Notes R.B.G. Edinb. 38(3):517–525 (1980)

THREE NEW SPECIES OF ZINGIBERACEAE FROM AUSTRALIA

R. M. SMITH

ABSTRACT. Three new Zingiberaceae are described from Northern Queensland: *Achasma australasicum*, the first Australian record of the genus, *Amomum queenslandicum* and *Alpinia hylandii*. The affinities of the Queensland Zingiberaceae with those of neighbouring New Guinea are discussed.

The Zingiberaceae is not particularly well represented in Australia: seven genera, with perhaps 20 species are known at present. These genera are *Achasma, Amomum, Alpinia* and *Hornstedtia* (Zingiberoideae/Alpineae), *Curcuma* (Zingiberoideae/Hedychieae), *Costus* and *Tapeinochilus* (Costoideae). The Cape York Peninsula of northern Queensland is of special interest, for it is here, and in the islands of the Torres Strait, that the expected links with the flora of neighbouring New Guinea are most apparent. Of four gingers collected from the Claudie River area of the Peninsula, two, *Curcuma australasica* Hk. f. and *Hornstedtia scottiana* (F. Muell.) K. Schum. (syn. *H. lycostoma* K. Schum.) are also natives of New Guinea.

Two of the three taxa dealt with below also come from the Claudie River: *Achasma australasicum*, the first of the genus to be described from Australia and perhaps close to the Papuan *A. labellosum* (K. Schum.) Val., and *Amomum queenslandicum* which, with its open bracteoles and winged capsules, is quite distinct from the only other known Australian *Amomum, A. dallachyi* F. Muell. The third new species is *Alpinia hylandii*, closely related to the Queensland *A. modesta* [F. Muell. ex] K. Schum., and these two, together with *A. coerulea* (R. Br.) Benth. and *A. arundelliana* (Bailey) K. Schum. (*A. coerulea* v. *arundelliana*), belong to sect. *Allughas* and form a closely related group. *Alpinia* is the best represented of Australian Zingiberaceae and two other species have been described; they are *A. racemigera* F. Muell. which belongs to sect. *Pleuranthodium*, the other members of which are known from New Guinea only, and the sectionally problematic *A. arctiflora* F. Muell.

Publication of these new species is the result of study of material sent to Edinburgh by Mr B. P. M. Hyland of CSIRO, Atherton, Queensland. These excellent collections, which include the spirit material so essential for the elucidation of the family will, it is hoped, form the basis of a future revision of the Zingiberaceae in Australia.

Achasma australasicum R. M. Smith, **species nova** *A. labelloso* (K. Schum.) Val. similis inflorescentia paucifora labello concolori et calyce corollae tubum longitudine excendente; sed ligula marginibus ciliatis, bracteis pubescentibus et labello integro differt. **Fig. 1.**

Herba rhizomatosa ad 3 m alta. *Folia* subsessilia vel breviter (ad 2 cm) petiolata; lamina 40–60 × (4–)6–12 cm, lanceolata, ad basin attenuata, apice acuminato, plus minusve glabra marginibus hic inde pubescentibus

