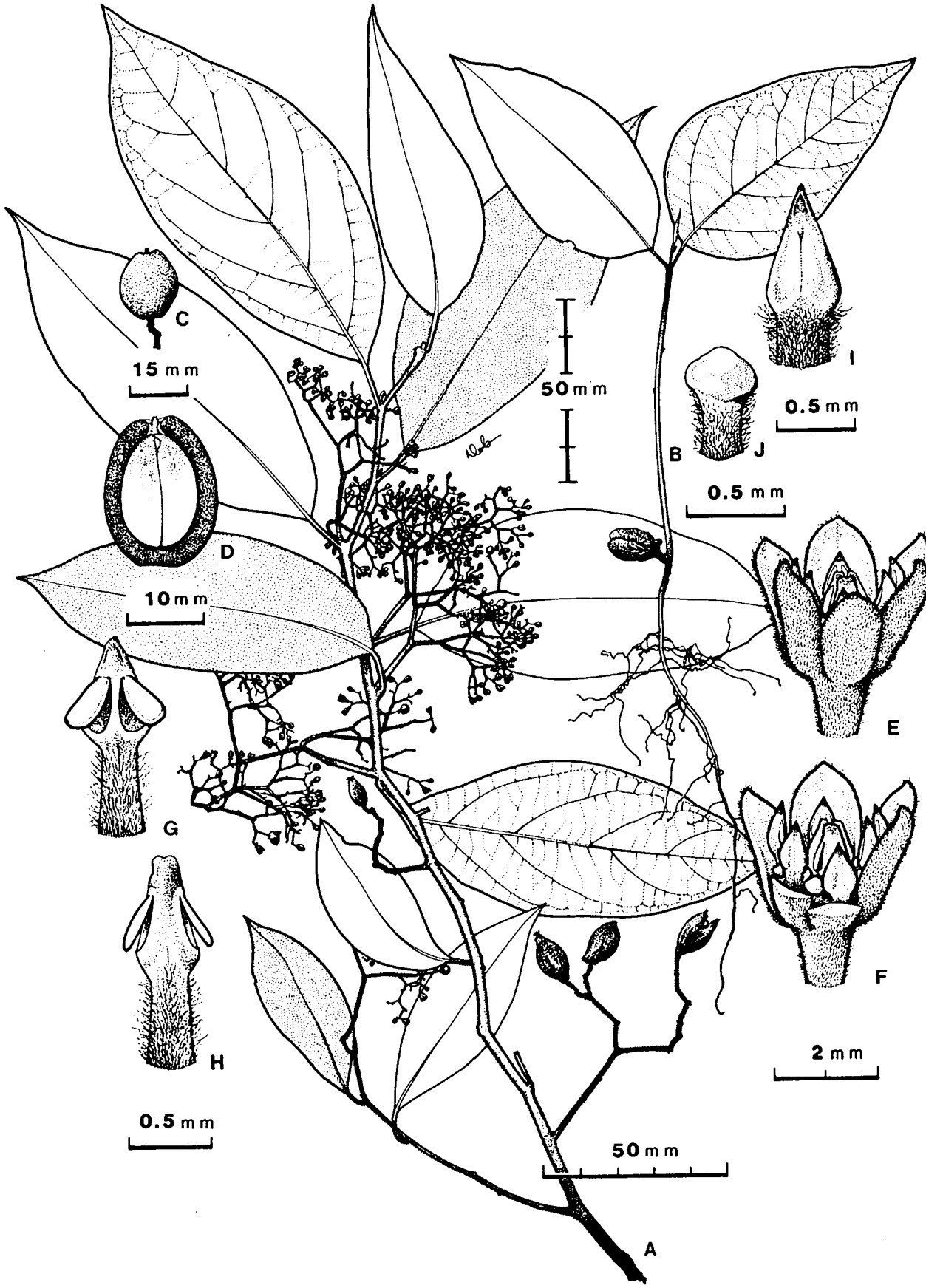

Fig.33. Cryptocarya rhodosperma. A Habit Gray 3077; B seedling, C fruit, D fruit (LS) Hyland 25036 RFK; E flower, F flower (side view, 2 tepals removed), G anther (outer whorl, adaxial view), H anther (inner whorl, abaxial view), I staminode (adaxial view), J gland Gray 3077.

long, filaments pubescent, 0.2-0.5 mm long. Ovary glabrous, 0.8-1.1 x about 0.5 mm, style glabrous, 0.9-1.0 mm long. Fruits black or brownish black when ripe, ellipsoid, 16-27 x 9.5-16.5 mm, mesocarp + exocarp 0.3-1.2 mm thick, endocarp 0.1-0.2 mm thick. Seed 12-22 x 8-13 mm, testa <0.1-0.2 mm thick, radicle apical. Cotyledons pink or purplish, uniform in texture. Seedling leaves glaucous on the underside, cataphylls present (usually 2), first pair of leaves opposite. (Fig. 33)

Distribution (Fig. 90, Map 17)

Ecology

Rain forests of northern Queensland and Cape York Peninsula on soils derived from a variety of rock types. Altitudinal range: 40-120 m.

Uses

This species grows large enough to produce millable logs but it is of rare occurrence in accessible areas and has not been utilized to date. It does not have a Standard Trade Name. Wood S.G. about 0.78.

Notes and Observations

Flowers have been collected each month from January to May while, ripe fruits have been collected in June, September, October, November and December. Seedling germination period 18-50 days.

Some specimens in KEP, identified as C. invasiorum Kosterm., resemble this species but more work is required to elucidate the relationship.

Etymology

The specific epithet was chosen for this species because of the pink colour exhibited by the cotyledons.

Specimens Examined (27 collections examined)

40. Cryptocarya rigida Meissner in DC., Prodr. 15(1):508 (1864); Beadle et al., Flora of the Sydney Region 150 (1972); Floyd, N.S.W. Rainforest Trees, Part 1. ed.2:58 (1979).
Type: F. Mueller (Probably H. Beckler) Clarence River (Clouds Creek?) (G-DC holotype, MEL 623264 isotype).
[Cryptocarya patentinervis Benth., Fl. austrl. 5:296 (1870), Bailey, Queensl. fl. 4:1299 (1901) nom. illeg.]

Shrub or small tree to 10 m tall x 20 cm dbh. Stem without buttresses. Bark usually nondescript, occasionally flaky, outer blaze pink, usually marked by speckles and cream longitudinal stripes, granular in texture, sometimes emitting a noticeable odour. Twigs fluted or angular, clothed in straight and tortuous, pale brown, mainly appressed hairs which persist to some extent even on old twigs. Leaves: Underside glaucous, clothed in straight and tortuous, white or pale brown, appressed and erect hairs, some of which persist even on old leaves. Leaf blade lanceolate or elliptical, apex acuminate, base attenuate or cuneate, 6.0-13.5 x 1.5-5.0 cm (mean 8.9 x 3.1); penninerved, primary veins 4-8 pairs (mode 6), midrib depressed on the upper surface; petiole 5-13 mm long (mean 8.5), flat or channelled on the upper surface. Inflorescence paniculate or almost reduced to a compound cyme, not exceeding the leaves, axillary, (never pseudoterminal?); bracts usually linear, 0.8-1.6 mm long, deciduous, absent at anthesis. Flowers cream or pale green, without any obvious perfume, opening quite widely but the tepals remaining ±

erect at anthesis. Pedicel 0.6-1.7 x about 0.6 mm. Perianth tube 1.4-1.6 x 1.7-1.8 mm, inner surface pubescent throughout. Outer and inner tepals of similar dimensions, 1.5-2.0 x 0.9-1.5 mm, all tepals pubescent on both their inner and outer surfaces. Outer anthers glabrous adaxially but pubescent along the midline on the abaxial surface, about 0.8 x 0.6-0.7 mm, filaments pubescent, 0.5-0.6 mm long; gland heads glabrous, 0.3-0.5 x 0.5-0.6 mm, stalks pubescent, 0.2-0.4 mm long. Inner anthers mainly glabrous adaxially (sometimes pubescent towards the base), pubescent near the base and along the midline on the abaxial surface, 0.8-0.9 x 0.5-0.6 mm, filaments pubescent, 0.5-0.7 mm long. Staminodes differentiated, head cordate or sagittate (apex acuminate), glabrous or pubescent adaxially, pubescent along the midline on the abaxial surface, the hairs projecting well beyond the apex of the staminode, 0.7-0.9 mm long, filaments pubescent, 0.2-0.3 mm long. Ovary pubescent, occasionally glabrous, 1.1-1.6 x 0.6-0.7 mm, style pubescent, 0.8-1.1 mm long. Fruits black when ripe, (sometimes glaucous), ellipsoid, 17-25 x 11-17.5 mm, mesocarp + exocarp about 0.9 mm thick, endocarp 2.0-2.5 mm thick. Seed 11-20 x 9-11 mm, testa about 0.05 mm thick, radicle apical. Cotyledons cream, uniform in texture. Seedling leaves slightly glaucous on the underside, cataphylls present (usually 2), first pair of leaves opposite.

Distribution (Fig. 91, Map 23)

Ecology

Rain forests, particularly rain forest margins in New South Wales and the southernmost parts of Queensland, usually on the poorer soils derived from sedimentary and acid volcanic rocks. Altitudinal range:

150-900 m.

Uses

This species has no commercial value as it does not grow large enough to produce millable logs. It has been combined with Cryptocarya erythroxylon under the Standard Trade Name of Rose Maple. This combination can probably be traced back to the misapprehension that C. rigida grew to a large tree in the rainforests of northern Queensland. However, it is my opinion that the northern Queensland taxon is C. onoprienkoana, a superficially similar but specifically distinct species. Wood S.G. uncertain.

Notes and Observations

Flowers have been collected each month from October to March, while ripe fruits have been collected in February and March. Seedling germination period about 20-30 days.

These results correspond quite well with the observations of Floyd (1979) who concluded that the flowering period extended from October to March and the fruiting period from January to May.

This species often grows in sclerophyll forests which are periodically burned, but it has not developed many anatomical traits to survive fires other than the development of a slightly flaky bark. However, it flowers and fruits as a shrub so that the individuals remaining after fires are soon capable of producing seeds to recolonize areas where the species has been decimated.

Specimens Examined (72 collections examined)

41. **Cryptocarya saccharata** B. Hyland sp. nov.
Differt a C. corrugata fructu ellipsoideo vel pyriformi, quo in specie altera ± depresse obovato.
Typus: B. Hyland 3477 RFK: State Forest Reserve 144 Whypalla, 18.xi.1976 (holotypus QRS).
Differs from C. corrugata the fruit being ellipsoid or pyriform while in the other species ± depressed obovate.

Tree to 35 m tall x 100 cm dbh, usually medium to large sized and well formed. Stem usually buttressed in the larger size classes but often without buttresses in the smaller. Bark usually flaky, occasionally nondescript, rarely fissured or tessellated, outer blaze usually pink, occasionally brown, rarely reddish, fibrous or granular in texture, nearly always emitting a conspicuous odour like that of sugarcane. Twigs fluted, densely clothed in tortuous, dark brown, erect and appressed hairs which persist even on older twigs. Leaves: Underside slightly glaucous, clothed in tortuous, brown, erect hairs, many of which persist on old leaves. Leaf blade lanceolate, apex acute or acuminate, base shortly attenuate, 5.5-12.0 x 2.0-5.0 cm (mean 7.6 x 3.2); penninerved, primary veins 3-7 pairs (mode 5), midrib flush with the upper surface; petiole 5-11 mm long (mean 8.5), flat on the upper surface. Inflorescence paniculate, not exceeding the leaves, axillary and pseudoterminal; bracts linear, 0.7-1.3 mm long, deciduous, absent at anthesis. Flowers creamy green, pleasantly perfumed, or without any obvious perfume, opening quite widely but the tepals remaining ± erect at anthesis. Pedicel 0.1-0.5 x 0.6-0.7 mm. Perianth tube 0.7-1.1 x 1.2-1.6 mm, inner surface glabrous, sometimes pubescent on the upper half. Outer tepals usually larger than the inner, outer tepals 1.3-1.6 x 0.9-1.1 mm, inner tepals 1.2-1.5 x 0.8-1.0 mm, all tepals pubescent on both the inner and outer surfaces. Outer anthers glabrous adaxially but often pubescent

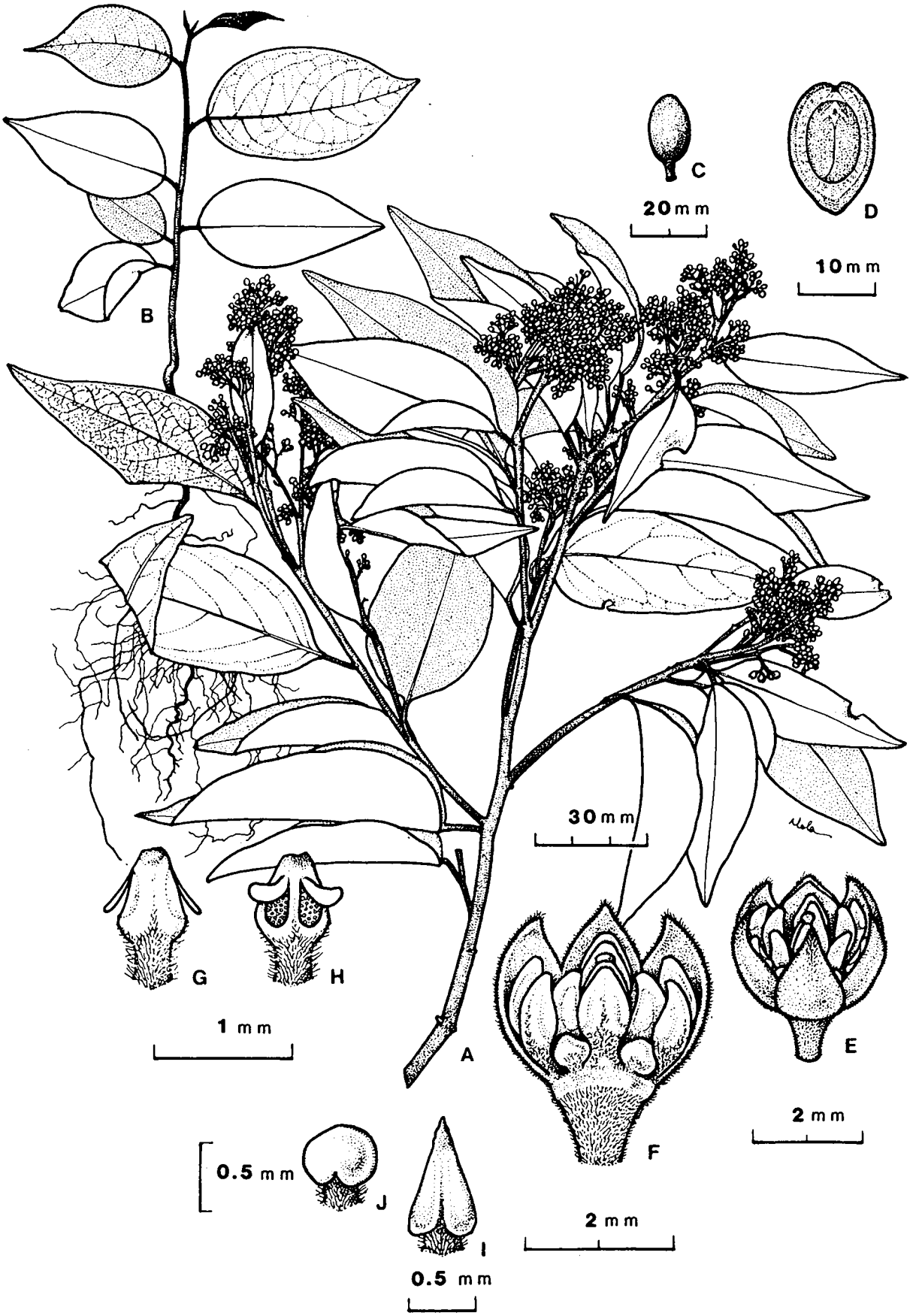

Fig.34. Cryptocarya saccharata. A Habit Hyland 3477 RFK; B seedling, C fruit, D fruit (LS) Gray 387; E flower, F flower (side view, 3 tepals removed), G stamen (inner whorl, adaxial view), H stamen (outer whorl, adaxial view), I staminode (adaxial view), J gland (adaxial view) Hyland 3477 RFK.

towards the base on the abaxial surface, 0.5-0.6 x 0.5-0.6 mm, filaments pubescent, 0.2-0.4 mm long; gland heads glabrous, 0.3-0.4 x 0.4-0.5 mm, stalks pubescent, 0.1-0.2 mm long. Inner anthers mainly glabrous, sometimes sparsely pubescent on the adaxial surface, 0.6-0.7 x 0.4-0.6 mm, filaments pubescent, 0.2-0.4 mm long. Staminodes differentiated, head cordate or sagittate (apex mucronate), glabrous adaxially but pubescent along the midline on the abaxial surface, about 0.8 mm long, filaments pubescent, 0.2-0.4 mm long. Ovary mainly glabrous, 0.7-1.0 x about 0.5 mm, style glabrous or pubescent, 0.7-0.9 mm long. Fruits black or blue-black when ripe, ellipsoid, occasionally pyriform, 17-24 x 11-15 mm, mesocarp + exocarp 0.5-0.8 mm thick, endocarp 0.5-0.8 mm thick. Seed 13-19 x 9-11 mm, testa 0.04-0.1 mm thick, radicle apical. Cotyledons yellowish, uniform in texture. Seedling leaves glaucous on the underside, cataphylls absent, first pair of leaves opposite. (Fig. 34)

Distribution (Fig. 90, Map 14)

Ecology

Mountain rain forests of northern Queensland particularly on soils derived from granite. Altitudinal range: 650-1150 m.

Uses

This species produces millable logs and the sawn timber is marketed as Corduroy Laurel, a useful but not very popular, general purpose timber. Wood S.G. 0.85-0.97.

Notes and Observations

Flowers have been collected in November and December, while ripe

fruits have been collected in March, April and June. Seedling germination period 75-100 days.

Etymology

The specific epithet was chosen for this species because of the sugarcane odour in the blaze.

Specimens Examined (41 collections examined)

42. Cryptocarya sclerophylla B. Hyland sp. nov.
Differt a speciebus ceteris petiolo 4-6 mm longo, laminae costa supra elevata et venis lateralibus sub angulo plus quam 45° patentibus, radicula lateralis.
Typus: B. Hyland 12321: Nicholl's Property, Currumbin Creek, 14.xi.1982 (holotypus QRS).
Differing from other species, the petiole 4-6 mm long, the midrib raised on the upper surface, the lateral vein angle more than 45°, the radicle lateral.

Tree to 10 m tall x 10 cm dbh, usually a shrub or small tree. Stems small, without buttresses, usually with coppice shoots at the base. Bark nondescript, outer blaze cream, granular in texture. Twigs ± terete (perhaps slightly fluted), clothed in straight, pale brown, appressed hairs when very young, but soon becoming glabrous. Leaves: Underside green, clothed in straight, pale brown, appressed hairs when very young but soon becoming completely glabrous. Leaf blade lanceolate, apex acuminate or abruptly acuminate, base attenuate or narrowly cuneate, 6.5-12.0 x 2.0-4.5 cm (mean 9.2 x 3.1); penninerved, primary veins 6-9 pairs (mode 8), midrib conspicuously raised on the upper surface; petiole 4-6 mm long (mean 5.3), flat or channelled on the upper surface. Inflorescence paniculate, slightly exceeding the leaves, axillary but mainly pseudoterminal; bracts linear or triangular, 0.8-1.0 mm long, deciduous, absent at anthesis.

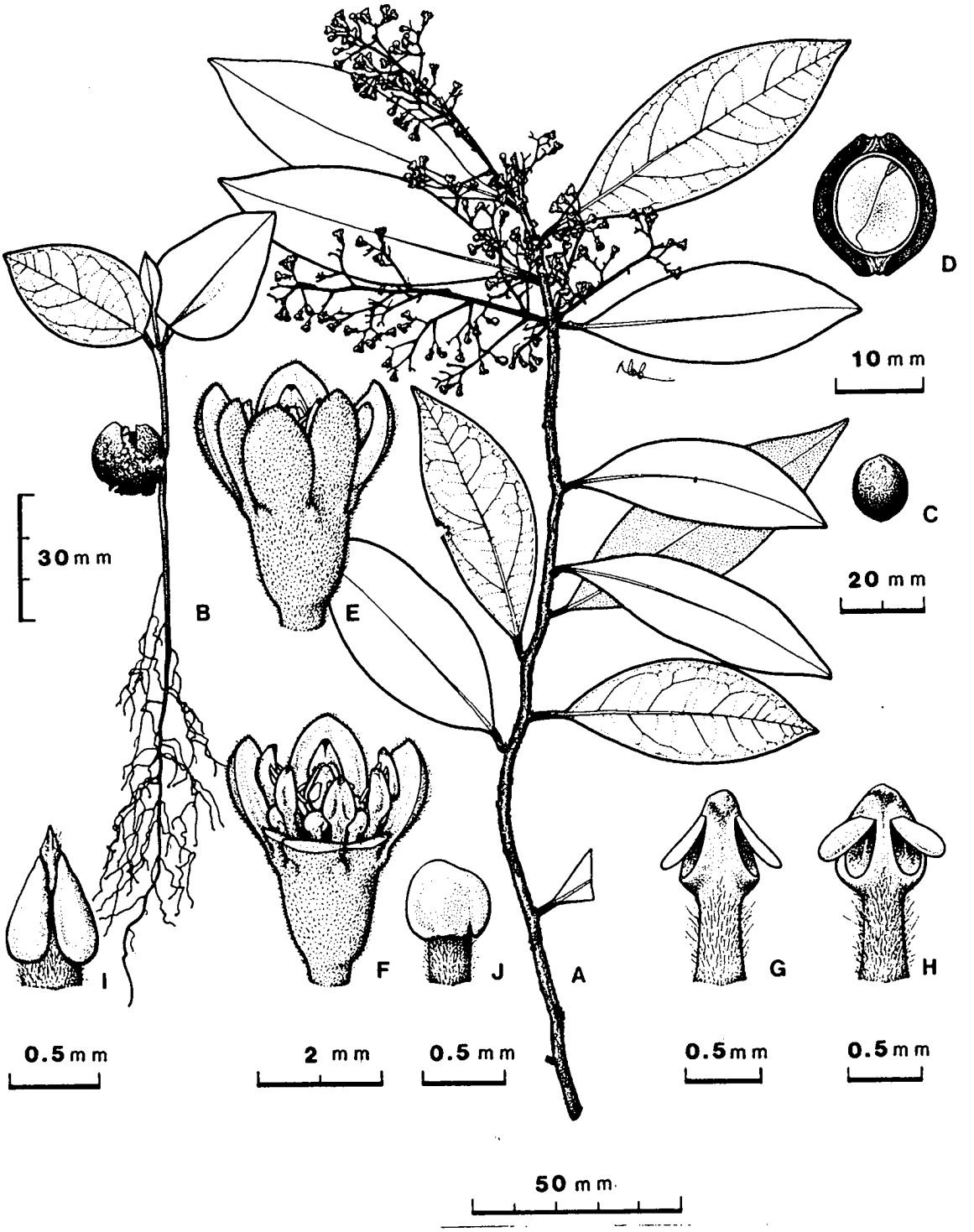

Fig.35. Cryptocarya sclerophylla. A Habit Hyland 12321; B seedling, C fruit, D fruit (LS) D.L. Jones 10; E flower, F flower (side view, 3 tepals removed), G anther (inner whorl, abaxial view), H anther (outer whorl, adaxial view), I staminode (adaxial view), J gland (adaxial view) Hyland 12321.

Flowers pale green or cream, pleasantly perfumed, opening quite widely but the tepals remaining ± erect at anthesis. Pedicel 0.4-0.5 x 0.6-0.7 mm. Perianth tube 1.5-1.6 x 1.3-1.5 mm, inner surface pubescent throughout. Outer and inner tepals of similar dimensions, about 1.5 x 1.1-1.4 mm, all tepals pubescent abaxially, adaxial surface glabrous or pubescent throughout. Outer anthers glabrous adaxially but pubescent near the base and along the midline on the abaxial surface, 0.7-0.8 x 0.5-0.6 mm, filaments pubescent, about 0.5 mm long; gland heads glabrous, 0.4-0.5 x about 0.5 mm, stalks pubescent, 0.4-0.5 mm long. Inner anthers glabrous adaxially, abaxial surface glabrous or with a few hairs along the midline, 0.6-0.8 x about 0.5 mm, filaments pubescent, about 0.5 mm long. Staminodes differentiated, head cordate or sagittate, glabrous adaxially but pubescent along the midline on the abaxial surface, about 0.8 mm long, filaments pubescent, 0.2-0.3 mm long. Ovary glabrous, 1.1-1.2 x about 0.6 mm, style glabrous, 1.4-1.7 mm long with a distinct lateral swelling, usually about 0.7-0.8 mm from the apex. Fruits black when ripe, globular or ellipsoid, 14-16 x 11-12 mm, mesocarp + exocarp 0.3-0.7 mm thick, endocarp 0.2-0.3 mm thick. Seed 10-12 x 9.0-9.5 mm, testa 0.3-0.4 mm thick, radicle lateral. Cotyledons cream, uniform in texture. Seedling leaves green on the underside, cataphylls absent, first pair of leaves opposite. (Fig. 35)

Distribution (Fig. 91, Map 22)

Ecology

Rain forests, particularly the more seasonal ones where there is a long period of water stress each year. On soils derived from a variety of rock types. Altitudinal range: 50-200 m.

Uses

This species does not grow large enough to produce millable logs and has no commercial value, neither does it have a Standard Trade Name. Wood S.G. unknown.

Notes and Observations

Flowers have been collected in September and November, while ripe fruits have been collected in June. Seedling germination period about 70-80 days.

Etymology

The specific epithet was chosen because of the rather stiff and leathery leaves produced by this species.

Specimens Examined (29 collections examined)

43. Cryptocarya smaragdina B. Hyland sp. nov.
Differt a speciebus ceteris laminis glaucis sericeis subtus, floribus foetidis cotyledonibus ruminatis.
Typus:B. Gray 2796: State Forest Reserve 607, Emerald Logging Area, 1.xi.1982 (holotypus QRS).
Differs from all other species by the leaf blade being glaucous and sericeous on the underside, foetid flowers, ruminate cotyledons.

Tree to 25 m tall x 40 cm dbh, usually small and well formed. Stem buttressed. Bark nondescript, outer blaze brown, occasionally cream, frequently speckled, granular in texture, sometimes with a conspicuous blaze odour. Twigs fluted, clothed in straight, pale brown appressed hairs which persist even on old twigs. Leaves: Underside glaucous, clothed in straight, white, appressed hairs which persist even on old leaves. Leaf blade lanceolate, apex acuminate, base attenuate or

shortly attenuate, 5.0-8.5 x 1.5-2.5 cm (mean 6.8 x 2.2); penninerved, or somewhat triplinerved, primary veins 3-4 pairs, midrib depressed or flush with the upper surface; petiole 5-10 mm long (mean 6.9), flat or channelled on the upper surface. Inflorescence paniculate or almost reduced to racemose, not exceeding the leaves, mainly axillary but also pseudoterminal; bracts lanceolate to navicular, 1.2-2.1 mm long persistent or deciduous, present or absent at anthesis. Flowers greenish or creamy green, unpleasantly perfumed, opening quite widely but the tepals remaining ± erect at anthesis. Pedicel nil or up to 0.5 x about 0.6 mm. Perianth tube 1.2-1.5 x 1.5-1.6 mm, inner surface pubescent throughout but more sparse on the lower half. Outer tepals usually shorter, 1.5-2.0 x 0.9-1.2 mm, inner tepals 1.5-2.3 x 0.9-1.3 mm, all tepals pubescent on both their inner and outer surfaces. Outer anthers glabrous adaxially but pubescent at the base and along the midline on the abaxial surface, 0.7-0.8 x about 0.6 mm, filaments pubescent, 0.5-0.7 mm long; gland heads glabrous, 0.35-0.50 x 0.4-0.5 mm, stalks pubescent, 0.3-0.6 mm long. Inner anthers glabrous abaxially but pubescent near the base and sometimes along the midline of the adaxial surface, 0.8-0.9 x 0.4-0.5 mm, filaments pubescent, 0.5-0.9 mm long. Staminodes differentiated, head ± cordate (apex acuminate), glabrous adaxially but pubescent along the midline on the abaxial surface, 0.8-0.9 mm long, filaments pubescent, about 0.3 mm long. Ovary usually pubescent, 1.0-1.4 x 0.5-0.6 mm, style pubescent, 1.0-1.3 mm long. Fruits often maroon, but black when fully ripe, globular, 9-11.5 x 10-11 mm, mesocarp + exocarp 0.3-0.4 mm thick, endocarp 0.5-0.8 mm thick. Seed about 7-8 x 8-9 mm, testa 0.1-0.2 mm thick, radicle apical. Cotyledons white or cream, ruminate. Seedling leaves glaucous on the underside, cataphylls absent, first pair of

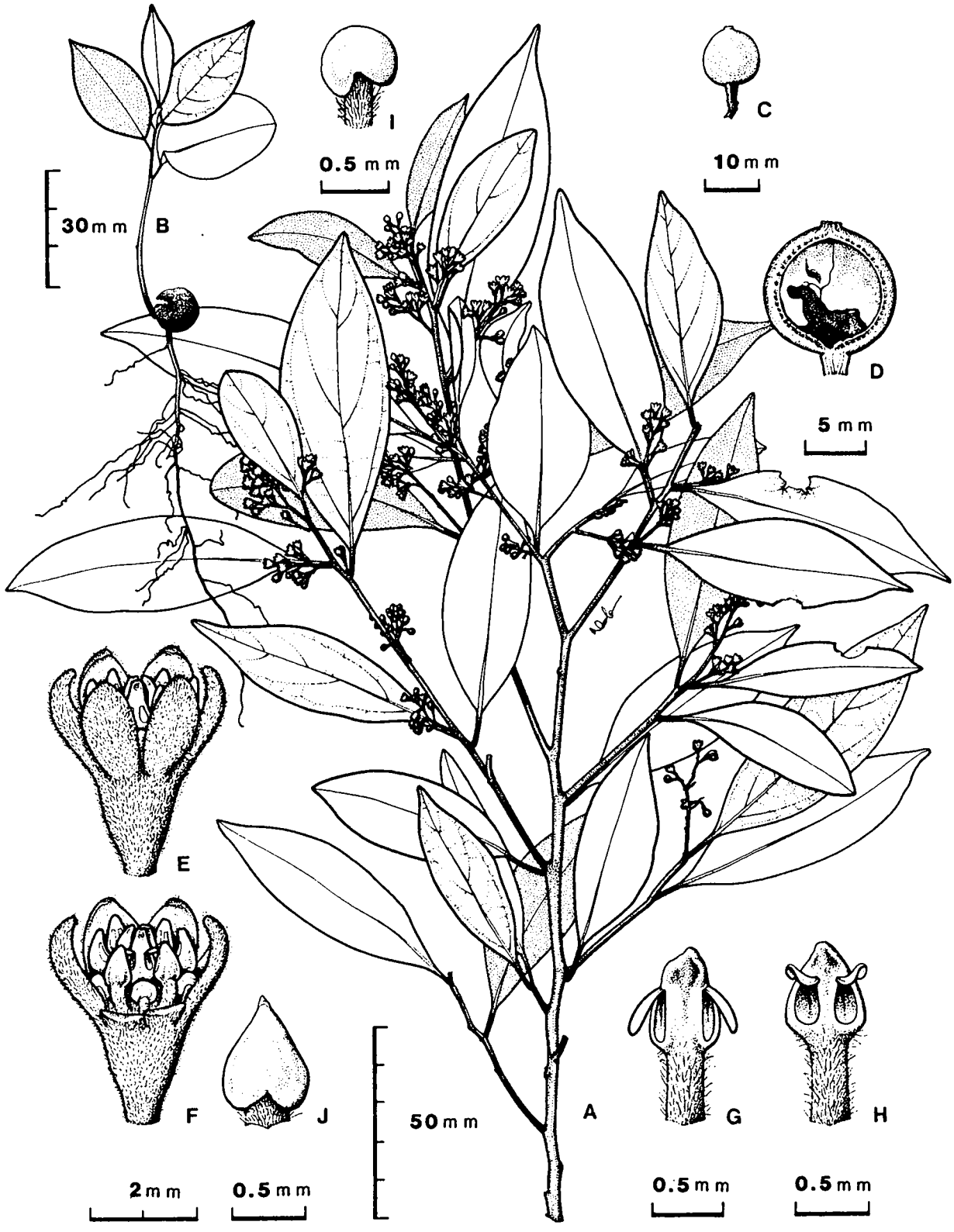

Fig.36. Cryptocarya smaragdina. A Habit Gray 2796; B seedling, C fruit, D fruit (LS) Gray 3027; E flower, F flower (side view, 2 tepals removed), G anther (inner whorl, abaxial view), H anther (outer whorl, adaxial view), I gland (adaxial view), J staminode (adaxial view) Gray 2796.

leaves opposite. (Fig. 36)

Distribution (Fig. 91, Map 22)

Ecology

Rain forests of northern Queensland on a variety of soil types but most frequently encountered in mountain rain forests on soils derived from granite and acid volcanic rocks. Altitudinal range: 50-1150 m.

Uses

This species sometimes grows large enough to produce millable logs but it is not utilized and it does not have a Standard Trade Name. Wood S.G. 0.90.

Notes and Observations

Flowers have been collected in September, October and November, while ripe fruits have been collected in March and April. Seedling germination period 50-140 days.

This species may be related to C. sleumeri Kosterm. of New Guinea but fruiting collections need to be examined to explore this possibility.

Etymology

The specific epithet was applied to this species because it was first recognized as a distinct species from collections made on the headwaters of Emerald Creek.

Specimens Examined (28 collections examined)

44. **Cryptocarya triplinervis** R. Br., Prod. 402 (1810); Benth., Fl. austral 5:297 (1870); Bailey, Queensl. fl. 4:1300 (1901); Francis, Austral. Rain-Forest Trees ed.2:135 (1951)p.p.; Floyd, N.S.W. Rainforest Trees, Part 1, ed.2:61 (1979); Stanley & Ross, Flora of South-eastern Queensland 1:158 (1983).

[Caryodaphne browniana Nees, Syst. laur. 230 (1836) nom. illeg.]

Type: R. Brown 3017, Cumberland Islands (BM holotype, K, MEL, NSW isotypes)

Caryodaphne browniana var. ferruginea Meissner in DC., Prodr. (15)1:78 (1864)

Syntypes: A. Cunningham 129, Brisbane River, Moreton Bay (BM, K, NY)

F. Mueller, Brisbane River, Moreton Bay n.v.

Cryptocarya triplinervis var. euryphylla Domin, Biblioth. Bot. 89:122 (1926).

Type: A. Dietrich 1380, Brisbane River (PR holotype, MEL, SING isotypes) (According to the MEL collection the locality is Rockhampton)

Three varieties are recognized in this species.

Key to the Varieties *

1a. Underside of mature leaves clothed in tortuous, erect hairs. . . . . var. pubens

b. Underside of mature leaves clothed in straight, appressed hairs or glabrous. 2

2a. Underside of mature leaves glabrous or almost glabrous.
Leaf hairs short (i.e. length < diam. of each reticulation in the leaf venation).
Twig hairs mainly appressed. . . . . .var. riparia

b. Underside of mature leaves clothed in straight, white, mainly appressed (rarely some erect) hairs.
Leaf hairs long (i.e. length > diam. of each reticulation in the leaf venation).
Twig hairs appressed and erect. . . . . .var. triplinervis

*NB Mature i.e. fully developed leaves should be examined, not old almost moribund ones.

a. Cryptocarya triplinervis R. Br. var. **triplinervis**

Tree to 20 m tall x 40 cm dbh, usually small and often poorly

formed. Stem without buttresses. Bark nondescript, outer blaze cream, pink or brown, marked by longitudinal stripes, granular in texture, usually emitting a distinct odour, difficult to describe. Twigs terete or angular in section, clothed in straight and tortuous, white, pale brown or brown, appressed and erect hairs which persist even on old twigs. Leaves: Underside green, clothed in straight, long (i.e. length > width of each reticulation), white, mainly appressed, (rarely some erect) persistent hairs. Leaf blade ovate, elliptical, lanceolate or narrowly lanceolate, apex abruptly acuminate, acute or narrowly acuminate, base rounded to attenuate, 4.5-13.5 x 1.5-5.0 cm (mean 7.8 x 2.9), conspicuously triplinerved, primary veins 2-5 pairs (mode 3), domatia (tufts of hairs) sometimes present on the underside, midrib raised, flush or depressed on the upper surface; petiole 3-9 mm long (mean 5.6), flat or ridged on the upper surface. Inflorescence paniculate, not or scarcely exceeding the leaves, mainly pseudoterminal but also axillary, bracts linear, triangular about 1.0-1.2 mm long, deciduous, absent at anthesis. Flowers pale green, faintly perfumed, (the odour difficult to describe), opening quite widely but the tips of the tepals remaining ± erect at anthesis. Pedicel 0.2-0.7 x 0.4-0.6 mm. Perianth tube 1.3-2.7 x 1.0-1.3 mm, inner surface at least partly pubescent on strips from the base to the apex. Outer and inner tepals of similar dimensions, 1.6-2.2 x 0.8-1.4 mm, all tepals pubescent on both their inner and outer surfaces (hairs predominantely appressed). Outer anthers glabrous adaxially, but usually pubescent along the midline on the abaxial surface, 0.6-0.7 x 0.4-0.7 mm, filaments pubescent, 0.3-0.8 mm long, gland heads glabrous, 0.3-0.5 x 0.2-0.5 mm, stalks pubescent, 0.2-0.4 mm long. Inner anthers glabrous abaxially, glabrous adaxially or with a few

hairs along the midline near the base, 0.6-0.8 x 0.3-0.5 mm, filaments pubescent, 0.6-0.8 mm long. Staminodes differentiated, head sagittate, glabrous adaxially, glabrous or pubescent abaxially, 0.7-1.1 mm long, filaments pubescent, 0.2-0.6 mm long. Ovary mainly glabrous except for pubescent strips from base to apex, 0.9-1.2 x 0.5-0.6 mm, style pubescent, 1.8-2.0 mm long. Fruits black when ripe, ellipsoid, about 14 x about 12 mm, mesocarp + exocarp about 0.9 mm thick, endocarp about 0.8 mm thick. Seed about 9.5 x about 8.0 mm, testa about 0.1 mm thick, radicle apical. Cotyledons cream, uniform in texture. Seedling leaves green on the underside, cataphylls absent, first pair of leaves opposite. (Fig. 71 B-D)

Distribution. (Fig. 91, Map 19)

Ecology.

Rain forests and beach forests of central and southern Queensland and northern New South Wales on soils derived from a variety of rock types. Altitudinal range: Sea level to 100 m.

Uses

This variety has little or no commercial value as it seldom grows large enough to produce millable logs. Standard Trade Name: Brown Laurel. Wood S.G. 0.75.

Notes and Observations

Flowers have been collected in September, October and November, while ripe fruits have been collected in October and January. Seedling germination period about 20 days.

Possible synonyms include C. elegans (Reinecke) A. C. Smith of Samoa and C. lifuensis Guillaumin of New Caledonia.

Specimens Examined (71 collections examined)

b. Cryptocarya triplinervis R. Br. var. **pubens** B. Hyland var. nov.
Differt a var. typica, pilis laminae subtus tortuosis erectis.
Typus: B. Hyland 12325: Currumbin Valley Bird Garden, 14.xi.1982 (holotypus QRS).
Differs from var. typica, the hairs on the underside of the lamina being tortuous and erect.

Tree to 15 m tall x 35 cm dbh, usually small and slender. Stem buttressed in the larger but not the smaller size classes. Bark nondescript, outer blaze cream, brown, pink or reddish, often speckled and usually marked by conspicuous longitudinal stripes, granular in texture, usually emitting a distinct odour, but usually difficult to describe, sometimes peppery. Twigs terete, occasionally fluted or angular, clothed in straight and tortuous, brown or pale brown, erect hairs which persist even on old twigs. Leaves: Underside green, clothed in straight and tortuous, white or pale brown, erect persistent hairs. Leaf blade ovate, elliptical, lanceolate, narrowly elliptical or narrowly lanceolate, apex acute or acuminate, base usually acute or attenuate, 4.5-12.9 x 1.6-4.5 cm (mean 7.6 x 2.7), usually triplinerved, sometimes penninerved, primary veins 2-6 pairs (mode 3), domatia absent, midrib flush with the upper surface of the leaf blade (rarely raised), midrib pubescent on the upper surface; petiole 3-8 mm long (mean 4.8), flat on the upper surface. Inflorescence paniculate, not or scarcely exceeding the leaves, mainly pseudoterminal but also axillary, bracts linear, 0.9-1.3 mm long, deciduous, usually absent at anthesis. Flowers cream to pale green,

faintly perfumed, opening quite widely, but the tips of the tepals remaining ± erect at anthesis. Pedicel 0.2-0.6 x 0.4-0.5 mm. Perianth tube 1.2-1.7 x 0.9-1.2 mm, inner surface pubescent at the apex, glabrous or pubescent towards the base. Outer and inner tepals of similar dimensions, 1.4-2.2 x 0.8-1.5 mm, all tepals pubescent, hairs erect on the outer surface, but appressed on the inner surface. Outer anthers glabrous adaxially, mainly glabrous abaxially, except for hairs along the midline, 0.5-0.7 x 0.4-0.6 mm, filaments pubescent 0.4-0.7 mm long. Inner anthers glabrous abaxially, mainly glabrous adaxially except for hairs along the midline, 0.5-0.8 x 0.3-0.5 mm, filaments pubescent 0.5-0.7 mm long. Staminodes differentiated, head sagittate, glabrous adaxially, but pubescent at least along the midline on the abaxial surface, 0.7-0.9 mm long, filaments pubescent 0.3-0.6 mm long. Ovary mainly glabrous (occasionally sparsely hairy towards the apex or along one side), 0.9-1.2 x 0.5-0.6 mm, style usually partly pubescent (rarely completely glabrous), 1.1-1.7 mm long. Fruits black(?) when ripe, ellipsoid, about 10 x about 7 mm, mesocarp + exocarp about 0.3 mm thick, endocarp about 0.1 mm thick. Seed about 8 x about 5 mm, testa about 0.1 mm thick., radicle apical. Cotyledons cream(?), uniform in texture. Seedling features unknown. (Fig. 71 E)

Distribution. (Fig. 91, Map 18)

Ecology

Drier rain forests of northern, central and southern Queensland and northern New South Wales, on soils derived from a variety of rock types. Altitudinal range: Sea level to 750 m.

Uses

This variety has little or no commercial value as it seldom grows large enough to produce millable logs. It does not have a Standard Trade Name. Wood S.G. unknown.

Notes and Observations

Flowers have been collected in October and November, while ripe fruits have been collected in December, January and April. Seedling germination period unknown.

Specimens Examined (53 collections examined)

c. Cryptocarya triplinervis var. **riparia** B. Hyland
var. nov.
Differt a var. typica laminis ad maturitatem subtus glabris et pilis ramunculorum praecipue adpressis.
Typus: B. Hyland 12452: Gordon Creek, 13.xii.1982 (holotypus QRS).
Differs from var. typica the lamina being glabrous on the underside at maturity and the twig hairs being mainly appressed.

Tree to 20 m tall x 40 cm dbh, usually small and well formed tree. Stem with or without buttresses. Bark nondescript, outer blaze cream or brown, sometimes speckled, usually marked by longitudinal stripes, brown and fibrous and also white and granular, mainly granular in texture, often emitting a distinct odour, resembling that of guava. Twigs usually fluted, rarely terete, clothed in straight (occasionally tortuous), white or pale brown, appressed (rarely erect) hairs which persist to some extent even on old twigs. Leaves: Underside green, clothed in short, (i.e. length < width of a reticulation), straight, white, appressed hairs when young but often almost glabrous at maturity. Leaf blade usually lanceolate, (sometimes narrowly

lanceolate) to almost ovate, apex usually acuminate, sometimes acute, base usually attenuate, sometimes shortly attenuate, acute or obtuse, 6.0-13.5 x 1.8-4.5 cm (mean 9.6 x 3.1) usually penninerved, occasionally triplinerved, primary veins 3-6 pairs (mode 4), domatia usually absent, tufts of hairs sometimes present, foveoles rarely present, midrib usually raised, sometimes flush with the upper surface; petiole 3-13 mm long (mean 6.1), usually flat on the upper surface. Inflorescence paniculate, usually exceeding the leaves, mainly pseudoterminal but also axillary, bracts linear, triangular, 0.7-1.6 mm long, deciduous, present or absent at anthesis. Flowers cream to pale green, without any obvious perfume, opening quite widely but the tips of the tepals remaining ± erect at anthesis. Pedicel 0.3-0.6 x 0.5-0.6 mm. Perianth tube 1.5-2.3 x 0.9-1.2 mm, inner surface glabrous or pubescent. Outer and inner tepals of similar lengths but the inner usually wider, 1.5-2.1 x 0.7-1.2 mm, all tepals pubescent on both their inner and outer surfaces (hairs appressed). Outer anthers glabrous adaxially, but usually pubescent near the base or along the midline on the abaxial surface, 0.6-0.8 x 0.5-0.6 mm, filaments pubescent 0.5-0.8 mm long. Inner anthers glabrous abaxially, glabrous adaxially or with a few hairs near the base or along the midline, 0.7-0.8 x 0.4-0.5 mm, filaments pubescent, 0.5-0.8 mm long. Staminodes differentiated, head sagittate, glabrous adaxially, but pubescent along the midline on the abaxial surface, 1.0-1.1 mm long, filaments pubescent, 0.1-0.4 mm long. Ovary glabrous 1.0-1.4 x 0.4-0.6 mm, style glabrous or sparsely hairy, 1.3-1.8 mm long. Fruits black when ripe, ellipsoid, rarely globular, 8-13 x 6.5-10.0 mm, mesocarp + exocarp 0.2-0.6 mm thick, endocarp 0.2-0.4 mm thick. Seed 6-9 x 5.0-8.5 mm, testa 0.1-0.2 mm thick, radicle

apical. Cotyledons cream, uniform in texture. Seedling leaves green on the underside, cataphylls absent, first pair of leaves opposite. (Fig. 71 F)

Distribution. (Fig. 91, Map 18)

Ecology

Gallery forests of northern Queensland usually on alluvial soils derived from a variety of rock types. Altitudinal range: Sea level to 400 m.

Uses

This variety has little or no commercial value as it seldom grows large enough to produce millable logs and does not have a Standard Trade Name. Wood S.G. 0.78.

Notes and Observations

Flowers have been collected in August, September and October, while ripe fruits have been collected each month from December to March. Seedling germination period 11-32 days.

Specimens Examined (84 collections examined)

d. Cryptocarya triplinervis sens. lat.

This category is used to accommodate those specimens which do not conform to any of the formally recognized varieties.

Specimens Examined (86 collections examined)

45. Cryptocarya vulgaris B. Hyland sp. nov.

Differt a C. leucophylla laminis ad maturitatem glaucis glabris.
Typus: B. Gray 1367: State Forest Reserve 933, Little Pine Logging Area, 30.iii.1979 (holotypus QRS).
Differs from C. leucophylla the lamina glaucous and glabrous on the underside at maturity.
Cryptocarya glaucescens R. Br. var. coriacea Benth., Fl. austral. 5:297 (1870)
Type: J. Dallachy s.n., Rockingham Bay (K holotype)
[C. hypotephra F. Muell. ex Koorders & Valeton, Bijdr. Boomsorten Java 10:224 (1904) in nota, nom. inval.]

Tree to 30 m tall x 50 cm dbh, usually small and well formed. Stem buttressed in the larger but not the smaller size classes. Bark flaky or nondescript, rarely tessellated, outer blaze cream or brown, sometimes speckled, granular in texture, sometimes emitting a piney odour. Twigs fluted, clothed in straight, pale brown, appressed hairs which persist even on fairly old twigs. Leaves: Underside glaucous, clothed in straight, white, appressed hairs when young but eventually becoming almost glabrous. Leaf blade lanceolate, elliptical or oblong, apex acuminate, acute or obtuse, base attenuate, shortly attenuate or truncate, 6.5-14.0 x 2.5-6.0 cm (mean 9.4 x 3.9); penninerved, primary veins 3-6 pairs (mode 5), midrib usually depressed or flush with the upper surface; petiole 6-19 mm long (mean 12.7), channelled on the upper surface. Inflorescence paniculate, exceeding the leaves, axillary and pseudoterminal, bracts triangular, 0.4-0.9 mm long, deciduous, absent at anthesis. Flowers yellow, cream, greenish cream or pale green, unpleasantly perfumed, opening quite widely but the tepals remaining ± erect at anthesis. Pedicel nil or up to 0.5 x about 0.6 mm. Perianth tube 0.8-1.4 x 0.9-1.3 mm, inner surface glabrous or pubescent towards the apex but glabrous on the lower half. Outer and inner tepals of similar dimensions, outer tepals 1.0-1.5 x 0.8-1.1 mm, inner tepals 1.0-1.5 x 0.6-0.9 mm, all tepals pubescent on both their inner and outer surfaces. Outer

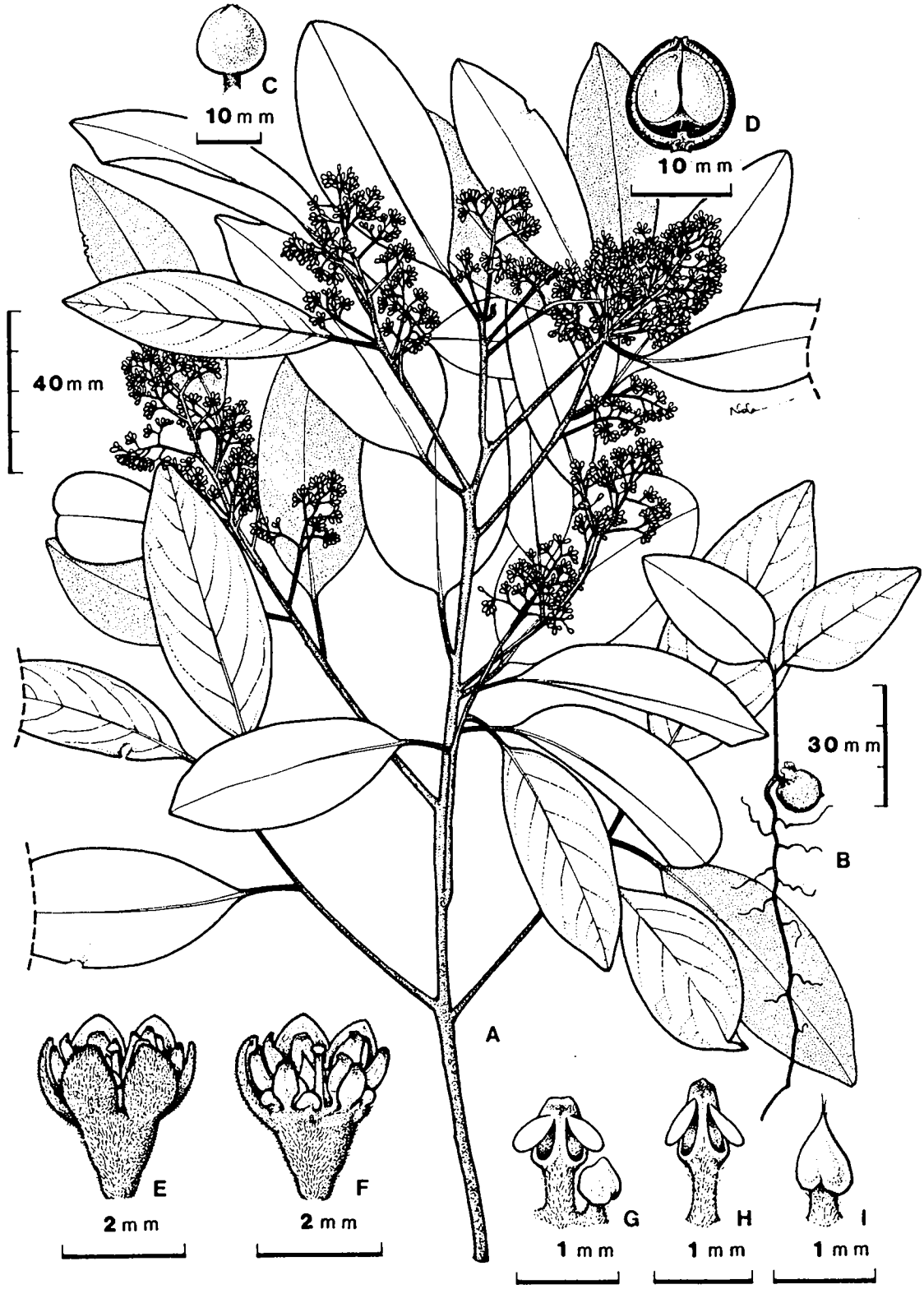

Fig.37. Cryptocarya vulgaris. A Habit Gray 1367; B seedling, C fruit, D fruit (LS) Gray 1903; E flower, F flower (side view, 3 tepals removed), G stamen and gland (outer whorl, adaxial view), H stamen (inner whorl, abaxial view), I staminode (adaxial view) Gray 1348.

anthers glabrous adaxially, but pubescent near the base or along the midline on the abaxial surface, 0.4-0.6 x about 0.5 mm, filaments pubescent, 0.4-0.6 mm long; gland heads glabrous, 0.3-0.5 x 0.4-0.5 mm, stalks pubescent, 0.3-0.4 mm long. Inner anthers glabrous, 0.5-0.7 x 0.4-0.5 mm, filaments pubescent, 0.4-0.7 mm long. Staminodes differentiated, head cordate or sagittate (apex acuminate), glabrous adaxially but pubescent along the midline on the abaxial surface, 0.5-0.8 mm long, filaments pubescent, 0.3-0.4 mm long. Ovary glabrous, 0.7-1.0 x 0.3-0.5 mm, style glabrous, 0.9-1.3 mm long. Fruits black when ripe, usually globular, rarely ovoid or ellipsoid, 8-13 x 8-12 mm, mesocarp + exocarp 0.2-0.9 mm thick, endocarp 0.4-0.7 mm thick. Seed 5-9 x 5.0-8.5 mm, testa 0.04-0.2 mm thick, radicle apical sometimes slightly lateral. Cotyledons cream or yellowish, uniform in texture. Seedling leaves glaucous on the underside, cataphylls absent, first pair of leaves opposite. (Fig. 37)

Distribution (Fig. 91, Map 23)

Ecology

Rain forests of central and northern Queensland on soils derived from a variety of rock types but usually on the poorer soils derived from granite, acid volcanic and metamorphic rocks. Altitudinal range: Sea level to 850 m.

Uses

This species occasionally grows large enough to produce millable logs but it is seldom utilized even though it has been given the Standard Trade Name of Northern Laurel. Wood S.G. 0.95-1.00.

Notes and Observations

Flowers have been collected each month from November to April, while ripe fruits have been collected each month from October to February and also in April and August. Seedling germination period 35-220 days.

Etymology

The specific epithet was applied to this species because it is one of the more commonly encountered species of Lauraceae in Queensland.

Specimens Examined (114 collections examined)

46. Cryptocarya williwilliana B. Hyland & Floyd sp. nov.
Cryptocarya sp. nov. (Willi Willi) Floyd, N.S.W. Rainforest Trees Part 1, ed.2:63 (1979).
Differt a C. triplinervi et C. bidwillii laminis 2.5-3.5 cm longis.
Typus: B. Hyland 12344: Willi Willi, 17.xi.1982 (holotypus QRS).
Differs from C. triplinervis and C. bidwillii the lamina being 2.5-3.5 cm long.

Tree to 6 m tall x 10 cm dbh, usually a shrub or small, poorly formed tree. Stem without buttresses, often with coppice shoots at the base. Bark nondescript, outer blaze pink or brown, granular in texture. Twigs terete, or fluted, clothed in straight and tortuous, pale brown, erect and appressed hairs which persist to some extent even on old twigs. Leaves: Underside green, clothed in straight, white or pale brown, appressed hairs when young but soon becoming almost glabrous. Leaf-blade lanceolate or broadly lanceolate, apex acuminate, abruptly acuminate or obtuse, base attenuate, 2.5-3.5 x 1.3-1.8 cm (mean 3.2 x 1.6); penninerved, primary veins 3-4 pairs, midrib raised on the upper surface; petiole 3-4 mm long (mean 3.6),

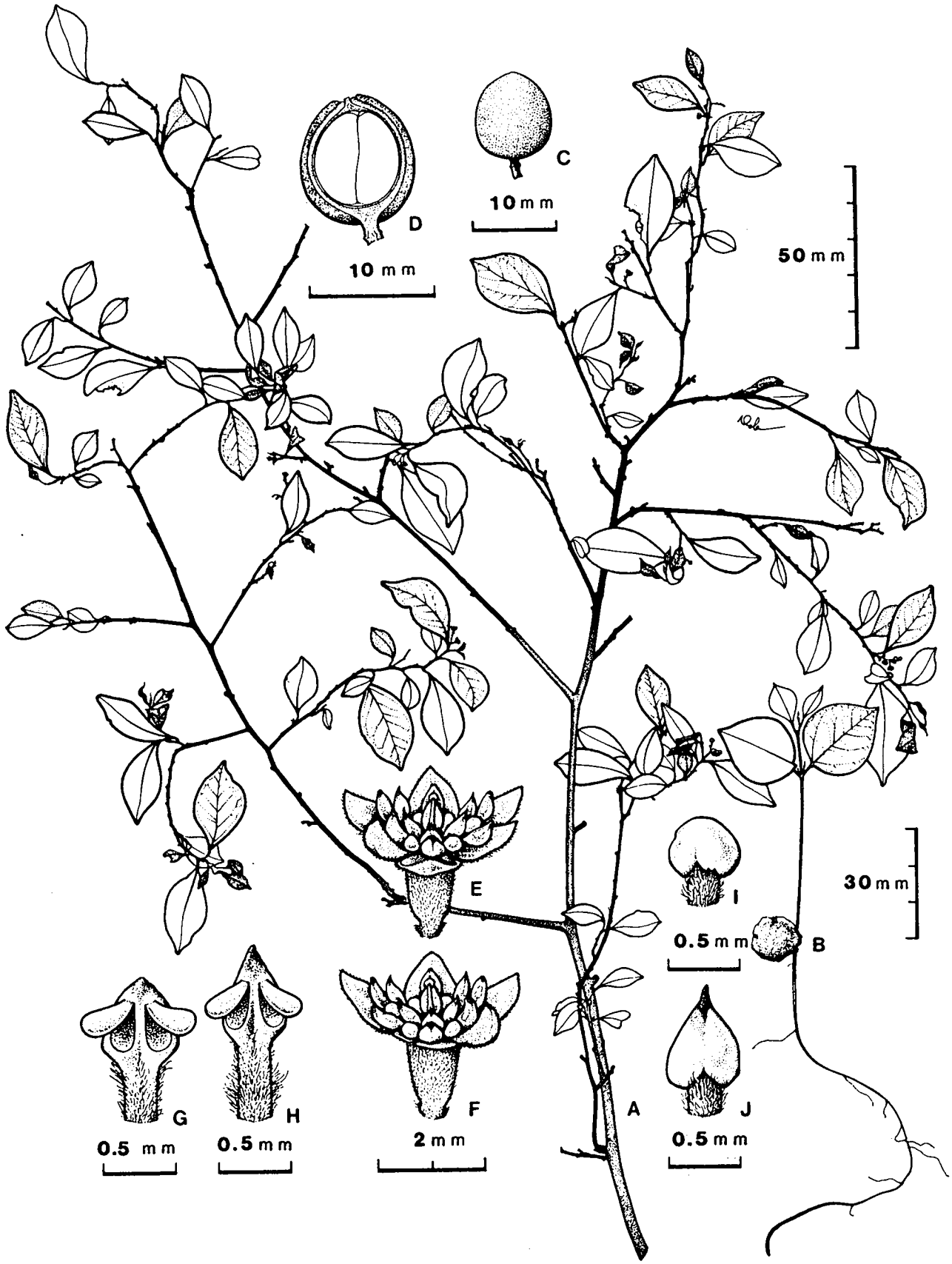

Fig.38. Cryptocarya williwilliana. A Habit Hyland 12344; B seedling, C fruit, D fruit (LS) Hyland 10986; E flower, F flower (side view, 2 tepals removed), G anther (outer whorl, adaxial view), H anther (inner whorl, abaxial view), I gland (adaxial view), J staminode (adaxial view) Hyland 12344.

channelled on the upper surface. Inflorescence racemose, not exceeding the leaves, mainly axillary, bracts linear, about 0.9 mm long, persistent, present at anthesis. Flowers cream or pale green, rarely white, faintly but pleasantly perfumed, opening very widely, the tepals being ± horizontal at the base but the tips ± erect at anthesis. Pedicel 0.2-0.6 x 0.3-0.4 mm. Perianth tube 1.3-2.0 x 0.9-1.0 mm, glabrous on the inner surface. Outer and inner tepals of similar lengths but inner usually wider, outer tepals, 1.4-2.0 x 1.0-1.2 mm, inner tepals 1.5-2.1 x 1.1-1.4 mm, all tepals with at least some hairs on both the inner and outer surfaces. Outer anthers glabrous adaxially but usually pubescent towards the base on the abaxial surface, 0.5-0.7 x 0.5-0.7 mm, filaments pubescent, 0.5-0.7 mm long; gland heads glabrous, 0.3-0.5 x 0.4-0.5 mm, stalks pubescent 0.3-0.5 mm long. Inner anthers glabrous, 0.6-0.8 x 0.4-0.6 mm, filaments pubescent, 0.5-0.7 mm long. Stamindoes differentiated, head cordate or sagittate (apex rostrate or acuminate), glabrous adaxially, pubescent along the midline on the abaxial surface, 0.7-0.8 mm long, filaments pubescent, 0.2-0.3 mm long. Ovary glabrous, 1.0-1.3 x 0.5-0.6 mm, style glabrous, 1.1-1.6 mm long. Fruits black when ripe, globular, occasionally ellipsoid, 10-12 x 8.5-11.0 mm, mesocarp + exocarp 0.1-0.3 mm thick, endocarp 0.1-0.2 mm thick. Seed 8-10 x 7.5-9.0 mm, testa 0.1-0.15 mm thick, radicle apical. Cotyledons white or cream, uniform in texture. Seedling leaves green on the underside, cataphylls absent, first pair of leaves opposite. (Fig. 38)

Distribution (Fig. 91, Map 22)

Ecology

Dry rain forest on limestone, fide Floyd (1979). Altitudinal range:

250-800 m.

Uses

This species does not grow large enough to produce millable logs and does not have a Standard Trade Name. Wood S.G. 0.80.

Notes and Observations

Flowers have been collected in October, November and January, while ripe fruits have been collected in February and March. Seedling germination period about 40 days.

There is little doubt that this is a relict species with a limited distribution and narrow ecological amplitude. It appears to be related to *C. triplinervis* and perhaps *C. bidwillii* but is quite distinct from each.

Etymology

The specific epithet was applied to this species because it was first collected in the Willi Willi area by A.G. Floyd.

Specimens Examined (18 collections examined)

4.Endiandra R. Br. *

Endiandra R. Br., Prodr. 402 (1810).
Type: E. glauca R. Br.
Dictyodaphne Blume, Mus. bot. Lugd. 1(17):270 (1851).
Brassiodendron Allen, J. Arnold Arb. 23:153 (1942).

Trees, often quite large, rarely down to shrub size. Twigs ± sericeous to villous to almost glabrous. Leaves petiolate, minutely oil dotted, penninerved, rarely triplinerved towards the base, spirally arranged. Inflorescence usually paniculate, pseudoterminal and/or axillary, rarely racemose or cymose and axillary. Flowers bisexual, usually 3-merous (rarely 2-merous), tepals 3 + 3 (rarely 2 + 2), stamens usually 3, (E. xanthocarpa 2, E. globosa and E. montana usually 6), extrose (rarely ± introrse), usually 2-locular, (E. monothyra ± unilocular), glands usually present (6 per flower) (Fig. 83 C), occasionally absent, sometimes fused to form a disk (Fig. 76 C), staminodes usually present (3), occasionally absent, ovary ± sessile, style usually short, stigma usually inconspicuous (Figs 72-85). Fruits superior, variable in size, often quite large (up to 100 mm diam.), pedicel not swollen or cup-like, mesocarp + exocarp usually fleshy, occasionally ± leathery, endocarp thin in small but usually thick in large fruits. Seed: Cotyledons usually distinct from one another and uniform in texture, radicle usually apical, but sometimes basal, central or lateral. Seedling leaves spirally arranged, cataphylls present.

Distribution

A genus of about 100 species occurring in Asia, Malesia, Australia and the Pacific Islands.

* Organ numbers in the flowers are only included in the species

descriptions if they differ from the generic description.

Keys to the Species of Endiandra

Flowering Material

1a. Stamens 4-6 per flower 2

b. Stamens 2-3 per flower. 3

2a. Staminal glands larger than the anther openings. . . . . E. globosa

b. Staminal glands smaller than the anther openings. . . . . E. montana

3a. Glands fused. Either all fused to form a ring of tissue or pairs of glands fused to form 3 masses of tissue ± in a ring. 4

b. Glands quite separate from one another (sometimes touching but not fused) or absent. 11

4a. Outer tepals more than 4 mm long 5

b. Outer tepals less than 4 mm long 7

5a. Glands fused to form a 3-partite ring of tissue. Leaves green on underside. . . . . E. floydii

b. Glands fused to form a continuous ring of tissue. Leaves white or glaucous on the underside. 6

6a. Inner surface of the tepals pubescent . . . . . .E. grayi

b. Inner surface of the tepals glabrous. . . . E. hypotephra

7a. Ovary hairy 8

b. Ovary glabrous. 9

8a. Each pair of staminal glands ± fused but separate from the glands associated with the adjacent anthers. Staminodes hairy, quite free from the glands . . . . . E. bellendenkerana

b. Glands fused to form a ± continuous hexagonal disk-like

ring of tissue.
Staminodes fused with the disk and
indistinguishable from it or absent . . . . . E. wolfei

9a. Anthers opening upwards, the backs
of the valves of each anther almost
touching and projecting
above the apex of the anther . . . . . .E. glauca

b. Anther opening outwards or sideways,
the valves of each anther being quite
widely separated at anthesis 10

10a. Anther valves hinged ±
vertically so that the valves
open outwards like a door.
Young twigs clothed in tortuous,
erect, brown or rusty brown hairs . . E. longipedicellata

b. Anther valves hinged horizontally
so that the valves lift upwards.
Young twigs clothed in straight,
appressed, white or pale brown hairs . . . . . E. floydii

11a. Glands absent 12

b. Glands present, quite separate
from one another 21

12a. Anthers opening inwards 13

b. Anthers opening upwards, outwards
or sideways 14

13a. Ovary hairy.
Outer tepals more than 1.3 mm long.
Hairs present on the back of the anther . . . .E. jonesii

b. Ovary glabrous.
Outer tepals less than 1.3 mm long.
No hairs present on the back of
the anther . . . . . .E. introrsa

14a. Staminodes present 15

b. Staminodes absent 19

15a. Anther openings not pore-like, longer
than wide 16

b. Anther openings pore-like, ±
circular or about as long as wide 18

16a. Underside of the lamina hairy, many
hairs erect and ± tortuous. . . . . E. pubens

b. Underside of the lamina glabrous

or with sparsely scattered
appressed hairs. 17

17a. Primary veins 4-6 pairs.
Pedicel 2.5-7.6 mm long. . . . . .E. anthropophagorum

b. Primary veins 5-13 pairs.
Pedicel 0.6-2.0 mm long. . . . . E.virens

18a. Stamens usually 3 per flower.
Filaments not wider than the anthers. . . . E. phaeocarpa

b. Stamens usually 2 per flower.
Filaments wider than the anthers . . . . . E. xanthocarpa

19a. Outer tepals more than 3 mm long.
Anthers more than 1.5 mm long . . . . . .E. impressicosta

b. Outer tepals less than 3 mm long.
Anthers less than 1.5 mm long 20

20a. Anther openings pore-like, ±
circular or about as long as wide.
Filaments wider than the anthers. . . . . E. phaeocarpa

b. Anther openings not pore-like,
openings longer than wide.
Filaments not wider than the anthers. . . . .E. sankeyana

21a. Anthers opening by one valve, inwards 22

b. Anthers opening by two valves,
outwards, sideways or upwards 23

22a. Pedicel 0.3-1.3 mm long.
Mature leaves sparsely
pubescent or almost
glabrous on the underside. . .E. monothyra ssp. monothyra

b. Pedicel 1.5-2.4 mm long.
Mature leaves pubescent
on the underside. . . . . .E. monothyra ssp. trichophylla

23a. Staminodes absent 24

b. Staminodes present 26

24a. Outer tepals more than 2.5 mm long.
Anthers more than 1.5 mm long . . . . . .E. cooperana

b. Outer tepals less than 2.5 mm long.
Anthers less than 1.5 mm long 25

25a. Apex of the anthers papillose.
Anthers laterally dehiscent . . . . . .E. compressa

b. Apex of the anthers glabrous.

Anthers almost extrorse . . . . . E. microneura

26a. Staminodes undifferentiated i.e. the staminode ± subulate not consisting of a head and distinctly different stalk 27

b. Staminodes differentiated i.e. the staminode consisting of a swollen head (rudimentary anther) and a distinctly different stalk or sessile 32

27a. Tips of the inner tepals ± level with the tips of the outer tepals at anthesis. 28

b. Tips of the inner tepals well below the tips of the outer tepals (appearing about half the height) at anthesis. 31

28a. Anther valves projecting beyond the tepals at anthesis. . . . . .E. muelleri ssp. bracteata

b. Anther valves not projecting beyond the tepals at anthesis. 29

29a. Anthers pubescent at the apex or almost to the apex. . . . . .E. palmerstonii

b. Anthers glabrous at the apex. 30

30a. Tepals ± glabrous on the outer surface.
Outer tepals 1.3-2.1 mm long. . . . . .E. globosa

b. Tepals pubescent on the outer surface.
Outer tepals 1.2-1.3 mm long. . . . . E. microneura

31a. Hairs on the underside of the midrib erect. . . . . E. insignis

b. Hairs on the underside of the midrib appressed. . . . . .E. anthropophagorum

32a. Flowers not opening widely, the tepals being ± erect at anthesis, closely surrounding the anthers and style so that only the tips of the anthers and style are visible when viewed from above. 33

b. Flowers opening quite widely, the tepals being erect, ± horizontal

or reflexed at anthesis.
Complete anthers, portions of the style, ovary and glands visible when viewed from above. 37

33a. Tepals (particularly the outer tepals) cucullate or geniculate, the angle formed by the upper part of the tepal and the perianth tube being about 90° or even less. 34

b. Tepals curved or rounded but the angle formed by the upper part of the tepal and the perianth tube being much more than 90° 35

34a. Tepals and perianth tube clothed in long, erect hairs.
Flowers ± triangular in transverse section.
Flowers ± flat topped at anthesis . . . . . .E. hayesii

b. Tepals and perianth tube clothed in short, appressed and erect hairs.
Flowers ± circular or hexagonal in transverse section.
Flowers with curved apices at anthesis . . . . . .E. leptodendron

35a. Tips of the inner tepals well below the tips of the outer tepals at anthesis.
Style projecting beyond the tips of the anthers at anthesis. . . . . E. insignis

b. Tips of the inner tepals ± level with the tips of the outer tepals at anthesis.
Style below or level with the tips of the anthers at anthesis. 36

36a. Style more than 0.5 mm long.
Anther filaments 0.3-0.5 mm long.
Perianth tube 2.5 mm or more in diam. . . . . E. muelleri

b. Style less than 0.5 mm long.
Anther filaments 0.1-0.2 mm long.
Perianth tube less than 2.5 mm diam . . . . .E. collinsii

37a. Anthers hairy at the apex or almost to the apex. . . . . .E. palmerstonii

b. Anthers glabrous at the apex (usually the entire upper half of the anther) 38

38a. Base of the filaments much wider than

the anthers . . . . . .E. acuminata

b. Base of the filaments usually narrower than the anthers, rarely as wide as the anthers 39

39a. Tepals glabrous on the outer surface 40

b. Tepals hairy on the outer surface 43

40a. Inflorescence racemose; bracts more than 3 mm long, present at anthesis . . . . . .E. crassiflora

b. Inflorescence paniculate, bracts less than 3 mm long, absent at anthesis 41

41a. Leaves glaucous on the underside. Midrib flush with the upper surface. Stem bark nondescript. Petiole 6-21 mm long. . . . . .E. dielsiana

b. Leaves green on the underside. Midrib raised on the upper surface. Stem bark corky. Petiole 3-9 mm long. 42

42a. Inner tepals 1.6-1.8 mm wide. Anthers 0.7-0.9 mm long. Leaf blade 10-17 cm long. . . . . .E. globosa

b. Inner tepals 0.9-1.0 mm wide. Anthers 0.5-0.6 mm long. Leaf blade 5.5-11.5 cm long. . . . . E. sieberi

43a. Adaxial surface of the anther hairy 44

b. Adaxial surface of the anther glabrous 49

44a. Leaves glaucous on the underside. Midrib depressed or flush with the upper surface. 45

b. Leaves green on the underside. Midrib raised or flush with the upper surface. 47

45a. Foveoles absent on the underside of the leaves. . . . . .E. dichrophylla

b. Foveoles present on the underside of at least 50% of the leaves. 46

46a. Primary veins 6-11 pairs. Apex of the leaf blade obtuse or rounded. . . . . E. bessaphila

b. Primary veins 3-7 pairs.
Apex of the leaf blade
bluntly pointed or acuminate . . . . . .E. discolor

47a. Foveoles present on the underside
of at least 50% of the leaves. . . . . .E. bessaphila

b. Foveoles absent on the underside
of all leaves. 48

48a. Outer tepals 1.7-2.0 mm long.
Reticulate veins not very
prominent even on dried leaves. . . . . .E. sideroxylon

b. Outer tepals 1.2-1.3 mm long.
Reticulate veins prominent
particularly on dried leaves. . . . . E. microneura

49a. Foveoles always absent 50

b. Foveoles usually present on the
underside of the leaves 51

50a. Inflorescence exceeding the leaves.
Inflorescence usually more
than 10 cm long . . . . . E. sideroxylon

b. Inflorescence not exceeding
the leaves.
Inflorescence less than 10 cm long . . . . E. crassiflora

51a. Leaves green on the underside.
Outer tepals 0.9-1.4 mm long . . . . . E. cowleyana

b. Leaves glaucous on the underside.
Outer tepals 1.1-1.9 mm long 52

52a. Older leaves glaucous on the underside.
Perianth tube 1.2-2.1 mm diam. . . . . .E. discolor

b. Older leaves slightly glaucous on
the underside.
Perianth tube 1.0-1.3 mm diam. . . . . .E. limnophila

Fruiting Material

1a. Fruits more than 30 mm long 2

b. Fruits up to 30 mm long 35

2a. Radicle basal, central or lateral 3

b. Radicle apical 10

3a. Fruits black, blue-black or purplish-black.
Radicle lateral or almost lateral. . . . E. impressicosta

b. Fruits pink, red, orange-red, brown or yellow.
Radicle basal or central. 4

4a. Older leaves glabrous on the underside 5

b. Older leaves hairy on the underside 9

5a. Fruits globular 6

b. Fruits ellipsoid or allantoid (sausage shaped). 7

6a Seeds 22-36 mm diam. . . . . E. anthropophagorum

b. Seeds about 35-40 mm diam. . . . . E. virens

7a Fruits scurfy brown when ripe . . . . . E. phaeocarpa

b. Fruits yellow or orange when ripe 8

8a. Mesocarp + exocarp 2.5-3.5 mm thick.
Midrib depressed on the upper surface . . . . . .E. xanthocarpa

b. Mesocarp + exocarp 4-5 mm thick.
Midrib raised on the upper surface . . . . .E. microneura

9a. Fruits 40-75 mm diam.
Mesocarp + exocarp 4-8 mm thick.
Southern Queensland and northern New South Wales . . . . . E. pubens

b. Fruits 50-100 mm diam.
Mesocarp + exocarp 7-17 mm thick.
Northern Queensland . . . . . E. insignis

10a. Fruits yellow, orange, orange-brown or scurfy brown when ripe 11

b. Fruits black, blue-black or

purplish black when ripe 17

11a. Fruits globular 12

b. Fruits ellipsoid or allantoid (sausage shaped) 14

12a. Endocarp 1.5-2.5 mm thick. Mature leaves shortly tomentose on the underside, occasionally almost glabrous. . . . . E. palmerstonii

b. Endocarp 0.5-1.5 mm thick. Mature leaves glabrous on the underside 13

13a. Endocarp 0.5-1.0 mm thick. Mesocarp + exocarp 1.8-3.1 mm thick. Cotyledons cream. . . . . .E. montana

b. Endocarp 1.0-1.5 mm thick. Mesocarp + exocarp 4.3-6.0 mm thick. Cotyledons pink. . . . . E. cooperana

14a. Fruits scurfy brown . . . . . E. phaeocarpa

b. Fruits yellow or orange yellow 15

15a. Mesocarp + exocarp 4-5 mm thick. Midrib raised on the upper surface . . . . .E. microneura

b. Mesocarp + exocarp 1.8-3.5 mm thick. Midrib depressed or flush with the upper surface 16

16a. Fruits 60-70 mm long. Radicle ± apical but 10-15 mm from the testa. . . . . .E. xanthocarpa

b. Fruits 30-55 mm long. Radicle apical (close to the testa). . . . . E. montana

17a. Fruits globular, depressed globular, wider than long or laterally compressed (and then sometimes slightly longer than wide), circular or elliptical in transverse section 18

b. Fruits ellipsoid, pyriform, cylindrical or longer than wide, circular in transverse section 22

18a. Mature leaves hairy on the underside . . . . E. sankeyana

b. Mature leaves glabrous, rarely shortly tomentose on the underside 19

19a. Leaves green on the underside even when young. Lamina of typical leaves more than 3 cm wide 20

b. Leaves slightly glaucous on the underside particularly when young. Lamina of typical leaves less than 3 cm wide 21

20a. Fruits ± circular in cross section. . . . . .E. globosa

b. Fruits oval or elliptical in cross section i.e. fruits laterally compressed. . . . . .E. compressa

21a. Margin of the lamina recurved. Northern Queensland . . . . . .E. jonesii

b. Margin of the lamina flat. Northern New South Wales . . . . . .E. introrsa

22a. Foveoles present on the underside of some or most leaves 23

b. Foveoles not present on the underside of any leaves 25

23a. Foveole opening ± pore like and raised above the underside of the lamina . . . . . .E. cowleyana

b. Foveole opening ± semicircular, the diameter coinciding with the underside of the lamina 24

24a. Lamina green on the underside. Lateral veins 6-11 pairs . . . . . .E. bessaphila

b. Lamina glaucous on the underside (particularly when young). Lateral veins 4-8 pairs. . . . . .E. limnophila

25a. Midrib depressed on the upper surface or in a channel in the lamina. 26

b. Midrib raised on the upper surface or flush with the upper surface 30

26a. Blade margin usually recurved. . . . . E. jonesii

b. Blade margin flat. 27

27a. Primary veins 8-15 pairs. Lamina of a typical leaf 5.0-9.5 cm wide. . . . . E. sankeyana

b. Primary veins 3-9 pairs.
Lamina of a typical leaf 2.0-5.5 cm wide. 28

28a. Leaves green on the underside,
even when young . . . . . .E. monothyra

b. Leaves glaucous on the underside,
particularly when young 29

29a. Primary veins 3-6 pairs.
Young twigs clothed in straight,
appressed, pale brown hairs . . . . . .E. acuminata

b. Primary veins 6-9 pairs.
Young twigs clothed in tortuous,
± erect, rusty hairs . . . . . E. grayi

30a. Young twigs clothed in tortuous,
± erect, rusty hairs 31

b. Young twigs clothed in straight,
appressed, pale brown hairs 32

31a. Fruits 30-50 mm long
x 17-27 mm diam. . . . . .E. longipedicellata

b. Fruits 50-60 mm long x 35-46 mm diam. . . . . .E. grayi

32a. Leaves usually glaucous on the
underside, at least when young.
Blade margins often recurved. 33

b. Leaves green on the underside
even when young.
Blade margins flat. 34

33a. Cotyledons pink to burgundy when
freshly cut.
Endocarp about 0.5 mm thick. . . . . E. dielsiana

b. Cotyledons cream or yellowish when
freshly cut.
Endocarp 0.5-3.0mm thick. . . . . .E. jonesii

34a. Seed 16-23 mm diam.
Endocarp 0.8-1.1 mm thick. . . . . E. sideroxylon

b. Seed 22-50 mm diam.
Endocarp 1.0-2.1 mm thick. . . . . E. globosa

35a. Foveoles (rarely tufts of hairs)
present on the underside of some
or most leaves 36

b. Foveoles not present on the
underside of any leaves 45

36a. Lamina green on the underside 37

b. Lamina glaucous on the underside 41

37a. Surface of the foveoles projecting beyond the level of the midrib on the underside of the lamina . . . . . .E. cowleyana

b. Surface of the foveoles not projecting beyond the level of the midrib on the underside of the lamina. 38

38a. Hairs on the underside of the leaf blade straight and appressed 39

b. Hairs on the underside of the leaf blade straight and tortuous, appressed and erect. 40

39a. Fruits 20-25 mm long. Primary veins 4-6 pairs . . . . . .E. collinsii

b. Fruits 26-34 mm long. Primary veins 6-11 pairs . . . . . .E. bessaphila

40a. Twig hairs straight, appressed . . . . . .E. muelleri

b. Twig hairs straight and tortuous, appressed and erect. . . . . E. muelleri ssp. bracteata

41a. Fruits less than 19 mm long. Seeds less than 16 mm long . . . . . .E. discolor

b. Fruits more than 19 mm long. Seeds more than 16 mm long 42

42a. Foveole opening ± pore like and raised above the underside of the lamina . . . . . .E. cowleyana

b. Foveole opening ± semicircular, the diameter coinciding with the underside of the lamina 43

43a. Apex of the leaf blade obtuse to rounded. Primary veins 6-11 pairs. . . . . E. bessaphila

b. Apex of the leaf blade obtuse to acuminate. Primary veins 4-8 pairs. 44

44a. Fruits 25-35 mm long. Seed 20-30 mm long. Petiole 8-17 mm long. . . . . E. limnophila

b. Fruits 20-25 mm long.
Seed 15-20 mm long.
Petiole 4-11 mm long . . . . . E. collinsii

45a. Midrib raised or flush with the upper surface of the lamina 46

b. Midrib depressed on the upper surface of the lamina 56

46a. Fruits 17-60 mm diam. 47

b. Fruits 8-17 mm diam. 49

47a. Fruits yellow, orange, orange-red or maroon. . . . . E. montana

b. Fruits black or blue-black. 48

48a. Young twigs clothed in tortuous, erect hairs. . . . . E. longipedicellata

b. Young twigs clothed in straight, appressed hairs. . . . . E. globosa

49a. Lamina green on the underside 50

b. Lamina glaucous on the underside 52

50a. Cotyledons pink when freshly cut.
Stem bark corky . . . . . .E. sieberi

b. Cotyledons cream to yellow when freshly cut.
Stem bark nondescript 51

51a. Lamina of a typical leaf 6.0-11.0 x 2.5-4.5 cm.
Petiole 4-11 mm long.
Primary veins 4-6 pairs . . . . . .E. collinsii

b. Lamina of a typical leaf 9.5-16.0 x 4.0-7.5 cm.
Petiole 7-15 mm long.
Primary veins 5-8 pairs . . . . . E. leptodendron

52a. Cotyledons mostly red, sometimes pink or purplish when freshly cut. 53

b. Cotyledons cream when freshly cut, sometimes pink near the periphery. 54

53a. Perianth remnants >7 mm diam. . . . . E. hypotephra

b. Perianth remnants <7 mm diam. . . . . E. wolfei

54a. Twig hairs straight.

