

Notes on the genus *Cussonia* in South Africa

R. G. STREY*

ABSTRACT

Information gathered during studies of the genus *Cussonia* under field conditions is presented. The development of the inflorescences, and branch and leaf initiation, is given special attention. The subdivision of the genus *Cussonia* is discussed and the following new subgeneric taxa are created: Subgenus *Cussonia* (type species: *C. spicata* Thunb.) with two sections: Sect. *Cussonia* and Sect. *Capitata* Strey; Subgenus *Paniculata* Strey (type species: *C. paniculata* Eckl. & Zeyh.); Subgenus *Protocussonia* (type species: *C. natalensis* Sond.). It is pointed out that the names *C. kraussii* Hochst. and *C. chartacea* Schinz have been misapplied to two undescribed species, and are synonyms of *C. spicata* Thunb. and *Schefflera umbellifera* (Sond.) Baill., respectively. Four new species are described viz. *C. arenicola* Strey, *C. zuluensis* Strey, *C. nicholsonii* Strey and *C. sphaerocephala* Strey.

INTRODUCTION

In the course of studies of the genus *Cussonia* a number of interesting facts emerged, especially from the field studies that were undertaken. Several of these features, particularly the development of the inflorescence, the mode of flowering and the renewal of vegetative growth after flowering, have apparently not been recorded before and are therefore discussed in the following pages. It was also discovered that two names had been misapplied and that the species masquerading under these names were new and required to be described. In addition, two new species were identified and are described here. I am indebted to Dr D. J. B. Killick for the Latin descriptions. The majority of specimens studied are deposited in the National Herbarium, Pretoria, and Natal Herbarium, Durban. Those seen in other herbaria are specially indicated.

FIELD STUDIES

The development of the inflorescence

In all species of *Cussonia* the structures bearing the flowers are borne in clusters at the apices of branches or in some cases even at the apices of fairly thick trunks. These clusters usually consist of a few to many peduncled spikes, racemes or even panicles originating in the axils of the apical bracts which are numerous and in dormant branches completely cover the apices. At the beginning of a new season when the trees start sprouting it is soon evident that branch apices either produce a new flush of leaves or somewhat more slowly develop inflorescences. Leaves and inflorescences are seldom, if ever, simultaneously produced at the apex of the same branch. Whereas branches producing inflorescences may be leafy, these leaves are almost invariably produced during the previous season and are usually shed before the inflorescences are mature. Mature and particularly fruiting inflorescences are therefore borne at the apices of bare branches. In all the species studied, the clusters of pedunculate flower-bearing branches together form an apical compound inflorescence, since no normal leaves are produced

by the bract-covered apices from which the inflorescence-branches develop. The development of the inflorescence of two of the species studied differs fundamentally from the pattern displayed by the others. In most species the inflorescence bud initials are laid down in the bract-covered apices of some of the branches towards the end of the growing season and develop from these usually in the following spring. The situation in *Cussonia spicata* and *C. sphaerocephala* is quite different. Instead of producing inflorescences, an "umbel" of fairly slender leafy branches is produced at the apex of a trunk during the first season. Each branch has a knob-like thickening covered with bracts, at the apex. Only during the following season are inflorescences produced at the apices of these branches. Since the leafy branches formed during the first season lose their year-old leaves, as soon as the inflorescences start developing, the final structure resembles a compound "umbel" at the end of the second season. These pseudo-inflorescences are therefore biennial structures in contrast to the inflorescences produced by other species which develop in one year.

The flowers and fruits

The fully-developed flowerbuds open up in irregular sequence on almost any parts of the spikes or racemes, at the base or the apex or at the middle, and in addition one side of the spike may be in full flower when no flowers have opened on the other side. Flowers at various stages of development are therefore found irregularly grouped in the inflorescences. The open flowers are star-shaped with the petals and stamens stiffly spreading. The petals and stamens are very easily detached and are never preserved *in situ* in dried specimens.

Newly opened flowers are greenish-cream to butter-yellow in colour, the top of the ovary green, the stigmas pale and erect and the anthers yellow. As the flower ages the petals and stamens drop, the top of the ovary becomes yellow and exudes a shiny, sticky fluid which attracts insects, the stigmas become darker and the styles recurve. It is probably at this stage that pollination is effected by the various types of insects found on the flowers, including bees, flies and beetles. Not all ovaries are fertilized. The ones

*Botanical Research Unit, Botanic Gardens Road, Durban.

that are fertile increase in size and develop a fleshy purple exocarp attractive to birds. Each fruit contains one to two seeds. Unfertilized and parasitized ovaries may develop but remain dry and hollow structures. Mature inflorescences are attacked by insects and the stem-apex in particular seems susceptible. When the stem-apex has decayed, the whole inflorescence breaks off and drops to the ground.

The formation of new branches

The apices of the stems which have fruited and have subsequently lost the inflorescences, are now usually more or less truncate and dry out, or develop a certain amount of callus-tissue. These truncated branches and trunks eventually produce side-shoots which continue the growth of the branch. It appears that side-shoots are seldom formed on actively growing vegetative branches and trunks in the sparingly branched species such as *C. spicata* and *C. sphaerocephala*, but that usually one, rarely more, side-branches are formed after the growth of a trunk or branch has been temporarily halted by production of an inflorescence or by injury. In species which by nature have a more branched habit, such as *C. natalensis*, several shoots originate from dormant buds after the inflorescences have been discarded.

Leaf-form and development

The leaves, which in all species are clustered at the ends of branches, are, in most species, produced in flushes. The young leaves mature and usually remain on the tree for a full year. Old leaves lower on the stems are gradually cast off after a new flush of leaves has appeared so that the clusters are always situated apically. Usually only one flush of leaves per year is produced. Renewal of leaves, as also the production of inflorescences, is not only seasonally determined and may vary from tree to tree.

In shape the leaves vary from simple and deeply lobed to singly or doubly compound. The leaflets of the compound leaf are arranged digitately (like the spokes of a wheel) round the apex of the peduncle. They spread in one plane and at an angle to the peduncle forming a fan-like structure, sub-circular in outline. The individual leaflets are vertebrate, a term first used by Mirbel (1815, p. 655) for leaves of *Cussonia spicata*. These leaflets resemble pinnae with the rachillas very broadly winged. The leaf therefore is a doubly compound structure with the first division digitately compound the second vertebrate or rarely doubly vertebrate. The leaflets are arranged in pairs, lower pairs being the least developed and the single terminal leaflet showing the