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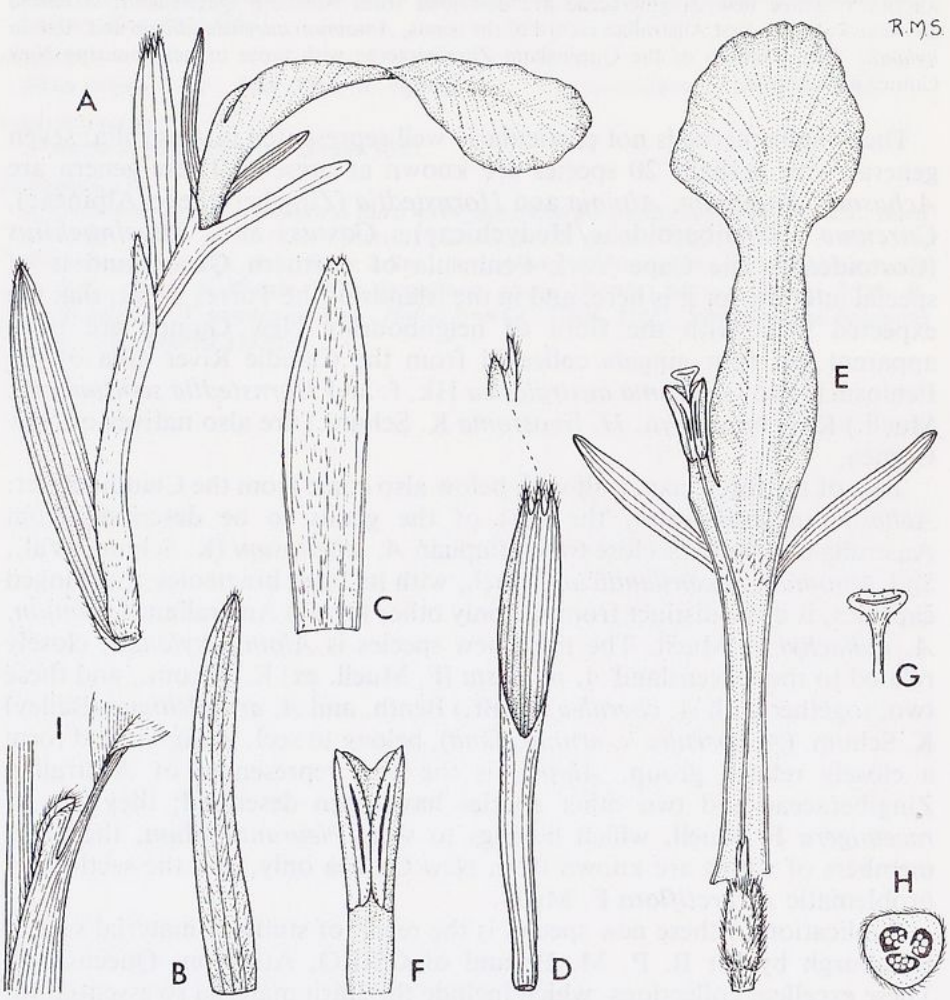

FIG. 1. *Achasma australasica* R. M. Smith. A, flower with bract & bracteole × 1; B, bract × 1; C, tubular bracteole, dissected × 1; D, calyx × 1; E, corolla, dissected × 1; F, anther × 2; G, stigma × 2; H, ovary in T.S. × 2; I, ligule × ⅔ (from *Hyland* 9742, spirit material).

exceptis; ligula ad 2 cm, tenax, dense ciliato-marginata; vaginae glabrae. *Inflorescentiae* ad 8 × 2·5 cm, 4–6-florae, e rhizomate repente inter se 1–3 cm distantes orientes, apicibus florum exceptis subterraneae; bracteae steriles (involucrales) ad 5 × 2·5 cm, lanceolatae vel ovatae, apiculatae, leviter pubescentes; bracteae fertiles 4–6 × 0·5–1 cm, anguste lanceolatae, pubescentes; flores singuli per bracteam, brevissime pedicellati, plerumque singulatim aperti; bracteolae usque ad 5 cm longae, tubulares, unilateraliter fissae, pubescentes. *Calyx*, ovario incluso, ad 8 cm longus, unilateraliter fissus, breviter tridentatus, dentibus sub apice calcaratis, in fauce leviter pubescens. *Corollae* tubis ab c. 1 cm calyce brevior, in fauce leviter pubescens; petala anguste lanceolata, 2–2·5 cm longa, subaequalia. *Labellum* rubrum, supra petalorum insertionem cum parte filamenti inferiore in tubum 0·8–1 cm longum connatum, parte libera 5–6 cm longa basi lobis lateralibus rotundatis circum stamen amplectentibus praedita, lamina 1 cm lata in partem apicalem integram 2 × 1·5 cm; staminodia lateralia absentia. Filamentum parte libera 0·2–0·3 cm longa; anthera 1–1·3 cm ad filamentum plus minusve transversali, thecis ad basin leviter convergentibus, connectivo profunde emarginato. *Stylus* parce pubescens; stigma rubrum, prominens, usque ad 0·4 cm latum; glandulae epigynae ad 0·5 cm longae, inter se liberae; ovarium 1–1·3 cm, dense pubescens, triloculare (interdum imperfecte) multiovulatum; placentatio axilis. *Fructus* ignotus.

