

Acacia karroo in Southern Africa

by

J. H. Ross

ABSTRACT

Reasons for adopting the name *Acacia karroo* Hayne are considered and the nomenclature and synonymy are dealt with. A broad description of the species is provided. The relationship of *A. karroo* to the closely related *A. seyal* Del., *A. hockii* De Willd. and the glandular podded *Acacia* species is mentioned. *Acacia karroo* Hayne, which is the most widespread *Acacia* in southern Africa, is an extremely variable species which occupies a diverse range of habitats. The range of variation within *A. karroo*, and in particular in Natal, is considered. At least six entities are recognizable within *A. karroo* in Natal. The nature and range of variation within these entities is considered. No infraspecific categories are recognized within *A. karroo*.

The southern African *Acacia* species for which the correct name is now known to be *Acacia karroo* Hayne often forms a conspicuous feature of the landscape in the western Cape where it is the only *Acacia* to be seen for miles. On account of its occurrence in proximity to Cape Town it was the first *Acacia* encountered by early travellers in the interior of southern Africa. A number of these travellers (Simon van der Stel, Barrow, Lichtenstein, Sparrman, Thunberg and later Burchell) mentioned the plants in the accounts of their journeys and collected specimens which were later sent to Europe. This was ultimately responsible for some of the confusion concerning the correct name for this species.

Mimosa nilotica Burm. f., Prodr. Fl. Cap. 27 (1768), is apparently the earliest name applied to this southern African *Acacia*. For this species Burman quoted a figure published by Plukenet in his Phytographia, t. 123, Fig. 1 (1691) and mentioned that there were dried specimens preserved. Examination of Plukenet's figure, which consists only of a small vegetative shoot, shows that the leaflets are far too large for *Mimosa nilotica* L. (Sp. Pl. 521, 1753) whilst it is known that *M. nilotica*, or to give it its correct name, *Acacia nilotica* (L.) Willd. ex Del., does not occur in the Cape. Verdoorn in *Bothalia* 6 : 409 (1954) mentions having received photographs of the only two *Acacia* specimens in Burman's collection from Prof. Baehni, Director of the Conservatoire et Jardin Botaniques, Geneva. One specimen is a seedling that cannot be identified with certainty. The other specimen has written on it "*Mimosa nilotica* Linn." and "Plukn. Tab. 123, Fig. 1". The name *Mimosa capensis* was later written over *Mimosa nilotica*. This specimen of Burman's is certainly referable to what is now known as *Acacia karroo* so it is evident therefore that *Mimosa nilotica* was a wrong identification by Burman.

Mimosa nilotica Thunb., Prodr. Pl. Cap. 92 (1800) was also an incorrect identification. This is clarified by Barrow in his *Travels* : 89 (1801) where he pointed out that the Swedish travellers (Sparrman and Thunberg) had erroneously called the Karroo Mimosa the nilotica, or that which produces the gum Arabic.

Mimosa capensis Burm. f., Prodr. Fl. Cap. 27 (1768), was based on a figure published by Plukenet in his Phytographia, t. 123, Fig. 2 (1691). However, Linnaeus referred to this same figure for his *M. reticulata* L., Mant. 1 : 129 (1767), and added to it a description of a plant from the Upsala garden with a flat reticulate pod. Linnaeus's description of the pod is quite at variance with the pod figured by Plukenet. Unfortunately Plukenet's illustration cannot be identified with any South African species of *Acacia* with certainty. Both names based on Plukenet t. 123, Fig. 2, that is *Mimosa capensis* and *M. reticulata*, must therefore be rejected as there is no preserved dried specimen of either species and as the figure cannot be identified.

Burchell in his Travels, 1 : 114 (1822), used the name *Acacia capensis* B. for the Karroo-thorn-tree but did not give a Latin diagnosis as was his custom with a new species. This suggests that Burchell was making a new combination but nowhere does he confirm this. He provided an unmistakable description of the plant on page 189 and there is a vignette of it on the same page. However, Benthham, who worked with Burchell on his Leguminosae, wrote in Trans. Linn. Soc. 30 : 507 (1875) "Burchell adopted the name *A. capensis* for this species, supposing it to be the *Mimosa capensis* Burm., Fl. Cap. Prodr. 27, which it probably is." Burchell's name, which is the combination in *Acacia* based on *Mimosa capensis* Burm. f., must therefore also be rejected.

Jacquín's plate of *Mimosa leucacantha*, Hort. Schoenbr. 3 : 75, t. 393 (1798), provided the first readily identified illustration with a definite name but the combination of the epithet with *Acacia* is rendered inadmissible by *A. leucacantha* Vatke in Oesterr. Bot. Zeitsch. 30 : 276 (1880) for an entirely different species.

For many years *A. karroo* was incorrectly called *A. horrida* (L.) Willd. Hillcoat and Brenan in Kew Bull. 13 : 39-40 (1958), in establishing the true identity of *A. horrida* (L.) Willd., explain how the name "*Acacia horrida*", which was originally based on a quite distinct Indian species (*Mimosa horrida* L., Sp. Pl. 521, 1753), was gradually accepted as the correct name for this South African species.