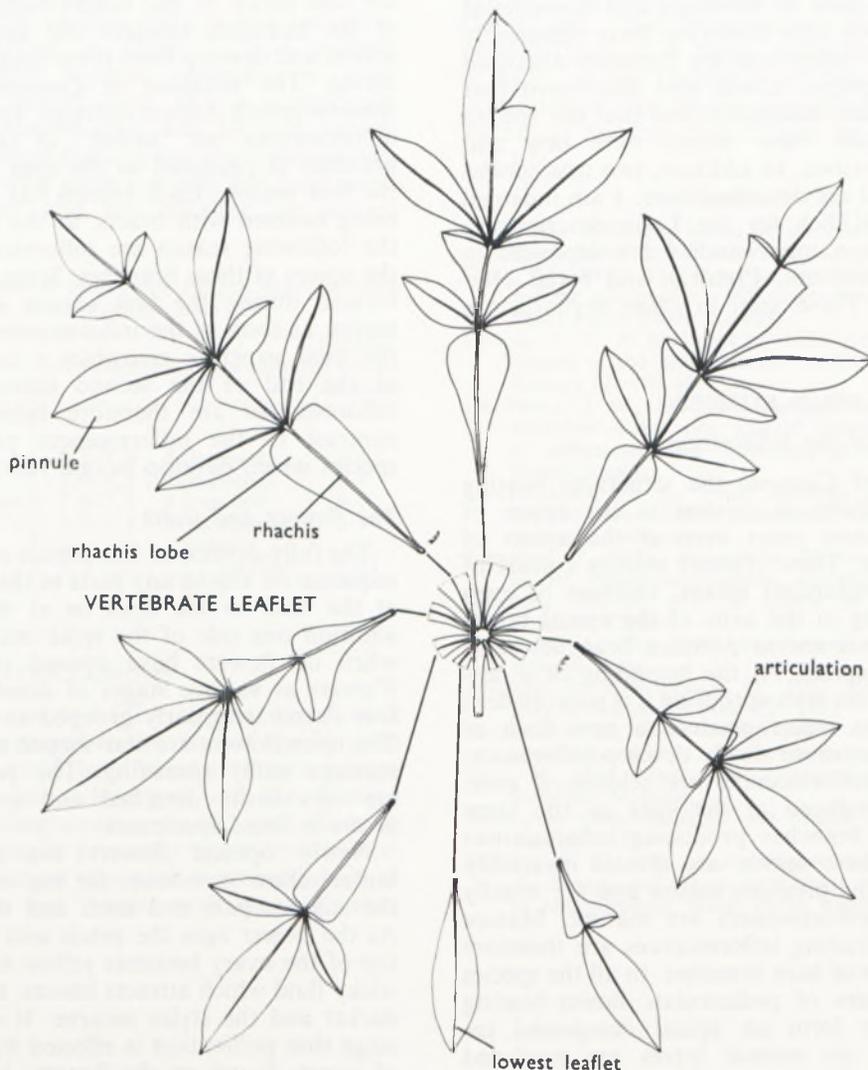


FIG. 1.—Semi-diagrammatic drawing of a leaf of *Cussonia spicata* to illustrate the terminology used in this paper.

most elaborate development. The vertebrate leaflets have 1–5 articulations, characterized by turgid green papillate scales on the lower surface. These scales may represent reduced bracts. At these articulations the pinnules are attached. The articulations may be devoid of pinnules, or bear two, four or six pinnules arranged in a whorl, the numbers increasing progressively upwards. The terminal pinnules of the vertebrae usually repeat the form of the lowest leaflet, if this is a simple structure. Because of the size of the compound leaves, only single leaflets are usually represented in herbaria and the leaf-structure is usually not fully understood. In Fig. 1 a complete leaf of *C. spicata* is semi-diagrammatically represented. This figure also serves as a reference to the terminology used in this paper.

Bark, wood and roots

The wood is soft, light, very coarse and fibrous and the branches have a distinct pith. The bark of most species is thick and corky and usually fissured, but it is thinner and less corky and more smooth in forest trees. The roots of all species investigated are thick, fleshy and frequently tuberous. Depending on the species the roots may form a single large tuber, may be thick and fleshy or produce a series of tuberous swellings along their length. Such roots are often used as a source of water by animals and also by man.

CLASSIFICATION AND SUBDIVISIONS OF THE GENUS *CUSSONIA*

The family Araliaceae to which *Cussonia* belongs is represented in South Africa by three genera. *Seemannaralia gerrardii* (Seemann) Vig. and *Schefflera umbellifera* (Sond.) Baill. were formerly both included in *Cussonia* but now are the sole representatives in South Africa of the genera to which they have been transferred. *Seemannaralia* (a monotypic genus) is not closely related to *Cussonia* and needs further study to confirm its inclusion in the Araliaceae. *Schefflera umbellifera* has a much closer relationship to *Cussonia*. It was recently removed to *Neocussonia* by Hutchinson (1967, p. 79). I prefer to follow Bernardi (1969, p. 92) who confirmed that it and other related species, should be placed in the genus *Schefflera* as was done by Baillon as early as 1878.

When the South African species of *Cussonia* are considered it is soon evident that they do not form a homogeneous assemblage of species, but may be divided into several groups of closely related species. Hutchinson selected *C. spicata* Thunb. as the lectotype species of the genus and his typification is here accepted. The species most closely related to *C. spicata* is *C. sphaerocephala* Strey which is newly described in this paper. Therefore these two species represent typical *Cussonia*.

The development of the inflorescences in the latter two species is described in detail earlier in this paper and distinguishes them from the following species which, in other respects are closely related to them, namely, *C. thyrsoflora* Thunb., *C. arenicola* Strey, *C. nicholsonii* Strey and *C. zuluensis* Strey. All the previously mentioned species have the following characteristics in common: they bear fairly large pedunculate spikes or racemes in terminal compound inflorescences on relatively sparsely branched plants; their leaves are mostly doubly compound and the leaflets of the vertebrate type, except for *C. thyrsoflora* which usually has simple leaflets.

A second distinct group is represented by only one species, namely, *C. paniculata* Eckl. & Zeyh. which may be distinguished from all other species by the paniculate branches of the inflorescence and the elongate simple, shallowly to deeply lobed leaflets which are never vertebrate.

The third group is composed of species which have palmatifid, palmatisect or digitately compound leaves. There seems to be a somewhat gradual transition from palmatilobed—palmatifid—palmatisect—digitately compound leaves (see also Aitken, 1923, p. 58), and a further division of the species into two groups, one possessing simple lobed leaves (e.g. *C. natalensis*) and a group possessing compound palmatisect or digitate leaves was contemplated but abandoned.

The following subgenera and sections are described to accommodate the South African species of the genus. It seems likely that most of the tropical species can, without much difficulty, be accommodated in these subdivisions.

***Cussonia* Thunb.** in Nova Acta R. Soc. Sci. 3: 210–213 (1780); Harms in Pflanzenfam. 3, 8: 1 (1894) pro parte, excl. Sect. *Neocussonia* Harms; Phill. Gen. Ed 2: 545 (1951); Hutch. Gen. Fl. Pl. 2: 57 (1967). Type species: *C. spicata* Thunb.

Subgen. *Cussonia*

Trees or shrubs usually only sparsely branched, roots swollen, fleshy, leaves palmatisect or twice compound with the leaflets vertebrate in arrangement; seeds plano-convex.

Sect. *Cussonia*

Trees, terminal pseudoinflorescence a double umbel consisting of a number of pedunculate spikes arranged at the apex of bare, somewhat flattened vegetative branches formed the previous season.

Species included: *C. spicata* Thunb., *C. sphaerocephala* Strey.

Sect. *Capitata* Strey, sect. nov.

Arbores vel frutices; inflorescentia terminalis umbellata ex spicis vel racemis pluribus pedunculatis ex apice bracteato caulium exorientibus constans.

Type species: *C. thyrsoflora* Thunb.

Other species included: *C. arenicola* Strey, *C. nicholsonii* Strey, *C. zuluensis* Strey.

Subgen. *Paniculata* Strey, subgen. nov.

Arbores; folia digitato-composita marginibus foliorum non profunde ad profunde sed non ad rhachim lobatis; inflorescentia terminalis umbellata ex spicis pluribus pedunculatis ex apice bracteato caulium exorientibus constans.

Type species: *C. paniculata* Eckl. & Zeyh.

This subgenus is monotypic.

Subgen. *Protocussonia* Strey, subgen. nov.

Arbores; folia simplicia palmato-lobata (vel digitato-composita) foliolis sessilibus vel petiolatis; inflorescentia ex spicis vel racemis pluribus sessilibus vel breviter pedunculatis in pseudo-umbella terminali ad apicem ramulorum dispositis constans; semina subglobosa.

Type species: *C. natalensis* Sond.

Other species included: *C. natalensis* Sond., *C. arborea* Hochst. ex A. Rich., *C. angolensis* Hiern, *C. holstii* Harms ex Engl. and others.

MISAPPLIED NAMES

During the investigation it was found that two names of long standing were misapplied and should be relegated to synonymy. The specimens to which these two names were applied, represent three distinct undescribed species.

Cussonia kraussii Hochst. in Flora 27: 431 (1844).

