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STUDIES ON QUEENSLAND GRASSES, I.

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## STUDIES ON QUEENSLAND GRASSES, I.

By S. T. BLAKE, M.Sc., Walter and Eliza Hall Fellow in Economic Biology, University of Queensland.

(Read before the Royal Society of Queensland, 27th November, 1939.)

## PLATES IV. AND V.

This is the first of a series of papers in which are to be presented previously undescribed species, new records for Queensland, and notes of a taxonomic, ecological, or economic nature on various genera and species of the Gramineae, serving either as introductory notes to more complete accounts of the groups concerned or as addenda to previously published works. In this paper some preliminary notes on that most difficult genus *Aristida* are presented. Between the years 1926 and 1933 two monumental works on the genus by J. T. Henrard were published in Mededeelingen van 's Rijks Herbarium, viz., "A Critical Revision of the Genus *Aristida*" and "A Monograph of the Genus *Aristida*." In these 33 species and 6 varieties are described as occurring in Australia, nearly all of which are now known to occur in Queensland. Field work, supplemented by intensive collecting, carried out in very many localities in Queensland, has testified to the accuracy of Henrard's species-concept within the genus, although it has been found that to give an accurate idea of many species the circumscriptions of these will have to be widened. This is particularly so in the case of the lengths of the spikelet-parts, while the character of normal and inverse glumes is not so reliable as one might wish. Hybridism may very likely, as suggested by Henrard, play a very big part in producing some of the extraordinarily difficult forms encountered in such complex series of forms as those centring around *A. calycina* and *A. glumaris*, and *A. pruinosa* and *A. inaequiglumis*. In this paper only some of the more outstanding forms are dealt with.

Except where stated to the contrary, all collections cited have been personally examined, and are represented in the Queensland Herbarium, Brisbane, where also the actual types of the new species here described are deposited.

***Aristida acuta*** S. T. Blake sp. nov. (sect. *Chaetaria*) affinis *A. glumari* Henr. et *A. praealtae* Domin, ab hac foliorum vaginis collo glabris, panicula pauciore haud rigida, ab illa panicula laxiore ejus ramis longioribus filiformibusque, ab utraque paniculae ramulis spiculisque appressis, glumis ambabus acutissimis, differt.

*Gramen* perenne, caespitosum, viride. *Culmi* numerosi  $\pm$  patentés, 3-nodes, e nodis inferioribus ramosi, graciles, teretes vel subcompressi, tenuiter striati, ceterum glabri laevesque, panicula inclusa 40-65 cm. longi. *Folia* haud numerosa; vaginae internodiis breviores vel multo breviores, prominule striatae, glabrae, minute scaberulae vel fere laeves; ligula brevissima, dense ciliata; auriculae vix incrassatae, pubescentes, nec barbatae vel innovationum parvae barbatae; collum glabrum; laminae angustae, apice setaceo-attenuatae, usque ad 14 cm. longae, subrigidae, involutae vel convolutae, applanatae usque ad 2 mm. latae, nervis pluribus validis crebre percursae quorum 3 alii crassiores, pagina superiore hirtellae, inferiore minute scaberulae. *Panicula* exserta

plerumque 15-30 cm. longa, laxa,  $\pm$  nutans saepe quasi-secunda; rhachis gracilis,  $\pm$  trigona, sursum  $\pm$  compressa, marginibus scaberula vel omnino fere laevis; rami singuli, remoti, filiformes, internodiis paullo longiores, primo suberecti tandem (saltem inferiores) patuli vel subnutantes (in siccitate  $\pm$  flexuosi), a basi pubescenti divisi, imus usque ad 8.5 cm. longus; ramuli pedicellique pauciores appressi, hi spiculis breviores, scabridi, apice subelavati. *Spiculae* haud densae,  $\pm$  violaceo-coloratae. *Glumae* certe inversae, lineari-lanceolatae, membranaceae, hyalinae vel dilute coloratae, 1-nerves, glabrae, fere omnino laeves, sursum gradatim acuminata acutissima; inferior carina parce scaberula, aristulata, aristula 1-1.2 mm. longa inclusa 8.5-10.7 mm. longa; superior 1-1.7 mm. brevior, vix aristulata, 7.5-9 mm. longa. *Lemma* lineare, utrinque angustatum, dense punctulato-scaberulum, marginibus involutum hinc ventre sulcatum, callo fere recto dense barbato ca. 1 mm. longo incluso 8.5-9 mm. longum. *Columna* nulla. *Aristae* subsimiles, scabrae, oblique patentis, basi haud applanatae, 13-19 mm. longae, medialis lateralibus 4-5 mm. longior paullo robustior. —Plate IV., figs. 1-3.