Herb of up to 3 m, plane of distichy of leaf shoots transverse to the rhizome, leaves subsessile or shortly petiolate, more or less glabrous, ligule entire, margins densely ciliate. Inflorescence almost entirely subterranean, arising directly on the creeping rhizome, few-flowered and surrounded by a few lanceolate or ovate sterile bracts; fertile bracts narrowly lanceolate, pubescent, each subtending a single red flower; bracteoles tubular, pubescent, calyx shortly 3-dentate, pubescent; corolla tube shorter than the calyx, petals narrowly lanceolate, subequal; base of labellum connate with the lower part of the filament into a distinct tube, blade of labellum with rounded lateral lobes and an elongated entire central part; filament short, much exceeded by the emarginate anther which is held at right angles to the filament; stigma prominent; ovary usually perfectly trilocular, axile, with many ovules.

The crushed stems and leaf bases have a somewhat peach-like smell.

Type. Queensland, Cape York Peninsula, Claudie River, 12°45′ S, 143°25′ E, 30 m, rain forest, 22 x 1973, *Irvine* 700 (holo. QRS).

QUEENSLAND. *Ibidem*, 18 x 1974, *Irvine* 1014 (QRS, E); *ibidem*, 12°45′ S, 143°15′ E, 80 m, to 3 m tall, 3 vii 1972, *Dockrill* 462 (QRS, E); *ibidem*, 12°44′ S, 143°15′ E, 60 m, 21 vii 1978, *Hyland* 9742 (QRS); McIlwraith Range, Leo Ck. rd, T.R. 14, 13°45′ S, 143°20′ E, 450 m, rain forest, 23 ix 1975, *Hyland* 8437 (QRS); Q.R.S. Atherton, in cultivation, planting no. 31 from *Dockrill* 462, 22 xi 1974, *Dockrill* 892 (QRS, E).

Achasma australasicum has been found at two stations in the Cape York Peninsula and is also in cultivation at Atherton. *Achasma* is a wide-spread genus with a distribution ranging from the tropical Himalayas through Thailand and Malesia to Papua New Guinea; its discovery in Queensland is, therefore, not unexpected. It is readily recognised by the elongated blade of the labellum and belongs to that small group of radically flowered