The material on which the description of this species was based was collected by Krauss at the Geelbeck's River near George. The Geelbeck's River is today called Geelbeck's Vlei as it is no longer the perennial stream of former times. It is a tributary of the Klein Brak River situated between Mosselbay and George. Only *Cussonia spicata* is found in this region and an investigation of the type of *C. kraussii*, which we had on loan from Zurich (photo, PRE), confirmed its identity with this species. It is therefore a synonym of *C. spicata* Thunb. In South African herbaria the specimens placed under *C. kraussii* were all from Natal, an error probably caused by the erroneous citation of a single specimen collected by Gueinzus at Port Natal in the Flora Capensis (1862, p. 569) as *C. kraussii*. An examination of these specimens revealed that two distinct species were represented in the material. These two species are here described as *C. nicholsonii* Strey and *C. zuluensis* Strey.

Cussonia chartacea Schinz in Bull. Herb. Boiss. 2: 211 (1894).

An examination of the type, Rehmann 8096 from Umbilo, Natal, showed that it represents a juvenile leaf of *Schefflera umbellifera* (Sond.) Baill. of which *Cussonia umbellifera* Sond. is the basionym. The name was, however, probably due to the lack of floral parts, misapplied by Harms (1921, p. 784) and by Engler. Engler stated that he collected it himself "um Kearney bei Stander in Natal" an obvious error for "Kearsney near Stanger", and applied the name to the tall, little branched species, with globose apical clusters of leaves, fairly commonly found in Natal forests. Specimens of this species are as a result frequently found under the name *C. chartacea* in South African herbaria, but in fact represents an undescribed species closely related to *C. spicata*, here described as *C. sphaerocephala* Strey.

NEW SPECIES OF *CUSSONIA*

Cussonia arenicola Strey, sp. nov., *C. thyrsoiflorae* Thunb. affinis, sed caulibus gracilioribus unicus erectis ex basi tuberosa unica turbinata ovoidea vel globosa exorientibus, foliolis vertebratis, floribus fructibusque parvioribus cupiformibus differt.

Fruticulus ligneus caule unico ex basi tuberosa unica turbinata ovoidea vel globosa exorienti. Folia digitato-composita ad apices ramorum exorientia; stipulae c. 2 mm longae, interpetiolares basi junctae ad petiolum adnatae; foliola (4)–7–(12), vertebrata, 6–18 cm longa; petioli brevissimi; rhachilla late lobata, lobis obtriangularibus vel obhastatis, pinnulis sessilibus ovatis oblanceolatis obovatis vel trullatis marginibus serratis apice mucronato. Inflorescentia ex racemis pedunculatis constans; racemi caulium apice bracteato clavato umbellati. Flores breviter pedicellati; bractae unicae, subulatae. Calyx oram

lobis 5 minutis redactus. Petala 5, ovata, valvata. Stamina 5, caduca; antherae ovoideae versatiles. Ovarium 2-loculare; stylus brevissimus, stigmatibus 2 patentibus persistentibus. FIG. 2.

Type: Natal, 2632 CD (Bella Vista): at Makane, Nov. 1970, Strey 10283 (PRE, holo.; NH).

Single-stemmed shrubs, 1–2 m high; stems 1–2 cm thick, arising singly from a globose, ovoid or turbinate tuber; basal tubers up to 14 cm broad and up to 25 cm long often several spaced along a single root; bark smooth greenish or grey. Leaves glabrous or with scattered scale-like papillae at the articulations, twice compound, first division digitate, bearing vertebrate leaflets; petiole ribbed, terete, up to 25 cm long, 2–4 mm thick; stipules intrapetiolar, joined at the base, adnate to the base of the petiole, lobes 2–3 mm long; limb of the leaf sub-circular in outline, about 20 cm in diam.; leaflets 4–7(12) per leaf, 6–18 cm long, chartaceous, dark green above, dull green beneath, margin revolute, serrate, 1–3 times vertebrate, petiolules about 1(2) cm long, usually narrowly winged, rhachilla wings obtriangular to obhastate; pinnules up to 9 cm long and 2–4 cm wide, sessile, 1–5, obovate-oblanceolate, or trullate, base cuneate, rounded, acute or apiculate. Inflorescence a terminal umbel consisting of (5)8–15(23) pedunculate, dense, cylindrical racemes arranged on the often distinctly swollen, bracteate, apex of the stems; peduncles of the racemes 3–18 cm long, (1)–2–4 mm thick; bracts subtending the peduncles binate, up to 1 cm long; racemes 3–9 cm long, 8–14 mm broad. Pedicels 1–2 mm long; bracts subtending flowers subulate, 2 mm long. Flowers loosely spirally arranged, white to greenish cream. Calyx reduced to a 4-toothed rim. Petals broadly ovate, caducous. Stamens about as long as the petals, caducous; anthers ovoid, introrse, versatile. Ovary inferior, 2-loculed; disc conical; style about 1 mm long, stigmas 2, divergent. Fruit 2 (1) seeded, barrel-shaped, about 4 × 4 mm, exocarp mauve and fleshy when ripe, calyx rim and styles persistent. Seed globose to subglobose, about 3 mm long; raphe with ovate areole; endosperm ruminant.

A species mainly found on the coastal sand-dunes of northern Natal but occasionally further inland in sand forest (Fig. 3). The specific epithet *arenicola* meaning "dwelling on sand" was applied to this species, because it is the only species which is confined to sandy habitats.

MOZAMBIQUE.—2532 (Lourenco Marques): (–DC), Borle 157; Lourenco Marques (–DC), Borle 204; Polana (–DC), Borle 553; Santaca (–DD), Gomes e Souza; Inhaca Island (–DD), Moss J. 28163; Breyer 20507; Mogg 28013; Mogg 25/32; Mauve & Verdoorn 88; Moss J. 27535 & 28164.

NATAL.—2632 (Bella Vista): (–CC), Moll 4372A (NH, K); Ndumu Game Reserve (–CC), De Moor 24; Makane Location (–CD), Strey 9810 & 10283 (NH, K); do., Ross 2369 (NH); do., Moll 5008 (NH, K); Kosi Bay (–DD), Strey & Moll 3845 & 3848 (NH); do., Ross & Moll 5100 (NH, K); do., Strey 10326, 10434, 10435 & 10436 (NH, K). 2732 (Ubombo): Manzengwenya (–BA), Ross & Moll 5103 & 5076 (NH, K); do., Strey 10453 (NH, K); Sibaya (–BC), Sibaya Project 35/ (NH); do., (–BC), Strey 10300 (NH, K); Sordwana Bay (–DA), Strey & Moll 3954 (NH, K); South of Sordwana Bay (–DA), Strey 10465 & 10466 (NH, K). 2832 (Mtubatuba): Bangazi Pan, Cape Vidal (–BA), Edwards 4288 (NH, K).

For differences from *C. zuluensis* see notes under that species.