QUEENSLAND.—Moreton District: Near Villeneuve, on upper hillslopes in cleared Eucalyptus forest on grey podzolised soil, 400 feet, Feb. 22nd, 1939, *Blake* 13960 (TYPE); Petrie, on somewhat open ground on poor soil, Dec. 28th, 1930, *Blake* 94.

This species is readily distinguished by its lax habit, prominently inverse very acute glumes, and furrowed lemma. The primary branches of the panicle are bipartite or tripartite shortly above the base, the longer or longest secondary branch is naked for at least half its length, while the other or others are much shorter and bear 1-3 spikelets.

***Aristida dissimilis*** *S. T. Blake* sp. nov. (sect. *Chaetaria*) affinis *A. glumari* Henr. a qua panicula minus rigida ejus ramis ramulisque appressis, gluma inferiore dense scaberula, aristis lateralibus breviusculis capillaribus differt.

*Gramen* perenne, caespitosum, suberectum, viride. *Culmi* numerosi, stricti vel leviter geniculati, teretes, leviter striati, fere laeves sed sub panicula scabri, 2-3-nodes, plerumque simplices raro parce ramosi, cum panicula 40-60 cm. longi. *Folia* pauca; vaginae internodiis multo breviores, arctae, persistentes vel inferiores delapsae, prominule nervosae, subcarinatae, glabrae, minute scaberulae; ligula brevissima dense ciliolata; auriculae breviter pubescentes; collum glabrum; laminae anguste lineares apicem versus acutatae, firmae nec rigidae, vel planae vel involutae vel sursum convolutae, (applanatae) 1-1.5 mm. latae, pagina superiore scaberulae, inferiore laeves, usque ad 20 cm. longae sed plerumque multo breviores. *Panicula* tandem longe exserta, plerumque 10-20 cm. longa, laxiuscula, interrupta, pauciramosa: rhachis angulata scabra; rami bini, vel singuli et fere ad basin furcati, suberecti, internodiis breviores, gracillimi, scabri, parte superiore pauciramulosi; pedicelli spiculis breviores apicem versus subelavati. *Spiculae* erecti, purpurascens vel violascens. *Glumae* inversae, lineari-lanceolatae, aristulatae, firme membranaceae, 1-nerves; inferior gradatim acuminata, carina scabra ceterum dense scaberula, cum aristula 9-10 mm. longa; superior plerumque 0.5-1 mm. brevior. apice abrupte acuminata  $\pm$  biauriculata, fere laevis, aristula inclusa 8-9 mm. longa. *Lemma* anguste lanceolatum, aliquantulum complanatum, ventre sulcatum ob margines involutas, dense punctulatum, cum callo obliquo

obtusum 0.7–0.9 mm. longo dense longeque barbato 8–8.5 mm. longum. *Columnna* nulla. *Aristae* valde inaequales, hispidae, erectae vel suberectae, medialis inferne robusta, 10–14 mm. longa, laterales multo breviores gracilioresque 5–8 mm. longae.—Plate IV., figs 4-7.

QUEENSLAND.—North Kennedy District: Townsville, on sandy soil on the exposed rocky slopes of Castle Hill, and in Eucalyptus forest, June 7th, 1934, *Blake* 5945 (TYPE); and on roadsides, *Blake* 5957.

Distinguished by the rather plump spikelets with scaberulous lower glumes, and the dissimilarity between the  $\pm$  erect awns, of which the central is rather robust while the lateral ones are very slender and only  $\frac{1}{2}$ – $\frac{2}{3}$  as long.

***Aristida helicophylla*** S. T. *Blake* sp. nov. (sect. *Chaetaria*) affinis *A. jerichoensi* Domin et *A. ingratae* Domin, ab illa tamen foliis omnibus persistentibus planis circinatis, ab hac gracilitate, foliis angustioribus, collo glabris, spiculis minoribus, ab utraque aristis leviter recurvatis flexuosisve differt.