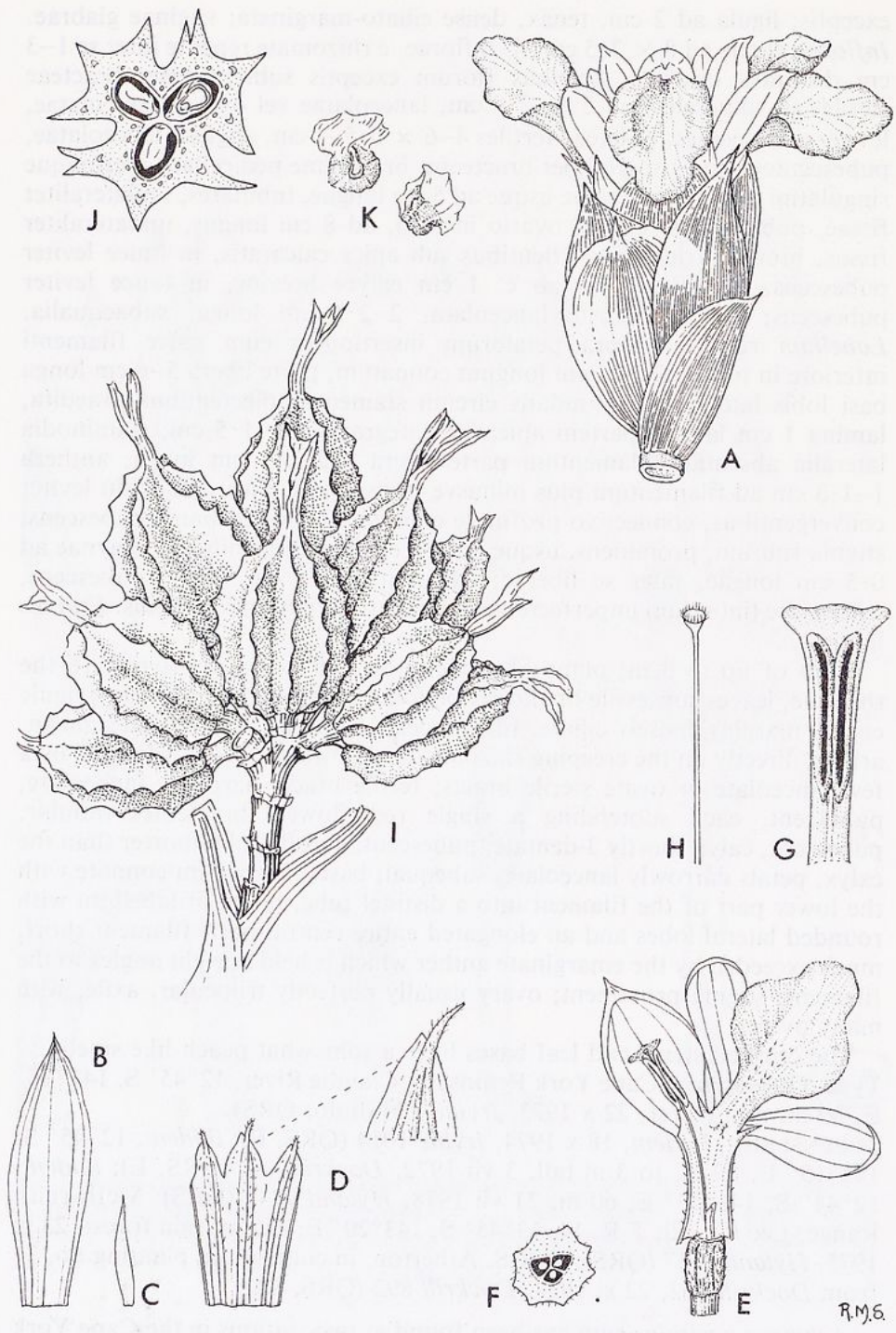

FIG. 2. *Amomum queenslandicum* R. M. Smith. A, inflorescence × 1; B, bract × 1; C, bracteole ×1; D, calyx × 1; E, corolla, dissected × 1; F, ovary in T.S. × 2; G, anther & filament × 2; H, stigma & upper part of style × 2; I, infructescence × ⅔; J, fruit in T.S. × 2; K, seeds × 3 (A, I, J, K from *Dockrill* 893; B, C, D, E, F, G, H from *Hyland* 6671, all from spirit material).

Zingiberoideae/Alpineae in which the basal parts of the filament and labellum are joined to form a conspicuous tube above the insertion of the petals. Such a condition also occurs in *Nicolaia* and *Geanthus*. About 20 *Achasma* species are known, they appear to show two distinct flower types: those in which the calyx is more or less equal to the narrow petals in length, and those with a much shorter calyx and broad petals which are hooded over the base of the labellum. *A. australasicum* belongs to the former group as does the apparently closely related *A. labellosum* (K. Schum.) Val. from northern Papua New Guinea (Type: *Hollrung* 266 n.v.). Valeton knew *A. labellosum* from literature only and for this reason attached an interrogation mark to his generic transfer. However, Schumann's description depicts the typical *Achasma* labellum quite well. The species also agrees with *A. australasicum* in the few-flowered inflorescences and concolorous flowers, but the Queensland plant is distinguished by the ciliate ligule, pubescent inflorescence and entire, rather than bilobed, labellum.