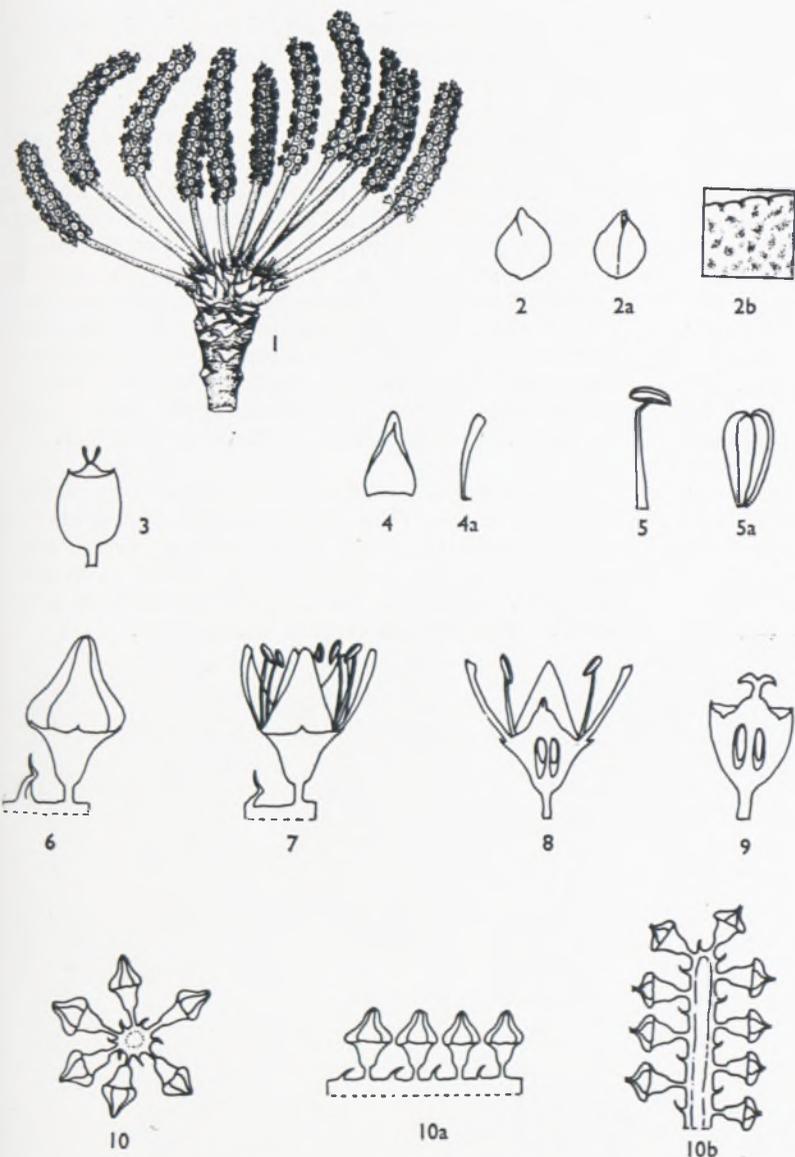


FIG. 2.—1, *Cussonia arenicola*, inflorescence $\times \frac{1}{2}$ (Strey 10283); 2, seed, front view $\times 1\frac{1}{2}$; 2a, seed, back view $\times 1\frac{1}{2}$; 2b, enlargement of surface of seed $\times 5$; 3, fruit $\times 1\frac{1}{2}$; 4, petal, front view $\times 3$; 4a, petal, side view $\times 3$; 5, stamen $\times 3$; 5a, anther $\times 4\frac{1}{2}$; 6, flower bud and bract $\times 3$; 7, flower; 8, longitudinal section of flower at anthesis $\times 3$; 9, longitudinal section of mature flower $\times 3$; 10, cross section of raceme; 10a–10b longitudinal sections of inflorescence $\times 1\frac{1}{2}$.

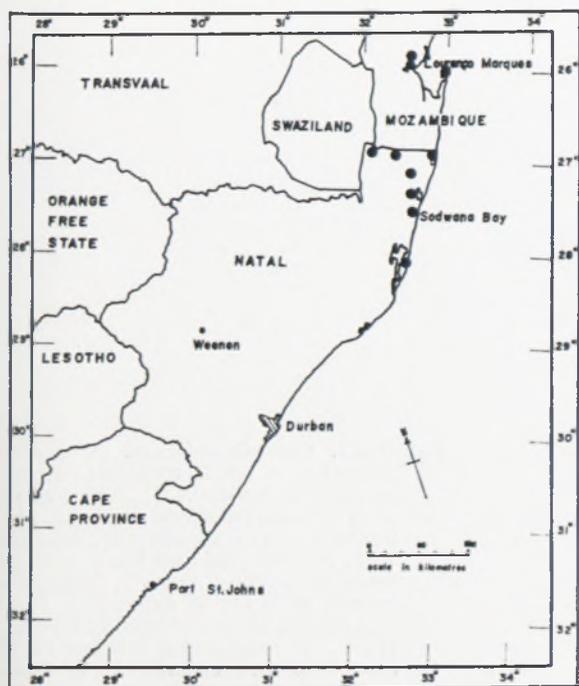


FIG. 3.—Distribution of *Cussonia arenicola*.

Cussonia zuluensis Strey, sp. nov., *C. thyrsoiflorae* Thunb. affinis, sed arboribus parvis, foliis bicompositis foliolis vertebratis 8–12 differt.

Arbores parvae multicaulescentes ad 4 m altae; radices tumoribus fusiformibus. *Folia* in fasciculis terminalibus disposita, bicomposita, divisione prima digitata; foliola 1 vel 2-vertebrata. *Inflorescentia* ex fasciculo terminali racemis pedunculatis constans; racemi 8–26, caulium apice tumido bracteato subumbellati; pedunculi 20–35 cm longi, partibus floriferis teretis 20–30 cm longis 3–5 cm diam. *Flores* pedicellati, spiraliter dispositi; pedicelli 1–3 cm longi, bracteis subulatis subtentis. *Calyx* minute 5-dentatus. *Petala* 5, valvata. *Stamina* 5, petalis alternantia. *Fructus* poculiformes; exocarpium carnosum. *Semen* 1, albumine ruminato. FIG. 4.

Type: Natal, 2831BB (Nkandhla): Mbabasi River, Strey 9822 (PRE, holo.; NH, K).

Small trees with several stems, up to 4 m high, trunks 2–5 cm thick, rarely branched; wood coarse, long-fibrous, pithed; bark smooth, flaking, grey-green; roots tuberous, with fleshy fusiform swellings. *Leaves* twice (rarely thrice) compound, first division digitate, bearing vertebrate leaflets; petiole terete, 20–30 cm long, (2)3–3,5(4) mm thick ribbed, glabrous.

stipules intrapetiolar, adnate to the base of the petiole and joined to each other at the base, up to 4 cm long, glabrous or hairy; leaflets spreading at an angle to the petiole, the whole sub-circular in outline, up to 30 cm in diam.; leaflets 8–12 per leaf, vertebrate or twice or thrice vertebrate (rarely simple) chartaceous, thickly coriaceous when mature, glossy green above, dark green beneath; 15–25 cm long, with 1–5 articulations, scaly-papillate at the articulations, petioles 5–10 cm long, occasionally narrowly winged, rhachilla wings obtriangular to obhastate; pinnules 3–10 cm long, lanceolate, broadly ovate, obovate or oblong, base cuneate, margins sparsely to distinctly serrate, apex mucronate. *Inflorescence* a terminal umbel, consisting of 8–26 pedunculate fairly dense, cylindrical racemes arranged on much abbreviated club-shaped, bracteate apices of the stems; peduncles of racemes 20–35 cm long; bracts subtending the peduncles joined at the base and adnate to the peduncle, bilobed, up to 3 cm long, often hairy, carinate, caducous; racemes 20–30 cm long, 3–5 cm in diameter. *Pedicels* slender, 0.7–3 cm long; bracts subulate, 5–8 mm long. *Flowers*

loosely spirally arranged fairly densely in the racemes, but not compacted, buds sphaeroid 5–10 mm long; petals in bud about equal or slightly longer than the ovary. *Calyx* reduced to a 5-toothed rim. *Petals* 5, deltoid, greenish white, acute, spreading and starlike when open, caducous. *Stamens* 5, spreading-erect alternating with the petals; filaments as long as the petals, white; anthers oblong, introrse, versatile, caducous. *Ovary* 2-loculed, broadly oblong 3–4 mm long and 2.5–3 mm wide; disc conical, raised, ribbed; style 2, spreading, eventually recurved. *Fruits* 1(2)-seeded, 5–8 mm long and 3–5 mm wide, goblet-shaped, exocarp mauve, fleshy when ripe, calyx and styles persistent. *Seeds* triangular in outline, planoconvex, rugose, crested in upper third; raphe ending in an ovate areole, endosperm ruminant.