Primary veins 7-11 pairs. . . . . E. dichrophylla

b. Twig hairs tortuous.
Primary veins 4-9 pairs. 55

55a. Lamina underside clothed in straight, appressed hairs. . . . . .E. glauca

b. Lamina underside clothed in tortuous, erect hairs. . . . . E. crassiflora

56a. Lamina green on the underside 57

b. Lamina glaucous on the underside 62

57a. Petiole channelled on the upper surface 58

b. Petiole flat on the upper surface 60

58a. Fruits 20-25 mm long.
Hairs on the underside of the leaf blade straight and appressed. . . . . .E. collinsii

b. Fruits 25-35 mm long.
Hairs on the underside of the leaf blade straight and tortuous, appressed and erect. 59

59a. Twig hairs straight, appressed . . . . . .E. muelleri

b. Twig hairs straight and tortuous, appressed and erect . . . . . .E. muelleri ssp. bracteata

60a. Northern New South Wales and southern Queensland . . . . . .E. hayesii

b. Northern Queensland 61

61a. Fruits 20-26 mm long. . . . . .E. bellendenkerana

b. Fruits 27-40 mm long. . . . . .E. monothyra

62a. Cotyledons mostly red, sometimes pink or purplish when freshly cut 63

b. Cotyledons mostly cream, sometimes pink when freshly cut 64

63a. Perianth remnants >7 mm diam. . . . . E. hypotephra

b. Perianth remnants <7 mm diam. . . . . E. wolfei

64a. Twig hairs tortuous.
Twig hairs erect or appressed 65

b. Twig hairs straight.

Twig hairs appressed 68

65a. Primary vein angle >40°.
Lamina arched between the lateral veins on the upper surface.
Northern New South Wales and southern Queensland . . . . . .E. crassiflora

b. Primary vein angle <40°.
Lamina ± flat on the upper surface.
Northern Queensland (central Queensland?). 66

66a. Hairs on the underside of the lamina straight and appressed.
Primary veins not or scarcely impressed on the upper surface of the lamina. . . . . .E. glauca

b. Hairs on the underside of the lamina tortuous and erect.
Primary veins conspicuously impressed on the upper surface of the lamina. 67

67a. Leaves very glaucous or almost white on the underside . . . . . .E. wolfei

b. Leaves only slightly glaucous on the underside . . . . . E. bellendenkerana

68a. Primary veins 7-11 pairs . . . . . .E. dichrophylla

b. Primary veins 3-6 pairs 69

69a. Fruits more than 27 mm long . . . . . .E. acuminata

b. Fruits less than 27 mm long . . . . . .E. collinsii

1. **Endiandra acuminata** C. White & Francis, Queensl. Dept. Agric., Bot. Bull. 22:31 (1920).
Type: N. Michael 508, Yarrabah (BRI holotype, BO, K, MEL isotypes).
Endiandra subtriplinervis C. White & Francis, Queensl. Dept. Agric., Bot. Bull. 22:34 (1920); Francis, Austral. Rain-Forest Trees ed.2:409 (1951), syn. nov.
Type: N. Michael 590, Yarrabah (BRI holotype, A, BO, K, MEL isotypes).

Tree to 30 m tall x 80 cm dbh, frequently medium sized and well formed. Stem usually buttressed, sometimes without buttresses in the smaller size classes. Bark usually nondescript, occasionally flaky, fissured or tessellated, outer blaze pink, red, brown or pink brown, usually granular in texture, sometimes slightly fibrous. Twigs ± terete, clothed in straight, appressed, white or pale brown hairs. Leaves: Underside usually glaucous, clothed in straight, appressed, white or pale brown hairs. Leaf blade lanceolate, apex acuminate, base attenuate, 6.2-10.5 x 2.2-4.0 cm (mean 8.4 x 3.1); usually penninerved, occasionally triplinerved at the base, primary veins 3-6 pairs (mode 5), midrib usually depressed, sometimes flush with the upper surface; petiole 5-14 mm long (mean 9.2), flat or channelled on the upper surface. Inflorescence paniculate, axillary and pseudoterminal, bracts lanceolate to navicular, 1.0-2.0 mm long, deciduous, usually absent at anthesis. Flowers cream to pale brown, odourless or producing a faint pleasant odour, opening widely, the tepals often becoming reflexed, hanging like a skirt around the pedicel. Pedicel 1.9-3.9 x 0.6-1.0 mm. Perianth tube, 0.1-0.5 x 1.7-2.3 mm, outer tepals 2.1-3.0 x 1.7-2.4 mm, inner tepals 1.9-3.0 x 1.5-2.3 mm. Anthers glabrous, opening outwards or sideways, 0.5-0.9 x 0.5-1.0 mm, filaments hairy, 0.3-0.7 mm long; glands glabrous, 6, distinct, 0.3-0.7 x 0.5-0.9 mm, stalk usually present, hairy, up to 0.2 mm long; staminodes 3, differentiated, head glabrous, 0.2-0.6 mm

long, filaments hairy, 0.3-0.5 mm long. Ovary usually glabrous, occasionally hairy, sessile or shortly stalked (to 0.2 mm), 0.5-1.1 x 0.9-1.2 mm, style glabrous, 0.6-0.9 mm long. Fruits blue-black, ellipsoid, 30-32 x 17-21 mm, mesocarp + exocarp 1.2-2.0 mm thick, endocarp 1.0-1.7 mm thick. Seed 23-25 x 11-16 mm, testa 0.1-0.2 mm thick, radicle terminal. Cotyledons cream. Seedling leaves glaucous on the underside. (Fig. 72 A-B)

Distribution (Fig. 96, Map 50)

Ecology

Lowland and mountain rain forests on soils derived from granite, rhyolite and metamorphic rocks. Altitudinal range: Sea level to 1000 m.

Uses

This species has been the subject of a certain amount of confusion in the timber industry in the past, but it does produce millable logs and the timber has been marketed as Brown Walnut, a useful general purpose timber. Wood S.G. 1.10.

Notes and Observations

Flowers have been collected each month from March to October and also in December, while ripe fruits have been collected in November, December and January. Seedling germination period about 60-200 days.

Specimens Examined (65 collections examined)

2. **Endiandra anthropophagorum** Domin, Biblioth. Bot. 89:123 (1925).

Type: K. Domin, Harveys Creek, (Domin 4098, PR holotype; Domin 4097, PR isotype).

Tree to 8 m tall x 15 cm dbh. Stem without buttresses, but coppice shoots often present at the base. Bark nondescript, outer blaze cream to pink, granular in texture. Twigs ± terete to slightly fluted, glabrous or clothed in straight, pale brown, appressed hairs. Leaves: Underside green, clothed in straight, pale brown, appressed hairs when young, but soon becoming almost glabrous. Leaf blade lanceolate or elliptical, apex acuminate, base attenuate, 9.0-16.0 x 3.5-6.5 cm (mean 12.7 x 4.6); penninerved, primary veins 4-6 pairs (mode 5), midrib depressed on the upper surface; petiole 4-14 mm long (mean 9.1). Inflorescence, paniculate, pseudoterminal and in the upper axils, not exceeding the leaves, bracts triangular, 0.4-0.7 mm long, persistent, usually present at anthesis. Flowers cream to pale green, without any obvious odour, scarcely opening at anthesis, the tepals remaining erect and forming a sheath around the slightly exserted anthers and style. Pedicel 2.5-7.6 x 0.3-0.8 mm. Perianth tube 0.8-1.3 x 1.7-2.4 mm at the widest point, but narrowing towards the apex where it ranges from 1.2-1.5 mm diam., outer tepals 0.5-1.1 x 1.0-1.6 mm, inner tepals 0.7-1.1 x 0.7-1.2 mm, all tepals usually with sparse, appressed hairs on the inner and outer surfaces. Anthers glabrous, opening outwards or sideways, 0.5-0.7 x 0.4-0.7 mm, filaments hairy, 0.6-0.9 mm long, glands glabrous, shortly stalked, usually absent; staminodes 3, flattened, ± lanceolate, usually undifferentiated, sparsely hairy, 0.7-0.9 mm long. Ovary glabrous, sessile, 0.7-1.0 x 0.6-0.9 mm, style glabrous, 0.7-1.1 mm long. Fruits pink to red when ripe, globular, 43-65 x 44-64 mm, mesocarp + exocarp 9-15 mm thick, endocarp 0.4-1.2 mm thick. Seed 19-33 x 22-36 mm diam., testa 0.1-0.5 mm thick, radicle central or towards the base

of the seed. Cotyledons cream to pink. Seedling tap root thick + resembling a carrot in shape, leaves green on the underside. (Fig. 72 C-D).

Distribution (Fig. 94, Map 39)

Ecology

A rare tree found only in a small area of lowland rain forest growing on soils derived from granite. Altitudinal range probably quite small, most collections being made between 40-200 m with only one collection recorded from 900 m.

Uses

This species has no commercial value as it never grows large enough to produce millable logs. Domin observed that the fruit was eaten by aborigines and applied a specific epithet which indicated that. Wood S.G. 0.84.

Notes and Observations

Flowers have been collected in March, July, December and January, while mature fruits have been collected in December and January. Seedling germination period 45-75 days.

Specimens Examined (32 collections examined)

3. Endiandra bellendenkerana B. Hyland sp. nov.
Differt a E. wolfei staminodiis et disco mutue separatis.
Typus: B. Gray 2948: Frenchmans Creek, Reserve 843 Bellenden Ker, 26.i.1983 (holotypus QRS).
Differs from E. wolfei the staminodes and disc being separate from one another.

Tree to 15 m tall x 20 cm dbh. Stem often buttressed, sometimes with coppice shoots at the base. Bark nondescript, outer blaze cream, brown or red, granular in texture. Twigs ± terete, clothed in tortuous, erect, white or pale brown hairs. Leaves: Underside usually green, sometimes slightly glaucous, clothed in tortuous, erect, pale brown hairs. Leaf blade lanceolate, apex acuminate, base attenuate, 9.0-12.0 x 4.0-5.0 cm (mean 10.0 x 4.4); penninerved, primary veins 3-7 pairs (mode 5), midrib depressed on the upper surface; petiole 10-12 mm long (mean 11), flat on the upper surface. Inflorescence paniculate, upper axillary, bracts usually ± hemispherical, occasionally spoonform or hemispherical, 1.0-2.0 mm long, deciduous, present or absent at anthesis. Flowers greenish, without any obvious odour, scarcely opening at anthesis, the outer tepals being geniculate enclosing and clasping the inner tepals. Pedicel 0.3-1.7 x 0.5-0.6 mm. Perianth tube 0.4-1.0 x 2.2-3.2 mm, outer tepals larger, 1.1-1.2 x 1.7-2.3 mm, inner tepals 0.8-1.1 x 1.0-1.3 mm, all tepals with hairs on both the inner and outer surfaces. Anthers glabrous, opening outwards or sideways, 0.5-0.7 x 0.5-0.6 mm, filaments hairy, 0.2-0.6 mm long; glands sessile, hairy, forming 3 masses, the glands on each anther being ± fused together, each pair 0.5-0.8 x 1.0-1.6 mm; staminodes 3, hairy, undifferentiated, about 0.6 mm long. Ovary sessile, hairy, 0.7-1.1 x 0.8-1.2 mm, style glabrous, 0.5-0.7 mm long. Fruits black, ellipsoid, about 20-26 x 10-15 mm, mesocarp + exocarp about 0.6-1.1 mm thick, endocarp about 0.3 mm thick. Seed about 20-23 x about 11-12 mm, testa about 0.1 mm thick, radicle apical. Cotyledons cream. Seedling leaves slightly glaucous on the underside. (Fig. 39, 72 E-F)

Distribution (Fig. 95, Map 46)

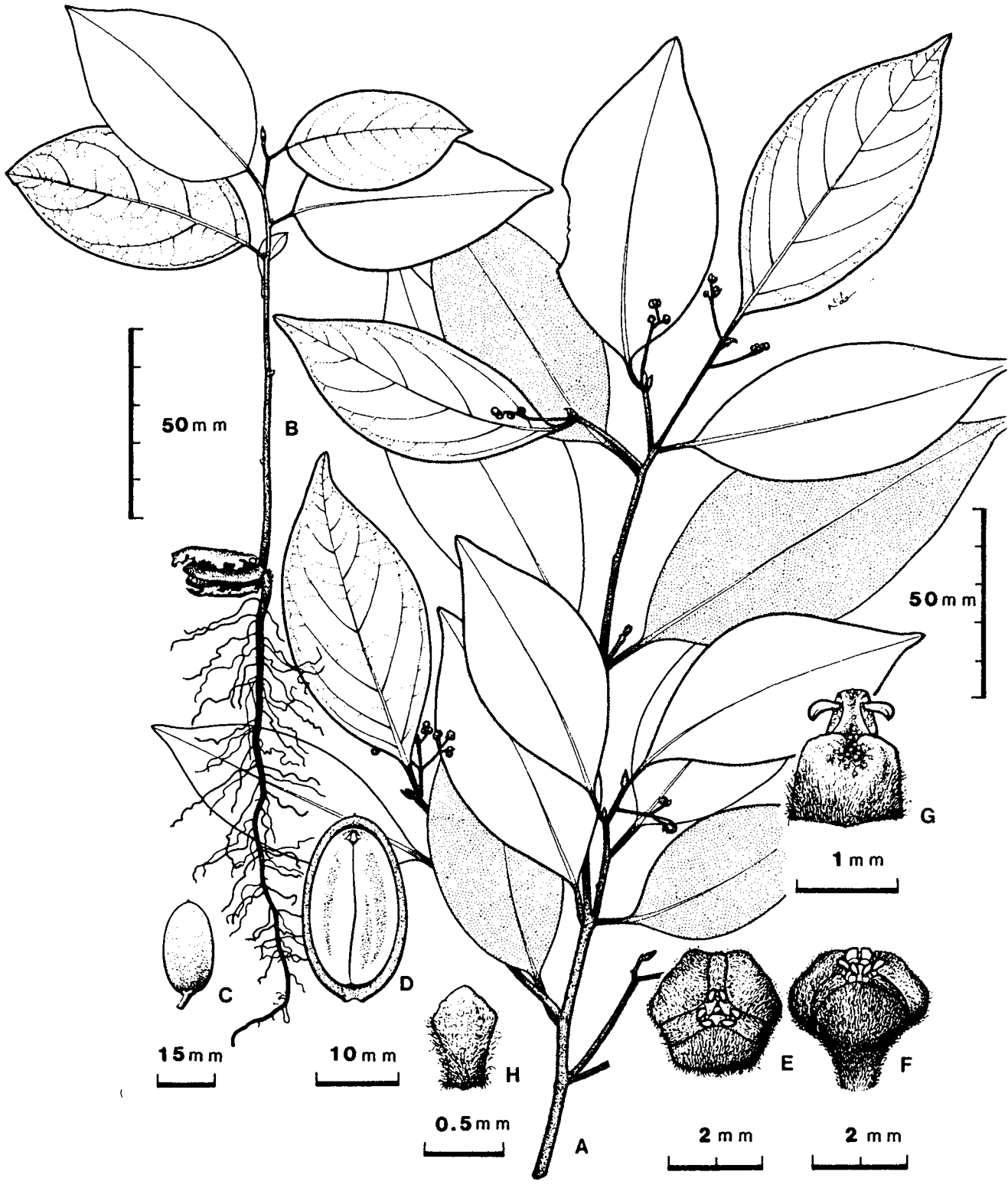

Fig.39. Endiandra bellendenkerana. A Habit Gray 2948; B seedling, C fruit, D fruit (LS) Gray 3216; E flower (top view), F flower (side view), G anther and fused glands (abaxial view), H staminode (adaxial view) Gray 2948.

Ecology

Very wet lowland rain forests of northern Queensland on soils derived from granite and basalt. Altitudinal range: Sea level to 250 m.

Uses

This species has no commercial value as it does not grow large enough to produce millable logs. Wood S.G. 1.0.

Notes and Observations

Flowers have been collected in January, March, April, June and November, while ripe fruits have been collected in August and November. Seedling germination period about 40-60 days.

Etymology

The specific epithet was chosen because this species was first recognized as a new species from specimens collected at the foot of Mt Bellenden Ker.

Specimens Examined (13 collections examined)

4. Endiandra bessaphila B. Hyland sp. nov.
Differt a speciebus ceteris laminis foveolatis, floribus late aperientibus cum tepalis extus pubescentibus.
Typus: B. Gray 939: State Forest Reserve 194 Western, 15.iii.1978 (holotypus QRS).
Differing from the other species, foveoles being present on the lamina, the flowers opening widely with the tepals pubescent on the outer surface.

Tree to 35 m tall x 60 cm dbh, usually small to medium sized. Stem usually buttressed both in the larger and smaller size classes, rarely

with coppice shoots at the base. Bark usually nondescript, rarely flaky, outer blaze pink, red or brownish, occasionally cream on small stems, granular in texture. Twigs fluted, clothed in straight, appressed, pale brown hairs when young but almost glabrous when older. Leaves: Underside green, (rarely slightly glaucous), clothed in straight, appressed, white or pale brown hairs when young but almost glabrous when older, foveoles (up to 6), usually visible on some leaves. Leaf blade elliptical, apex obtuse or rounded, base attenuate to shortly attenuate, 6.5-17.0 x 3.5-8.0 cm (mean 11.4 x 5.3); penninerved, primary veins 6-11 pairs (mode 8), midrib flush with the upper surface; petiole 5-15 mm long (mean 9.6), channelled on the upper surface. Inflorescence paniculate, axillary and pseudoterminal, bracts navicular, about 0.7-1.4 mm long, deciduous, absent at anthesis. Flowers green, creamy-green, occasionally cream or yellow, perfumed, odour faint and pleasant or strong and somewhat unpleasant, opening quite widely, the tepals becoming ± horizontal at anthesis. Pedicel 0.1-2.4 x 0.4-0.6 mm. Perianth tube 0.5-0.9 x 1.2-1.7 mm, outer tepals usually larger, 1.0-1.6 x 0.8-1.2 mm, inner tepals 0.9-1.5 x 0.6-1.1 mm, all tepals with hairs on both the inner and outer surfaces. Anthers ± glabrous abaxially but hairy adaxially, opening outwards, 0.3-0.5 x 0.5-0.7 mm, filaments hairy, 0.2-0.4 mm long, glands glabrous, 6, distinct, 0.2-0.4 x 0.2-0.45 mm, stalks hairy, about 0.1-0.2 mm long; staminodes 3, differentiated, head glabrous abaxially but usually hairy adaxially, 0.2-0.3 mm long, filaments hairy, 0.15-0.30 mm long. Ovary glabrous, sessile, 0.4-0.9 x 0.5-1.0 mm, style glabrous, 0.4-0.6 mm long. Fruits black or purplish black, ellipsoid, 28-34 x 14-22 mm, mesocarp + exocarp 1.3-1.7 mm thick, endocarp 0.3-0.5 mm thick. Seed 22-28 x 11-15 mm,

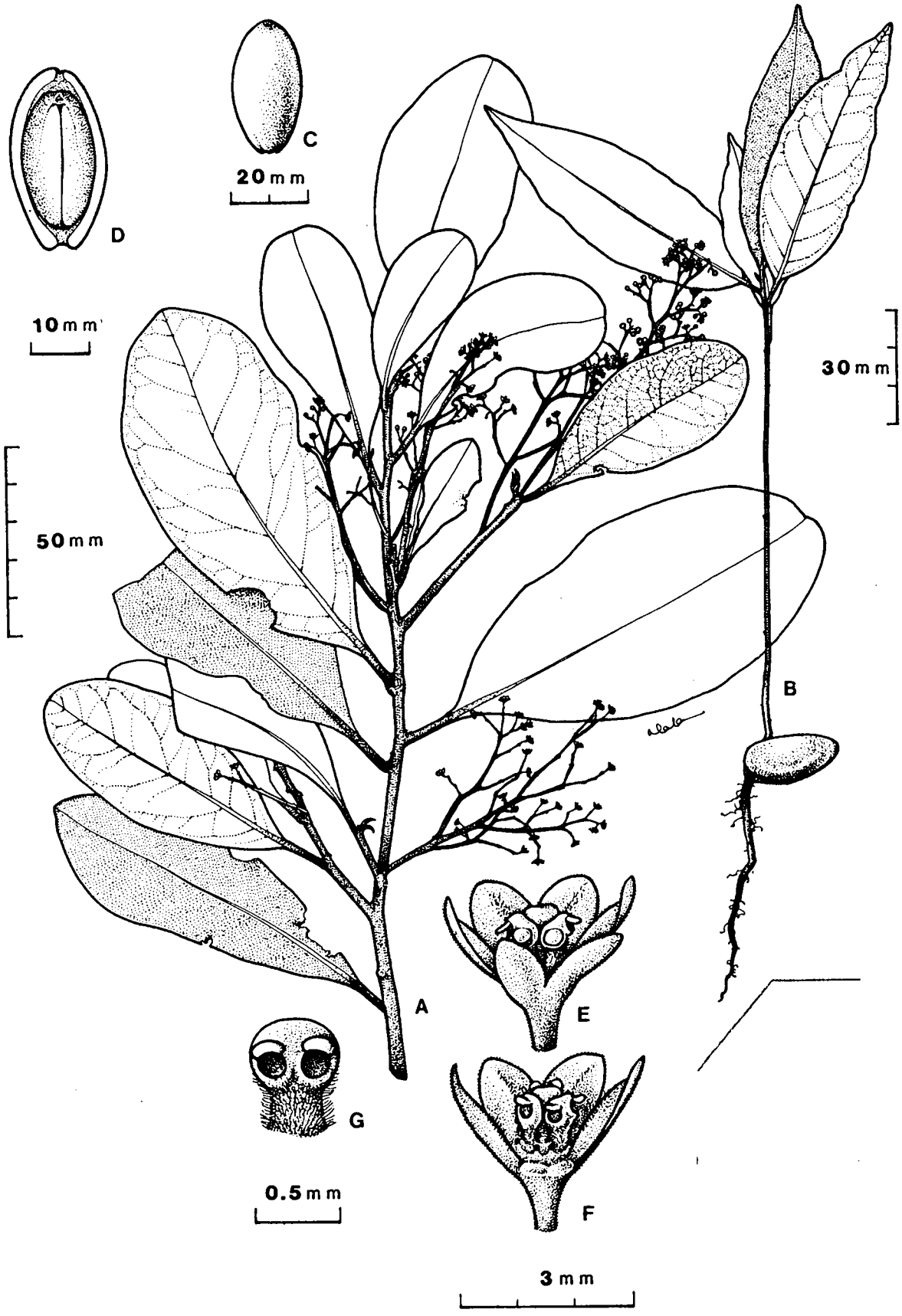

Fig.40. Endiandra bessaphila. A Habit Gray 939; B seedling, C fruit, D fruit (LS) Gray 809; E flower, F flower (side view, 2 tepals removed), G stamen (abaxial view) Gray 939.

testa 0.1-0.4 mm thick, radicle apical. Cotyledons cream. Seedling leaves green on the underside. (Fig. 40, 73 A-B)

Distribution (Fig. 97, Map 58)

Ecology

Rain forests of northern Queensland on soils derived from a variety of rock types. Altitudinal range: 150-1100 m.

Uses

This species grows large enough to produce millable logs but is seldom utilized. Standard trade name - Blush Walnut. Wood S.G. 0.65-0.68.

Notes and Observations

Flowers have been collected each month from January to April, while ripe fruits have been collected each month from September to December. Seedling germination period 25-55 days.

Etymology

The specific epithet refers to the affinity this species appears to have for gullies.

Specimens Examined (52 collections examined)

5. Endiandra collinsii B. Hyland sp. nov.
Differt a speciebus ceteris floribus non late aperientibus, staminodiorum glandiumque praesentia, laminis subtus viridibus.
Typus: B. Hyland 25005 RFK: Timber Reserve 14, Parish of Kesteven, 19.v.1981 (holotypus QRS).
Differing from other species by the flowers not opening widely, the presence of staminodes and glands, the lamina

green on the underside.

Tree to 15 m tall x 20 cm dbh, usually small. Stem usually buttressed and coppice shoots sometimes present at the base. Bark nondescript, outer blaze usually pink or red, occasionally reddish-brown, usually granular in texture. Twigs terete or fluted, almost glabrous to sparsely clothed in straight, appressed, brown to pale brown hairs. Leaves: Underside green or slightly glaucous, glabrous or sparsely clothed in short, straight, appressed, pale brown hairs; foveoles usually apparent on some leaves, usually 1-2 per leaf, sometimes fewer or up to 3 or 4 per leaf. Leaf blade usually lanceolate, apex acuminate or bluntly pointed, base attenuate, 6.0-11.0 x 2.5-4.5 cm (mean 8.2 x 3.4); penninerved, primary veins 4-6 pairs (mode 5), midrib depressed or flush with the upper surface; petiole 4-11 mm long (mean 8.1), upper surface flat or channelled. Inflorescence paniculate, axillary or pseudoterminal, bracts navicular, 0.7-1.2 mm long, deciduous, absent at anthesis. Flowers pale green or creamy green, without any obvious perfume, scarcely opening at anthesis, the tepals remaining erect and forming a sheath around the enclosed anthers and style. Pedicel about 0.4 x 0.6-0.7 mm. Perianth tube 0.7-1.0 x about 2.0 mm, outer tepals 0.9-1.0 x 1.1-1.2 mm, inner tepals 0.8-0.9 x 0.8-1.0 mm, all tepals with hairs on both the inner and outer surfaces. Anthers glabrous, opening outwards or sideways, 0.5-0.6 x 0.4-0.5 mm, filaments hairy, 0.1-0.2 mm long; glands glabrous, 6, distinct, about 0.3 mm long, stalks glabrous, 0.09-0.11 mm long; staminodes 3, differentiated, head glabrous, about 0.2 mm long, filament hairy, about 0.2 mm long. Ovary glabrous, sessile, 0.9-1.4 x 0.8-1.4 mm, style glabrous, 0.1-0.2 mm long. Fruits shiny black, ellipsoid, 22-23 x 13-14 mm, mesocarp +

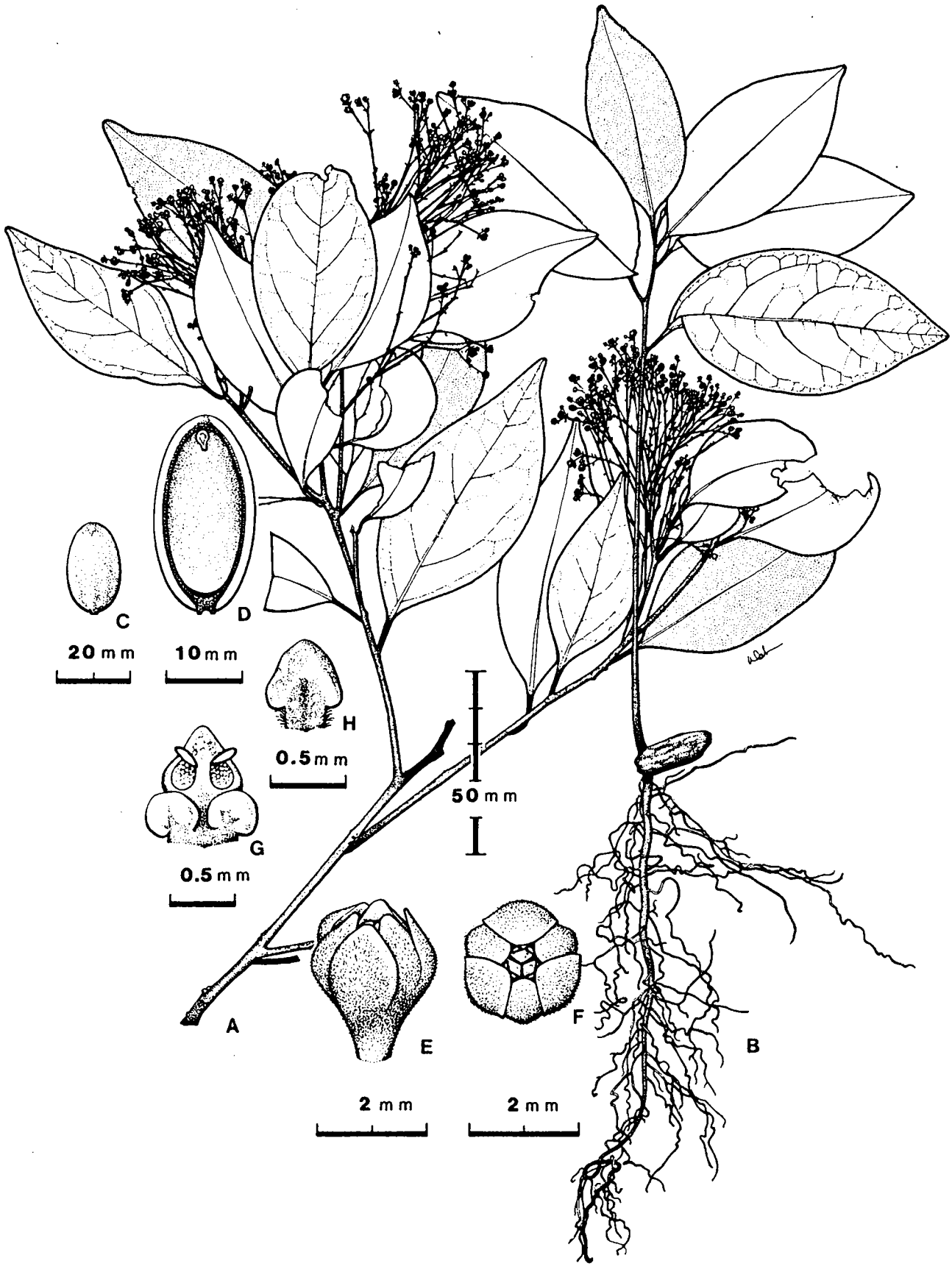

Fig.41. Endiandra collinsii. A Habit Hyland 25005 RFK; B seedling, C fruit, D fruit (LS) Hyland 11134; E flower (side view), F flower (top view), G anther and glands (abaxial view), H staminode (adaxial view) Hyland 25005 RFK.

exocarp 0.6-0.9 mm thick, endocarp 0.2-0.3 mm thick. Seed 19-20 x 11-12 mm, testa 0.1-0.4 mm thick, radicle apical. Cotyledons cream. Seedling leaves green on the underside, foveoles usually visible. (Fig. 41, 73 C-D)

Distribution (Fig. 96, Map 51)

Ecology

Rain forests of Cape York Peninsula, on soils derived from a variety of rock types. Altitudinal range: 60-500 m.

Uses

This species has no commercial value as it does not grow large enough to produce millable logs. Wood S.G. 1.03.

Notes and Observations

Flowers have been collected in May and October, while ripe fruits have been collected in October and November. Seedling germination period about 40 days.

Etymology

It gives me great pleasure to name this lean, tough, weatherbeaten tree after Dr R.D. (Ron) Collins of Atherton, who, although primarily interested in epiphytes and other lesser plants, has helped me in my botanical endeavours and accompanied me on a number of field trips, some of which turned out to be quite arduous.

Specimens Examined (17 collections examined)

6. Endiandra compressa C. White, Queensl. Dept. Agric. Bot. Bull. 21:14 (1919); Francis, Austral. Rain-Forest Trees ed.2:142 (1951); Floyd, N.S.W. Rainforest Trees, Part 1, ed.2:65 (1979); Stanley & Ross, Flora of south-eastern Queensland 1:168 (1983).
Type: F. H. Weatherhead 352, Imbil (BRI holotype; K, MEL isotypes).

Tree to 20 m tall x 40 cm dbh, usually small. Stem usually buttressed. Bark nondescript, occasionally flaky, outer blaze cream to brown, usually marked by longitudinal stripes, granular in texture. Twigs terete or slightly fluted, clothed in straight, appressed, pale brown hairs when young but soon becoming glabrous. Leaves: Underside green and glabrous. Leaf blade lanceolate, elliptical, apex acuminate, base attenuate, 13.0-20.5 x 4.5-8.5 cm (mean 16.2 x 6.2); penninerved, primary veins 5-10 pairs (mode 7), midrib depressed or flush with the upper surface; petiole 10-22 mm long (mean 15.6), flat or channelled on the upper surface. Inflorescence paniculate, scarcely exceeding the petioles, axillary, bracts usually triangular, occasionally linguiform or linear, 0.7-1.3 mm long, present or absent at anthesis. Flowers cream or yellowish, faintly but pleasantly perfumed, not opening very widely, the tepals remaining erect with incurved tips at anthesis. Pedicel 1.5-1.7 x 0.9-1.4 mm. Perianth tube 0.6-1.1 x 2.9-3.0 mm, outer tepals wider, 1.0-1.9 x 1.7-2.2 mm, inner tepals 1.6-1.7 x 1.4-1.8 mm, all tepals hairy on the inner surface and usually hairy on the outer surface. Anthers hairy (papillose at the apex), opening sideways, 0.6-1.1 x 0.5-1.0 mm, filaments nil; glands glabrous, 6, distinct, 0.4-0.5 x 0.5-0.9 mm, stalks hairy, 0.1-0.2 mm long; staminodes absent. Ovary glabrous, sessile, 0.8-1.0 x 0.6-0.7 mm, style glabrous, 0.1-0.2 mm long. Fruits black, blue-black or glaucous black when ripe, laterally compressed, compressed globular, compressed pyriform, sometimes

bilobed, 48-54(71) mm long x 39-60 mm and 25-38 mm wide on the longer and shorter axis, mesocarp + exocarp 3.4-5.5 mm thick, endocarp 0.5-0.8 mm thick. Seed 33-41(52) mm long x 30-49 mm and 16-27 mm wide on the longer and shorter axis, testa 0.1-0.3 mm thick, radicle apical. Cotyledons cream to pink. Seedling leaves green on the underside. (Fig. 73 E-F)

Distribution (Fig. 96, Map 51)

Ecology

Rain forests of northern, central and southern Queensland and northern New South Wales on soils derived from a variety of rock types. Altitudinal range: Sea level to 450 m.

Uses

This species seldom grows large enough to produce millable logs but it has been given the standard trade name of Queensland Greenheart. Wood S. G. 0.97.

Notes and Observations

Flowers have been collected in November and December, while ripe fruits have been collected in March and each month from June to November. Seedling germination period 30-60 days.

This species has quite an extended distribution, the populations being more or less discrete and because of this, it seemed to me at various stages of this revision, that more than one entity should be recognized. However, although I have been able to examine a reasonable number of fertile collections from northern Queensland,

very few collections were available from the rest of the range. I have concluded, from examination of the available material, that only one species can be recognized at this stage.

Specimens Examined (63 collections examined)

7. Endiandra cooperana B. Hyland sp. nov.
Differt a speciebus ceteris glandium praesentia sed staminodiorum absentia, fructu aurantiaco vel flavo, cotyledonibus roseis.
Typus: B. Gray 1507: Cooper Creek, Portion 54v Alexandra, 28.8.1979 (holotypus QRS)
Differing from other species by the presence of glands but the absence of staminodes, fruit orange or yellow and cotyledons pink.

Tree to 25 m tall x 40 cm dbh, usually small or medium sized. Stem usually buttressed. Bark nondescript, outer blaze pink, granular in texture. Twigs fluted, clothed in straight, appressed, pale brown hairs when young but glabrous when older. Leaves: Underside green, clothed in straight, appressed, pale brown hairs when young but glabrous when older. Leaf blade lanceolate, apex acuminate, base attenuate, 8.5-15.0 x 3.0-6.0 cm (mean 10.9 x 3.8); penninerved, primary veins 5-7 pairs (mode 6), midrib depressed or flush with the upper surface; petiole 7-18 mm long (mean 13.4), channelled on the upper surface. Inflorescence paniculate, axillary and pseudoterminal, bracts navicular, about 1.0 mm long, deciduous, absent at anthesis. Flowers yellow, pleasantly perfumed, scarcely opening at anthesis, the tepals remaining ± erect. Pedicel 0.4-1.1 x 0.9-1.2 mm. Perianth tube absent or very short, outer tepals larger, 2.8-3.3 x 2.3-2.8 mm, inner tepals 2.3-2.6 x 2.0-2.3 mm, all tepals glabrous on the outer surface, but with very short papillose hairs on the inner surface, particularly the inner tepals. Anthers densely clothed in short

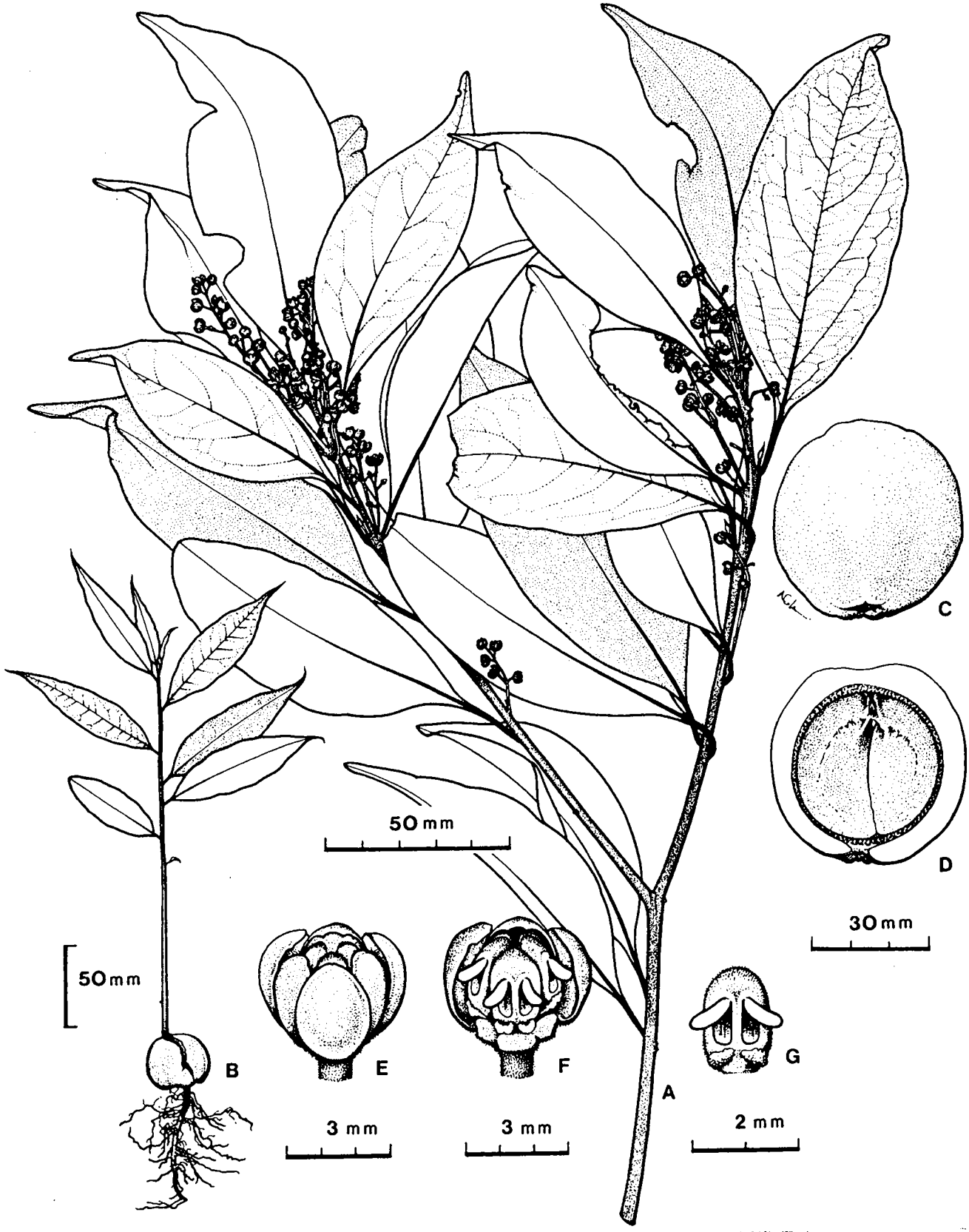

Fig.42. Endiandra cooperana. A Habit Gray 1507; B seedling Gray 3208; C fruit, D fruit (LS), E flower (side view), F flower (oblique view, 3 tepals removed), G anther and glands (abaxial view) Gray 1507.

papillose hairs, sessile, opening outwards and sideways, 2.0-2.2 x 1.5-1.7 mm; glands glabrous, sessile, 3-6, distinct, about 0.3-0.5 x 0.4-0.9 mm, attached to the lower part of the anther; staminodes absent. Ovary glabrous, ovary plus style 1.2-1.5 x 1.0-1.1 mm, abruptly tapering into the stigma, style scarcely developed. Fruits orange or yellow, globular, 44-53 x 43-52 mm, mesocarp + exocarp 4.3-6.0 mm thick, endocarp 0.8-1.5 mm thick. Seed 30-39 x 30-41 mm, testa 0.1-0.3 mm thick, radicle apical. Cotyledons pink. Seedling leaves green on the underside. (Fig. 42, 74 A-B)

Distribution (Fig. 94, Map 38)

Ecology

A rare species found only in a very restricted area of high rainfall, lowland rain forest in northern Queensland. Altitudinal range very small: Sea level to 10 m.

Uses

This species grows large enough to produce millable logs but the species is not utilized largely because of its rarity. No Standard Trade Name. Wood S.G. 0.79.

Notes and Observations

Flowers and fruits have been collected in August and September. Seedling germination period about 55-80 days.

Etymology

The specific epithet was chosen because this species has only been found in the Cooper Creek area so far.

Specimens Examined (14 collections examined)

8. Endiandra cowleyana Bailey, Queensl. Dept. Agric. Bot. Bull. 5:23 (1892); Bailey, Queensl. fl. 4:1306 (1901). Type: E. Cowley 42, Barron River (BRI holotype, BM?, K?, isotypes).

Tree to 30 m tall x 80 cm dbh, frequently medium sized and well formed. Stem usually buttressed on the larger trees. Bark nondescript, outer blaze pink, red or brown, granular in texture. Twigs terete or fluted, clothed in straight, appressed, pale brown hairs. Leaves: Underside usually green, sometimes slightly glaucous, glabrous or clothed in straight, appressed, pale brown hairs; foveoles conspicuous, usually 1-4 per leaf, occasionally up to 11-12, sometimes absent, particularly on small trees. Leaf blade elliptical, lanceolate, apex usually bluntly pointed, sometimes acuminate, base attenuate, 5.5-9.0 x 2.0-4.0 cm (mean 6.9 x 2.8); penninerved, primary veins 3-8 pairs (mode 6), midrib raised or flush with the upper surface; petiole 4-11 mm long (mean 7.3), upper surface channelled or flat. Inflorescence paniculate, pseudoterminal and in the upper axils, bracts navicular, 0.7-1.3 mm long, deciduous, absent at anthesis. Flowers cream, yellow or creamy green, faintly perfumed or without any obvious odour, opening quite widely, the tepals sometimes becoming ± horizontal(?) at anthesis. Pedicel 0.4-1.4 x 0.3-0.7 mm. Perianth tube 0.2-0.8 x 1.1-1.6 mm, outer tepals 0.9-1.4 x 0.8-1.2 mm, inner tepals 0.8-1.3 x 0.6-0.9 mm, all tepals with hairs on both the inner and outer surfaces. Anthers glabrous, opening outwards or sideways, 0.3-0.4 x 0.4-0.6 mm, filaments hairy, 0.3-0.4 mm long; glands glabrous, 6, distinct, 0.2-0.4 x 0.25-0.4 mm, stalks hairy, 0.1-0.25 mm long; staminodes 3, differentiated, head glabrous, 0.2-0.3

mm long, filament hairy, 0.1-0.2 mm long. Ovary glabrous, sessile, 0.4-0.7 x 0.5-0.7 mm, style glabrous, 0.3-0.4 mm long. Fruits black, blue-black, ellipsoid, 24-33 x 14-17 mm, mesocarp + exocarp 0.7-1.2 mm thick, endocarp 0.3-0.6 mm thick. Seed 20-28 x 12-15 mm, testa 0.1-0.2 mm thick, radicle apical. Cotyledons cream. Seedling leaves green on the underside, foveoles sometimes present. (Fig. 74 C-D)

Distribution (Fig. 95, Map 43)

Ecology

Lowland and mountain rain forests on a variety of rock types. Altitudinal range: Sea level to 1000 m.

Uses

This species produces millable logs and the sawn timber is marketed as Northern Rose Walnut, a useful general purpose timber. Wood S.G. 0.72-0.77.

Notes and Observations

Flowers have been collected in January, February, March and April, while ripe fruits have been collected in March, and each month from July to November. Seedling germination period about 30-65 days.

Specimens Examined (76 collections examined)

9. Endiandra crassiflora C. White & Francis, Proc. Roy. Soc. Queensland, 33:164 (1922); Francis, Austral. Rain-Forest Trees ed.2:142 (1951); Floyd, N.S.W. Rainforest Trees, Part 1, ed.2:67 (1979); Stanley & Ross, Flora of south-eastern Queensland 1:165 (1983).
Type: C.T. White, Macpherson Range (BRI 10080 holotype, K isotype).

Tree to 20 m tall x 40 cm dbh, usually a small tree. Stem buttressed on larger trees, coppice shoots sometimes present at the base. Bark usually nondescript, sometimes flaky, outer blaze pink, granular in texture. Twigs terete or fluted, clothed in erect, tortuous, brown hairs. Leaves: Underside glaucous, clothed in erect, tortuous, brown or pale brown hairs. Leaf blade lanceolate or elliptical, apex acuminate to obtuse, base cuneate to fairly abruptly narrowed into the petiole, 6.0-11.5 x 3.0-4.5 cm (mean 8.1 x 3.7); penninerved; primary veins 4-8 pairs (mode 5), midrib depressed or flush with the upper surface; petiole 7-14 mm long (mean 10), flat on the upper surface. Inflorescence few flowered, racemose, axillary; bracts linear or lanceolate, 1.5-4.0 mm long, persistent, present at anthesis. Flowers, greenish or greenish pink, opening widely, the tepals becoming ± horizontal at anthesis. Pedicel about 0.5-1.5 x 0.7-1.0 mm. Perianth tube 2.1-3.5 x 2.7-2.8 mm. Outer tepals fleshy, 2.6-2.8 x 2.3-2.7 mm, inner tepals fleshy, 2.5-3.2 x 2.1-2.7 mm, all tepals glabrous on the inner and outer surfaces but sometimes sparsely pubescent on the outer surface, the hairs tortuous and rusty. Anthers sessile or very shortly stalked (filament 0.2 mm long), glabrous, opening outwards or sideways, about 0.7-0.9 x 0.7-1.2 mm; glands glabrous, sessile, 6, distinct, about 0.25-0.40 x 0.28-0.70 mm; staminodes 3, differentiated, head glabrous, about 0.4-0.6 mm long, filament glabrous, 0.1-0.3 mm long. Ovary glabrous, sessile, 1.0-2.3 x 0.7-1.3 mm, style glabrous, about 0.5-0.6 mm long. Fruits blue-black, oval, 13-25 mm long, fide Floyd (1979). Seed and Seedling features unknown. (Fig. 74 E-F)

Distribution (Fig. 97, Map 58)

Ecology

Mountain rain forests particularly on the poorer soils derived from sedimentary rocks. Altitudinal range: 460-760 m, fide Floyd (1979).

Uses

This is an uncommon tree which scarcely grows large enough to produce millable logs but it has been given the Standard Trade Name, Dorrigo Walnut. Wood S.G. 0.78.

Notes and Observations

Flowers have been collected in November, January, March and August, but most collections have been made in March. I have not seen any fruiting collections but Floyd (1979) has observed ripe fruit from September to December.

Specimens Examined (21 collections examined)

10. Endiandra dichrophylla F. Muell., Victorian Naturalist 9:12 (1892); Bailey, Queensl. fl. 4:1306 (1901); Francis, Austral. Rain-Forest Trees ed.2:409 (1951).
Type: S. Johnson, Russell River (Towalla) (MEL 622315 holotype; K, NSW, isotypes).

Tree to 20 m tall x 40 cm dbh, usually medium sized and of variable form. Stem usually buttressed in the larger size classes and usually with coppice shoots at the base. Bark nondescript, occasionally flaky, outer blaze cream, pink, red or brown, granular in texture. Twigs terete or fluted, clothed in straight, appressed, white or pale brown hairs. Leaves: Underside glaucous, clothed in straight, appressed, pale brown hairs. Leaf blade elliptical to lanceolate, apex obtuse to acuminate, base attenuate, 6.5-15.5 x 2.5-6.0 cm (mean

9.8 x 4.2); penninerved, primary veins 7-11 pairs (mode 9), midrib depressed or flush with the upper surface; petiole 7-20 mm long (mean 11.4), channelled on the upper surface. Inflorescence paniculate, axillary, bracts lanceolate or navicular, 1.2-2.0 mm long, deciduous, absent at anthesis. Flowers cream, pale brown, brownish cream or greenish cream, faintly perfumed or without any obvious odour, opening widely but the tips of the tepals still pointing upwards at anthesis. Pedicel 0.2-1.8 x 0.5-0.8 mm. Perianth tube 0.3-0.9 x 1.2-2.0 mm, outer tepals 1.1-1.7 x 1.0-1.6 mm, inner tepals 0.9-1.3 x 0.8-1.1 mm, all tepals with hairs on both the inner and outer surfaces. Anthers mainly glabrous but usually hairy towards the base and usually with a few hairs on the adaxial surface, opening outwards or sideways, 0.4-0.6 x 0.4-0.6 mm, filaments hairy, 0.2-0.4 mm long; glands glabrous or hairy, 6, distinct, 0.1-0.4 x 0.2-0.4 mm, stalks hairy, 0.1-0.2 mm long; staminodes 3, head glabrous or hairy, 0.1-0.4 mm long, filament hairy, 0.1-0.3 mm long. Ovary usually glabrous, occasionally hairy, sessile, 0.5-0.8 x 0.5-0.8 mm, style glabrous, 0.2-0.4 mm long. Fruits blue-black or purplish black, ellipsoid, 22-28 x 10-12 mm, mesocarp + exocarp 0.4-1.0 mm thick, endocarp 0.1-0.3 mm thick. Seed 20-26 x 8-10 mm, testa 0.1-0.4 mm thick, radicle apical. Cotyledons cream. Seedling leaves glaucous on the underside. (Fig. 75 A-B)

Distribution (Fig. 95, Map 45)

Ecology

Mountain rain forests of north Queensland, more abundant on the poorer soils derived from sedimentary and acid volcanic rocks. Altitudinal range: 80-1200 m.

Uses

This species occasionally produces logs which are of millable size, but they are seldom utilized. Brown Walnut is the trade name allocated to this species. Wood S.G. 0.77.

Notes and Observations

Flowers have been collected in November, December and January, while ripe fruits have been collected in January. This species produces small crops of flowers at various times throughout the year, but the best crops are produced during the summer months. Despite frequent flowering, good seed crops are uncommon and fruiting material in collections is rare. Seedling germination period 40-70 days.

E. sericea Kosterm. is possibly one of this species closer relatives.

Specimens Examined (43 collections examined)

11. Endiandra dielsiana Teschner, Bot. Jahrb. Syst. 58:417 (1923).
Beilschmiedia pustulata Kosterm., Reinwardtia 8:28 (1970). [Non B. dielsiana Teschner (1923)].
Lectotype: C. L. Ledermann 8885, Ettapenberg, Sepik Dist., New Guinea (SING isotype), vide Kostermans (1969).
Syntype: C. L. Ledermann 12438, Felsspitze, Sepik Dist., New Guinea n.v.
Endiandra glandulosa Allen, J. Arnold Arbor. 23:148 (1942)
Type: L.J. Brass 13678, Bernhard Camp, Idenburg River, New Guinea (A holotype; BO, BRI, L, isotypes).

Tree to 35 m tall ✕ 120 cm dbh, usually large and well formed. Stem usually buttressed, particularly in large size classes. Bark nondescript, occasionally flaky, rarely somewhat tessellated, outer blaze usually cream to brown, sometimes pink, usually somewhat

speckled, longitudinal stripes usually obvious, granular in texture. Twigs usually ± terete, densely clothed in straight, appressed, pale brown hairs when very young but almost glabrous when older. Leaves: Underside usually glaucous, densely clothed in straight, appressed, pale brown hairs when very young, but almost completely glabrous when fully mature. Leaf blade linear, lanceolate, oblong, elliptical or ovate, apex obtuse to acuminate, base attenuate, margins often recurved, 6.5-16.0 x 2.0-5.5 cm (mean 10.2 x 3.5); penninerved, primary veins 6-14 pairs (mode 9), midrib raised or flush with the upper surface; petiole 6-21 mm long (mean 13.5), flat on the upper surface. Inflorescence paniculate, pseudoterminal and in the upper axils, bracts triangular or navicular, 0.7-1.2 mm long, deciduous, absent at anthesis. Flowers pale green, greenish yellow, yellowish, faintly but pleasantly perfumed, opening quite widely, but the tepals pointing upwards at anthesis. Pedicel 1.2-1.6 x 0.6-0.9 mm. Perianth tube 0.4-0.7 x 1.9-2.5 mm, outer and inner tepals similar, 1.6-2.2 x 0.9-1.2 mm, all tepals glabrous outside but clothed with long hairs inside, particularly along the midline and towards the base. Anthers hairy towards the base, particularly on the adaxial surface, opening upwards, outwards and sideways, 0.5-0.6 x 0.8-0.9 mm, filaments hairy, 0.4-0.5 mm long; glands glabrous, 6, distinct, 0.4-0.6 x 0.5-0.6 mm, stalks hairy, 0.2-0.4 mm long; staminodes 3, differentiated, head glabrous, 0.3-0.5 mm long, filament hairy, 0.3-0.4 mm long. Ovary glabrous, sessile, 0.5-0.8 x 0.6-0.8 mm, style glabrous, 0.4-0.5 mm long. Fruits black, ellipsoid, about 40 x 23-27 mm, mesocarp + exocarp 1.5-1.7 mm thick, endocarp 0.5 mm thick. Seed 33-34 x 19-22 mm, testa 0.1-0.3 mm thick, radicle apical. Cotyledons usually pink, sometimes mauve or burgundy. Seedling leaves glaucous on the

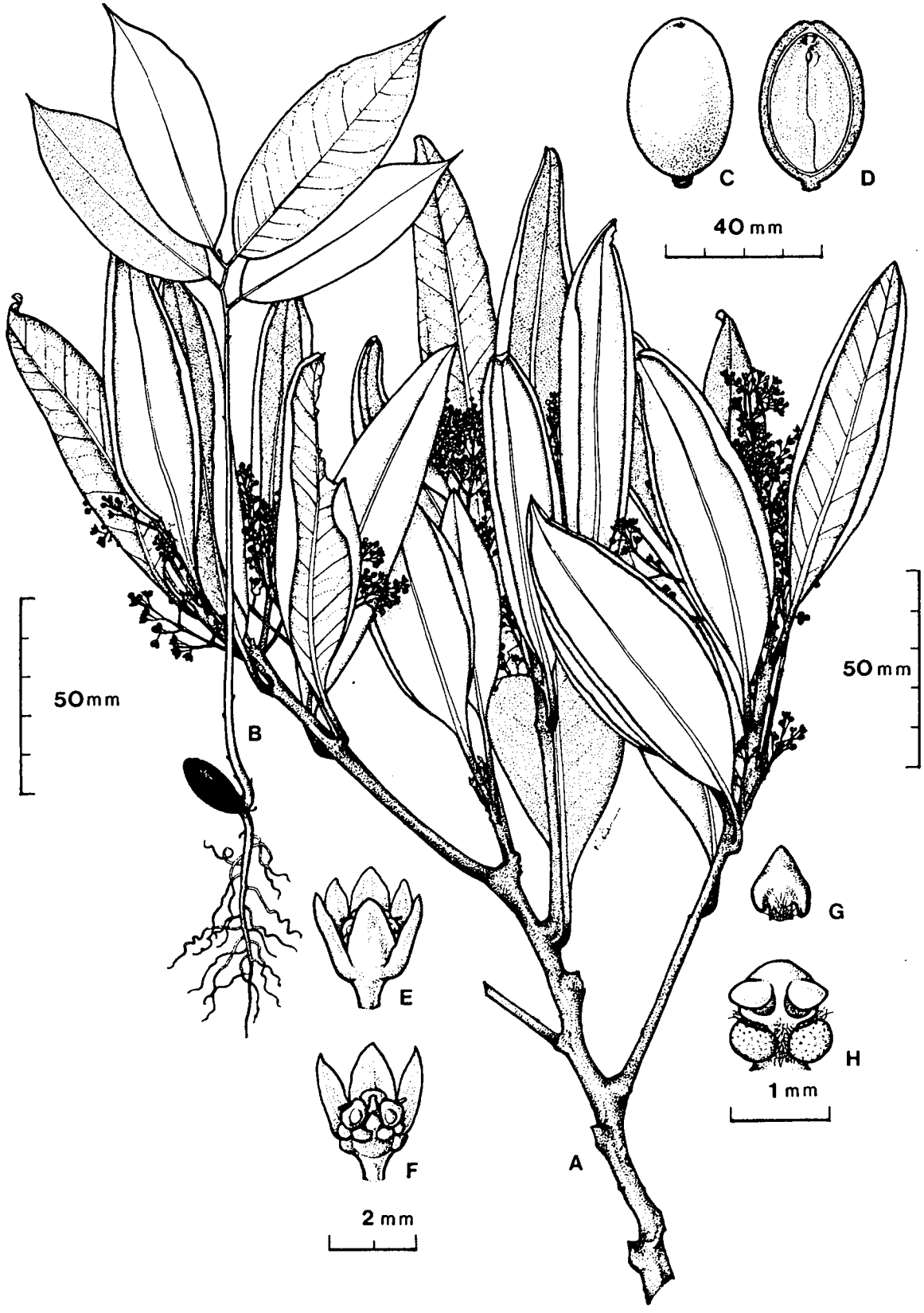

Fig.43. Endiandra dielsiana. A Habit Gray 1259; B seedling, C fruit, D fruit (LS) Irvine 396; E flower, F flower (side view, 3 tepals removed), G staminode (abaxial view), H stamen and glands (abaxial view) Gray 1259.

underside. (Fig. 43, 75 C-D)

Distribution

North-eastern Queensland in Australia (Fig. 95, Map 47), also in New Guinea.

Ecology

A tree of the rain forests of northern and central Queensland, occurring on soils derived from a variety of rock types, but probably reaching its best development in mountain rain forests on soils derived from granite. Altitudinal range: 150-1200 m.

Uses

This species produces large millable logs and the sawn timber is marketed as Candle Walnut, a useful general purpose timber. Wood S.G. 0.62-0.76.

Notes and Observations

Flowers have been collected in November, January and February, while ripe fruits have been collected in November. Seedling germination period 45-105 days.

E. sebertii Guillaumin of New Caledonia appears to be very closely related and the possibility of it being conspecific should not be completely excluded.

E. aurea Kosterm. appears to be related but specifically distinct.

Specimens Examined (66 collections examined)

12. **Endiandra discolor** Benth., Fl. Aust. 5:301 (1870); Bailey, Queensl. fl. 4:1305 (1901)p.p.; Francis, Austral. Rain-Forest Trees ed.2:135 (1951); Beadle et al., Flora of the Sydney Region 151 (1972); Floyd, N.S.W. Rainforest Trees, Part 1, ed.2:69 (1979); Stanley & Ross, Flora of south-eastern Queensland 1:165 (1983).

Lectotype (here designated): J. Dallachy, Coast Range, Rockingham Bay (MEL 565779 holotype, K isotype?).

Syntypes: W. Hill, Albany Island (K) and Cape York (K). C. Moore, Macleay, Richmond and Hastings Rivers (A, K, MEL 565777-8).

Tree to 25 m tall x 100 cm dbh, usually medium sized and well formed, sometimes flowering as a shrub. Stem usually buttressed on the larger stems and coppice shoots occasionally present at the base. Bark nondescript occasionally flaky, outer blaze pink or red, granular in texture. Twigs fluted, clothed in straight, appressed, pale brown hairs. Leaves: Underside glaucous, clothed in short, straight, appressed, white or pale brown hairs; foveoles conspicuous, usually about 3-6 per leaf, sometimes fewer or up to 10 per leaf. Leaf blade elliptical, lanceolate, apex bluntly pointed, sometimes acuminate, base attenuate, 5.5-10.5 x 2.0-4.5 cm (mean 7.6 x 3.4); penninerved, primary veins 3-7 pairs (mode 5), midrib flush with the upper surface; petiole 4-13 mm long (mean 7.9), upper surface channelled. Inflorescence paniculate, usually axillary, sometimes pseudoterminal, bracts navicular or triangular, 0.7-1.0 mm long, deciduous, absent at anthesis. Flowers pale green or creamy green, faintly but pleasantly perfumed, opening quite widely, the tepals sometimes becoming ± horizontal at, or after anthesis. Pedicel 0.2-2.0 x 0.4-0.5 mm. Perianth tube 0.5-0.8 x (1.2)1.4-2.1 mm, outer tepals 1.1-1.9 x 1.0-1.6 mm, inner tepals 1.0-1.6 x 0.8-1.2 mm, all tepals with hairs on both the inner and outer surfaces. Anthers usually glabrous, (adaxial surface sometimes sparsely hairy), opening outwards or

sideways, 0.4-0.6 mm long, filaments usually hairy, 0.2-0.5 mm long; glands glabrous, 6, distinct, 0.2-0.5 x 0.3-0.5 mm, stalks usually hairy, 0.1-0.25 mm long; staminodes 3, differentiated, head glabrous, 0.25-0.4 mm long, filament usually hairy, 0.1-0.2 mm long. Ovary glabrous, 0.5-0.8 x 0.5-0.7 mm, style glabrous, 0.1-0.5 mm long. Fruits black or blue-black, ellipsoid, 16-17 x 10-13 mm, mesocarp + exocarp 0.9-1.3 mm thick, endocarp 0.4-0.5 mm thick. Seed 12-14 x 7-9 mm, testa about 0.1 mm thick, radicle apical. Cotyledons cream to pink. Seedling leaves glaucous on the underside, foveoles sometimes present. (Fig. 75 E-F)

Distribution (Fig. 94, Map 36)

Ecology

This species occurs over a latitudinal range of about 16^{o} and occurs in a variety of habitats. In the southern part of its range it often occurs in rain forest on alluvial flats, while in the northern part of its range it tends to occur on mountain rain forest margins on soils derived from a variety of rock types. Altitudinal range: Sea level to 1000 m, the higher elevations being attained at the northern end of its range.

Uses

This species produces millable logs and the sawn timber is marketed as Rose Walnut. Wood S.G. 0.77-0.86.

Notes and Observations

Flowers have been collected each month from September to March, while ripe fruit has been collected each month from February to July.

Seedling germination period 40-145 days.

This species resembles E. cowleyana but can usually be distinguished, even on sterile material, because of the glaucous underside of the leaf blade in E. discolor, while that of E. cowleyana is green.

In the northern part of the range, a lignotuberous form of this species is found in eucalypt forest which is periodically burned. This form can survive fires by producing shoots from the lignotuber when the aerial parts of the tree are killed during fires. The capacity to survive fires is rare in Australian Lauraceae. Endiandra sieberi has the capacity to survive fires but it utilizes an entirely different mechanism.

It was necessary to choose a lectotype for this species because of the two discordant elements present in the lectotypes viz. W. Hill, Albany Island and Cape York. These specimens belong in E. glauca R. Br. and cannot be considered for lectotypification if the name E. discolor is to be used.

Specimens Examined (96 collections examined)

13. Endiandra floydii B. Hyland sp. nov.
Differt a E. grayi et E. hypotephra laminis subtus viridibus et disco glandium connatarum tripartito.
Typus: B. Hyland 4619 RFK: Tomewin, 11.iii.1985 (holotypus QRS).
Differing from E. grayi and E. hypotephra the lamina being green on the underside and the glands fused into a 3-part disk.

Tree to 15 m tall x 25 cm dbh, usually small to medium sized. Stem without buttresses, often with coppice shoots at the base. Bark

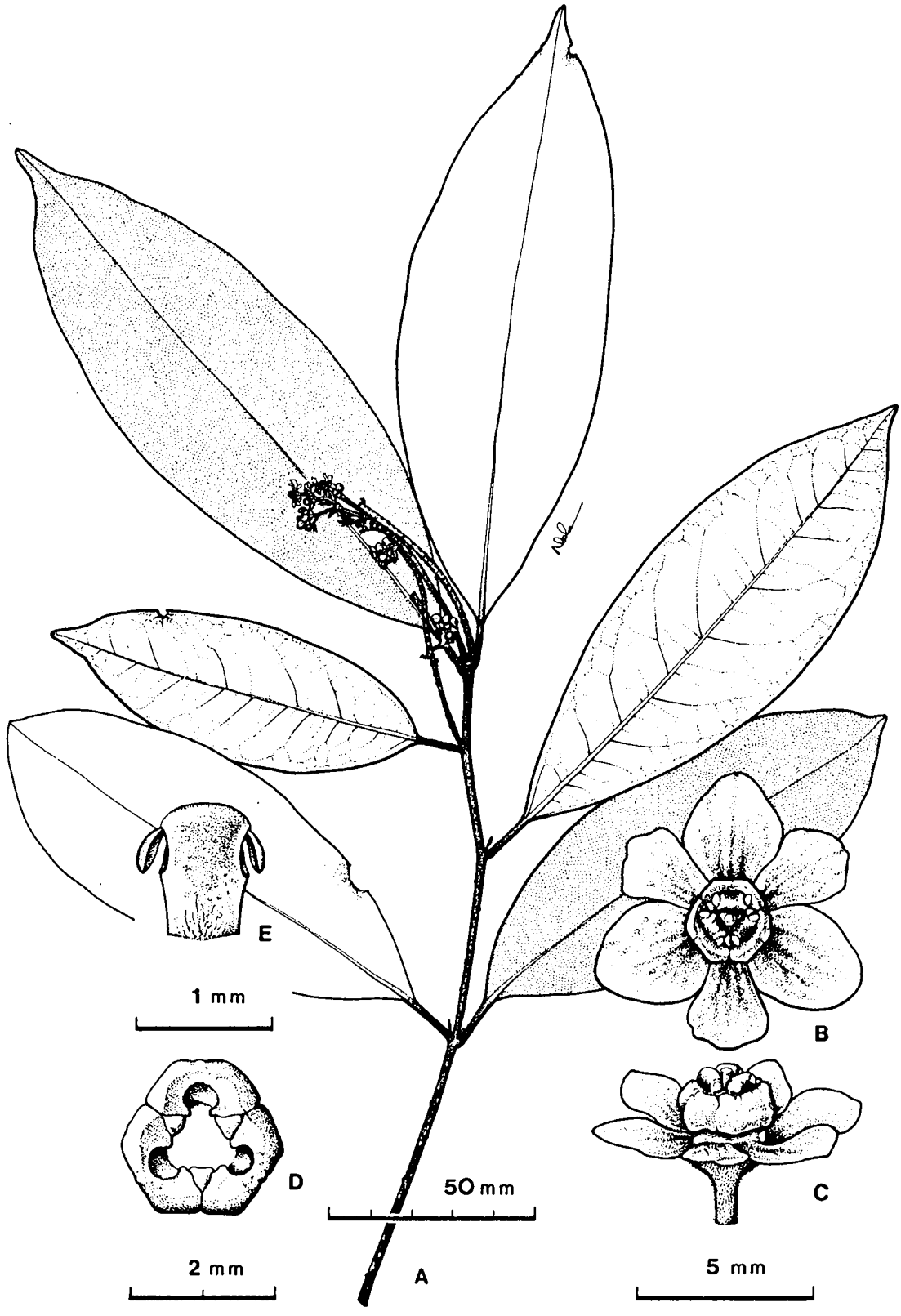

Fig.44. Endiandra floydii. A Habit, B flower (top view), C flower (side view), D glands fused into a disc and the staminodes (top view), E stamen (abaxial view) Hyland 4619 RFK.

nondescript or flaky, outer blaze cream, pink, red or brown. Twigs fluted, clothed in straight, appressed, white or pale brown hairs when young, but almost terete and glabrous when older. Leaves: Underside glabrous. Leaf blade lanceolate, apex acuminate, base attenuate, about 10.5 x 3.5 cm; penninerved, about 7 pairs of primary veins, midrib flush with the upper surface; petiole about 9 mm long, flat or channelled on the upper surface. Inflorescence paniculate, axillary, bracts navicular, 1.5-2.0 mm long, persistent, present at anthesis. Flowers pale green, creamy green, without any obvious odour, opening quite widely, the tepals becoming ± horizontal at anthesis. Pedicel 1.4-2.2 x 0.4-0.7 mm. Perianth tube 0.5-0.7 x 1.6-1.9 mm, outer tepals larger, 3.2-4.2 x 2.4-3.2 mm, inner tepals 2.8-3.9 x 2.0-2.9 mm, all tepals glabrous on both the inner and outer surfaces. Anthers almost sessile, glabrous, opening sideways, 0.6-0.7 x 0.7-0.8 mm, filament glabrous or sparsely hairy, 0.1-0.4 mm long; glands usually green when fresh, glabrous, fused to form a 3-partite ring of tissue about 0.9 mm high; staminodes difficult to distinguish, apparently fused to the glands to form part of the disk. Ovary glabrous, 1.3-1.9 x 0.8-1.0 mm, style glabrous, 0.5-0.7 mm long. Fruits purplish black when ripe but reddish before maturity, oblong, about 50-70 mm long (Floyd pers. comm.) Seed and Seedling features unknown. (Fig. 44, 76 A-B)

Distribution (Fig. 96, Map 52)

Ecology

A rare species found in the rain forests of the extreme north eastern corner of New South Wales close to the Queensland border. Altitudinal Range: Sea level to 200 m.