*Gramen* perenne, caespitosum, glauco-pruinatum, usque ad 1 m. altum. *Culmi* stricti vel fere stricti, erecti, simplices vel pauciramosi, 2–3-nodes, graciles, leviter compressi, leviter striati, valde pruinosi, ceterum glabri laevesque, nodis leviter incrassati. *Folia* pruinosa; vaginae aretae vel inferiores  $\pm$  hiantes, internodiis subduplo breviores, sulcatae, scaberulae, collo incluso glabrae; ligula longe denseque ciliata; auriculae pubescentes; laminae anguste lineares, planae vel praesertim superne  $\pm$  complicatae, flexuosae, usque ad 20 cm. longae, 1.5–2 mm. latae, valide multinerves nec carinatae, pagina superiore longiuscule denseque hirtellae, inferiore scaberulae, veterae semper planae laxae tortae  $\pm$  circinatae. *Panicula* exserta vel longe exserta, stricta, angusta, continua, densiuscula, 12–25 cm. longa; rhachis hincinde visibilis, angulata, sursum scabrida; rami graciles, plerumque bini, a basi divisi, rhacheos internodiis plerumque longiores, inferiores usque ad 5 cm. longi, cum ramulis pedicellisque stricti, appressi, erecti. *Spiculae* longiuscule pedicellatae, pedicellis subclavatis spiculis brevioribus. *Glumae* subaequales, plerumque inversae, membranaceae, 1-nerves; inferior acute acuminata, aristulata, carina scaberula, ceterum brevissime scabro-ciliolata, 6.2–7.7 mm. longa; superior angustior, usque ad 0.7 mm. brevior, apice profunde biloba, inter lobos angustissimos aristulata, 6–7 mm. longa. *Lemma* glumis multo brevius, atrofusum vel atromaculatum, lineari-ellipticum, admodum compressum, punctulatum, ventre sulcatum, marginibus involutis pilis brevibus antrorsim conicis albidis interdum praeditum, cum callo acutissimo 0.8 mm. longo dense barbato 4.2–4.5 mm. longum, 0.55 mm. latum. *Columnna* nulla. *Aristae* lemmate quasi-articulatae (i.e. inter lemma aristasque sulcus angustus adest), pallidae, subsimiles, capillares, leviter recurvae vel flexuosae, 17–21 mm. longae.—Plate IV., figs. 8-12.

QUEENSLAND.—Mitchell District: Between Jericho and Lochnagar on sand in mixed open forest, ca. 1,100 feet, July 17th, 1934, *Blake* 6875; east of Jericho in mixed open forest on sand, ca. 1,250 feet, July 16th, 1934, *Blake* 6822; near Jericho on rocky crest of low range on shallow reddish sand among low shrubs and *Triodia*, ca. 1,500 feet, July 15th, 1934, *Blake* 6807. Warrego District: Between Charleville and Westgate on red sand associated with *Eucalyptus melanophloia* and *Triodia*, April 20th, 1934, *Blake* 5411 (TYPE).

The persistent flat old leaves curled somewhat in the manner of a watch-spring, and the very slender flexuose or curved awns give this species quite a distinctive appearance. The leaves are very similar to those of *A. ingrata* Domin, but they are narrower, and lack the characteristic villous line across the collar. There is a distinct narrow but rather deep constriction between the lemma and the awns, and also a marked differentiation in colour between them, but there is no differentiation in tissue and therefore no articulation. The lower glume is usually the longer, but rarely it is shorter than the upper.

***Aristida exserta*** *S. T. Blake* sp. nov. (sect. *Chaetaria*) affinis *A. queenslandicae* Henr. a qua praecipue internodiis glabris, lemmate angustiore longius exserto, aristis minus inaequalibus differt.

*Gramen* perenne, caespitosum, pallide viride, 30–60 cm. altum. *Culmi* erecti, stricti, graciles,  $\frac{1}{2}$ –1 mm. crassi, teretes, tenuiter striati, ceterum laeves vel fere laeves, glabri, 2–3–nodes, e nodis omnibus ramosi. *Folia* pauca; vaginae arctae vel inferiores tandem hiantes, striati, ceterum fere laeves, internodiis multo breviores; ligula brevissima longe denseque ciliata; auriculae pubescentes; collum glabrum; laminae subsetaceae, rigidae, leviter curvatae vel flexuosae, involutae et quasi-teretes (applanatae usque ad 1 mm. latae), nervis validis paucis percursae, marginibus scabrae, pagina superiore breviter hirtellae, inferiore glabrae laevesque. *Panicula* longiuscule exserta, stricta, erecta, angusta,  $\pm$  interrupta, 10–15 cm. longa, 1 cm. lata raro metiens (aristis exclusis); rhachis compressa trigona, marginibus scaberula, bene visibilis; rami singuli, erecti, filiformes, a basi divisi, rhacheos internodiis breviores; ramuli pauci; pedicelli spiculis breviores, anguste clavati, scabridi. *Spiculae* pallidae vel violascentes. *Glumae* inversae, lineari-lanceolatae, glabrae laevesque; inferior acuminata longiuscule aristulata, 3–nervis, manifeste carinata, aristula 0.5–0.75 mm. longa inclusa 7–8.7 mm. longa; superior prominente brevior, 1–nervis, breviter biloba, aristulata (aristula ca. 0.5 mm. longa inclusa), 6.5–7 mm. longa. *Lemma* glumis manifeste longius, angustissime lanceolatum fere subulatum, prope basin leviter angustatum, sursum longe angustatum, ventre sulcatum (marginibus involutis), prope apicem ciliatulo-scabrum ceterum glabrum laeveque, callo brevi admodum obliquo 0.4–0.5 mm. longo dense barbato incluso 8–10 (plerumque 9) mm. longum. *Columna* nulla. *Aristae* subsimiles subaequales, 8–12 mm. longae.—Plate V., figs. 6–9.