A species found in the coastal areas from Durban to Mozambique (Fig. 5). It inhabits dry scrub and open dry forest, often found in the river valleys and occurs in the thornveld as far inland as Weenen in Natal. Specimens from riverine bush have larger leaves which are less divided and greener.

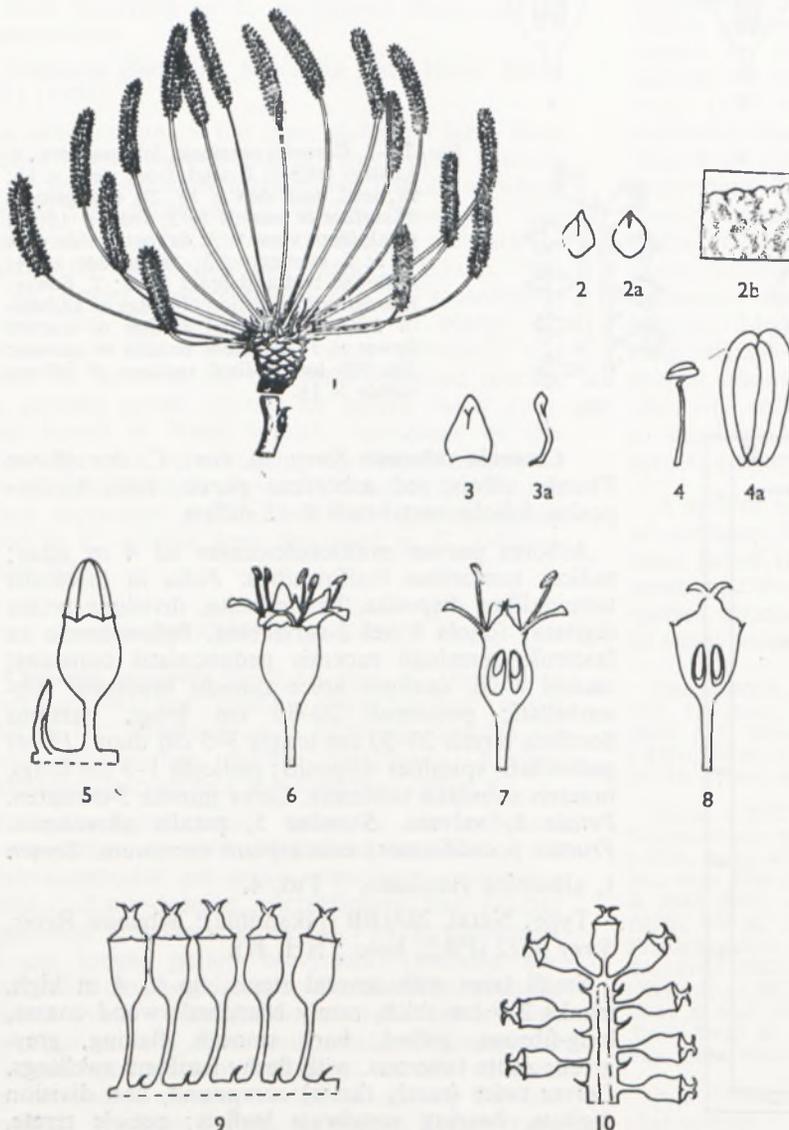


FIG. 4.—1, *Cussonia zuluensis*, inflorescence reduced to $\times 1/6$; 2, seed front view $\times \frac{1}{2}$; 2a, seed, back view $\times \frac{1}{2}$; 2b seed surface $\times 5$; 3, petal, front view $\times 1\frac{1}{2}$; 3a, petal, side view $\times 1\frac{1}{2}$; 4, stamen $\times 1\frac{1}{2}$; 4a, anther $\times 5$; 5 flower bud and bract $\times 1\frac{1}{2}$; 6, flower at anthesis $\times 1\frac{1}{2}$; 7, longitudinal section of flower at anthesis $\times 1\frac{1}{2}$; 8, longitudinal section of mature flower $\times 1\frac{1}{2}$; 9, 10 longitudinal sections of the racemes to show arrangement of flowers $\times \frac{1}{2}$.

SWAZILAND.—2631 (Mbabane): Manzini, (-DA), *Compton* 32011.

MOZAMBIQUE.—2632 (Bella Vista): Catembe, (-BA), *Borle* 113 & 496; Maputa, (-DC), *Hornby* 2669.

NATAL.—2731 (Louwsburg): A.T.S. Farm, Pongola (-BD), *Moll* 5474, 5478 & 5479 (NH, K); Rooirand (-DB), *Strey* 9821 (NH, K); Rooirand, Mkuzi-Nongoma road (-DB), *Strey* 1467 (NH, K); Mkuzi-Nongoma main road 12 miles from Mkuzi (-DB), *Bower* 4; 10 miles from Mkuzi Railway Station on Mkuzi-Nongoma main road (-DB), *Bower* 1; 2732 (Ubombo): False Bay (-CD), *Gerstner* (NH); Gwaliweni forest (-AC), *Moll* 4486 (NH); 2830 (Dundee): Weenen (-CC), *Pentz* 2831 Nkandhla (-DB), *Codd* 1418; Inadi River and Tugela River junction north of Greytown (-DC), *Dyer* 4387 I; Enseleni, Richards Bay (-CA), *Strey* 9914 (NH, K); Inadi River and Tugela River junction north of Greytown (-DC), *Dyer* 4387 II (NH); 2930 (Pietermaritzburg): Edge of Mooi River near Greytown (-AB), *Acocks* 11587 (NH); 3 miles from Mandini off Tugela Mouth road, Mtunzini district (-AB), *Edwards* 1626; Town Hill (-CB), *Bayer s.n.* (NH); 2931 (Stanger): Tugela valley, Mapumulo (-AD), *West* 1878 (NH); Lower Tugela (-AA), *Stewart* 42 (NH); Lower Tugela (-AA), *Edwards* 3138 I & II (NH); Nonoti (-AD), *Wood* 3867 (NH); 2831 (Nkandhla): White Umfolosi bridge (-AA), *Strey* 10492 (NH, K); Mbabazi River (-AB), *Strey* 9822 & 9824 (NH, K); Black Umfolosi near Keza, (-AB), *Strey* 1944 (NH, K); Mhlabatini (-AB), *Gerstner s.n.*; Hill between Mhlabatini and Black Umfolosi River (-AB), *Verdoorn* 1726; Hlabisa (-BB), *Strey* 56166 (NH); Msuzi River banks (-CA), *L. E. Codd* 1418; I. Scott Barnes' farm (-DB), *Moll* 4962 & 4968 (NH, K); Umlalazi Nature Reserve (-DB), *Moll* 4984 (NH, K); Umhlatuzi Valley, (-DD), *J. G. Lawn* 524 (NH); 2832 (Mtubatuba): Hlabisa (-AA), *Ward* 2171 (NH); Hluhluwe State Dam (-AA), *Ward* 5615 (NH); Hlabisa, Palm Ridge Farm (-AC), *Harrison* 449 (NH); Charter's Creek on Lake St. Lucia (-AB), *De Winter* 8724; Hluhluwe (-AB), *Strey* 7355.

small tree with several erect stems, *C. thyrsoflora* is a scandent scrambler with more or less patent branches.

From *C. nicholsonii* it differs by the pedicellate (not sessile) flowers, the less dense inflorescence and the shape of the fruits which have a rounded, not cuneate base.

Differs from *C. arenicola* by the cluster of tubers producing a number of stems set closely together and by the differently shaped fruits, those of *C. zuluensis* being goblet-shaped and vertically grooved between the locules.

The name is derived from the area to which it is mainly confined, namely Zululand in northern Natal.

Cussonia nicholsonii Strey, sp. nov., *C. zuluensis* Strey affinis, sed floribus fructibusque sessilibus cuneiformibus differt.