Uses

This species has no commercial value as it does not grow large enough to produce millable logs. Wood S.G. unknown.

Notes and Observations

Flowers have been collected in May and mature fruits in December and January.

Etymology

It gives me great pleasure to name this species after Mr A.G. Floyd of Coff's Harbour who, as an officer of both the Forestry Commission and the National Parks and Wildlife Service of New South Wales has assisted me in my botanical endeavours not only with the refractory Lauraceae but also with Syzygium and allied genera which seemed almost as bad when they were being studied.

Specimens Examined (7 collections examined)

14. Endiandra glauca R.Br., Prod. 402 (1810); Benth. Fl. austral. 5:300 (1870); Bailey, Queensl. fl. 4:1304 (1901).
Type: Banks and Solander, Endeavour River (BM holotype, MEL 1517127-8 isotypes?).
Endiandra merrilliana Allen, J. Arnold Arbor. 23:149 (1942)
Type: L.J. Brass 8589, Tarara, Wassi Kussa River, Papua. (A holotype; BRI, L isotypes).

Tree to 20 m tall x 25 cm dbh, usually small, sometimes flowering when scarcely more than a shrub. Stem without buttresses, coppice shoots sometimes present at the base. Bark often nondescript but occasionally flaky, fissured or tessellated, outer blaze pink or red, granular in texture. Twigs terete, fluted or angular in section,

clothed in tortuous, appressed and erect, brown or pale brown hairs. Leaves: Underside almost white or glaucous, clothed in straight, brown, appressed hairs. Leaf blade elliptical or lanceolate, apex acuminate, sometimes almost obtuse, base attenuate, 6.0-10.5 x 2.0-4.5 cm (mean 8.3 x 2.9); penninerved, primary veins 4-9 pairs (mode 7), midrib depressed on the upper surface; petiole 5-13 mm long (mean 7.9), upper surface flat or channelled. Inflorescence paniculate, axillary, occasionally pseudoterminal, bracts linear, lanceolate, triangular or navicular, 1.0-2.0 mm long, persistent, usually present at anthesis. Flowers usually cream or greenish, occasionally pale brown, without any obvious perfume, opening quite widely, but the tepals still pointing upwards at anthesis. Pedicel 0.2-1.8 x 0.5-0.7 mm. Perianth tube 1.0-1.7 x 2.1-3.0 mm, outer tepals 1.5-2.2 x 1.2-1.7 mm, inner tepals 1.5-2.2 x 1.2-2.2 mm, all tepals with hairs on both the inner and outer surfaces. Anthers glabrous, opening upwards and sideways, 0.2-0.4 x 0.5-0.8 mm, filaments glabrous or hairy, 0.2-0.3 mm long; glands fused to form a disk or continuous ring of tissue; staminodes absent, although sections of the disk between the anthers, project inwards towards the ovary and may in fact be remnants of the staminodes. Ovary glabrous, sessile, 1.1-1.6 x 0.9-1.4 mm, style glabrous, 0.1-0.3 mm long. Fruits usually black and glaucous, also described as navy blue, deep purple or blue-black, ellipsoid, 15-26 x 11.5-14 mm, mesocarp + exocarp 0.7-1.1 mm thick, endocarp 0.3-0.6 mm thick. Seed 13-23 x 8.5-11 mm, testa <0.1-0.2 mm thick, radicle apical. Cotyledons cream, but often pink towards the periphery. Seedling leaves white or glaucous on the underside. (Fig. 76 C-D)

Distribution

Cape York Peninsula in Australia (Fig. 97, Map 57), also in New Guinea.

Ecology

Rain forests, rain forest margins and gallery forests of Cape York Peninsula on soils derived from a variety of rock types. Altitudinal range: Sea level to 450 m.

Uses

This species has no commercial value as it does not grow large enough to produce millable logs, but it has been allocated the Standard Trade Name, Brown Walnut. Wood S.G. 1.00.

Notes and Observations

Flowers have been collected each month from January to June. Mature fruits have been collected each month from July to October. Seedling germination period 35-75 days.

Specimens Examined (74 collections examined)

15. **Endiandra globosa** Maiden and E. Betche, Proc. Linn. Soc. New South Wales, 24:149 (1899); Francis, Austral. Rain-Forest Trees ed.2:135 (1951); Floyd, N.S.W. Rainforest Trees, Part 1, ed.2:71 (1979); Stanley & Ross, Flora of south-eastern Queensland 1:166 (1983).
Type: J.A. Goldsmid, Murwillumbah (Tweed River) (NSW 150072 holotype).

Tree to 30 m tall x 40 cm dbh, usually small to medium sized. Stem with or without buttresses. Bark flaky or nondescript, outer blaze pink or red, granular in texture. Twigs terete or shallowly fluted, clothed in straight, appressed, pale brown hairs when young but almost

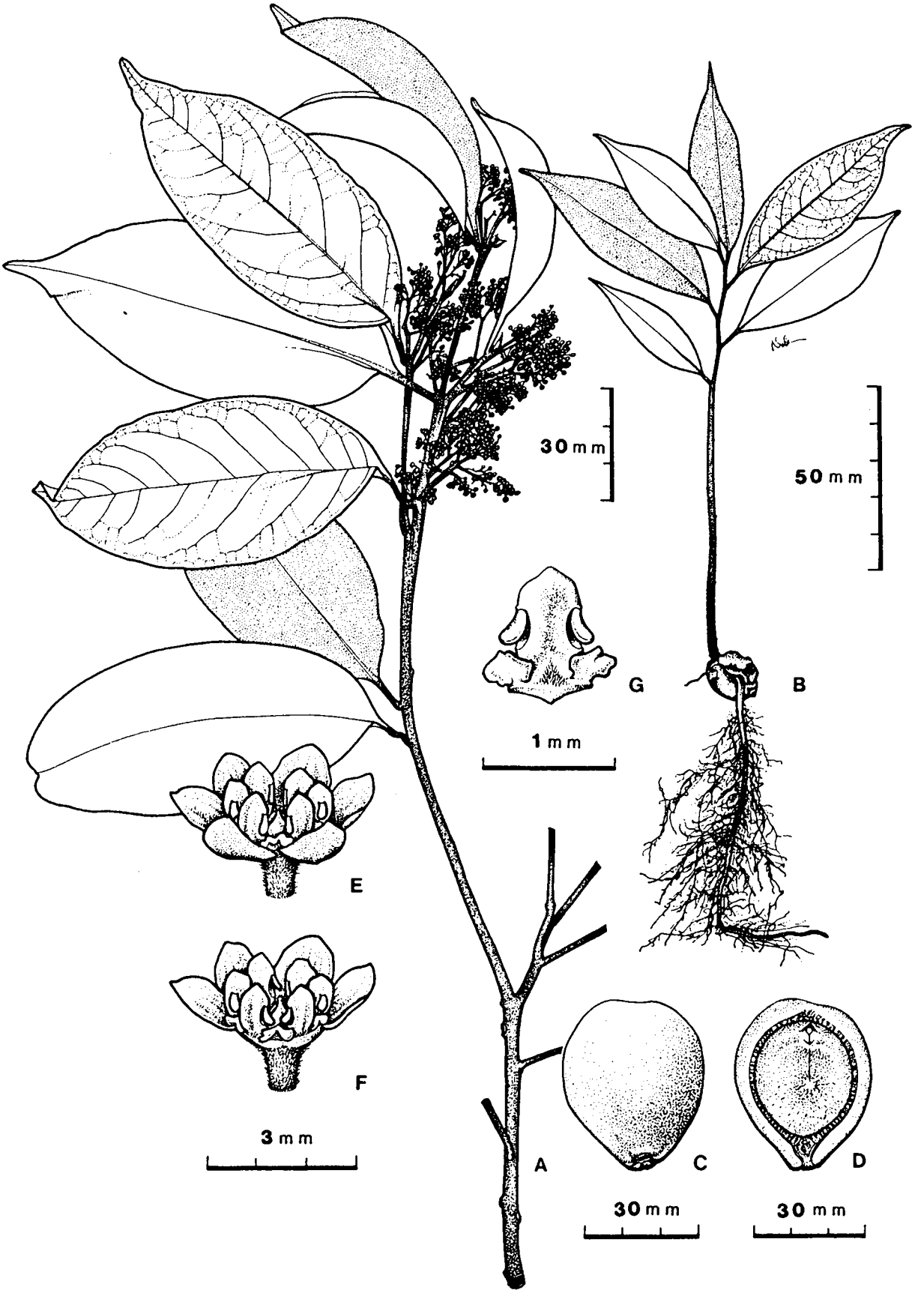

Fig.45. Endiandra globosa. A Habit Gray 1572; B seedling, C fruit, D fruit (LS) Gray 1873; E flower, F flower (oblique view, 2 tepals removed), G anther and glands (abaxial view) Gray 1572.

glabrous at maturity. Leaves: Underside green, clothed in straight, appressed, pale brown hairs when young but almost glabrous at maturity. Leaf blade elliptical or lanceolate, apex acuminate or bluntly pointed, base cuneate or attenuate, 7.0-16.5 x 2.7-7.5 cm (mean 12.5 x 4.9); penninerved, primary veins 6-11 pairs (mode 9), midrib raised on the upper surface; petiole 5-17 mm long (mean 10.0), channelled on the upper surface. Inflorescence paniculate, axillary, sometimes pseudoterminal; bracts lanceolate, navicular, 1.0-2.0 mm long, deciduous, absent at anthesis. Flowers cream, faintly but pleasantly perfumed, not opening very widely, the tepals remaining erect and ± enclosing the anthers and style at anthesis. Pedicel 0.5-2.1 x 0.3-0.6 mm. Perianth tube 0.5-1.0 x 1.6-1.8 mm, outer tepals 1.2-2.1 x 1.2-2.0 mm, inner tepals 1.5-2.0 x 1.6-1.8 mm, all tepals ± glabrous outside but with hairs on the inner surfaces. Anthers usually 3-5 (occasionally 6), glabrous, opening outwards or sideways, 0.7-0.9 mm long x 0.7-0.9 mm wide, filaments hairy, 0.1-0.3 mm long; glands distinct, variable in number, (sometimes 6, sometimes adjacent glands fused to form 3 masses), sessile, glabrous, 0.3-0.6 x 0.5-0.9 mm; staminodes 3 (sometimes 0-1), undifferentiated, hairy or glabrous, 0.4-0.6 mm long. Ovary glabrous, 0.6-1.0 x 0.6-1.5 mm, style glabrous, 0.2-0.4 mm long. Fruits black, globular (sometimes wider than long), 34-60 x 33-60 mm, mesocarp + exocarp sometimes orange, 2.8-5.5 mm thick, endocarp 1.0-2.1 mm thick. Seed 24-50 x 24-50 mm, testa 0.1-1.0 mm thick, radicle apical. Cotyledons cream but apricot or pink colourations recorded towards the periphery. Seedling leaves green or slightly brownish on the underside. (Fig. 45, 76 E-F))

Distribution (Fig. 96, Map 53)

Ecology

A tree with a very restricted distribution in northern New South Wales, southern Queensland and northern Queensland rain forests. It is usually encountered as an open grown tree on alluvial flats on former rain forest sites in the southern part of its range, but is also found on better soils in hillside situations. However, in northern Queensland it is found in lowland rain forest situations. Altitudinal range: Sea level to 360 m.

Uses

This is an uncommon species and it is unlikely that it is utilized nowadays, however, it grows large enough to produce millable logs and has been given the Standard Trade Name of Ball-Fruited Walnut. Wood S.G. 0.99.

Notes and Observations

Flowers have been collected in November, December and January, while ripe fruits have been collected in November, January and each month from March to September. Seedling germination period 28-80 days.

Specimens Examined (65 collections examined)

16. Endiandra grayi B.Hyland sp. nov.
Differt a E. hypotephra tepalis facie adaxiali pubescentibus et fructu 50-65 mm longo.
Typus: B. Gray 3305: Portion 188, Parish of Alexandra, 13.xii.1983 (holotypus QRS).
Differing from E. hypotephra the tepals being pubescent on the adaxial surface and the fruit 50-60 mm long.

Tree to 35 m tall x 90 cm dbh, usually medium to large and well formed. Stem buttressed in most size classes. Bark nondescript, sometimes flaky, rarely somewhat papery, outer blaze usually red or brown, sometimes pink, usually marked by longitudinal stripes, granular in texture. Twigs fluted and densely clothed in tortuous, erect, dark brown to rusty brown hairs when young but eventually becoming almost glabrous. Leaves: Underside glaucous, clothed in tortuous, erect, brown or rusty brown hairs when young but eventually becoming almost glabrous. Leaf blade lanceolate, elliptical, apex acuminate, base cuneate, attenuate, 11.5-14.5 x 3.5-5.0 cm (mean 12.8 x 4.4); penninerved, primary veins 6-9 pairs (mode 7), midrib depressed on the upper surface; petiole 13-20 mm long (mean 15.6) flat or channelled on the upper surface. Inflorescence usually paniculate, sometimes almost racemose, not exceeding the leaves, axillary and pseudoterminal, bracts broadly lanceolate or navicular, occasionally triangular, 1.8-1.9 mm long, deciduous, absent at anthesis. Flowers yellowish green inside, but rusty brown and hairy outside, without any obvious perfume, opening quite widely but the tips of the tepals erect at anthesis. Pedicel 1.3-4.5 x 1.4-1.7 mm. Perianth tube 0.6-1.2 x 4.3-5.5 mm, outer tepals larger, 4.5-5.1 x 4.7-5.2 mm, inner tepals 3.3-4.1 x 3.3-4.2 mm, all tepals usually with hairs on both the inner and outer surfaces (occasionally the outer tepals glabrous outside). Anthers glabrous, opening sideways, 0.7-0.9 x 0.8-0.9 mm, filaments hairy, 0.2-0.5 mm long; glands and staminodes fused or partly fused to form a disk (lobed or with projections on the inner surface, the lobes probably corresponding to glands and staminodes). Ovary hairy or glabrous, 1.7-1.9 x 1.8-2.3 mm, sometimes shortly stalked, style glabrous, 0.3-0.5 mm long. Fruits black, blue-black or glaucous black

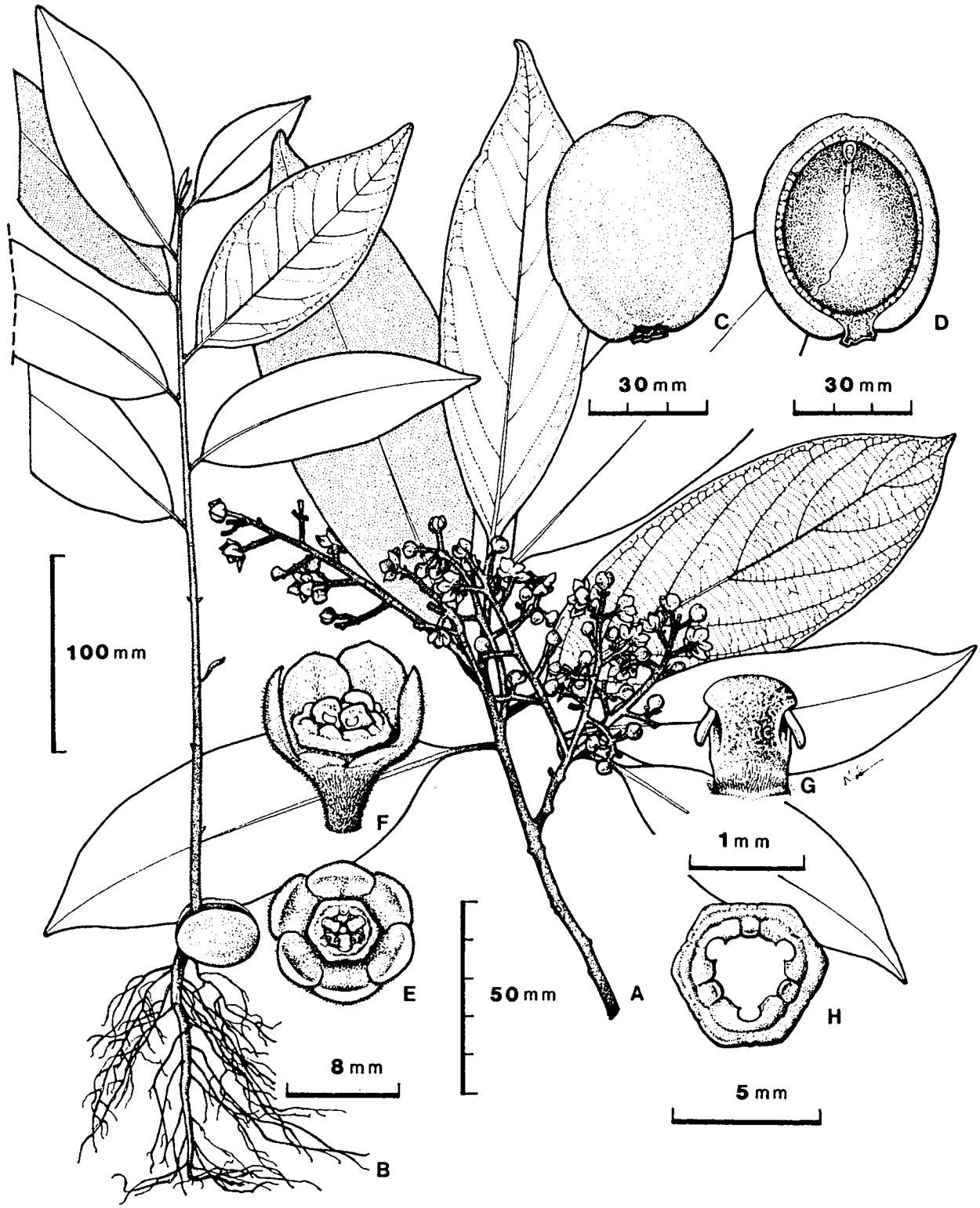

Fig.46. Endiandra grayi. A Habit Gray 3305; B seedling, C fruit, D fruit (LS) Gray 3157; E flower (top view), F flower (side view, 2 tepals removed), G anther (abaxial view), H disk (top view) Gray 3305.

when ripe, ellipsoid, globular, ovoid, sometimes laterally compressed, 50-65 x 35-50 mm, mesocarp + exocarp 2.3-4.5 mm thick, endocarp 1.2-1.5 mm thick. Seed 40-54 x 27-38 mm, testa 0.1-0.3 mm thick, radicle apical. Cotyledons cream. Seedling leaves glaucous on the underside. (Fig. 46, 77 A-B)

Distribution (Fig. 96, Map 52)

Ecology

Lowland rain forests of northern Queensland on soils derived from metamorphic rocks. Altitudinal range very small: Sea level to 40 m.

Uses

This species grows large enough to produce millable logs but has only recently been distinguished and does not have a Standard Trade Name. Wood S.G. 1.00.

Notes & Observations

Flowers have been collected in November and December while, ripe fruits have been collected in June, July, August and September. Seedling germination period 35-90 days.

Etymology

Named in honour of Bruce Gray who first recognized this tree as a new species and has collected all the critical material for its description.

Specimens Examined (14 collections examined)

17. Endiandra hayesii Kosterm., Reinwardtia 8:81 (1970); Floyd, N.S.W. Rainforest Trees, Part 1, ed.2:73 (1979); Stanley & Ross, Flora of south-eastern Queensland 1:165 (1983).
Type: R.D. Hoogland and H. Hayes 8598, Minyon Falls (BO holotype; A, BRI, K, L, MEL, NSW isotypes).

Tree to 20 m tall x 30 cm dbh [35 m x 60 cm dbh fide Floyd (1979)], usually small. Stem usually buttressed in the larger size classes. Bark nondescript, outer blaze usually pink, occasionally cream or red, granular in texture. Twigs terete or fluted, clothed in tortuous, erect, pale brown hairs. Leaves: Underside green, clothed in straight and tortuous, erect, pale brown hairs. Leaf blade elliptical or lanceolate, apex acuminate or obtuse, base cuneate or rounded, 8.5-15.5 x 3.5-6.0 cm (mean 11.2 x 4.8); penninerved, primary veins 5-9 pairs (mode 7), often depressed on the upper surface, midrib also depressed on the upper surface; petiole 6-14 mm long (mean 9.0), upper surface flat. Inflorescence few flowered, cymose or paniculate, axillary, not exceeding the leaves, peduncles often long and slender, bracts lanceolate or navicular, 1.0-2.5 mm long, persistent, present at anthesis. Flowers cream to pale green, odour unknown, ± triangular in transverse section, ± flat at the apex scarcely opening at anthesis, the tepals bending inwards, forming a sheath which completely encloses everything except the tips of the anthers and the tip of the style. Pedicel 3.6-10.0 x 0.7-0.8 mm. Perianth tube 0.5-1.1 x 2.0-3.2 m, outer tepals 1.1-1.2 x 2.1-2.4 mm, inner tepals 1.0-1.4 x 1.3-1.7 mm, all tepals with long erect hairs on both the inner and outer surfaces. Anthers sometimes sessile, glabrous, opening outwards, 0.6-0.8 x 0.4-0.6 mm, filaments (if present), hairy, about 0.2 mm long; glands glabrous, 6, distinct, sometimes sessile, 0.2-0.4 x 0.4-0.55 mm, stalks (if present), hairy, about 0.1 mm long; staminodes 3, differentiated, head glabrous, 0.25-0.3 mm long,

filament hairy, 0.2-0.3 mm long. Ovary glabrous, 0.7-1.0 x 0.7-1.0 mm, style glabrous, 0.2-0.3 mm long. Fruits black, slightly glaucous, ellipsoid, about 28-30 mm long. Seed dimensions unknown, cotyledons cream. Seedling characteristics unknown. (Fig. 77 C-D)

Distribution (Fig. 94, Map 37)

Ecology

A tree with a restricted occurrence in rain forests and gallery forests of northern New South Wales and southern Queensland, nearly always found on alluvium. Altitudinal range: Sea level to 300 m.

Uses

This species has no commercial value as it is of infrequent occurence and seldom grows large enough to produce millable logs. Wood S.G. unknown.

Notes and Observations

Flowers have been collected in March, October and November, while fruits have been collected in March and May.

Specimens Examined (14 collections examined)

18. Endiandra hypotephra F. Muell., Fragm. Phytogr. Austral. 5:166 (1866); Benth., Fl. austral 5:301 (1870); Bailey, Queensl. fl. 4:1304 (1901).
Lectotype (here designated): J. Dallachy, Meunga Creek, Rockingham Bay (MEL 565959 holotype). See comments in the discussion section below.

Tree to 30 m tall x 40 cm dbh, usually small and well formed. Stem usually buttressed in the larger size classes. Bark often

nondescript, occasionally flaky or tessellated, outer blaze usually pink, red, or reddish brown, occasionally cream, granular in texture. Twigs terete or fluted, clothed in straight and tortuous, erect, pale brown hairs. Leaves: Underside glaucous, clothed in straight and tortuous, erect, pale brown hairs. Leaf blade lanceolate, apex acuminate, base attenuate, 3.5-14.0 x 2.5-5.5 cm (mean 11.0 x 4.2); penninerved, primary veins 5-10 pairs (mode 7), often depressed on the upper surface, midrib depressed on the upper surface; petiole 5-16 mm long (mean 9.3), upper surface flat or channelled. Inflorescence racemose or paniculate, usually axillary, sometimes pseudoterminal; bracts lanceolate, navicular to hemispherical, 1.6-3.0 mm long, persistent, present at anthesis. Flowers usually pink to reddish, occasionally pale green, without any obvious perfume, opening quite widely, but the tepals usually not horizontal at anthesis. Pedicel 0.3-2.6 x 0.6-1.3 mm. Perianth tube 0.9-3.4 x 4.2-5.6 mm, outer tepals larger, 4.3-6.0 x 3.7-5.7 mm, inner tepals 3.5-4.4 x 3.1-4.7 mm, all tepals glabrous inside but usually sparsely clothed in appressed hairs outside. Anthers glabrous, opening outwards or sideways, 0.7-1.0 x 0.7-1.2 mm, filaments glabrous 0.2-0.5 mm long; glands fused to form a disk or continuous ring of tissue; staminodes absent or forming part of the disk. Ovary glabrous, sometimes stalked 1.4-2.2 x 1.4-2.0 mm, style glabrous, 0.4-0.8 mm long. Fruits black or blue-black, ellipsoid, 20-28 x 12-16 mm, mesocarp + exocarp 0.6-1.5 mm thick, endocarp 0.2-0.8 mm thick. Seed about 17-25 x 9-12 mm, testa about 0.1 mm thick, radicle apical. Cotyledons pink, red or purplish. Seedling leaves glaucous on the underside. (Fig. 77 E-F)

Distribution (Fig. 94, Map 37)

Ecology

Rain forests of northern and central Queensland on soils derived from a variety of rock types, usually of more frequent occurrence at lower elevations. Altitudinal range: Sea level to 650 m.

Uses

This species has no commercial value as it seldom grows large enough to produce millable logs but it has been given the Preferred Trade Name of Northern Rose Walnut. Wood S.G. 1.04.

Notes and Observations

Flowers have been collected each month from March to June, while ripe fruits have been collected in September and November. Seedling germination period about 25-55 days.

This is a very distinctive large-flowered species. However, the interpretation of the floral parts poses some problems. Structures occur between the anthers on the inner side of the disk which may in fact be staminodes. However, they are attached to and form part of the disk and the tissue of both appears to be the same and it thus appears to be equally logical to assume that there are no staminodes, just a large disk, formed by the fusion of the glands.

I experienced some difficulty in selecting a lectotype for this species. There are 40 sheets in MEL in red folders and all are labelled as being possible types. Some can be eliminated because they were collected after the species was described (indeed this was the fate of my first selection of a lectotype and I was only saved considerable embarrassment by the astute observation of my colleague

John Connors); others can be eliminated because they are flowering and lack the fruits mentioned in the original description. Despite this, there are still a number of possible candidates and I was guided in my final choice by the presence of information on the field label which also appeared in Mueller's description.

Specimens Examined (112 collections examined)

19. Endiandra impressicosta Allen, J. Arnold Arbor. 23:151 (1942).
Type: L.J. Brass 7619, Lake Daviumbu, Middle Fly River, Papua (A holotype, BO, BRI, L, isotypes).

Tree to 25 m tall x 60 cm dbh, usually medium sized and well formed. Stem usually buttressed, particularly in the larger size classes, coppice shoots rarely present at the base. Bark usually nondescript, occasionally flaky in the larger size classes, outer blaze usually pink, red or brown, sometimes cream on small trees, granular in texture, usually conspicuously layered. Twigs terete or fluted, glabrous, but clothed in straight, appressed, pale brown hairs when very young. Leaves: Underside green, glabrous, very sparsely scattered, straight, appressed, pale brown hairs only present on very young leaves. Leaf blade lanceolate, oblong or oval, apex acuminate, obtuse or rounded, base attenuate, cuneate or rounded, 7.5-14.5 x 4.0-8.0 cm (mean 10.5 x 5.0); penninerved, primary veins 6-11 pairs (mode 7), forming loops well inside the blade margin, midrib depressed on the upper surface; petiole 8-14 mm long (mean 10.6), channelled on the upper surface. Inflorescence paniculate, axillary and pseudoterminal, bracts lanceolate or navicular, about 1.2 mm long, deciduous, absent at anthesis. Flowers cream, pleasantly perfumed, opening widely, the outer tepals eventually becoming horizontal or

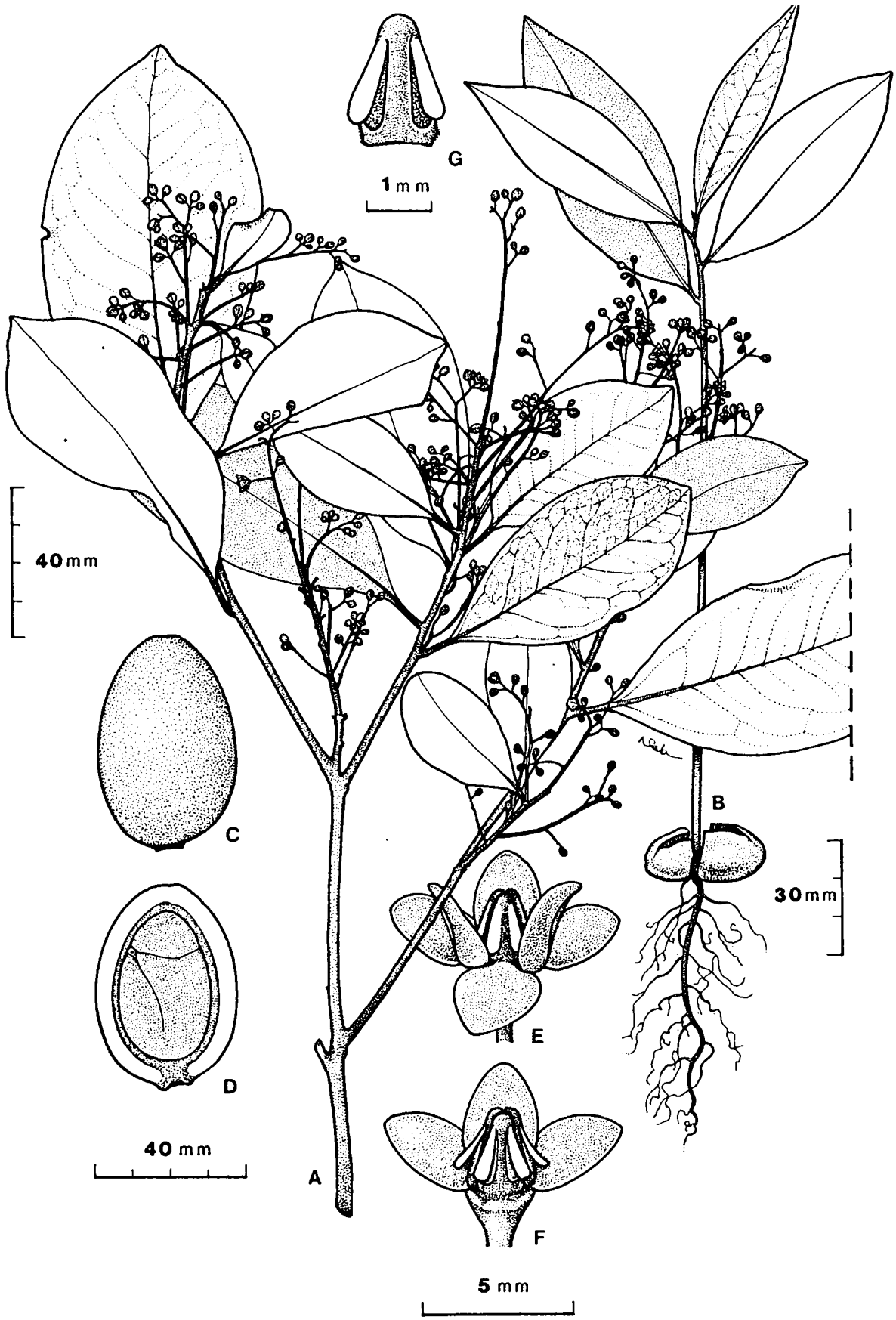

Fig.47. Endiandra impressicosta. A Habit Gray 542; B seedling, C fruit, D fruit (LS) Gray 744, E flower, F flower (side view, 3 tepals removed), G stamen (abaxial view) Gray 542.

reflexed. Pedicel 0.1-1.7 x 0.6-0.8 mm. Perianth tube 0.7-1.2 x 2.2-2.7 mm, outer tepals usually larger, 3.2-4.3 x 2.4-3.3 mm, inner tepals 3.3-4.4 x 2.1-2.6 mm, all tepals predominantly glabrous on both the inner and outer surfaces, although a few hairs may be visible towards the base or very sparsely scattered over the outer surface. Anthers opening outwards, glabrous, except for the basal part and a line of hairs on the adaxial surface, 2.0-2.4 x 1.2-1.6 mm, filaments hairy, 0.1-0.3 mm long. Glands and staminodes absent. Ovary glabrous, sessile, 0.8-1.1 x 0.8-1.1 mm, style glabrous, 0.2-0.3 mm long. Fruits blue-black, purplish black, ellipsoid, 45-60 x 30-37 mm, mesocarp + exocarp 2.0-6.1 mm thick, endocarp 0.9-2.0 mm thick. Seed 38-47 x 20-27 mm, testa 0.1-0.4 mm thick, radicle lateral or almost lateral. Cotyledons cream. Seedling leaves green on the underside. (Fig. 47, 78 A-B)

Distribution

North-eastern Queensland and Cape York Peninsula in Australia (Fig. 96, Map 53), also in New Guinea.

Ecology

A tree of the rain forests of northern Queensland, tending to be more abundant in the more seasonal forests. Altitudinal range: Sea level to 500 m.

Uses

This species grows large enough to produce millable logs but is seldom utilized for sawn timber. The wood is quite hard and very abrasive to mechanical tools. Wood S.G. 0.95-1.10.

Notes and Observations

Flowers have been collected in April, May and June, while ripe fruit has been collected each month from September to December and also in February. Seedling germination period 25-45 days.

The complete absence of glands and staminodes is rather unusual but makes this a very distinctive species and easy to identify from flowering material.

Specimens Examined (44 collections examined)

20. Endiandra insignis (Bailey) Bailey, Queensland Agric. J. 1:80 (1897); Bailey, Queensl. fl. 4:1307 (1901).
Cryptocarya insignis Bailey, Queensl. Dept. Agric. Bot. Bull. 2:15 (1891).
Type: F.M. Bailey, Cairns-Bellenden Ker Range (BRI 288982-3 holotype).
Endiandra exostemonea F. Muell., Victorian Naturalist 9:42 (1892); Bailey, Queensl. fl. 4:1307 (1901).
Type: T. Pentzke, Daintree River, (MEL 622312 holotype; BRI 27954, K isotypes).

Tree to 25 m tall x 80 cm dbh, usually medium sized and well formed. Stem buttressed on larger but not smaller trees. Bark usually nondescript, but tending towards flaky on larger trees, outer blaze brown, occasionally pink, granular in texture. Twigs terete or fluted, clothed in tortuous, erect, brown or reddish brown hairs. Leaves: Underside green, clothed in tortuous, erect, brown hairs. Leaf blade elliptical, apex obtuse or acute, base attenuate or cuneate, 10.0-22.5 x 2.5-13.0 cm (mean 15.9 x 7.3); penninerved, primary veins 5-9 pairs, (mode 6), midrib flush with, or very slightly depressed on the upper surface; petiole 8-25 mm long (mean 15.1), flat on the upper surface. Inflorescence paniculate, axillary, frequently on the twigs below the leaves, occasionally pseudoterminal; bracts

linear, lanceolate, or triangular, 0.6-1.3 mm long, deciduous, usually absent at anthesis. Flowers cream to green, pleasantly perfumed (faint or strong), scarcely opening at anthesis, the tepals remaining erect and forming a sheath around the exserted anthers and style. Pedicel 1.9-6.3 x 0.5-0.7 mm. Perianth tube 0.7-1.8 x 1.5-2.4 mm at the widest point, but narrowing towards the apex, where it ranges from 1.2-1.9 mm diam; outer tepals larger, 0.6-1.3 x 1.0-1.4 mm, inner tepals 0.4-0.9 x 0.4-0.8 mm, tepals usually clothed in appressed hairs on both the inner and outer surfaces, occasionally glabrous outside. Anthers hairy abaxially, sometimes glabrous adaxially, opening sideways, 0.6-1.0 x 0.5-0.8 mm, filaments hairy, 0.7-1.0 mm long; glands glabrous, sessile, 6, distinct, 0.5-0.8 x 0.3-0.5 mm; staminodes 3, generally undifferentiated, sometimes ± lanceolate, generally sparsely hairy, rarely glabrous, 0.3-1.2 mm long. Ovary mainly glabrous, 0.6-1.1 x 0.6-0.9 mm, style glabrous, 0.9-1.3 mm long. Fruits red, orange-red or pink, globular, sometimes wider than long, usually longitudinally ribbed, (50)60-80 x (50)65-100 mm, mesocarp + exocarp (7)11-17 mm thick, endocarp (1.0)1.5-2.5 mm thick. Seed (25)30-40 x (22)30-46 m, testa 0.2-1.0 mm thick, radicle basal. Cotyledons cream to apricot. Seedling leaves green on the underside, tap root thick ± resembling a carrot, vascular rays prominent. (Fig. 78 C-D)

Distribution (Fig. 97, Map 55)

Ecology

Rain forests of northern Queensland on a variety of rock types but reaching its best development on soils derived from basalt. Altitudinal range: Sea level to 1000 m.

Uses

This species produces millable logs and the sawn timber is marketed as Hairy Walnut. Wood S.G. 0.70-0.80.

Notes and Observations

Flowers have been collected in November, December, January and February, while ripe fruits have been collected in December, January, March, April and July. The flowering-fruiting cycle is thought to be 12 months or more. Seedling germination period about 35-100 days.

This species is very closely related to E. pubens, but flowering specimens can be readily distinguished by the anther glands which are present on E. insignis but absent on E. pubens.

Specimens Examined (62 collections examined)

21. Endiandra introrsa C. White, Proc. Roy. Soc. Queensland, 59:151 (1948); Francis, Austral. Rain-Forest Trees ed.2:142 (1951); Floyd, N.S.W. Rainforest Trees, Part 1, ed.2:75 (1979); Stanley & Ross, Flora of south-eastern Queensland 1:165 (1983).
Type: W.T. Jones 3, Orara West (BRI holotype, NSW isotype).

Tree to 40 m tall x 100 cm dbh, usually large and well formed. Stem buttressed in the larger but not the smaller size classes. Bark nondescript, outer blaze pink, occasionally cream, granular in texture. Twigs terete to shallowly fluted, clothed in straight, appressed, pale brown hairs when young, almost glabrous when older. Leaves: Underside slightly glaucous, clothed in straight, appressed, pale brown hairs when young, but almost glabrous when older. Leaf blade lanceolate, apex acuminate, base attenuate, 6.0-9.5 x 1.8-2.7 cm

(mean 6.9 x 2.2); penninerved, primary veins 6-13 pairs (mode 10), midrib raised above or flush with the upper surface; petiole 5-10 mm long (mean 6.8), channelled on the upper surface. Inflorescence paniculate, axillary, bracts lanceolate or navicular, 0.6-1.5 mm long, deciduous, absent at anthesis. Flowers yellowish green, without any obvious perfume, not opening very widely, the tepals at anthesis surrounding the style and anthers so that only the stigma, the tip of the style and anther flaps are visible. Pedicel 1.4-2.0 x about 0.5 mm. Perianth tube about 0.5 x 1.6-2.2 mm; outer tepals larger, 0.6-0.8 x 1.3-1.6 mm, inner tepals 0.5-0.7 x 1.2-1.3 mm, all tepals usually with sparsely scattered hairs on both the inner and outer surfaces. Anthers glabrous, opening inwards, 0.7-0.9 x 1.0-1.2 mm, filaments hairy, 0.2 mm long; glands absent; staminodes 3, undifferentiated, hairy, 0.8-0.9 mm long; ovary glabrous, 0.4-0.7 x 0.5-0.7 mm, style glabrous, 0.6-0.8 mm long. Fruits black when ripe but reddish before maturity, usually globular, often broader than long, occasionally ellipsoid, 40-55 x 40-50 mm, mesocarp + exocarp 0.7-1.4 mm thick, endocarp 2.5-4.0 mm thick. Seed 30-40 x 30-40 mm, testa 0.1-0.3 mm thick, radicle apical. Cotyledons orange or yellowish. Seedling leaves glaucous on the underside. (Fig. 78 E-F)

Distribution (Fig. 94, Map 40)

Ecology

Rain forests of northern New South Wales, usually on the poorer soils derived from sedimentary and acid volcanic rocks. Altitudinal range: 300-1000 m.

Uses

This species produces millable logs and the sawn timber is marketed as Red Plum. Wood S.G. 0.75-0.80.

Notes and Observations

Flowers have been collected in November, while fruits have been collected in January, March, May and November. This corresponds fairly well with the findings of Floyd (1979) who recorded flowering in October and ripe fruit in February and March. Seedling germination period 50-60 days.

This species is closely related to E. jonesii but is specifically distinct and separated geographically by a gap of approximately 1500 km. It is interesting to note that Bandaranayake et al. (1980) & D.J. Collins et al. pers. comm. have found high levels of the rare compound, endiandric acid, in both species.

Specimens Examined (19 collections examined)

22. Endiandra jonesii B. Hyland sp. nov.
Differt a E. introrsa tepalis externis plus quam 1.3 mm longis, a speciebus ceteris antheris introrsis.
Typus: B. Hyland 7755: State Forest Reserve 143, South Mary Logging Area, 10.x.1974 (holotypus QRS).
Differing from E. introrsa the outer tepals being more than 1.3 mm long, from other species in the anthers opening inwards.

Tree to 35 m tall x 60 cm dbh, usually medium sized and well formed. Stem usually buttressed. Bark nondescript, occasionally flaky, outer blaze usually pink or red, occasionally brownish, granular in texture. Twigs terete or fluted, clothed in straight, appressed, white or pale brown hairs when young but ± glabrous at maturity. Leaves: Underside green or slightly glaucous, clothed in

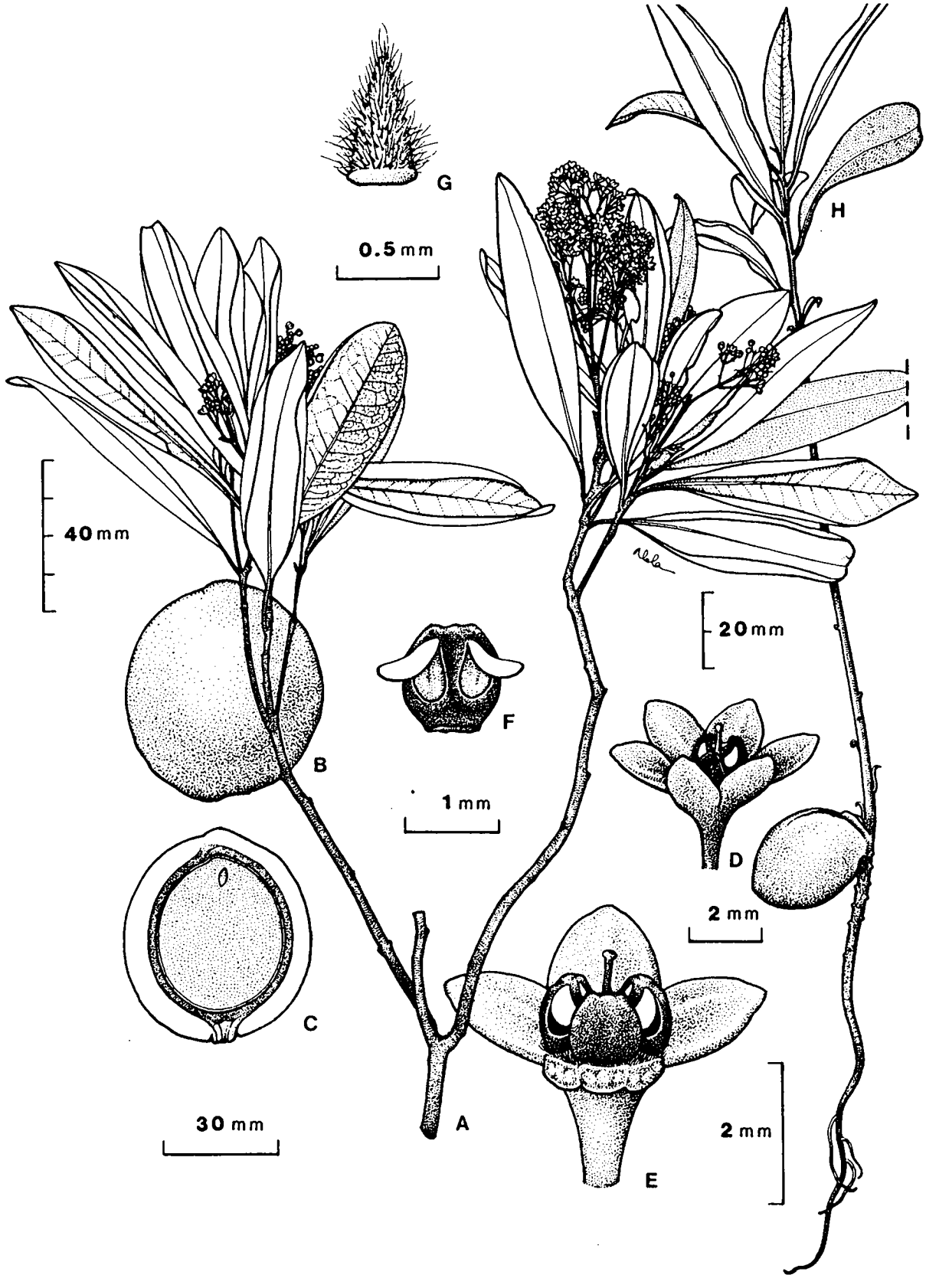

Fig.48. Endiandra jonesii. A Habit Hyland 7755; B fruit, C fruit (LS) Gray 760; D flower, E flower (side view, 3 tepals removed), F stamen (adaxial view), G staminode (abaxial view), Hyland 7755; H seedling Gray 760.

straight, appressed, pale brown hairs when young but sometimes becoming almost glabrous when older. Leaf blade lanceolate, apex acute, obtuse, rarely rounded, base cuneate, attenuate, margin frequently recurved, 5.0-8.7 x 1.5-2.6 cm (mean 6.6 x 2.2); penninerved, primary veins 8-13 pairs (mean 11), midrib depressed or flush with the upper surface; petiole 6-11 mm long (mean 9.2), flat or channelled on the upper surface. Inflorescence paniculate, axillary, bracts linear, lanceolate or spathulate, 0.7-2.0 mm long, present at anthesis. Flowers usually cream, sometimes creamy yellow, pleasantly perfumed, opening widely, the tepals eventually becoming reflexed at or after anthesis. Pedicel 0.8-3.3 x 0.6-0.8 mm. Perianth tube 0.2-0.6 x 1.5-2.3 mm, outer tepals 1.6-2.4 x 1.3-1.8 mm, inner tepals usually larger, 1.9-2.3 x 1.7-1.8 mm, all tepals with hairs on both the inner and outer surfaces. Anthers pubescent at the base and usually along the midline on the abaxial surface, opening inwards, 0.7-1.1 x 0.9-1.3 mm, filaments hairy, 0.0-0.1 mm long; glands absent, staminodes 3, usually present, undifferentiated, 0.5-0.8 mm long. Ovary sessile, hairy, 0.4-0.8 x 0.5-0.9 mm, style glabrous or with a few hairs, 0.6-1.1 mm long. Fruits black or purplish black, ellipsoid, globular, but more commonly depressed globular, usually also laterally compressed, 43-55 mm long and 40-61 x 35-55 mm wide along the longer and shorter horizontal axes, mesocarp + exocarp 1.3-6.0 mm thick, endocarp 0.5-3.0 mm thick. Seed usually laterally compressed 32-42 mm long and 25-42 x 29-48 mm along the longer and shorter horizontal axes, testa 0.2-1.1 mm thick, radicle apical or almost apical. Cotyledons cream or yellowish. Seedling leaves green or glaucous on the underside. (Fig. 48, 79 A-B)

Distribution (Fig. 95, Map 46)

Ecology

This species is found in rain forests in northern Queensland on soils derived from granite. Altitudinal range: 600-1300 m.

Uses

This species grows large enough to produce millable logs but is not utilized and no Standard Trade Name has been allocated. Wood S.G. 0.80.

Notes and Observations

Flowers have been collected in August, October, November and December, while ripe fruits have been collected in April, May, August, September and November. Seedling germination period about 34-180 days.

Etymology

It gives me great pleasure to name this species after Mr D.L. Jones who, although primarily interested in orchids and ferns has assisted me in my botanical endeavours, Australian vernacular and in other ways.

Specimens Examined (24 collections examined)

23. Endiandra leptodendron B. Hyland sp. nov.
Differt a E. hayesii pilis tepalorum brevioribus, et appressis et erectis non solum longis et erectis.
Typus: B. Gray 2978: State Forest Reserve 755, Boonjee Logging Area, 22.ii.1983 (holotypus QRS).
Differing from E. hayesii the tepal hairs being short, appressed and erect, not long and erect only.

Tree to 18 m tall x 30 cm dbh, usually small and slender. Stem usually buttressed. Bark nondescript, outer blaze pink, granular or fibrous in texture. Twigs terete or slightly fluted, clothed in straight and tortuous, appressed and erect, white or pale brown hairs. Leaves: Underside green, glabrous or sparsely clothed in tortuous, erect, pale brown hairs. Leaf blade usually elliptical, occasionally lanceolate, apex acuminate or obtuse, base cuneate or rounded, 9.5-16.0 x 4.0-7.5 cm (mean 12.6 x 5.7); penninerved, primary veins 5-8 pairs (mode 6), midrib raised or flush with the upper surface; petiole 7-15 mm long (mean 9.8), flat or channelled on the upper surface. Inflorescence many flowered, paniculate, axillary, not exceeding the leaves, bracts navicular or hemi-minaretiform, 0.7-1.6 mm long, deciduous, absent at anthesis. Flowers pale green to bluish green, faintly but pleasantly perfumed, or without any obvious perfume, ± domed at the apex scarcely opening at anthesis, the tepals surrounding the anthers so that only the tips of the anthers, their valves and the stigma exceed the tepals. Pedicel 1.1-5.5 x 0.5-0.9 mm. Perianth tube 0.3-1.0 x 2.2-3.6 mm, outer tepals larger, 0.9-1.8 x 1.8-2.5 mm, inner tepals 0.9-1.6 x 1.3-1.9 mm, all tepals with short, appressed and erect hairs on the outer surfaces but not always on the inner surfaces. Anthers usually with a few hairs on the adaxial surface, opening outwards or sideways, 0.4-0.6 x 0.5-0.7 mm, filaments hairy, 0.3-0.5 mm long; glands usually glabrous outside, but sometimes partly hairy on the inside, 6, distinct, 0.5-0.8 x 0.8-1.1 mm, stalks hairy, 0.2-0.3 mm long; staminodes 3, differentiated, head mainly glabrous except for some basal hairs, 0.3-0.4 mm long, filaments hairy, 0.3-0.4 mm long. Ovary glabrous, stipitate, stalk 0.1-0.2 mm long, ovary 0.5-0.7 x 0.9-1.0 mm, style glabrous, 0.2-0.5

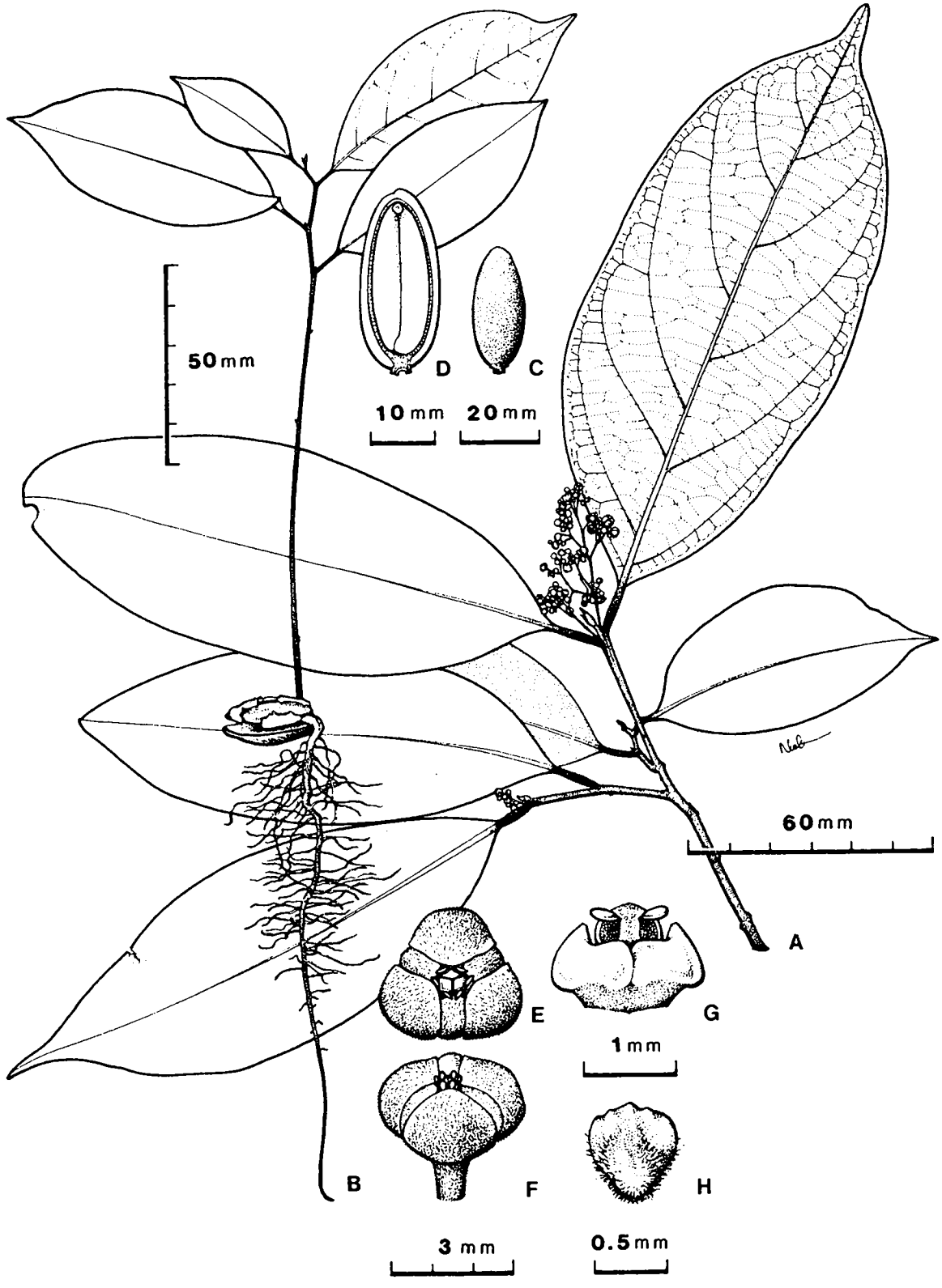

Fig.49. Endiandra leptodendron. A Habit Gray 2978; B seedling, C fruit, D fruit (LS) Gray 3283; E flower (top view), F flower (side view), G anther and large glands (abaxial view), H staminode (abaxial view) Gray 2978.

mm long. Fruits black (usually shiny, sometimes slightly glaucous), ellipsoid, 18-29 x 12-14 mm, mesocarp + exocarp 0.5-1.5 mm thick, endocarp 0.3-0.7 mm thick. Seed 13-18 x 9-11 mm, testa about 0.1 mm thick, radicle apical. Cotyledons cream or yellow. Seedling leaves green on the underside. (Fig 49, 79 C-D)

Distribution (Fig. 97, Map 56)

Ecology

Rain forests of northern Queensland on soils derived from a variety of rock types. Altitudinal range: Sea level to 1000 m.

Uses

This species has no commercial value as it does not grow large enough to produce millable logs. Wood S.G. 0.87.

Notes and Observations

Flowers have been collected in February, March, May and June, while ripe fruits have been collected in December. Seedling germination period about 25-50 days.

This species may be related to Endiandra hayesii which has a similar flower. However, the inflorescence of E. leptodendron is much more complex and the flowers are not densely clothed in long hairs.

Etymology

The specific epithet refers to the fact that this species is usually a rather small and insignificant tree.

Specimens Examined (42 collections examined)

24. Endiandra limnophila B. Hyland sp. nov

Differt a speciebus ceteris tubo perianthii 1.0-1.3 mm diametro et orificio fovearum ± semicirculari.

Typus: B. Hyland 12377: Between Lockerbie and Somerset, 8.xii.1982 (holotypus QRS).

Differing from other species, the perianth tube being 1.0-1.3 mm diameter and the opening of the foveoles more or less semicircular.

Tree to 20 m tall x 30 cm dbh, usually small. Stem usually buttressed. Bark nondescript, outer blaze cream, pink, red or brown, granular in texture. Twigs terete, clothed in straight, appressed, pale brown hairs. Leaves: Underside usually somewhat glaucous (at least when young), clothed in straight, appressed, pale brown hairs; foveoles usually present, 3-5 per leaf, occassionally fewer or up to 6 per leaf. Leaf blade elliptical, apex, obtuse to acuminate, base cuneate or attenuate, 5.5-12.5 x 3.0-5.0 cm (mean 8.5 x 4.1); penninerved, primary veins 4-8 pairs (mode 5), midrib flush with the upper surface; petiole 8-17 mm long (mean 11.7), flat on the upper surface. Inflorescence paniculate, axillary, not exceeding the leaves, bracts linear or triangular, 0.7-1.0 mm long, deciduous, absent at anthesis. Flowers pale green to cream but turning brown with age, faintly but pleasantly perfumed or without an odour, opening quite widely, the tepals becoming almost horizontal at anthesis. Pedicel 0.6-0.9 x about 0.4 mm. Perianth tube about 0.5 x 1.0-1.3 mm, outer tepals 1.2-1.4 x 0.7-0.8 mm, inner tepals 1.2-1.4 x 0.6-0.7 mm, all tepals with hairs on both the inner and outer surfaces. Anthers glabrous, opening outwards or sideways, about 0.4 x 0.4-0.5 mm, filaments hairy, 0.3-0.4 mm long; glands glabrous, 6, distinct, 0.2-0.3 x 0.3-0.5 mm, stalks glabrous, 0.1-0.2 mm long; staminodes 3, differentiated, head glabrous, 0.3-0.4 mm long, filament hairy, 0.1-0.25 mm long. Ovary glabrous, 0.5-0.6 x 0.4-0.5 mm, style

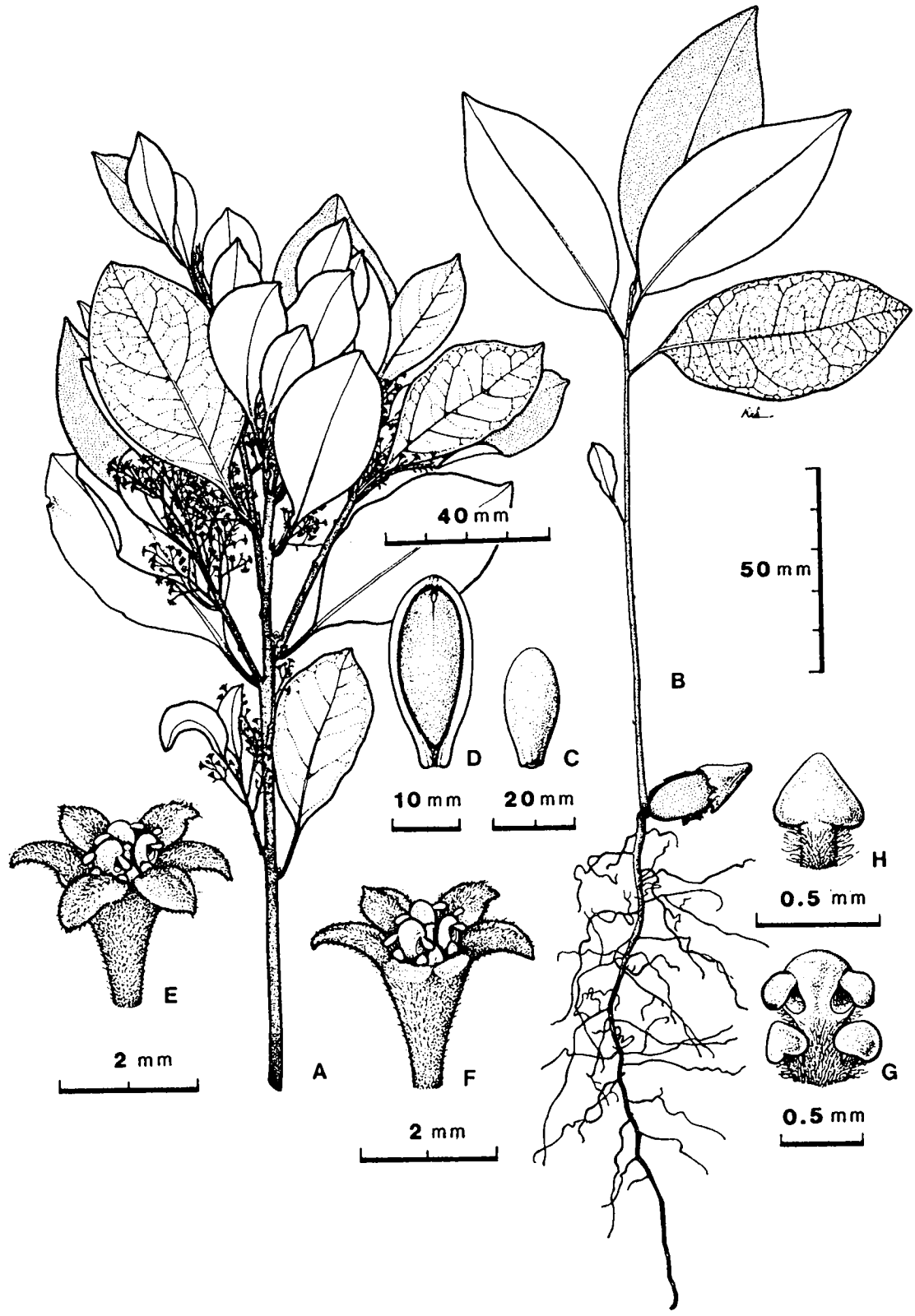

Fig.50. Endiandra limnophila. A Habit, B seedling, C fruit, D fruit (LS), E flower, F flower (oblique view, 2 tepals removed), G anther and glands (abaxial view), H staminode Hyland 12377.

glabrous, 0.1-0.5 mm long. Fruits black, glaucous, usually ellipsoid, sometimes pyriform, 28-35 x 14-15 mm, mesocarp + exocarp 0.9-1.3 mm thick, endocarp 0.2-0.4 mm thick. Seed 22-27 x about 11 mm, testa 0.2-0.4 mm thick, radicle apical. Cotyledons cream. Seedling leaves green on the underside. (Fig 50, 79 E-F)

Distribution (Fig. 97, Map 54)

Ecology

A northern Australian gallery rain forest species normally found on swampy creek margins. Altitudinal range very small: Sea level to 80 m.

Uses

This species has no commercial value as it does not grow large enough to produce millable logs. Wood S.G. 0.68.

Notes and Observations

Flowers have been collected in November and December, while ripe fruits have been collected in September, October and December. Seedling germination period 30-60 days.

Etymology

The specific epithet was chosen because this species is usually found in swampy situations.

Specimens Examined (17 collections examined)

25. **Endiandra longipedicellata** C. White & Francis, Queensl. Dept. of Agric., Bot. Bull. 22:31 (1920).

Type: H.W. Mocatta, Atherton District (BRI 10077 holotype, K isotype).

Tree to 30 m tall x 70 cm dbh, usually medium sized and well formed. Stem usually buttressed. Bark flaky or nondescript, rarely otherwise, outer blaze pink or red, granular in texture. Twigs fluted, clothed in tortuous, erect, brown or rusty brown hairs. Leaves: Underside green or slightly glaucous, densely clothed in tortuous, erect, brown or rusty brown hairs when young but much less so when older. Leaf blade lanceolate, apex acuminate, base attenuate, 7.5-16.5 x 2.0-6.5 cm (mean 11.7 x 4.6); penninerved, primary veins 5-9 pairs, (mode 7), midrib flush with the upper surface; petiole 6-16 mm long (mean 9.4), flat on the upper surface. Inflorescence paniculate, long and slender (e.g. 10-20 cm long), exceeding the leaves, axillary, occasionally pseudoterminal; bracts linear or triangular, 1.3-2.0 mm long, deciduous, present or absent at anthesis. Flowers green or olive-green, without any obvious perfume, not opening very widely, the tepals being ± vertical at anthesis. Pedicel 2.0-5.5 x 0.6-0.9 mm. Perianth tube 1.4-2.6 x 2.2-3.1 mm, outer tepals larger, 1.9-3.0 x 1.9-2.6 mm, inner tepals 2.1-2.5 x 1.5-2.1 mm, all tepals with hairs on both the inner and outer surfaces. Anthers glabrous, opening outwards and sideways, 0.5-0.6 x 0.7-0.9 mm, filaments hairy, 0.2-0.4 mm long; glands fused to form a disk or continuous ring of tissue; staminodes absent or indistinguishable from the disk. (Inward projections from the disk may be the remnants of the staminodes). Ovary glabrous, sessile, 1.7-2.3 x 1.2-1.7.mm, style glabrous, 0.1-0.45 mm long. Fruits black or blue-black, ellipsoid, 30-50 x 17-27 mm, mesocarp + exocarp 1.5-5.0 mm thick, endocarp 0.2-0.7 mm thick. Seed 24-42 x 11-21 mm, testa 0.1-0.7 mm thick, radicle apical. Cotyledons pink, sometimes cream.

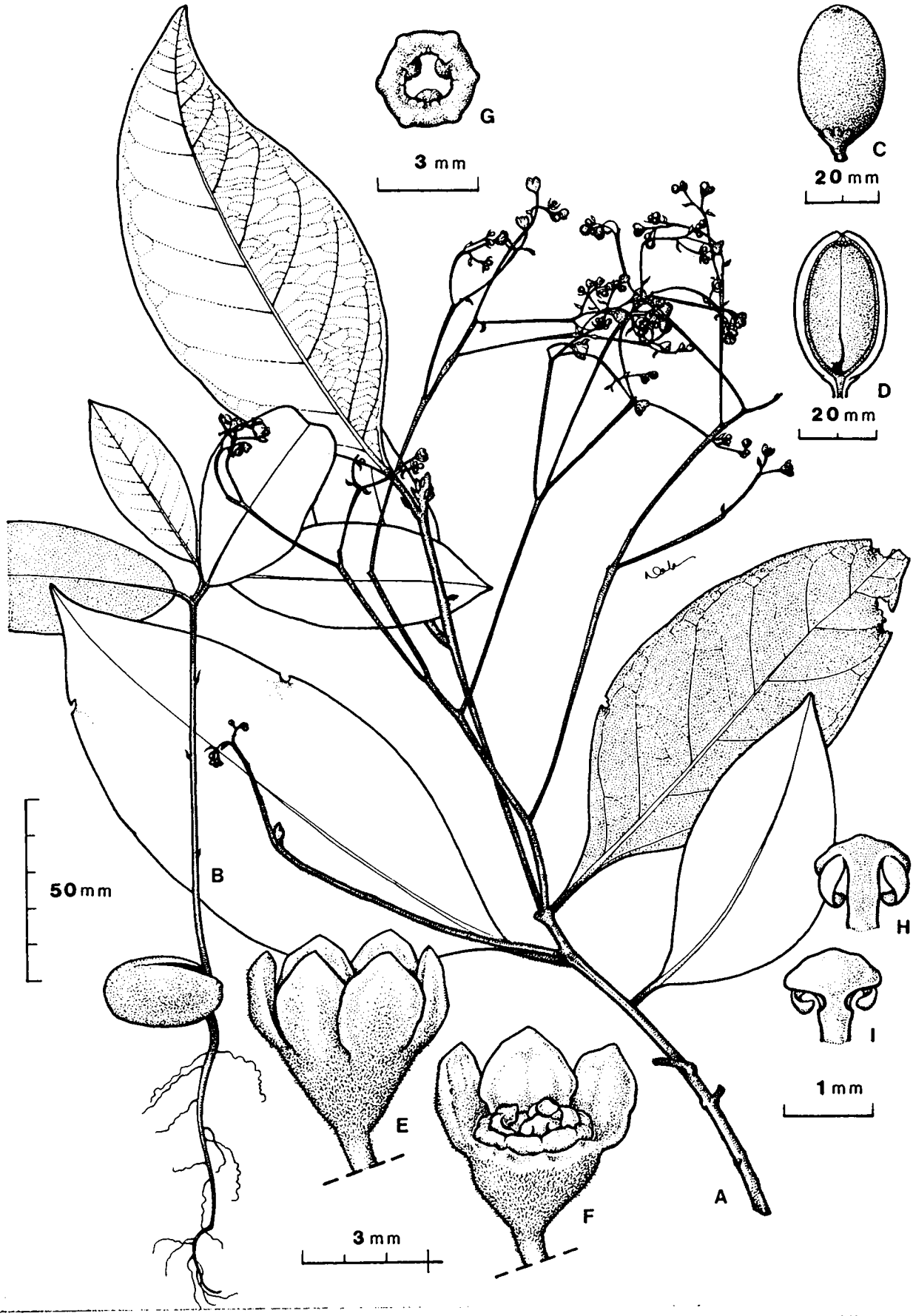

Fig.51. Endiandra longipedicellata. A Habit Hyland 3517 RFK; B seedling, C fruit, D fruit (LS) Dockrill 538; E flower, F flower (side view, 3 tepals removed) Stocker 868; G glands (fused into a disc, top view), H stamen (abaxial view), I stamen (adaxial view) Hyland 3517 RFK.

Seedling leaves green on the underside. (Fig 51, 80 A-B)

Distribution (Fig. 96, Map 48)

Ecology

Rain forests and gallery forests of northern Queensland on soils derived from a variety of rock types, but tending to be more common in the more seasonal forests. Altitudinal range: Sea level to 700 m.

Uses

This species produces millable logs and the sawn timber is marketed as Buff Walnut. Wood S.G. 0.96-0.98.

Notes and Observations

Flowers have been collected in September and October, while ripe fruits have been collected each month from October to January. Seedling germination period 20-50 days.

Specimens Examined (56 collections examined)

26. Endiandra microneura C. White, Proc. Roy. Soc. Queensland 59:152 (1948).
E. reticulata C. White, Proc. Roy. Soc. Queensland 47:76 (1936) nom. illeg., non Gillespie, Bernice P. Bishop Mus. Bull. 83:8 (1931).
Type: L.J. Brass 2244, Daintree River (BRI holotype; A, BISH, BO, SING, isotypes).

Tree to 30 m tall x 80 cm dbh, usually medium to large sized and well formed. Stem usually buttressed, particularly in the larger size classes. Bark flaky or nondescript, outer blaze usually pink or brown, sometimes cream on small trees, granular in texture. Twigs fluted, and clothed in straight, appressed, pale brown hairs when

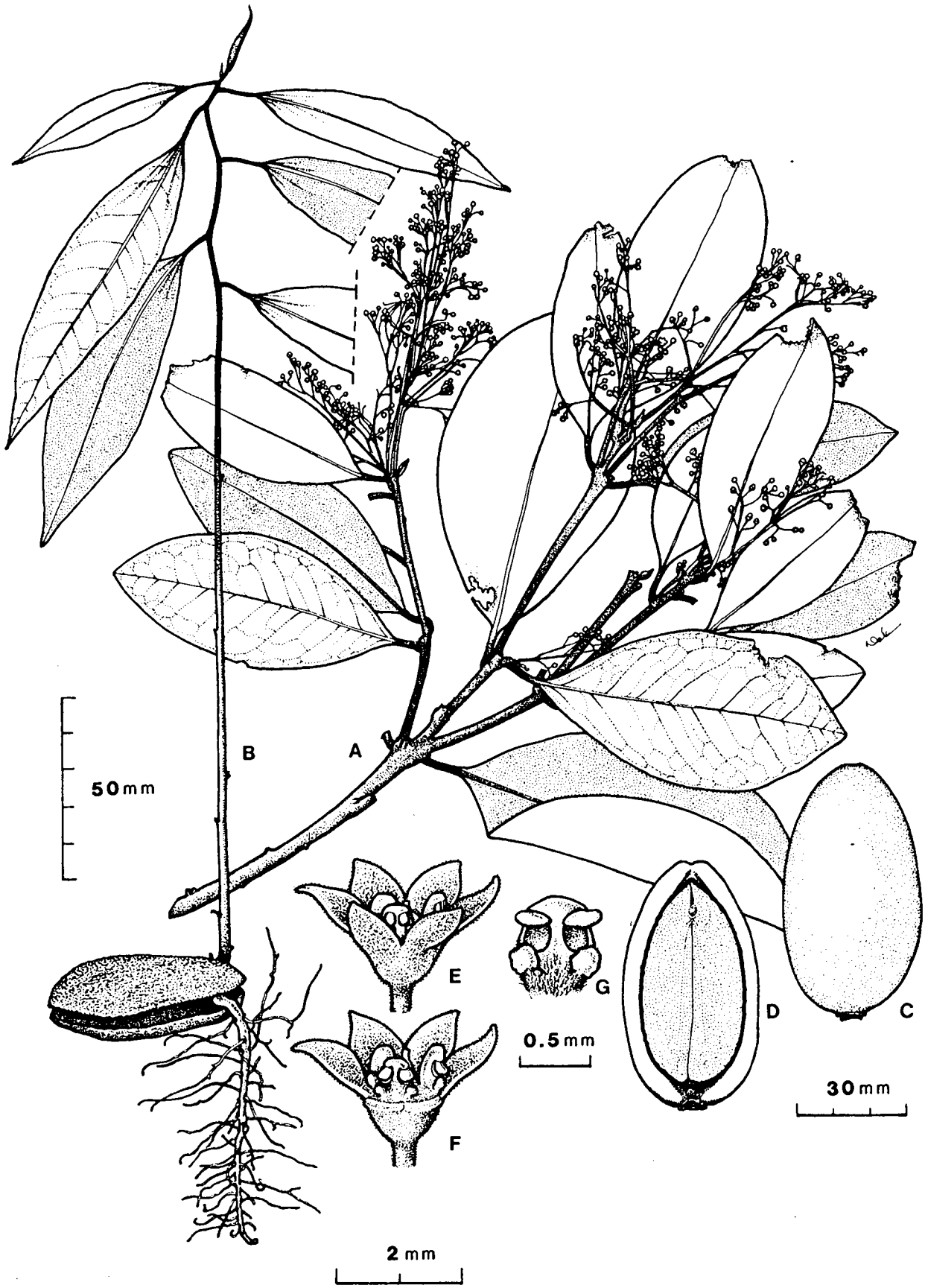

Fig.52. Endiandra microneura. A Habit Hyland 5965; B seedling, C fruit, D fruit (LS) Hyland 2963; E flower, F flower (side view, 2 tepals removed), G stamen and glands (abaxial view) Flecker Herb. 14786.

young but almost terete and glabrous when older. Leaves: Underside green and glabrous. Leaf blade elliptical, apex obtuse or acute, base cuneate, 8.5-15.0 x 3.0-6.5 cm (mean 11.7 x 4.6); penninerved, primary veins 7-13 pairs (mode 9), midrib raised on the upper surface; petiole 8-17 mm long (mean 11.7), flattened or channelled on the upper surface. Inflorescence paniculate, axillary and pseudoterminal, bracts triangular, spathulate or navicular 0.8-1.2 mm long, deciduous, absent at anthesis. Flowers cream, perfume resembling that of freshly cut watermelon, opening quite widely at anthesis, the tepals becoming ± horizontal, at least towards the tips. Pedicel 0.5-2.7 x 0.4-0.7 mm. Perianth tube 0.7-1.3 x 1.3-2.1 mm, outer tepals larger, 1.2-1.3 x 1.0-1.2 mm, inner tepals 1.0-1.4 x 0.8-1.3 mm, all tepals with hairs on both the inner and outer surfaces. Anthers mainly glabrous, hairy adaxially near the base, opening outwards, 0.5-0.7 x 0.5-0.8 mm, filaments hairy, 0.1-0.2 mm long; glands glabrous, 6, distinct, 0.2-0.4 x 0.3-0.6 mm, sessile (or almost so); staminodes usually absent sometimes present (0-3) about 0.4-0.5 mm long. Ovary glabrous, 0.6-0.8 x 0.7-0.8 mm, style glabrous, 0.3-0.4 mm long. Fruits yellow or orange, ellipsoid, 50-78 x 28-43 mm, laterally compressed, mesocarp + exocarp 4-5 mm thick, endocarp 0.5-1.0 mm thick. Seed 40-66 x 20-35 mm, laterally compressed, testa 0.1-0.3 mm thick, radicle located between the centre and the apex (about 10-15 mm from the apex). Cotyledons cream. Seedling leaves green on the underside. (Fig. 52, 80 C-D)

Distribution (Fig. 95, Map 45)

Ecology

A tree with a very restricted distribution in lowland rain forests

of the Daintree River district. Usually found on soils derived from metamorphic rocks. Altitudinal range: Sea level to 250 m.

Uses

This species grows large enough to produce millable logs and it is occasionally utilized, however, it does not have a Standard Trade Name. Wood S.G. 0.83.