QUEENSLAND.—North Kennedy District: Near Pentland on Mount Remarkable and neighbouring peaks in open forest, June 11th, 1934, *Blake* 6130 (TYPE).

A slender species fairly readily recognised by the setaceous leaves, very narrow scanty inflorescence, inverse glumes, and narrow attenuate furrowed lemma at least 1 mm. longer than the glumes and usually more. The shape of the lemma approaches that of *A. ramosa* R. Br., but it is furrowed, and the species abundantly differ in many other characters.

***Aristida intricata*** *S. T. Blake* sp. nov. (sect. *Chaetaria*) affinis *A. Warburgii* Mez sed foliis hispidis, culmis distincte compressis scabris, spiculis in omni parte brevioribus, gluma prima hirtella, lemmate sursum scabro-hispido differt.

*Gramen* perenne caespitosum viride. *Culmi* graciles, basi  $\pm$  erecti, sed sursum tandem patentes, compressi, antrorsim scabri, panicula

inclusa usque ad 90 cm. longi, simplices, 1-2-nodes, internodio supremo (pedunculo) longe exserto usque ad 50 cm. longo sublaevi. *Folia* plura; vaginae internodiis breviores, arcte appressae, striati, scabrae; ligula brevis dense breviterque ciliolatae; auriculae inconspicuae pilis longis paucis barbatae vel glabrae; laminae angustissime lineares, longe attenuatae, valde complicatae, applanatae usque ad 1.8 mm. latae, pagina superiore hirtellae, inferiore scabro-hirtellae. *Panicula* angusta,  $\pm$  nutans, contracta sed haud densa, saepe quasi-secunda; rhachis angulata scabra, bene visibilis; rami singuli vel sub-bini, internodiis rhacheos breviores (inferiores usque ad 80 mm. longi, basi vel prope basin 1-ramulosi, saepe autem apicem versus ramulos 1-2 gerentes), tenuissime filiformes, sub flore saepe patentes,  $\pm$  nutantes, sub fructu  $\pm$  erecti et appressi, scaberuli, plerumque 3-1-spiculosi; pedicelli angulati, sub-clavati, scabri, laterales 1.5-4 mm. longi, terminales usque ad 12 mm. longi. *Spiculae* purpureo-suffusae, maturitate ob aristas tortas inter se innexae. *Glumae* normales, marginibus involutae; inferior linearilanceolata, acuta, valde 3-nervis, nervis percurrentibus, carina scabra, ceterum hirtella, vel margines versus glabra, plerumque 6-7, raro 5, mm. longa; superior  $\frac{1}{3}$ - $\frac{1}{4}$  longior, angustior, apice abrupte acuminata, 1-nervis, carina sursum scabridula excepta glabra laevisque, admodum patula sed a latere visa incurva, 8.5-11 mm. longa. *Lemna* angustissime lanceolatum, prominule carinatum, haud sulcatum, marginibus convolutum, parte superiore vel tota margine exteriori parce scabrum, ceterum glabrum laeveque, cum callo 7-8 mm. longum; callus leviter curvatus, pungens, 1.2-1.5 mm. longus, pilis albis usque ad 1 mm. longis dense barbatus. *Columna* lemmate vix tenuior, scabra, valde torta, 11-13 mm. (cum lemmate calloque 19-21 mm.) longa, sursum saepe  $\pm$  flexuosa. *Aristae* scabrae, media robusta 17-19 mm. longa, basi recurvata, laterales multo tenuiores,  $\pm$  filiformes, 12-14 mm. longae, divaricatae, vel omnes laxe spiraliter contortae vel media solum contorta.—Plate V., figs. 1-5.

QUEENSLAND.—Wide Bay District: Near Bundaberg, on hill slopes in Eucalyptus forest, April 27th, 1936, *Blake* 11325A; Howard, *Watson* 13. Moreton District: Bribie Island, in flat sandy country, April 30th, 1916, *White*; Caloundra, in open forest on sandy soil, August 24th, 1932, *Blake* 305; Caboolture, May 2nd, 1931, *Mayze in Herb. Blake* 180; Lawnton, near Brisbane, at edge of dried-up swamp, March 28th, 1932, *Blake* 252; Blackheath, April 23rd, 1918, *White*; Virginia, Brisbane, fairly common in *Melaleuca nodosa* forest on ill-drained light grey sandy loam, 25 feet, June 3rd, 1939, *Blake* 14097 (TYPE); Sunnybank, near Brisbane, June 2nd, 1914, and March, 1918, *White*.