Arbores parvae multicaulescentes ad 3 m altae; radices tumoribus tuberosis. *Folia* in fasciculis terminalibus disposita, bis vel ter composita, divisione prima digitata; foliola 1-3-vertebrata. *Inflorescentia* ex fasciculo terminali spicis pedunculatis constans; spicae 8, caulium apice tumido bracteato subumbellatae, 5-12 cm longae, 3-4 cm diam.; pedunculi tereti, 6-22 cm longi. *Flores* sessiles vel fere sessiles, spiralter disposita, bracteis subulatis subtentis. *Calyx* 5-dentatus. *Petala* 5, valvata. *Stamina* 5, petalis alternantia. *Fructus* cuneiformes; exocarpium carnosum. *Semen* 1, albumine ruminato. FIG. 6.

Type: Natal, 3030CB (Port Shepstone): Gibraltar, *Strey* 10025 (PRE, holo.; NH, K, NU).

Small trees with several stems, up to 3 m tall, trunks 3-6 cm thick, rarely branched; wood coarse, long-fibrous, pithed; bark smooth, flaking, reddish-grey to grey; roots tuberous with fleshy fusiform swellings. *Leaves* twice compound, first division digitate, bearing vertebrate leaflets; petiole terete, 20-30 cm long, 6 mm thick, ribbed, glabrous; stipules intrapetiolar, adnate to the base of the petiole and joined to each other at the base, up to 4 cm long, hairy; leaflets spreading at an angle to the petiole, the whole sub-circular in outline, up to 30 cm in diam.; leaflets (5)-7-9-(11) per leaf, vertebrate to thrice vertebrate, rarely simple, chartaceous, thickly coriaceous when mature, glossy-green above, dark green beneath, 10-20 cm long, with 1-3 articulations, papillate-scaly at the articulations, petiolules 3-5 cm long, occasionally winged; rhachilla wings obtriangular to obhastate; pinnules up to 10 cm long, 2-4 cm broad, oblong or obovate, broadly ovate, base cuneate, margins sparsely serrate to distinctly serrate, rarely entire, mucronate. *Inflorescence* a terminal umbel, consisting of 8-30 pedunculate dense, cylindrical spikes arranged on the much abbreviated club-shaped, bracteate apex of the stem; peduncles of spikes 6-22 cm long; bracts subtending the peduncles joined at the base and adnate to the peduncle, bilobed, up to 3 cm long, caducous; spikes 5-12 cm long, 3-4 cm in diameter, bracts subulate, up to 10 mm long. *Flowers* sessile or subsessile, spirally arranged, densely compacted, buds slightly domed; calyx reduced to a 5-toothed rim. *Petals* 5, valvate, deltoid-acuminate, yellowish green; caducous. *Stamens* 5, alternating with the petals; filaments as long as the petals; anthers oblong, introrse, versatile, caducous. *Ovary* 2-loculed, wedge-shaped, styles



FIG. 5.—Distribution of *Cussonia zuluensis*.

C. zuluensis is usually easily distinguished from all other South African species of *Cussonia* by the length of the pedicels of the flowers and fruits which are seldom much less than 1 cm in length and usually much longer. From *C. thyrsoflora* it may be distinguished by the leaves which have (3)5-7(8) leaflets which are once or twice vertebrate in contrast to the usually 4-5 simple (or rarely once vertebrate) leaflets of *C. thyrsoflora*. Whereas this species is a

4 mm long, spreading; stigma folded, introrse. *Fruit* 10–15 mm long, 8–12 mm wide, wedge-shaped, angled by pressure, exocarp mauve and fleshy when ripe, calyx rim and styles persistent, fruit 1-seeded by abortion of one ovule. *Seeds* 5–10 mm long, obovoid, plano-convex, rugose, crested and beaked; raphe ending in a round areole; endosperm ruminant.

A species found mainly in the coastal areas of Natal (Fig. 7). It inhabits a fairly wide range of ecological habitats from hillsides to *Euphorbia* scrub and riverine bush.

NATAL.—2732 (Ubombo): Josini Dam (–CA), *Strey & Moll* 3670 (NH). 2930 (Pietermaritzburg): Inanda, Umzimyati Falls (–DB), *Strey* 7412 (NH); Inanda (–DB), *Moll* 2172 (NH); Paradise Valley Nature Reserve (–DD), *Moll* 5007

(NH, K); Durban (–DD), *Bevis* (NH). 2931 (Stanger): Mt. Edgecombe (–CA), *Rault s.n.* (NH); Umgeni, *Hutchinson* 1840 (NH). 3030 (Port Shepstone): Amanzimtoti (–BB), *Ward* 5903 I, II, III, (NH); *Wood* 12306 (NH); Warner Beach (–BB), *Strey* 8800, 9490, 9925 & 10401 (NH, K); Gibraltar (–CB), *Strey* 10025 (NH, K); *Strey* 9570 (NH, K); Mpunzi Bridge (–CC), *Strey* 8710 A & B (NH); do., (–CC), *Strey* 9020a, 9020, 9274a 10024 & 9710 (NH, K).

C. nicholsonii resembles *C. spicata* and *C. sphaerocephala* in the spike-like inflorescence and sessile flowers, but the inflorescence is not a double umbel as in the latter two species. The sessile flowers and dense flowering spike distinguish it from all the other species. The specific epithet was chosen to honour Mr H. B. Nicholson of Skyline, St. Michaels-on-Sea, Natal, and to acknowledge his companionship and help on many botanical tours.

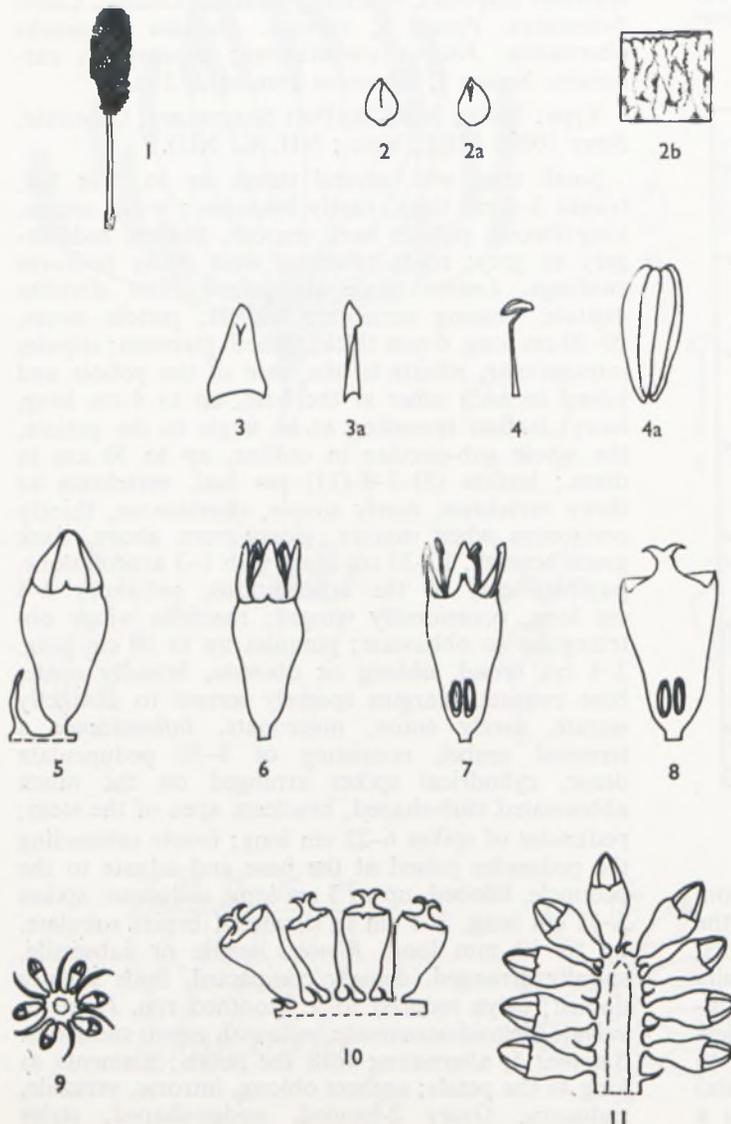


FIG. 6.—1, *Cussonia nicholsonii*, flowering spike $\times 1/20$; 2, 2a, seed, front view and back view $\times 1/2$; 2b, surface of seed $\times 5$; 3, 3a, petal, front view and side view $\times 1 1/4$; 4, stamen $\times 1 1/4$; 4a, anther $\times 5$; 5, flower bud and bract $\times 1 1/4$; 6, flower at anthesis $\times 1 1/4$; 7, longitudinal section of flower at anthesis $\times 1 1/4$; 8, longitudinal section of fruit $\times 1 1/4$; 9, cross section of immature spike $\times 1/2$; 10, 11, longitudinal sections of fruiting and flowering spikes $\times 1 1/4$.