Acacia karroo was described by Hayne in Arzneyk. Gebr. Gewächse 10 : t. 33 (1827). Hayne stated that his illustration was made from a specimen named *Acacia vera* in the Willdenow Herbarium (No. 19184 fol. 2) and from another specimen which he received from the Cape. The Director of the Botanischer Garten und Museum, Berlin-Dahlem, to whom I am very grateful, sent me a photograph of this specimen from Willdenow's Herbarium. I have not succeeded in tracing the other specimen mentioned by Hayne. Examination of the labels on this sheet from the Willdenow Herbarium (No. 19184 fol. 2) reveals that the specimen was initially called *Mimosa nilotica*. *Mimosa nilotica* was subsequently erased on the one label and "*Acacia vera*" was written over it in dark ink. *A. vera* Willd. (Sp. Pl. 4 : 1085—1806) is given as a synonym of *A. arabica* (now *A. nilotica* (L.) Willd. ex Del.) by Benthham in Trans. Linn. Soc. 30 : 506 (1875). From Willdenow's description of *A. vera* it is clear that Benthham's decision was correct. It is quite certain that this specimen from Willdenow's Herbarium (No. 19184 fol. 2) is not referable to *A. nilotica* for the leaflets are far too large for that species. The name "Vieweg" also appears on one of the labels. Wagenitz in Willdenowia Bd. 3, Heft 1 : 109-136 (1962) mentions that the name "Vieweg" occurs frequently on specimens and on covers in the Willdenow Herbarium. Because of this frequent appearance of the name "Vieweg" it might be concluded that Vieweg was the collector of these plants. Specimens from as far afield as North America, Jamaica, Europe and particularly from the Mediterranean area, plus 100 specimens from South Africa bear

the name "Vieweg". Despite this, nothing much is apparently known about Vieweg and there is no evidence that he was a collector. Nobody could have travelled so extensively before 1800 and yet have remained so unknown. Vieweg was apparently the owner of an Herbarium hence the appearance of his name on so many specimens. It is thought that Vieweg handed the specimens on to Willdenow who then described them. Unfortunately Willdenow seldom gave the name of the collector when describing species. There is no record of where the specimen No. 19184 in the Willdenow Herbarium was collected. Although one of the labels reads "Habitat in Aegypto, Arabia fi" I know of no species from North Africa to which the specimen could be referred. However, the specimen is a very good match of a number of specimens that I have examined from the Cape. This close resemblance of the specimen in the Willdenow Herbarium (No. 19184) to many other Cape specimens suggests strongly that the specimen was collected in the Cape and that the phrase "Habitat in Aegypto, Arabia fi" does not refer specifically to this specimen but rather to the species *A. nilotica* and is taken either from Linnaeus' description of *Mimosa nilotica* or from Willdenow's *Acacia vera*. Presumably either specimen No. 19184 or the other species mentioned by Hayne was collected in the Karoo, whence the specific epithet for this species. *Acacia karroo* Hayne is therefore the earliest valid name for this common southern African *Acacia*.

A. karroo was introduced into Mauritius and became naturalized there. It was erroneously identified as *Mimosa eburnea* L.f. by Bojer and was listed under the name in his Hort. Maurit. 115 (1837).

A. karroo Hayne, Arzneyk. Gebr. Gewächse 10 : t. 33 (1827); Glover in Ann. Bolus Herb. 1 : 150 (1915); Burt Davy in Kew Bull. 1922 : 328 (1922); Marloth, Fl. S. Afr. 2 : 51 (1925); Bak. f., Leg. Trop. Afr. 843 (1930); Burt Davy, Fl. Transv. 2 : 346 (1932); Henkel, Woody Pl. Natal 229 (1934); Gerstner in J.S. Afr. Bot. 14 : 19-27 (1948); Codd, Trees & Shrubs Kruger N. Park : 44, fig. 38h & i (1951); Miller in J.S. Afr. Bot. 18 : 22 (1952); Verdoorn in Bothalia 6 : 409 (1954); Fl. Pl. Afr. 31 : t. 1220 (1956); Palmer & Pitman, Trees of S. Afr. 157-159, Pl. 36, 37 (1961); White, For. Fl. N. Rhod. 85, fig. 18D (1962); v. Breitenbach, Indig. Trees S. Afr. 2 : 298 (1965); de Winter *et al.*, Sixty-Six Tv. Trees 50-51 (1966); Schreiber in Prod. Fl. S.W. Afr. 58 : 9 (1967). Type: Herb. Willdenow 19184 (B, lecto.; PRE, photo.).

Mimosa nilotica sensu Burm. f., Prodr. Fl. Cap. : 27 (1768), non L.

M. capensis Burm. f., Fl. Cap. : 27 (1768), pro parte.

M. leucacantha Jacq., Hort. Schoenbr. 3 : 75, t. 393 (1798), non *Acacia leucacantha* Vatke (1880).

Acacia horrida sensu Willd., Sp. Pl. 4, 1082 (1806), pro parte, quoad Jacq. fig.; sensu auct. mult. : *E. Mey., Comm. 1 : 166 (1835); Harv. in Fl. Cap. 2 : 281 (1865); Benth. in Trans. Linn. Soc. Lond. 30 : 507 (1875); Engl. in Bot. Jahrb. 10 : 23 (1888); Marloth in Trans. S.A. Phil. Soc. 5 : 270 (1889); Fourcade, Report on Natal Forests : 106 (1889); Schinz in Mém. Herb. Boiss. 1 : 113 (1900) quoad Marloth 1334, excl. specim. Lüderitz 122 [The identity of Lüderitz 122, which I have not seen, is in some doubt as Schinz cited it as *A. horrida* on

*As mentioned earlier the name "*A. horrida* (L.) Willd." was widely misapplied to this common southern African *Acacia*, the correct name of which is now known to be *A. karroo*. *A. horrida* (L.) Willd. is a distinct species that is found in East Africa and Asia.

p. 113, as *A. trispinosa* Marl. & Engl. on p. 115 and as *A. aff. trispinosa* on p. 116]; Sim, For. Fl. Cape Col. 211, Pl. LXI (1907); Burt Davy in Kew Bull. 1908 : 158 (1908); Sim, For. Fl. P.E. Afr. : 57 (1909).

A. capensis sensu Burch., Trav. 1 : 114, 189 (1822); Sw., Hort. Britt. 1 : 103 (1826); Colla in Mem. Acad. Torin 35 : 175 (1831); Eckl. & Zeyh., Enum. 260 (1835).

Mimosa nilotica Thunb., Fl. Cap. ed Schult. 432 (1823), non L.