Notes and Observations

Flowers have been collected in December, March and April, while ripe fruits have been collected each month from August to December. Seedling germination period about 30 days.

The leaves of this species are quite characteristic, particularly when dry, when all the veins show up very clearly, even the finest reticulations, all of which are raised on the upper surface of the leaf blade.

Specimens Examined (21 collections examined)

27. Endiandra monothyra B. Hyland sp. nov.
Differt a speciebus ceteris antheris univalvatis.
Typus: B. Gray 317: State Forest Reserve 185, Robson Logging Area, 22.ii.1977 (holotypus QRS).
Differing from other species the anthers opening by one valve.

Two subspecies are recognized in this species.

Key to the Subspecies

1a. Pedicel 0.3-1.3 mm long. Mature leaves sparsely pubescent or almost glabrous on the underside. . . . . ssp. monothyra

b. Pedicel 1.5-2.4 mm long. Mature leaves pubescent on

the underside. . . . . .ssp. trichophylla

a. Endiandra monothyra B. Hyland ssp. monothyra

Tree to 35 m tall x 80 cm dbh, usually medium sized and well formed. Stem usually buttressed, particularly in the larger size classes. Bark usually nondescript, occasionally flaky, outer blaze, red, pink or brown, granular in texture. Twigs fluted, clothed in tortuous, erect, brown hairs. Leaves: Underside green, clothed in tortuous, appressed and erect, pale brown hairs when young but only sparsely pubescent at maturity. Leaf blade lanceolate, elliptical or ovate, apex acuminate to obtuse, base cuneate to rounded, 6.0-15.0 x 2.5-7.5 cm (mean 10.3 x 4.8); penninerved, primary veins 4-9 pairs (mode 6), depressed on the upper surface, midrib depressed on the upper surface; petiole 5-14 mm long (mean 8.8), flat on the upper surface. Inflorescence paniculate, axillary and pseudoterminal, bracts orbicular, hemispherical or hemi-minaretiform, 1.6-2.3 mm long, persistent, present at anthesis. Flowers pale brown, brown or greenish brown, without any obvious perfume, not opening very widely, the tepals being ± vertical at anthesis. Pedicel 0.3-1.3 x 0.8-1.3 mm. Perianth tube 0.7-1.7 x 2.0-3.0 mm, outer tepals larger, 0.9-1.3 x 1.5-2.0 mm, inner tepals 0.8-1.1 x 1.2-1.6 mm, all tepals with hairs on both the inner and outer surfaces. Anthers usually glabrous, occasionally hairy, opening inwards by means of one valve, anther 0.35-0.45 x 0.35-0.60 mm, filaments hairy, 0.2-0.75 mm long; glands sessile or almost sessile, glabrous, 6, distinct, 0.1-0.2 x 0.3-0.5 mm; staminodes 3, usually differentiated, head glabrous, 0.25-0.45 mm long, filament hairy, 0.2-0.4 mm long. Ovary glabrous, sessile, 0.6-0.7 x 0.5-0.7 mm, style glabrous, 0.1-0.2 mm long. Fruits black (usually shiny), often maroon before maturity, usually ellipsoid,

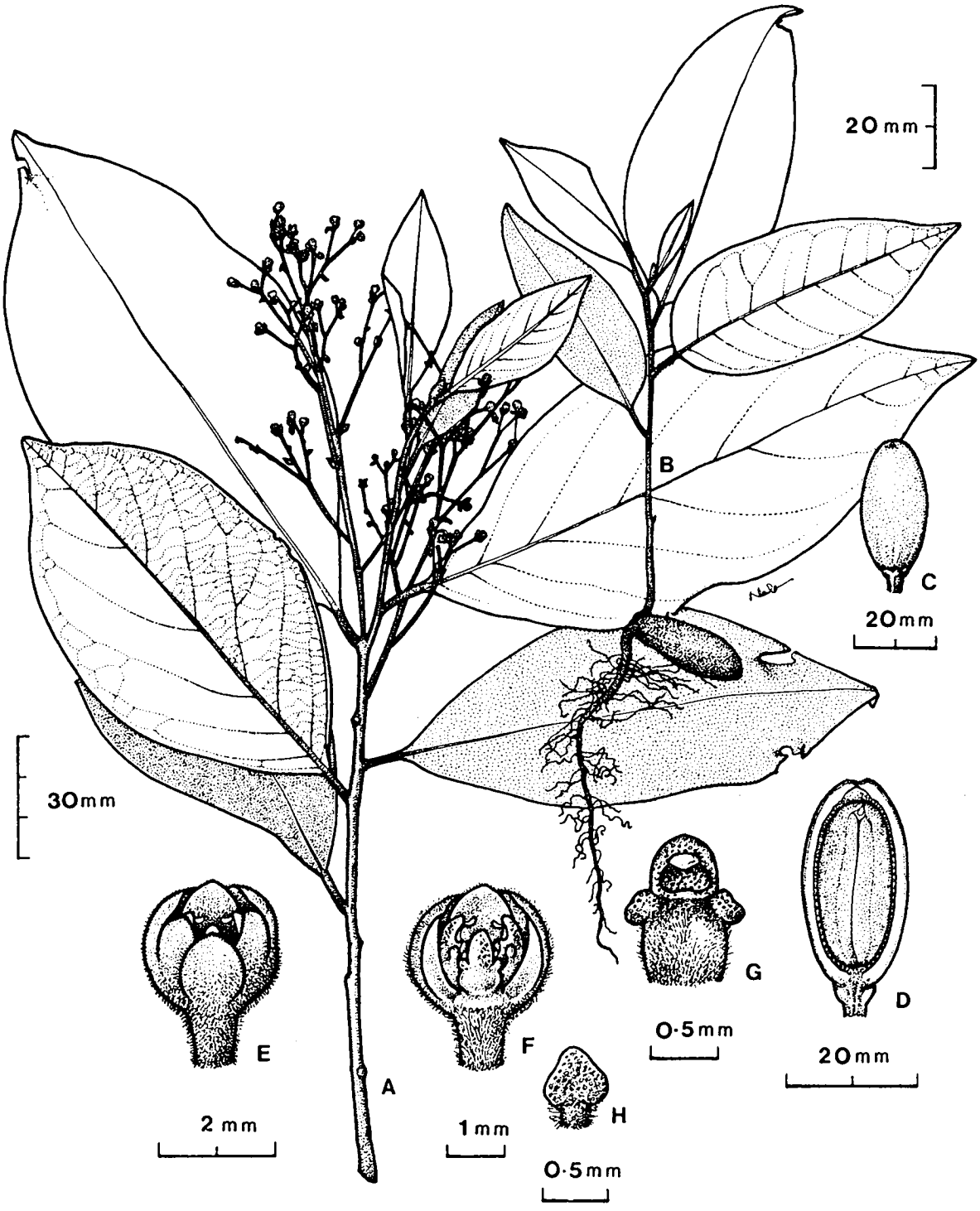

Fig.53. Endiandra monothyra. A Habit Gray 317; B seedling, C fruit, D fruit (LS) Irvine 387; E flower (oblique view), F flower (side view, 3 tepals removed), G stamen and glands (adaxial view), H staminode (adaxial view) Gray 317.

sometimes ovoid, narrowly ovoid or cylindrical, 30-40 x 15-20 mm, mesocarp + exocarp 1.2-1.8 mm thick, endocarp 0.4-0.6 mm thick. Seed 27-34 x 10-15 mm, testa about 0.1 mm thick, radicle apical. Cotyledons cream or yellow. Seedling leaves green on the underside. (Fig. 53, 80 E-F)

Distribution (Fig. 94, Map 40)

Ecology

Rain forests of northern Queensland on soils derived from a variety of rock types. Altitudinal range: 200-1000 m.

Uses

This species grows large enough to produce millable logs but as there has been a certain amount of confusion about the specific identity of this species, the properties of its sawn timber are unknown, and it has not been given a Standard Trade Name. Wood S.G. 0.74-0.86.

Notes and Observations

Flowers have been collected each month from January to June with most collections in February and March, while fruits have been collected in September, October and November. Seedling germination period 24-70 days.

Flowering specimens of this species can be readily identified by the anthers opening inwards by one valve.

Etymology

The specific epithet refers to the single opening in each anther.

Specimens Examined (76 collections examined)

b. Endiandra monothyra ssp. trichophylla B. Hyland ssp. nov.
Differt a ssp. typica pedicellis 1.5-2.4 mm longis et laminis subtus pubescentibus.
Typus: B. Gray 1589: State Forest Reserve 310 Gadgarra, Presley L. A., 12.xii.1979 (holotypus QRS).
Differs from ssp. typica the pedicel 1.5-2.4 mm long and the lamina pubescent on the underside.

Tree to 25 m tall x 60 cm dbh, usually medium sized and well formed. Stem buttressed, at least in the larger size classes. Bark nondescript, outer blaze pink, red or brown, occasionally cream, granular in texture. Twigs terete or fluted, clothed in tortuous, erect, brown hairs. Leaves: Underside green, clothed in tortuous, erect brown hairs which persist even on fully mature leaves. Leaf blade lanceolate, elliptical, apex acuminate, base cuneate or shortly attenuate, 5.5-8.5 x 2.0-3.5 cm (mean 6.7 x 2.7); penninerved, primary veins 4-6 pairs, depressed on the upper surface, midrib depressed on the upper surface; petiole 5-10 mm long (mean 8.2), flat on the upper surface. Inflorescence paniculate, axillary and pseudoterminal, bracts orbicular, spathulate or spoonform, 1.4-2.5 mm long, persistent, present at anthesis, Flowers brown outside but greenish inside, without any obvious perfume, not opening very widely, the tepals being ± vertical at anthesis. Pedicel 1.5-2.4 x 0.7-0.8 mm. Perianth tube 0.9-1.4 x 2.1-2.6 mm, outer tepals usually larger, 1.1-1.2 x 1.4-1.6 mm, inner tepals 1.0-1.2 x 1.1-1.3 mm, all tepals with hairs on both the inner and outer surfaces. Anthers hairy or glabrous, opening inwards by means of one valve, anther 0.35-0.50 x 0.45-0.50 mm, filaments hairy, 0.3-0.5 mm long; glands sessile,

0.1-0.4 x 0.3-0.4 mm; staminodes differentiated, head hairy or glabrous, 0.3-0.4 mm long, filament hairy, 0.2-0.3 mm long. Ovary glabrous, about 0.6 x about 0.6 mm diameter, style glabrous, 0.1-0.2 mm long. Fruits black (usually shiny), ellipsoid, about 35 x about 15 mm, mesocarp + exocarp about 1.2 mm thick, endocarp about 0.2 mm thick. Seed about 28 x about 12 mm, testa about 0.1 mm thick, radicle apical. Cotyledons cream. Seedling leaves green on the underside. (Fig. 81 A-B)

Distribution (Fig. 94, Map 41)

Ecology

Rain forests of northern Queensland on soils derived from a variety of rock types. Altitudinal range: 650-800 m.

Uses

This species grows large enough to produce millable logs but because of uncertainty about its identity, it has not been given a Standard Trade Name and the properties of its sawn timber are unknown. Wood S.G. 0.87.

Notes and Observations

Flowers have been collected in November, December and February, while ripe fruits have seldom been collected, the only known collections being made in September, October and December. Seedling germination period about 30-40 days.

Etymology

The subspecific epithet was applied because of the hairs which

occur on the underside of the leaves.

Specimens Examined (14 collections examined)

28. Endiandra montana C. White, Contr. Arnold Arbor. 4:36 (1933).
Type: S.F. Kajewski 1497, Mt Alexander (A holotype, B, BRI, K, L, NSW, isotypes).
Brassiodendron fragrans Allen, J. Arnold Arbor. 23:153 (1942);
Endiandra fragrans (Allen) Kosterm., J. Sci. Res. (Jakarta) 1:151 (1952).
Type: L.J. Brass 7465, Lake Daviumbu, Middle Fly River, Papua (A holotype, BO, BRI, L, isotypes).

Tree to 30 m tall x 80 cm dbh, usually medium sized and well formed. Stem usually buttressed in all size classes. Bark nondescript, rarely flaky, outer blaze cream, brown, pink or red, granular in texture. Twigs slightly fluted, angular or terete, glabrous, clothed in straight, pale brown, appressed hairs only when very young. Leaves: Underside green and glabrous. Leaf blade lanceolate, elliptical, apex acuminate or bluntly pointed, base attenuate, 7.0-13.5 x 3.0-6.2 cm (mean 10.2 x 4.8); penninerved, primary veins 6-14 pairs (mode 9), midrib flush with the upper surface; petiole 6-16 mm long (mean 9.5), flat or channelled on the upper surface. Inflorescence racemose, not exceeding the leaves, axillary; bracts navicular or lanceolate, 1.2-3.2 mm long, deciduous, absent at anthesis. Flowers cream, pleasantly perfumed, opening quite widely, the outer tepals becoming almost horizontal at anthesis. Pedicel absent or very short and difficult to distinguish from the perianth tube. Perianth tube 0.6-2.4 x 1.7-2.3 mm, outer tepals often wider, but not necessarily longer than the inner tepals, outer tepals 2.4-3.9 x 1.9-2.7 mm, inner tepals 2.3-4.1 x 1.9-2.7 mm, all tepals glabrous outside (rarely outer tepals sparsely hairy on the outer

surface), but usually tuberculate on at least part of the inner surface. Anthers tuberculate, sometimes rather variable, (3 small + 3 larger), usually opening outwards and sideways but sometimes opening inwards and sideways, 0.9-1.8 x 0.7-1.3 mm, sessile or with tuberculate filaments, 0.2-0.6 mm long; glands glabrous, sessile, distinct, 2 per anther, 0.2-0.3 x 0.3-0.6 mm, staminodes absent. Ovary glabrous, sessile, 0.7-1.1 x 0.6-1.0 mm, style glabrous, 0.1-0.4 mm long. Fruits yellow, orange, orange-red or maroon, globular, pyriform or ellipsoid, 30-52 x 20-41 mm, mesocarp + exocarp 1.8-3.1 mm thick, endocarp 0.5-1.0 mm thick. Seed 21-39 x 15-34 mm, testa 0.1-0.3 mm thick, radicle apical. Cotyledons cream. Seedling leaves green on the underside. (Fig 81 C-D)

Distribution

North-eastern Queensland in Australia (Fig. 96, Map 49), also in New Guinea.

Ecology

Rain forests of northern Queensland on soils derived from a variety of rock types. Altitudinal range: Sea level to 1300 m.

Uses

This species produces millable logs and the sawn timber is marketed as Brown Walnut. Wood S.G. 0.70-0.80.

Notes and Observations

Flowers have been collected from October to December and also in February, while ripe fruits have been collected each month from April

to October. Seedling germination period 36-98 days.

The flowers of this species can be rather variable and the tepals can sometimes appear to be spirally arranged and not in 2 whorls. The number of tepals can also vary and cases have been encountered where tepals have developed as anthers or vice versa. The number of anthers can likewise vary but the number is always in excess of 3 and the "normal" number is 6. This species was originally collected in New Guinea and its generic placement has been the subject of some debate. Collections from the Mollucas also appear to belong here, but in the absence of flowers, it is difficult to be sure.

Specimens Examined (82 collections examined)

29. Endiandra muelleri Meissner in DC., Prodr. 15(1):509 (1864); Benth., Fl.austral 5:302 (1870); Bailey, Queensl. fl. 4:1305 (1901); Francis, Austral. Rain-Forest Trees ed.2:142 (1951); Floyd, N.S.W. Rainforest Trees, Part 1, ed.2:77 (1979); Stanley & Ross, Flora of South-eastern Queensland 1:166 (1983).
Type: F. Mueller (More likely H. Beckler) Clarence River (G-DC holotype, BO, NY isotypes).

Two subspecies are recognized in this species.

Key to the Subspecies.

1a. Twig hairs straight and appressed. . . . . E. muelleri ssp. muelleri

b. Twig hairs straight and tortuous, appressed and erect. .E. muelleri ssp. bracteata

a. Endiandra muelleri ssp. muelleri

Tree to 20 m tall x 40 cm dbh, usually small or medium sized, often flowering when quite small. Stem buttressed in the larger, but not in the smaller size classes, coppice shoots occasionally present at the

base. Bark usually nondescript, occasionally flaky, outer blaze usually pink or reddish, occasionally cream on small trees, usually granular in texture. Twigs fluted and clothed in straight, appressed, pale brown or white hairs when young, but ± terete and almost glabrous when older. Leaves: Underside green, clothed in straight and tortuous, erect and appressed, pale brown hairs; 1 or 2 domatia (either foveoles or tufts of hair), often visible on the underside, at the junction of the primary veins and the midrib. Leaf blade elliptical or lanceolate, apex obtuse to acuminate, base attenuate to cuneate, 5.0-11.0 x 2.0-5.0 cm (mean 8.2 x 3.3); penninerved, primary veins 4-7 pairs (mode 5), midrib depressed on the upper surface; petiole 4-14 mm long (mean 7.2), channelled on the upper surface. Inflorescence paniculate, axillary, sometimes pseudoterminal, bracts usually navicular, or lanceolate, sometimes spathulate or spoonform, 1.2-2.0 mm long, persistent, present at anthesis. Flowers variable in colour, pink to reddish, cream, pale brown or green, without any obvious odour, not opening very widely, the tepals surrounding and almost enclosing the anthers at anthesis. Pedicel 0.8-6.6 x 0.8-1.1 mm. Perianth tube 1.0-1.7 x 2.5-4.0 mm, outer tepals larger, 0.8-1.5 x 1.2-2.1 mm, inner tepals 0.7-1.6 x 1.0-1.7 mm, usually all tepals with hairs on both the inner and outer surfaces (rarely glabrous outside). Anthers glabrous, (apex prominently beaked), opening sideways, 0.5-0.8 x 0.4-0.7 mm, filaments glabrous or hairy, 0.3-0.5 mm long; glands variable in shape, glabrous, 6, distinct, 0.3-0.8 x 0.4-1.0 mm, stalks glabrous or hairy, 0.1-0.2 mm long; staminodes 3, differentiated, head sagittate to almost globular, 0.4-0.7 mm long, filament usually hairy, 0.2-0.5 mm long. Ovary glabrous, 0.7-1.3 x 0.8-1.3 mm, style glabrous, 0.6-1.2 mm long. Fruits black or glaucous

black, ellipsoid, about 30 x 15 mm, mesocarp + exocarp about 1.0 mm thick, endocarp about 0.7 mm thick. Seed about 20 x 10 mm, testa about 0.2 mm thick, radicle apical. Cotyledons cream. Seedling characteristics unknown. (Fig. 81 E-F)

Distribution (Fig. 94, Map 38)

Ecology

Rain forests of northern New South Wales and the southern extremity of Queensland, usually on the poorer soils derived from sedimentary rocks. Altitudinal Range: Sea level to 900 m.

Uses

This species occasionally produces millable logs and has been given the Standard Trade Name of Mueller's Walnut. Wood S.G. 0.75.

Notes and Observations

Flowers have been collected in March and April and also in November and December, but fruiting specimens in Australian herbaria are few and scanty and it is not possible, from this source, to nominate months in which mature fruits might be expected, however Floyd (1979) states that fruit ripens in April.

Specimens Examined (77 collections examined)

b. Endiandra muelleri ssp. bracteata B. Hyland ssp. nov.
Differt a ssp. typica pilis ramunculorum strictis et tortuosis, appressis et erectis.
Typus: D. L. Jones 1263: Austinville, 7.x.1983 (holotypus QRS).
Differs from the type species, the twig hairs being straight and tortuous, appressed and erect.
Endiandra pubens var. glabriflora Benth., Fl. austr.

5:303 (1870)
Type: J. A. Henderson, Richmond River (MEL 622708 holotype, K isotype).

Tree to 20 m tall x 60 cm dbh, usually small to medium sized and well formed. Stem usually buttressed in the larger size classes but not always in the smaller, coppice shoots rarely present at the base. Bark nondescript, outer blaze usually pink, occasionally reddish, granular in texture. Twigs fluted, clothed in straight and tortuous, appressed and erect, pale brown hairs. Leaves: Underside green, clothed in straight and tortuous, appressed and erect, pale brown hairs; domatia, either foveoles or tufts of hair, usually visible on the underside at the junction of the primary veins and the midrib. Leaf blade elliptical, apex obtuse or acute, base cuneate, truncate or rounded, 6.0-11.0 x 2.5-5.0 cm (mean 8.4 x 3.6); penninerved, primary veins 4-8 pairs (mode 6), midrib depressed on the upper surface; petiole 4-10 mm long (mean 6.9), channelled on the upper surface. Inflorescence paniculate, axillary, bracts hemispherical or navicular, 1.0-1.8 mm long, persistent, present at anthesis. Flowers, cream, green or yellowish green, without any obvious odour (?), scarcely opening, the tepals being ± vertical at anthesis, forming a cylinder around the anthers and ovary so that only the tips of the anthers and stigma exceed the perianth lobes. Pedicel 0.2-2.7 x 0.5-1.0 mm. Perianth tube 1.0-1.7 x 1.9-2.6 mm, outer tepals larger, 0.7-1.0 x 1.1-1.6 mm, inner tepals 0.6-0.9 x 0.7-1.4 mm, all tepals glabrous outside but usually with hairs on the inner surface. Anthers glabrous, without a prominent beak, opening outwards or sideways, 0.4-0.7 x 0.4-0.7 mm, filaments glabrous or with basal hairs, 0.2-0.9 mm long; glands glabrous, 6, distinct, 0.3-0.5 x 0.2-0.9 mm, stalks nil or scarcely discernible, up to 0.1-0.2 mm long; staminodes 3, ±

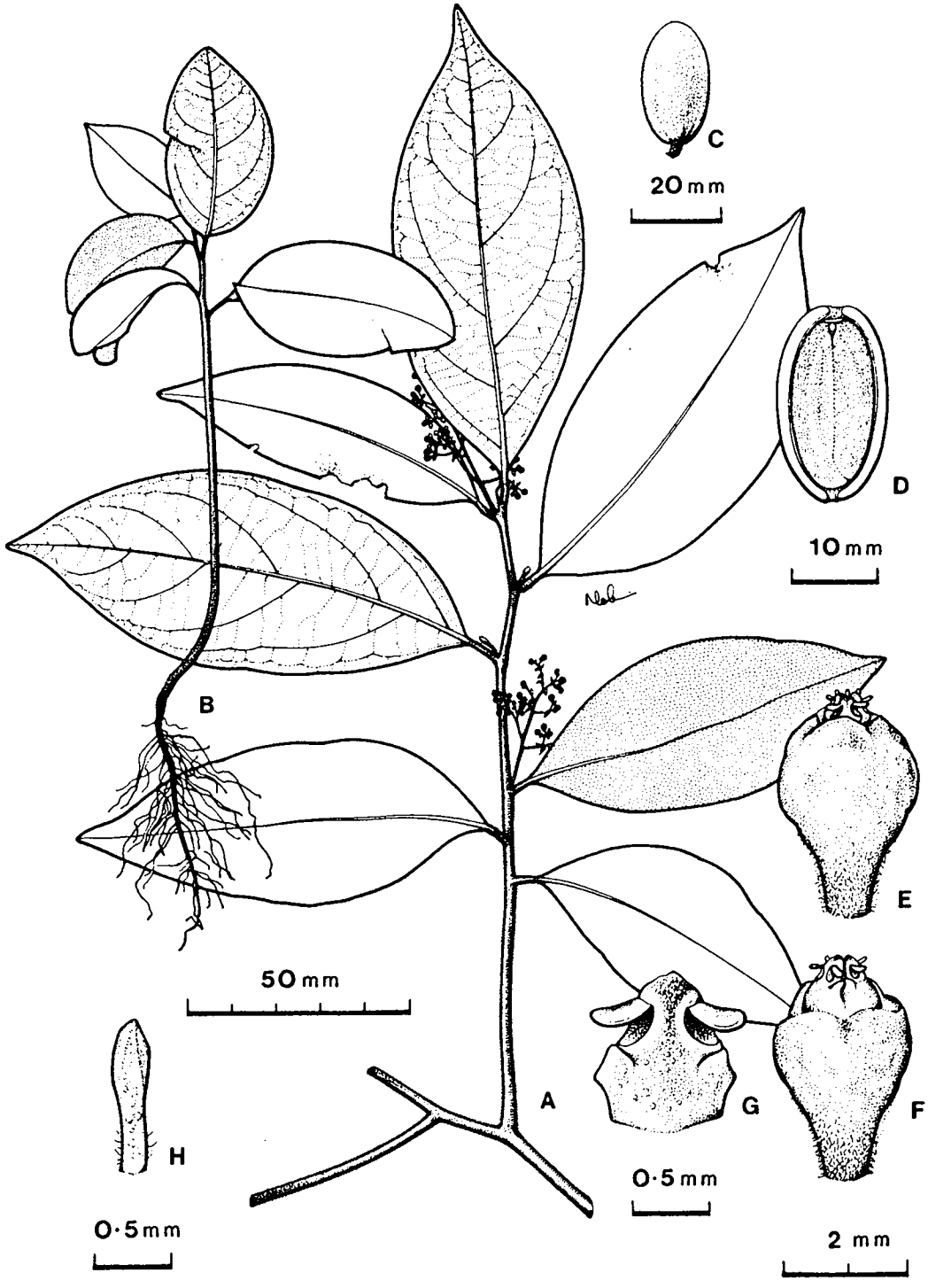

Fig.54. Endiandra muelleri ssp. bracteata. A Habit D.L. Jones 1263; B seedling, C fruit, D fruit (LS) Hyland 11278; E flower, F flower (side view, 3 tepals removed), G anther and fused glands (abaxial view), H staminode (abaxial view) D.L. Jones 1263.

differentiated or undifferentiated, hairy towards the base, 0.5-1.0 mm long. Ovary glabrous, 0.7-0.9 x 0.7-0.9 mm, style glabrous, 0.3-0.8 mm long. Fruits black, ellipsoid, 25-30 x about 15 mm, mesocarp + exocarp 0.9-1.3 mm thick, endocarp 0.3-0.4 mm thick. Seed 20-25 x 11-12 mm, testa about 0.1 mm thick, radicle apical. Cotyledons cream. Seedling leaves green on the underside. (Fig. 54, 82 A-B)

Distribution (Fig. 94, Map 39)

Ecology

Rain forests of northern New South Wales, southern and central Queensland, usually growing on the poorer soils derived from sedimentary or acid volcanic rocks. Altitudinal range: 150-800 m.

Uses

This subspecies grows large enough to produce millable logs but it has only recently been recognized as a separate entity and consequently has not been given a Trade Name. Wood S.G. 0.70.

Notes and Observations

Flowers have been collected in January, May and November, while ripe fruits have been collected in March, October and November. The fruiting collections are not prolific so it is difficult to decide when the fruiting season occurs. Seedling germination period about 60 days.

The subspecies may also be distinguished by the following features:

E. muelleri	E. muelleri

		ssp. bracteata
Glands	Base cordate	Base not cordate
Staminodes	Differentiated	Undifferentiated or ± differentiated
Tepals	Hairy outside (rarely glabrous)	Glabrous outside
Bracts	Navicular, lanceolate, spathulate, spoonform, 1.2-2.0 mm long	Hemispherical or navicular 1.0-1.8 mm long

Etymology

The subspecific epithet was chosen because of the bracts which normally persist until anthesis.

Specimens Examined (47 collections examined)

30. Endiandra palmerstonii (Bailey) C. White & Francis, Queensl. Dept. Agric., Bot. Bull. 22:36 (1920); Francis, Austral. Rain-Forest Trees ed.2:409 (1951).
Cryptocarya palmerstonii Bailey, Queensl. Dept. Agric., Bot.Bull. 2:16 (1891); Bailey,Queensl. fl. 4:1302 (1901).
Lectotype (here designated): BRI 334277, Bellenden-Ker Expedition?.
Syntype: C. Palmerston, Northern Queensland (K, MEL).

Tree to 30 m tall x 120 cm dbh, usually large and well formed. Stem usually buttressed, particularly in the larger size classes. Bark usually nondescript, occasionally flaky, outer blaze red or pink, usually granular in texture. Twigs fluted, clothed in tortuous, erect, pale brown hairs. Leaves: Underside green or slightly glaucous, clothed in short, tortuous, erect, white or pale brown hairs. Leaf blade lanceolate, ovate or elliptical, apex acuminate, acute or obtuse, base attenuate, cuneate or rounded, 7.0-22.5 x

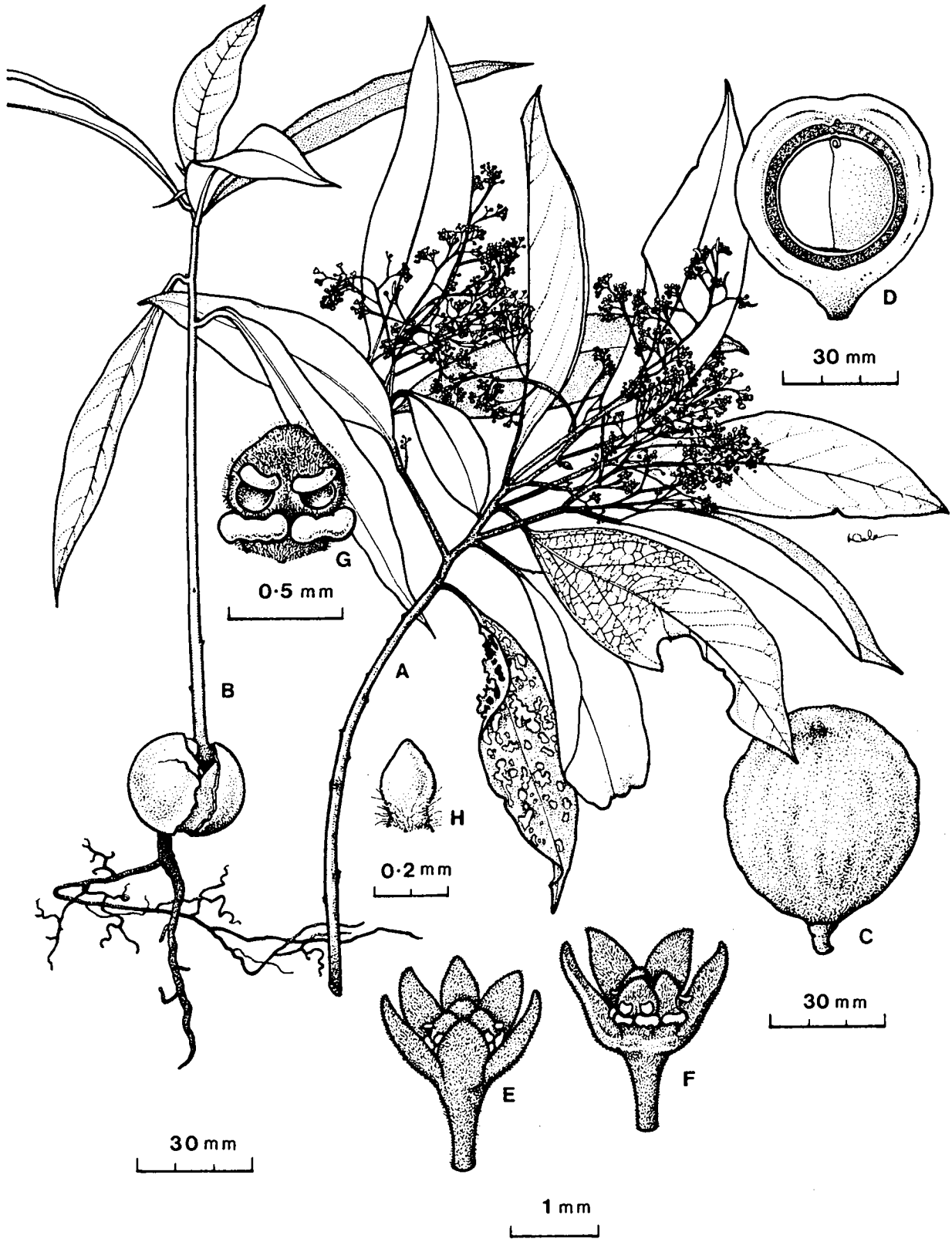

Fig.55. Endiandra palmerstonii. A Habit Hyland 9634; B seedling, C fruit, D fruit (LS) Risley 480; E flower, F flower (side view, 2 tepals removed), G stamen and glands (abaxial view), H staminode (abaxial view) Hyland 9634.

2.5-13.0 cm (mean 13.0 x 5.6); penninerved, primary veins 6-9 pairs (mode 7), midrib ± flush with the upper surface; petiole 5-21 mm long (mean 12.1), flat or channelled on the upper surface. Inflorescence containing a large number of flowers, paniculate, exceeding the leaves, axillary and pseudoterminal, bracts linear, triangular or lanceolate, 0.4-1.0 mm long, deciduous, absent at anthesis. Flowers cream or yellow, pleasantly perfumed (rarely otherwise), opening fairly widely and although the tepals tend to point upwards at anthesis the tips may be recurved. Pedicel 0.4-1.7 x 0.4-0.6 mm. Perianth tube 0.1-0.4 x 0.6-1.4 mm, outer tepals slightly larger, 1.0-1.4 x 0.6-1.0 mm, inner tepals 0.9-1.3 x 0.5-1.0 mm, all tepals with hairs on both the inner and outer surfaces. Anthers usually hairy, at least towards the apex, opening outwards, 0.3-0.5 x 0.4-0.6 mm, filaments hairy 0.1-0.2 mm long; glands glabrous, 6, distinct, 0.15-0.30 x 0.35-0.45 mm, stalks usually hairy, 0.0-0.2 mm long; staminodes 3, differentiated, or undifferentiated, head usually glabrous, 0.1-0.25 mm long, filament usually hairy 0.1-0.35 mm long. Ovary sessile, mainly glabrous (sometimes hairy towards the base), 0.3-0.5 x 0.35-0.6 mm, gradually tapering into a glabrous style 0.15-0.35 mm long. Fruits often falling while green, but the colour when ripe appears to be yellow or orange-brown, globular, usually showing some longitudinal ribs, 45-60 x 45-65 mm, mesocarp + exocarp 2.5-7.5 mm thick, endocarp 1.5-2.5 mm thick. Seed 30-40 x 30-45 mm, testa 0.1-0.9 mm thick, radicle apical. Cotyledons cream, pinkish cream, or apricot. Seedling leaves green on the underside. (Fig. 55, 82 C-D)

Distribution (Fig. 97, Map 54)

Ecology

Rain forests of northern Queensland, on soils derived from a variety of rock types but probably reaching its best development on soils derived from basalt. It has generally been assumed that E. palmerstonii is one of the more common species of Lauraceae in the northern rain forests, however, inspection of the distribution map shows that it only occurs over a very small area. Altitudinal range: Sea level to 1100 m.

Uses

This species produces millable logs and the timber is marketed as Queensland Walnut, a very popular high quality cabinet and veneer timber. Wood S.G. 0.69-0.81.

Notes and Observations

Flowers have been collected each month from November to March with most collections in January, while mature fruits have been collected in December, February and March. Seedling germination period 125-550 days.

The lectotypification of this name is not very satisfactory but there is little which can be done to improve the situation. It is obvious from Bailey's description of Cryptocarya palmerstonii that both leaves and fruit were available to him. However, a leafy specimen no longer appears to exist in BRI or any other likely herbarium. Unfortunately, two discordant elements are represented in the fruit collection at BRI. Two of the fruits belong to Cryptocarya pleurosperma, while the rest of the material (one complete fruit, one

pericarp and a piece of bark) probably belong to Endiandra palmerstonii, although it is difficult to be sure about the bark. There is no possibility that Bailey's description of the leaves was based on material of Cryptocarya pleurosperma as the leaves of this species are ± glabrous and conspicuously trinerved and Bailey does not mention either of these features. It must therefore be assumed that Bailey's description does refer to leaves of the species which is now referred to Endiandra palmerstonii but at the same time, it must be acknowledged that his fruit description describes features which are found in both Cryptocarya pleurosperma and Endiandra palmerstonii.

Specimens Examined (68 collections examined)

31. Endiandra phaeocarpa B. Hyland sp. nov.
Differt a E. xanthocarpa tepalis 6, antheris 3, fructu furfuraceo brunneo.
Typus: B. Gray 3009: State Forest Reserve 143, South Mary Logging Area, 1.iii.1983 (holotypus QRS).
Differs from E. xanthocarpa in the 6 tepals, 3 anthers and scurfy brown fruit.

Tree to 30 m tall x 60 cm dbh, usually small to medium sized. Stem buttressed in the larger but not in the smaller size classes. Bark nondescript, outer blaze pink or red, occasionally brown, granular in texture. Twigs fluted, clothed in straight, appressed, pale brown hairs when young but glabrous when older. Leaves: Underside glabrous. Leaf blade elliptical, apex acute or obtuse, base shortly attenuate, 9.8-18.5 x 3.4-8.5 cm (mean 13.4 x 5.5), margin often recurved, penninerved, primary veins 6-10 pairs (mode 8), midrib depressed or flush with the upper surface; petiole 8-27 mm long (mean 15.5), flat or channelled on the upper surface. Inflorescence paniculate, axillary or on the twigs below the leaves, bracts linear

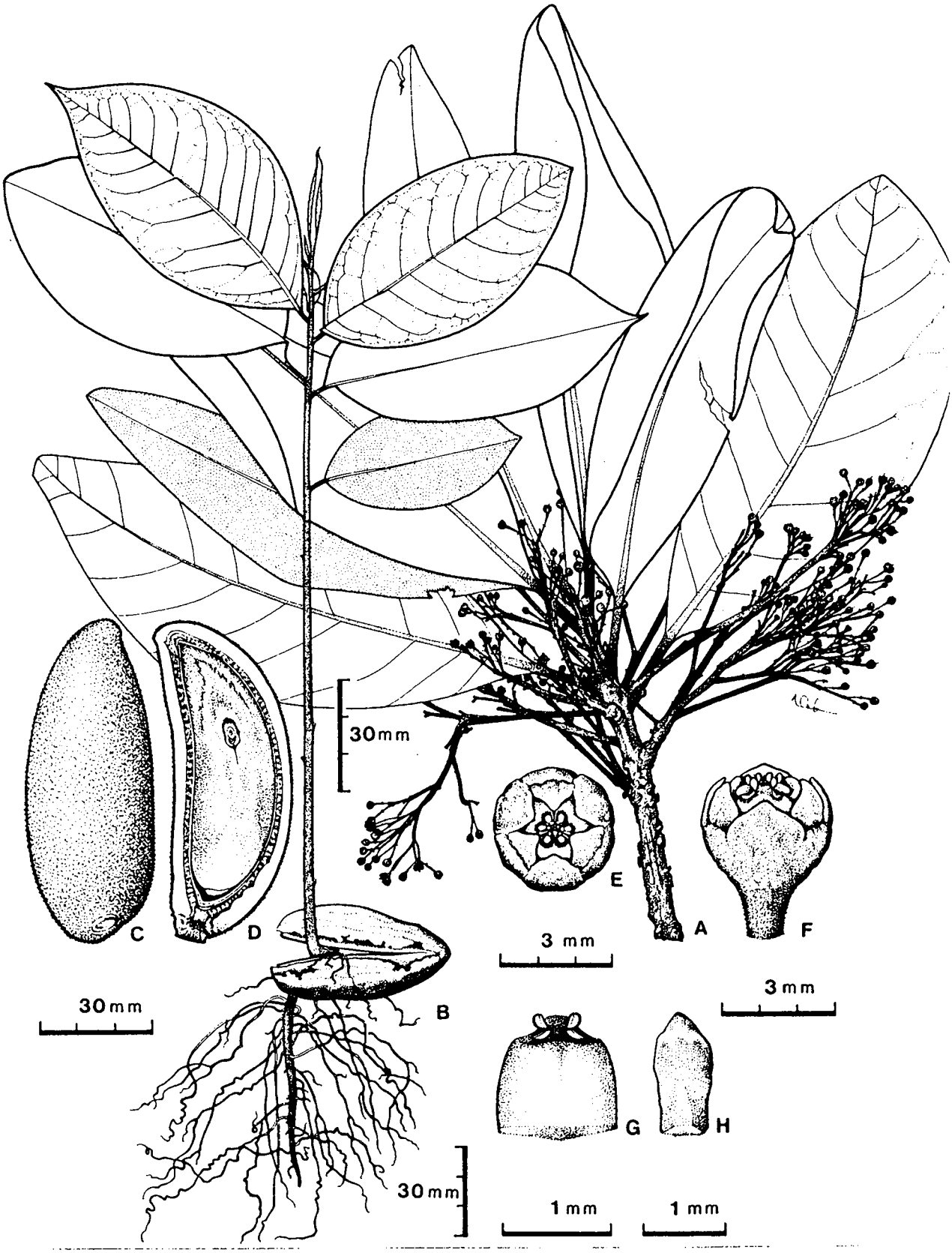

Fig.56. Endiandra phaeocarpa. A Habit Gray 3009; B seedling, C fruit, D fruit (LS) Gray 3297; E flower (top view), F flower (side view), G anther (abaxial view), H staminode (abaxial view) Gray 3009.

or triangular, 0.5-1.0 mm long, present or absent at anthesis. Flowers 3-merous, yellow or cream, faintly perfumed, scarcely opening, the tepals at anthesis surrounding the style and anthers so that only the stigma and the tips of the anthers and their valves are visible. Pedicel 0.0-3.8 x 0.9-1.4 m. Perianth tube 1.2-2.5 x 2.6-3.0 mm, outer tepals larger (i.e. wider), 0.6-1.3 x 1.2-1.7 mm, inner tepals 0.9-1.3 x 0.9-1.4 mm, all tepals glabrous on both the inner and outer surfaces. Anthers glabrous, opening by terminal ± circular pores, anthers 0.2-0.5 x 0.7-0.9 mm, filaments glabrous, wider than the anthers 1.0-1.5 mm long; glands absent, staminodes usually 2-3 (sometimes absent), undifferentiated, glabrous, 0.7-1.0 mm long; ovary glabrous, sessile, 0.6-1.0 x 0.8-1.0 mm, tapering very gradually into the style. Style glabrous, 0.6-1.0 mm long. Fruits scurfy brown when ripe, allantoid or ellipsoid, 65-89 x 32-35 mm, mesocarp + exocarp about 4.0 mm thick, endocarp 0.9-1.8 mm thick. Seed 52-72 x 20-26 mm, testa 0.3-0.4 mm thick, radicle central or between the centre and the apex of the seed. Cotyledons cream but pink towards the apex. Seedling leaves green on the underside. (Fig. 56, 82 E-F)

Distribution

Limited to north-eastern Queensland (Fig. 97, Map 54), but may occur in New Guinea.

Ecology

Mountain rain forests of northern Queensland on soils derived from granite. In Australia found only in the Mt Lewis area. Altitudinal range: 950-1100 m.

Uses

This species sometimes grows large enough to produce millable logs but it has not been utilized to date and it does not have a Standard Trade Name. Wood S.G. 0.70.

Notes and Observations

Flowers have been collected each month from December to March, while ripe fruits have been collected in November and December. Seedling germination period 30-40 days.

Some collections from the Lae District of New Guinea probably belong in this species. E. phaeocarpa is closely related to E. xanthocarpa which also occurs in northern Queensland and is probably also related to specimens from New Guinea labelled E. furfuracea which have similar fruits. E. sulavesiana Kosterm. of the Celebes has similar fruits but is probably not closely related.

Etymology

The specific epithet was chosen because the fruits are brown when ripe.

Specimens Examined (23 collections examined)

32. **Endiandra pubens** Meissner in DC., Prodr. 15(1):509 (1864); Benth., Fl. austral 5:302 (1870); Bailey, Queensl. fl. 4:1306 (1901); Francis, Austral. Rain-Forest Trees ed.2:142 (1951)p.p.; Floyd, N.S.W. Rainforest Trees, Part 1, ed.2:79 (1979); Stanley & Ross, Flora of south-eastern Queensland 1:166 (1983).
Type: F. Mueller (Probably H. Beckler) Clarence River, (G-DC holotype; BO, K, MEL 618632-4, isotypes).
[E. pubens var. typica Domin, Biblioth. Bot. 89:124 (1925) nom. invalid]
Cryptocarya muelleri Meissner in DC., Prodr. 15(1):73 (1864);
Tetranthera ferruginea F. Muell. ex Meissner in DC., Prodr.

15(1):73 (1864), non R. Br., Prodr. 403 (1810).
Type: F. Mueller (& W. Hill?), Brisbane River (K).
Endiandra pubens var. obtusifolia Domin, Biblioth. Bot. 89:124 (1925).
Type: K. Domin, Tambourine Mountain (PR holotype, n.v.)

Tree to 25 m tall x 60 cm dbh, usually small to medium sized. Stem usually without buttresses, occasionally larger stems buttressed, coppice shoots often present at the base. Bark nondescript, rarely flaky, outer blaze pink or red, occasionally cream, usually granular in texture. Twigs terete or fluted, clothed in straight and tortuous, erect, brown or pale brown hairs. Leaves: Underside green, clothed in straight and tortuous, erect, brown hairs. Leaf blade lanceolate, elliptical or ovate, apex acuminate or acute, base attenuate or cuneate, 7.0-22.5 x 2.5-13.0 cm (mean 13.0 x 5.6); penninerved, primary veins 4-9 pairs (mode 6), midrib depressed on the upper surface; petiole 7-26 mm long (mean 14.1), channelled on the upper surface. Inflorescence paniculate, axillary and pseudoterminal, bracts linear or narrowly triangular, 0.6-1.3 mm long, persistent, present at anthesis. Flowers cream, greenish cream or dull orange, pleasantly perfumed (the odour resembling sarsaparilla), or without any odour, scarcely opening at anthesis, the tepals remaining erect, forming a sheath around the exserted anthers and style. Pedicel 0.7-2.4 x 0.4-0.8 mm. Perianth tube 0.8-2.4 x 1.8-2.8 mm, sometimes constricted towards the apex where it may be 1.4-2.2 mm diam. Outer tepals larger (i.e. wider) 0.8-1.2 x 1.1-1.8 mm, inner tepals 1.0-1.2 x 0.8-1.3 mm, all tepals with hairs on both the inner and outer surfaces. Anthers glabrous, opening outwards or sideways, 0.5-0.8 x 0.5-0.8 mm, filaments hairy, 0.7-1.4 mm long; glands absent; staminodes 3, undifferentiated, subulate, 0.2-1.1 mm long, sparsely clothed in appressed hairs. Ovary sessile, glabrous or with 3 lines

of hairs extending from the base to the style, ovary 0.5-0.7 x 0.5-0.8 mm, style glabrous or lower part hairy, 0.8-1.4 mm long. Fruits red when ripe, green or pink before maturity, depressed globular or globular, 45-70 x 40-75 mm, mesocarp + exocarp 4-8 mm thick, endocarp 0.9-1.2 mm thick. Seed 30-40 x 30-40 mm, testa 0.5-1.7 mm thick, radicle basal. Cotyledons cream, pinkish cream or apricot. Seedling leaves green on the underside, tap root thick, ± resembling a carrot. (Fig. 83 A-B)

Distribution (Fig. 94, Map 41)

Ecology

Rain forests of northern New South Wales and southern Queensland, on soils derived from a variety of rock types, but reaching its best development on alluvial soils. Altitudinal range: Sea level to 500 m.

Uses

This species seldom grows large enough to produce millable logs and little is known about its timber qualities. According to Cause et al. (1974) it has been given the standard trade name of Hairy Walnut. However, this name almost certainly refers to E. insignis, the closely related North Queensland species. Wood S.G. unknown.

Notes & Observations

Flowers have been collected each month from February to May, while ripe fruits have been collected in February and March. Seedling germination period about 30-100 days.

This species is very closely related to E. insignis and E. virens. However, flowering specimens can be readily distinguished by the glands which are present on the anther filaments of E. insignis but absent in E. pubens and E. virens.

Specimens Examined (93 collections examined)

33. **Endiandra sankeyana** Bailey, Queensl. Dept. Agric., Bot. Bull. 8:82 (1893); Bailey, Queensl. fl. 4:1307 (1901).
Type: E. Cowley 81D, Barron River (BRI 10078 holotype, MEL 622335 isotype).

Tree to 30 m tall x 50 cm dbh, usually medium sized. Stem usually buttressed, except in the smallest size classes. Bark nondescript, rarely flaky, outer blaze usually pink or reddish, rarely cream or brown, granular in texture, rarely somewhat fibrous. Twigs angular or fluted, clothed in straight and tortuous, erect, white or pale brown hairs. Leaves: Underside green or slightly glaucous, clothed in straight and tortuous, erect, white or pale brown hairs. Leaf blade lanceolate, elliptical or slightly obovate, apex acuminate, acute or obtuse, base cuneate, 8.0-17.0 x 5.0-9.5 cm (mean 13.7 x 5.7); penninerved, primary veins 8-15 pairs (mode 11), depressed on the upper surface, midrib depressed on the upper surface; petiole 6-18 mm long (mean 10.7), flat or channelled on the upper surface. Inflorescence paniculate, axillary, bracts navicular, 1.3-2.4 mm long, deciduous, absent at anthesis. Flowers yellow or cream-yellow, pleasantly perfumed or without any obvious perfume, not opening very widely, the tepals remaining ± erect at anthesis. Pedicel 0.6-2.1 x 0.5-0.6 mm. Perianth tube 0.3-0.7 x 1.6-1.9 mm, outer tepals larger, 1.0-1.9 x 1.2-1.6 mm, inner tepals 1.1-1.6 x 1.2-1.5 mm, all tepals

glabrous outside but with hairs on the inner surface. Anthers glabrous, opening outwards or sideways, 0.8-0.9 x 0.8-1.0 mm, filaments hairy, 0.2-0.3 mm long; glands absent; staminodes absent. Ovary sessile, glabrous or hairy, 0.5-0.6 x 0.4-0.6 mm, style glabrous, 0.2-0.5 mm long. Fruits black, purplish black or blue-black, ellipsoid, occasionally pyriform or globular and laterally compressed, 33-54 x 27-41 mm, mesocarp + exocarp 1.9-6.1 mm thick, endocarp 0.5-5.5 mm thick. Seed 23-31 x 15-26 mm, testa 0.1-0.2 mm thick, radicle apical or almost at the apex. Cotyledons orange or apricot in colour. Seedling leaves slightly glaucous on the underside. (Fig. 83 C-D)

Distribution (Fig. 95, Map 42)

Ecology

Rain forests of northern Queensland on soils derived from a variety of rock types. Altitudinal range: Sea level to 1300 m.

Uses

This species sometimes produces millable logs but is seldom utilized. However, it has been allocated the Standard Trade Name Sankey's Walnut. Wood S.G. 0.76-0.89.

Notes and Observations

Flowers have been collected in October, November and December, while ripe fruits have been collected each month from May to November. Seedling germination period 25-100 days.

Specimens Examined (76 collections examined)

34. Endiandra sideroxylon B. Hyland sp. nov.

Differt a speciebus ceteris floribus late aperientibus, pilis ramunculorum strictis appressis, fructu 37-54 mm longo cotyledonibus cremeis vel roseis.

Typus: B. Gray 226: State Forest Reserve 194 near Portion 69 Herberton, 12.i.1977 (holotypus QRS).

Differs from other species in the flowers opening widely, the twig hairs straight and appressed, the fruit 37-54 mm long, the cotyledons cream or pink.

Tree to 35 m tall x 150 cm dbh, usually medium to large and well formed. Stem usually buttressed in all classes. Bark usually nondescript, occasionally flaky, outer blaze pink or brown, granular in texture. Twigs fluted, clothed in straight, appressed, pale brown hairs when young but almost glabrous when older. Leaves: Underside green, sparsely clothed in straight, appressed, pale brown hairs when young but glabrous when older. Leaf blade elliptical or ovate, apex acute, obtuse or almost rounded, base truncate or shortly attenuate, 6.0-11.0 x 3.0-6.0 cm (mean 8.1 x 4.2); penninerved, primary veins 6-10 pairs (mode 7), midrib flush with or raised on the upper surface; petiole 5-14 mm long (mean 8.3), flat or channelled on the upper surface. Inflorescence paniculate, axillary, sometimes pseudoterminal, bracts lanceolate or orbicular, 0.8-1.5 mm long, deciduous, absent at anthesis. Flowers cream, to yellow, pleasantly perfumed, or without an odour, opening quite widely, the tepals becoming ± horizontal at anthesis. Pedicel 0.3-1.6 x 0.5-0.7 mm. Perianth tube 0.2-0.6 x 1.4-2.3 mm, outer tepals usually larger, 1.6-2.0 x 1.1-1.4 mm, inner tepals 1.2-2.2 x 0.9-1.5 mm, all tepals with hairs on both the inner and outer surfaces. Anthers mainly glabrous abaxially, sometimes hairy adaxially, opening outwards or sideways, 0.4-0.6 x 0.5-0.7 mm, filaments hairy, 0.2-0.4 mm long; glands glabrous, 6, distinct, 0.3-0.5 x 0.4-0.5 mm, stalks usually

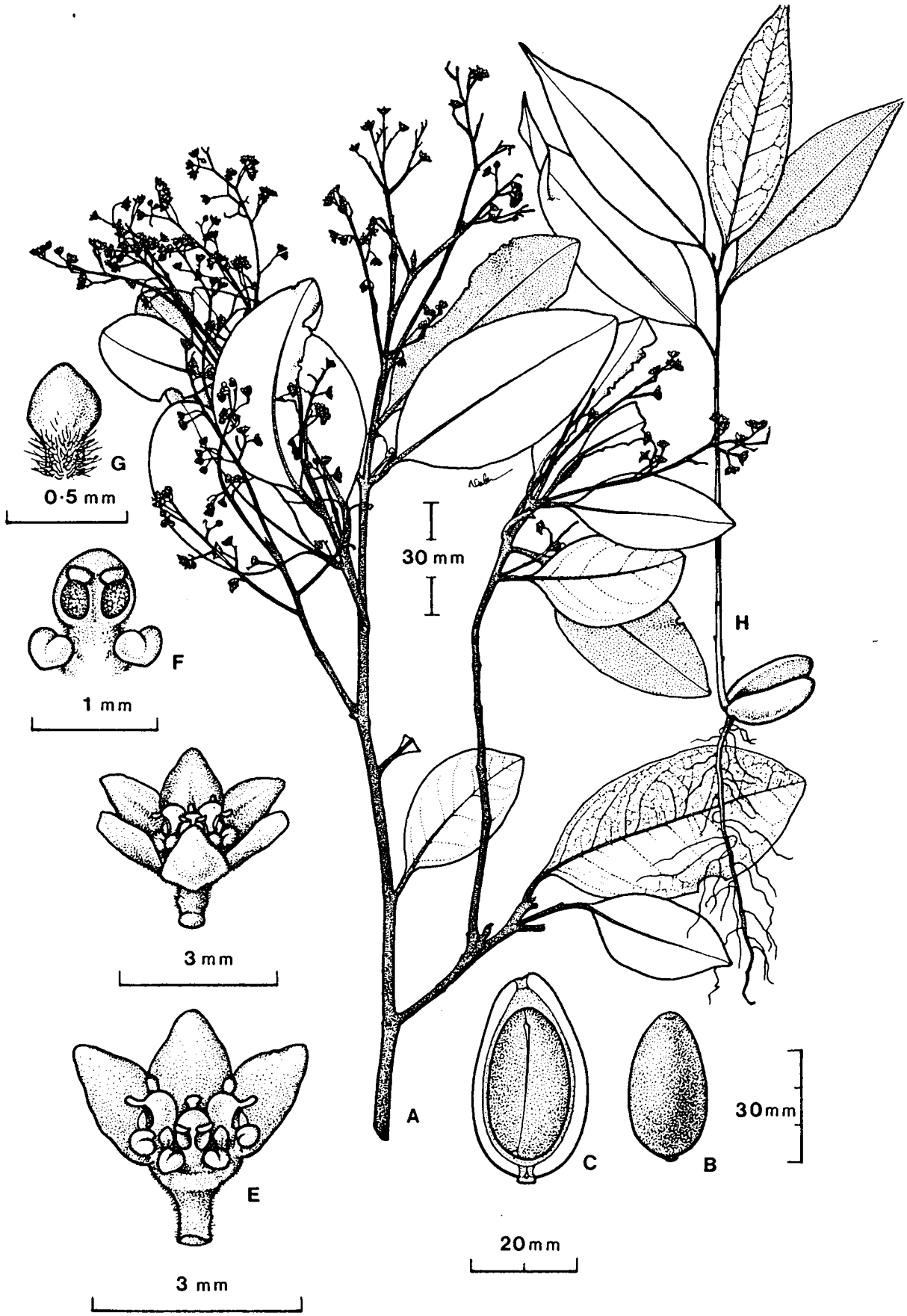

Fig.57. Endiandra sideroxylon. A Habit Gray 226; B fruit, C fruit (LS) Gray 808; D flower, E flower (side view, 3 tepals removed), F stamen and glands (abaxial view), G staminode (abaxial view) Gray 226; H seedling Gray 808.

hairy, 0.1-0.2 mm long; staminodes 3, differentiated, head glabrous or hairy, 0.3-0.4 mm long, filament hairy, 0.2-0.3 mm long. Ovary glabrous or sparsely hairy, sessile, or very shortly stalked, 0.6-0.8 x 0.6-0.9 mm, style glabrous, 0.3-0.5 mm long. Fruits black, ellipsoid, sometimes laterally compressed, 37-54 x 22-28.5 mm, mesocarp + exocarp 1.6-4.3 mm thick, endocarp 0.8-1.1 mm thick. Seed 29-45 x 16-23 mm, testa 0.1-0.3 mm thick, radicle apical or 5-10 mm from the apex. Cotyledons cream to pink. Seedling leaves green on the underside. (Fig. 57, 83 E-F)

Distribution (Fig. 96, Map 52)

Ecology

Rain forests of northern Queensland on soils derived from a variety of rock types but probably reaching its best development on soils derived from basalt. Altitudinal range: 140-1000 m.

Uses

This species grows large enough to produce millable logs but the timber is rather hard and not very popular in the trade. Standard Trade Name - Buff Walnut. Wood S.G. 0.78-0.82.

Notes and Observations

Flowers have been collected each month from November to February, while ripe fruit has been collected each month from August to November. Seedling germination period 32-85 days.

Etymology

The specific epithet refers to the common name applied to this

species: Steelbutt.

Specimens Examined (41 collections examined)

35. **Endiandra sieberi** Nees, Syst. laur. 194 (1836); Benth., Fl. austral 5:301 (1870); Bailey, Queensl. fl. 4:1305 (1901); Beadle et al., Flora of the Sydney Region 151 (1972); Floyd, N.S.W. Rainforest Trees, Part 1, ed.2:81 (1979); Stanley & Ross, Flora of south-eastern Queensland 1:166 (1983).
Type: F.W. Sieber 275, New Holland (G-DC holotype; B?, BM, G, K, L, MEL 582693, NY, isotypes).

Tree to 30 m tall x 90 cm dbh, but usually small to medium sized. Stem without buttresses, occasionally with coppice shoots at the base. Bark pale, fissured and corky, very thick on large trees (more than 3 cm thick); outer blaze pink or red, granular in texture. Twigs terete or fluted, clothed in straight, appressed, pale brown hairs when young but almost glabrous when older. Leaves: Underside green, glabrous. Leaf blade lanceolate, apex acuminate, base attenuate, 5.5-11.5 x 1.5-4.5 cm (mean 8.1 x 2.7); penninerved, primary veins 6-15 pairs (mode 10), midrib raised or flush with the upper surface; petiole 3-9 mm long (mean 5.5), flat on the upper surface. Inflorescence paniculate, axillary, pseudoterminal, bracts lanceolate or navicular, 0.8-1.8 mm long, deciduous, absent at anthesis. Flowers pinkish cream, yellowish, faintly but pleasantly perfumed, opening quite widely although the tepals seldom become horizontal at anthesis. Pedicel 0.1-2.0 x 0.5-0.7 mm. Perianth tube 0.7-1.0 x 1.5-1.6 mm, outer tepals usually larger, 1.5-2.0 x 1.2-1.4 mm, inner tepals 1.3-1.9 x 0.9-1.0 mm, all tepals glabrous outside but with hairs on the inner surfaces. Anthers mainly glabrous (a few hairs towards the base on the adaxial surface), opening outwards, 0.5-0.6 x 0.5-0.7 mm, filaments hairy, 0.3-0.5 mm long; glands glabrous, 6,

distinct, 0.3-0.6 x 0.35-0.60 mm, stalks hairy, 0.1-0.3 mm long; staminodes 3, differentiated, head 0.2-0.4 mm long, filament hairy, 0.15-0.35 mm long. Ovary glabrous, sessile, 0.8-1.3 x 0.6-1.1 mm, style glabrous, 0.5-0.7 mm long. Fruits black or purplish black, shiny, ellipsoid, 20-24 x 14-17 mm, mesocarp + exocarp 0.8-2.0 mm thick, endocarp 0.6-1.0 mm thick. Seed about 18 x 12-14 mm, testa 0.2-1.0 mm thick, radicle apical. Cotyledons pink. Seedling leaves green on the underside. (Fig. 84 A-B)

Distribution (Fig. 95, Map 45)

Ecology

Rain forests and other closed forests of New South Wales, southern and central Queensland. Usually found on the poorer soils derived from sedimentary rocks or deep sands. In coastal areas it is a very characteristic tree on the margins of littoral rain forest and fringing rain forest on creek banks. Altitudinal range: Sea level to 700? m.

Uses

This species grows large enough to produce millable logs but is seldom utilized. Standard Trade Name - Pink Walnut. Wood S.G. 0.72.

Notes and Observations

Flowers have been collected each month from April to October, while ripe fruits have been collected each month from May to October. Seedling germination period about 45-100 days.

Compared with the other Australian species of Lauraceae this

species is enigmatic. It appears to have adapted itself to cope with periodic fires by protecting its trunk and cambial layer with thick corky bark. It survives quite well in the ecotone between the fire prone eucalypt forest of the coastal "wallum" country and the rain forests fringing the water courses over quite a wide latitudinal range. It is difficult to avoid the conclusion that E. sieberi is an old species which departed from the evolutionary line of the rest of the Australian Lauraceae a long time ago.

Specimens Examined (134 collections examined)

36. Endiandra virens F. Muell., Fragm. Phytogr. Austral. 2:90 (1860); Benth., Fl. austral 5:302 (1870); Bailey, Queensl. fl. 4:1305 (1901); Francis, Austral. Rain-Forest Trees ed.2:135 (1951)p.p.; Floyd, N.S.W. Rainforest Trees, Part 1, ed.2:84 (1979); Stanley & Ross, Flora of south-eastern Queensland 1:166 (1983).
Lectotype (here designated): H. Beckler, Clarence River MEL 623266; (MEL 622310 & MEL 623265, probable isotypes; BO, G-DC, K, L, NY, possible isotypes).
Endiandra lowiana Bailey, Queensl. Dept. Agric. Bot. Bull. 5:24 (1892); Bailey, Queensl. fl. 4:1307 (1901).
Syntypes: J.A. Low, Maroochie (Yandina) (BRI, K, MEL). Field Naturalists, Eudlo (BRI).

Tree to 10 m tall x 20 cm dbh, usually small tree. Stem with or without buttresses, sometimes with coppice shoots at the base. Bark nondescript to slightly corky, outer blaze pink, sometimes cream, granular in texture. Twigs fluted, clothed in straight, appressed, pale brown hairs when young but almost glabrous when older. Leaves: Underside green and glabrous. Leaf blade lanceolate or narrowly lanceolate, apex acuminate, acute or obtuse, base cuneate or attenuate, 6.0-14.0 x 1.5-4.5 cm (mean 9.9 x 2.7); penninerved, primary veins 5-13 pairs (mode 8), midrib depressed or flush with the upper surface; petiole 4-17 mm long (mean 8.9), channelled on the

upper surface. Inflorescence paniculate, axillary, not exceeding the leaves, bracts lanceolate, linear or triangular, 0.4-0.9 mm long, persistent, present at anthesis. Flowers cream?, odour not recorded, scarcely opening at anthesis, the tepals remaining erect, forming a sheath around the exserted anthers and style. Pedicel 0.6-2.0 x 0.4-0.6 mm. Perianth tube 1.0-1.3 x 1.9-2.2 mm at the widest part but contracted at the apex and measuring 1.2-1.4 mm wide, outer tepals 0.6-1.0 x 1.0-1.4 mm, inner tepals 0.8-0.9 x 0.8-0.9 mm, all tepals with a sparse covering of appressed hairs on both the inner and outer surfaces. Anthers glabrous, opening outwards or sideways, 0.7-0.8 x about 0.6 mm, filaments hairy, 0.7-0.8 mm long; glands absent; staminodes 3, undifferentiated, lanceolate, hairy, 0.6-0.7 mm long. Ovary sessile, glabrous, 0.6-0.7 x 0.5-0.6 mm, style glabrous, 0.8-1.4 mm long. Fruits yellow to orange-red, globular or depressed globular, 35-60 x 45-60 mm, mesocarp + exocarp 1.2-5.0 mm thick, endocarp 1.5-2.0 mm thick. Seed 32-40 x 35-40 mm, testa 0.3-1.0 mm thick, radicle basal. Cotyledons cream to apricot. Seedling leaves green on the underside, tap root thick ± resembling a carrot. (Fig. 84 C-D)

Distribution (Fig. 95, Map 46)

Ecology

Rain forests on the poorer sedimentary soils, fide Floyd (1979). This species often grows in fringing rain forests along water courses but is not confined to this habitat. Altitudinal range: Sea level to 1000 m.

Uses

This species seldom grows large enough to produce millable logs and

therefore has a very limited commercial value. However, it has been given the Standard Trade Name of New South Wales Walnut. Wood S. G. unknown.

Notes and Observations

Flowers have been collected in February, March, May and June, while ripe fruits have been collected in May, July and September. Seedling germination period about 150 days.

The flowers and fruits of this species are very similar to those of E. pubens and E. anthropophagorum. In fact it could be argued that E. virens is no more than a segregate of E. pubens. In New South Wales it is a relatively easy matter to distinguish the two species, but as one proceeds northward into southern Queensland it becomes more difficult to confidently place specimens into one or other of the species. Geographically E. anthropophagorum is quite distinct being separated from E. pubens and E. virens by a gap of about 8^{o} in latitude.

Specimens Examined (47 collections examined)

37. Endiandra wolfei B. Hyland sp. nov.
Differt a speciebus ceteris disco glandium connatarum, staminodiis disco connatis tepalis externis 2.2-3.0 mm longis.
Typus: B. Gray 325: State Forest Reserve 1073, Black Mtn Road, 23.ii.1977 (holotypus QRS).
Differs from other species in the glands fused to form a disc, the staminodes fused to the disc and the outer tepals 2.2-3.0 mm long.

Tree to 25 m tall x 60 cm dbh, usually small and well formed. Stem frequently buttressed, coppice shoots sometimes present at the base. Bark flaky or nondescript, outer blaze usually red, occasionally pink,

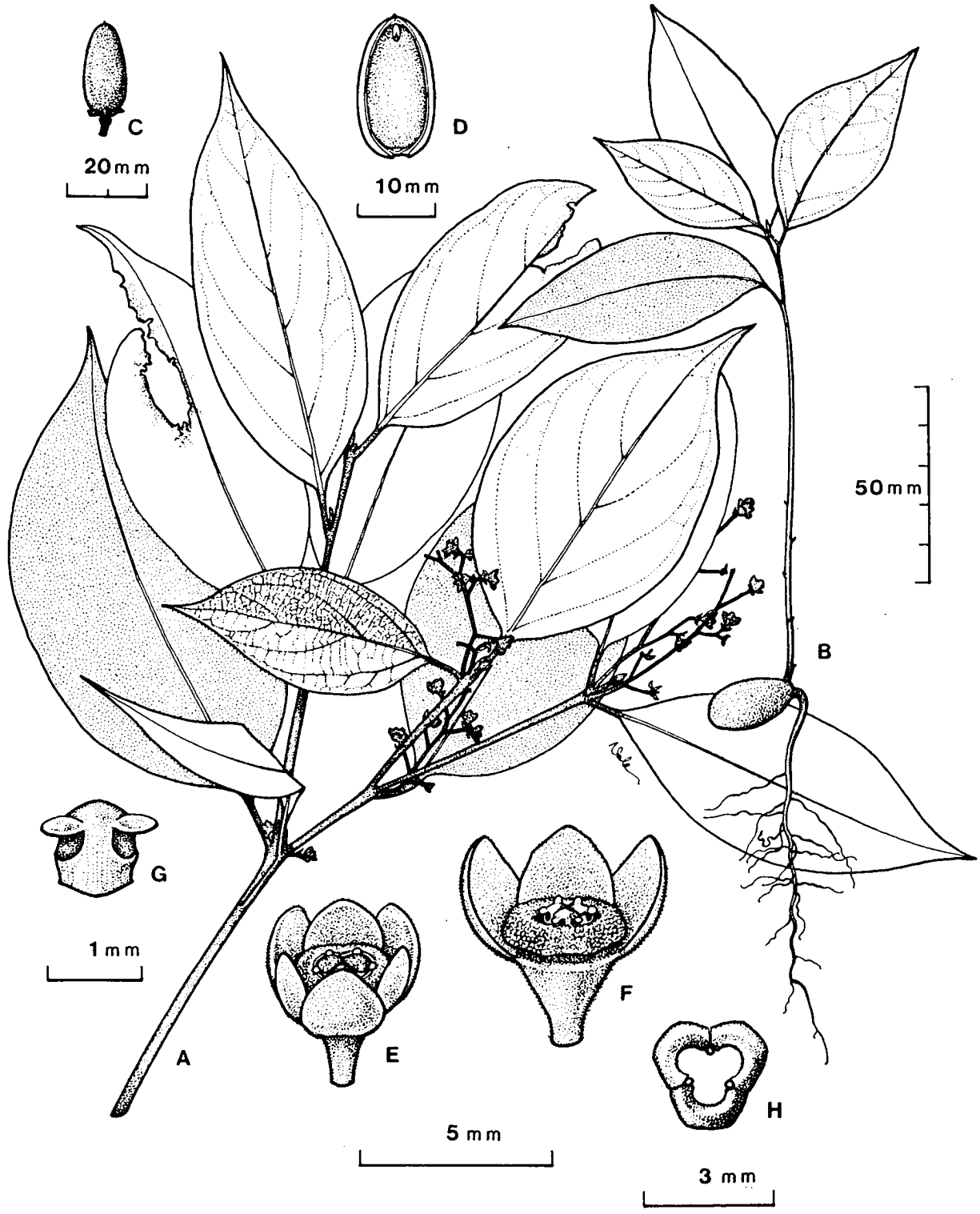

Fig.58. Endiandra wolfei. A Habit Gray 325; B seedling, C fruit, D fruit (LS) Stocker 1591; E flower (oblique view), F flower (side view, 3 tepals removed), G stamen (abaxial view), H glands fused into a disc and 3 staminodes (top view) Gray 325.

granular in texture. Twigs angular or fluted, clothed in tortuous, erect, white or pale brown hairs. Leaves: Underside glaucous or white, clothed in tortuous, erect, pale brown hairs. Leaf blade lanceolate, apex acuminate, base attenuate, 6.5-12.5 x 2.0-5.0 cm (mean 9.2 x 3.3); penninerved, primary veins 3-6 pairs (mode 5), usually depressed on the upper surface, midrib also depressed on the upper surface; petiole 4-15 mm long (mean 8.6), flat on the upper surface. Inflorescence racemose or paniculate, axillary, bracts lanceolate, 1.3-2.5 mm long, deciduous, absent at anthesis. Flowers green, cream-green, yellowish green, without any obvious odour, opening quite widely, but with the tepals still pointing upwards. Pedicel 0.7-1.8 x 0.6-0.9 mm. Perianth tube 0.9-1.7 x 2.0-2.8 mm, outer tepals larger, 2.2-3.0 x 2.0-2.8 mm, inner tepals 1.8-2.6 x 1.4-2.3 mm, all tepals with tortuous, ± erect hairs on the outer surface and usually on the inner surface also. Anthers glabrous, opening outwards, 0.5-0.8 x 0.6-0.9 mm, filaments hairy, 0.2-0.5 mm long, glands fused to form a disk or continuous ring of tissue, staminodes absent or fused with the disk and scarcely distinguishable from it. Ovary 1.1-2.0 x 1.0-1.5 mm, clothed in brown hairs, usually sessile, sometimes shortly stalked, style glabrous, 0.2-0.4 mm long. Fruits black or blue-black, ellipsoid, 20-24 x 10-13 mm, mesocarp + exocarp 0.7-1.0 mm thick, endocarp 0.2-0.6 mm thick. Seed 17-21 x 9-11 mm, testa about 0.1 mm thick, radicle apical. Cotyledons pink. Seedling leaves glaucous on the underside. (Fig. 58, 84 E-F)

Distribution (Fig. 95, Map 44)

Ecology

Rain forests of northern Queensland, on soils derived from a

variety of rock types. Altitudinal range: Sea level to 1100 m.

Uses

This species has no commercial value as it does not grow large enough to produce millable logs. Wood S.G. 0.96-1.04.

Notes and Observations

Flowers have been collected each month from November to March and also in July, while ripe fruits have been collected in August, September, October and December. Seedling germination period 29-60 days.

Etymology

It gives me great pleasure to name this species after Mr T. J. Wolfe of Atherton who has assisted me in my studies of Lauraceae and seedling morphology of Elaeocarpus.

Specimens Examined (87 collections examined)

38. Endiandra xanthocarpa B. Hyland sp. nov.
Differt a E. phaeocarpa tepalis 4, antheris 2, fructu flavido.
Typus: B. Gray: 2913: Timber Reserve 1230 Boonjee Logging Area, 11.i.1983 (holotypus QRS).
Differs from E. phaeocarpa in the 4 tepals, 2anthers, yellowish fruit.