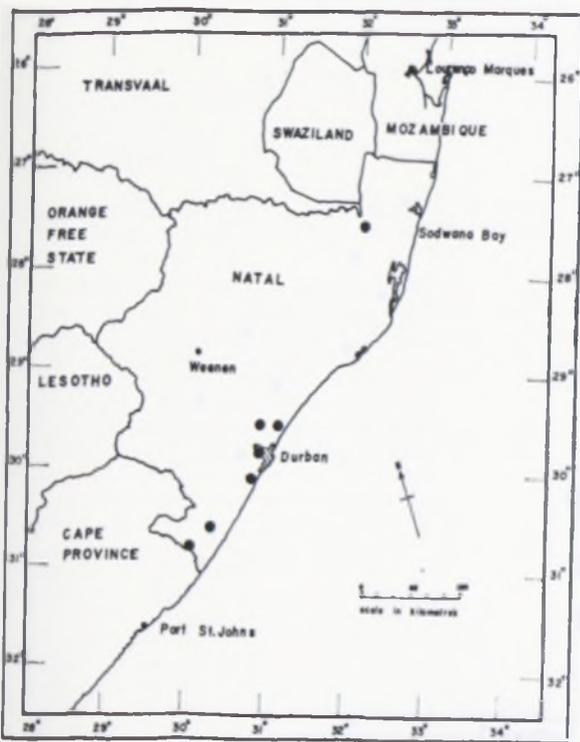


FIG. 7.—Distribution of *Cussonia nicholsonii*.

Cussonia sphaerocephala Strey, sp. nov., *C. spicatae* Thunb. affinis, sed truncis plerumque unicus relative tenuibus non nisi prope apicem ramosis, ramo quoque fasciculo sphaerico foliorum terminanti spicis plerumque brevioribus crassioribus, bracteis, majoribus, bracteolis acute carinatis, calyx majore accrescenti, seminibus longioribus planoconvexis differt.

Arbor usque ad 25 m alta, truncis relative tenuibus unicus vel parce ramosis. *Rami* fasciculo sphaerico foliorum terminantes. *Folia* composita vel bis composita, divisione prima digitata; foliola vertebrata vel bis vertebrata; lamina circularis. *Pseudoinflorescentia* in anno primo biennis, ex fasciculo ramis sparse foliosis constans; rami ad apicem incrassatum caulium portati quisque fasciculo bractearum imbricatarum 5–6 cm longiarum terminans. *Rami primarii* folia in extremo tempi exuti, spicas 4–8 pedunculatas ex apice bracteato producentes. *Spicae* partibus floriferis 8–14 cm longis, 4–6 latis. *Flores* dense spiraliter dispositi, sessiles, flavovirides. *Bractea*e lineares, chartaceae. *Calyx* ovarium inferiore adnatus oram 5-dentatam 2–3 mm altam formans. *Petala* 5, valvata, deltoidea. *Stamina* 5, petalis alternantia; antherae oblongae. FIG. 8, 10 and 11.

Type: Natal, 2931 (Stanger): Mapumulo, milestone, 3, Dec. 1969 (–AA) *Strey* 9470 (PRE, holo., NH, K).

Evergreen trees, up to 25 m high with a single bole; trunk wider and fluted at base, sparingly branched upwards, with a distinct pith; wood coarse, fibres long; bark somewhat corky, smooth or slightly fissured, reddish-grey, dark-grey with age; old leaves well spaced due to elongation of boles, deciduous shortly after flush of new closely spaced leaves, which form the spherical terminal clusters, develops *Leaves* alternate, twice compound, first division digitate bearing vertebrate leaflets; petiole terete, ribbed, glabrous, up to 90 cm long, up to 1 cm thick, swollen at the base; stipules 2, intrapetiolar, more or less joined at the base, adnate to the petiole,

approximate or fairly wide apart, broadly-subulate, coriaceous, up to 3 cm long; outline of lamina orbicular, up to 40 cm in diam., comprised of 6–12 leaflets; leaflets coriaceous to chartaceous depending on age; shiny and darkgreen above, darkgreen beneath, rarely simple, usually vertebrate with 1–5 articulations, 10–35 cm long; vertebrae petioluled or sessile; petiolules with wings or up to 5 pinnules; base of petiolule and articulations with scales, scales rarely absent; pinnules broadly obovate, lanceolate to lanceolate-oblong, cuneate; base narrowly to broadly decurrent, apex often mucronate, margin entire or sparsely to coarsely serrate, rarely sinuate-serrate; rachilla wings entire, obovate to obtriangular, base cuneate, main nerves raised on both surfaces, secondary nerves immersed above, inconspicuous beneath. *Leaf-scars* persistent on young trunks, disappearing lower down. *Pseudo-inflorescence* biennial; in the first year consisting of 10–40 spreading sparsely leafy primary branches produced at the thickened apex of the stem, each branch up to 60 cm long, 3–7 cm thick, warty, bearing a cluster of 5–6 cm long imbricate and stipular bracts at its apex. *Primary branches* casting their leaves in the second season and develop the true inflorescence at its apex, consisting of 4–8 plano-terete peduncles arranged in an umbel, each peduncle bearing a short thick terete, 8–14 cm long, 4–6 cm thick flowering spike; bracts at the base of each peduncle 3–5, triangular in shape. *Flowers* densely spirally arranged, sessile, yellowish green. Bracts linear, chartaceous, ciliate to fimbriate, 6–12 mm long, upper 2–3 mm caducous; bracteoles carinate, fimbriate, 2–5 mm long. *Calyx* rim 2–3 mm high, margin 5-toothed, fringed. *Petals* 5, valvate, deltoid, acuminate. *Stamens* 5, alternating with the petals; anthers oblong, introrse, versatile, spreading, caducous. *Ovary* inferior, bilocular; styles persistent-approximate, fleshy; stigma folded, introrse, spreading. *Disc* flat, rugose. *Fruit* up to 3 cm long, 1 cm broad, conical, mauve and fleshy when fertile; calyx somewhat accrescent; seed solitary by abortion, 1 cm long, plano-convex, crested, rugose; raphe ventral; areole linear; testa brown; endosperm ruminant.

This species occurs from Port St. Johns to Kosi Bay in coastal dune forest, but is also common in moist frost-free high forest kloofs up to an altitude of 1300 m preferring south-eastern aspects, crowns often emerging from the surrounding canopy and very conspicuous (FIG. 9). Not yet recorded outside of the Transkei and Natal.