Very similar in appearance to *A. Warburgii* Mez, and like it forms rather leafy tufts with long flexuose peduncles straggling over the ground. *A. pernicioso* Domin of North Queensland has a similar habit, although Domin describes the species as strictly erect. *A. intricata* is rather common in the coastal districts of South-east Queensland in flattish often ill-drained deep sandy soil in wallum communities and related forest communities, usually in damper places than *A. Warburgii*. At maturity, the awns are usually more or less strongly spirally twisted and intertwined, so that the lemmas are shed in groups. This, in addition to the difficulty at first experienced in distinguishing immature specimens from immature specimens of *A. Warburgii* (almost all the earlier collections of these species are more or less immature) suggested the specific epithet.

For note on *A. Warburgii* Mez and *A. heterochaeta* Henr. see below.

***Aristida platychaeta*** *S. T. Blake* sp. nov. (sect. *Chaetaria*) affinis *A. muricatae* Henr. et *A. anthoxanthoidi* Henr., ab hac inflorescentia laxiore, lemmatis marginibus convolutis nec involutis, callo longiore, aristis basin versus dilatatis planisque, ab illa partibus omnibus minoribus, lemmata a medio utrinque angustato, callo paullo angustiore, aristis basi applanatis distinguenda.

*Gramen* perenne, caespitosum, viride vel  $\pm$  atro-violaceum usque ad 50 cm. altum. *Culmi* erecti vel basi geniculati graciles, teretes, striati, glabri laevesque, 1–2–nodes, internodium summum (pedunculus) longissimum, cetera breviora. *Foliorum* vaginae arctae, internodiis breviores vel inferiores iis subaequales longioresve, prominule striatae, minutissime scaberulae; ligula dense ciliata; auriculae pubescentes, pilis longis paucis sparse barbatae; collum glabrum; laminae  $\pm$  flexuosae usque ad 15 cm. longae, convolutae vel basin versus planae, vel fere totae planae, 1–2 mm. latae, pagina superiore dense hirtellae inferiore glabrae laevesque vel scaberulae, nervis pluribus utrinque percursae quorum 3 ceteris crassiores, marginibus incrassatae sursum scaberulae. *Panicula* longe exserta, 10–20 cm. longa, aristis inclusis ca. 2–3 cm. lata, spiciformis haud densa, inferne saepe  $\pm$  interrupta; rhachis visibilis, angulata, striata, parce scaberula vel fere laevis; rami internodiis multo breviores, bini, a basi divisi, cum ramulis pedicellisque erecti, filiformes, scaberuli, pedicelli spiculis breviores vel terminales longiores. *Spiculae*  $\pm$  violaceo-coloratae. *Glumae* membranaceae, subaequales, 5–7 mm. longae, lineari-lanceolatae, 1–nerves; inferior acuta, cuspidata, aristula usque ad 0.5 mm. longa, carina interdum quoque lateribus sursum scabrida; superior paullo longior vel raro brevior, paullo angustior, abrupte  $\pm$  acuminata, apice  $\pm$  minute ciliolata, carina laevis. *Lemma* tubulosum, angustum, fusiforme, marginibus convolutum, inferne punctulatum, sursum scabrum atque pilis hyalinis albis conicis antrorsis dense praeditum, cum callo obtuso oblongo longiuscule denseque barbato 1 mm. longo 5–6 mm. longum. *Columna* nulla. *Aristae* inter se similes, subaequales, 12–18 mm. longae, oblique patentes, basi plana latiuscula marginibus scabridae,  $\pm$  tortae, sursum setaceae, scabrae.—Plate V., figs. 10–13.

QUEENSLAND.—Warrego District: Chesterton, approx. 25° 20' S., 147° 20' E., on grassland slope on dark grey silt clay, ca. 1,800 feet, April 7th, 1936, *Blake* 11072; Morven, in grassland on dull brown silt clay, ca. 1,400 feet, April 2nd, 1936, *Blake* 11002. Maranoa District: Mitchell, on open downs on dark greenish brown silty clay, 1,100 feet, May 3rd, 1934, *Blake* 5701 (TYPE); Roma, in cemetery reserve on sand, ca. 1,000 feet, May 6th, 1934, *Blake* 5786; Noondoo, near Dirranbandi, on grey silt clay plain with scattered *Eucalyptus coolabah*, 550 feet, Feb. 27th, 1936, *Blake* 10574.

One of the very few species of the genus regularly found on heavy soils. Although an element in the grassland climax, it tends to dominate overgrazed areas in some places. The rather broad flat thin bases of the awns are very characteristic, though they also occur to a more or less extent in other forms. The glumes are almost always normal, but very occasional instances of the inverse position were observed.