Acacia hirtella E. Mey., Comm. 1 : 167 (1835); Harv. in Fl. Cap. 2 : 281 (1865); Benth. in Trans. Linn. Soc. Lond. 30 : 513 (1875). ²Glover in Ann. Bolus Herb. 1 : 150 (1915). Type: Natal, between Umkomaas and Umlaas, *Drege* (whereabouts unknown).

A. natalitia E. Mey., Comm. 1 : 167 (1835); Harv. in Fl. Cap. 2 : 281 (1865); Benth. in Trans. Linn. Soc. Lond. 30 : 508 (1875); Burt Davy in Kew Bull. 1908 : 159 (1908); Glover in Ann. Bolus Herb. 1 : 150 (1915); Burt Davy in Kew Bull. 1922 : 329 (1922); Fl. Transv. 2 : 347 (1932); Gerstner in J.S. Afr. Bot. 14 : 22 (1948). Syntypes: Natal, Port Natal (Durban) and Umgeni, alt. 300 ft, *Drege* (? K. iso.); Pondoland, between Umgazana and Umzimvubu, alt. 600-1000 ft, *Drege* (whereabouts unknown).

Mimosa eburnea sensu Bojer, Hort. Maurit. 115 (1837), non L.

Acacia horrida Willd. var. *transvaalensis* Burt Davy in Kew Bull. 1908 : 158 (1908). Syntypes: Transvaal, Pretoria district, Groenkloof, near Pretoria, *Burt Davy* 2468 (BOL!; PRE!); Arcadia, Pretoria, *Burt Davy* 2807 (PRE!).

A. karroo Hayne var. *transvaalensis* (Burt Davy) Burt Davy in Kew Bull. 1922 : 328 (1922); Fl. Transv. 2 : 347 (1932).

A. inconflagrabilis Gerstner in J.S. Afr. Bot. 14 : 24-26 (1948). Syntypes: Natal, Nongoma district, Nongoma township *Gerstner* 4562 (NBG!; NH!; PRE!); *Gerstner* 4635 (NBG!; NH!; PRE!); *Gerstner* 4637 (NBG!).

Shrub, often many stemmed, or a tree to 22 m, sometimes very slender and sparsely branched; crown rounded, often irregularly so, or flattened; trunk to 0.75 m in diameter. *Bark* dark brown, reddish-brown, brownish-black to black, rough, often fissured, or white to pale greyish-white or greyish-brown and smooth, the latter green when young and with conspicuous transversely elongated lenticels. *Young branchlets* reddish- to purplish- or blackish-brown or white to yellowish- or greyish-brown, flaking minutely or smooth, conspicuously or inconspicuously lenticellate, glabrous or sometimes sparingly pubescent, especially when young. *Stipules* spinescent, glabrous, in pairs below the nodes,

²non Sim in Agric. Jour. 19 (1900); non Sim in For. and For. Fl. Cape Col. : 211, t. LIX (1907). Sim was apparently referring to *A. sieberana* DC. var. *woodii* (Burt Davy) Keay & Brennan as evidenced by his description of the bark "yellowish white flaky" and of the pod as "4 inches long. $\frac{1}{4}$ -1 inch wide, solid, indehiscent, tomentose." However, *A. sieberana* var. *woodii* seldom has only 4 pinna pairs as described by Sim and the involucre is in the upper half of the peduncle or apical and not in the lower third as illustrated in t. LIX. Sim described the inflorescence as "light yellow or nearly white" which is in contrast to the deep yellow inflorescence of *A. karroo*.

A. robusta Burch., however, which often has only 4 pinna pairs, has a whitish inflorescence and has the involucre in the lower third so it appears as though Sim's description of *A. hirtella* might possibly be taken from *A. sieberana* var. *woodii* and from *A. robusta* Burch.; non Sim in For. Fl. P.E. Afr. : 57, t. XXXV A (1909). In this instance Sim was clearly referring to *A. robusta* Burch.

straight or slightly curved, white or the same colour as the stem, usually 0.4-4.5 (-10.0) cm long, sometimes swollen and greatly elongated to 25.0 cm long, latter elongated spines usually united basally, entire plant frequently exceedingly spinescent. *Leaf*: petiole 0.5-1.8 cm long, glabrous or sometimes sparingly pubescent, adaxial gland usually present, variable in position, usually rounded or oval, at times slightly stalked, to 1.5 x 1.5 mm; rachis (0-) 1.0-4.6 (-9.0) cm long, glabrous, sometimes sparingly pubescent, abaxial surface without recurved prickles, sulcate adaxially; glands rounded or sometimes stalked, yellowish- to reddish-brown or black, between top 1-3 pinna pairs, between all pinna pairs or absent from some; pinnae (1-) 2-6 (-13) pairs; rachillae (1.0-) 1.5-3.8 (-7.2) cm long, glabrous or sometimes sparingly pubescent; leaflets 6-15 (-24) pairs, (2.8-) 3.5-8.0 (-12.5) mm long, 1.0-2.5 (-5.0) mm wide, linear, linear-oblong to obovate-oblong, base oblique, apex rounded to sub-acute or acute, margin entire, glabrous or occasionally sparingly puberulous. *Inflorescence* capitate, on axillary peduncles, fasciated or sometimes solitary, forming terminal racemes, sometimes on lateral axillary branchlets the entire inflorescence producing an irregular terminal panicle; flowers sessile, bright yellow; peduncle 0.7-2.4 (-4.0) cm long, terete, olive- or reddish-brown, glabrous, occasionally sparingly pubescent, sometimes glandular; involucrel at, slightly above or below middle (down to one third) of peduncle (when the flowers are young the involucrel appears to be at the apex of the peduncle, however, as the peduncle lengthens the involucrel soon assumes its true position). *Calyx* deep yellow, campanulate, glabrous throughout or apices of lobes sometimes sparingly pubescent, tube 1.2-1.8 mm long, lobes up to 0.5 mm long. *Corolla* deep yellow, glabrous, tube 1.5-2.3 mm long, lobes to 0.8 mm long, reflexed, alternating with calyx lobes; stamen filaments free, up to 5 mm long, yellow; anthers with deciduous apical gland; ovary glabrous, shortly stipitate, up to 1.5 mm long; style glabrous, up to 5 mm long. *Legume* dark yellowish- or reddish-brown to brown, straightish or slightly to strongly falcate, irregularly constricted between the seeds, often distinctly moniliform, (4.4-) 5.0-10.5 (-21.0) cm long, 0.5-0.7 (-1.1) cm wide, apex rounded to acute or acuminate, sometimes attenuate at both ends, dehiscing longitudinally, subcoriaceous, venose, usually longitudinally so, often very conspicuously, glabrous, sometimes glandular, umbonate over the seeds. *Seeds* olive-brown to reddish-brown, elliptic or lenticular, sometimes \pm quadrate or sub-orbicular, compressed, (3.5-) 4.5-6.5 (-9.0) mm x (2-) 3-4 (-7) mm wide; areole elliptic or lenticular, sometimes subcircular, 3.0-5.5 (-7.5) mm x 2.0-3.5 (-4.5) mm.