NATAL.—2731 (Louwsburg): Ngome (–DD), *Strey* 10472 (NH, K). 2732 (Ubombo): Mseleni River bridge on Mbazwana-Mseleni Mssion road (–BC), *De Winter & Vahrmeijer* 8582. 2830 (Dundee): Qudeni Forest (–DB), *Talbot*; Qudeni Forest (–DB), *For. Dept. Herb. No. 7860*. 2831 (Nkandhla): South of Richards Bay (–DD), *Strey* 9918 (NH, K); Port Durnford Native Reserve No. 10 (–DD), *Strey* 9920 (NH, K). 2832 (Mtubatuba): St. Lucia (–AD), *Landsell* 54 (NH); 6 miles from St. Lucia towards Mtubatuba (–AD), *De Winter* 8752. 2930 (Pietermaritzburg): Lions River (–AC), *Moll* 3536 (NH); Ismont (–DC), *Strey* 9888 (NH, K); Glenwood, Durban (–DD), *Ward* 5896 II, III (NH,); Pigeon Valley, Durban (–DD), *Strey* 9480 (NH, K); *Strey* 9681 (NH, K); *Strey* 9682 (NH, K); Bulwer Park, Durban (–DD), *Strey* 9832a, b (NH). 2931 (Stanger): Mapumulo, milestone 3 (–AA), *Strey* 9470 (NH, K). 3030 (Port Shepstone): Umzinto (–BC), *Bourquin* (NH); Beacon Hill (–CB), *Strey* 6547 (NH); Mills Farm, Paddock (–CB), *Strey* 6928 (NH, K). 3129 (Port St. Johns): Lusikisiki Manteku (–BD), *Strey* 10200 (NH, K); Ndindini Forest (–BD), *Strey* 10207 (NH, K); Lusikisiki (–BD), *Marais* 1184 (NH), Ntafufu (–DA), *Strey* 8980 (NH, K). 3130 (Port Edward): Umtamvuna Forest Reserve (–AA), *Strey* 10406 (NH, K)

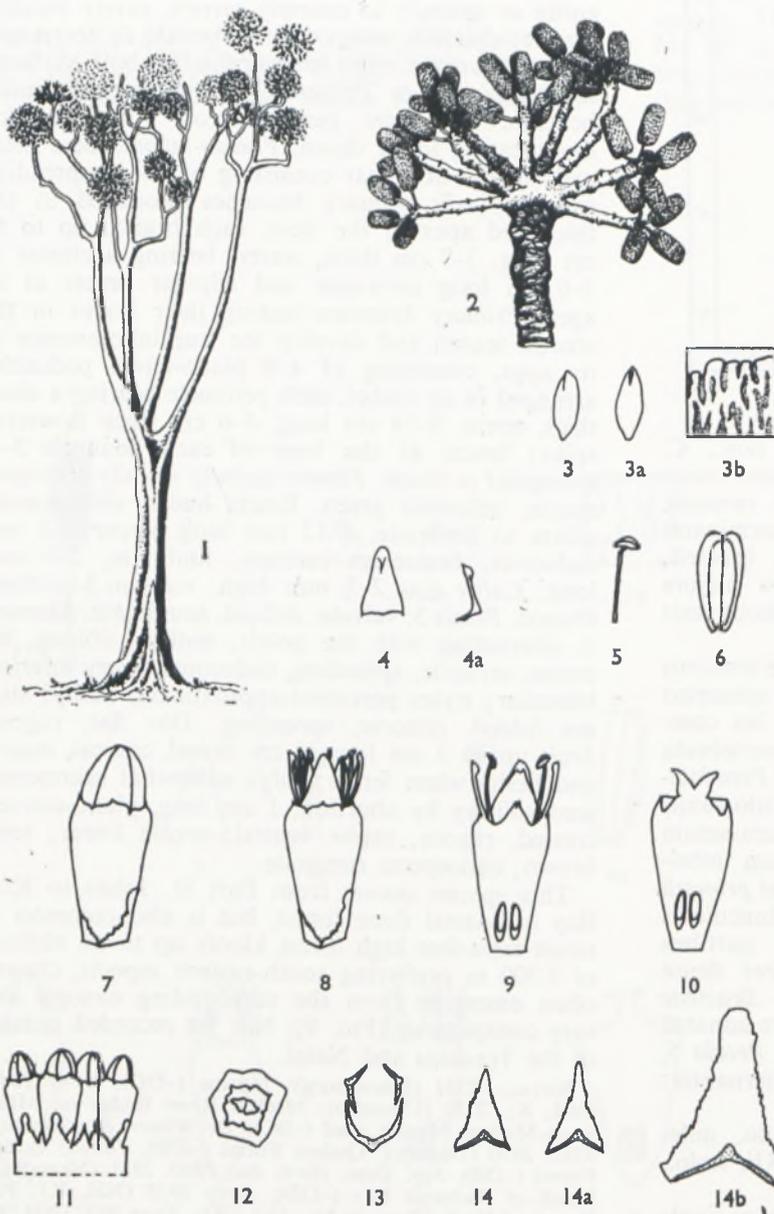


FIG. 8.—1, *Cussonia sphaerocephala*, habit; 2, pseudoinflorescence $\times 1/20$; 3, 3a, seed, front and back view; 3b, surface of seed enlarged $\times 5$; 4, 4a, petal front and side view $\times 1\frac{1}{2}$; 5, stamen $\times 1\frac{1}{2}$; 6, anther $\times 5$; 7, flower bud $\times 1\frac{1}{2}$; 8, flower at anthesis $\times 1\frac{1}{2}$; 9, longitudinal section of flower at anthesis $\times 1\frac{1}{2}$; 10, longitudinal section of mature flower $\times 1\frac{1}{2}$; 11, buds showing arrangement in spike $\times \frac{1}{2}$; 12, flower viewed from above $\times \frac{1}{2}$; 13, arrangement of bracts and bracteoles $\times 1\frac{1}{2}$; 14–14b, bracts, front view $\times 1\frac{1}{2}$.

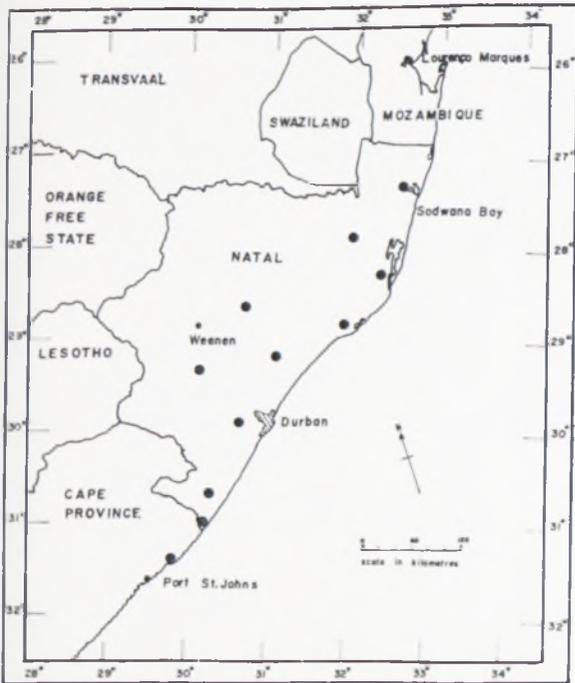


FIG. 9.—Distribution of *Cussonia sphaerocephala*.



FIG. 11.—Cluster of spikes at the apex of a first-year branch which has cast its leaves. Note leaf-scar below inflorescence.



FIG. 10.—*Cussonia sphaerocephala* in clearing in the Dukuduku Forest, Hlabisa District.

C. sphaerocephala has been erroneously referred to as *C. chartacea* by several authors and this is the name it generally bears in herbaria. As explained earlier in this paper under "Misapplied Names", *C. chartacea* Schinz is a synonym of *Schefflera umbellifera* (Sond.) Baill. The habit and habitat of this species are described by Aitken (1923, p. 59), who relates it to *C. spicata* Thunb. In spite of mentioning the possibility that it could be a distinct species, he favoured the view that it was an ecological form of *C. spicata* occurring on "slopes with southern exposure covered with close bush". He was apparently not aware of the form of *C. spicata* which occurs in forests, since he described the habitat of the latter as "tree-veld on hillsides with northern exposure". The specific epithet was chosen to describe the striking spherical, terminal leaf-clusters, which characterize the species.

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