***A. anthoxanthoides*** (*Domin*) *Henr.* l.c. No. 54, 29 (1926); *A. peregrina* *Henr.* l.c. 16 (1926). *A. adscensionis* *L.* var. *anthoxanthoides* *Domin* in *Biblioth. Bot.* xx. Heft 85, 343 (1915), and var. *subaequiglumis* *Domin*, l.c.



Henrard based his *A. peregrina* on the description of *A. adscensionis* var. *subaequiglumis* Domin without having seen the type, but later, after having seen the specimens, he united it with *A. anthoxanthoides* (l.c. 438). Henrard has however erred in describing the lemma as tubular with overlapping margins (see particularly the Monograph, p. 303, and the key on p. 294). I have seen specimens from the type-collections of both Domin's varieties, and in these as in all other specimens I have seen, the lemma is prominently ventrally furrowed with inrolled margins. It is thus impossible to determine specimens from the key.

*A. anthoxanthoides* is fairly common in Western Queensland, chiefly in the far west, occurring often as a pioneer on bare ground such as clay-pans.

**A. obscura** *Henr.* l.c. No. 54A, 385 (1927). Henrard's description of this species seems to have been based on poor material, to judge from the material of the type collection in Herb. Sydney received on loan through the courtesy of Mr. R. H. Anderson. Particularly during 1936 I collected an excellent series of specimens, but owing to the inadequate description had been at a loss to place them. Two notable characteristics appear to have been overlooked by Henrard. Firstly the uppermost internode (peduncle) is very thin and strongly flattened sometimes concavo-convex, a feature prominent both in the field and in the herbarium. Secondly, the lemma is strongly and densely antrorsely hispid all over. The awns are much longer than described by Henrard, up to 45 mm., but are apparently broken in the type, while the glumes are distinctly aristulate. The panicle in well-developed specimens has the branches bipartite or tripartite at the base and longer. There is no essential difference between the general structure and appearance of the panicle of this species and of *A. Leichhardtiana* Domin and the two species are closely allied, although Henrard places them in different inflorescence-groups (cf. Monograph, 208). The internodes of the latter species are at times slightly hirtellous, but the uppermost internode is always terete, and the lemma is smooth. The spikelets are also slightly smaller, and the leaves are not flat.

*A. obscura* var. *luxurians* *Henr.* l.c. 54c, 729 (1933), seems likely to be the hybrid *A. Behriana*  $\times$  *A. obscura*. The peduncle is terete, and the other characters seem to be as much those of *A. Behriana* as of *A. obscura*. I have not seen the type collection of this form, but there are two collections in Herb. Sydney from the type locality (Nyngan) which match the description. Is it merely a coincidence that this "variety" is known only from the only locality from which both *A. Behriana* and *A. obscura* have been collected?

**A. Warburgii** *Mez* in Fedde, Rep. Spec. Nov. xvii. 149 (1921); *Henr.* in Meded. Herb. Leid. No. 54B, 681 (1928). *A. heterochaeta* *Henr.* l.c. No. 54A, 227 (1927).

Through the courtesy of Dr. Pilger I have received an excellent photograph and fragments of the type of *A. Warburgii* in the Berlin Herbarium, while through the courtesy of Mr. R. H. Anderson I have had the loan of specimens of the type collection of *A. heterochaeta*. In both cases the specimens are somewhat immature, but they are certainly conspecific. It was unfortunate that Henrard was unable to see *A. Warburgii*, but it is strange that while discussing its possible identity he omitted his *A. heterochaeta* from the list of the species with 3-nerved

lower glumes and a twisted column. It is probable that he did not consider this species to be involved as Mez did not mention the diversity of the awns in his description.

*A. Warburgii* varies rather considerably in the degree of heterogeneity of the awns and in the degree of their curvature. Sometimes the central awn is nearly horizontal with the laterals suberect; at other times all are more or less curved, the median strongly recurved and in addition twisted away from the lemma. In the preparation of herbarium specimens this torsion is usually sufficient to wrench mature lemmas from the glumes, so that really good mature specimens are almost unknown in herbaria. Some very young specimens in Herb. Sydney were compared by Henrard with *A. hirta* Domin (according to herbarium notes by Miss Vickery) and one very young specimen in Herb. Brisbane has been identified by Henrard with this species. *A. hirta* Domin and *A. superpendens* Domin are species with heterogeneous awns belonging to the sect. *Arthratherum*, but there is no trace of an articulation at the base of the column in *A. Warburgii* or *A. intricata*. I am not exactly sure which is *A. hirta* Domin. I have collected and seen several series of specimens from Domin's type locality and neighbouring places belonging to two distinct allied species, but I have not seen a single specimen which matches exactly both the descriptions and figures of either Domin or Henrard. Certain rather stout forms of *A. Warburgii* from near Brisbane however, are very similar in outward appearance to what I take to be typical *A. superpendens*.

In another form the column is unusually short (7-8 mm.) with the callus also slightly shorter than usual.