A. karroo Hayne is the most widespread *Acacia* in southern Africa (see Fig. 1). Not only is *A. karroo* widespread, but it is numerically well-represented throughout most of its range. *A. karroo*, being so widespread, has exploited many diverse habitats and is consequently an exceedingly variable species. Story in Mem. Bot. Surv. S. Afr. 27:28 (1952) noted: "The fact that *Acacia* (*A. karroo*) is South Africa's most widely distributed tree suggests strongly that it is also the least exacting in its demands, and that it would often be the first to migrate into an unfavourable area. One could also expect to find pure and permanent stands more and more strongly marked according as the areas were progressively less suited to trees — obviously as far as these areas were not too unfavourable to preclude its growth altogether." *A. karroo* has the ability to encroach rapidly into grassland grazing areas and is consequently considered a serious menace in parts of its range. Attempts to eradicate plants by chopping often result in a vigorous coppice growth. Of all the indigenous *Acacia* species, *A. karroo* appears to be subjected to the severest attacks by the wattle bagworm, *Kotochalia junodii* (Heyl.). The degree of infestation is often sufficient to kill fairly large trees.

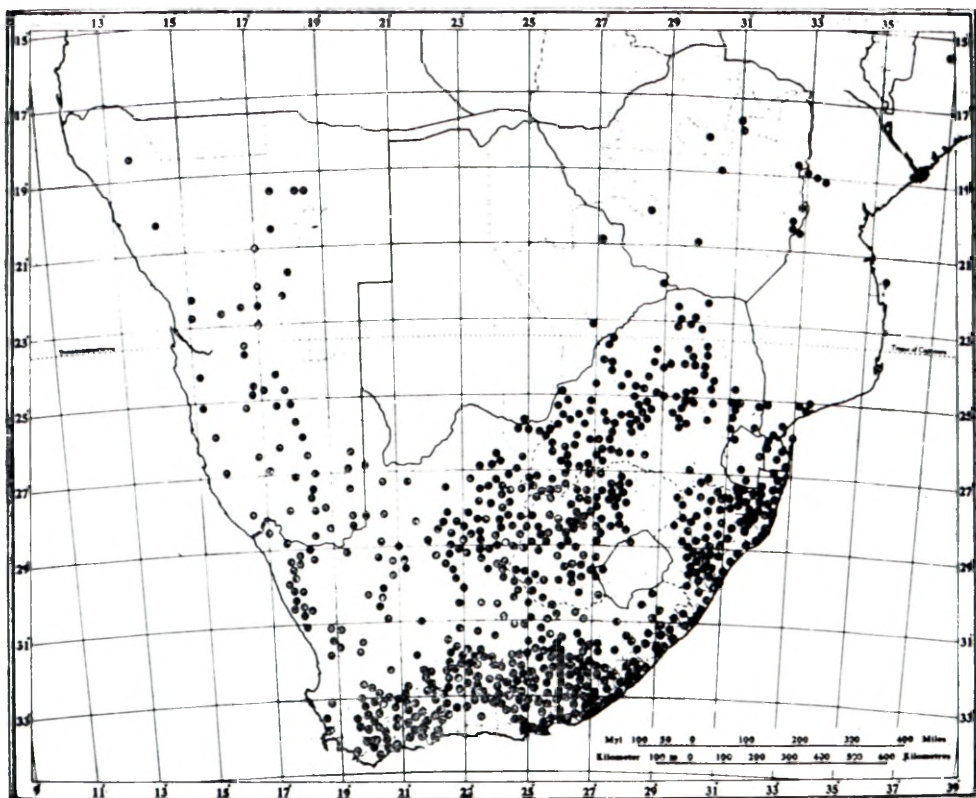


FIG. 1.—The known distribution of *A. karroo* based on an examination of herbarium specimens, field observations, on an unpublished map prepared by Acocks in 1965, and on De Winter et al. in *Sixty-Six Transvaal Trees* : 50-51 (1966).

Plants tend often to have a different "look" in various parts of the species geographical range. In the arid regions of the northern Cape and in South West Africa plants are confined to the banks of dry watercourses or other areas where underground water is available. In parts of the Transvaal plants are often exceedingly robust and are vegetatively easily confused with *A. robusta* Burch. In the reproductive phase, *A. karroo* is, however, readily distinguishable from *A. robusta* in having bright yellow flowers and much narrower, less woody pods.

A tendency of *A. karroo*, shared also by *A. seyal* Del., *A. hockii* De Willd., *A. nilotica* (L.) Willd. ex Del. and sometimes also by *A. davyi* N.E. Br., is for a few flowers to develop in the involucrel on the peduncle, sometimes giving the appearance of a smaller secondary capitulum below the main one. The flowers in this secondary capitulum in *A. karroo* often develop before those in the main capitulum. Most of these flowers are male only although in a few flowers examined the ovary was present, but the style absent. The flowers are apparently sterile, but this needs further investigation.