Amomum queenslandicum R. M. Smith, **species nova** *A. maximo* ob folia petiolata subtus pubescentia et capsulas 9-alatas similis, sed bracteolis adsentibus, labello trilobo unguiculato, ovario parce pubescente differt. **Fig. 2.**

Herba rhizomatosa ad 3 m alta. *Folia* petiolis 3–7 cm longis; lamina 40–60 × 7–12 cm, lanceolata, breviter caudata, basi distincte inaequilateralis, subtus molliter pubescens; ligula 1·5–2·3 cm, membranacea, acute biloba; vaginae glabrae. *Inflorescentia* c. 5 × 3 cm, arcte congesta, multiflora, e basi surculi foliati admodum supra terram oriens; pedunculus fortassee 3–4 cm bracteis glabris 4 × 2 cm ovatis apiculatis indutus; bracteae fertiles ad 4 × 1 cm, apice obtuso vel acuto, flores singulos subtendentes; flores pro maxima parte albi, breviter pedicellati; bracteolae ad 3 × 0·5 cm, plerumque minores (interdum absentes). *Calyx* ovario incluso 2·5–3 cm, parce pubescens, distincte 3-lobus, lobis sub apice calcaratis. *Corollae* tubus c. 1·5 cm longus, in fauce pubescens; lobi 2 cm longi, dorsalis 1 cm latis cucullatis, laterales angustiores et apice rotundatis. *Labellum* album, medio ad basin ochroleucum, unguiculatum; lamina triloba 1·5–1 cm trans lati simam partem; staminodia lateralia ad 0·5 cm plerumque subalata interdum spatulata. *Anthera* subsessilis, filamento 0·3 cm, thecis 1 cm plus minusve parallelis; crista 0·2 × 0·7 cm obscure triloba. *Stylus* linearis; stigma ciliato-marginatum; glandulae epigynae 0·3 cm, inter se liberae, ovarium 0·5 × 0·4 cm costatum, parce pubescens, triloculare placentatione axili, multiovulatum. *Capsula* carnosa, 3–4 × 1·5–2 cm, plus minusve ampulliformis, alis primariis novem, alis alliis interdum bifurcis.

Herb of up to 3 m high, plane of distichy of leaf-shoots transverse to the rhizome, leaves long petiolate, lanceolate, softly pubescent and velvety to the touch below, shortly caudate apically, markedly unequal at the base, ligule acutely bilobed. Inflorescence tightly congested, borne on a short peduncle at the base of a leaf shoot, peduncle bracts ovate, those of the inflorescence much narrower, each subtending a single white flower and (usually) a small non-tubular bracteole; calyx 3-lobed, exceeding the corolla tube, dorsal corolla lobe shortly cucullate, wider than the laterals; labellum unguiculate, 3-lobed, tinged yellow at the base; lateral staminodes very short, subulate or occasionally spathulate; anther subsessile with a


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prominent obscurely 3-lobed crest; ovary sparsely pubescent, ribbed, trilocular with axile placentation and numerous ovules; capsule 9-winged, some wings occasionally bifurcate.

Type. Queensland, Q.R.S., Atherton, in cultivation, planting no. 29 from Claudie River, *Hyland* 6671, stems tufted up to 3 m, flowers white, undersurface of leaves furry to touch, 22 x 1974, *Dockrill* 893 (holo. E; iso. QRS).

QUEENSLAND. *Ibidem*, fruiting specimen, 12 v 1975, *Dockrill* 906 (QRS, E); Cape York Peninsula, Claudie River, 12°45′ S, 143°15′ E, 60 m, gallery rain forest, wild ginger on the edge of road clearing, inflorescence green to cream, 4 i 1973, *Hyland* 6671 (QRS).

Amomum queenslandicum is easily distinguished from the only previously recorded Australian *Amomum, A. dallachyi* F. Muell. which has glabrous, sessile leaves, tubular bracteoles and large echinate, rather than winged, capsules.