#### EXPLANATION OF PLATES.

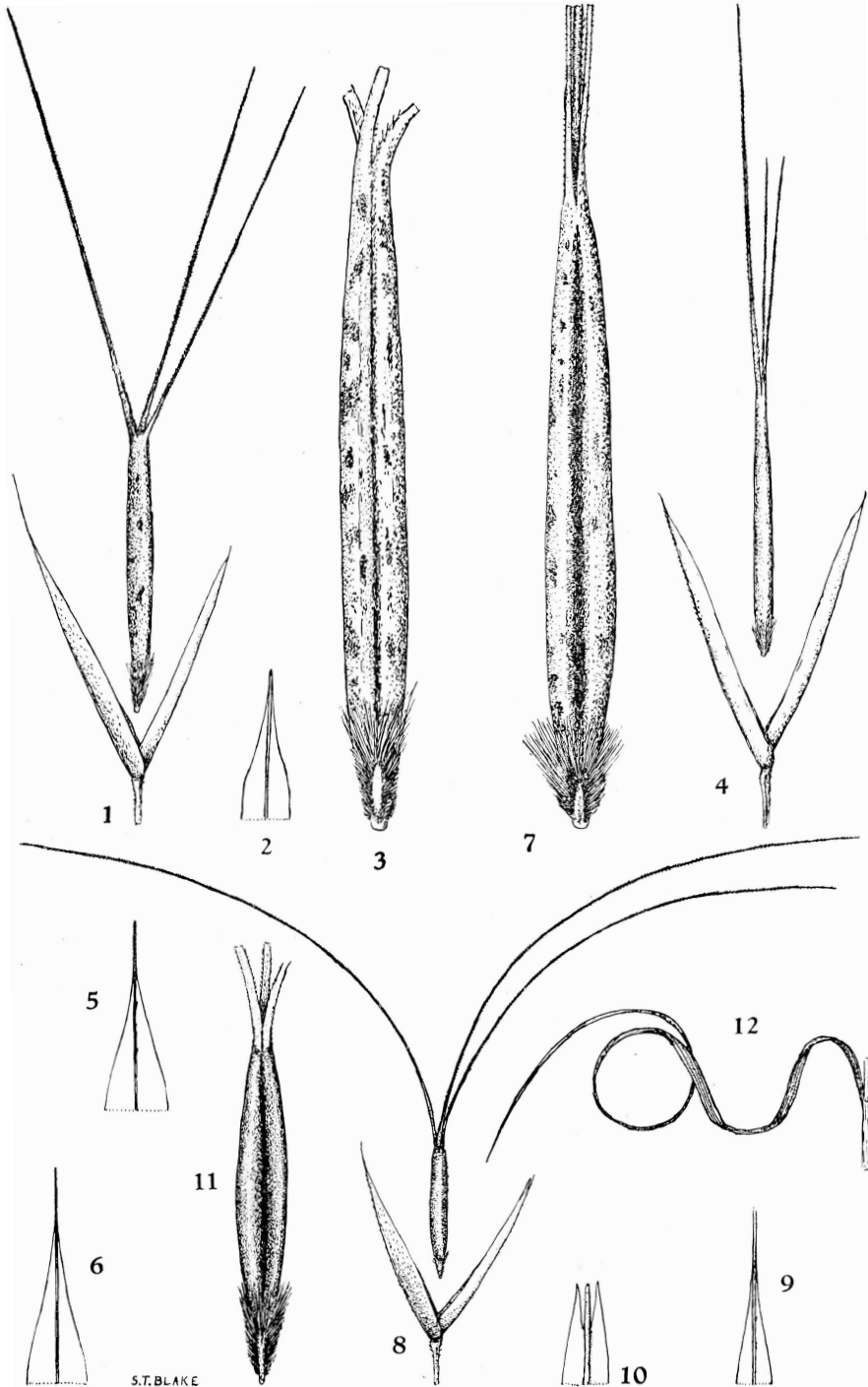
In all cases spikelet (with lemma separated)  $\times 4$ , lemma (with upper part of awns removed) and apices of glumes  $\times 10$ . All figures drawn from type specimens.