The relationship of *A. karroo* to the very closely related *A. hockii* and to *A. seyal* needs careful investigation. *A. seyal* is widespread in northern tropical Africa, extending to Egypt and southwards to Zambia, Malawi and Mozambique. *A. hockii* occurs from French Guinea in west Africa to the Sudan in the north

and southwards to Angola, Zambia and Mozambique. The northern limit of distribution of *A. karroo*, therefore, corresponds roughly to the southern limits of distribution of *A. seyal* and *A. hockii*. Although all three species are found in Zambia and Mozambique their ranges scarcely overlap. Brenan in Fl. Trop. E. Afr. Mimos. : 103-105 (1959) enumerates the differences between *A. seyal* and *A. hockii* whilst White in For. Fl. N. Rhod. : 85 (1962) provides descriptions of all three species.

The glandular podded *Acacia* species (*A. borleae* Burt Davy, *A. exuvialis* Verdoorn, *A. nebrownii* Burt Davy, *A. permixta* Burt Davy, *A. swazica* Burt Davy, *A. tenuispina* Verdoorn and *A. torrei* Brenan) in southern Africa all have a close affinity to *A. karroo* and appear to have been derived from the latter during earlier times. It is not clear whether each of the above species was independently derived from *A. karroo* or whether some of the species have given rise to others. Most of the species are now fairly distinct from *A. karroo*, but certain specimens cannot be referred either to *A. karroo* or to *A. tenuispina* with certainty. Codd 7040 (PRE) from north of Pienaars River (Grid. Reference: 2528 AB PRE-TORIA) was described by the collector of "possibly a hybrid between *A. karroo* and *A. tenuispina*." Some plants have the growth form of *A. tenuispina* and agree with it vegetatively but lack the glandular pods. The two species may well hybridize but this requires careful field investigations. Burt Davy 4075, 4077 (PRE) from the Springbok Flats are difficult to place. They are vegetatively very close to *A. tenuispina*, but lack glandular pods and are therefore referred to *A. karroo*.

A. karroo, therefore, is very closely related to a number of other species. It is apparently one of the least exacting in regard to habitat preference and has consequently been able to inhabit a wide range of habitats.

Before proceeding to examine the variation within *A. karroo* it is necessary to consider the value of recognizing infraspecific categories within such a widespread and variable species. Two alternatives are available: to fragment the species and accord each recognizable entity formal taxonomic status, or to recognize only one variable species with no infraspecific categories. Clearly a decision must be taken as to which of the two alternatives to follow. For ecological purposes it is useful for variants to have names for ease of reference. The significance of infraspecific "labels" is obvious in that if two variants occur in the same community the use of the same name for each will suggest a degree of similarity which may be misleading. However, the problem of identifying each entity clearly and thereby facilitating identification by other workers is often extremely difficult.

In Natal, *A. karroo* occurs from sea level to the top of the Low Berg at Van Reenen's Pass (1524 m). It is perhaps in Natal that *A. karroo* exhibits its greatest range of morphological variation. At least six entities may be recognized, namely:

1. shrubs or small trees with dark, rough bark (see Pl. 1) growing in dry thornveld or dry valley scrub;
2. large trees with dark, rough bark forming a narrow riverine fringe along the banks of streams in dry thornveld or dry valley scrub;
3. white barked trees or shrubs with short spines (*A. natalitia* E. Mey.);
4. "fire-resistant" shrubs found in northern Zululand (*A. inconflagrabilis* Gerstner);
5. slender, sparingly branched trees in Zululand (popularly termed "spindle *A. karroo*");
6. trees with whitish bark, long white spines and long, moniliform pods found along the Zuluian coast.



PLATE 1.—The rough, dark brown to brownish-black bark of *A. karroo*. Bisley, near Pietermaritzburg (2930 CB Pietermaritzburg), April, 1967.

The first two entities are comparable with specimens of *A. karroo* found in other areas of distribution and present no difficulty. The riverine plants are larger than those in the surrounding dry thornveld or valley scrub and consequently often enable the course of a stream to be detected from afar.

A. natalitia E. Mey.

E. Meyer, Comm. 1 : 167 (1835), described *A. natalitia* from specimens collected at "Port Natal et Omgeni . . . ; inter Omgaziana et Omsamwubo . . ." by Drege. Meyer held that *A. natalitia* differed from *A. karroo* in its whitish and not blackish bark, in its spines being short or nearly wanting ("*aculeis saepe brevissimis et vix ullis, numquam 9 lineas longis*"), in its more numerous pinnae (4-7) and leaflet (12-18) pairs, and in its smaller and narrower leaflets. Mr. J. P. M. Brenan, Keeper of the Herbarium and Library, Royal Botanic Gardens, Kew, to whom I am extremely grateful, informed me that there is a specimen at Kew which may possibly be an isotype of *A. natalitia*. This specimen was originally in Bentham's herbarium and bears a label reading "Acacia natalitia E. M. a." plus a bibliographical reference in Bentham's hand. There is a pencil note on the sheet by Dr. N. E. Brown reading "Port Natal Umgeni 300 ft. alt." It is thought that this specimen may be part of the first Drège gathering mentioned by Meyer (l.c.). However, the label of this specimen does not bear any collector's name and it is only inference that it is part of a Drège specimen although it must have been accepted by N. E. Brown who was probably very familiar with the early collectors. The sheet bears a type specimen label. I have not succeeded in tracing the whereabouts of the other specimen mentioned by Meyer. There are, however, specimens from Port Natal (Durban) collected by *Gueinzius* (K, PRE) and *Krauss* 66 (K) which agree with the description. A further selection of specimens, for example *Ross* 802, 803 (NU) from Uvongo (3030 CD PORT SHEPSTONE) and *Ross* 806 (K, NU) from Port Edward (3130 AA PORT EDWARD), serves to establish the identity of the entity referred to *A. natalitia* by Meyer.