Tree to 30 m tall x 60 cm dbh, usually small to medium sized. Stem buttressed in the larger but not in the smaller size classes. Bark usually nondescript, occasionally flaky, outer blaze pink or red, occasionally cream, granular in texture. Twigs fluted, clothed in straight, appressed, pale brown hairs when young but glabrous when

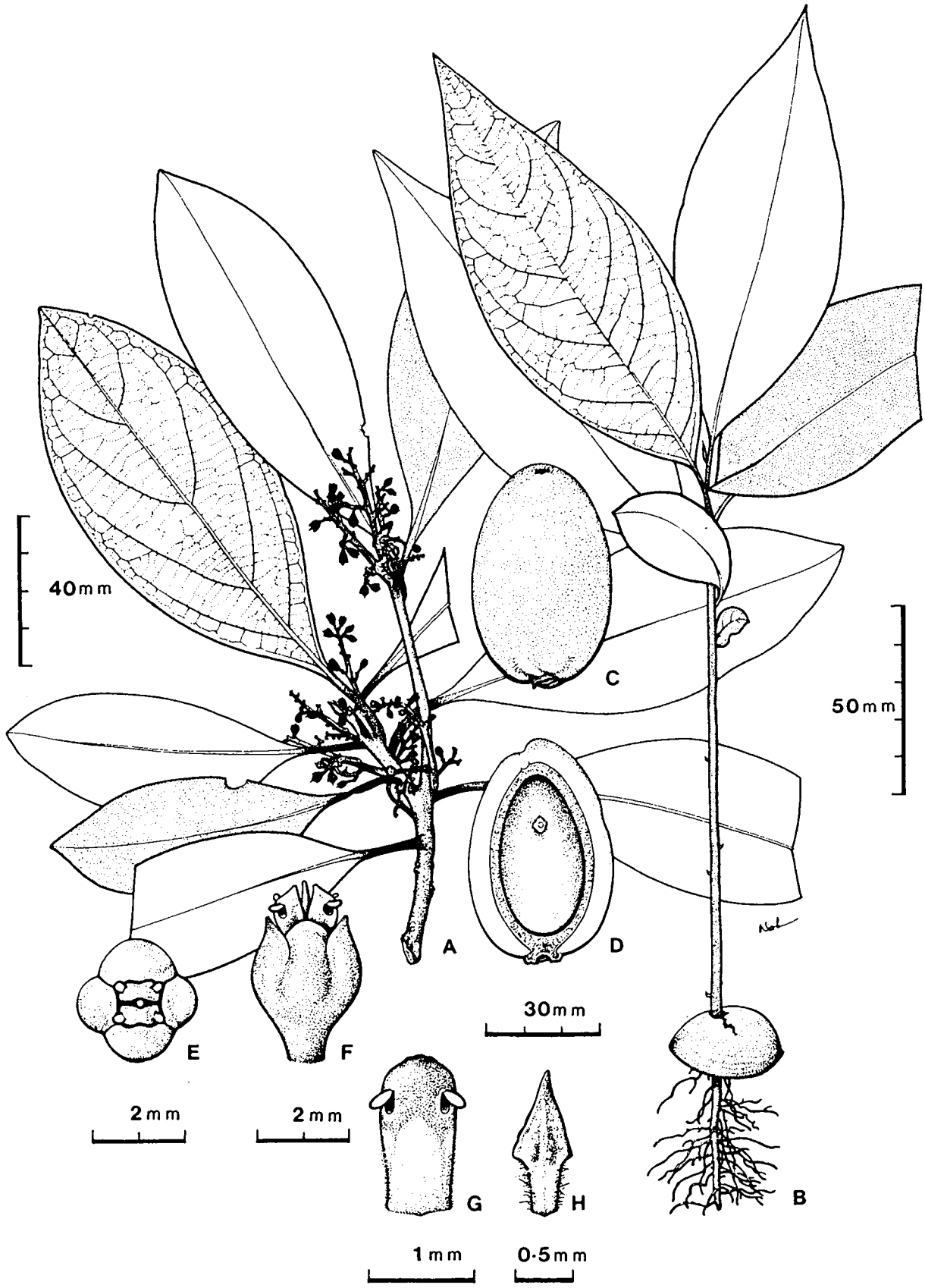

Fig.59. Endiandra xanthocarpa. A Habit Gray 2913; B seedling, C fruit, D fruit (LS) Gray 3255; E flower (top view), F flower (side view), G anther (abaxial view), H staminode (adaxial view) Gray 2913.

older. Leaves: Underside green, glabrous. Leaf blade elliptical, apex acute or obtuse, base attenuate to shortly attenuate 9.0-15.5 x 4.0-7.0 cm (mean 11.7 x 5.3), margin flat; penninerved, primary veins 4-8 pairs (mode 6), midrib usually depressed on the upper surface; petiole 10-27 mm long (mean 17.8), flat or channelled on the upper surface. Inflorescence paniculate, axillary or on the twigs below the leaves, bracts triangular to almost orbicular, 0.6-1.6 mm long, persistent, present at anthesis. Flowers 2-merous, cream or creamy yellow, faintly perfumed, scarcely opening, the tepals at anthesis surrounding the style and anthers so that only the stigma and tips of the reddish anthers and their valves are visible. Pedicel 0.0-1.5 x 0.8-0.9 mm. Perianth tube 1.6-2.5 x 2.0-2.5 mm, outer tepals larger (i.e. wider), 0.7-0.9 x 1.0-1.6 mm, inner tepals 0.7-1.0 x 0.8-0.9 mm, all tepals predominantly glabrous on both the inner and outer surfaces. Anthers glabrous, opening by lateral pores near the apex, anthers 0.4-0.7 x 0.6-0.9 mm, filaments hairy or glabrous, 0.7-0.9 mm long; glands absent, staminodes usually 2, scarcely differentiated, hairy or glabrous, 0.8-1.2 mm long; ovary glabrous, sessile, 0.6-1.0 x 0.6-0.8 mm, tapering very gradually into the glabrous style, 0.7-1.3 mm long. Fruits yellow or orange-yellow, ellipsoid, 60-70 x 33-45 mm, mesocarp + exocarp 2.7-5.0 mm thick, endocarp 1.2-1.8 mm thick. Seed 40-72 x 21-36 mm, testa 0.1-0.8 mm thick, radicle central, or 10-15 mm from the apex of the seed. Cotyledons pale pink. Seedling leaves green on the underside. (Fig. 59, 85 A-B)

Distribution (Fig. 97, Map 57)

Ecology

Upland rain forests of northern Queensland on soils derived from

basalt. Found only in the Boonjee area to date. Altitudinal Range: 350-750 m.

Uses

This species sometimes grows large enough to produce millable logs but it has not been utilized to date and it does not have a Standard Trade Name. Wood S.G. 0.83.

Notes and Observations

Flowers have been collected in November and January, while ripe fruits have been collected in October. Seedling germination period 35-50 days.

All flowering collections, so far, made of this species have 4 tepals and 2 anthers while its close relative from the Mt Lewis area (E. phaeocarpa) normally has 6 tepals and 3 anthers.

Etymology

The specific epithet was chosen because of the bright yellow fruits.

Specimens Examined (25 collections examined)

5. **Lindera Thunb.** (nom. cons.)

Lindera Thunb., Nova Gen. Pl. 64 (1783).
Type: L. umbellata Thunb.

[For extra-Australian synonyms see Kostermans (1957)].

Tree. Twigs shortly pubescent when young. Leaves petiolate, minutely oil-dotted, penninerved, spirally arranged. Inflorescence umbellate, axillary. Flowers unisexual, dioecious, 3-merous? Male flowers: Perianth tube and tepals nil, stamens 10-14, introrse, 2-locular, glands peltate, staminodes nil. Female flowers: Perianth tube and tepals nil, staminodes 7-15, glands peltate, ovary sessile, stigma thallose (Fig. 85 D). Fruits superior, globular, seated on a slightly swollen receptacle, mesocarp fleshy, endocarp thin. Seed enclosed in a thin testa, radicle almost apical, cotyledons distinct from one another, uniform in texture. Seedling germination period 40-60 days, cataphylls present, leaves spirally arranged.

Distribution

A widely distributed genus of about 100 species occurring in Asia (as far north as Korea and Japan), Malesia, Australia, South, Central and North America.

1. **Lindera queenslandica** B. Hyland sp. nov.
Differt a speciebus ceteris sempervirenti, tepalis nullis, fructu rubro.
Typus: B. Gray 1277: State Forest Reserve 191, 14.ii.1979 (holotypus QRS).
Differs from other species in being evergreen, without tepals, and the fruit red.

Tree to 35 m tall x 90 cm dbh, usually medium sized and well formed. Stem usually buttressed in the larger but not the smaller size classes. Bark flaky or nondescript, outer blaze usually cream, occasionally brown, speckled, sometimes marked by longitudinal stripes, granular in texture, sometimes odorous. Twigs ± terete, clothed in tortuous and straight, white, erect hairs when very young but almost glabrous at maturity. Leaves: Underside green, clothed in straight and tortuous, white, appressed and erect hairs when young but almost completely glabrous at maturity. Leaf blade lanceolate, ovate or oblong, apex acute, acuminate or abruptly acuminate, base attenuate to truncate, sometimes unequal sided, 8-27 x 4-8 cm (mean 13.6 x 5.9); penninerved, primary veins 6-11 pairs (mode 8), midrib flush with the upper surface; petiole 17-46 mm long (mean 28.9), flat or channelled on the upper surface. Inflorescence umbellate, pedunculate (peduncle 6.5-21 mm long), not exceeding the leaves, axillary; inflorescence bracts ± hemispherical, navicular, 3.6-6.2 x 3.0-5.0 mm, pubescent on both the inner and outer surfaces, persistent, present at anthesis. Flowers green or creamy green, pleasantly perfumed, 9-15 flowers per umbel. Male flowers opening widely. Pedicel 4.5-5.0 mm long. Perianth tube and tepals nil. Stamens in one series, 10-14 per flower, anthers glabrous, 1.0-1.1 x about 0.9 mm, filaments pubescent, at least for the lower half, 2.5-2.6 mm long, with or without 1 or 2 glands; gland heads glabrous, peltate about 0.4-0.7 x 0.6-0.8 mm, stalks glabrous, about 0.3 mm long. Pistillode present (ovary about

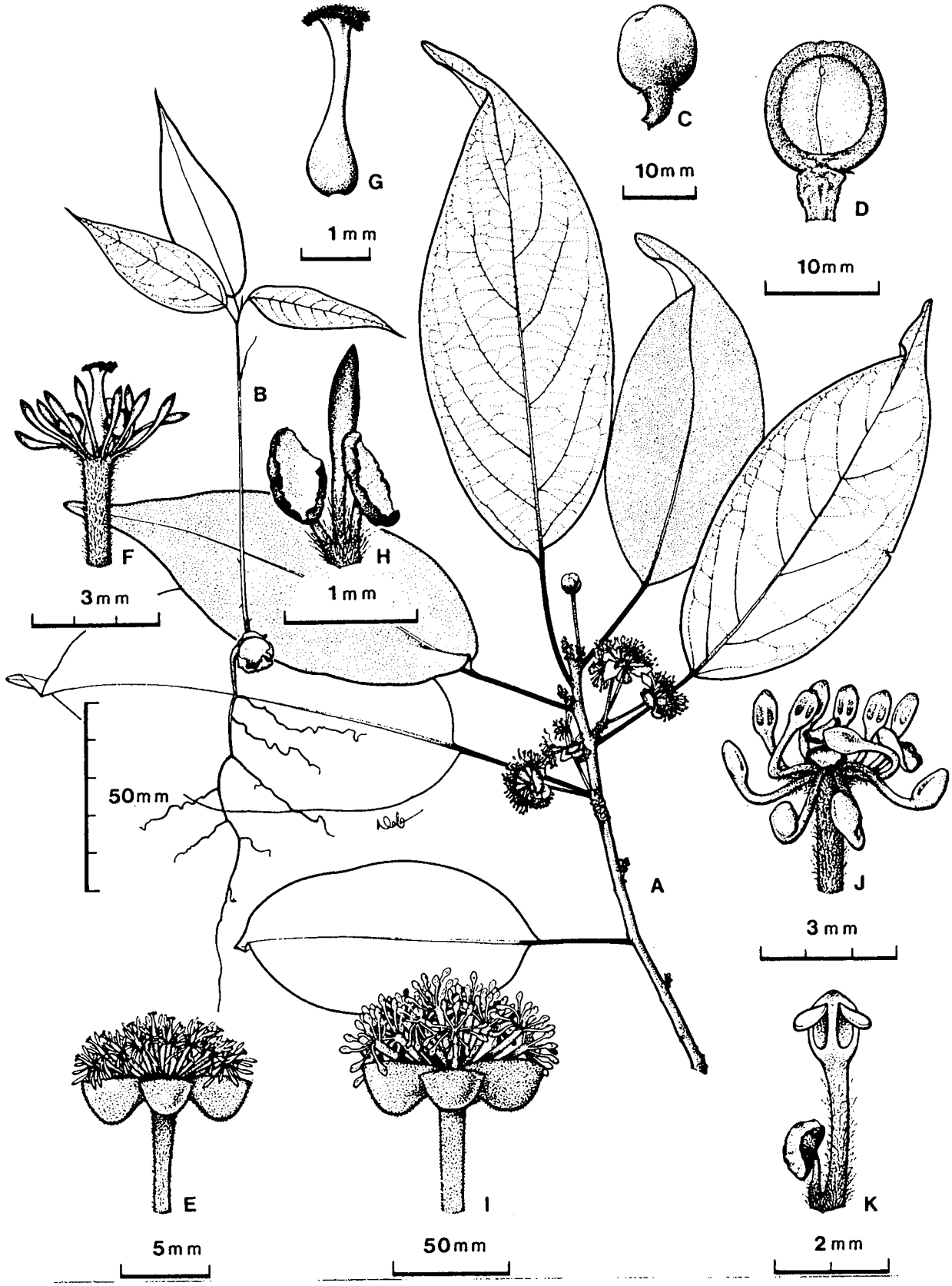

Fig.60. Lindera queenslandica. A Habit Gray 1277; B seedling, C fruit, D fruit (LS) Gray 2516; E female umbel, F female flower (side view), G ovary, style and stigma, H staminode and gland Gray 1276; I male umbel, J male flower (side view), K stamen and gland Gray 1277.

0.5-0.6 mm long, style and stigma absent). Female flowers opening widely. Pedicel 3-4 mm long. Perianth tube and tepals nil. Staminodes in one series, 7-15 per flower, glabrous or pubescent, 1.3-1.8 mm long, with or without 1 or 2 glands; gland heads glabrous, peltate, about 0.7 mm diam., stalks glabrous, 0.4-0.5 mm long. Ovary glabrous, about 1.0-1.1 x 0.7-0.9 mm, style glabrous, 0.7-0.9 mm long, stigma 0.6-0.9 mm wide. Fruits red when ripe, globular, about 12-14 x 11.5-14 mm, mesocarp + exocarp 1.0-1.4 mm thick, endocarp 0.02-0.12 mm thick, receptacle 8.5-11.0 x 4.5-6.5 mm. Seed 8.5-10.0 x 8.5-10.0 mm, testa 0.03-0.18 mm thick, radicle slightly below the apex. Cotyledons cream, uniform texture. Seedling leaves green on the underside. (Figs 60, 85 C-F)

Distribution

North-eastern Queensland and Cape York Peninsula in Australia (Fig. 99, Map 68), perhaps also in New Guinea.

Ecology

Rain forests of northern Queensland and Cape York Peninsula on soils derived from a variety of rock types. Altitudinal range: Sea level to 800 m.

Uses

This species produces millable logs and the sawn timber is marketed as Bollywood. Wood S.G. 0.52-0.66.

Notes and Observations

Flowers have been collected in November, January and February,

while ripe fruits have been collected in January, March and May. Seedling germination period 40-80 days.

Trees of this species are encountered rather infrequently in north Queensland rain forests and until good fertile material became available, it was usually identified as Litsea glutinosa. However, once good male flowering material was examined, it was obvious that this species could no longer be placed in Litsea. The occurrence of the genus Lindera in Australia is of considerable phytogeographic interest. Some New Guinea species identified as Litsea irianensis (Kosterm) are a good match for Lindera but the type of Dehaasia novoguineensis and Litsea irianensis (C.E. Carr 15627) is a different taxon altogether. Further work is needed to correctly assign New Guinea material to the appropriate species. Lindera queenslandica is probably closer to L. lucida (Bl.) Boerl. of Java than most other species but it is amply distinct from it.

Etymology

No explanation needed.

Specimens Examined (53 collections examined)

6. **Litsea Lam.** (nom. cons.)

Litsea Lam., Encycl. 3:574 (1792)
Type: L. chinensis Lam.

Trees, sometimes small or shruby. Twigs usually pubescent when young, but sometimes glabrous at maturity. Leaves petiolate, minutely oil-dotted, penninerved, spirally arranged. Inflorescence umbellate, the umbels ± in racemes, axillary or on the twigs below the leaves. Flowers unisexual, dioecious, 2-4 merous? Male flowers: Tepals 0-8, anthers 5-20, introrse, 4-locular, (rarely 2-locular), glands variable, sometimes peltate, staminodes usually nil, sometimes (1-2). Female flowers: Tepals 0?-8, staminodes 5-16, glands variable, sometimes peltate, ovary sessile, stigma usually thallose, sometimes bilobed (Fig. 86 F). Fruits superior, usually ellipsoid, sometimes globular, 8-18 mm diameter, seated in a cup shaped receptacle or on a swollen receptacle, mesocarp fleshy, endocarp thin. Seed enclosed in a thin testa, radicle below the apex, cotyledons distinct from one another, uniform in texture and cream or purple in colour. Seedling leaves spirally arranged, cataphylls present.

Distribution

A widely distributed genus of about 400 species occurring in Asia (as far north as Korea and Japan), Malesia, Australia, Pacific Islands, New Zealand, South, Central and North America.

Key to the Species of Litsea

Flowering Material

1a. Flowers male 2

b. Flowers female 17

2a. Glands not attached to the anther filaments. . . . . .L. glutinosa

b. Glands attached to the anther filaments. 3

3a. Twig hairs mainly appressed. 4

b. Twig hairs mainly erect. 7

4a. Primary veins straight, then forking & curving well inside the blade margin. Stamens 6-10 per flower. 5

b. Primary veins curved throughout their length, usually curving inside the blade margin without forking. Stamens 8-14 per flower. 6

5a. Primary vein angle 50-80°. Staminal glands pink-red in fresh flowers. . . . . L. reticulata

b. Primary vein angle 30-65°. Staminal glands cream in fresh flowers. . .L. fawcettiana

6a. Outer anther filaments 0.7-1.8 mm long. Underside of young leaves clothed in straight & tortuous erect hairs. . . . . L. australis

b. Outer anther filaments 1.8-2.6 mm long. Underside of young leaves clothed in straight, appressed hairs. . . . . L. connorsii

7a. Leaf blade less than 6 times the length of the petiole. Apex of the lamina usually rounded. 8

b. Leaf blade more than 6 times the length of the petiole. Apex of the lamina usually acute or acuminate 9

8a. Mature leaves puberulous or shortly tomentose on

the underside . . . . . L. bindoniana

b. Mature leaves glabrous on the underside . . .L. granitica

9a. Umbel peduncle more than 14 mm long.
Primary veins 8-18 pairs . . . . . L. macrophylla

b. Umbel peduncle less than 14 mm long.
Primary veins 4-11 pairs 9

10a. Stamens about 8-16 per flower 11

b. Stamens about 6-9 per flower 15

11a. Hairs on the midrib and primary veins
on the underside of the younger
leaf blades tortuous only 12

b. Hairs on the midrib and primary veins
on the underside of the younger
leaf blades straight and tortuous. 14

12a. Perianth tube + pedicel 0.6-1.9 mm long.
Southern Queensland and northern
New South Wales. . . . . .L. australis

b. Perianth tube + pedicel 1.3-3.4 mm long.
Northern Queensland. 13

13a. Primary veins 7-12pairs.
Flowers 3-6 per umbel.
Twigs clothed in tortuous hairs. . . . .L. breviumbellata

b. Primary veins 4-7 pairs.
Flowers 1-3 per umbel.
Twigs clothed in straight &
tortuous hairs. . . . . .L. bennettii

14a. Base of the leaf blade attenuate.
Perianth tube + pedicel 0.6-1.9 mm long.
Outer anther filaments 0.7-1.8 mm long. . . .L. australis

b. Base of the leaf blade truncate or
rounded, rarely attenuate.
Perianth tube + pedicel 2.2-3.8 mm long.
Outer anther filaments 1.3-2.5 mm long. . . . L. leefeana

15a. Staminal glands usually mauve
in fresh flowers.
Twigs clothed in tortuous hairs. . . . .L. breviumbellata

b. Staminal glands cream in fresh flowers.
Twigs clothed in straight & tortuous hairs. 16

16a. Perianth tube + pedicel 1.3-2.5 mm long.
Underside of young leaves clothed in
tortuous, erect, brown hairs.

Mountain tops of northern Queensland. . . . .L. bennettii

b. Perianth tube + pedicel 0.6-1.9 mm long.
Underside of young leaves clothed in
straight & tortuous, erect, white or
pale brown hairs.
Southern Queensland &
northern New South Wales. . . . . .L. australis

17a. Glands not attached to the staminodes. . . . L. glutinosa

b. Glands attached to the staminodes. 18

18a. Twig hairs mainly appressed 19

b. Twig hairs mainly erect 22

19a. Primary veins straight, forking well
inside the blade margin. 20

b. Primary veins curved throughout their
length, usually curving inside the blade
margin without forking. 21

20a. Primary vein angle 50-80°.
Staminal glands pink-red
in fresh flowers. . . . . L. reticulata

b. Primary vein angle 30-65°.
Staminal glands cream in fresh flowers. . .L. fawcettiana

21a. Underside of young leaves clothed in
straight & tortuous, erect hairs. . . . . .L. australis

b. Underside of young leaves clothed in
straight, appressed hairs. . . . . L. connorsii

22a. Leaf blade less than 6 times the
length of the petiole.
Apex of the lamina usually rounded 23

b. Leaf blade more than 6 times the
length of the petiole.
Apex of the lamina usually
acute or acuminate 24

23a. Mature leaves puberulous or
shortly tomentose on the underside . . . . .L. bindoniana

b. Mature leaves glabrous on the underside. . . L. granitica

24a. Ovary pubescent 25

b. Ovary mainly glabrous 27

25a. Petiole 17-42 mm long.
Leaf blade 25-40 cm long. . . . . .L. macrophylla

b. Petiole 7-21 mm long.
Leaf blade 4.5-15.0 cm long. 26

26a. Pedicel + perianth tube about
1.5-2.0 mm long.
Underside of young leaves clothed
in straight & tortuous, erect,
white or pale brown hairs.
Southern Queensland and
northern New South Wales. . . . . .L. australis

b. Pedicel + perianth tube 2.1-2.5 mm long.
Underside of young leaves clothed in
tortuous, erect, brown hairs.
Mountain tops of northern Queensland. . . . .L. bennettii

27a. Staminal glands usually mauve
in fresh flowers. . . . . L. breviumbellata

b. Staminal glands cream in fresh flowers 28

28a. Underside of young leaves clothed
in tortuous, brown, erect hairs. . . . . L. bennettii

b. Underside of young leaves clothed
in straight & tortuous, white or
pale brown, erect hairs. 29

29a. Base of the leaf blade attenuate.
Perianth tube + pedicel 0.6-1.9 mm long. . . L. australis

b. Base of the leaf blade truncate or
rounded rarely attenuate.
Perianth tube + pedicel 2.2-3.8 mm long. . . .L. leefeana

Fruiting Material

1a. Cotyledons white, cream or yellow when freshly cut 2

b. Cotyledons purple when freshly cut 7

2a. Fruiting carpel more than 18 mm long . . . . L. granitica

b. Fruiting carpel less than 18 mm long 3

3a. Fruiting carpel attached to the apex of a swollen receptacle, but the base of the carpel not enclosed by the receptacle, the apex of the receptacle ± flat. . . . . .L. glutinosa

b. Fruiting carpel seated in a cupule, like an egg in an egg cup, the apex of the receptacle obviously dished i.e. concave. 4

4a. Twig hairs mainly erect. 5

b. Twig hairs mainly appressed 6

5a. Axis of the infructescence usually more than 10 mm long . . . . . .L. bindoniana

b. Axis of the infructescence never more than 10 mm long . . . . . L. macrophylla

6a. Primary vein angle 50-80°. Fruiting carpels 10-12 mm diam. Receptacle about 10 mm diam. . . . . .L. reticulata

b. Primary vein angle 30-65°. Fruiting carpels 7-10 mm diam. Receptacle 6.5-9.0 mm diam. . . . . .L. fawcettiana

7a. Fruiting carpels 10-14 mm long. Receptacle 4.5-7.0 mm diam. . . . . L. breviumbellata

b. Fruiting carpels 12.0-22.5 mm long. Receptacle 7.0-11.5 mm diam. 8

8a. Mature leaves almost glabrous on the underside. Apex rounded or obtuse, rarely acute. Secondary veins scarcely raised on the underside of the leaf blade . . . . . .L. connorsii

b. Mature leaves pubescent or sparsely pubescent on the underside.

Apex acuminate, acute or obtuse.
Secondary veins conspicuously raised
on the underside of the leaf blade 9

9a. Hairs on the midrib and primary veins
on the underside of the younger leaf
blade tortuous only . . . . . .L. bennettii

b. Hairs on the midrib and primary veins
on the underside of the younger leaf
blade straight and tortuous 10

10a. Receptacle 3.5-7.0 mm long . . . . . .L. leefeana

b. Receptacle 7.5-10.0 mm long . . . . . .L. australis

1. **Litsea australis** B. Hyland sp. nov.
Differt a L. leefeana receptaculo fructifero 8-10 mm longo.
Typus: D. L. Jones 1772: Brunswick Heads, 20.iii.1985 (holotypus QRS).
Differs from L. leefeana the fruiting receptacle being 8-10 mm long.
[L. leefeana auct. non (F. Muell.) Merr (1919): Floyd, N.S.W. Rainforest Trees. Part 1, ed.2:86 (1979).]

Tree to 20 m tall x 40 cm dbh, usually small to medium sized and well formed. Stem without buttresses in all size classes. Bark flaky or nondescript, outer blaze cream, usually speckled or longitudinally striped, granular in texture. Twigs terete or fluted, clothed in straight and tortuous, brown and pale brown, erect and appressed hairs. Leaves: Underside green, densely clothed in straight and tortuous, white or pale brown, erect hairs when young but sparsely pubescent at maturity. Leaf blade lanceolate, elliptical or oblong, apex acuminate, acute or obtuse, base attenuate, 8.0-14.7 x 2.0-4.7 cm (mean 9.3 x 1.1); penninerved, primary veins 6-10 pairs (mode 8), midrib depressed on the upper surface; petiole 0.6-1.9 cm long (mean 1.1), flat or shallowly grooved on the upper surface. Inflorescence a sessile fascicle or a shortly pedunculate raceme of umbels, axillary and on the twigs below the leaves. Umbel peduncle 3.0-10.2 mm long, umbel bracts (4-5), ± hemispherical (the inner usually larger), 2.0-4.0 x 1.6-4.0 mm, usually glabrous inside but sometimes pubescent outside, persistent, present at anthesis. Flowers yellow, green or cream, without any obvious perfume, 1-3 flowers per umbel. Male flowers opening widely, the tepals becoming ± horizontal at or after anthesis. Pedicel gradually tapering into the perianth tube, pedicel + perianth tube 0.6-1.9 mm long, perianth tube 1.2-1.9 mm diam., sericeous on the outer surface, tepals 5-8, usually in one series,

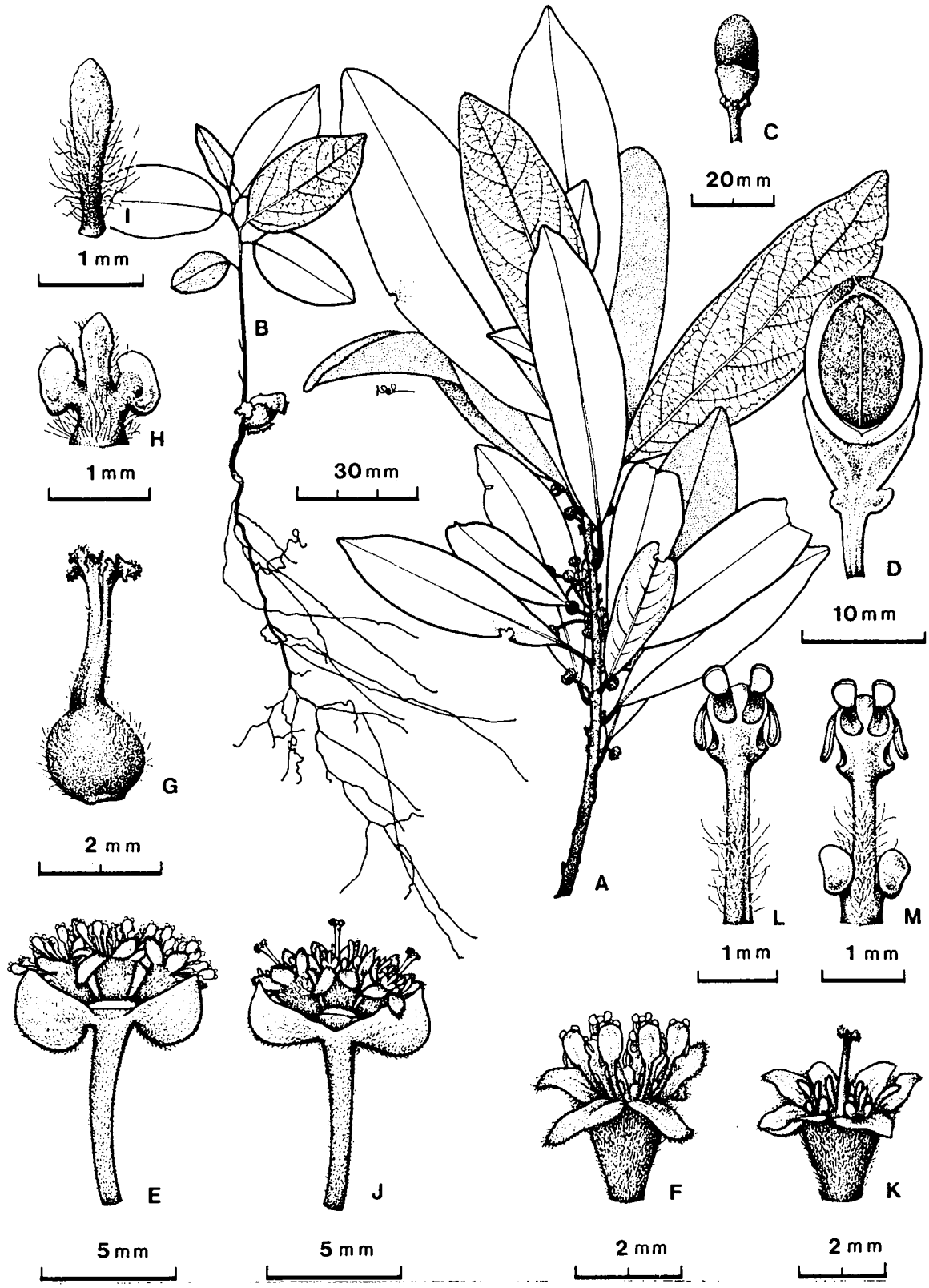

Fig.61. Litsea australis. A Habit D.L. Jones 1772; B seedling, C fruit, D fruit (LS) D.L. Jones 2187; E male umbel with an inner bract removed, F male flower (side view), G ovary, style and stigma, H staminode and glands (adaxial view), I staminode (adaxial view), J female umbel with an inner bract removed, K female flower (side view), L stamen (outer whorl, adaxial view), M stamen (inner whorl, adaxial view) D.L. Jones 1772.

1.5-2.6 x 0.8-1.5 mm, glabrous on the inner surface but sericeous outside. Stamens 7-13 per flower, anthers glabrous, outer anthers 0.8-1.0 x 0.5-0.8 mm, filaments pubescent at least for the lower half, 0.7-1.8 mm long, sometimes glandular (a gland near the base), inner anthers similar but the filaments generally shorter, glandular (2 glands near the base); gland heads 0.2-0.6 x 0.3-0.7 mm, stalks 0.05-0.2 mm long. Pistillode usually present, 0.6-1.1 mm long. Female flowers opening quite widely, the tepals becoming almost horizontal at or after anthesis. Pedicel gradually tapering into the perianth tube, pedicel + perianth tube 1.5-2.6 mm long, perianth tube 1.5-2.2 mm diam., pubescent on the outer surface, tepals 5-8, in one series, 1.4-2.0 x 0.6-1.2 mm, glabrous inside but sericeous outside. Staminodes 6-11, usually glandular, (a few without), scarcely differentiated, 0.5-1.6 mm long, pubescent towards the base, gland heads glabrous, 0.3-0.5 x 0.5-0.6 mm, stalks glabrous 1.4-1.7 mm long. Ovary glabrous or pubescent 1.0-1.5 x 0.9-1.4 mm, style glabrous 1.5-2.5 mm long, stigma thallose, 0.5-0.9 mm wide. Fruits black when ripe, ellipsoid, about 15 x 11.5 mm, mesocarp + exocarp about 1.9 mm thick, endocarp about 0.05 mm thick, receptacle about 9 x 11.5 mm. Seed about 11 x 7 mm, testa about 0.09 mm thick, radicle just below the apex. Cotyledons purple. Seedling leaves green on the underside. (Fig. 61)

Distribution (Fig. 98, Map 62)

Ecology

Rain forests of southern Queensland and northern New South Wales, on soils derived from a variety of sources (beach sand to basalt). Altitudinal range: Sea level to 700 m.

Uses

This species scarcely grows large enough to produce millable logs and it is doubtful if it has been utilized. Wood S.G. unknown.

Notes and Observations

Flowers have been collected in March, April and May, while fruits have been collected in October and November. Seedling germination period about 30 days.

Specimens Examined (40 collections examined)

2. Litsea bennettii B. Hyland sp. nov.
Differt a L. australi L. breviumbellata L. leefeanaque pilis laminae subtus non nisi tortuosis.
Typus: B. Hyland 12916: State Forest Reserve 310, Bellenden-Ker, 6.xii.1983 (holotypus QRS).
Differs from L. australis, L. breviumbellata and L. leefeana in having only tortuous hairs on the underside of the lamina.

Tree to 25 m x 50 cm dbh, often small and windswept. Stem buttressed in the larger but not the smaller size classes. Bark nondescript or flaky, outer blaze usually cream, sometimes brown, speckled, sometimes marked by longitudinal stripes, granular in texture, sometimes emitting an odour. Twigs ± terete or slightly angular, clothed in tortuous, brown, erect hairs when young but eventually becoming almost completely glabrous. Leaves: Underside green, clothed in tortuous, brown, erect hairs which persist to some extent even on old leaves. Leaf blade elliptical, apex acuminate, base attenuate, 4.5-9.0 x 2.5-3.5 cm (mean 6.3 x 3.0); penninerved, primary veins 4-7 pairs (mode 5), midrib depressed on the upper surface; petiole 7-12 mm long (mean 9.0), channelled on the upper

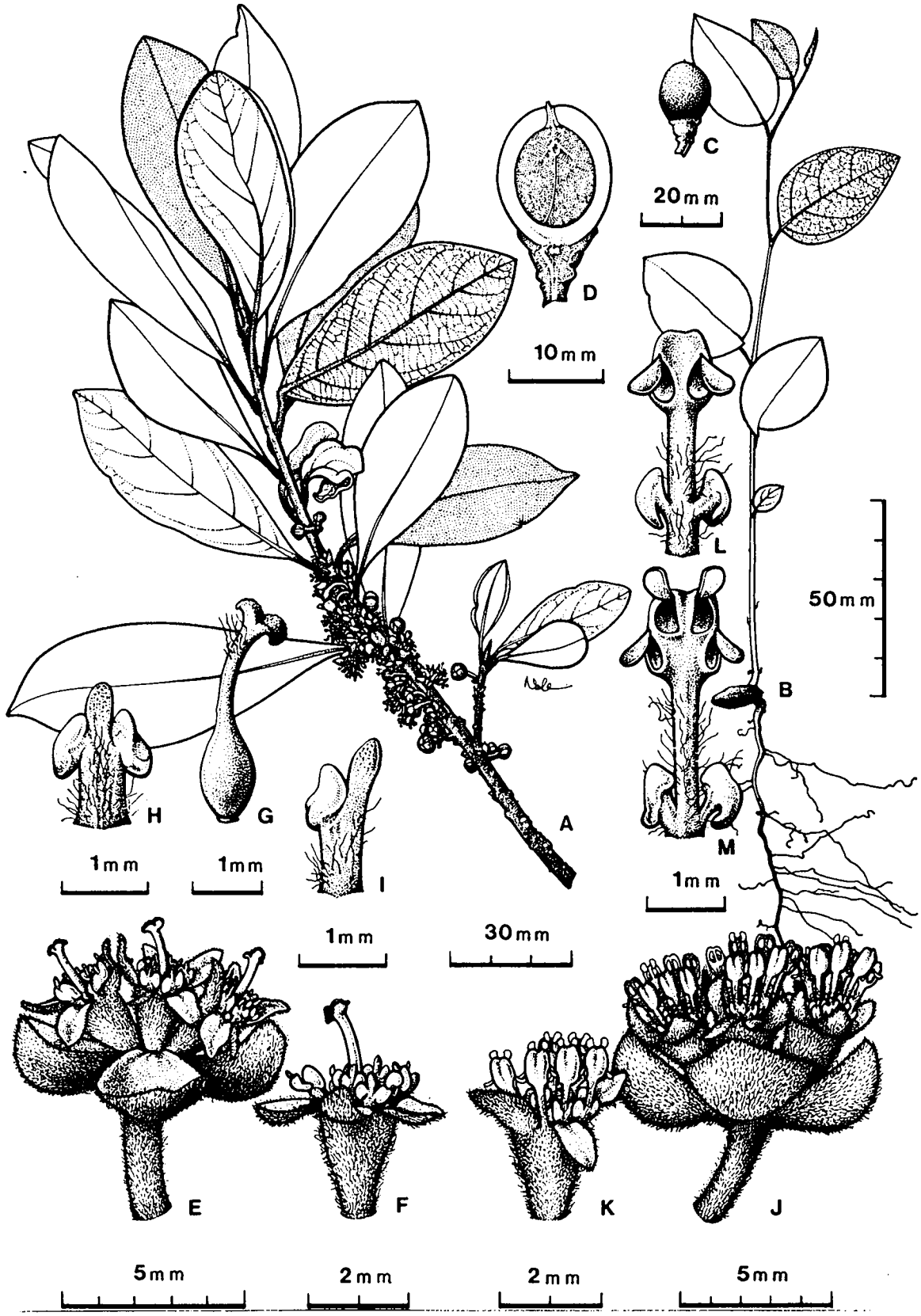

Fig.62. Litsea bennettii. A Habit Hyland 12916; B seedling, C fruit, D fruit (LS), E female umbel (side view), F female flower (side view), G ovary, style and stigma, H staminode and glands (abaxial view), I staminode and gland (abaxial view) Hyland 25060 RFK, J male umbel (side view), K male flower (side view), L stamen and glands (adaxial view), M stamen and glands (adaxial view) Hyland 12916.

surface. Inflorescence a sessile or shortly stalked fascicle of umbels, usually axillary, sometimes also on the twigs below the leaves. Umbel peduncles 2.5-8.1 mm long, umbel bracts (4-5), ± hemispherical, 3.0-5.5 x 2.7-5.6 mm, the inner often slightly larger than the outer, glabrous inside but pubescent outside, persistent, present at anthesis. Flowers cream, greenish cream, faintly, but pleasantly perfumed, about 3-5 per umbel. Male flowers opening quite widely, the tepals becoming ± horizontal at or after anthesis. Pedicel gradually tapering into the perianth tube, pedicel + perianth tube 1.3-2.5 mm long, perianth tube 1.2-2.1 mm diam., woolly on the outer surface, tepals 4-6, in one series, 1.7-2.0 x 1.5-1.6 mm, glabrous inside but woolly on the outer surface. Stamens 5-11 per flower, anthers glabrous, 0.6-1.2 x 0.8-1.1 mm, usually 4-locular, occasionally 2 or 3-locular, filaments woolly (at least towards the base), 0.6-1.4 mm long, glandular (2 glands per filament); gland heads glabrous, 0.3-0.6 x 0.5-0.8 mm, stalk glabrous, 0.1-0.2 mm long. Pistillode sometimes present, sometimes glandular, 0.7-1.4 mm long. Female flowers opening widely, the tepals becoming horizontal at or after anthesis. Pedicel gradually tapering into the perianth tube, pedicel + perianth tube 2.1-2.6 mm long, perianth tube 1.6-2.0 mm diam., pubescent or sericeous on the outer surface, tepals usually 4-7(8), in one series, 1.6-1.9 x 1.0-1.1 mm, glabrous on the inner surface but sericeous on the outer surface. Staminodes 5-11, scarcely differentiated, 0.7-2.0 mm long, glabrous or with a few hairs near the base, some glandular, (usually 2 glands per staminode); gland heads glabrous, 0.2-0.6 x 0.4-0.6 mm, stalks nil. Ovary mainly glabrous, sometimes pubescent, 1.1-1.4 x 0.9-1.2 mm, style glabrous, 1.9-2.4 mm long, stigma usually ± bilobed, 0.8-0.9 mm wide. Fruits black when

fully ripe but reddish before maturity, ellipsoid, 15.5-18.0 x 11.5-14.0 mm, mesocarp + exocarp 1.2-1.5 mm thick, endocarp 0.01-0.10 mm thick, receptacle about 6 mm long x about 10 mm diam. Seed 11-13 x 8.5-9.5 mm, testa 0.02-0.05 mm thick, radicle below the apex. Cotyledons purple. Seedling leaves green on the underside, cataphylls present, leaves spirally arranged. (Fig. 62)

Distribution (Fig. 98, Map 62)

Ecology

Mountain rain forests of northern Queensland on soils derived from granite. Altitudinal range: 1100-1550 m.

Uses

This species grows large enough to produce millable logs but has only recently been distinguished and has not been utilized. It does not have a Standard Trade Name. Wood S.G. 0.56.

Notes and Observations

Flowers have been collected in December, January and February, while ripe fruits have been collected in November and December. Seedling germination period 25-40 days.

Related species probably include the following: L. acrantha Ridley, L. crenata Allen, L. habbemensis Allen and L. morobensis Allen but I am not sure of the closeness of the relationships.

Etymology

It gives me great pleasure to name this species after Mr Graham

Bennett, Officer in Charge of the Bellenden Ker Cableway.

Specimens Examined (23 collections examined)

3. Litsea bindoniana (F. Muell.) F. Muell., Syst. census Austral. pl. 4 (1882); Bailey, Queensl. fl. 4:1311 (1901).
Cylicodaphne bindoniana F. Muell., Fragm. 5:167 (1866).
Type: J. Dallachy, Mt McAllister (MEL 624005 holotype; A, BO, K?, MEL 624006, NSW, isotypes).
Tetranthera bindoniana (F. Muell.) Benth. Fl. austral. 5:305(1870).
Malapoenna bindoniana (F. Muell.) Kuntze, Rev. gen. pt. 2:571 (1891).

Tree to 30 m tall x 80 cm dbh, usually medium sized and well formed. Stem usually buttressed in all size classes. Bark usually nondescript, occasionally flaky, outer blaze usually cream, rarely brown, sometimes speckled or striped, granular in texture, sometimes emitting an odour, difficult to describe. Twigs terete or fluted, clothed in straight and tortuous, brown and white, erect hairs which persist even on mature twigs. Leaves: Underside green, clothed in inconspicuous, short, straight and tortuous, white, appressed and erect hairs which persist even on old leaves, very small foveoles sometimes apparent in the axils of the primary veins. Leaf blade oblong, apex obtuse, base truncate 11.0-27.5 x 5.0-18.0 cm (mean 16.8 x 10.3); penninerved, primary veins 6-11 pairs (mode 8), midrib flush with the upper surface; petiole 2.3-6.7 cm long (mean 3.9), flat or channelled on the upper surface. Inflorescence a raceme of umbels, axillary and on the twigs below the leaves. Axis of the inflorescence about 20-30 mm long, umbel peduncle 5-22 mm long, umbel bracts (5) ± hemispherical, 3.5-6.2 x 3.2-6.0 mm (the inner usually slightly larger), usually glabrous inside, (sometimes slightly hairy towards the base), but pubescent on the outer surface, persistent, present at

anthesis. Flowers greenish cream, cream, yellow, brownish cream or green, pleasantly perfumed, about 4-6 flowers per umbel. Male flowers opening quite widely, the tepals becoming horizontal or reflexed at or after anthesis. Pedicel gradually tapering into the perianth tube, pedicel + perianth tube 1.7-4.1 mm long, perianth tube 2.1-3.5 mm diam., sericeous on the outer surface, tepals usually 5-7, in one series, 1.8-2.8 x 0.8-1.4 mm, glabrous on the inner surface but sericeous on the outer surface. Stamens 8-12 per flower, outer anthers glabrous, 0.7-1.3 x 0.7-1.1 mm, filaments pubescent throughout, 1.8-3.4 mm long, with or without 1-2 glands (about the middle or near the base), inner anthers and filaments of similar dimensions but filaments always glandular (2 glands); gland heads glabrous, 0.4-0.8 x 0.6-1.4 mm, stalks glabrous, 0.05-0.19 mm long or nil. Pistillode sometimes present, undifferentiated, 0.2-2.3 mm long. Female flowers opening fairly widely but the tepals remaining ± erect at anthesis. Pedicel gradually tapering into the perianth tube, pedicel + perianth tube 1.4-2.3 mm long. Perianth tube 1.8-2.5 mm diam., pubescent on the outer surface, tepals 5-8, in one series, 1.2-2.4 x 0.5-0.9 mm, glabrous on the inner surface but pubescent on the outer surface. Staminodes 9-12, outer staminodes (usually 6) scarcely differentiated, glabrous or pubescent towards the base, 0.9-1.9 mm long, with or without 1 or 2 glands, inner staminodes (usually 3), pubescent towards the base, scarcely differentiated, 0.6-1.1 mm long, usually with 2 glands; gland heads glabrous, 0.2-0.4 x 0.5-0.9 mm, stalks nil. Ovary pubescent at least towards the apex, 1.0-1.6 x 1.0-1.5 mm, style pubescent, 1.5-2.0 mm long, stigma thallose, 0.8-1.9 mm wide. Fruits black when fully ripe but reddish before maturity, ellipsoid, 14.0-15.5 x 11.5-12.5 mm, mesocarp +

exocarp 1.0-2.0 mm thick, endocarp 0.06-0.10 mm thick, receptacle 10-11 x 9.0-11.0 mm. Seed 10.5-11.0 x 7.5-10 mm, testa variable 0.04-0.19 mm thick, radicle slightly below the apex. Cotyledons cream or yellowish. Seedling leaves slightly glaucous on the underside.

Distribution (Fig. 98, Map 63)

Ecology

Rain forests of northern and central Queensland on soils derived from a variety of rock types. Altitudinal range: Sea level to 1000 m.

Uses

This species grows large enough to produce millable logs and the sawn timber is marketed as Bollywood, a useful lightweight timber. Wood S.G. 0.44-0.56.

Notes and Observations

Flowers have been collected each month from April to August, while ripe fruits have been collected in October and November. Seedling germination period 20-40 days.

Specimens Examined (57 collections examined)

4. **Litsea breviumbellata** Allen, J. Arnold Arbor. 23:121 (1942).
Type: L.J. Brass 7585, Lake Daviumbu, Middle Fly River, Papua (A holotype) (BO,BRI, L, isotypes).
L. ferruginea (R. Br.) Bailey, Syn. Queensl. fl. 426 (1883) nom. illeg, non Blume Bijdr. fl. Ned. Ind. 11:561 (1826).
Tetranthera ferruginea R.Br., Prodr. 403 (1810); Benth.,Fl. austral. 5:305 (1870); Bailey, Queensl. fl. 4:1312 (1901).
Type: Banks and Solander, Cape Grafton and Endeavour River, Queensland (BM syntypes, BRI, MEL isotypes).

Lectotype: Banks and Solander s.n. New Holland (BM).
[T. nesogena F. Muell., Fragm. 5:169 (1866) nom. prov.]

Tree to 20 m tall x 30 cm dbh, usually small or even flowering as a shrub. Stem slightly buttressed in the larger but not the smaller size classes. Bark usually nondescript, occasionally flaky, outer blaze usually cream, occasionally brownish, sometimes speckled, usually granular in texture, occasionally fibrous, sometimes emitting a definite odour, difficult to describe. Twigs ± terete, clothed in tortuous, brown or pale brown, erect hairs which persist even on mature twigs. Leaves: Underside green, clothed in tortuous, white and brown, erect hairs which persist even on quite old leaves. Leaf blade lanceolate, apex acuminate or acute, base attenuate, 8.0-21.5 x 2.4-5.8 cm (mean 11.8 x 4.0); penninerved, primary veins 7-12 pairs (mode 9), midrib depressed or flush with the upper surface; petiole 8-21 mm long (mean 13.1), channelled on the upper surface. Inflorescence umbellate, pedunculate (peduncle 3.0-9.5 mm long), not exceeding the leaves, axillary or on the twigs below the leaves, inflorescence bracts (4-6) ± hemispherical, 2.0-5.1 x 2.2-4.5 mm (inner bracts usually larger than the outer), glabrous inside but pubescent on the outer surface, persistent, present at anthesis. Flowers yellow, cream, creamy brown or greenish, faintly but pleasantly perfumed or without any obvious perfume, about 3-6 flowers per umbel. Male flowers opening widely, the tepals becoming ± horizontal at or after anthesis. Pedicel gradually tapering into the perianth tube, pedicel + perianth tube 1.8-3.4 mm long, perianth tube 1.1-1.9 mm diam., sericeous on the outer surface, tepals 4-8, in one series, 1.5-2.6 x 0.7-1.0 mm, glabrous inside but sericeous on the outer surface. Stamens about 9 per flower, outer anthers glabrous, 0.7-1.1 x 0.6-0.9 mm, filaments usually pubescent towards the base,

1.5-3.0 mm long, usually 3 eglandular and 3 glandular, 1.6-3.0 mm long; inner anthers 0.5-1.0 x 0.7-1.0 mm, filaments usually pubescent towards the base, 0.9-1.8 mm long, glandular, (usually 2); gland heads glabrous, mauve in fresh flowers, 0.2-0.6 x 0.4-0.9 mm, stalks glabrous, 0.08-0.16 mm long, sometimes absent. Pistillode present, scarcely differentiated, 0.4-1.4 mm long. Female flowers opening fairly widely, but the tepals remaining ± erect at anthesis. Pedicel gradually tapering into the perianth tube, pedicel + perianth tube 1.5-2.7 mm long. Perianth tube 1.3-1.5 mm diam., sericeous on the outer surface, tepals usually (5-7), in one series, 1.1-1.7 x 0.5-0.9 mm, glabrous inside but sericeous on at least part of the outer surface. Staminodes about 9 per flower (8-12), outer staminodes scarcely differentiated, head glabrous, 0.3-0.6 x 0.2-0.3 mm, filaments sericeous, 0.7-1.2 mm long, with or without 1 or 2 glands, inner staminodes sericeous, undifferentiated, 0.4-1.0 mm long, glandular; gland heads glabrous, 0.2-0.5 x 0.4-0.9 mm, stalks glabrous, to 0.1 mm long, sometimes absent. Ovary glabrous, 0.9-1.3 x 0.7-1.1 mm, style glabrous, 1.2-2.7 mm long, stigma thallose, 0.2-1.1 mm wide. Fruits black when fully ripe but reddish before maturity, ellipsoid, 10-13 x 7.5-11.5 mm, mesocarp + exocarp 0.4-1.3 mm thick, endocarp 0.0-0.05 mm thick, receptacle 4.0-8.0 x 4.5-7.0 mm. Seed 8.5-10.0 x 4.5-9.0 mm, testa 0.02-0.10 mm thick, radicle well below the apex. Cotyledons pink to purple. Seedling leaves green on the underside. (Fig. 86 A)

Distribution (Fig. 99, Map 65)

The collection (A. Cunningham 162) from Percy Isles is an isolated southern occurrence and I have doubts about the provenance of this

collection but all duplicates are similarly labelled and until more information becomes available its occurrence there must be regarded as a possibility.

Ecology

Rain forests, monsoon forests, beach forests and fire free open forests of northern Queensland and Northern Territory. This species is favoured by disturbance in fire free areas and as it can flower and fruit as a shrub it can quickly colonize any niche where it becomes established. Altitudinal range: Sea level to 700 m.

Uses

This species does not grow large enough to produce millable logs and has not been given a Standard Trade Name. Wood S.G. 0.78.

Notes and Observations

Flowers have been collected each month from May to September, but 70% of the collections were made in June, while ripe fruits have been collected in each month from March to July and also in November. Seedling germination period 20-75 days.

The type of Tetranthera monopetala var. glabriuscula Blume (Zollinger 327 NY) appears to be very close to Litsea breviumbellata but I am not prepared to recognize it as being conspecific at this stage. I strongly suspect that Tetranthera areolata Bl. is also conspecific but I would like to be sure that I had seen the type before coming to a conclusion.

Specimens Examined (81 collections examined)

5. **Litsea connorsii** B. Hyland sp. nov.
Differt a L. australi pilis laminae subtus appressis.
Typus: B. Gray 1302: State Forest Reserve 143 Riflemead, Windmill Logging Area, 1.iii.1979 (holotypus QRS).
Differs from L. australis in the appressed hairs on the underside of the lamina.

Tree to 30 m tall x 60 cm dbh, usually small to medium sized and moderately well formed. Stem usually buttressed in all size classes. Bark flaky or nondescript, outer blaze cream, occasionally pink, sometimes speckled or striped, usually granular, sometimes fibrous in texture, usually emitting a definite odour, usually difficult to describe. Twigs terete or slightly fluted, clothed in straight and tortuous, white or pale brown, appressed hairs when young, some of which persist even on mature twigs. Leaves: Underside green, clothed in straight, white or pale brown, appressed hairs when young but soon becoming almost completely glabrous. Leaf blade narrowly obovate, narrowly elliptical, apex rounded or obtuse, rarely acute, base attenuate, 6.5-12.0 x 2.0-4.0 cm (mean 8.7 x 2.9); penninerved, primary veins 6-9 pairs (mode 8), midrib depressed on the upper surface; petiole 7-20 mm long (mean 11.2), flat on the upper surface. Inflorescence an almost sessile fascicle (or very compressed raceme) of umbels, axillary but mainly on the twigs below the leaves. Axis of the inflorescence nil or up to 2.0 mm long, umbel peduncle 3.7-15 mm long, umbel bracts (4), ± hemispherical, 2.7-4.9 x 2.1-5.6 mm, the inner bracts larger than the outer, glabrous inside but usually pubescent on the outer surface, persistent, present at anthesis. Flowers usually greenish cream, cream or yellow, 1-6 flowers per umbel, faintly but pleasantly perfumed. Male flowers opening quite widely, the tepals becoming ± horizontal at or after anthesis. Pedicel gradually tapering into the perianth tube, pedicel + perianth

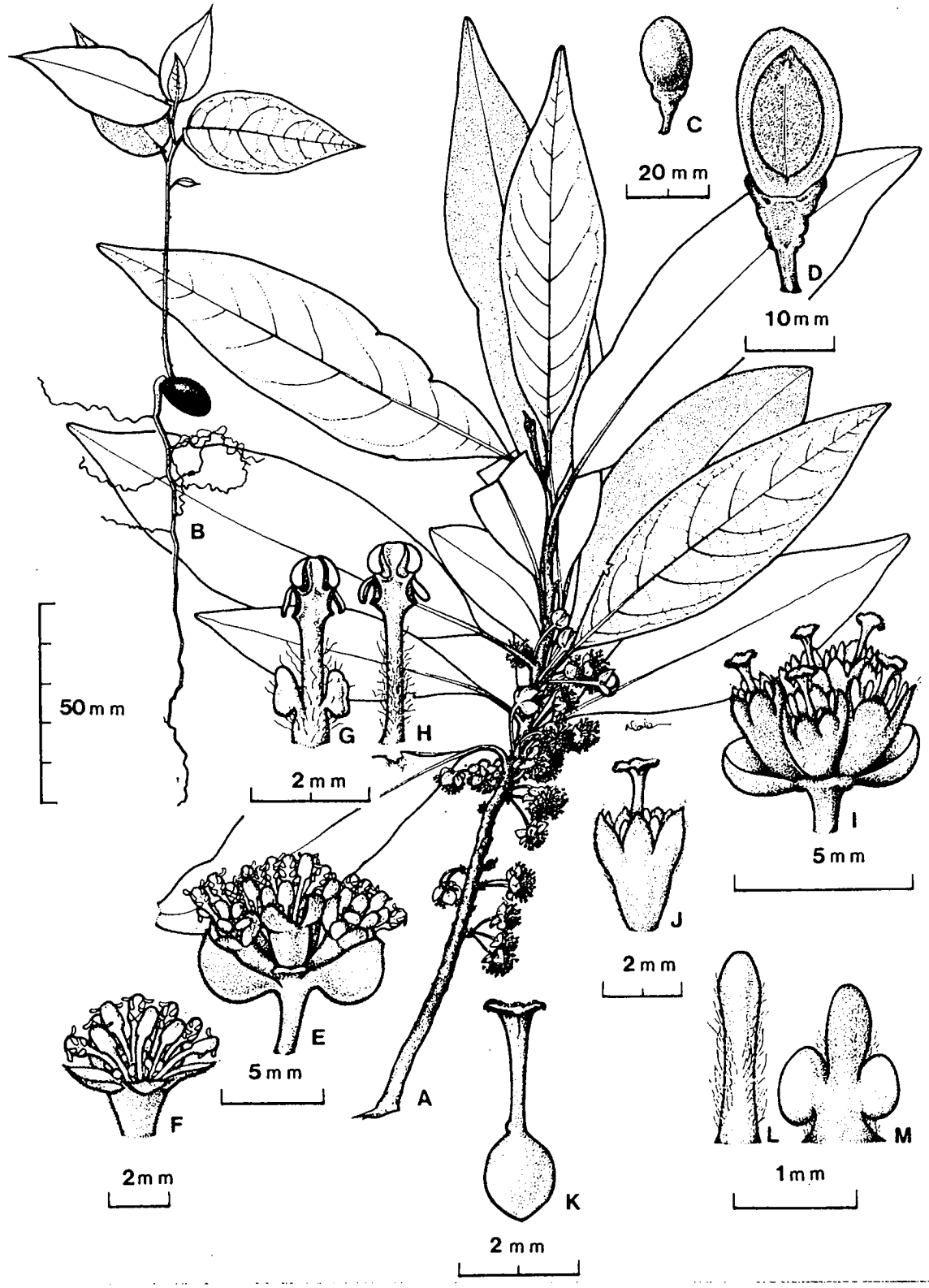

Fig.63. Litsea connorsii. A Habit Gray 1302; B seedling, C fruit, D fruit (LS) Gray 755; E male umbel with an inner bract removed, F male flower, G stamen and glands (adaxial view), H stamen (outer whorl, adaxial view) Gray 1302; I female umbel with an inner bract removed, J female flower, K ovary, style and stigma, L staminode (adaxial view), M staminode and glands (adaxial view) Gray 1325.

tube 1.5-3.2 mm long, perianth tube 1.3-1.9 mm diam., sericeous on the outer surface, tepals usually 5-6(4-8), ± in one series, 1.8-2.6 x 1.0-2.1 mm, glabrous on the inner surface but sericeous or pubescent on the outer surface. Stamens 8-13 per flower, anthers glabrous, 0.9-1.1 x 0.5-1.0 mm, outer filaments 1.8-2.6 mm long, usually hairy, glandular or eglandular, inner filaments 0.7-1.8 mm long, hairy, at least towards the base, glandular (usually 2 per filament); gland heads glabrous, 0.4-0.7 x 0.4-0.8 mm, stalks glabrous, 0.05-0.20 mm long. Pistillode usually present, often glandular, pistillode 0.3-1.5 mm long. Female flowers opening fairly widely but the tepals remaining ± erect at anthesis. Pedicel gradually tapering into the perianth tube, pedicel + perianth tube 1.6-2.7 mm long, perianth tube 1.3-1.7 mm diam., sericeous or pubescent on the outer surface, tepals 6, (4-8) in one series, 1.3-1.7 x 0.7-1.1 mm, glabrous inside but sericeous on the outer surface. Staminodes 8-14, outer staminodes (usually 6), slightly differentiated, 1.3-1.5 mm long, usually eglandular, hairy, inner staminodes (usually 3) slightly differentiated, 0.5-1.1 mm long, glandular (usually 2 glands), mainly glabrous (perhaps with a few basal hairs); gland heads glabrous, 0.2-0.4 x 0.4-0.8 mm, stalks to 0.15 mm long or nil. Ovary glabrous, 1.1-1.6 x 1.0-1.3 mm, style glabrous, 1.2-3.0 mm long, stigma thallose, 0.7-1.1 mm wide. Fruits black when ripe but reddish before maturity, ellipsoid, 15.5-19.0 x 8.5-13.0 mm, mesocarp + exocarp 1.4-1.9 mm thick, endocarp not discernible, receptacle 5.0-9.5 x 8-11 mm. Seed 11.5-14.0 x 8-9 mm, testa 0.02-0.11 mm thick, radicle below or well below the apex. Cotyledons purple. Seedling leaves green on the underside. (Fig. 63)

Distribution (Fig. 98, Map 64)

Ecology

Rain forests and rain forest margins in northern Queensland, particularly on soils derived from granite and acid volcanic rocks. Altitudinal range: 600-1200 m.

Uses

This species seldom grows large enough to produce millable logs but it has been given the Standard Trade Name, Bollywood. Wood S.G. 0.47.

Notes and Observations

Flowers have been collected in January, February and March while, ripe fruits have been collected in October and December. Seedling germination period 20-40 days.

Etymology

It gives great pleasure to name this species after Mr J.R. Connors whose cheerful assistance has been of great help to me in this long and arduous project.

Specimens Examined (46 collections examined)

6. Litsea fawcettiana (F. Muell.) B. Hyland comb. nov.
Cylicodaphne fawcettiana F. Muell., Fragm. 5:168 (1866).
Lectotype (here designated): A. Thozet 76 (MEL 624274), Mount Archer.
Syntypes: A. Thozet, Mount Archer, Rockhampton (MEL 624275-624277 & 624279, K isotype).

Tree to 30 m tall x 75 cm dbh, usually medium sized and well formed. Stem buttressed in the larger classes but not in the smaller. Bark usually flaky (often coarsely flaky), rarely

nondescript, outer blaze cream, occasionally pink or brown, usually fibrous in texture, sometimes granular, frequently emitting a conspicuous odour, difficult to describe. Twigs terete or slightly fluted, clothed in straight, white or pale brown, appressed hairs when young but eventually becoming ± glabrous. Leaves: Underside green, clothed in straight and tortuous, white or pale brown, appressed hairs when very young but soon becoming almost completely glabrous. Leaf blade obovate, narrowly obovate, elliptical, apex acute, obtuse or rounded, base attenuate, 6.0-14.0 x 2.0-7.5 cm (mean 8.9 x 3.4); penninerved, primary veins 6-11 pairs (mode 9), midrib depressed or flush with the upper surface; petiole 5-16 mm long (mean 11.5), flat or channelled on the upper surface. Inflorescence a short raceme of umbels, mainly axillary, but also on the twigs below the leaves. Axis of the inflorescence about 3-8 mm long, umbel peduncle 4.0-14.0 mm long, umbel bracts (usually 4-5), ± hemispherical, 2.7-6.0 x 2.1-5.1 mm (the inner usually longer than the outer), glabrous inside, the outer surface glabrous or pubescent towards the base, persistent, present at anthesis. Flowers cream or green, rarely yellowish or brownish, pleasantly perfumed, about 4-6 flowers per umbel. Male flowers opening quite widely, the tepals becoming ± horizontal at or after anthesis. Pedicel gradually tapering into the perianth tube, pedicel + perianth tube 1.0-2.4 mm long, perianth tube 1.4-2.0 mm diam., pubescent or sericeous on the outer surface, tepals 4-6, in one series, 1.5-4.0 x 0.8-1.4 mm, glabrous inside but pubescent or sericeous outside. Stamens 6-10 per flower, anthers glabrous, 1.1-1.6 x 0.6-1.0 mm, filaments of the outer anthers usually eglandular, filaments of the inner anthers usually with 1-2 glands, all filaments usually hairy, at least towards the base, 1.1-3.7 mm long; gland heads

glabrous, 0.3-0.9 x 0.5-1.0 mm, stalks glabrous, 0.0-0.3 mm long. Pistillode sometimes present, 0.4-1.3 mm long. Female flowers opening fairly widely the tepals becoming ± horizontal at or after anthesis. Pedicel gradually tapering into the perianth tube, pedicel + perianth tube 1.0-1.8 mm long, perianth tube 1.0-2.0 mm diam., pubescent or sericeous on the outer surface, tepals 4-7, in one series, 1.5-2.3 x 0.6-1.1 mm, glabrous inside but pubescent on the outer surface. Staminodes 6-9, scarcely differentiated, usually 3 with and 3-6 without glands, staminodes 0.6-1.5 mm long, pubescent, at least towards the base; gland heads glabrous, 0.3-0.6 x 0.4-0.7 mm, stalks nil or 0.1-0.2 mm long, glabrous. Ovary glabrous, 1.0-1.2 x 0.8-1.2 mm, style glabrous, 0.9-2.0 mm long, stigma thallose or obscurely bilobed, 2.0 mm wide. Fruits black when fully ripe but reddish before maturity, ellipsoid, 11.0-15.5 x 7-10 mm, mesocarp + exocarp 0.9-1.1 mm thick, endocarp 0.05-0.10 mm thick, receptacle 8.0-12.5 x 6.5-9.0 mm. Seed 9.5-14.0 x 4.5-7.5 mm, testa 0.02-0.03 mm thick, radicle below the apex. Cotyledons white or cream. Seedling leaves green on the underside. (Fig 86 B-C)

Distribution (Fig. 98, Map 61)

Ecology

Rain forests of northern, central and southern Queensland on soils derived from a variety of rock types. Altitudinal range: Sea level to 1350 mm.

Uses

This species produces millable logs and the sawn timber is marketed as Bollywood, a useful lightweight timber. Wood S.G. 0.50-0.53.

Notes and Observations

Flowers have been collected each month from March to July while, ripe fruits have been collected from October to January. Seedling germination period 15-30 days.

Specimens Examined (118 collections examined)

7. Litsea glutinosa (Lour.) C. B. Robinson, Philip. J. Sc. Bot. 6:321 (1911).
Sebifera glutinosa Lour., Fl. cochinch. 638 (1790).
Type: J. Loureiro, Cochinchina (BM holotype).
Litsea chinensis Lam., Encycl. 3:574 (1792); Bailey, Queensl. fl. 4:1310 (1901).
Type: "Martin?, China, Ille de France?" n.v.
Tetranthera laurifolia Jacq. Pl. hort. schoenbr. 1, pl. 113 (1797).
Type: Mauritius n.v.
T. apetala Roxb. Pl. Corom. 2:25 t147 (1800).
Syntypes?: W. Roxburgh, India (MO isotype).
J. de Silva, Sillet (NY isotype?).
Litsea multiflora Blume, Bijdr. 564 (1826).
Type: C. Blume?, Java (NY isotype?).
Tetranthera laurifolia var. undulata Blume, Mus. Bot. Lugd. Bat. 1:374 (1851).
Type: A. Zippelinus, Moluccas (NY syntype).
A. Zippelinus?, Timor (NY syntype).
A. Zippelinus?, Timor (NY syntype).
T. tomentosa var. birmanica Meissner in DC., Prodr. 15(1):178 (1864).
Type: Wallich, Hb. Birman 172, Donabue, 5.ix.1826 (NY isotype).
T. litoralis Blume var. glabrescens Meissner in DC., Prodr. 15(1):180 (1864).
Type: J. D. Hooker, Khaysa (NY isotype).
Litsea brassii O. Schmidt in C. White, J. Arnold Arbor. 10:214 (1929).
Type: L.J. Brass 813, Kappa Kappa, Papua (A, BRI isotypes).

Tree to 12 m tall x 30 cm dbh, usually a small or shruby. Stem usually without buttresses. Bark usually flaky, occasionally nondescript, outer blaze cream or brown, usually speckled, granular in

texture. Twigs terete, clothed in tortuous, white, erect and appressed persistent hairs. Leaves: Underside green, clothed in white, tortuous, erect, persistent or deciduous hairs which may persist on mature leaves or may be almost entirely shed. Leaf blade elliptical, apex acuminate, acute, base attenuate, 7.0-28.5 x 3.0-18.5 cm (mean 15.4 x 6.2); penninerved, primary veins 6-13 pairs (mode 9), midrib raised or flush with the upper surface; petiole 8-36 mm long (mean 20.6), flat or ridged on the upper surface. Inflorescence a compound umbel or raceme of umbels, axillary and on the twigs below the leaves. Axis of the inflorescence 10-30 mm long, umbel peduncle 5-24 mm long, umbel bracts (4) ± hemispherical, 4.0-6.1 x 2.9-8.8 mm (the inner bracts larger then the outer), pubescent on both the inner and outer surfaces, persistent, present at anthesis. Flowers cream, green, creamy green or yellowish, faintly but pleasantly perfumed, about 6-14 per umbel. Male flowers opening quite widely, some of the anther filaments becoming almost horizontal at or after anthesis. Pedicel gradually tapering into the perianth tube, pedicel + perianth tube 2.0-6.5 mm long, perianth tube 0.9-1.8 mm diam., woolly on the outer surface, tepals 0-4 per flower, 2.0-2.9 x 0.3-1.5 mm, glabrous or pubescent on both the inner and outer surfaces. Stamens about 8-20 per flower, anthers glabrous 0.9-1.5 x 0.7-1.2 mm, filaments usually hairy, 1.5-3.5 mm long, outer filaments slightly longer than the inner, staminodes (1-2), sometimes present; glands (usually 5-10), heads glabrous, ± peltate?, 0.3-0.9 x 0.3-1.0 mm, stalks hairy or glabrous, 0.4-0.8 mm long, without any obvious attachment to the anther filaments. Pistillode obpyriform, usually present, about 1.2 mm long. Female flowers opening quite widely, the staminodes becoming almost horizontal at or after anthesis. Pedicel gradually tapering

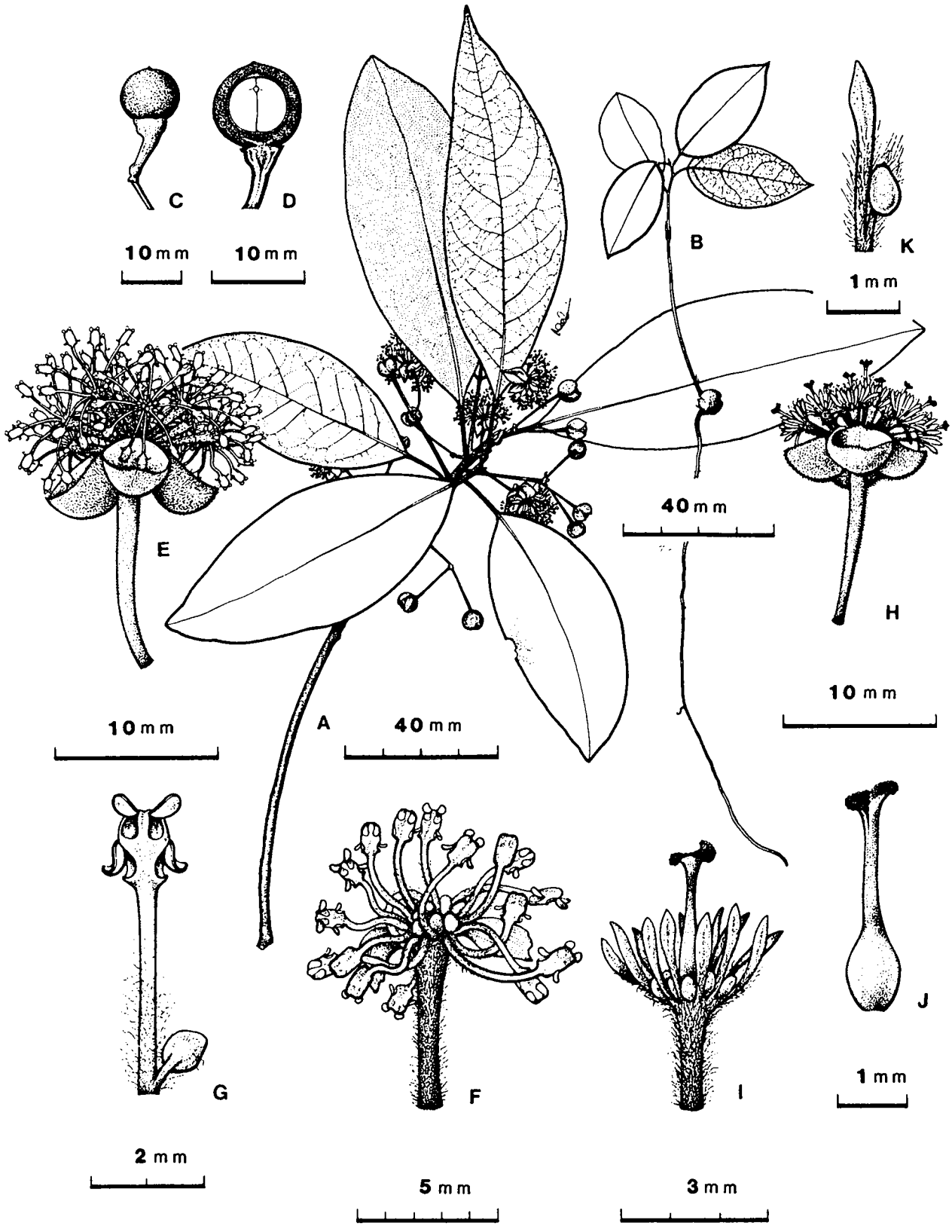

Fig.64. Litsea glutinosa. A Habit Hyland 12608; B seedling, C fruit, D fruit (LS) Gray 2028; E male umbel, F male flower, G stamen and gland (adaxial view) Hyland 12608; H female umbel, I female flower, J ovary, style and stigma, K staminode and gland (abaxial view) Hyland 11608.

into the perianth tube, pedicel + perianth tube 1.7-3.2 mm long, perianth tube 1.0-1.7 mm diam., sericeous or pubescent on the outer surface, tepals 0-6 (sometimes difficult to distinguish from staminodes). Assuming tepals to be absent, staminodes number about 9-16, outer staminodes slightly differentiated, the head ± spathulate, 1.8-2.8 mm long, inner staminodes similar but smaller. Glands (usually 3-10), heads glabrous, ± peltate, 0.3-0.4 x 0.3-0.6 mm, stalks hairy, 0.4-0.8 mm long, without any obvious attachment to the staminode filaments. Ovary glabrous, 0.8-1.8 x 0.7-1.2 mm, style glabrous, 0.9-2.2 mm long, stigma thallose, lanate, 0.6-1.0 mm wide. Fruits black when ripe, globular, 8.5-10.0 x 8.5-11.0 mm, mesocarp + exocarp 0.8-0.9 mm thick, endocarp 0.09-0.11 mm thick, receptacle 5-8 x 4-8 mm. Seed 6.0-7.5 x 5.0-8.5 mm, testa 0.02-0.11 mm thick, radicle below or well below the apex. Cotyledons cream. Seedling leaves green on the underside. (Figs 64, 86 D-E)

Distribution (Fig. 100, Map 72)

Ecology

Usually in open forests, monsoon forests and gallery forests of coastal central Queensland, northern Queensland, Northern Territory and the Kimberley region of Western Australia, occasionally found in rain forests. Growing on soils derived from a variety of rock types. Altitudinal range: Sea level to 600 m.

Uses

This species does not produce millable logs and does not have a Standard Trade Name. (Previous listings of Litsea glutinosa e.g. Cause et al. (1974) probably referred to Lindera queenslandica).

Wood S.G. 0.77.

Notes and Observations

Flowers have been collected each month from December to May while, ripe fruits have been collected each month from March to July and also in November. Seedling germination period about 200 days.

As recognized in this revision, this is a widespread species occurring naturally from China to Australia and apparently naturalised in Madagascar and Mauritius. Two sterile collections from Melville Island (Stocker 151 & 197) have been placed here but I have some doubts about their correct placement. Fertile material is needed before they can be identified with certainty. See notes under Generic Concepts in the Introduction.

Specimens Examined (204 collections examined)

8. Litsea granitica B. Hyland sp. nov.
Differt a L. bindoniana laminis subtus glabratis et fructu ad maturitatem plus quam 18 mm longo.
Typus: B. Gray 3833: State Forest Reserve 143 Riflemead, Carbine Logging Area, 3.i.1985 (holotypus QRS).
Differs from L. bindoniana in the lamina being glabrous on the underside and the fruiting carpel being more than 18 mm long.