Tubular bracteoles occur in the majority of *Amomum* species, but there is a number of species in which the bracteoles are split to the base or, occasionally, entirely absent. Several of these plants produce winged capsules and some are further characterised by the quickly decaying nature of the bracts. The group includes the Himalayan *A. dealbatum* Roxb. and *A. maximum* Roxb., *A. hochreutineri* Val. from Java and the Sri Lankan *A. pterocarpum* Thw. *A. queenslandicum* differs in the more persistent nature of the bracts, but is otherwise closely allied to *A. maximum*, which Valeton (*Bot. Jahrb.* 52:53, 1914) considered also to occur in the Bismarck Archipelago and in NE New Guinea. However, the labellum of *A. maximum* is obovate, lacks a claw and is stained red and yellow, the peduncles are pubescent, and bracteoles said to be entirely lacking; furthermore the indumentum of the lower leaf surface is very much denser and the ligule is entire.

Two *Amomum* species have been described from New Guinea: *A. chauncephalum* K. Schum. and *A. schlechteri* K. Schum. No material has been seen but neither seems closely related to *A. queenslandicum*.

Alpinia hylandii R. M. Smith, **species nova** *A. modesta* ob habitum parvum, ligulam integram, calycem brevem campanulatum et capsulas caeruleas similis, sed folius breviter petiolatis distincte caudatis, inflorescentia breviore magis congesta, corolla carnosiore, staminodiis lateralibus absentibus differt. **Fig. 3.**

Herba rhizomatosa ad 1·5 m. *Folia* breviter petiolata (petiolis 0·3–0·5 cm longis); lamina 10–16 × 2·5–5 cm (saepe ad apicem surculi redacta),

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FIG. 3. A. *Alpinia hylandii* R. M. Smith. a, habit × ½; b, young inflorescence × 1; c, cincinnus × 2; d, base of cincinnus, first bracteole removed to show pedicel of first flower × 2; e, calyx, dissected × 2; f, g, corolla, dissected, gynoecium removed × 2; h, gynoecium × 2; i, stamen × 4; j, ovary in T.S. × 4; k, capsule × 1 (a from *Hyland* 9630, b from *Dockrill* 1089, k from *Dockrill* 904, all dried material; remainder from spirit material of *Dockrill* 904). B. *Alpinia modesta* [F. Muell. ex] K. Schum. a, bract × 2; b, cincinnus × 2; c, corolla, dissected × 2; d, stigma & upper part of style × 4; e, ovary in T.S. × 4 (from dried material of *Hyland* 5599). C. *Alpinia caerulea* R. Br. a, bract × 2; b, old cincinnus × 2; c, calyx, dissected × 2; d, corolla, dissected × 2; e, stigma & upper part of style × 4; f, ovary in T.S. × 4 (a & b from *Dockrill* 890, c–f cult. R.B.G. Kew, all from spirit material).

lanceolata vel anguste elliptica, basi rotundata, apice in cauda 2 cm longa faciliter fracta producta, glabra; nervi laterales robustiores 2–3 tenuioribus separati; ligula ad 0·5 cm truncata, glabra; vaginae plus minusvae glabrae, striatae venis minutis transversalibus additis. *Inflorescentia* ad 3 cm longa, in surculo foliato terminalis, glabra, primo bracteis duobus 3 cm longis membranaceis longe caudatis obtecta; bracteae fertiles 1·5–2 cm longae (ad apicem inflorescentiae minores), anguste triangulares, acuminatae, cincinnos bifloros subtendentes; flores breviter pedicellati; bracteolae 0·4–0·6 cm longae, tubulares, unilateraliter fissae; apiculatae et uno latere paulo carinatae, tenuiter membranacea. *Calyx*, ovario incluso, 0·6–0·8 cm, campanulatus, trilobus, lobis calcari minimo subapicali praeditis. *Corollae* tubus calycem aequans, lobis c. 0·5–0·7 cm, lobo dorsali apiculato. *Labellum* carnosissimum, zona media fulva, ad margines roseum lineis rubris exceptis, 0·4 cm longum, ad 0·5–0·6 cm latum, trilobum; staminodia lateralia ad apiculos carnosos redacta. *Stamen* 0·4–0·5 cm; anthera thecis parallelis, ecristata, filamento paulo longior. *Stylus* filiformis; stigma ore ciliatum; glandulae epigynae c. 0·1 cm, truncatae. *Ovarium* c. 0·2 cm, glabrum, uniloculare, multiovulatum. *Capsula* plus minusve globosum, 2 cm diam., matura caerulea.