Meyer (l.c.) also described *A. hirtella* from a specimen collected between Umkomaas and Umlaas. The description of *A. hirtella* differed from that of *A. natalitia* in a few minor points, namely the hairiness of the leaflets in *A. hirtella*, the presence of a gland between the first and last pinna pairs as opposed to a gland between each pinna pair in *A. natalitia*, and the somewhat acute leaflet apices in *A. hirtella* in contrast to obtuse leaflet apices in *A. natalitia*. Unfortunately I have not been able to establish the whereabouts of the type specimen of *A. hirtella*. However, the specimen *Pole Evans* in *H. Medley Wood* 12014 (BOL, NH, SAM) from Winklespruit (3030 BB PORT SHEPSTONE) serves to establish the identity of the entity referred to *A. hirtella*. Gerstner in *J. S. Afr. Bot.* 14 : 19-27 (1948) considered *A. hirtella* to be "only a young and local variety or modification of *A. natalitia*" and consequently regarded *A. hirtella* as a synonym of *A. natalitia*.

The name *A. natalitia* has been loosely applied to the variant of *A. karroo* with white bark not only in Natal but also in the eastern Cape, the Transvaal, Swaziland and Mozambique. Burt Davy, *Fl. Transv.* 2 : 347 (1932) cited several specimens of *A. natalitia* from the Transvaal, for example *Pott* 5304 (PRE) from Barberton (2531 CC KOMATIPOORT). Gerstner (l.c.), although maintaining *A. natalitia* as a distinct species, also mentioned certain specimens which he regarded as hybrids between *A. karroo* and *A. natalitia*. For example, *Gerstner* 6225 (PRE) from Chipese in the northern Transvaal (2230 CA MESSINA) which "has bark of *A. karroo*, leaves of *natalitia* . . ."

From an examination of herbarium specimens it is obvious that Gerstner studied the variation within *A. karroo* and *A. natalitia* in some detail, and over a period of years. Apparently he initially considered the variant of *A. karroo* with long spines and long moniliform pods that is found along the Zululand coast as a new species which he proposed calling "*A. psammophila*." However, on discovering that this name had been used for an Australian species, *A. psammophila* Pritz in Engl. Bot. Jahrb. 35 : 294 (1904), he adopted the name "*A. zululandensis*." He evidently then considered some specimens from the northern Transvaal, for example Gerstner 5800, 5846 (PRE) to represent a new species for which he proposed the name "*A. karrooidea* MS (= forma *suluensis* Ms)". Subsequently Gerstner united his "*A. zululandensis*" and "*A. karrooidea*" with the short-spined variants referred to *A. natalitia* by Meyer under one species which he called *A. natalitia*. *A. natalitia* in Gerstner's view in J.S. Afr. Bot. 14 : 19-27 (1948) incorporated all of the white-barked variants irrespective of their locality. The widespread application of the name *A. natalitia* for the variant of *A. karroo* with long spines and long, moniliform pods seems to originate from Gerstner's publication.

Although the pod of *A. natalitia* was unknown to Meyer, it seems quite clear to which entity he intended his "*A. natalitia*" to be applied. Meyer made special mention of the spines being very short or nearly wanting in *A. natalitia* as opposed to those of *A. karroo* as evidenced by his description. The application of the name "*A. natalitia*" for the long-spined variant with long moniliform pods seems therefore in error.

In the western and northern Cape and in the Karoo itself, *A. karroo* has usually 2-3 pinna pairs, although the range is 1-5 pairs, and 6-12 leaflets pairs. Consequently, the presence of 4-7 (up to 13 are recorded) pinna pairs and 12-18 (—24) leaflet pairs in parts of the eastern Cape, Natal, Swaziland and the eastern Transvaal suggests at first sight these characters are of importance in distinguishing the entity from *A. karroo*. However, despite this tendency of *A. natalitia* to have a greater number of pinna and leaflet pairs, when the entire range of morphological variation of *A. karroo* throughout its distributional range is examined, the differences provide no discontinuity. Consequently, *A. natalitia* is not regarded as specifically distinct from *A. karroo* nor is it maintained at infraspecific rank within *A. karroo*.

A. inconflagrabilis Gerstner

Gerstner (l.c.) described *A. inconflagrabilis* from the Nongoma district of Zululand (2731 DC LOUWSBERG). *A. inconflagrabilis* was said to be always a shrub "in the mistbelt area and transition from mistbelt to grassveld and bushveld" in contrast to its nearest relations *A. karroo* and *A. natalitia* which "grow into trees and inhabit the dry bushveld." The leaflets of *A. inconflagrabilis* were said to be shiny and narrower than in the other two species although Gerstner conceded that "Purely vegetative Herbarium specimens of these two (*A. inconflagrabilis* and *A. natalitia*), if already dried, are impossible to distinguish." The type locality is an area that is usually heavily overgrazed. Consequently, the grass cover is kept very short and at times is very scant. Grass fires, therefore, do not generate so much heat and it would be interesting to ascertain whether *A. inconflagrabilis* is indeed more fire-resistant than *A. karroo*, or whether this impression is gained because plants of *A. inconflagrabilis* are never subjected to such intense heat as are plants of *A. karroo* growing in tall grassland.

A. inconflagrabilis is not considered sufficiently distinct from *A. karroo* for retention at specific rank nor at infraspecific rank within *A. karroo*.