Tree to 30 m tall x 60 cm dbh, usually small to medium sized, poorly formed and windswept. Stem with or without buttresses. Bark flaky or nondescript, outer blaze cream, often speckled and striped, fibrous or granular in texture, often emitting a conspicuous odour like pine or turpentine. Twigs ± terete or slightly angular, clothed in tortuous, brown, erect hairs when young but eventually becoming almost completely glabrous. Leaves: Underside green or slightly

glaucous, clothed in tortuous, white and brown, erect hairs when very young but soon becoming almost completely glabrous. Leaf blade oblong or almost orbicular, apex obtuse, base truncate or shortly attenuate, 12-19 x 6-12 cm (mean 15.4 x 9.4); penninerved, primary veins 6-10 pairs (mode 7), midrib ± flush or slightly raised on the upper surface; petiole 40-70 mm long (mean 51), flat or channelled on the upper surface. Inflorescence a very short axillary raceme of umbels. Axis of the inflorescence about 5-10 mm long, umbel peduncle about 7.5-9.5 mm long, umbel bracts (4-5), ± hemispherical, about 5.5-6.5 x 5.5-7.0 mm (the inner larger), glabrous inside but pubescent on the outer surface, persistent, present at anthesis. Flowers greenish cream, cream or pale brown, faintly perfumed or without any obvious perfume, about 4-6 flowers per umbel. Male flowers opening quite widely, the tepals becoming horizontal or reflexed at or after anthesis. Pedicel gradually tapering into the perianth tube, pedicel + perianth tube 2.9-3.0 mm long, perianth tube 2.7-3.0 mm diam., pubescent on the outer surface, tepals 6-8, in one series, 3.0-3.3 x 1.5-1.7 mm, glabrous on the inner surface but pubescent on the outer surface. Stamens 9-12 per flower, outer anthers glabrous, 1.2-1.3 x 1.0-1.2 mm, filaments pubescent, at least towards the base, 2.5-2.6 mm long, with or without 1-2 glands (about the middle), inner anthers and filaments of similar dimensions but filaments always glandular (2 glands); gland heads glabrous, 0.6-0.7 mm long x 0.9-1.4 mm wide, stalks glabrous, 0.1-0.5 mm long. Pistillode absent. Female flowers opening quite widely, the tepals becoming almost horizontal at anthesis. Pedicel + perianth tube 4.2-4.6 x 2.8-3.6 mm, sericeous on the outer surface, tepals 6-8, in one series, 2.0-3.0 x 1.0-1.3 mm, glabrous inside but sericeous on the outer surface and the margins

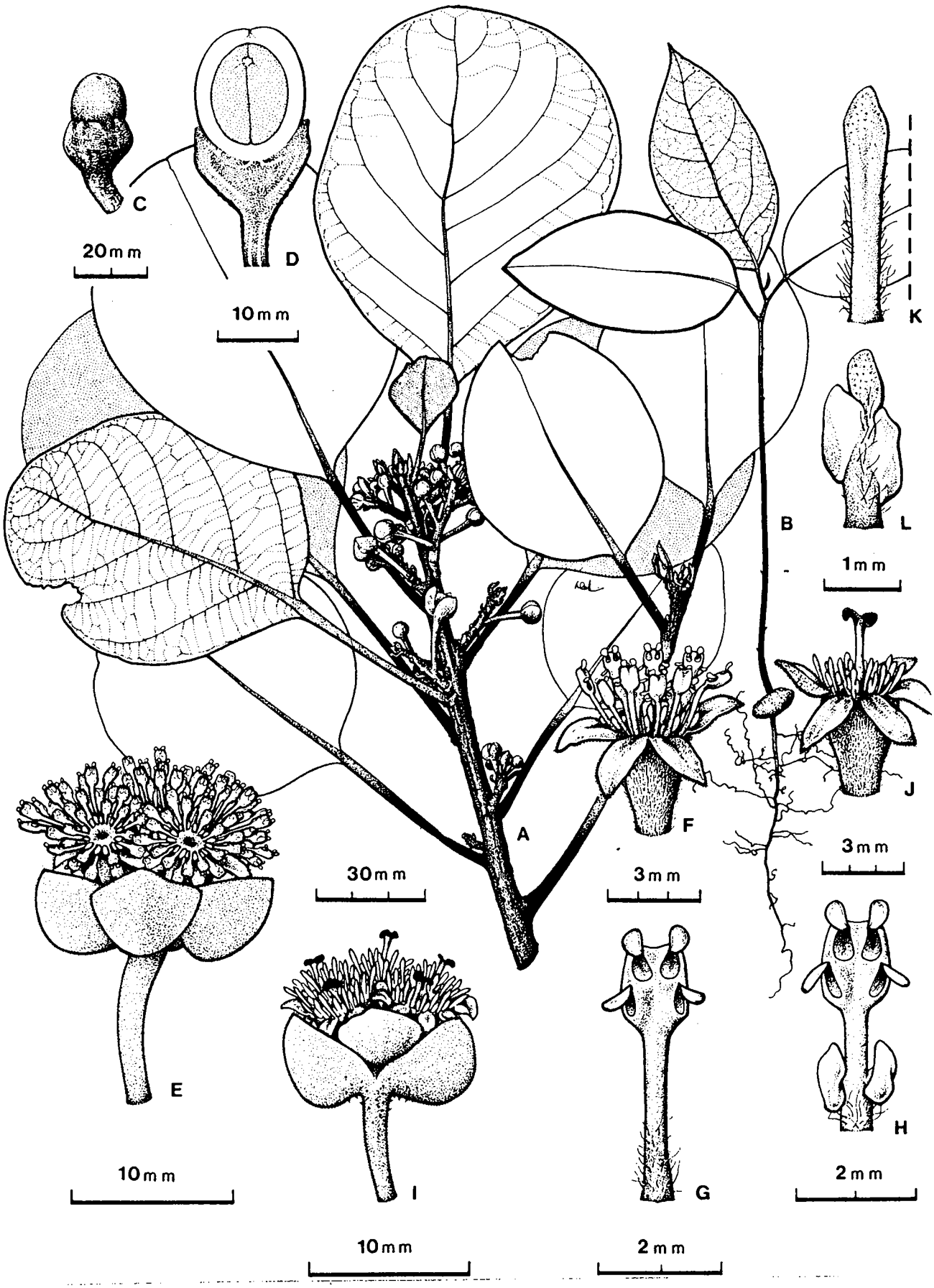

Fig.65. Litsea granitica. A Habit Gray 3833; B seedling, C fruit, D fruit (LS) Gray 827; E male umbel, F male flower, G stamen (outer whorl, adaxial view), H stamen and glands (inner whorl, adaxial view) Gray 3833; I female umbel, J female flower, K staminode (outer whorl, adaxial view), L staminode and glands (abaxial view) Gray 3891.

ciliate. Staminodes 9-12 per flower, outer staminodes (usually 6), somewhat differentiated, mostly pubescent except towards the apex, 1.8-2.4 mm long (with or without 1 or 2 glands); inner staminodes (usually 3), somewhat differentiated, mostly pubescent except towards the apex, 1.0-2.0 mm long (usually with 2 glands); gland heads glabrous, 0.4-0.5 x 0.7-0.8 mm, stalks glabrous, about 0.1 mm long or absent. Ovary pubescent, 1.9-2.0 x 1.8-2.3 mm, style pubescent, at least towards the base, 1.1-1.5 mm long, stigma thallose, about 1.4 mm wide. Fruits black when ripe but reddish before maturity, ellipsoid or globular, about 23 x 18-19 mm, mesocarp + exocarp 0.7-1.1 mm thick at base but 3.6-4.4 mm thick near apex, endocarp 0.08-0.10 mm thick, receptacle 25-32 x 16.5-19.0 m. Seed about 18 x 13-14 mm, testa 0.05-0.12 mm thick, radicle well below the apex. Cotyledons cream. Seedling leaves slightly glaucous on the underside. (Fig. 65)

Distribution (Fig. 98, Map 59)

Ecology

Mountain rain forests of northern Queensland in soils derived from granite. Altitudinal range: 1000-1200 m.

Uses

This species grows large enough to produce millable logs but has only recently been segregated and has not been given a Standard Trade Name and has not been utilized. Wood S.G. 0.60.

Notes and Observations

Flowers have been collected in January and March while, ripe fruits have been collected in November and December. Seedling germination

period 20-40 days.

Etymology

The specific epithet was chosen because this species has only been found on granitic mountains.

Specimens Examined (19 collections examined)

9. Litsea leefeana (F. Muell) Merr., Philipp.J.Sci. 14:242 (1919); Francis, Austral. Rain-Forest Trees ed.2:118 (1951); Stanley & Ross, Flora of south-eastern Queensland 1:156p.p.
Cylicodaphne leefeana F. Muell., Fragm. 5:169 (1866)
Type: J. Dallachy, Rockingham Bay (MEL 624010 holotype, MEL 624008-9 probable isotypes).

Tree to 30 m tall x 70 cm dbh, usually small to medium sized and well formed. Stem usually buttressed, particularly in the larger size classes. Bark flaky or nondescript, outer blaze usually cream, occasionally brown, usually speckled and longitudinally striped, granular in texture, rarely fibrous. Twigs terete or fluted, clothed in straight and tortuous, brown and pale brown, erect hairs. Leaves: Underside green, clothed in straight and tortuous, white or pale brown, erect hairs which persist even on mature leaves. Leaf blade lanceolate, elliptical or oblong, apex acuminate, acute or obtuse, base usually truncate or rounded, 5.0-20.5 x 2.5-9.5 cm (mean 10.9 x 4.8); penninerved, primary veins 5-11 pairs (mode 8), midrib depressed on the upper surface; petiole 0.6-2.1 cm long (mean 1.2), flat on the upper surface. Inflorescence a sessile fascicle of umbels, axillary and on the twigs below the leaves. Umbel peduncle 2.5-10.5 mm long, umbel bracts (4-5), ± hemispherical (the inner usually larger), 2.5-5.7 mm long x 2.5-6.1 mm wide, glabrous inside but pubescent

outside, persistent, present at anthesis. Flowers cream,yellow, green or combinations of yellow and green, sometimes strongly perfumed, about 3-6 flowers per umbel. Male flowers opening widely, the tepals becoming ± horizontal at or after anthesis. Pedicel gradually tapering into the perianth tube, pedicel + perianth tube 2.2-3.8 mm long, perianth tube 1.5-2.2 mm diam., sericeous on the outer surface, tepals 4-7, usually in one series, 1.6-3.1 x 1.1-1.9 mm, glabrous on the inner surface but sericeous outside. Stamens glabrous, 8-16 per flower, outer anthers glabrous, 0.8-1.3 x 0.6-1.0 mm, usually 4-locular, rarely 2-locular, filaments pubescent at least for the lower half, 1.3-2.5 mm long, sometimes glandular (a gland near the base), inner anthers similar but the filaments generally shorter, glandular (2 glands near the base); gland heads 0.3-0.8 x 0.4-0.9 mm, stalks 0.1-0.3 mm long. Pistillode usually present, undifferentiated, sometimes glandular, 0.4-1.2 mm long. Female flowers opening quite widely, the tepals becoming almost horizontal at or after anthesis. Pedicel gradually tapering into the perianth tube, pedicel + perianth tube 2.0-2.5 mm long, perianth tube 1.5-2.0 mm diam., pubescent on the outer surface, tepals 4-7, in one series, 1.4-2.0 x 1.0-1.5 mm, glabrous inside but sericeous outside. Staminodes about 8-13, outer staminodes (usually 6), scarcely differentiated, 0.9-2.1 mm long, pubescent towards the base, usually eglandular, occasionally 3 staminodes each with 2 glands, inner staminodes 3-6, scarcely differentiated, 0.4-1.0 mm long, glabrous, each with 2 glands; all gland heads glabrous, variable in size, 0.3-0.7 x 0.4-0.5 mm, stalks 0.1-0.2 mm or nil. Ovary glabrous, 1.0-1.4 x 0.9-1.3 mm, style glabrous, 1.3-2.6 mm long, stigma thallose,0.7-1.3 mm wide. Fruits black when ripe but reddish before maturity, ellipsoid, 12.0-22.5 x

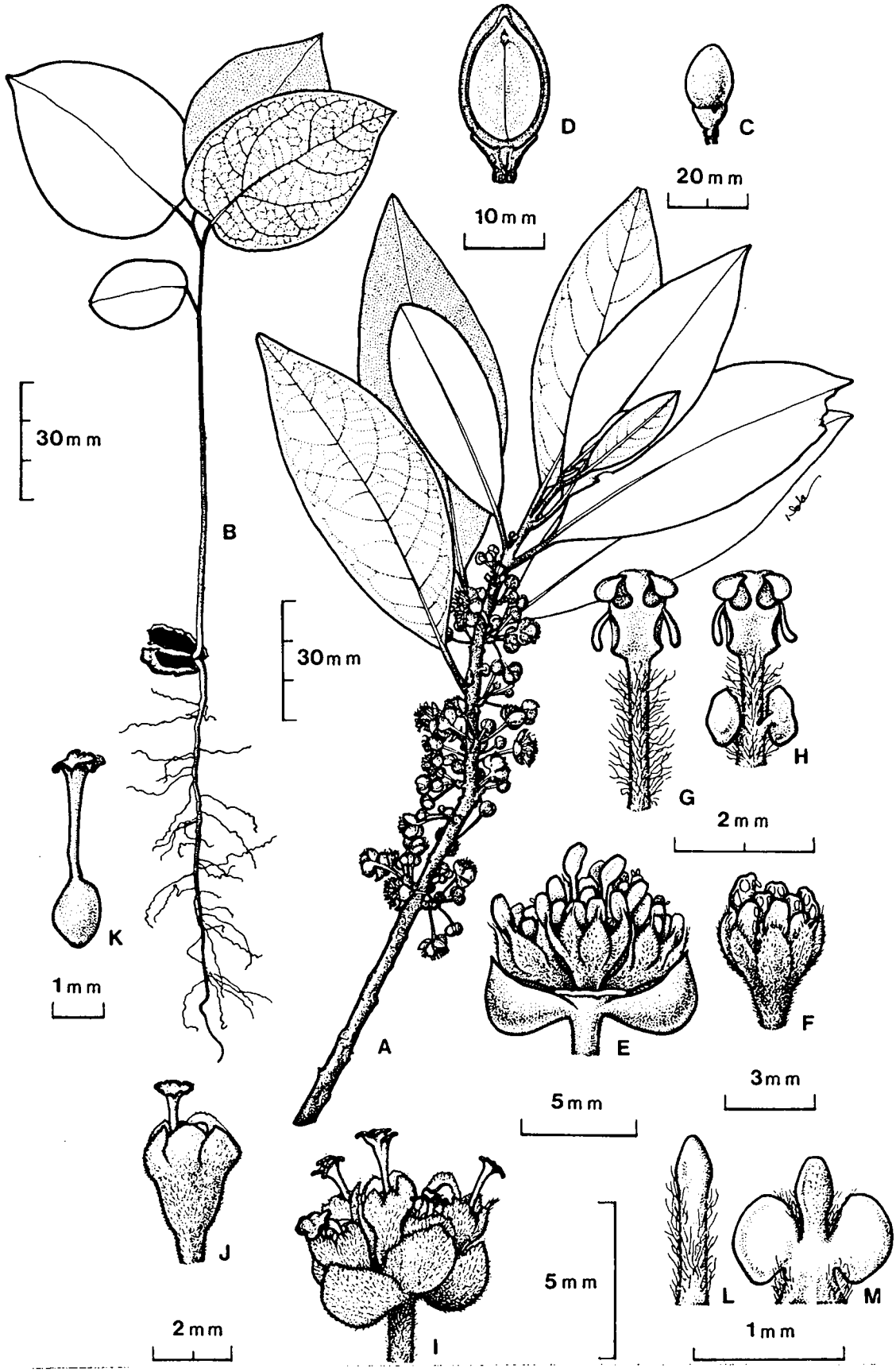

Fig.66. Litsea leefeana. A Habit Gray 879; B seedling, C fruit, D fruit (LS) Irvine 392; E male umbel with an inner bract removed, F male flower, G stamen (outer whorl, adaxial view), H stamen and glands (inner whorl, adaxial view) Gray 879; I female umbel, J female flower, K ovary, style and stigma, L staminode (adaxial view), M staminode and glands (adaxial view) Gray 1335.

10-15 mm, mesocarp + exocarp 1.2-1.9 mm thick, endocarp 0.02-0.06 mm thick, receptacle 3.5-7.0 x 7.0-10.5 mm. Seed 10-19 x 7-10 mm, testa 0.03-0.07 mm thick, radicle below or just below the apex. Cotyledons purple. Seedling leaves green on the underside. (Figs 66, 86 F)

Distribution (Fig. 98, Map 60)

Ecology

Rain forests of northern, central and southern Queensland, on soils derived from a variety of rock types. This species is favoured by disturbance and is a typical component of rain forest regrowth. Altitudinal range: Sea level to 1100 m.

Uses

This species grows large enough to produce millable logs and the sawn timber is marketed as Bollywood, a useful lightweight timber. Wood S.G. 0.48-0.54.

Notes and Observations

Flowers have been collected each month from December to July but mostly in March, while fruits have been collected each month from August to December. Seedling germination period 28-70 days.

Specimens Examined (139 collections examined)

10. Litsea macrophylla Blume, Bijdr. fl. Ned. Ind. 567 (1826).
Type: C. Blume?, Nusa Kambanga n.v.
L. calophyllantha Schumann in Schumann and Lauterbach, Fl. Deutsche Schutzgeb. Sudsee 331 (1901).
Type: Lauterbach 1386, Finschhafen (WRSL).
L. engleriana Teschner, Bot Jahrb. Syst. 58:398 (1923).
Syntypes: Ledermann 9830, Kaiserin Augusta-Flus, Lager

18 n.v.
Schlechter 17049, Walder des Kani-Gebirges n.v.
L. domariensis O. Schmidt, J. Arnold Arbor. 10:215 (1929).
Type: L.J. Brass 1595, Domara River (A holotype, BRI isotype).

Tree to 25 m tall x 40 cm dbh, usually small or medium sized and well formed. Stem usually somewhat buttressed in the larger but not in the smaller size classes. Bark flaky or nondescript, outer blaze cream or brown, marked by longitudinal stripes, granular in texture. Twigs ± terete or slightly fluted, clothed in tortuous, brown or pale brown, erect hairs when young but eventually becoming glabrous. Leaves: Underside usually slightly glaucous (quite glaucous on small trees), clothed in short, straight and tortuous, white and pale brown, erect hairs which persist even on mature leaves. Leaf blade lanceolate or ovate, apex acuminate, base truncate or rounded, 25.0-40.0 x 11.0-17.0 cm (mean 30.2 x 13.0); penninerved, primary veins 8-18 pairs (mode 14), midrib flush with the upper surface; petiole 1.7-4.2 cm long (mean 2.6), flat or channelled on the upper surface. Inflorescence a shortly stalked fascicle of umbels, axillary and on the twigs below the leaves. Axis of the fascicle usually 0-6 mm long, umbel peduncle 16.0-19.0 mm long, umbel bracts (5), ± hemispherical, 4.0-6.5 x 5.5-7.5 mm, glabrous inside but pubescent on the outer surface, persistent, present at anthesis. Flowers cream?, odour not recorded, 5-6 flowers per umbel. Male flowers opening widely, the tepals becoming reflexed at or after anthesis. Pedicel gradually tapering into the perianth tube, pedicel + perianth tube 1.4-1.6 mm long, perianth tube 1.8-2.1 mm diam., pubescent on the outer surface, tepals 6, in one series, 2.4-2.5 x 0.8-1.2 mm, glabrous on the inner surface but sericeous or pubescent on the outer surface. Stamens glabrous, 15 in 3 whorls, (6+6+3), outer anthers glabrous

1.1-1.3 x 0.8-0.9 mm, filaments glandular (usually 2, basal) pubescent throughout, about 1.5 mm long; innermost anthers and filaments similar but smaller; gland heads 0.4-0.6 x 0.4-0.8 mm, ± sessile. Pistillode absent or present, about 0.7 mm long. Female flowers unknown. Fruits black when fully ripe but red before maturity, ellipsoid, about 13-14 x 10.0-11.5 mm, mesocarp + exocarp about 0.7-1.2 mm thick, endocarp 0.06-0.12 mm thick, receptacle about 7.0-10.5 x 9.0-11.0 mm. Seed about 9.5-10 x 7.5-8.0 mm, testa about 0.04-0.11 mm thick, radicle well below the apex. Cotyledons cream. Seedling leaves usually glaucous on the underside.

Distribution (Fig. 98, Map 59)

Ecology

Rain forests and monsoon forests of Cape York Peninsula, on soils derived from a variety of rock types. Altitudinal range quite small: sea level to 100 m.

Uses

This species probably grows large enough to produce millable logs but as it grows in sparsely populated areas with limited sawmilling expertise it is doubtful if it has ever been utilized. Wood S.G. 0.50.

Notes and Observations

Flowers have been collected in June, while ripe fruits have been collected in November but the fruiting period appears to extend to January. Seedling germination period 36-70 days.

Other possible synonyms include L. guppyi (F. Muell.) ex Forman and L. filipedunculata Kosterm.

Specimens Examined (27 collections examined)

11. Litsea reticulata (Meissner) F. Muell., Syst. census Austral. pl. 4 (1882).
Tetranthera reticulata Meissner in DC., Prod. 15(1):192 (1864); Benth., Fl. austral 5:306 (1870)p.p.; Bailey, Queensl. fl. 4:1312 (1901)p.p.; Francis, Austral. Rain-Forest Trees ed.2:122 (1951)p.p.; Beadle et al., Flora of the Sydney Region 151 (1972); Floyd, N.S.W. Rainforest Trees, Part 1, ed.2:89 (1979); Stanley & Ross, Flora of south-eastern Queensland 1:156 (1983).
Malapoenna reticulata (Meissner) Kuntze, Rev. gen. pt. 2: 571 (1891).
Type: W. Macarthur 192, New South Wales (K).
[Non Tetranthera reticulata Buch.-Ham. ex Wallich, Cat. n. 2551 (1830) nom. nud.]
Tetranthera reticulata var. parvifolia Meissner in DC., Prodr. 15(1):192 (1864).
Type: W. Macarthur 228, New South Wales (K).

Tree to 35 m tall x 80 cm dbh, usually medium sized and well formed. Stem buttressed in the larger classes but not in the smaller. Bark usually flaky (often coarsely flaky), sometimes nondescript, outer blaze cream, occasionally pink or brown, usually granular in texture sometimes fibrous, frequently emitting a resinous odour. Twigs terete or slightly fluted, clothed in straight, white or pale brown, appressed hairs when young but eventually becoming ± glabrous. Leaves: Underside green, clothed in straight, white or pale brown, appressed hairs when very young but soon becoming almost completely glabrous. Leaf blade obovate, narrowly obovate, elliptical, apex obtuse or rounded, base attenuate, 5.0-13.0 x 2.0-6.0 cm (mean 7.9 x 2.9); penninerved, primary veins 8-12 pairs (mode 10), midrib depressed or flush with the upper surface; petiole 7-15 mm long (mean 9.4), flat or channelled on the upper surface. Inflorescence a

short raceme of umbels, mainly axillary, but also on the twigs below the leaves. Axis of the inflorescence about 3-20 mm long, umbel peduncle 2.0-11.0 mm long, umbel bracts (usually 4) ± hemispherical 3.5-7.2 x 3.5-7.2 mm (the inner usually longer than the outer), glabrous or pubescent inside, the outer surface glabrous or pubescent towards the base; persistent, present at anthesis. Flowers cream or green, rarely yellowish or brownish, (except for the glands which are pink or reddish), pleasantly perfumed, about 4-6 flowers per umbel. Male flowers opening quite widely, the tepals becoming ± horizontal at or after anthesis. Pedicel gradually tapering into the perianth tube, pedicel + perianth tube 1.5-2.4 mm long, perianth tube 1.7-2.0 mm diam., pubescent or sericeous on the outer surface, tepals 4-6, in one series, 2.5-5.0 x 1.1-1.8 mm, glabrous or pubescent inside, pubescent or sericeous outside. Stamens 6-9 per flower, anthers glabrous or sparsely pubescent, 1.1-1.7 x 0.7-1.1 mm, filaments of the outer anthers usually eglandular (sometimes with 1 gland), filaments of the inner anthers usually with 1-2 glands, all filaments usually hairy, at least towards the base, 1.5-4.5 mm long; gland heads glabrous, 0.4-1.4 x 0.5-1.1 mm, stalks glabrous, 0.2-0.3 mm long. Pistillode sometimes present, undifferentiated, 0.6-1.1 mm long. Female flowers opening fairly widely, the tepals becoming ± horizontal at or after anthesis. Pedicel gradually tapering into the perianth tube, pedicel + perianth tube 1.2-2.2 mm long, perianth tube 1.7-1.8 mm diam., pubescent or sericeous on the outer surface, tepals 4-6, in one series, 1.5-3.3 x 0.7-0.9 mm, glabrous inside but pubescent on the outer surface. Staminodes 6-9, scarcely differentiated, usually 3 with and 3-6 without glands, staminodes 0.8-1.5 mm long, pubescent, at least towards the base; gland heads glabrous, 0.3-0.6 x 0.5-0.8 mm, stalks

nil or 0.1 mm long, glabrous. Ovary glabrous, 0.9-1.3 x 0.9-1.0 mm, style glabrous, 1.5-2.3 mm long, stigma thallose or obscurely bilobed. Fruits black or purplish black when fully ripe, ellipsoid, 13-14 x 10-12 mm, mesocarp + exocarp 0.8-2.0 mm thick, endocarp 0.6-0.8 mm thick, receptacle 8.5-14.0 x about 10 mm. Seed 10.5-12.0 x 4-8 mm, testa 0.02-0.06 mm thick, radicle below the apex. Cotyledons white or cream. Seedling characteristics unknown.

Distribution (Fig. 98, Map 59)

Ecology

Rain forests of central and southern Queensland, northern and southern New South Wales on soils derived from a variety of rock types. Altitudinal range: Sea level to 1050 m.

Uses

This species produces millable logs and the sawn timber is marketed as Bollywood, a useful lightweight timber. Wood S.G. 0.44-0.58.

Notes and Observations

Flowers have been collected each month from May to July, while ripe fruits have been collected in November, February, March, April and May. Seedling germination period unknown.

L. deplanchei Guillaumin of New Caledonia appears to be related to this species and/or L. fawcettiana (F. Muell.) B. Hyland.

Specimens Examined (86 collections examined)

8. Neolitsea Merr. (nom. cons.)

Neolitsea Merr., Phillipp. J. Sci. 1 Suppl. 56 (1906).
Type: N. zeylanica (Nees) Merr. (Tetradenia zeylanica Nees) (typ. cons.) = Neolitsea cassia (L.) Kosterm. (fide Kostermans 1952).
Bryantea Raf., Sylva Tell. 165 (1838).

[For extra-Australian synonyms see Kostermans (1957)].

Trees, usually small. Twigs pubescent when young and pubescent or almost glabrous at maturity. Leaves petiolate, minutely oil-dotted, penninerved or triplinerved, spirally arranged, sometimes closely spaced and appearing almost whorled. Inflorescence umbellate, the umbels ± sessile, axillary or on the twigs below the leaves. Flowers unisexual and dioecious, (2-4) merous. Male flowers: Tepals usually 4 (4-5), stamens usually 6 (4-8), introrse, 4-locular, glands capitate fungiform or peltate, staminodes nil. Female flowers: Tepals usually 4 (4-6), staminodes 5-9, glands peltate, ovary sessile, stigma usually thallose? (Fig. 87 E) Fruits superior, ellipsoid or globular, 7.5-14.0 mm diam., seated on a slightly swollen receptacle not enclosing the base of the fruit, mesocarp fleshy, endocarp thin. Seed enclosed in a thin testa, radicle below the apex, cotyledons distinct from one another, uniform in texture, cream. Seedling: First leaves whorled, opposite or spirally arranged, cataphylls present.

Distribution

A genus of about 80 species occurring in Asia, Malesia and Australia.

Keys to the Species of Neolitsea

Flowering Material

1a. Flowers male 2

b. Flowers female 3

2a. Inflorescence bracts present at anthesis.
Flowers usually without a pistillode . . . . . .N. brassii
N. australiensis

b. Inflorescence bracts absent at anthesis.
Flowers usually with a pistillode . . . . . .N. dealbata

3a. Inflorescence bracts present at anthesis.
Tepal margins ± glabrous.
Glands attached to the middle of the inner staminodes. . . . . N. brassii
N. autraliensis

b. Inflorescence bracts absent at anthesis.
Tepal margins sericeous.
Glands attached close to the base of the inner staminodes . . . . . .N. dealbata

Fruiting Material

1a. Fruits red when fully ripe. . . . . N. brassii

b. Fruits black when fully ripe. 2

2a. Mature leaf petioles clothed in tortuous hairs. . . . . .N. dealbata

b. Mature leaf petioles almost completely glabrous. . . . . .N. australiensis

1. **Neolitsea australiensis** Kosterm., Brunonia 2:93 (1979); Stanley & Ross, Flora of south-eastern Queensland 1:157 (1983).
Type: H.H. Haines 108, Bunya Mountains, Queensland, 21.iii.1937 (K holotype).
[Neolitsea cassia auct. non (L.) Kosterm. (1952): Francis, Austral. Rain-Forest Trees ed.2:118 (1951); Floyd, N.S.W. Rainforest Trees, Part 1, ed.2:92 (1979).

Tree to 40 m tall x 50 cm dbh., usually small. Stem slightly buttressed in the larger size classes but without buttresses when small. Bark nondescript, outer blaze cream or yellowish-brown, granular in texture, often odorous. Twigs usually ± terete, clothed in straight, white, or pale brown appressed hairs when very young, becoming completely glabrous. Leaves: Underside slightly glaucous when young but often becoming green, clothed in straight, white or pale brown, appressed hairs when young becoming almost glabrous. Leaf blade lanceolate, elliptical, apex acuminate, base attenuate 6.5-13.5 x 2.0-5.0 cm (mean 10.3 x 3.4); penninerved or triplinerved, primary veins 3-6 pairs (mode 4-5), midrib raised on the upper surface; petiole 8-31 mm long (mean 18), channelled on the upper surface. Inflorescence umbellate, sessile, not exceeding the leaves, inflorescence bracts ± hemispherical, 3.8-6.0 x 2.7-5.2 mm, mainly glabrous inside but pubescent outside, except near the margins, persistent, present at anthesis. Flowers cream or pale brown, pleasantly perfumed, usually 4-5 flowers per umbel. Male flowers opening widely, the tepals often becoming horizontal or reflexed at anthesis. Pedicel + perianth tube 1.8-6.5 mm long, perianth tube sericeous on the outer surface, 1.1-2.6 mm diam., tepals usually 4, 2.4-3.9 x 1.3-2.6 mm, usually pubescent towards the base on the outer surface but glabrous on the inner. Stamens usually 6 (sometimes 5-7) per flower, outer anthers glabrous, 1.2-1.7 x 0.8-1.1 mm, filaments

eglandular, glabrous, 2.2-3.8 mm long; inner anthers 1.0-1.2 x 0.9-1.2 mm, filaments glabrous, 1.2-3.5 mm long, usually glandular (1-2); gland heads glabrous, 0.4-0.7 x 0.6-0.8 mm, stalks glabrous, 0.1-0.3 mm long. Pistillode absent. Female flowers opening widely, the tepals becoming horizontal or reflexed at anthesis. Pedicel + perianth tube about 3.5-4.5 mm long, perianth tube 1.0-1.5 mm diam., sericeous on the outer surface, tepals 4, in one series 2.5-3.0 x 1.4-2.2 mm, glabrous inside but sericeous towards the base on the outer surface. Staminodes about 6-8, outer staminodes glabrous, 1.5-1.8 mm long, eglandular, inner staminodes glabrous, 1.5-2.0 mm long, glandular, gland heads glabrous, 0.4-0.7 x 0.4-0.5 mm, stalks glabrous, 0.1-0.3 mm long. Ovary glabrous, 1.2-1.5 x 0.9-1.0 mm, style glabrous, 1.5-1.9 mm long, stigma 0.4-0.5 mm wide. Fruits reddish at first but black when ripe, globular, or ellipsoid, 12-20 x 11-14 mm, mesocarp + exocarp 1.0-1.5 mm thick, endocarp 0.8-1.0 mm thick, receptacle 9-14 x 6-8 mm. Seed 9.5-11.5 x 8-9 mm, testa 0.1-0.9 mm thick, radicle below the apex, sometimes well below. Cotyledons cream. Seedling features unknown.

Distribution (Fig. 99, Map 66)

Ecology

Mountain and lowland rain forests of New South Wales and southern Queensland on soils derived from a variety of rock types. Altitudinal range: Sea level to 1000 m.

Uses

This species grows large enough to produce millable logs, but is seldom utilized. The Standard Trade Name of Grey Bollywood should

probably be applied to this species. The Wood S.G. probably falls within the range 0.6-0.7, but this needs to be checked.

Notes and Observations

Flowers have been collected in March, April and May, while ripe fruits have been collected each month from February to May. Seedling germination period unknown.

Specimens Examined (95 collections examined)

2. **Neolitsea brassii** Allen, J. Arnold Arbor. 23:118 (1942).
Type: L.J. Brass 8704, Tarara, Wassi Kussa River, Papua, .i.1937 (A holotype; BO, BRI, L isotypes).
[Litsea zeylanica auct. non Nees (1823); Benth., Fl. austral 5:307 (1870); Bailey, Queensl. fl. 4:1311 (1901)]

Tree to 25 m tall x 40 cm dbh, usually small. Stem slightly buttressed in the larger size classes but without buttresses when small. Bark usually nondescript, rarely flaky, outer blaze usually pink, sometimes brown or pink, usually granular in texture, sometimes fibrous, often odorous. Twigs usually ± terete, sometimes slightly fluted, clothed in straight, white, appressed hairs only when very young but soon becoming almost completely glabrous. Leaves: Underside usually slightly glaucous, sometimes green, clothed in straight, white, appressed hairs when young but soon becoming almost completely glabrous. Leaf blade lanceolate, elliptical, apex acuminate, base attenuate, 6.5-15.5 x 2.5-7.1 cm (mean 10.5 x 4.2); penninerved or triplinerved, primary veins 3-7 pairs (mode 4), midrib raised or flush with the upper surface; petiole 10-31 mm long (mean 18.2), channelled on the upper surface. Inflorescence umbellate, sessile, not exceeding the leaves, axillary or on the twigs below the leaves, inflorescence

bracts ± hemispherical, 3.5-6.4 x 2.9-5.2 mm, glabrous inside but pubescent or sericeous on at least part of the outer surface, persistent, present at anthesis. Flowers cream or creamy green, pleasantly perfumed, usually 3-5 (sometimes 2-6) per umbel. Male flowers opening widely, the tepals becoming horizontal or reflexed at anthesis. Pedicel + perianth tube 3.1-6.0 mm long, perianth tube 1.6-2.3 mm diam., sericeous on the outer surface, tepals usually 4, 2.3-3.4 x 1.9-2.7 mm, usually pubescent towards the base on the outer surface but glabrous on the inner. Stamens usually 6 (sometimes 5-8) per flower; outer anthers glabrous, 1.1-1.7 x 0.9-1.1 mm, filaments eglandular, mainly glabrous, sometimes pubescent near the base, 2.3-3.3 mm long; inner anthers 0.9-1.3 x 0.8-1.2 mm, filaments pubescent at least towards the base, 1.2-3.3 mm long, usually glandular (1-2); gland heads glabrous, 0.4-0.8 x 0.7-1.0 mm, stalks glabrous, 0.1-0.3 mm long. Pistillode rarely present, undifferentiated, 3.0 mm long. Female flowers opening widely, the tepals becoming horizontal or reflexed at anthesis. Pedicel + perianth tube 2.5-5.2 mm long, perianth tube 1.3-2.3 mm diam., sericeous on the outer surface, tepals 4, in one series, 2.4-2.8 x 1.3-2.1 mm, glabrous inside but sericeous on at least part of the outer surface. Staminodes usually 8 sometimes 5-7 per flower, outer staminodes 4, glabrous, about 1.2-2.0 mm long, eglandular, inner staminodes 4, glabrous, 0.5-1.7 mm long, glandular (2 per staminode); gland heads glabrous, 0.25-0.40 x 0.6-0.7 mm, stalks glabrous, 0.07-0.15 mm long. Ovary glabrous, 0.8-1.2 x 0.6-1.1 mm, style glabrous, 1.0-1.8 mm long, stigma 0.7-0.9 mm wide. Fruits red when ripe, globular, sometimes ellipsoid 9-12 x 7.5-10.5 mm, mesocarp + exocarp 0.9-1.4 mm thick, endocarp 0.05-0.13 mm thick, receptacle

7.5-9.5 x 4.5-5.5 mm. Seed 6.0-9.5 x 5-8 mm, testa 0.05-0.21 mm thick, radicle usually well below the apex. Cotyledons cream. Seedling leaves glaucous on the underside. (Fig. 87 A-E)

Distribution (Fig. 99, Map 69)

Ecology

Rain forests, monsoon forests and wet sclerophyll forests of north-eastern and northern Australia, on soils derived from a variety of rock types. Altitudinal range: Sea level to 900 m.

Uses

This species seldom grows large enough to produce millable logs and does not have a Standard Trade Name. Wood S.G. 0.76-0.81.

Notes and Observations

Flowers have been collected each month from January to April, while ripe fruits have been collected in May and June and each month from August to November. Seedling germination period 40-170 days.

Specimens Examined (87 collections examined)

3. **Neolitsea dealbata** (R.Br.) Merr., J. Arnold Arbor. 29:200 (1948); Francis, Austral. Rain-Forest Trees, ed.2:118 (1951); Beadle et al., Flora of the Sydney Region, 15 (1972); Floyd, N.S.W. Rainforest Trees, Part 1, ed.2:94 (1979); Stanley & Ross, Flora of south-eastern Queensland 2:157 (1983).
Tetranthera dealbata R. Br., Prodr. 403 (1810).
Litsea dealbata (R. Br.) Steudel, Nom. 488 (1821); (R. Br.) Nees, Syst. laur. 630 (1836); Benth., Fl. austral 5:307 (1870); Bailey, Queensl. fl. 4:1311 (1901).
Bryantea dealbata (R. Br.) Raf., Sylva telluriana 165 (1838).
Malapoenna dealbata (R. Br.) Kuntze, Rev. gen. pt. 2:571 (1891).

[Litsea dealbata var. typica Domin, Biblioth. Bot. 189, 125 (1926) nom. inval.]
Lectotype (here designated): R. Brown 3013, Port Jackson (BM); K, MEL 624280, NY, QRS 071414 isotypes or syntypes).
Litsea rufa Nees, Syst. laur. 631 (1836).
Type: Anon. s. n. Brisbane River (E holotype).
L. baueri Endl., Iconogr. gen. pl. t44 (1838).
Type: Not specified.
L. dealbata var. glabrata Meissner in DC., Prodr. 15(1):224 (1864).
Type: Mus. Par. n. 299, M. Verreaux 299, Australia (East Coast) (P).
L. dealbata var. incisa Meissner in DC., Prodr. 15(1):515 (1864).
Type: F. Mueller, Pine River, Moreton Bay (K isotype) (Probably collected by W. Hill and communicated by F. Mueller or collected by Hill and Mueller together.)
L. dealbata var. rufa Benth., Fl. austral. 5:308 (1870).
Syntypes: Hill & Mueller, Brisbane River (MEL 624234).
Leichhardt 136, East coast (MEL 624242).
L. Atkinson, Blue Mountains (MEL 624241).

Tree to 15 m tall x 30 cm dbh, usually small in disturbed areas. Stem with or without buttresses. Bark nondescript, outer blaze cream or pale brown, granular in texture, usually emitting an obvious odour, difficult to describe. Twigs terete, clothed in long, tortuous, white or pale brown, erect hairs which persist even on mature twigs. Leaves: Underside white or glaucous, clothed in straight and tortuous, brown or pale brown, appressed hairs which persist to some extent even on old leaves. Leaf blade lanceolate, elliptical, apex acuminate, base attenuate, 8-22 x 3.5-8.5 cm (mean 14.1 x 5.5); penninerved or triplinerved, primary veins 2-6 pairs (mode 4), midrib raised on the upper surface; petiole 7-24 mm long (mean 13.1), flat or channelled on the upper surface. Inflorescence umbellate, sessile, not exceeding the leaves, axillary or on the twigs below the leaves, inflorescence bracts hemispherical or navicular, 3.0-5.5 x 2.5-5.3 mm, glabrous inside but sericeous on the outer surface, deciduous, absent at anthesis. Flowers usually cream, occasionally pale brown or yellow,

pleasantly perfumed or without any obvious odour, 3-5 per umbel. Male flowers opening fairly widely but the tepals remaining ± erect at anthesis. Pedicel + perianth tube 2.1-5.6 mm long, perianth tube sericeous outside, 1.0-2.4 mm diam., tepals 4-5, in one series, 2.4-6.0 x 0.9-2.5 mm, usually sericeous outside but glabrous on the inner surface. Stamens 4-8 per flower; outer anthers 4-5, glabrous, 1.1-2.0 x 0.7-1.3 mm, filaments eglandular, pubescent at least towards the base, 3.5-5.6 mm long; inner anthers 2-3 glabrous, 1.0-1.5 x 0.9-1.2 mm, filaments pubescent at least towards the base, 2.2-4.3 mm long, glandular (usually 2); gland heads glabrous, 0.5-0.8 x 0.4-1.0 mm, stalks pubescent, 0.2-0.3 mm long. Pistillode present, (ovary 0.7-0.9 mm long, style 1.1-1.6 mm long, stigma 0.2-0.5 mm wide or undifferentiated and about 1.9 mm long). Female flowers opening quite widely but the tepals remaining ± erect at anthesis. Pedicel 1.8-3.8 mm long. Perianth tube 1.1-2.0 x 1.3-1.8 mm, sericeous on the outer surface, tepals 4-6, in one series, 1.7-2.3 x 0.4-0.9 mm, sericeous on the outer surface but glabrous on the inner surface. Staminodes about 6-9 per flower, outer staminodes 4-5, mainly glabrous, hairy towards the base, 1.4-1.7 mm long, eglandular, inner staminodes 2-3, mainly glabrous, hairy towards the base, 1.0-1.3 mm long, glandular (usually 2); gland heads glabrous, 0.2-0.8 x 0.3-0.6 mm, stalk pubescent, 0.1-0.4 mm long. Ovary glabrous or hairy towards the apex, 0.8-1.2 x 0.6-0.9 mm, style pubescent, 1.7-2.1 mm long, stigma 0.6-1.6 mm wide. Fruits black when fully ripe but red before maturity, globular, 9-11 x 8.5-11.0 mm, mesocarp + exocarp 0.7-1.4 mm thick, endocarp 0.08-0.11 mm thick, receptacle 7.0-9.5 x 3.5-5.0 mm. Seed 5.5-7.0 x 5.5-9.0 mm, testa sometimes appearing to consist of 2 layers 0.04-0.26 mm total thickness, radicle below the apex. Cotyledons cream or white.

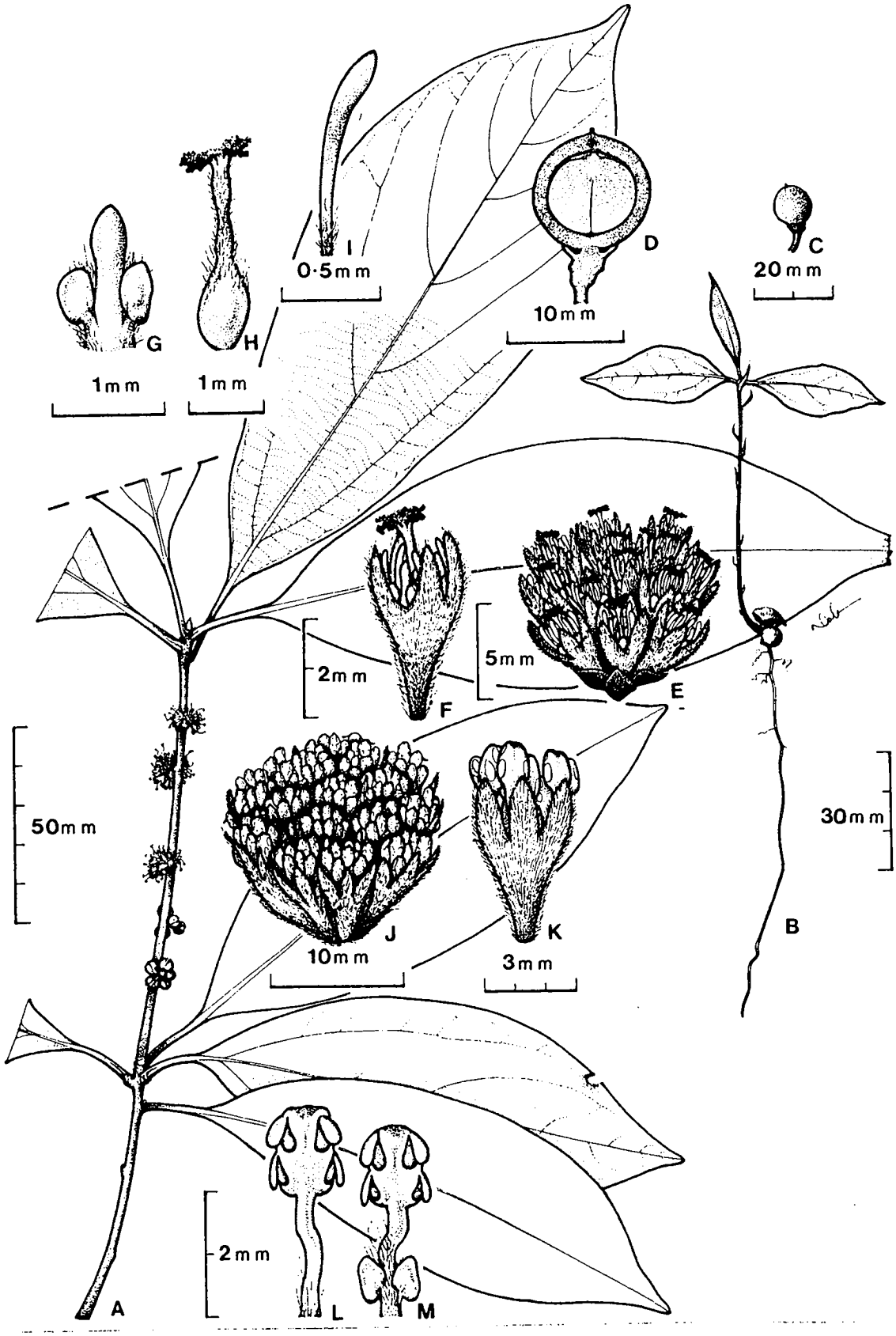

Fig.67. Neolitsea dealbata. A Habit Dockrill 1461; B seedling Whiffin 636; C fruit, D fruit (LS) Fitzsimon 291; E female umbel, F female flower, G staminode and glands, H ovary and style, I staminode Dockrill 1461; J male umbel, K male flower, L stamen, M stamen and glands Dockrill 1458.

Seedling leaves white or glaucous on the underside. (Figs 67, 87 F)

Distribution (Fig. 99, Map 67)

Ecology

Rain forests and wet sclerophyll forests along most of the east coast of Australia on soils derived from a variety of rock types. This species is favoured by disturbance and is a typical species in rain forest regrowth. Altitudinal range: Sea level to 1150 m.

Uses

This species does not grow large enough to produce millable logs and does not have a Standard Trade Name. Wood S.G. 0.68.

When this species is producing large numbers of new leaves the trees can have quite a pleasing appearance but have little aesthetic appeal at other times so its cultivation for decorative purposes has limited market appeal.

Notes and Observations

Flowers have been collected mainly in the months of March, April, May and June and once in September, while fruits have been collected from February to May and once in November. These observations largely agree with those of Floyd (1979) except that he also observed fruiting in June. Seedling germination period 35-235 days.

Other names which should be studied carefully as possible synonyms, include the New Guinea species Neolitsea archboldiana Allen, N. teschneriana Allen, Tetradenia pubescens Teschner and Actinodaphne tomentosa Teschner and also Litsea villosa Bl., Neolitsea villosa (Bl)

Merr. from Ambon and other localities and N. aurata (Hayata) Koidz. from Taiwan.

Specimens Examined (343 collections examined))

Exotic Species Cultivated in Australia

Beilschmiedia berteroana (Gay) Kosterm.
Cinnamomum camphora (L.) J. Presl - Camphor Laurel - Widely cultivated
Cinnamomum sintoc Bl.
Laurus nobilis L. - Bay Laurel
Persea americana Mill - Avocado - Widely cultivated

Excluded Names

Cryptocarya hypoglauca Meissner

I have examined the type of this name in Geneva: A. Cunningham, North Western coast of Australia? It does not match any other collections of Lauraceae made anywhere in Australia. (It does, however, have some similarities with C. wightiana Thwaites of India and Ceylon and C. odorata Guillaumin of New Caledonia). According to the original label, there seems to be some doubt whether it was in fact collected on the north western coast of Australia, furthermore, it is not certain that A. Cunningham was the collector. To make matters worse, the ships which carried Cunningham were engaged in coastal survey work and visited both Timor and Mauritius between 1818 and 1822. Because of the doubts about the provenance of the type specimen and the absence of any matching Australian specimens, I have excluded the species from this revision.

Cryptocarya graveolens Bailey

I have seen one syntype of this name: F.M. Bailey, Tringilburra Creek (BRI and MEL 60961) and agree with L.S. Smith (1956) who made the combination Acmena graveolens (Bailey) L.S. Smith.

Chapter 3 Scanning Electron Microscope Studies

Introduction

The flowers of most Australian species of Lauraceae are quite small, often only about 2-3mm diam. Although botanical descriptions can describe the various components of each flower, the average botanist or ecologist trying to identify material to the species level would have difficulty relating his specimen to the description. Because of these difficulties, it is desirable to incorporate illustrations of flowers and other critical parts in revisions such as this. Line drawings of species of Lauraceae can be quite informative, but it is difficult for the artist to capture all the details visible on each flower part. This problem can be overcome by means of SEM micrographs.

A scanning electron microscope has obvious advantages when trying to depict microscopic images and although such equipment is usually used at high magnfications, it can also be used at low magnifications and because of its great depth of field can give a good representation of a three dimensional organ on a two dimensional field like a photographic negative.

Method and Materials

Fresh flowers were transferred directly from recently collected tree branches into F.A.A. (Formalin : Acetic Acid : Alcohol : Water :: 1:1:9:9). Subsequently, these flowers were transferred through a drying series until they finished either in absolute alcohol or acetone. (Absolute alcohol is better as acetone can cause trouble

with rubber sealing rings in the critical point drying apparatus).

Flowers were transferred from the absolute alcohol and dried in a critical point dryer.

Dried flowers were attached to small segments of mica, which in turn were mounted on stubs with conductive glue and sputter coated with gold to a thickness of about 20 nanometres.

Coated flowers were examined in an Etec Autoscan Microscope operating in secondary mode at 5kv. Various magnifications were used, but photographs were usually taken at magnification X20, except where greater magnifications were required.

Results

Results varied, but on the whole good photographic prints were obtained of most species. However, their use is restricted in those genera where the species show little difference in flower morphology e.g. Cryptocarya. In the genus Endiandra, species can be identified from the features exhibited by one or two flowers and the SEM prints highlighted this.

Other genera viz. Beilschmiedia and Cinnamomum also yielded worthwhile results. Most species of Beilschmiedia exhibit floral features which are of importance in distinguishing taxa at the specific level. In most cases these showed up quite clearly on SEM photographic prints

Difficulties were experienced with those genera where the flowers

are borne in umbels viz. Lindera, Litsea and Neolitsea. Since the inflorescences are brittle when they emerge either from the drying sequence or from the critical point dryer, it is very difficult to handle inflorescences of these genera without breaking some organs.

In addition, some species have so many flowers in each umbel and so many parts e.g. stamens in each flower that photographic prints can be very confusing unless the observer is familiar with the floral morphology of the species under examination.

Conclusions

SEM prints of images produced at quite low magnification can be used to show features used to distinguish taxa at the specific level, particularly in genera exhibiting a lot of variation e.g. Endiandra and Beilschmiedia. (See Figs 68-87).

Chapter 4 Chemical Studies

Introduction

The paucity of morphological characters which may be used to readily demarcate taxa has led to a chemical approach being employed to either confirm or reject the inclusion of particular specimens in certain taxa erected on morphological evidence. This is part of a long term project completely outside the scope of this thesis and it will be reported elsewhere. However, it should be pointed out that such work cannot proceed until the basic traditional taxonomic work has been done or is at least underway. Nevertheless, it has been possible to employ some of the chemical information to test species concepts in difficult or doubtful situations. This approach has been used a number of times in the genus Cryptocarya where useful morphological features are scanty.

Revisions of families (even when restricted to individuals from a particular geographic area) should result in an overall idea of the relationships between the various taxa. Unfortunately, this has proved difficult in this study because of the unsuitabilty of features in most cases and the lack of them in others.

Studies of various chemical attributes appeared to be a way of gathering more information to show not only the differences between species but also their similarities.

Two lines of research are being explored:

(i) Leaf oils

(ii) Leaf isozymes

Leaf Oils

Method and Materials

Leaf samples of all the Australian species (except Cassytha spp.) are collected, placed in polythene bags, refrigerated and air freighted in insulated containers to Melbourne where the oils are extracted by steam distillation in an all-glass apparatus at La Trobe University under the direction of Dr T. Whiffin. The method used is almost identical with that outlined in Newnham et al. (1986). The oil in the oil-water condensate is extracted by shaking with twice distilled Freon 11. The Freon-oil solution is separated from the water after being allowed to settle in a separating funnell for 2h. Any remaining water is removed with excess anhydrous sodium sulphate. After filtration, about two-thirds of the Freon is removed by distillation. The oil sample is further concentrated with a jet of nitrogen gas. Oil samples are stored in capped vials at -20°C until analysis.

The oils are analysed with a Packard-Becker 427 gas chromatograph with a 25m x 0.23mm fused silica column coated with OV101 and fitted with a flame ionisation detector. For each run, a 0.2ul subsample is injected, with the split ratio set at approx. 1 : 100. The gas chromatograph is set to increase from 60 to 200°C at 3° per minute, plus a further 15 min at 200°C. Peaks are quantified with a Varian Vista CDS 401 integrator and percentage composition of the oils calculated.

An equal amount of oil from each taxon is included in a composite

sample that is run each day during the analysis of the leaf oil samples. Each individual peak of composite run is assigned a unique number. Superimposition of a chromatogram onto a composite chromatogram and crosscomparison of retention times allowed each individual peak of each sample to be numbered.

Results

This is a large and complex project and the results have not yet been examined in detail, but will be published elsewhere.

However, preliminary results of the leaf oil analysis have been used in this revision to either confirm or reject a number of hypotheses which I erected while grappling with species delimitation problems.

Conclusions

It appears that leaf oils will provide valuable additional data to distinguish species or to show species relationships.

Leaf Isozymes

Method and Materials

Leaf samples are collected, placed in polythene bags, refrigerated and air freighted in insulated containers to CSIRO, Division of Forest Research, Canberra, where the material is handled by Dr G.F. Moran. Unlike the leaf oils investigations, sampling is restricted to the genera Litsea and Neolitsea.

Isozymes are extracted and analysed using the technique developed by Moran et al. based largely on the work of Tanksley & Orton (1983)

and Conkle et al. (1982).

Results

The findings will be reported in detail elsewhere, but at this stage it can be stated that the results confirm the species delimitation which I had determined from morphology, and furthermore, support the species relationships which I had also inferred from morphology.

However, the most significant finding concerns the generic limits which I had determined from morphological evidence. It is my belief that if Litsea and Neolitsea are recognized as distinct genera then the species which we now recognize as Litsea glutinosa will have to be given separate generic status. (See Chapter 2 - Generic Concepts). The preliminary results from leaf isozymes support the movement of Litsea glutinosa into a separate genus and confirm my findings based on morphology alone.

Conclusions

It appears that leaf isozymes provide data which can be used to delimit species and show relationships at both the specific and generic level.

Chapter 5. Morphometric Analysis

Introduction

Plant taxonomy has traditionally been based on morphological features which are either visible to the naked eye or with the aid of a hand lens (usually X10 power). The importance to be attached to each morphological feature has usually been decided by each individual botanist based on previous experience and intuition. On the surface, it has the appearance of a system which could by very prone to biased assessments and skewed classifications. However, in practice the system tends to be more or less self correcting because successive botanists working on a particular group assess the work of their predecessors and make what they believe are necessary corrections.

However, in large families with world-wide distributions, assessments of the taxonomy of the whole family occur only at infrequent intervals and it is doubtful if the taxonomy keeps pace with the advances being made in the rest of the botanical world. The family Lauraceae poses additional difficulties. It has a world-wide distribution, but there are only a limited number of gross morphological features which can be used to distinguish subfamilies and genera. To make matters worse, many species are large trees, confined to rain forest areas, difficult to collect and poorly represented in herbaria. In addition to this, the flowers are usually small and the fruits often succulent and when dried may lose many of the features which would help to distinguish them from their

relatives.

Although I am entirely concerned with a revision of the Australian species of Lauraceae, I would like to be reasonably confident that the generic limits which I recognize, conform to those recognized by botanists overseas, so that my revision will make a worthwhile contribution to the taxonomy of the family as a whole. This can only occur if the current generic classification truly reflects the variation encountered in the family.

Generic Classification

Method and Materials

Kostermans (1957) has produced one of the more recent classifications of the whole family and his 31 genera were accepted for the purpose of this study (Appendix 1).

Twenty seven attributes (vegetative, floral, fruit and seed) were selected (Appendix 2) and each genus (Appendix 3) was scored on the presence or absence of these attributes. The attributes were necessarily of different types, numeric and multistate. These attributes were analysed using a program called TAXON and the results expressed as a dendrogram (Figure 101) (based on Burr's Strategy) and as a minimum spanning tree (Figure 102).

The dendrogram and the minimumn spanning tree (Figs 101 & 102) show similar broad subdivisions of the family e.g. Laurus, Lindera, Litsea, and Neolitsea differ from all other genera which can be placed in 6 more closely related, sometimes overlapping groups.

It is possible that the classification based on gross morphology as

expressed by Kostermans (1957) (Appendix 1) does really reflect the relationships of the genera in the family. However, such classifications are necessarily somewhat subjective as the taxonomist must subjectively weight attributes in many cases to produce his subdivisions.

The other possibility which must be considered is that because of the subjective weighting of features, the classification is skewed and does not really reflect the relationships of the genera. The problem of paucity of features contributes to this problem as does the problem of generic limits. It seems to me that it is time for a complete reappraisal of the overall classification of the family and this should be attempted by looking closely at the type of each genus and gathering as much information as possible on as many attributes as possible for each genus. (This type of approach is also advocated by Hutchinson 1964). These attributes could be morphological, both macroscopic and microscopic, chemical and any others which can be elucidated. All this information should be subjected to analysis by programs such as TAXON and a broad family classification produced, based on currently recognized genera.

Once this has been done, the problem of generic limits could be addressed, and where necessary genera could be either split or amalgamated and the family classification revised.

Species Classification

Although taxonomists have trouble in delineating genera in Lauraceae they often fare little better at the species level, particularly in some of the more difficult genera. In Australia, the

genus Cryptocarya presents the greatest difficulty as it contains a substantial number of species (49), some of which can be divided into recognizable entities at the sub-specific level. Once again, reliable gross morphological features are difficult to find, and organs which are of immense value in other groups e.g. flowers, are of little value in distinguishing species of Cryptocarya which are usually distinguished by a combination of characters, often vegetative.

Method and Materials

A trial run with 16 species of Cryptocarya (Appendix 4) was made using the TAXON program. Each species was scored for a total of 30 attributes (6 binary, 16 disordered multistate and 8 continuous) (Appendix 5). The results are presented as a dendrogram (Figure 103) and as a minimum spanning tree (Figure 104). At first sight, the subdivisions appear to be similar, particularly as species 4, 5, and 14 are split off from the rest of the species in both systems. However, the three species involved are a diverse group and have little in common other than triplinerved leaves and I don't believe that in this case, the feature is of such great significance. Conversely, a feature which I believe to be of considerable importance viz. cotyledons ruminate or uniform in texture, has not been used in the early subdivisions of the groups by the TAXON program.

This raises the problem of weighting of attributes and all its attendant difficulties and the circular arguments which necessarily follow.

It seems to me, that species relationships in a genus like Cryptocarya, will be difficult or impossible to evaluate using

traditional morphological characters.

It is imperative that we gain some insight into the relationship between species if we are to make any real progress in classification. At this stage, chemical attributes offer the best chance of success. The analysis of leaf oils is a chemical approach, all the Australian species have been sampled throughout their ranges and the results will be reported when the analyses are complete.

Chapter 6. Phylogeny

I have only studied the Australian species of Lauraceae in detail, so it would be presumptious of me to attempt to pontificate on the evolution of the whole family. However, it is important that my findings should be evaluated and compared with the phylogenies deduced by workers who have had experience with the family on a much larger geographical scale.

Although complete family treatments have appeared at various times, Nees (1836), Meissner (1864), Bentham (1880) and Pax (1889), the classification by Kostermans (1957) is the starting point for gaining an understanding of the relationships of the various genera recognized at that time. Despite this, the classification of Hutchinson (1964) should not be ignored. Although Figure 105 (based on Kostermans 1957) is probably not meant to be regarded as a strictly phylogenetic representation, it does reveal his views on the supposed relationships between currently recognized genera. In addition, at various points in the text, Kostermans specifies what he believes are the primitive states for various organs. Although he subsequently refined and modified his supposed relationships (Kostermans 1986) the same basic relationships are still evident.

In view of the lack of agreement between taxonomists about the features to be used to delimit genera and the even greater disagreement about the importance to be attached to various features used, it is not surprising that there are problems. Furthermore, authors don't agree on what constitutes a primitive feature e.g.

Kostermans (1957) lists the following as primitive states in flowers:

"Two outer whorls of fertile glandless stamens.
Third whorl of gland-bearing fertile stamens.
Fourth whorl of staminodes.
Anthers four-locular, the locules superposed.
Ovary superior".

However, Hutchinson (1964) states:

"Four-locellate anthers are very rare in other flowering plants and I am doubtful whether they signify an ancient type or represent a more recent development".

Anthers are generally regarded as being very important in the classification of this family. If eminent botanists such as Kostermans and Hutchinson cannot agree which anther type is primitive, then how can we hope to understand the phylogeny of the family without anatomical and developmental studies which are as yet inadequate.

If we turn to the fossil record we immediately run into trouble because as stated previously, there are well founded doubts about the correct identity of some fossil leaves placed in Lauraceae.

"Palaeontological results consequently have given us thus far only an incomplete idea of the distribution of Lauraceae in the Tertiary period, and have not yielded information on ancestral problems" (Kostermans 1957).

In many ways I believe this is still the situation. However, work on the cuticles of leaves in Eocene deposits in England indicates that the family was well represented in areas where it is now absent. Bandulska (1927)

In other respects the fossil record is non-existent or inadequate to support conclusions which can be inferred from plate tectonics and present day distribution of particular taxa. If we look at the genus Beilschmiedia we find that it now occurs on all the continents. The last time they were in contact was about 100 myr ago when Africa and South America broke away from Antartica (Smith & Briden 1977). It is

difficult to understand how this genus could have become distributed throughout the world unless it had already evolved before the continents drifted apart. This then suggests that some families of angiosperms were not only present during the cretaceous, but had already evolved to a considerable extent into genera which have persisted to the present. A similar argument could also be advanced to explain the present distribution of the genus Litsea which is found on all the continents except Africa.

I conclude from such evidence, that the family Lauraceae is one of the older angiosperm families which evolved rapidly during the cretaceous to produce stable genera which have persisted even to the present day. If we are to develop a phylogeny for the family this must be taken into account, but this in itself becomes difficult beacuse each of these two genera would have to be regarded as ancestral and consequently should exhibit primitive features. However, if we look at the anthers, we find that in Beilschmiedia the anthers are 2-locular while in Litsea they are 4-locular. Thus both Kostermans (1957) and Hutchinson (1964) could be correct in their interpretation of primitive features.

Once again we have encountered one of the main problems in Lauraceae i.e. the paucity of usable morphological features. Again we must look for other characters which might provide the information for the development of an hypothesis.

Cytology can sometimes provide an insight into the evolution of a family, but chromosome numbers contribute little. The family shows little variation, with most genera having a count of 2n=24 (Bowden 1945, Ehrendorfer et al. 1968, Morawetz 1986, Okada & Tanaka 1975).

There is some variation e.g. Laurus nobilis & Sassafras albidum 2n=48 (Okada & Tanaka 1975). However, Morawetz (pers. comm.) found little variation when he did chromosome counts on root tips from seedlings of 100+ taxa grown from specimens cited in this revision.

I agree with van der Werff (1985) when he states:

"There is, as yet, no agreement on generic limits in Lauraceae" and I also agree when he goes on to state; "The confusion at the generic level is due, in part, to conflicting evidence provided by fruit, floral, or wood anatomical characters. It is simply not yet known which characters should be used for the delimitation of genera, especially in neotropical lauraceous taxa."

These sentiments are also expressed by Kostermans (1957) when discussing his classification:

"In the classification outlined below, I have adopted the following sequence of characters (according to their importance):

1. The development of the flower tube in the fruit, which runs more or less parallel with inferior, intermediate and superior ovary.
2. The presence or absence of an involucrum of decussate persistent bracts surrounding and enveloping the pseudo-umbels.
3. The number of fertile stamens.
4. The number of anther cells.
5. The development of the 4th staminodial whorl.

It should be stressed here that several genera are linked by one or a few intermediate species.

Apparently the combination of characters is more or less indefinite and almost all combinations are represented. We may assume either that missing combinations are extinct or that the potentiality that they will develop is still present. With such an assumption and without any indication of the palaeontological succession I have refrained from trying to make a chronological family tree and have simply grouped related genera together. Even the position of the groups (tribus) has no proper phylogenetical base; nobody can tell whether Hypodaphnis with an inferior ovary has developed from Ocoteae from Litseeae or Perseeae, etc., although in our diagram it is placed at the end (top).

The course of the phylogenesis is not clear; the only thing we know is, that the family must be rather old (ubiquist)"(ubiquitous?).

Thus, there is little agreement about the generic relationships and the phylogeny of the family. It is possible that Kostermans (1957 &

1986) has correctly assessed the situation. The review of Gottlieb (1972) certainly supports Kostermans classification but further tests need to be done by workers from a variety of disciplines. At this stage however, there appears to be little incentive to re-examine the meagre morphological data available to Kostermans. It is my view, that data should be gathered from other disciplines, (chemical attributes such as leaf oils and isozymes could be used) and critically examined to see if there is any correspondence with Kostermans' views.

How do the Australian taxa relate to the rest of the Lauraceae? If we accept Kostermans (1986) classification we may say that each of the major tribes is represented in Australia. If this review had been written in 1957 it would have been accepted by most botanists, at that time, that the genera were recent immigrants from South-East Asia. However, since then it has been generally accepted that many of the Australian rainforest taxa are of considerable antiquity and of Gondwanic origin. This could also apply to the Lauraceae. In view of the apparent age of some genera in the Lauraceae e.g. Beilschmiedia it is necessary to recognize that we are dealing with an angiosperm family of great antiquity and the possibility that the angiosperms originated much earlier than is generally accepted by palaeontologists. The meagre available evidence does not preclude the possibility of a southern or Gondwanic origin for the family and northern migration to Europe-Asia and North America by way of the wandering southern continents.

Chapter 7. Future Work

Species Problems

Cinnamomum baileyanum

Complete fertile material of both the southern and northern forms of this species are needed to see if they are in fact conspecific or represent two distinct taxa.

Cryptocarya bidwillii, C. clarksoniana, C. claudiana, C. microneura, C. sclerophylla complex

Further studies are needed to determine the relationships of these species. Are the differences sufficient to maintain all as separate species or is the variation no more than that exhibited by geographic races?

C. rhodosperma

The northern and southern forms of this species appear to differ somewhat. Are the differences sufficient to treat them as distinct taxa? More material and further field studies are needed to assess the significance of the differences.

C. triplinervis

This is a widespread and variable species. Three varieties are recognized, but specimens are encountered which cannot be placed in any of the recognized varieties. Should further varieties or other

segregates be recognized or should this species be treated in an entirely different fashion? Field studies, further collections and perhaps chemical studies may provide the answers.

Endiandra acuminata

Generally this is an easily recognized, predominantly lowland rain forest species which is readily distinguished by the flower structure and is characterised by the tepals being strongly reflexed following anthesis. However, there are a few specimens collected from trees growing at higher elevations (ca 1000m) where leaves differ in texture, but the flowers appear to be superficially similar. More collections of this mountain form are needed to evaluate the significance of the differences noted to date.

E. compressa

This species was described from a specimen collected at Imbil in southern Queensland. The species (as circumscribed in this revision) has a distribution extending from northern New South Wales to northern Queensland. Although good fertile material has been collected from the northern Queensland populations, the specimens from northern New South Wales, central and southern Queensland are generally of much lower standard, and additional collections of fertile material from these areas are needed to confirm my view that the populations are indeed conspecific.

Lindera queenslandica

Some specimens from New Guinea identified as Litsea irianensis probably belong to Lindera queenslandica, but fertile material of the

New Guinea populations is needed to confirm this tentative conclusion.

L. queenslandica occurs in Cape York Peninsula and extends as far south as Mission Beach in northern Queensland. Fruiting collections of the peninsular populations are needed to confirm that the ripe fruit is always red when ripe.

Litsea bennettii

This species is superficially similar to a number of Malesian species viz. L. acrantha Ridley, L. crenata Allen, L. habbemensis Allen, L. morobensis Allen. Unfortunately, the differences exhibited by species of Litsea are often slight and it is necessary to obtain complete material to be sure that one is dealing with different species. The fact that species of Litsea are dioecious makes it more difficult, but nevertheless it is highly desirable that the relationships between L. bennettii and the Malesian species be more fully explored.

L. macrophylla

Despite visits to some of the more likely European herbaria, I have been unable to find any type material for this name. This is an unsatisfactory state of affairs and further searches to find type material of this name should be initiated.

Generic Problems

As discussed in the taxonomic section, further work is needed on the Litsea - Neolitsea et al. generic problem. If Litsea and Neolitsea are accepted as distinct genera then another genus is needed

to accomodate the Australian species in this complex. As discussed in the taxonomic section, this then raises a nomeclatural problem beacuse of the conservation of the generic name Litsea based on L. glutinosa. If the generic name Litsea is retained within its present circumscription, then perhaps hundreds of new combinations would have to be made for species now included in the genus, but which should be regarded as being generically distinct from L. glutinosa. This is not a very satisfactory solution to the problem as it negates most of the advantages normally associated with conservation of generic names.

Further developmental work is also needed on the relationships between Endiandra with 3 stamens and Beilschmiedia with 9 stamens in view of the fact that there are species with 6 stamens which have been placed in either genus.

Chemical Investigations

Leaf Oil Analysis

Most Australian species have been sampled, but data has yet to be analysed in detail to examine the relationships between species and between genera. This is a large project which is being undertaken jointly in collaboration with Dr T. Whiffin of La Trobe University.

Leaf Isozymes

The Australian species of Litsea have been sampled over most of their ranges, but the results have yet to be analysed in detail. This is a joint project with Dr G. Moran of CSIRO, Division of Forest Research in Canberra. Initial results with Litsea are quite promising and suggest that this work should be continued along two possible

lines:

1) The genus Litsea has a world-wide distribution and its species could be sampled throughout the world.

2) Species in other genera in Australia could be sampled to check on the species relationships deduced or inferred from morphological data.

Phytogeography

Phytogeography is a fascinating subject and with the general acceptance of plate tectonics in the last 15-20 years the subject has become even more interesting. However, I believe that the compilation of geographic lists of plants at the family or generic level has been explored fully and will yield little additional information. At this stage different approaches are needed utilizing data from entirely different disciplines.

These data may be obtained by looking at the oils or isozymes of species in genera or generic complexes which have a world-wide distribution. Litsea is one such genus which, if investigated chemically, and the data subjected to a variety of classificationary programs, could indicate the origin and evolutionary pathways of the various taxa investigated.

Leaf Anatomy

Preliminary investigations by Prof. D.J. Carr of the Australian National University and Dr D. Christophel of the University of Adelaide have shown that contrary to the findings of earlier investigations e.g. Teschner (1923) and Bandulska (1927), modern

light microscopy and the scanning electron microscope has revealed a great wealth of hither to undescribed features.

> "These include wax plates differing in form and distribution (as seen in SEM), lignified cells of the epidermis (upper and lower) and palisade mesophyll cells, and specifically differing stomal morphology. These and other anatomical features are certainly not uniformly distributed either in the family or in each genus, and a more complete investigation may make characterisation possible to the species level". (D.J. Carr in litt.)

Further work on leaf anatomy is desirable to see if the additional data support the classification of this revision and also to check on the so-called "Cinnamomum Flora" which is reported to have dominated much of the Australian continent during the Tertiary period Ettinshausen (1888).

World Wide Problems

Despite the efforts of botanists over a long period of time and in particular Kostermans who has spent a lifetime on this group, the family Lauraceae is still plagued by generic problems.

The family needs to be studied as an entity but this would require a team approach by experts from various geographical areas. Initially the type species for each genus should be examined in great detail to determine whether or not it is generically distinct. If the type material is not adequate then additional conspecific material should be sought in existing collections and if this also proves to be inadequate, then further collections should be made in the wild so that the species characteristics can be assessed.

Although it would probably be necessary to accord most importance to morphological features, data should be assembled from every possible discipline and evaluated to determine which genera should be

accepted as being distinct.

Having established a provisional generic framework, all the type specimens of described species should be assigned to a particular genus. If specimens are encountered which will not fit into the provisional generic framework, then additional genera should be erected and the generic framework explored until it can accomodate all the known species.

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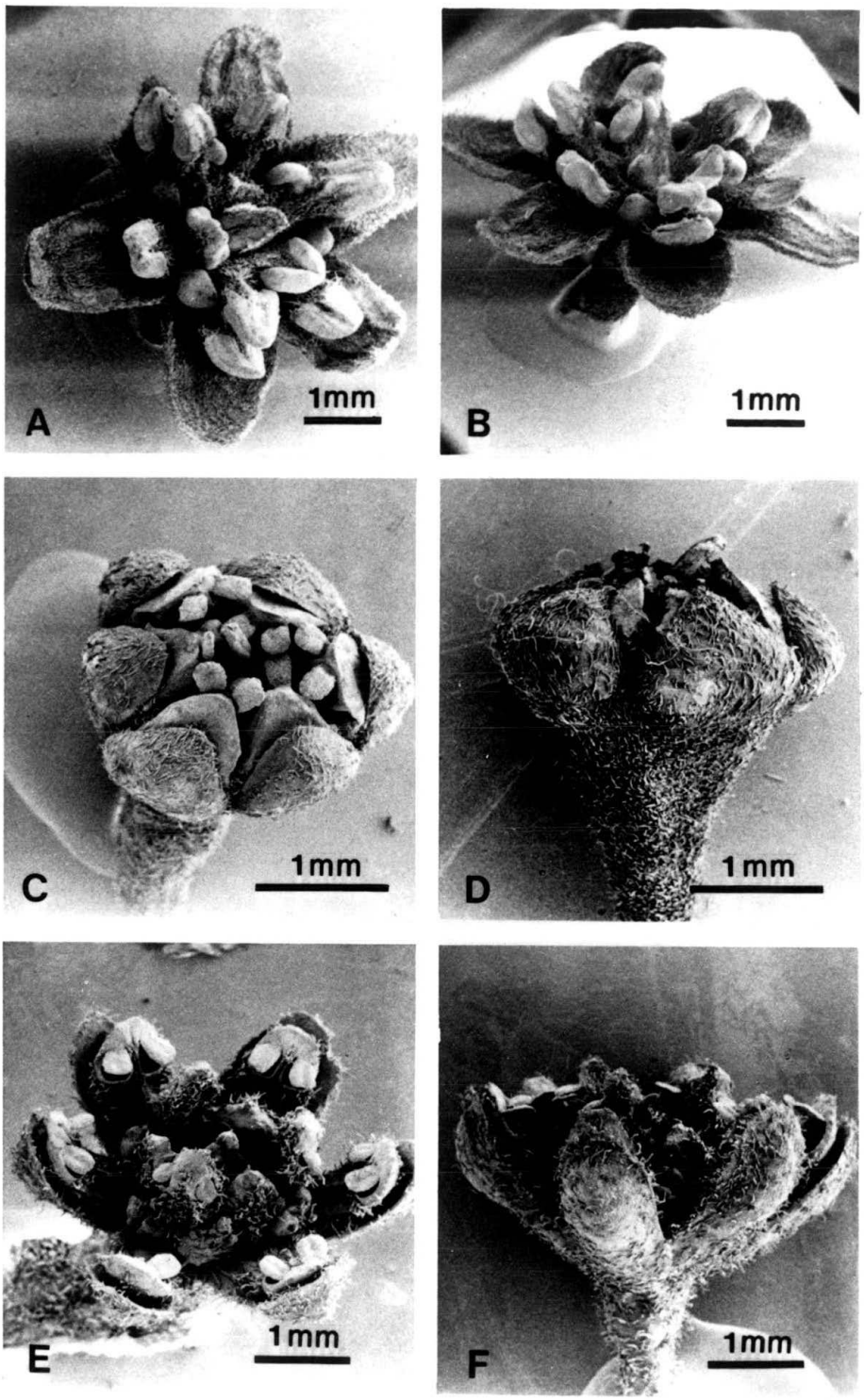


Fig.68. A-B Beilschmiedia brunnea. A flower (top view), B flower (side view), Gray 1599; C-D B. castrisinensis. C flower (top view), D flower (side view), Hyland 12861; E-F B. collina. E flower (top view), F flower (side view), Gray 3765.