Herb of up to 1·5 m, plane of distichy of leaf-shoots transverse to the rhizome, leaves shortly petiolate, lanceolate to elliptic, caudate at the apex, rounded basally, glabrous. Inflorescence terminal on the leafy stem, congested, at first protected by 2 sterile bracts; fertile bracts smaller, each subtending a 2-flowered cincinnus; flowers shortly pedicellate; bracteoles tubular, thin textured; calyx campanulate, 3-lobed; corolla tube equal to the calyx, dorsal lobe apiculate; labellum very fleshy, yellow and pink, staminodes minute fleshy points; filament a little shorter than the ecristate anther; ovary glabrous, unilocular with numerous ovules; fruit blue.

Type. Queensland, Q.R.S. C.S.I.R.O. Forest Research Station, Atherton, 760 m in cultivation, from *Hyland* 8655 ex SFR 1073, labellum pink around margins with darker radiating stripes from base almost to apex, 16 i 1978, *Hyland* 9630 (holo. E, iso. QRS).

QUEENSLAND. SFR 1073, Rooty L A, 16°40′ S, 145°30′ E, 440 m, rain forest, 2 iii 1976, *Hyland* 8655 (QRS); SFR 144, 16°16′ S, 145°05′ E, 1000 m, rain forest understory, 29 iii 1977, *Gray* 422 (QRS); Windin Falls, 17°20′ S. 145°45′ E, 700 m, rain forest, 6 vii 1975, *Collins & Gray* 20121 (QRS); Hort. A. W. Dockrill, Atherton, plant equal to planting No. 57 at QRS, Atherton, fruit blue, originally from Windsor Tableland, 26 ii 1975, *Dockrill* 904 (E, QRS); *ibidem*, 12 xii 1975, *Dockrill* 1089 (E, QRS).

Alpinia hylandii is closely allied to *A. modesta* (fig. 3B), *A. coerulea* (fig. 3C), and *A. arundelliana* (*A. coerulea* v. *arundelliana*); all bear flowers in cincinni, and all produce globose blue capsules. *A. coerulea* is the widest ranging, occurring in New South Wales and extending in an unbroken distribution northwards to the Cape York Peninsula. It may be easily distinguished by the much more robust habit, long pedicels and bilobed ligule. The remaining species have a more restricted distribution. *A. modesta* and *A. hylandii* are confined to Queensland, from Rockingham Bay (c. 18°S), the type locality of *A. modesta*, northwards to c. 16°S. In general facies these two species are similar but the shortly petiolate leaves, which are conspicuously caudate, and the shorter, more condensed

inflorescences with fewer flowered cincinni, distinguish *A. hylandii*. *A. arundelliana* comes from southern Queensland and also occurs in New South Wales. It too is of small stature and may be no more than a depauperate form of *A. coerulea* together with which it grows. Material studied, which includes several sheets from Eumundi, the type locality, have only old inflorescences or infructescences, but the plant has recently been introduced into cultivation at Atherton which will allow more critical examination to be made.

The ovary of *A. hylandii* appears to be consistently unilocular with parietal placentae, that of *A. modesta* is usually imperfectly trilocular with well-developed placentae; in *A. coerulea* the ovary, in median transverse section at least, is usually perfectly trilocular with axile placentation.

Whether these species form an endemic group of *Alpinia* sect. *Allughas* is uncertain. A recently collected *Alpinia* from southern Papua New Guinea (*LAE* 70404, fruiting specimen only) has blue capsules and is vegetatively similar to *A. coerulea*. Without flowering material no conclusion can be reached, but it seems probable that the distribution of this group may, not unexpectedly, be further extended.