“Spindle *A. karroo*”

Henkel in his report on the Plant and Animal Ecology of the Hluhluwe Game Reserve : 18 (1937) referred to “a dwarf or spindly form” of *A. karroo*. Henkel wrote “This (*Dichrostachys glomerata* and dwarf *Acacia karroo* association) is the most important of the lowlands associations and covers a large area, chiefly the eastern part of the lowlands.” This variant of *A. karroo*, which has subsequently been widely known as “spindle *A. karroo*,” is also found in the Umfolozi Game Reserve, in the corridor linking both reserves and northward to Rooirand. Plants grow typically as slender, relatively unbranched trees up to 6 m high (see Pl. 2). Typically the bark is bright reddish-brown and flaking minutely, the foliage is glaucous, the petiolar gland is large, flattened and discoid, and there is a large gland between each, or almost every pinna pair. The paired spines are usually very short although often they are completely absent. A few specimens will serve to establish the identity of this variant: *Downing* 451, 452, 453 (NH, NU) from Umfolozi Game Reserve; *Bourquin* H60307, H60308 (NH) from Hluhluwe Game Reserve.



PLATE 2.—Slender, relatively unbranched specimens of “Spindle *A. karroo*” up to 6 m high. *A. caffra* (Thunb.) Willd. in foreground, *Maytenus senegalensis* (Lam.) Exell left foreground and *Ceratotherium simum; simum* Burch. centre. Hluhluwe Game Reserve (2832 AA Mtubatuba), April, 1963.

“Spindle *A. karroo*” is not as common within the Hluhluwe Reserve as “typical” *A. karroo*. However, there is a complication because “typical” *A. karroo* also tends to be slender and often only sparingly branched (see Pl. 3), especially when young, but plants ultimately become fairly well branched with a fairly



PLATE 3.—Slender, relatively unbranched young specimens of “typical” *A. karroo* up to 7 m high. *A. castra* in foreground. Corridor between Hluhluwe and Umfolozi Game Reserves (2831 BD Nkandla), March, 1964.

dense crown (see Pl. 4). The bark on these plants, although sometimes reddish-brown, is often greyish-black with a reddish-brown inner bark and the foliage only slightly glaucous as opposed to the bright reddish-brown bark and distinctly glaucous foliage in “spindle *A. karroo*.” However, these plants possess the large petiolar gland and the large glands between the pinnae exhibited by “spindle *A. karroo*” (Ross & Moll 1773).

On the badly overgrazed areas outside the southern entrance to the Hluhluwe Game Reserve plants grow as small, slender, often much-branched trees or shrubs up to 2 m high. These plants have bright reddish-brown bark that flakes minutely and glaucous foliage. However, the large flattened petiolar gland and the large glands between the pinnae that are usually associated with the glaucous foliage are absent whilst the peduncle and young pods are distinctly glandular and the latter somewhat viscid (Ross & Moll 1770).

A “spindle” growth form is also recorded (Codd 8435 in PRE) from near the Loskop Dam in the Transvaal (2529 AD WITBANK). This specimen differs from the Natal “spindle *A. karroo*” in leaf and in pod characters.

Growth form alone does not distinguish this variant, because nearly all of the *A. karroo* in the Hluhluwe Reserve has the slender relatively unbranched habit, especially when young. However, whereas “typical” *A. karroo* continues to grow and branch until it is a fairly large tree up to 10 m high “spindle *A. karroo*”



PLATE 4.—Fairly well branched, more mature specimens of “typical” *A. karroo* up to 8 m high growing together with more slender specimens. Hluhluwe Game Reserve (2832 AA Mtubatuba), March, 1964.

remains slender and seldom appears to attain a height of over 6 m. These slender plants are often subjected to fairly severe mechanical breakage during strong winds. *A. karroo* often grows in extremely dense, pure stands within the Reserve, individuals being apparently of similar age as if germination was stimulated simultaneously by some environmental factor such as an unseasonal fire.

Emphasis on the growth form of “spindle *A. karroo*” has masked what is probably a more important taxonomic character in attempting to distinguish the variant from “typical” *A. karroo*, namely the glaucous foliage. Leaflet shape is perhaps also important because in “spindle *A. karroo*” the leaflets are often broader in relation to their length than in “typical” *A. karroo*. However, this character provides no clear distinction when leaflet shape of *A. karroo* from the entire distributional range is examined.

Field observations within the Hluhluwe and Umfolozi Reserves indicate that “typical” *A. karroo* and “spindle” *A. karroo* are linked by a number of intermediates. In its typical form “spindle *A. karroo*” is readily recognizable, yet when an attempt is made to delimit it from “typical” *A. karroo*, great difficulty is encountered. This difficulty is especially apparent from an examination of herbarium specimens. It is appreciated that this inability to distinguish specimens in the herbarium does not, of course, imply that the field differences are of no consequence. There are undoubtedly differences, but the characters appear to vary



PLATE 5.— Tall, slender specimens of the variant of *A. karroo* with whitish bark, long spines and long moniliform pods, up to 20 m high and forming a dense community in dune forest. Undergrowth mainly *Isoglossa woodii* C. B. Cl. Mapelane (2832 AD Mtubatuba), Nov. 1965. Photo: E. J. Moll.



PLATE 6.—Well branched specimen of the variant with long spines and long moniliform pods, up to 5 m high and with a rounded crown. Growing on the bank of the Amatikulu river estuary in an area subject to tidal inundation. The variant is dominant on the lower slopes of the hillside in the left foreground. (2931 BA Stanger), March, 1967.

independently as inconsistent tendencies. For example, the glaucous foliage, the large petiolar gland and glands between each pinna pair appear to typify “spindle *A. karroo*.” However, in some plants the glands are present but the foliage is green whilst in others the foliage is glaucous but the glands are absent. There is a gradation in leaf colour from glaucous to semi-glaucous to green. The “spindle *A. karroo*” recorded from the Transvaal has neither markedly glaucous foliage nor large glands.

It is not intended to accord “spindle *A. karroo*” formal infraspecific taxonomic status. This decision must not be taken as an indication of uniformity with *A. karroo*. The variant is considered as a local expression of an extremely variable species. In an ecological account the variant may be distinguished by reference to it as “the spindle form” and thus convey the lack of uniformity within the communities. The term “spindle” is perhaps an unfortunate one, but the term has been so widely adopted for this variant that an attempt to substitute the term with a new one would probably merely create confusion.