#### PLATE IV.

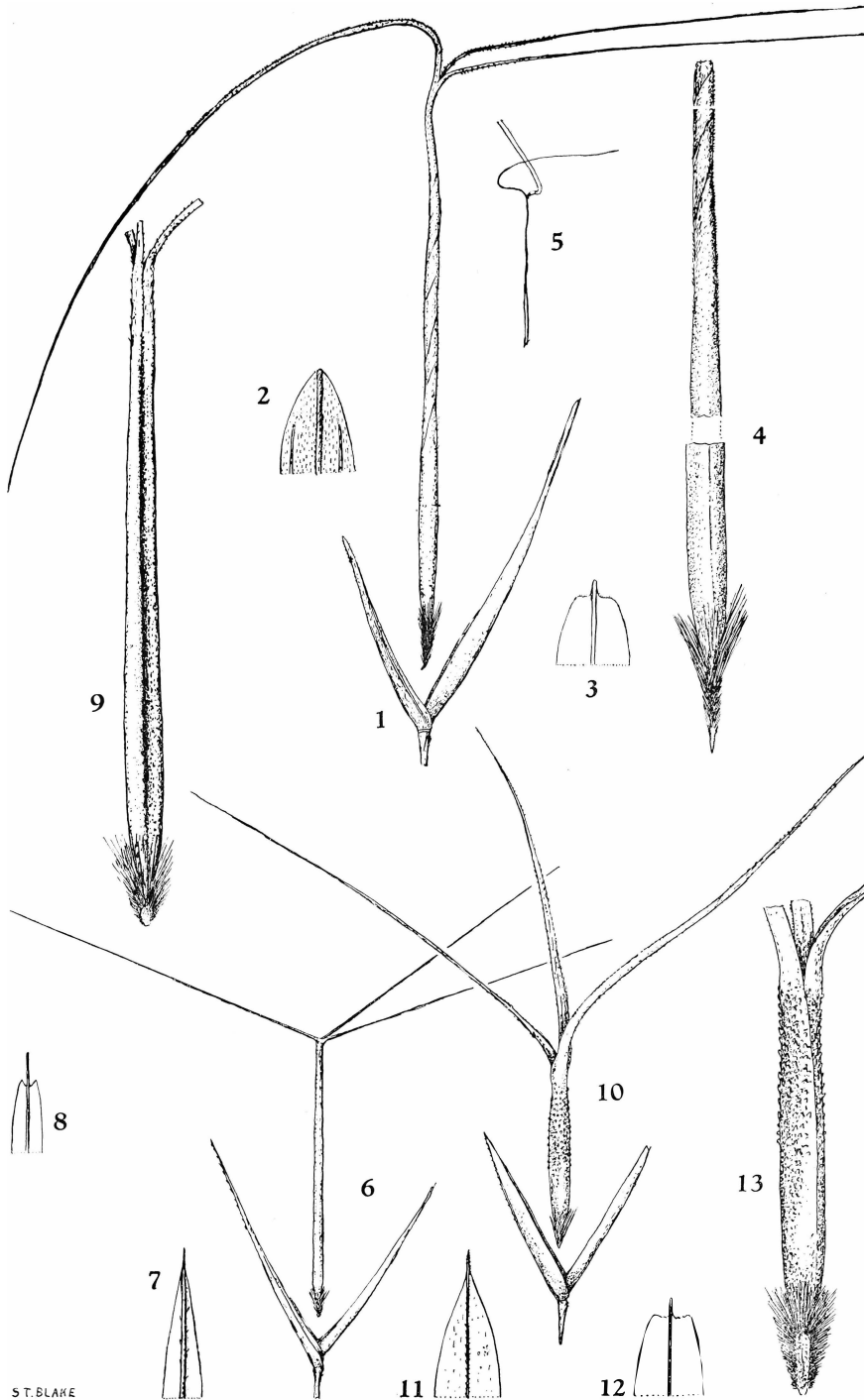
Figs. 1-3, *Aristida acuta* S. T. Blake: 1, spikelet; 2, apex of upper glume; 3, lemma. Figs. 4-7, *Aristida dissimilis* S. T. Blake: 4, spikelet; 5, apex of lower glume; 6, apex of upper glume; 7, lemma. Figs. 8-12, *Aristida helicophylla* S. T. Blake: 8, spikelet; 9, apex of lower glume; 10, apex of upper glume; 11, lemma; 12, old leaf, *natural size*.

#### PLATE V.

Figs. 1-5, *Aristida intricata* S. T. Blake: 1, spikelet; 2, apex of lower glume; 3, apex of upper glume; 4, portions of lemma; 5, another lemma, *natural size*, to show variation in twist of awns. Figs. 6-9, *Aristida exserta* S. T. Blake: 6, spikelet; 7, apex of lower glume; 8, apex of upper glume; 9, lemma. Figs. 10-13, *Aristida platychaeta* S. T. Blake: 10, spikelet; 11, apex of lower glume; 12, apex of upper glume; 13, lemma.



Figs. 1-3, *Aristida acuta* S. T. Blake. Figs. 4-7, *Aristida dissimilis* S. T. Blake.  
Figs. 8-12, *Aristida helicophylla* S. T. Blake.



Figs. 1-5, *Aristida intricata* S. T. Blake. Figs. 6-9, *Aristida exserta* S. T. Blake.  
Figs. 10-13, *Aristida platychaeta* S. T. Blake.