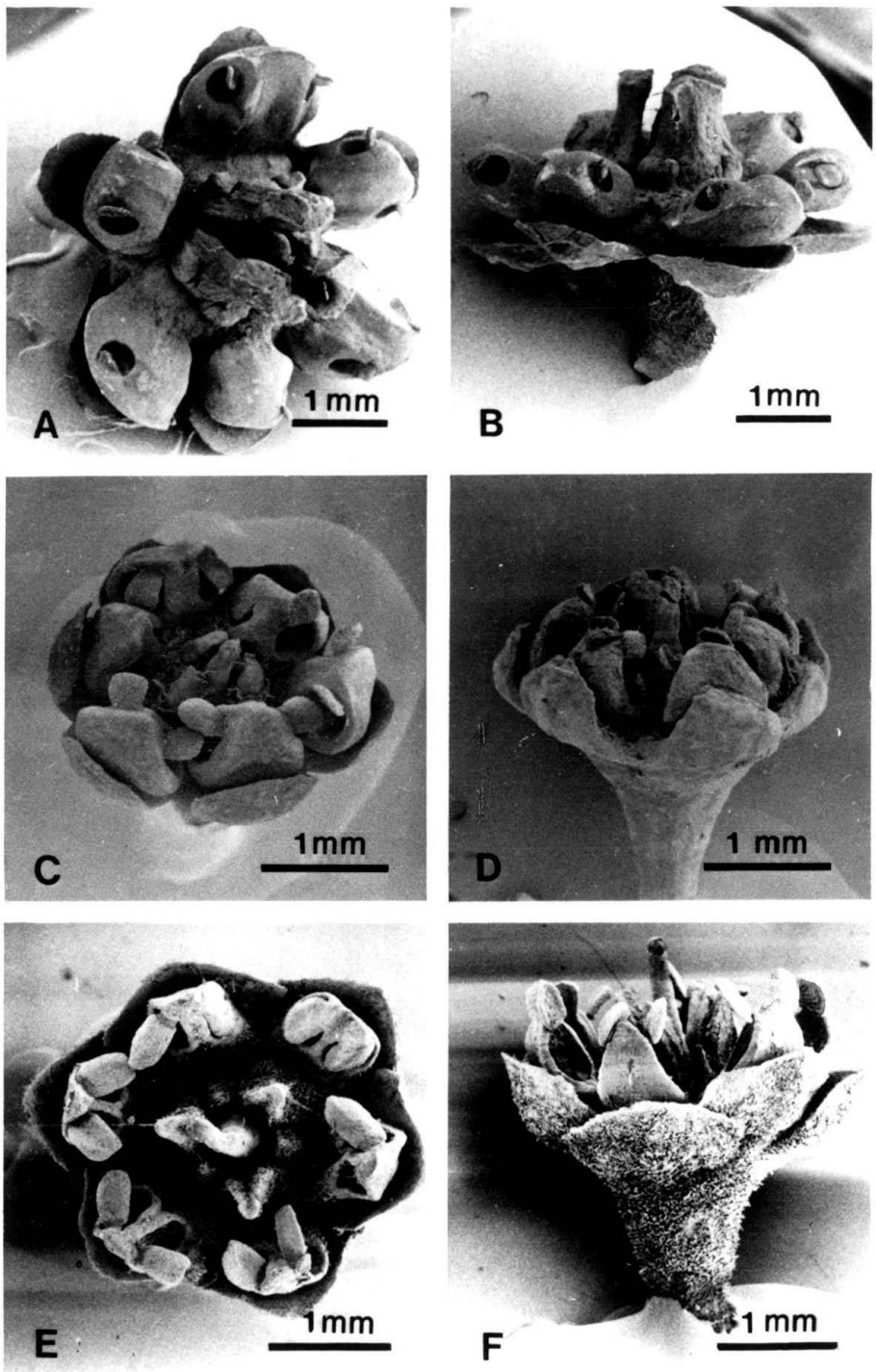


Fig.69. A-B Beilschmiedia oligandra. A flower (top view), B flower (side view), Gray 3172; C-D B tooram. C flower (top view), D flower (side view), Gray 3700; E-F B. volckii. E flower (top view), F flower (side view), Gray 3823.

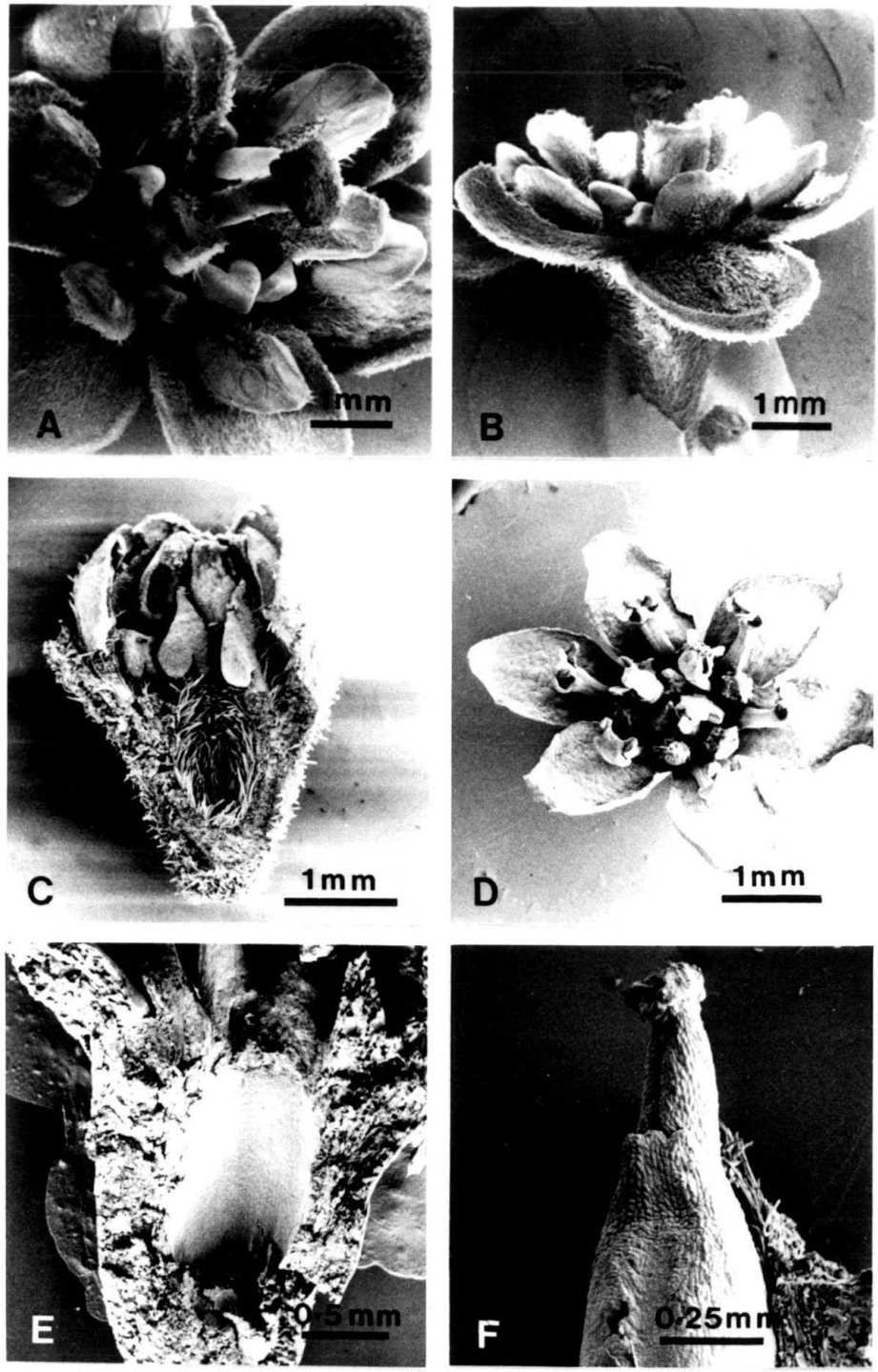


Fig.70. A-B Cinnamomum laubatii. A flower (top view). B flower (side view), Gray 3991; C Cryptocarya brassii. Perianth tube hairy on the inner surface; Hyland 3976 RFK; D-E C. laevigata. D flower - perianth segments glabrous, E Perianth tube glabrous on the inner surface, Gray 1019; F C. meissneriana - Vestigial style? Hyland 12332.

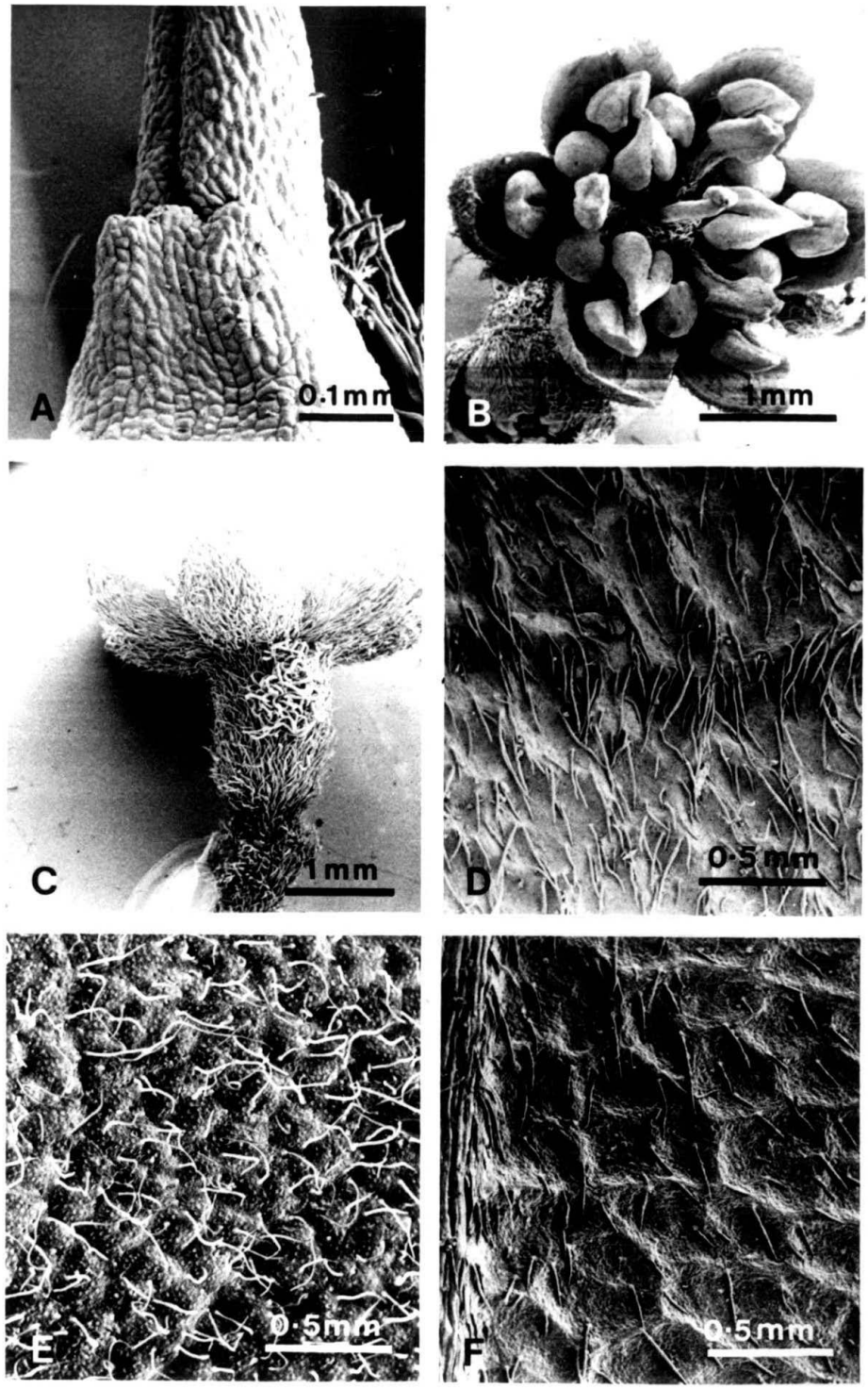


Fig.71. A Cryptocarya meissneriana - Vestigial style? Hyland 12332; B-D C. triplinervis var. triplinervis . B flower (top view), C flower (side view); Hyland 12346; D C. triplinervis var. triplinervis, lamina undersurface - hairs straight and appressed, Hyland 4403 RFK; E C. triplinervis var. pubens, lamina undersurface - hairs tortuous and erect, Hyland 12325; F C. triplinervis var. riparia, lamina undersurface - hairs short, straight and appressed, Hyland 12452.

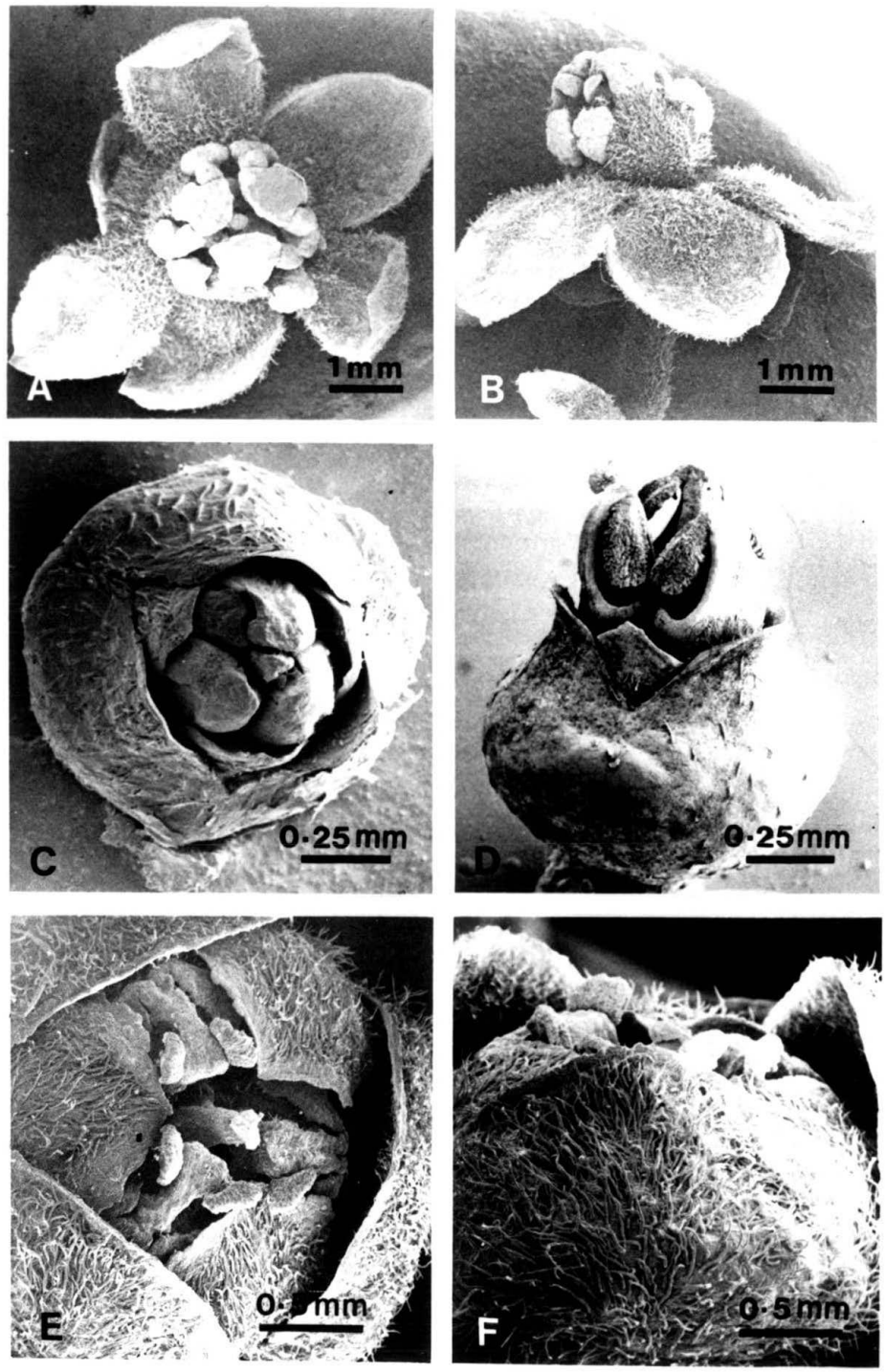


Fig.72. A-B Endiandra acuminata. A flower (top view), B flower (side view) Hyland 25033 RFK; C-D E. anthropophagorum. C flower (top view) Hyland 11712; D flower (side view) Hyland 11714; E-F E. bellendenkerana. E flower (top view), F flower (oblique view) Gray 2948.

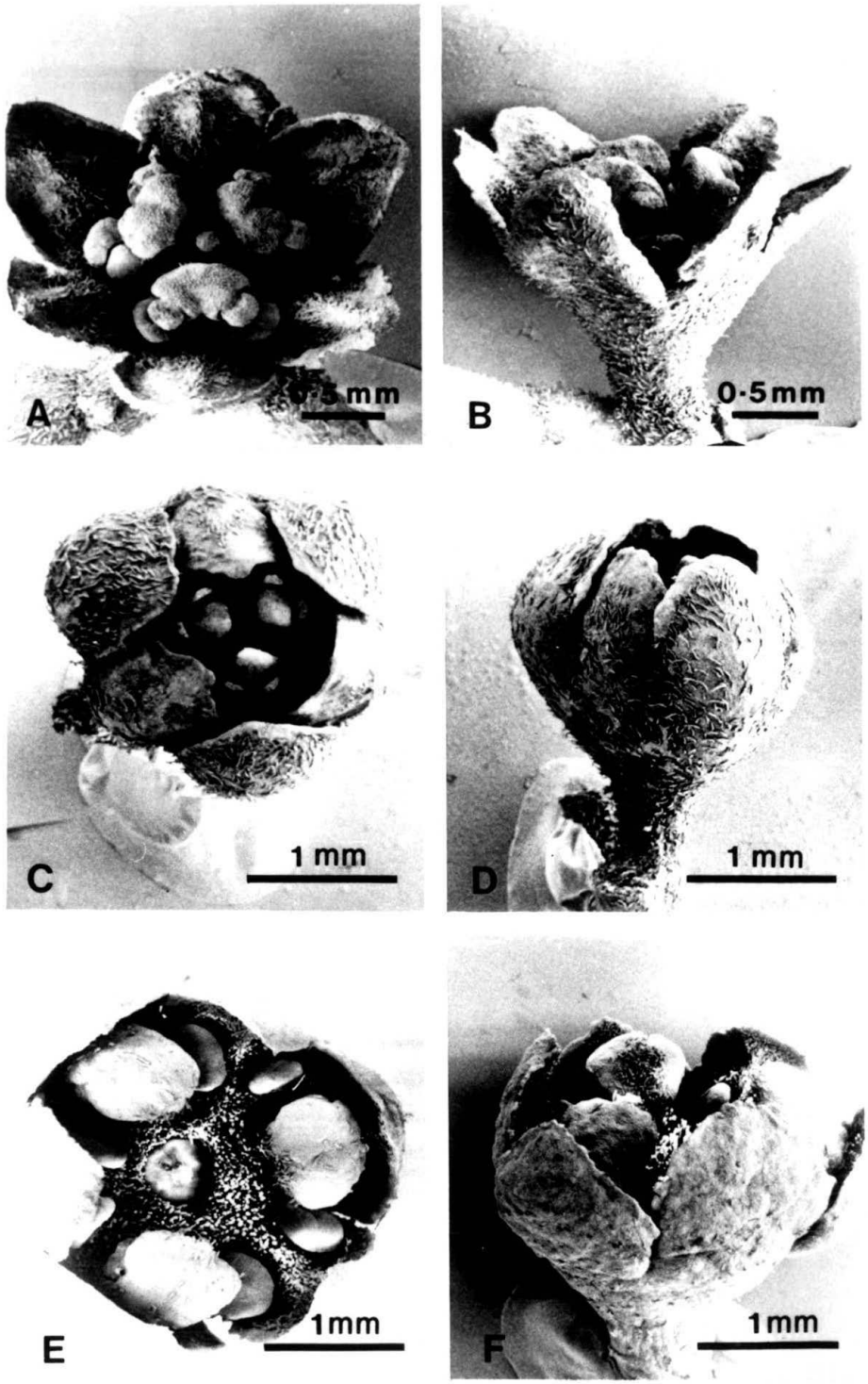


Fig.73. A-B Endiandra bessaphila. A flower (top view), B flower (side view) Gray 3864; C-D E. collinsii. C flower (top view), D flower (side view), Hyland 11134; E-F E. compressa. E flower (top view), F flower (side view), Gray 3732.

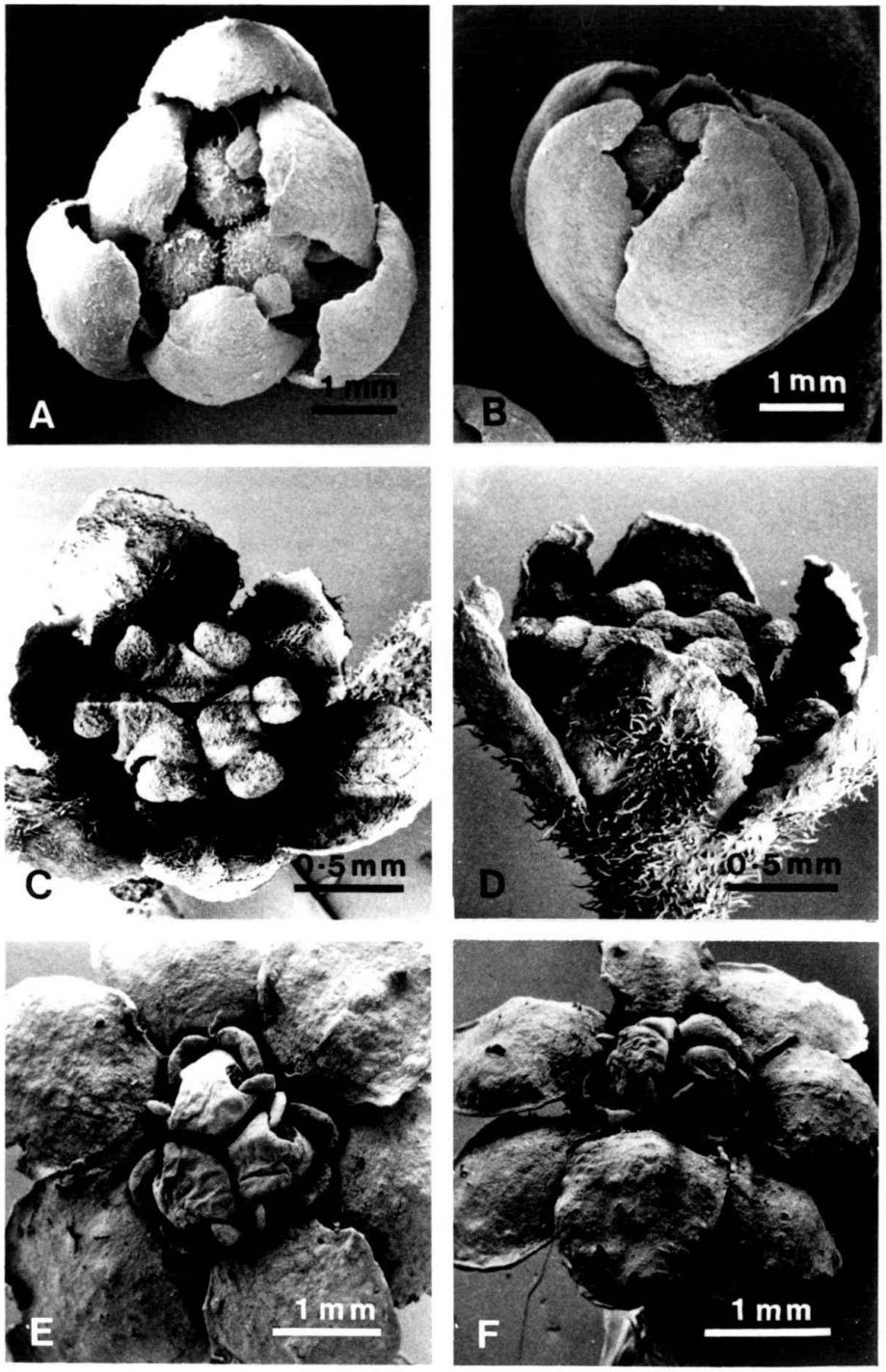


Fig.74. A-B Endiandra cooperana. A flower (top view), B flower (side view), Gray 1507; C-D E. cowleyana. C flower (top view) D flower (side view), Gray 3829; E-F E. crassiflora. E flower (top view), F flower (oblique view), D.L. Jones.

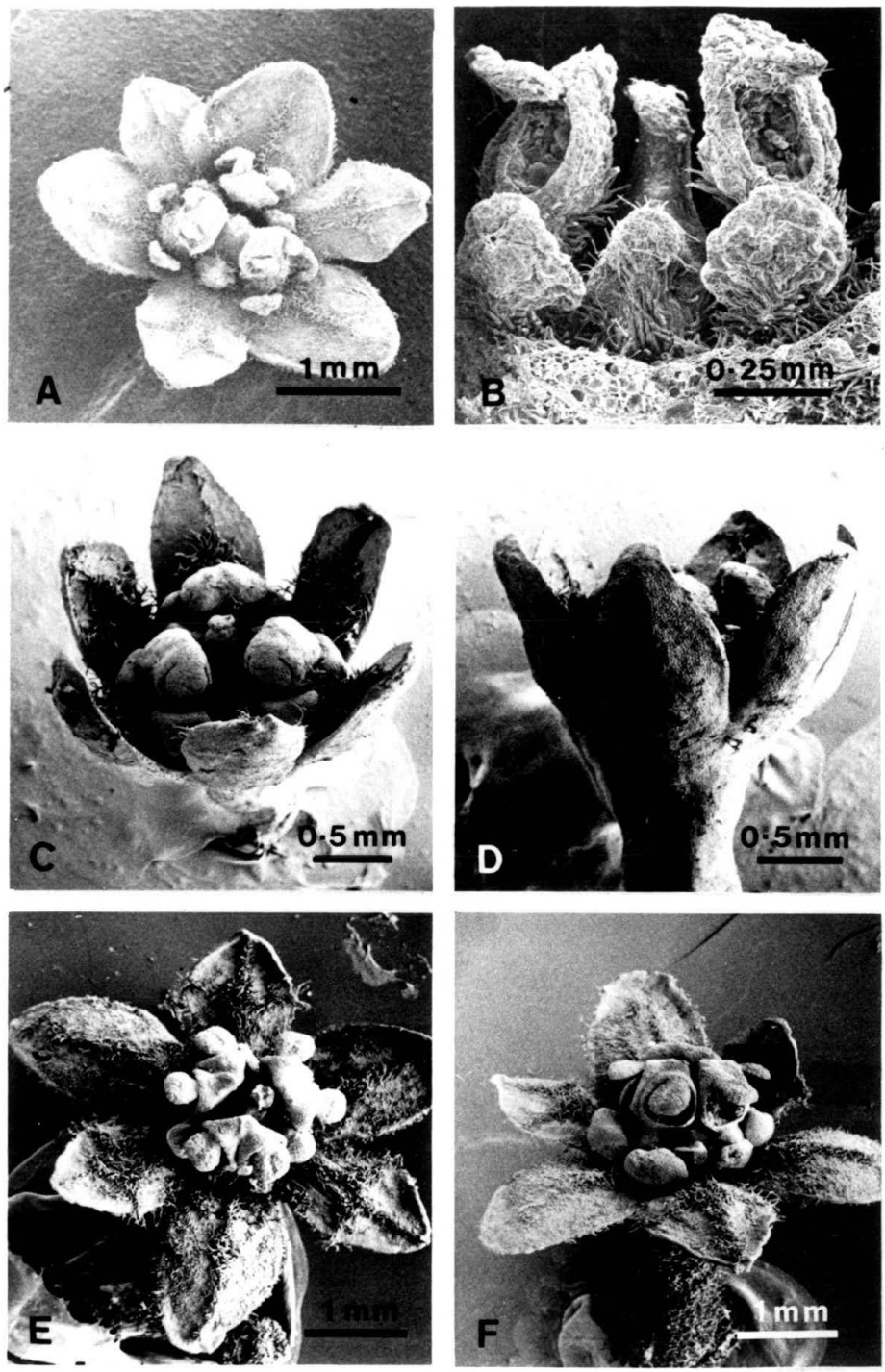


Fig.75. A-B Endiandra dichrophylla. A flower (top view), B flower (side view with tepals removed), Gray 2823; C-D E. dielsiana. C flower (top, oblique view), D flower (side view), Gray 3890; E-F E. discolor. E flower (top view), F flower (oblique view), Hyland 4559 RFK.

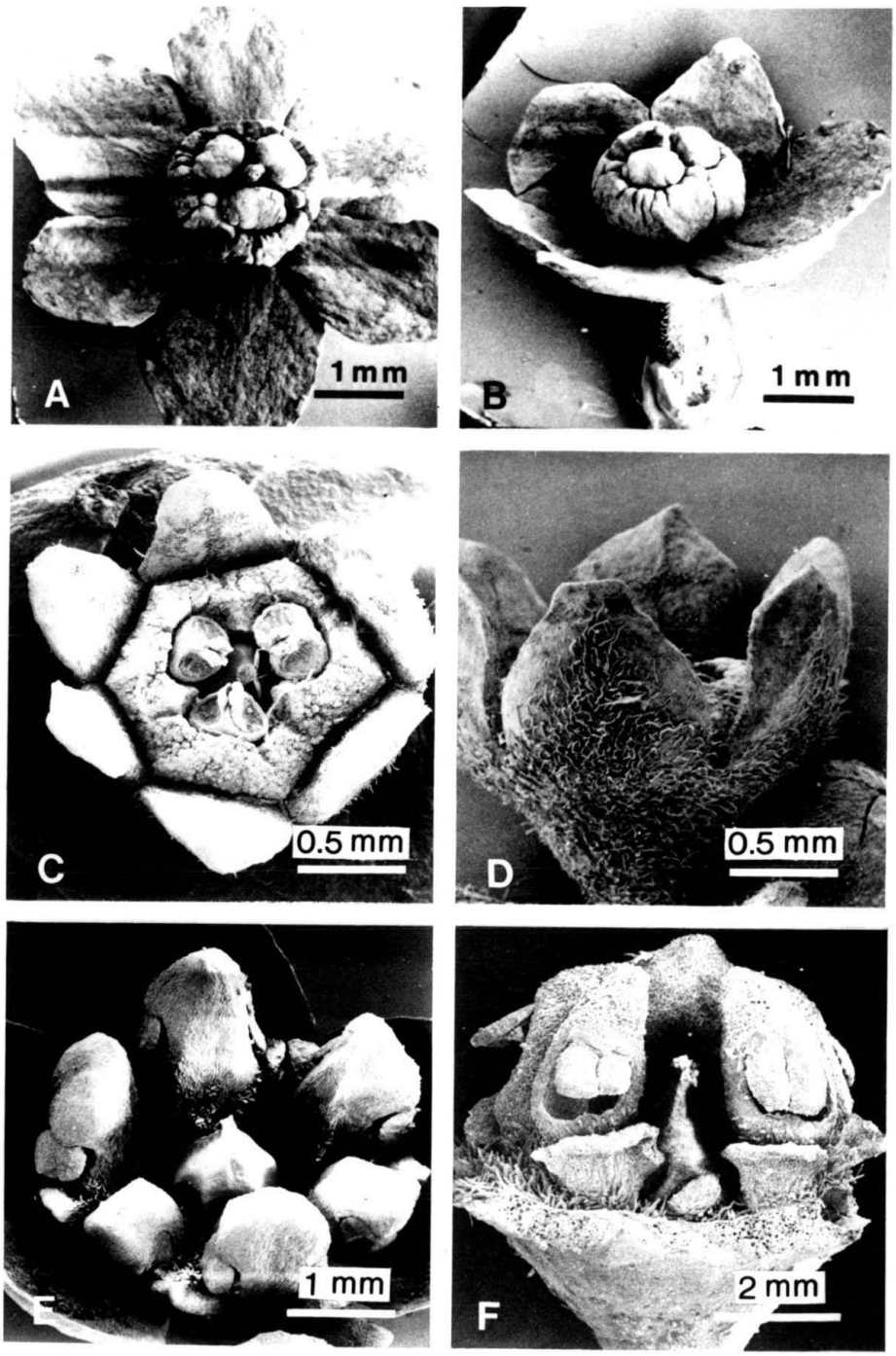


Fig.76 A-B Endiandra floydii. A flower (top view) B flower (side view), Hyland 4619 RFK; C-D E. glauca. C flower (top view), D flower (side view), Gray 1339; E-F E. globosa. E flower (top view), Gray 1572 F flower (side view with tepals removed), Hyland 4580 RFK.

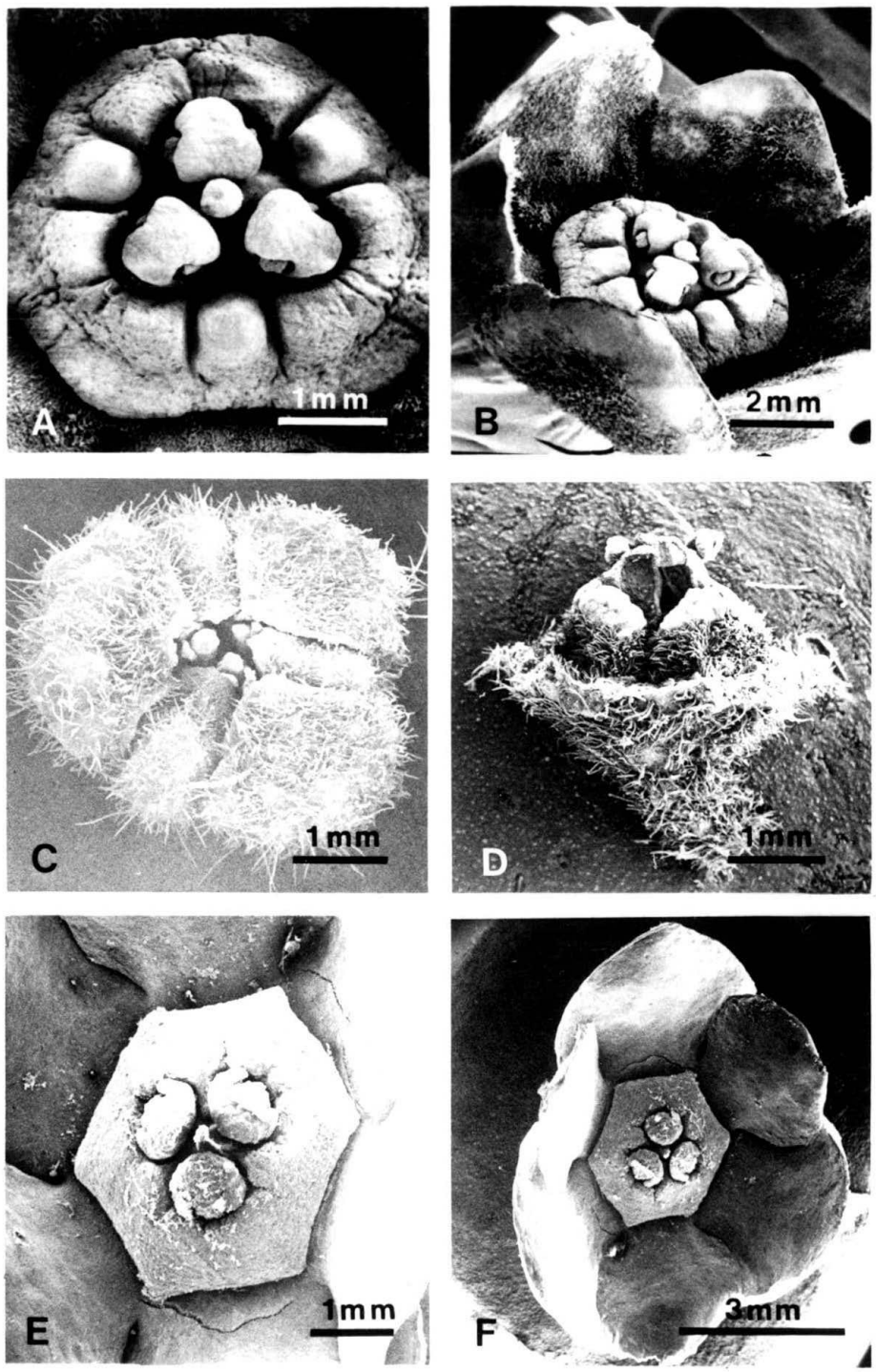


Fig.77. A-B Endiandra grayi. A disk (glands and staminodes), stamens, ovary, style and stigma (top view), B flower (oblique view), Gray 3305; C-D E. hayesii. C flower (top view), D flower (side view with the tepals removed), Hyland 4578 RFK; E-F E. hypotephra. E disk (glands and staminodes), stamens, style and stigma (top oblique view), F flower (oblique view), Gray 1332.

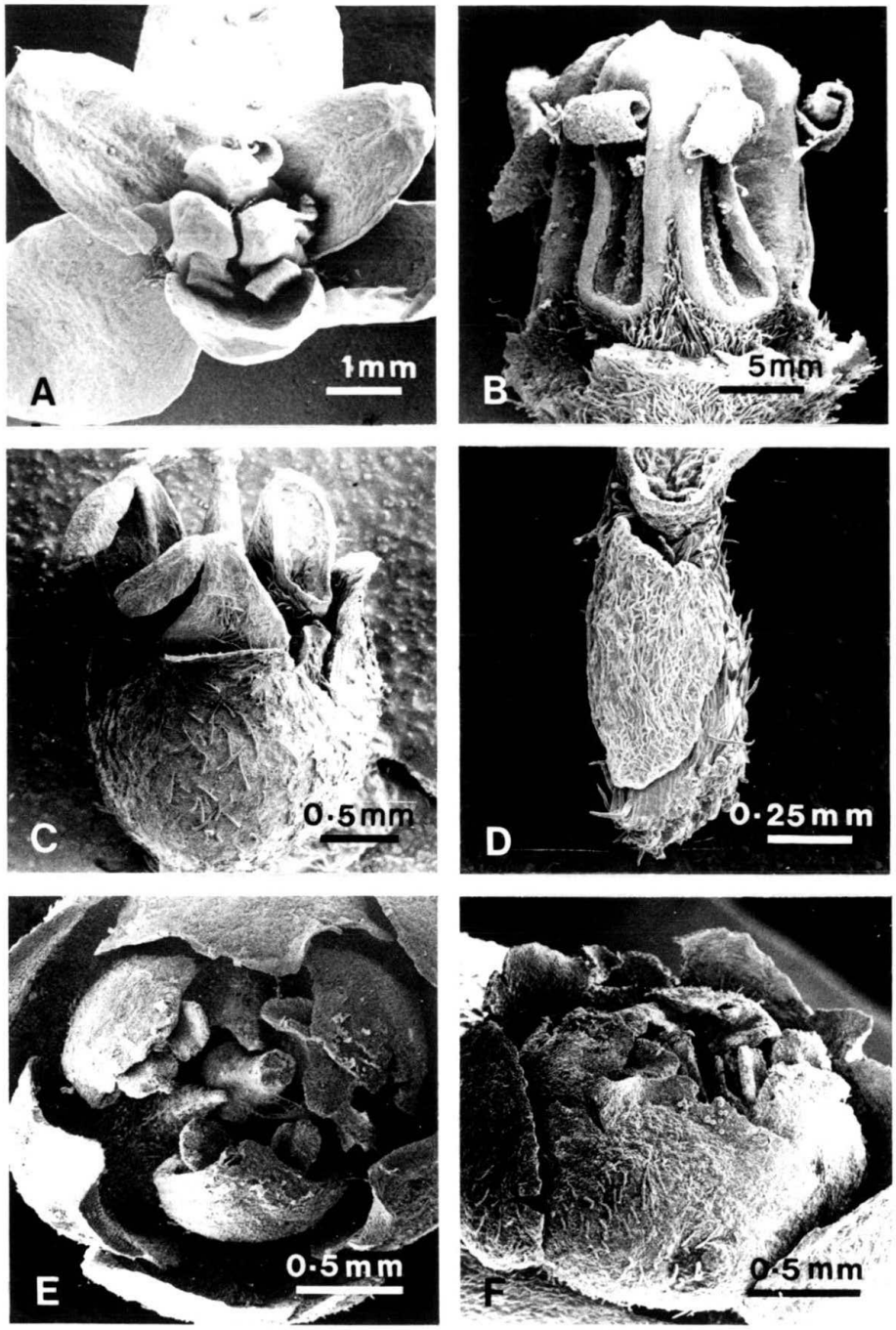


Fig.78. A-B Endiandra impressicosta. A flower (top view) B flower (side view with tepals removed), Gray 1958; C-D E. insignis. C flower (side view) D stamen showing gland on the filament, Hyland 12472. E-F E. introrsa. E flower (top view), F flower (oblique view), Hyland 4574 RFK.

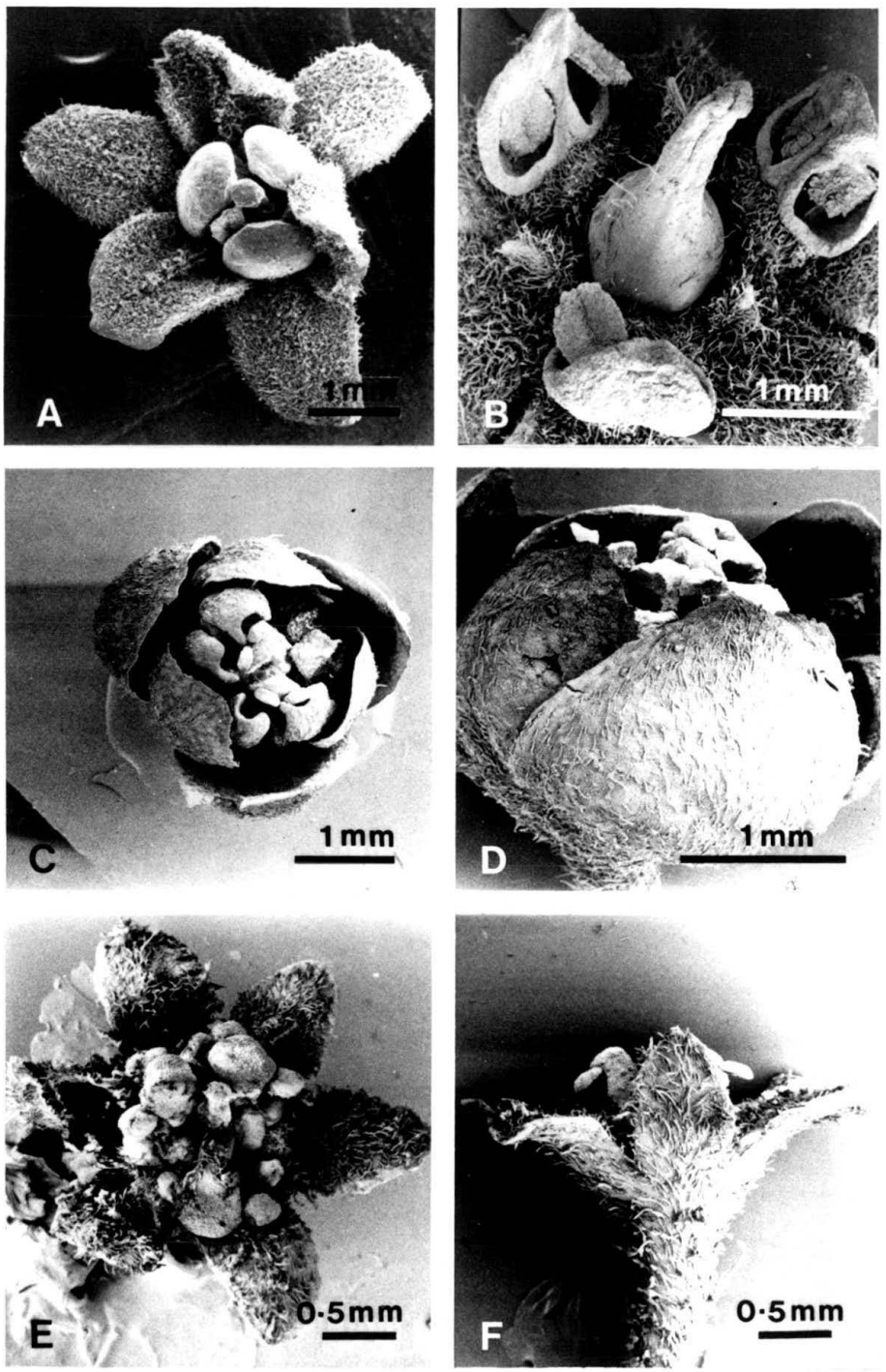


Fig.79. A-B Endiandra jonesii. A flower (top view), B flower (top oblique) Gray 2869; C-D E. leptodendron C flower (top view) D flower (side view) Gray 2978; E-F E. limnophila. E flower (top view), F flower (side view) Hyland 12377.

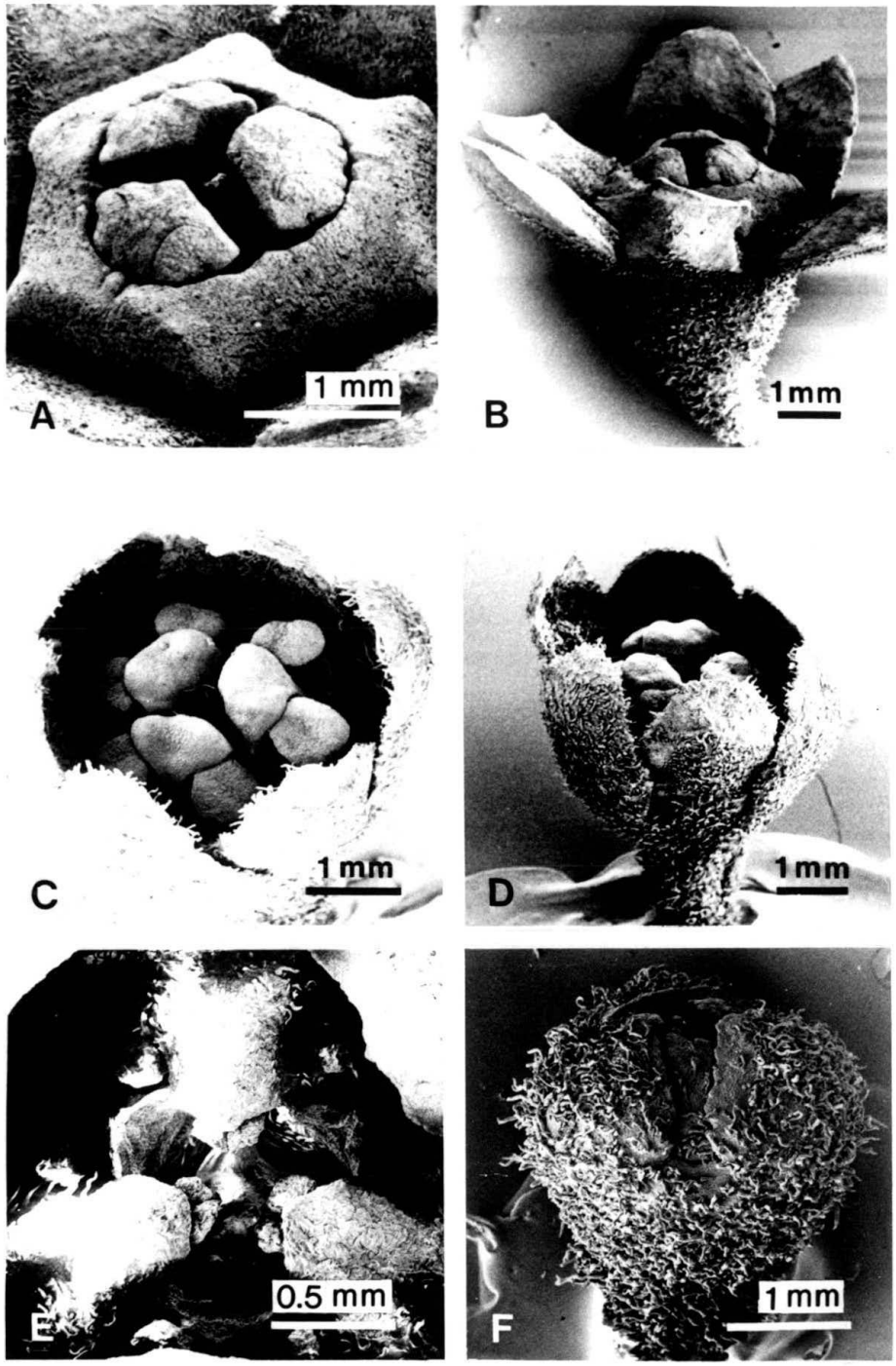


Fig.80. A-B Endiandra longipedicellata. A flower (top oblique showing the disk, anthers and stigma), B flower (side view), Gray 3247; C-D E. microneura. C flower (top oblique), D flower (side view), Gray 3811; E-F E. monothyra ssp. monothyra. E flower (top view showing the anthers opening inwards by one valve). Hyland 12555; F flower (side view), Gray 2973.

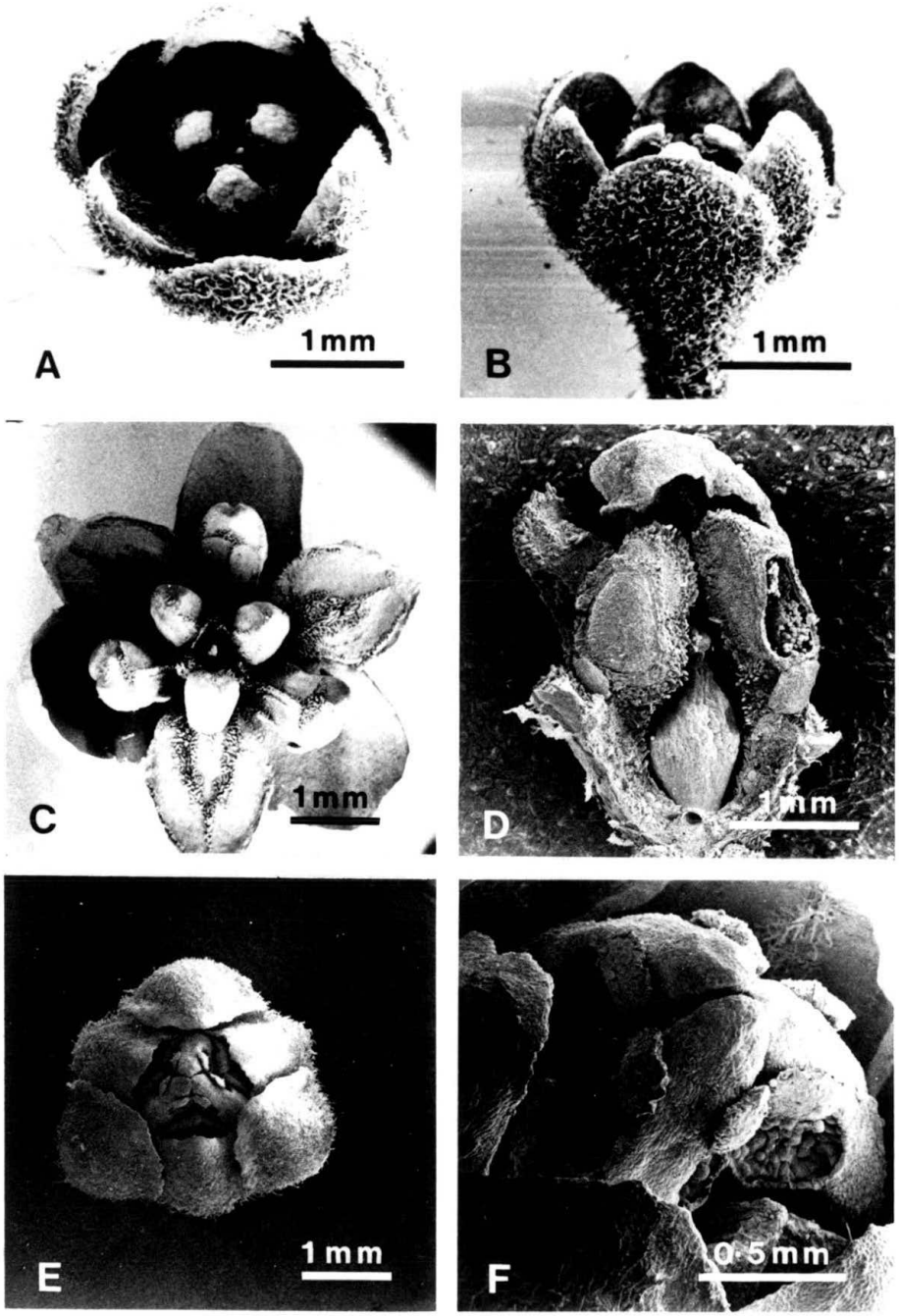


Fig.81. A-B Endiandra monothyra ssp. trichophylla. A flower (top oblique view), B flower (side view), Gray 3293; C-D E. montana. C flower (top view), Gray 3681; D flower (side view with tepals removed), Gray 2872; E-F E. muelleri ssp. muelleri E flower (top view), F flower (oblique view) Hyland 4556 RFK.

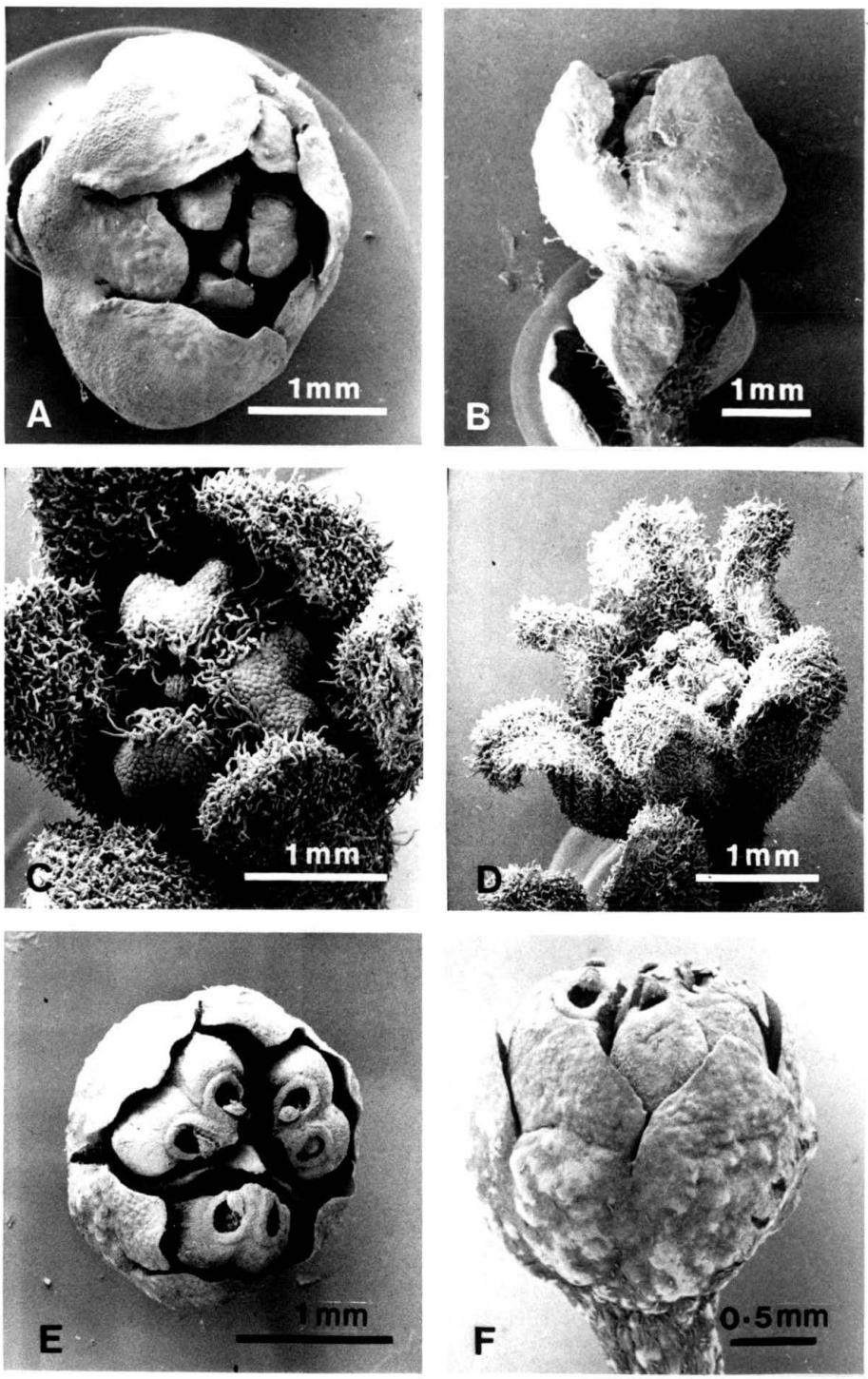


Fig.82. A-B Endiandra muelleri ssp. bracteata. A flower (top oblique view), B flower (side view), Hyland 4576 RFK; C-D E. palmerstonii. C flower (top oblique view), D flower (side oblique view), Hyland 12474; E-F E. phaeocarpa. E flower (top view), F flower (side view), Gray 3009.

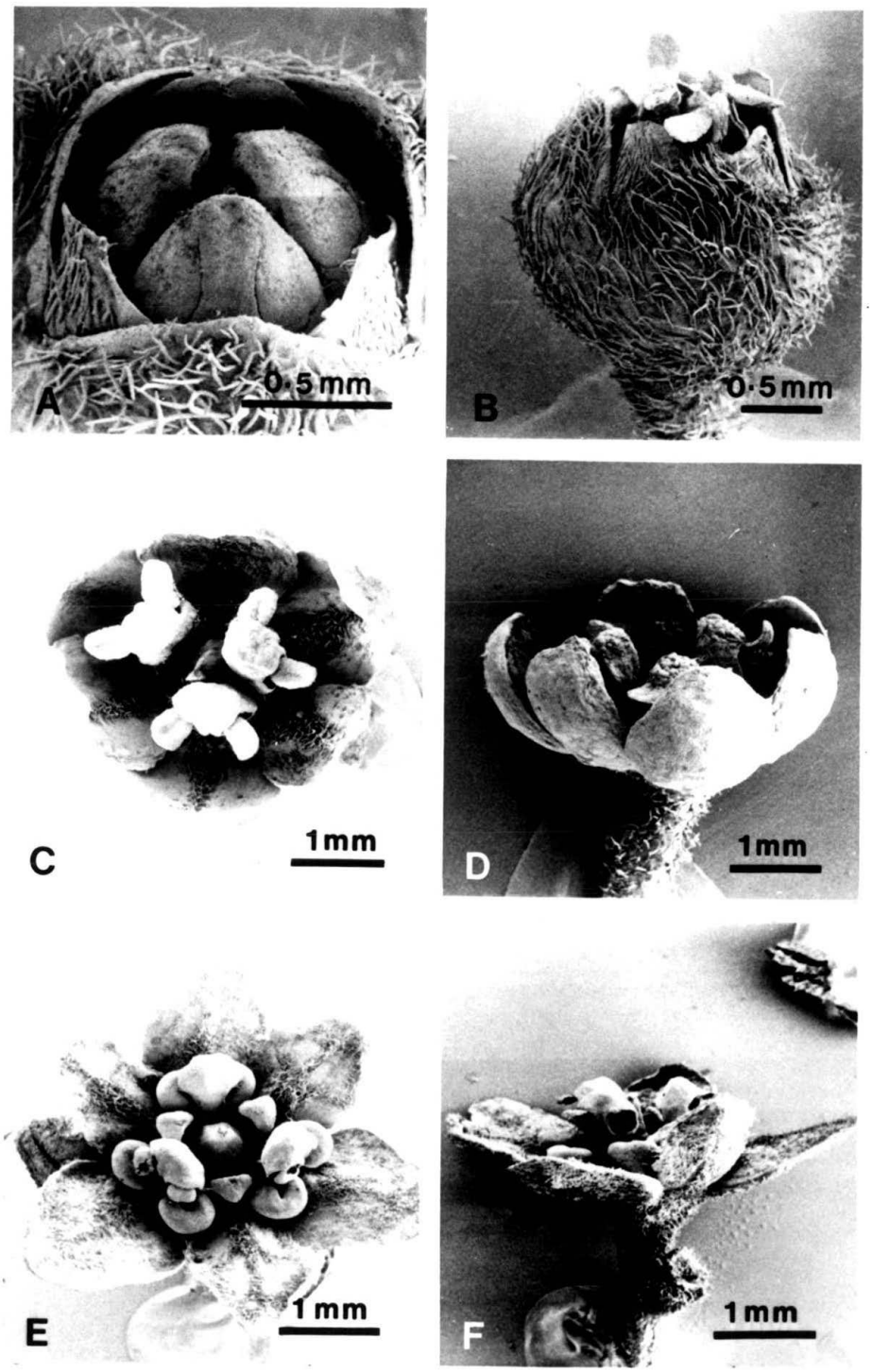


Fig.83. A-B Endiandra pubens. A flower (top oblique view), B flower (side view), Gray 2971; C-D E. sankeyana. C flower (top view) D flower (side view) Gray 3579; E-F E. sideroxylon E flower (top view), F flower (side view), Gray 3904.

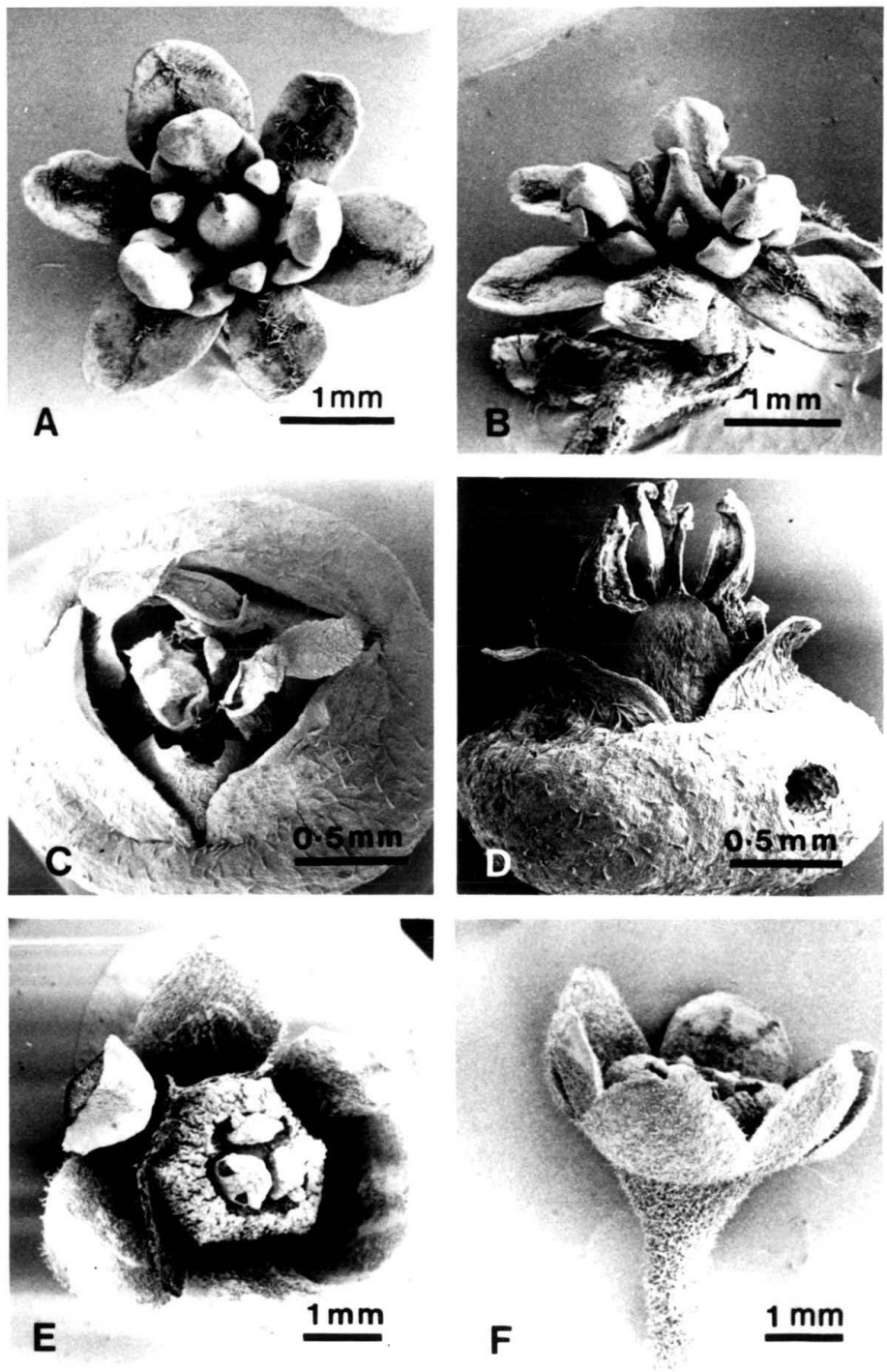


Fig.84. A-B Endiandra sieberi. A flower (top view), B flower (side view), Hyland 13044; C-D E. virens. C flower (top view), D flower (side view), A.G. Floyd s.n.; E-F E. wolfei E flower (top view), F flower (side view), Gray 2962.

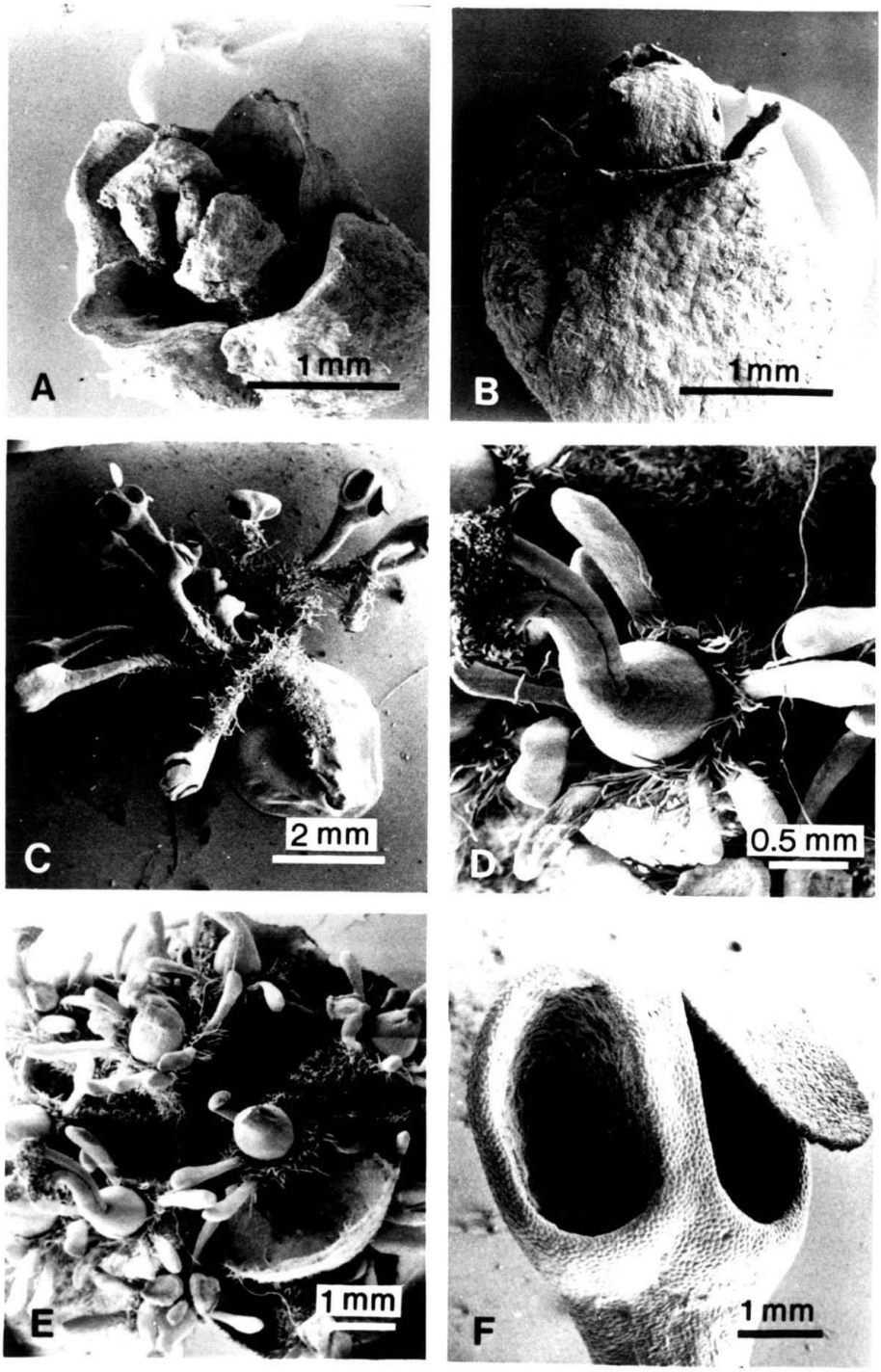


Fig.85. A-B Endiandra xanthocarpa. A flower (top oblique view), B flower (side view), Gray 2913; C-F Lindera queenslandica. C male flower (oblique view), Hyland 25063 RFK; D female flower (top view), E umbel of female flowers (top view), Gray 3721; F anther (side view) Hyland 25063 RFK.

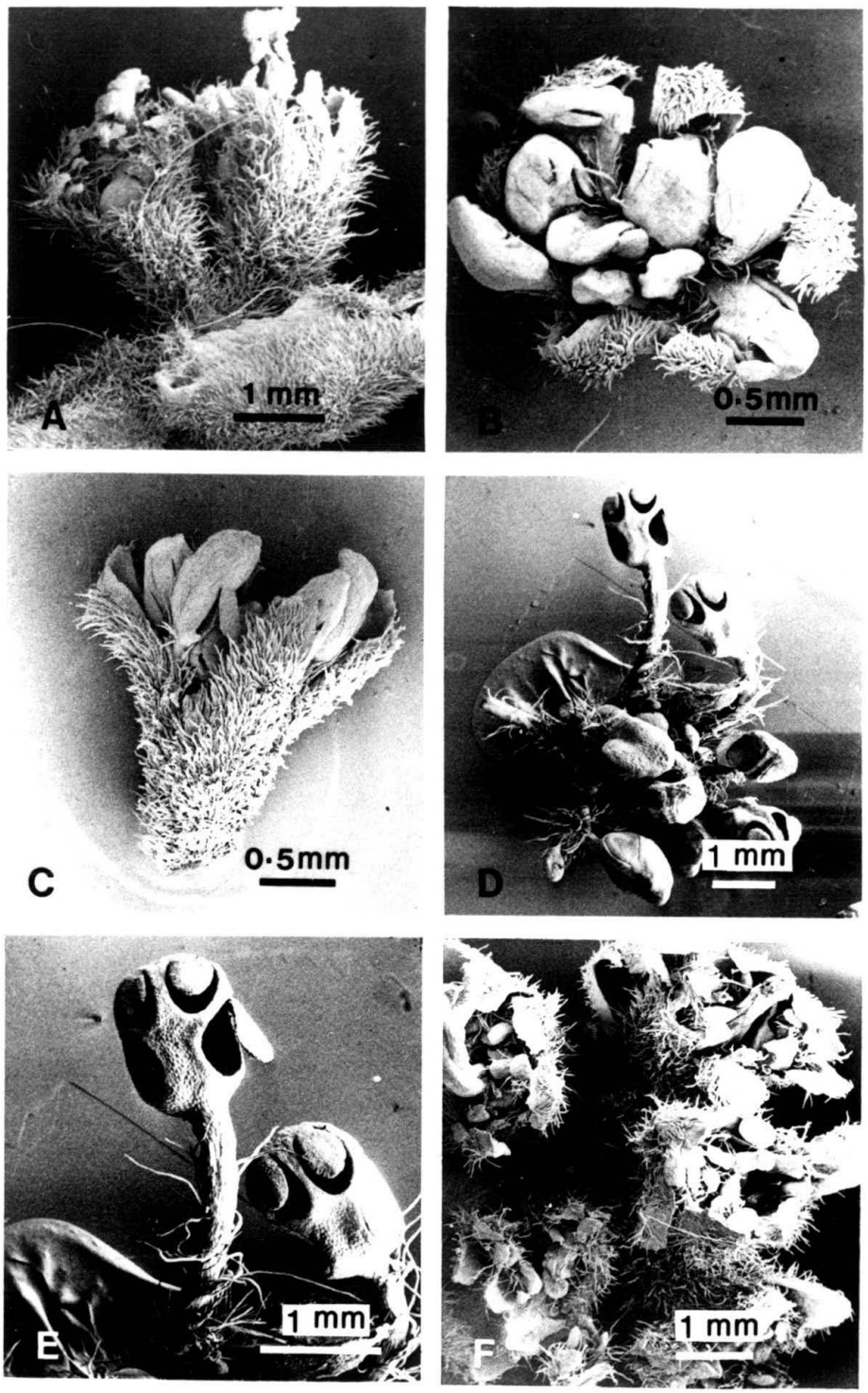


Fig.86. A Litsea breviumbellata female umbel (side view) Gray 2063; B-C L. fawcettiana. B male flower (±top view), C male flower (side view), Gray 2584; D-E L. glutinosa. D male flower (±top view), E anther (front view), Hyland 10283; F L. leefeana, female umbel (±top view), Gray 1335.

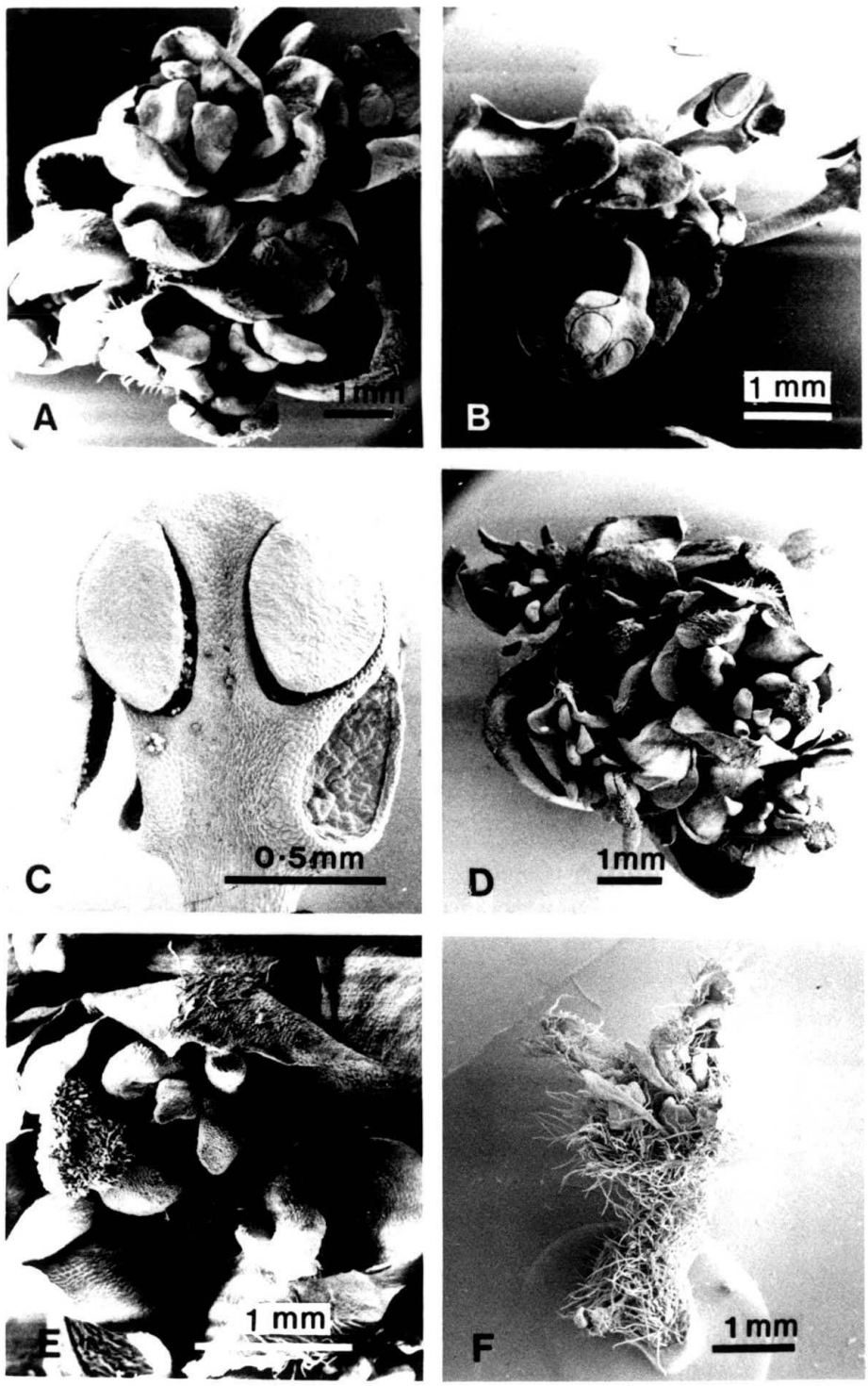


Fig.87. A-E Neolitsea brassii. A male umbel (±top view), B male flower, (top view), C anther, (adaxial view) Gray 1270; D female umbel,(top/oblique view), E female flower, (top view) Gray 3911; F Neolitsea dealbata female flower, (side view) Dockrill 1461.