The variant with long spines and long moniliform pods

This variant extends northwards along the coast of Zululand from about the mouth of the Tugela River to central Mozambique, including the offshore islands of Inhaca and Bazaruto. Plants are confined to a fairly narrow belt along the coast which is often narrower than one kilometre. They grow on the coastal plain,

amongst the coast dunes, in the mouths of many river estuaries, for example, the Amatikulu, and around the shores of the fresh water Lake Sibayi. The plants, which usually form very dense, pure stands and are dominant to the exclusion of other trees, often act as pioneers in stabilising loose sand dunes, especially in disturbed areas and in patches of regenerating coast dune forest. When growing in dense communities the plants are tall, fairly slender and relatively unbranched (see Pl. 5). In the open they are well branched with rounded crowns (see Pl. 6).

The bark is typically greyish-white or whitish, fairly smooth, often lenticellate and encrusted with crustose lichens (see Pl. 7). However, on exposed plants the bark becomes at times quite dark greyish-brown and rough. On young stems the bark is typically green with numerous white, transversely elongated lenticels whilst on the very young branches it is usually smooth and whitish although it may at times be purplish. Plants are armed with white spines that are frequently large and slightly swollen and which may attain a length of 25 cm. Many plants display persistent paired spines on the trunk, a feature not observed in any of the other variants. Some plants are exceedingly spinescent, a feature which renders them conspicuous. The view has been expressed, although not in print, that the large spines are a characteristic of this variant alone and that in other areas of distribution large spines are confined to young plants, mature plants bearing small spines. This is not true, for large spines (over 10 cm long) are found on mature plants in other areas of distribution, although largest spines are admittedly found in this variant. For example, *Ross* 640 (K, NH, NU), from near Muden (2830 CD DUNDEE) has spines up to 15 cm long. The foliage is often a dark green similar to that of *A. robusta* and there is a tendency for the glands between the pinna pairs to be slightly stalked.

None of the characters mentioned is sufficient to warrant the separation of this variant as an infraspecific entity of *A. karroo*. The smooth, whitish bark is shared by the entity referred to *A. natalitia*. Indeed, it will be recalled that Gerstner united both variants under *A. natalitia*.

This variant does, however, tend to differ from "typical" *A. karroo* in having longer and broader pods that are typically almost moniliform, larger seeds, larger areoles and longer peduncles. However, in no instance does a single character provide a clear discontinuity, the characters tending rather to occupy one extreme of the range of variation of *A. karroo*.

Although the smooth bark on the young branchlets, coupled with the above tendencies may be considered sufficiently distinctive it is not intended to accord the variant formal taxonomic status. This variant, which grows on the geologically recent sands of the Zululand coast, is in its extreme form perhaps the most distinctive of all the variants within *A. karroo*. The plants are adapted to the prevailing range of environmental conditions and are probably best regarded as an ecotypic response to this habitat. Some of the characters enabling the plants to flourish are no doubt physiological and genetical and are not primarily morphological. Consequently the differences do not manifest themselves morphologically in a manner that is sufficiently distinctive to facilitate taxonomic recognition. Further investigation is necessary and sufficient grounds may ultimately be found to accord the variant formal taxonomic status.

To date only one infraspecific category has been formally recognized. Burt Davy in *Kew Bull. Misc. Inf.* 1908 : 158 (1908) recognized var. *transvaalensis* within *A. horrida* Willd., the variety differing from typical *A. horrida* in being "pubescent on the younger parts." Burt Davy failed to nominate a type specimen for var. *transvaalensis* in this paper. Subsequently, in *Kew Bull.* 1922 : 328 (1922),



PLATE 7.— Pale greyish-white, smooth, lenticellate bark of the variant with long spines and long moniliform pods. Lake Sibayi (2732 BC Ubombo), Feb. 1968.

after learning that the correct name for the South African plants previously referred to *A. horrida* was *A. karroo*, Burt Davy transferred his var. *transvaalensis* to *A. karroo*. He maintained his variety in Fl. Transv. 2: 347 (1932) and it is here that he mentioned the syntypes *Burt Davy* 2468, 2807 for the first time. The type specimens are only sparingly pubescent and this sparse development of the indumentum is not considered sufficiently distinctive to warrant recognition at varietal rank.

In this treatment *A. karroo* has been regarded as an exceptionally variable species in which no infraspecific categories have been formally recognized. Within the species numerous biotypes are recognizable, each of which varies independently but always within certain limits, the limits of each falling within the range of variation that is accepted as *A. karroo*. Some of these biotypes, for example the variant with long spines and long moniliform pods, are more distinctive than others.

The extremes of each of the variants are usually quite distinctive and naturally it is these extremes that attract immediate attention. However, it has been found that the extremes of each variant are linked to the "central *A. karroo* gene-pool" by numerous and varied intermediate stages that become progressively less and less distinct until a stage is reached where it becomes extremely difficult to assign specimens to any particular entity with any degree of certainty. It has consequently been considered of dubious value to fragment such an inherently variable species into a number of taxonomic entities. Examination of *A. karroo* suggests that the *A. karroo* gene-pool is an ancient one, and one that has continually been able to adapt itself to new habitats. *A. karroo* is apparently one of the least exacting species in regard to habitat preference, a feature that enabled the species to inhabit a diverse range of habitats.

Acknowledgements

I am very grateful to Dr. L. E. Codd, Chief, Botanical Research Institute, for some valuable suggestions, for advice and for comments; Dr. H. Schulz of the Botanischer Garten und Museum, Berlin-Dahlem, for information relating to Vieweg, and to Dr. K. D. Gordon-Gray of the Bews Botanical Laboratories, University of Natal, Pietermaritzburg, for reading and commenting on the original manuscript.