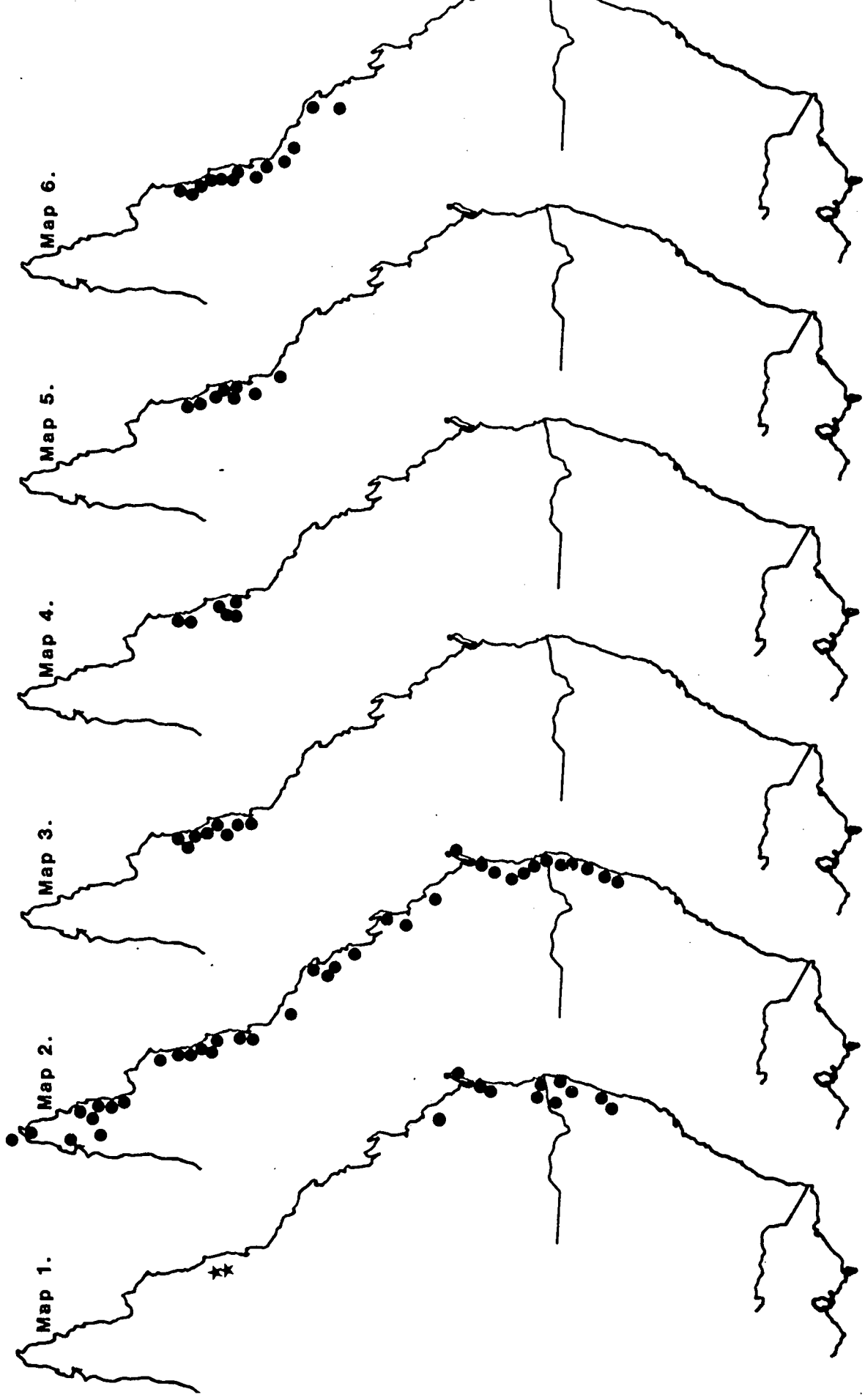


Fig.88. Map 1. ● Beilschmiedia elliptica; ★ B. volckii. Map 2. ● B. obtusifolia. Map 3. ● B. bancroftii. Map 4. ● B. tooram. Map 5. ● B. recurva. Map 6. ● B. collina.

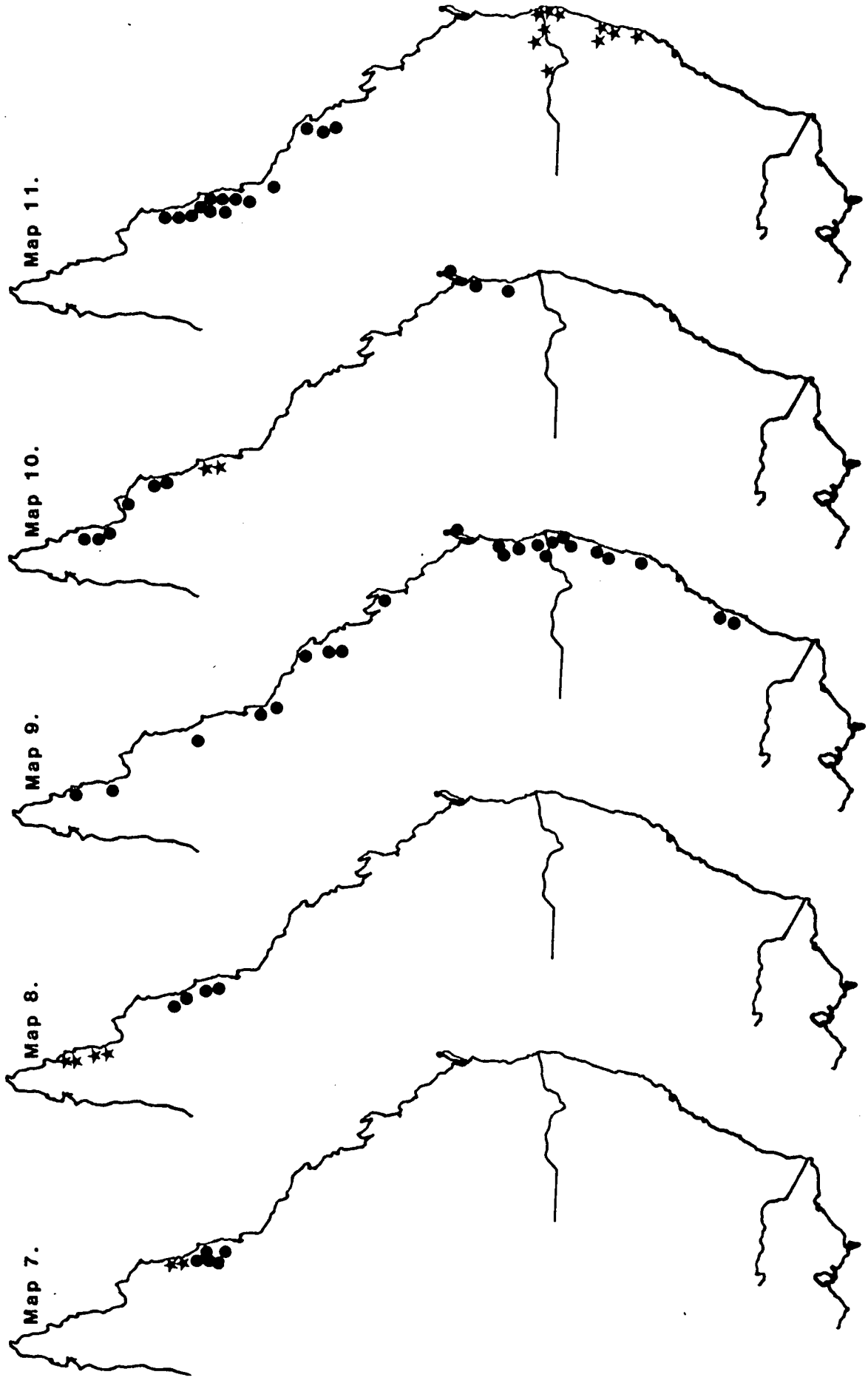


Fig.89. Map 7. ●Beilschmiedia brunnea; ★B. castrisinensis. Map 8. ●B. oligandra; ★B. peninsularis. Map 9. ●Cinnamomum oliveri. Map 10. ●C. baileyanum; ★C. propinquum. Map 11. ★C. virens; ●C. laubatii.

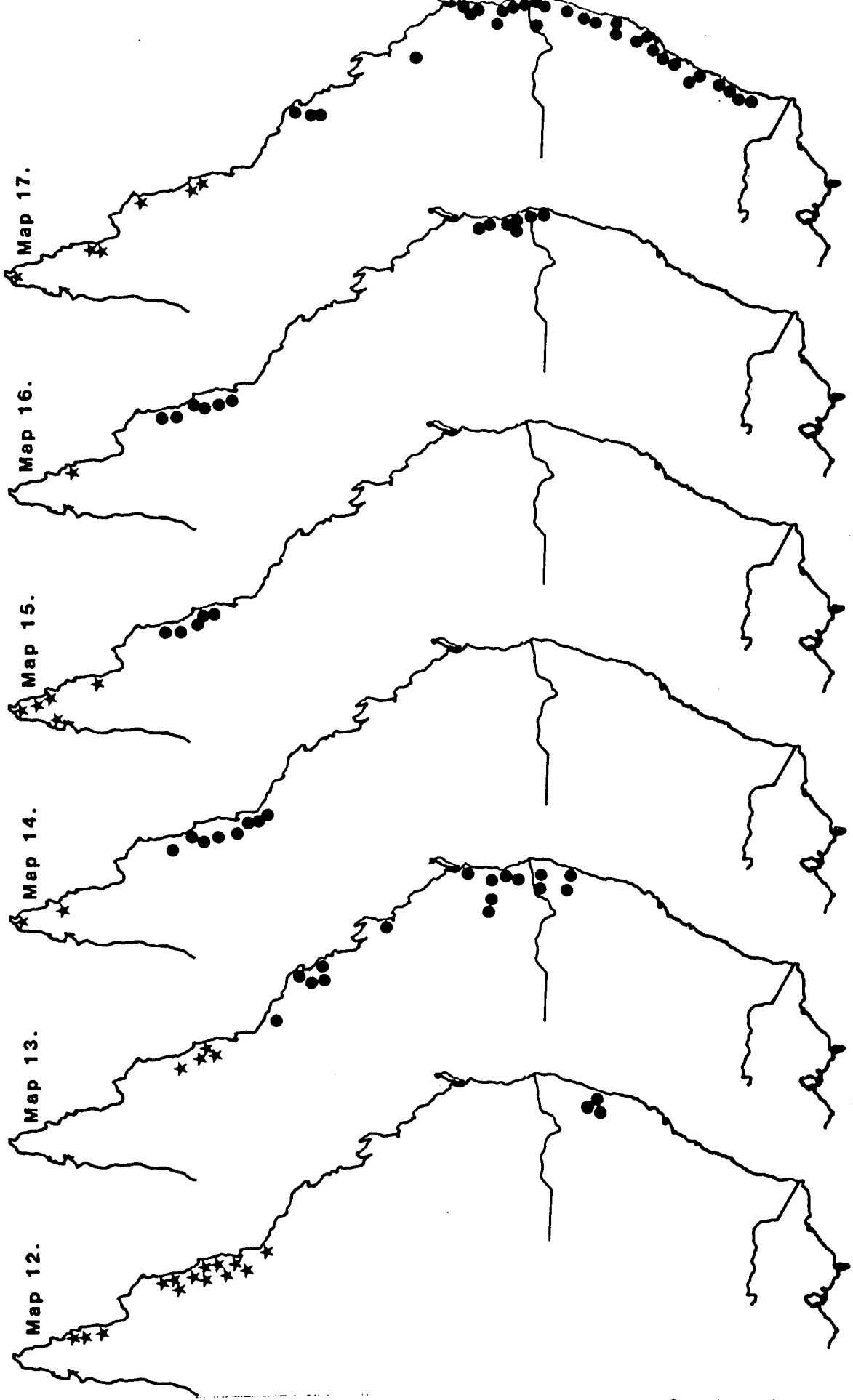


Fig.90. Map 12. ★ Cryptocarya mackinnoniana; ● C. dorrigoensis. Map 13. ★ C. melanocarpa; ● C. bidwillii. Map 14. ★ C. bamagana; ● C. saccharata. Map 15. ★ C. brassii; ● C. bellendenkerana. Map 16. ★ C. glaucocarpa; ● C. laevigata. Map 17. ● C. glaucescens; ★ C. rhodosperma.

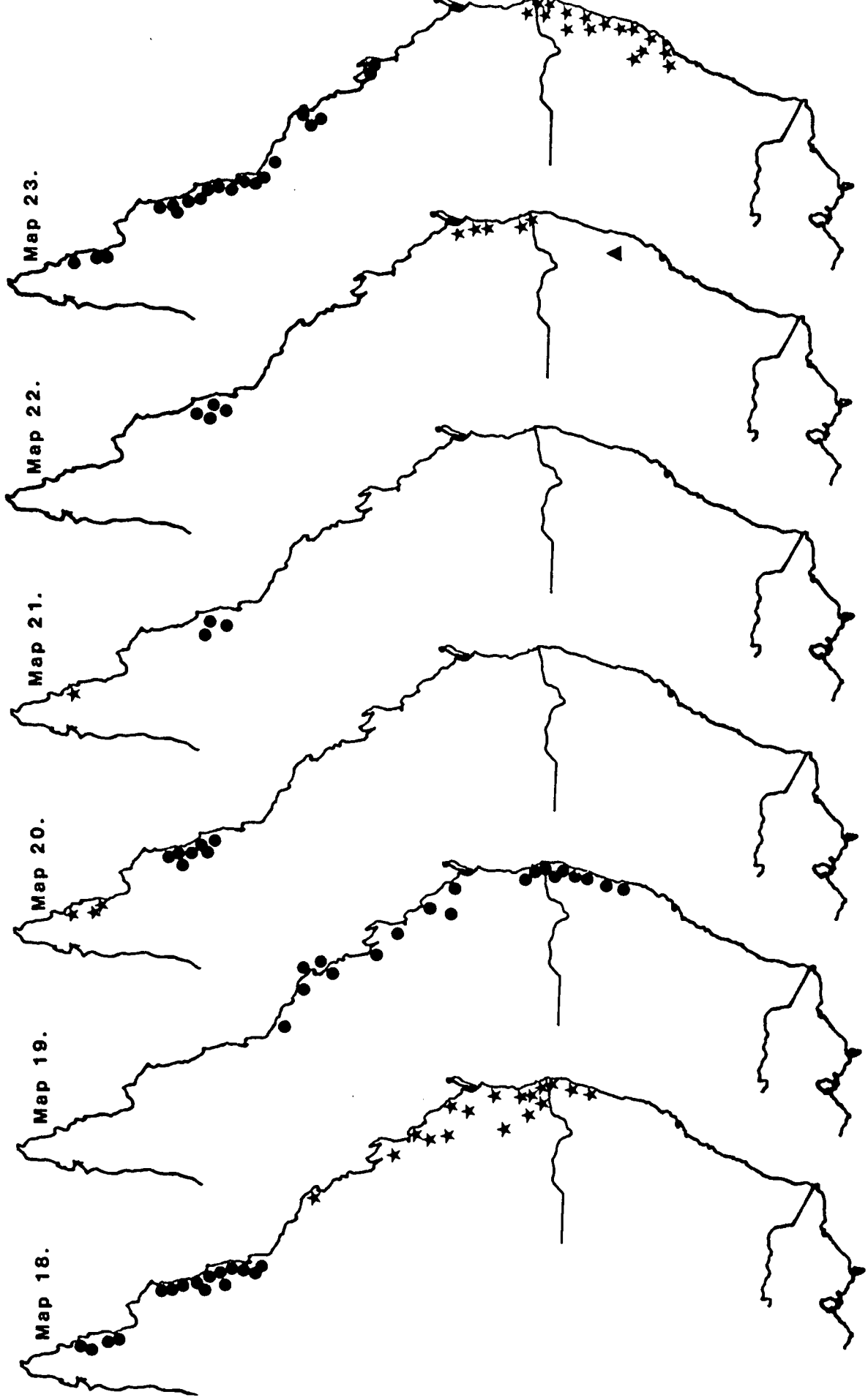


Fig.91. Map 18. ● Cryptocarya triplinervis var. riparia; ★C. triplinervis var. pubens. Map 19. ● C. triplinervis var. triplinervis. Map 20. ● C. clarksoniana; ★ C. claudiana. Map 21. ★ C. burckiana; ● C. cocosoides. Map 22. ● C. smaragdina; ★ C. sclerophylla; ▲ C. williwilliana. Map 23. ● C. vulgaris; ★ C. rigida.

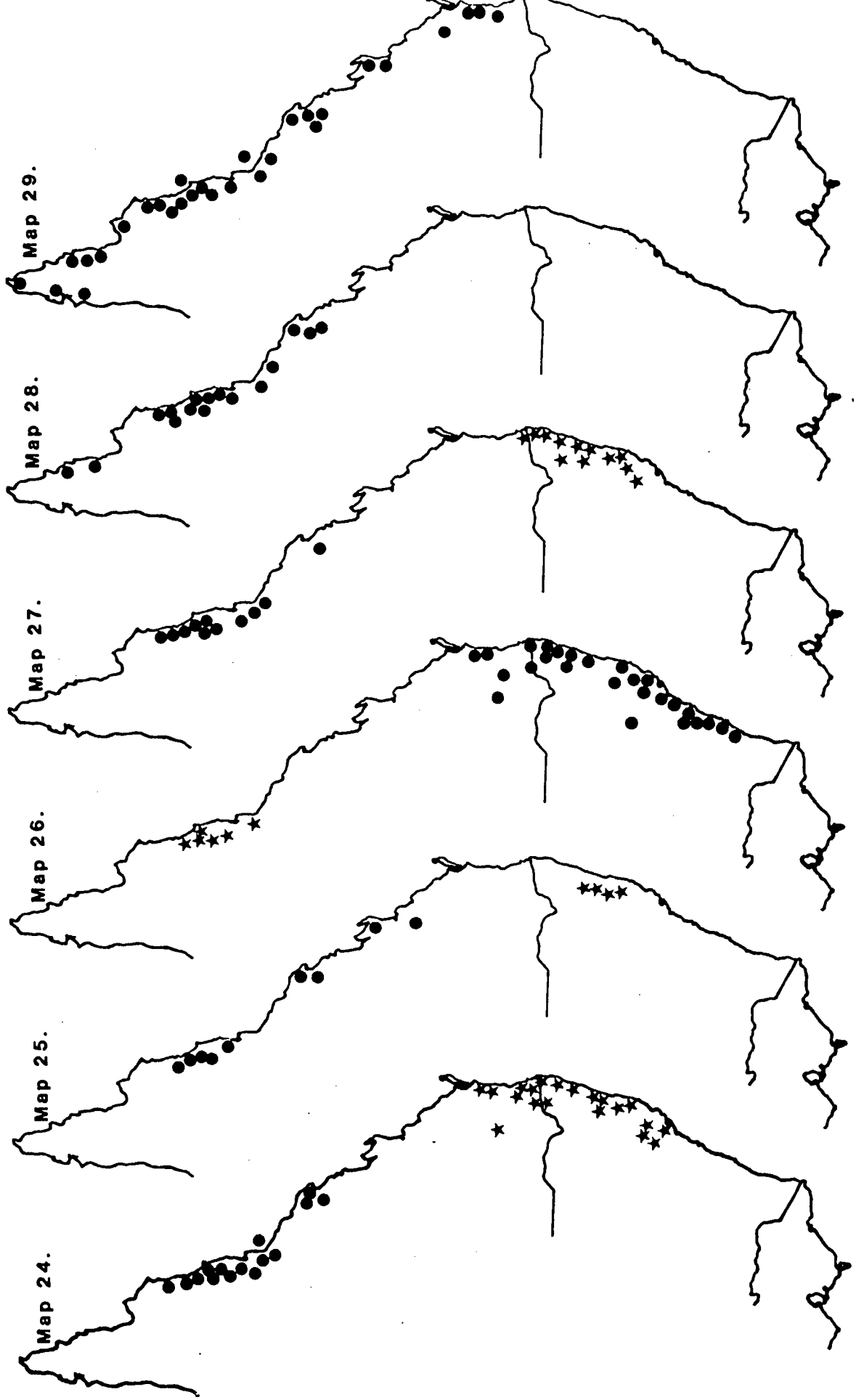


Fig.92. Map 24. ★Cryptocarya obovata; ●C. murrayi. Map25. ●C. onoprienkoana; ★C. nova-anglica. Map26. ★C. leucophylla; ●C. microneura. Map 27. ★C. meissneriana; ●C. angulata. Map 28. ●C. grandis. Map 29. ●C. hypospodia.

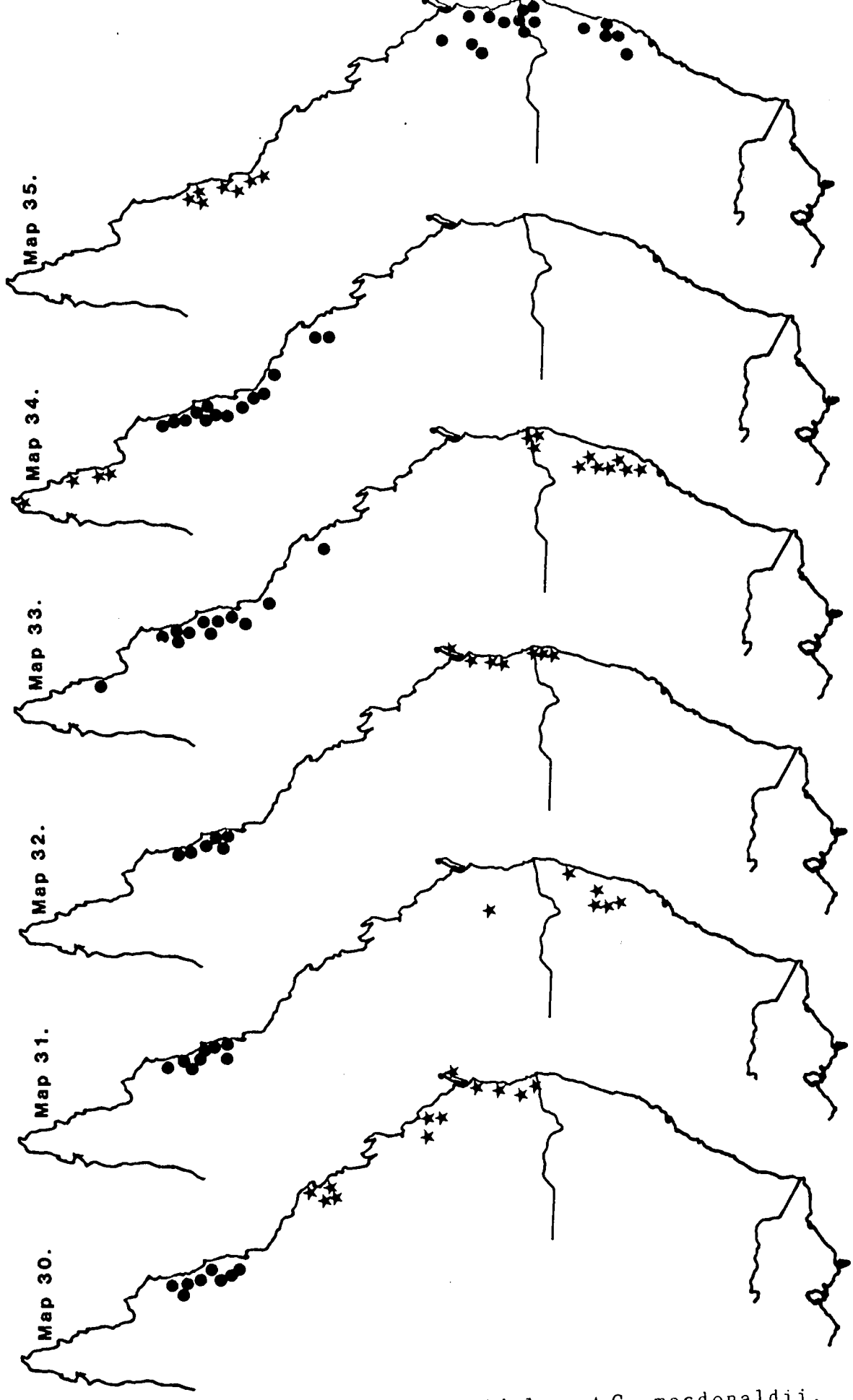


Fig.93. Map 30. ● Cryptocarya lividula; ★C. macdonaldii. Map 31. ●C. oblata; ★C. floydii. Map 32. ★C. foetida; ●C. densiflora. Map 33. ★C. foveolata; ●C. pleurosperma. Map 34. ★C. endiandraefolia; ●C. corrugata. Map 35. ★C. putida; ●C. erythroxylon.

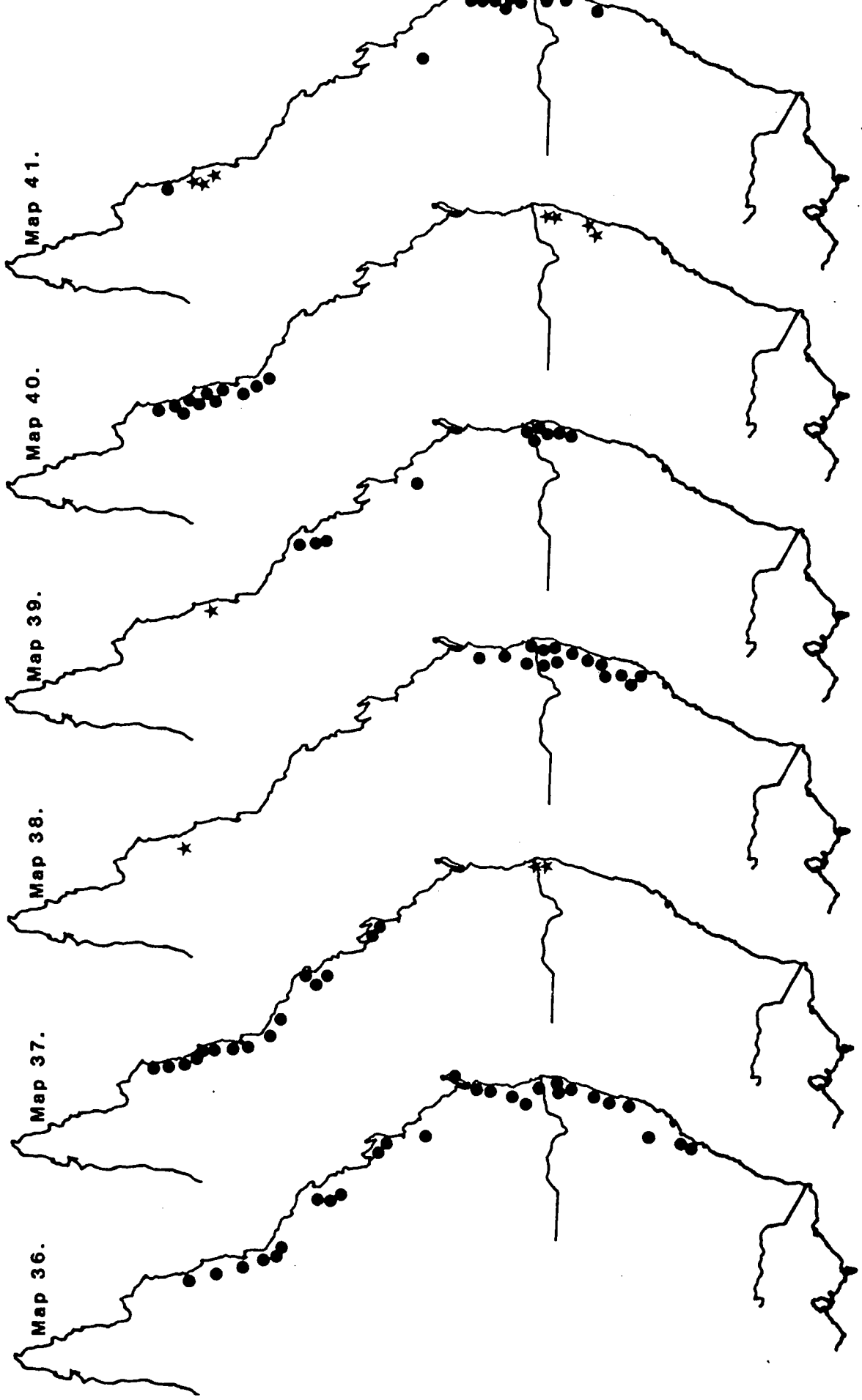


Fig.94. Map 36. ●Endiandra discolor. Map 37. ★E. hayesii; ● E. hypotephra. Map 38. ●E. muelleri ssp. muelleri; ★E. cooperana. Map 39. ★E. anthropophagorum; ● E. muelleri ssp. bracteata. Map 40. ★ E. introrsa; ● E. monothyra ssp. monothyra. Map 41. ● E. pubens; ★E. monothyra ssp. trichophylla.

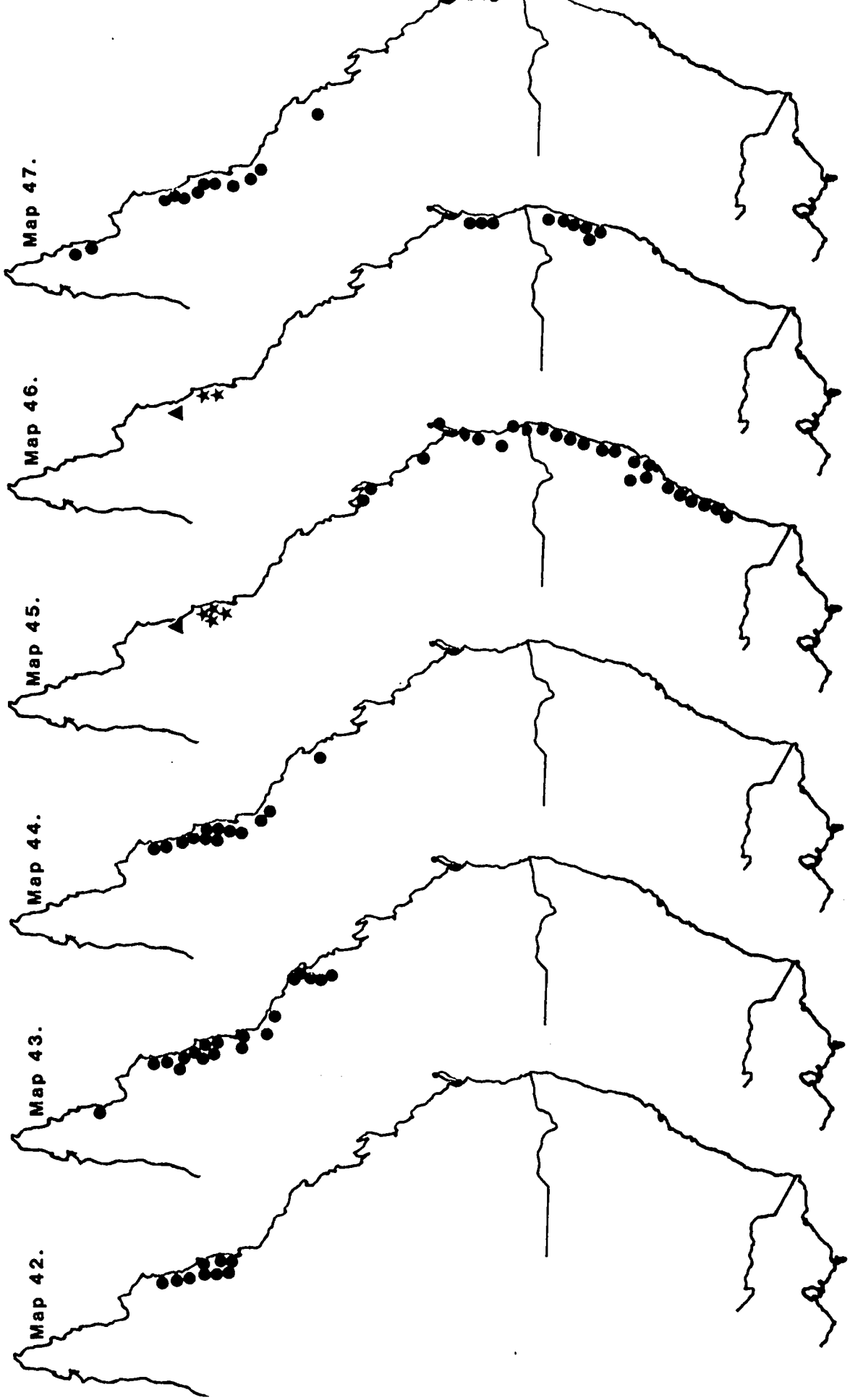


Fig.95. Map 42. ● Endiandra sankeyana. Map 43. ● E. cowleyana. Map 44. ● E. wolfei. Map 45. ▲ E. microneura; ★ E. dichrophylla; ● E. sieberi. Map 46. ★ E. bellendenkerana; ● E. virens; ▲ E. jonesii. Map 47. ● E. dielsiana.

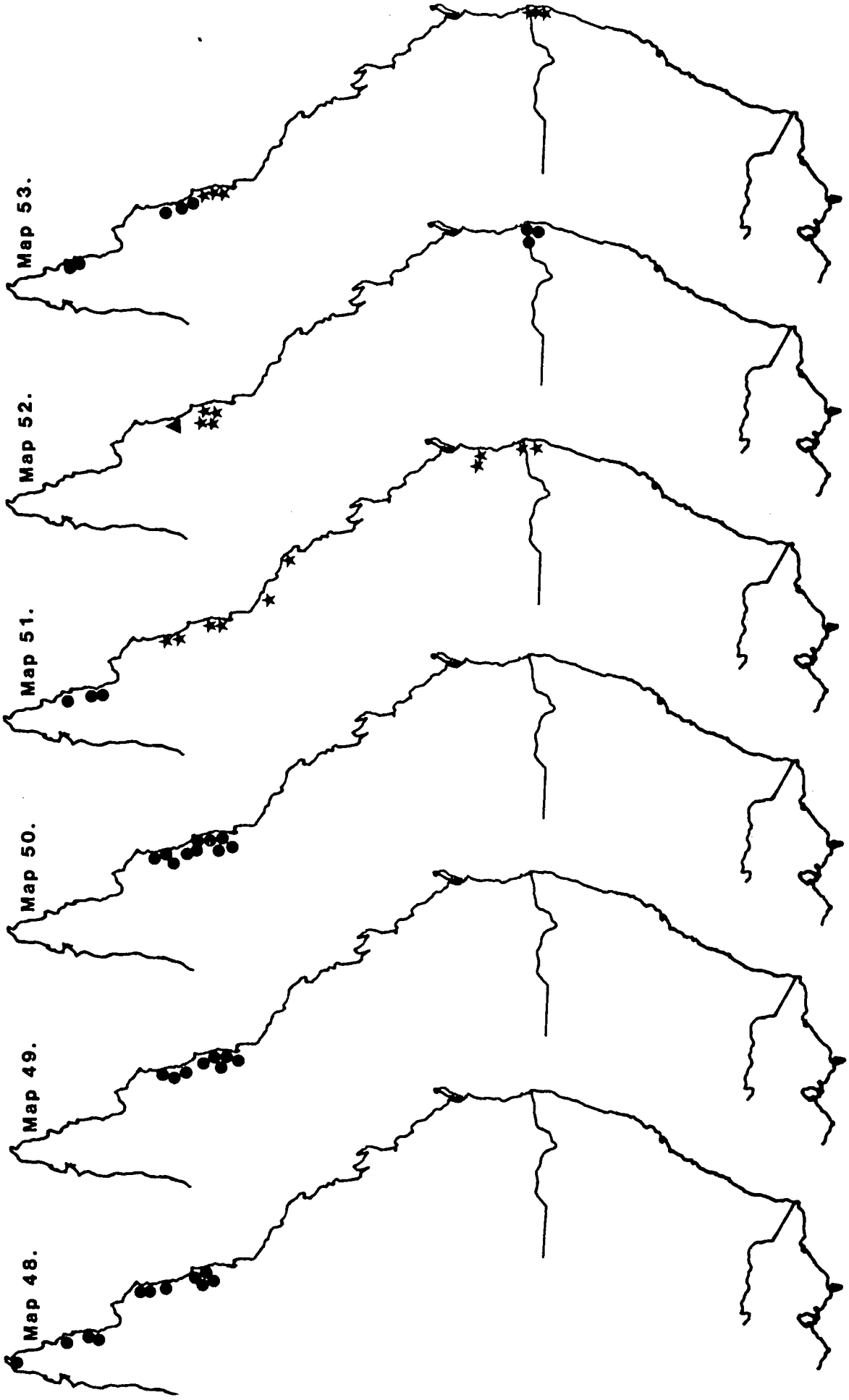


Fig.96. Map 48. ● Endiandra longipedicellata. Map 49. ● E. montana. Map 50. ● E. acuminata. Map 51. ● E. collinsii; ★ E. compressa. Map 52. ▲ E. grayi; ★ E. sideroxylon; ● E. floydii. Map 53. ★ E. globosa; ● E. impressicosta.

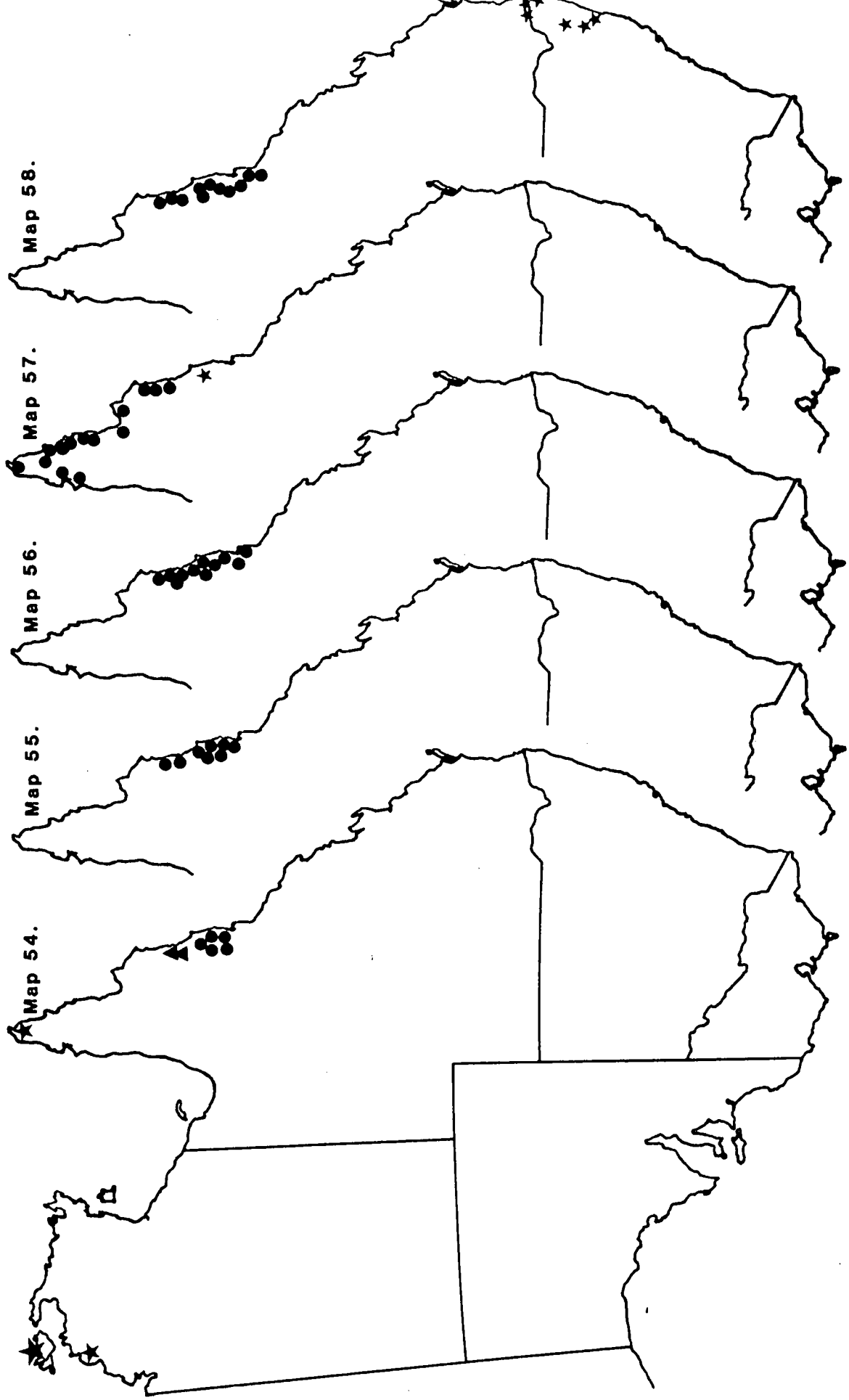


Fig.97. Map 54. ★ Endiandra limnophila; ▲ E. phaeocarpa; ● E. palmerstonii. Map 55. ● E. insignis. Map 56. ● E. leptodendron. Map 57. ★ E. xanthocarpa; ● E. glauca. Map 58. ★ E. crassiflora; ● E. bessaphila.

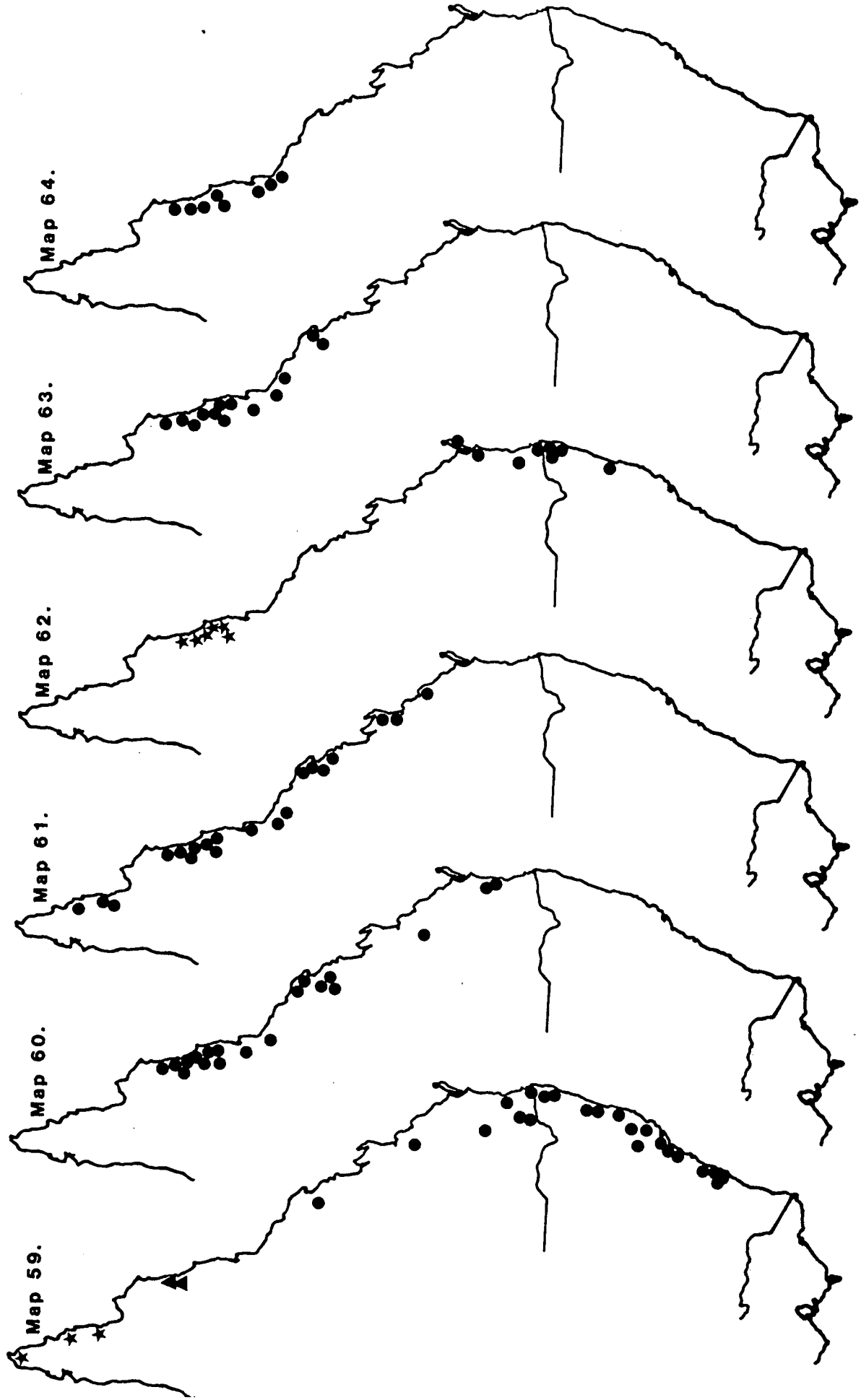


Fig.98. Map 59. ★ Litsea macrophylla; ▲ L. granitica; ● L. reticulata. Map 60. ● L. leefeana. Map 61. ● L. fawcettiana. Map 62. ● L. australis; ★ L. bennettii. Map 63. ● L. bindoniana. Map 64. ● L. connorsii.

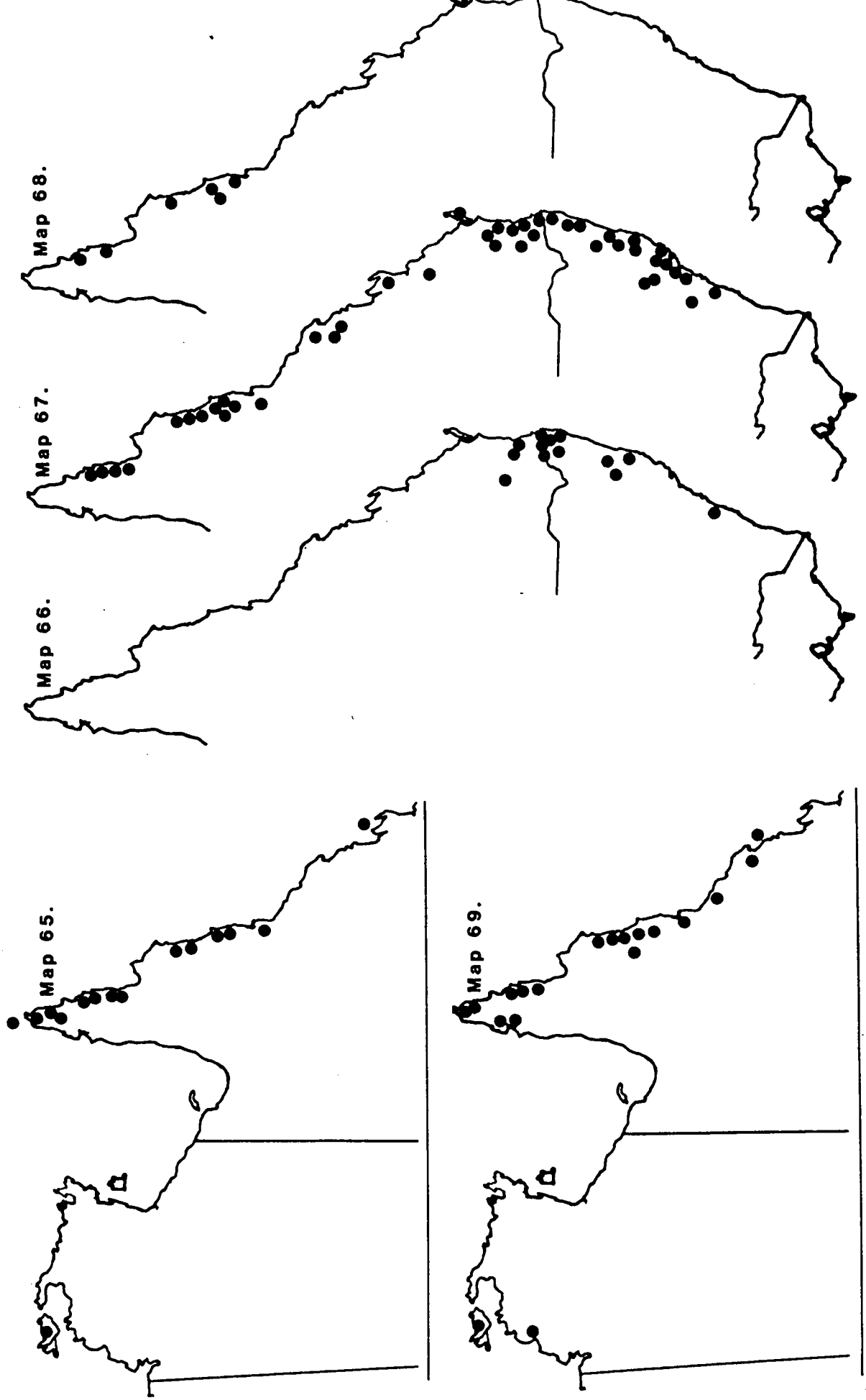
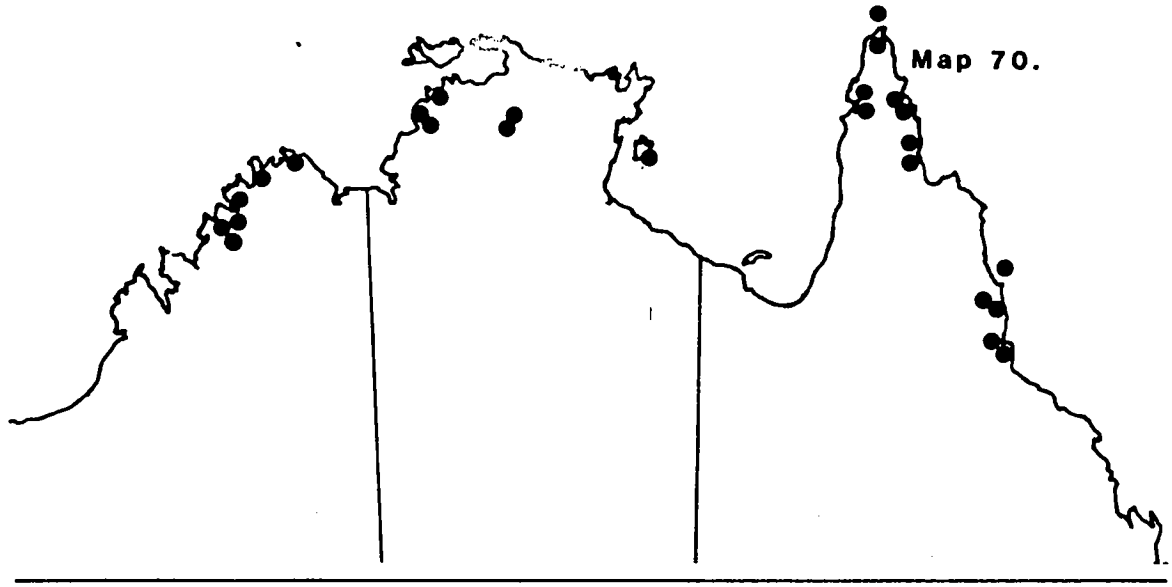
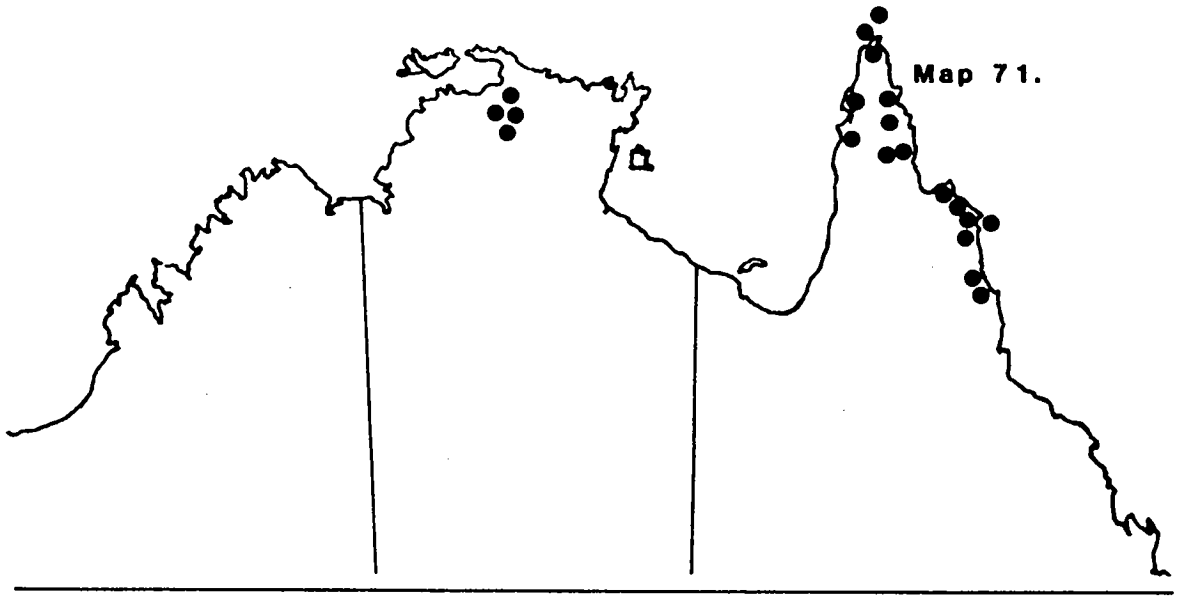


Fig.99. Map 65. ● Litsea breviumbellata. Map 66. ● Neolitsea australiensis. Map 67. ● N. dealbata. Map 68. ● Lindera queenslandica. Map 69. ● Neolitsea brassii.





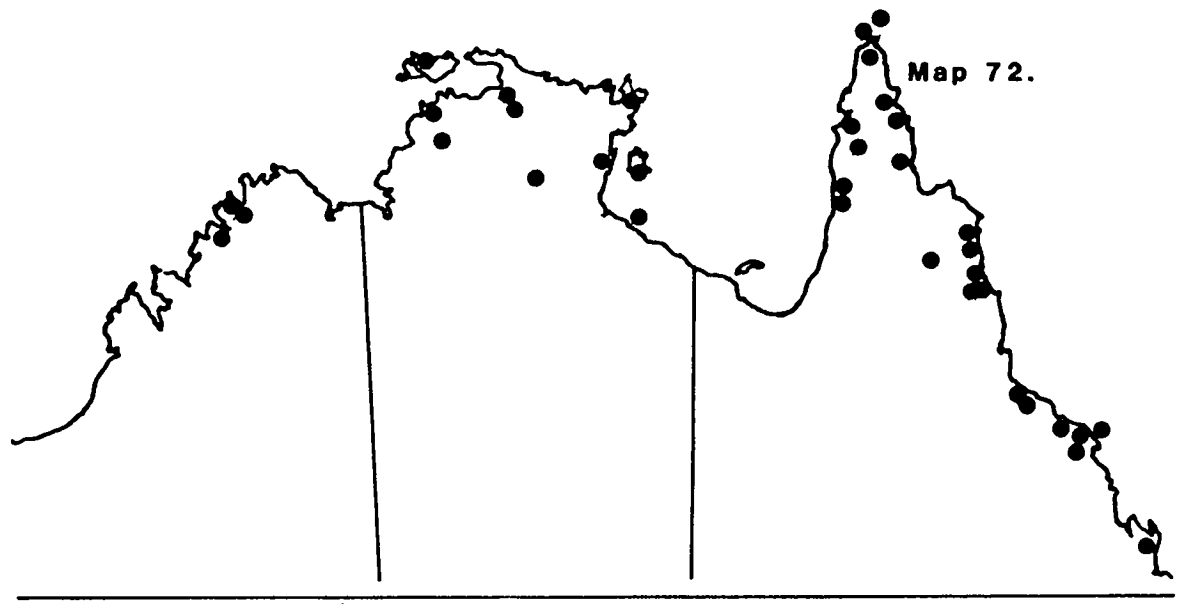


Fig.100. Map 70. ● Cryptocarya cunninghamii. Map 71. ● C. exfoliata. Map 72. ● Litsea glutinosa.

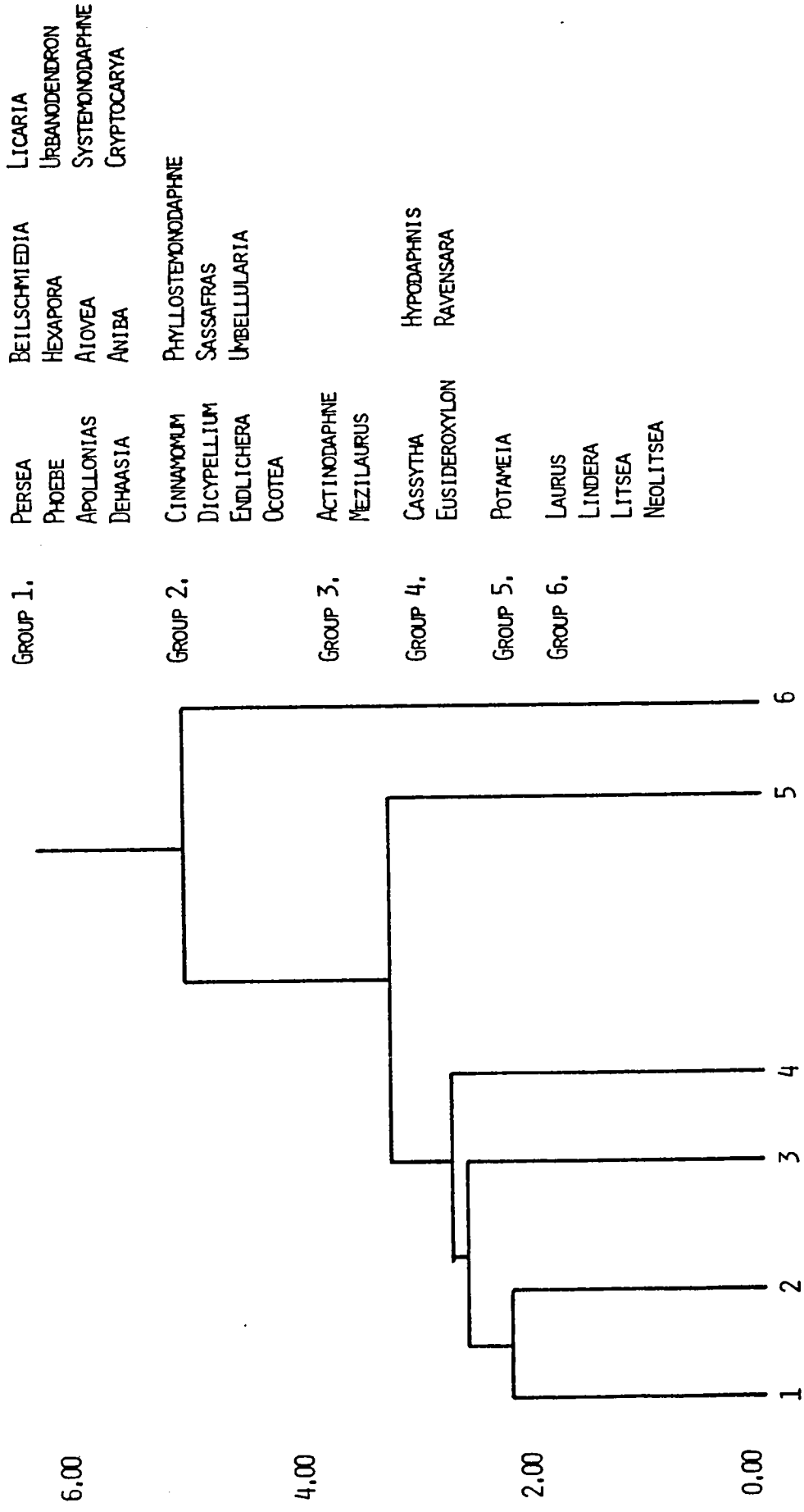


FIG. 101. DENDROGRAM OF THE RESULTS OF TAXON ANALYSIS OF THE GENERA OF LAURACEAE.

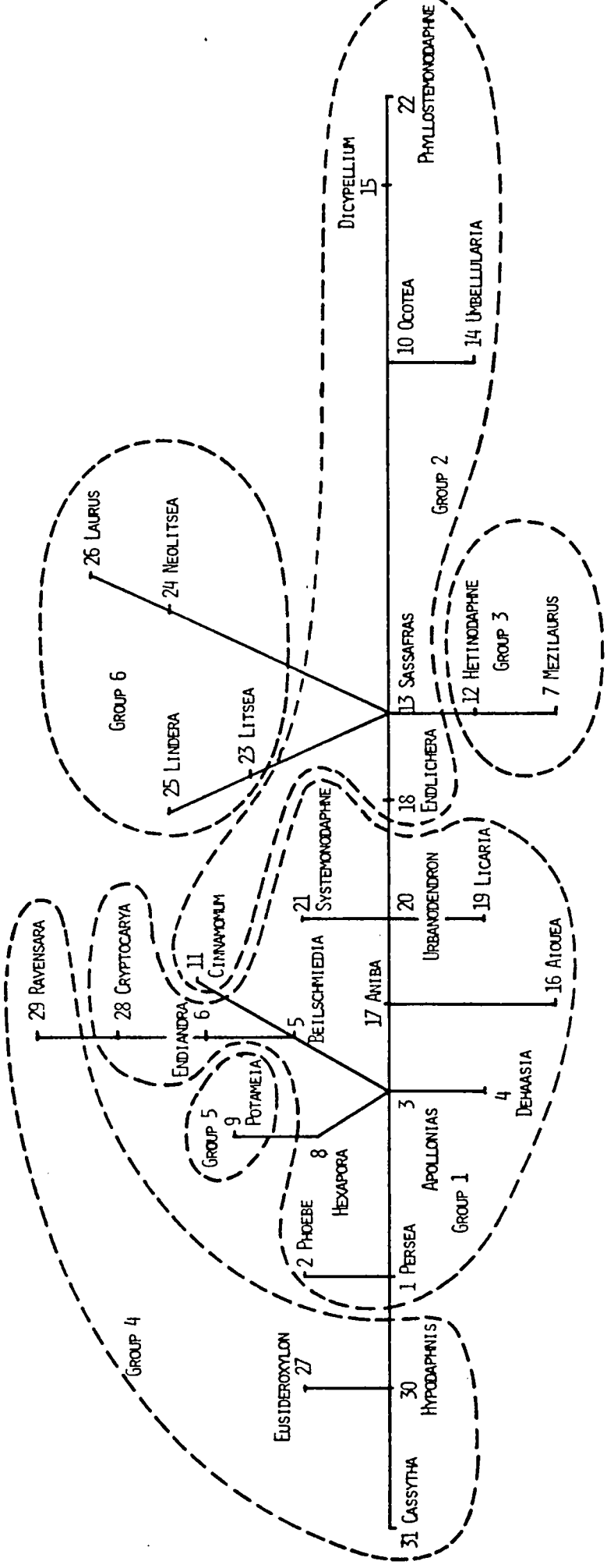


FIG. 102. MINIMUM SPANNING TREE OF THE RESULTS OF TAXON ANALYSIS OF THE GENERA OF LAURACEAE.

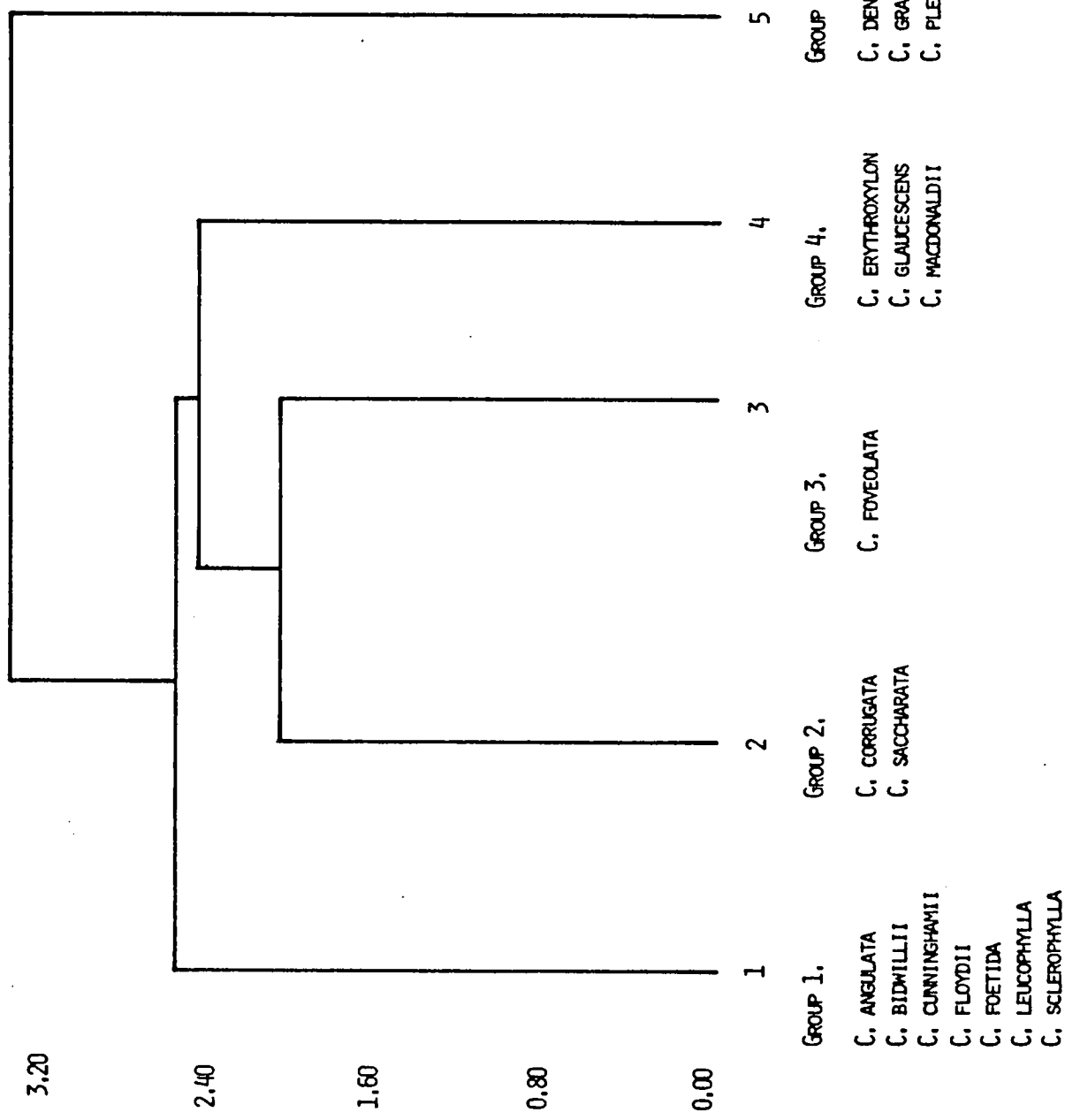


FIG. 103. DENDROGRAM OF THE RESULTS OF TAXON ANALYSIS OF 16 SPECIES OF CRYPTOCARYA.

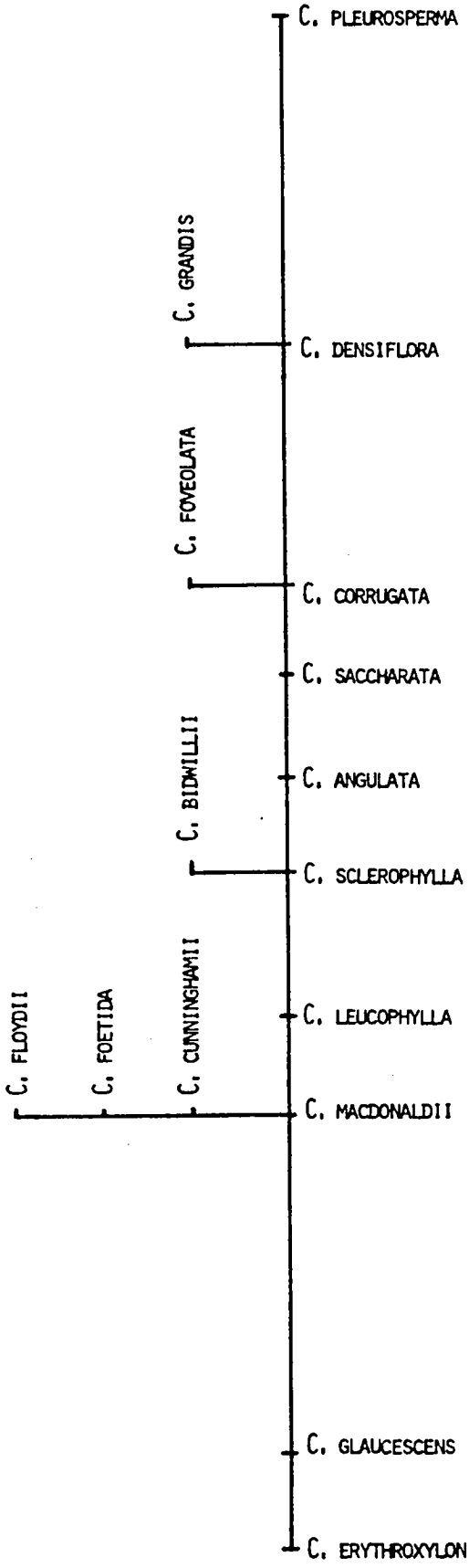


FIG. 104. MINIMUM SPANNING TREE OF THE RESULTS OF TAXON ANALYSIS OF 16 SPECIES OF CRYPTOCARYA.

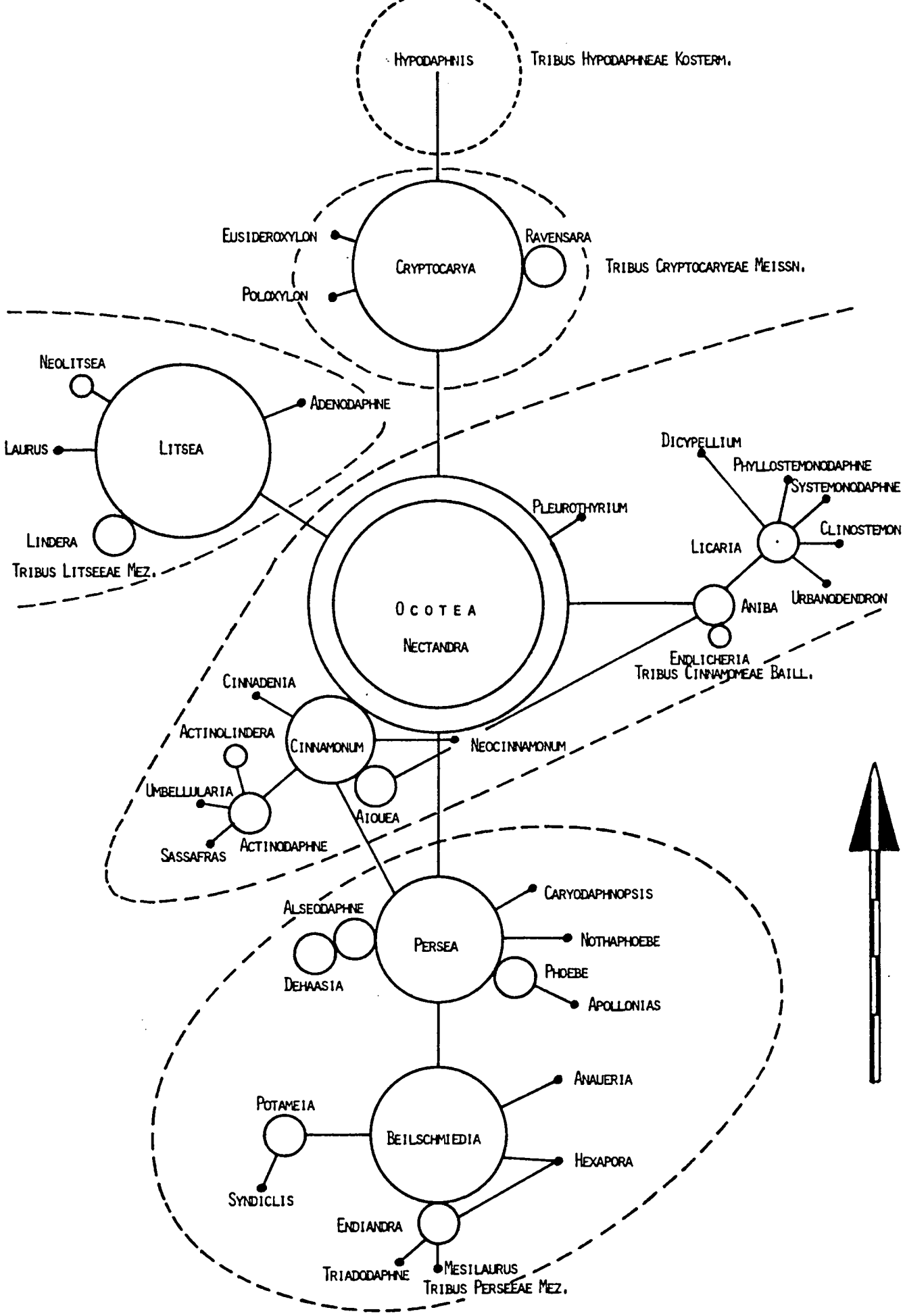


FIG. 105. THE GENERA OF LAURACEAE AND THEIR RELATIONSHIPS. AFTER KOSTERMANS (1986). ARROW SHOWS THE SUPPOSED DIRECTION OF EVOLUTION.

APPENDIX 1 A Classification of the Family Lauraceae
(Based on Kostermans 1957)

1 a. Arborescent. Leaves normal.
2 a. Inflorescences paniculate. Flower-umbels without involucre. Fruit without a cupule.

3 a. Anthers 4-locular.
- Persea
- Phoebe

3 b. Anthers 2-locular.
- Apollonias
- Dehaasia
- Beilschmiedia
- Endiandra
- Mezilaurus
- Hexapora
- Potameia

2 b. Inflorescences paniculate. Flower-umbels without involucre. Fruit-base embedded in a cupule.

4 a. Anthers 4-locular.
- Ocotea
- Cinnamomum
- Actinodaphne
- Sassafras
- Umbellularia
- Dicypellium

4 b. Anthers 2-locular.
- Aiouea
- Aniba
- Endlicheria
- Licaria
- Urbanodendron
- Systemonodaphne
- Phyllostemonodaphne

2 c. Flower-umbels surrounded by an involucre of decussate, large, persistent bracts. Fruits more or less embedded in a cupule.

5 a. Anthers 4-locular.
- Litsea
- Neolitsea

5 b. Anthers 2-locular.
- Lindera
- Laurus

2 d. Inflorescence paniculate. Flower-umbels without involucre. Ovary superior. Fruit completely included in the accrescent flower tube.

6 a. Anthers 4-locular.
- Eusideroxylon

6 b. Anthers 2-locular.
- Cryptocarya
- Ravensara

2 e. Inflorscences paniculate. Flower-umbels without involucre. Ovary inferior. Hypodaphnis

1 b. Parasitical climbers without proper leaves. Cassytha

APPENDIX 2 Features Used for Morphometric Analysis of the Genera of Lauraceae.

1. Parasitic
2. Not parasitic

---

3. Leaves alternate (spirally arranged)
4. Leaves opposite
5. Leaves whorled or pseudowhorled

---

6. Inflorescence, spicate, racemose or paniculate
7. Inflorescence umbellate

---

8. Flowers bisexual
9. Flowers unisexual

---

10. Tepals 0
11. Tepals 4
12. Tepals 6
13. Tepals 9

---

14. Anthers 3
15. Anthers 4
16. Anthers 6
17. Anthers 9
18. Anthers 12 or more

---

19. Anthers 4-locular
20. Anthers 2-locular
21. Anthers 1-locular

---

22. Fruits superior
23. Fruits inferior

---

24. Base of fruit enclosed in a cupule
25. Base of fruit not enclosed in a cupule

---

26. Cotyledons ruminate
27. Cotyledons uniform

APPENDIX 3 Genera of Lauraceae Subjected to Morphometric Analysis

Actinodaphne
Aiouea
Aniba
Apollonias
Beilschmiedia
Cassytha
Cinnamomum
Cryptocarya
Dehaasia
Dicypellium
Endiandra
Endlicheria
Eusideroxylon
Hexapora
Hypodaphnis
Laurus
Licaria
Lindera
Litsea
Mezilaurus
Neolitsea
Ocotea
Persea
Phoebe
Phyllostemonodaphne
Potameia
Ravensara
Sassafras
Systemonodaphne
Umbellularia
Urbanodendron

APPENDIX 4 Cryptocarya Species Subjected to Morphometric Analysis

C. angulata
C. bidwillii
C. corrugata
C. cunninghamii
C. densiflora
C. erythroxylon
C. floydii
C. foetida
C. foveolata
C. glaucescens
C. grandis
C. leucophylla
C. macdonaldii
C. pleurosperma
C. saccharata
C. sclerophylla

APPENDIX 5 Features Used for Morphometric Analysis of Cryptocarya spp.

Bark type.
Outer blaze colour.
Sapwood surface.
Twig cross section and indumentum.
Leaf length, width, primary vein number and venation type.
Leaf midrib.
Leaf domatia.
Lamina upper surface and underside.
Petiole length and upper surface.
Inflorescence bracts.
Flower odour.
Tepal length, width and indumentum.
Cotyledons (Ruminate or uniform).
Seedling leaf phyllotaxis and cataphylls.