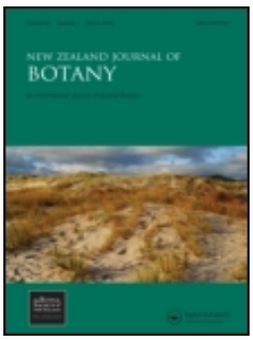

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Cortaderia splendens Connor sp. nov. (Gramineae)

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SUMMARY

A new species of *Cortaderia* from northern North Island coastal sand and rocks and offshore islands is described and named *C. splendens;* it would formerly have been included in *C. toetoe* Zotov.

A chemotaxonomic comparison of the several species of *Cortaderia* growing in New Zealand (Martin-Smith, Subramanian and Connor, 1967) showed that a sample collected from Raglan, west coast North Island, lacked triterpene methyl ethers, compounds present in all other indigenous material. Critical examination of material from that and other North Island localities together with further chemical analyses, have led to the recognition of a fourth species of *Cortaderia* distinct from the three described by Zotov (1963).

Cortaderia splendens Conner sp. nov.

Affinis *C. toetoe* Zotov sed dispositione pilorum foliorum et majore florum magnitudine differt.

Gramen gynodioicum perenne habitu dense caespitosum, innovationibus robustissimis culmis altissimisque. Vaginae foliorum inferiorum pilosae virides subter cera alba, superiorum glabrae eburneae. Laminae latae flexibiles, costis medianis dense tomentosis, marginibus et apicibus scabridae. Paniculae longae, erectae vel nutantes. Glumae longae, lemmatis aristis longiores. Antherae florum hermaphroditorum antheris florum femineorum longiores, gynoecia florum hermaphroditorum gynoeciis florum femineorum breviora.

HOLOTYPUS: CHR 184354 Ruapuke Beach, Raglan, R. Bell, 20 December 1967, ♀. Fig. 1.

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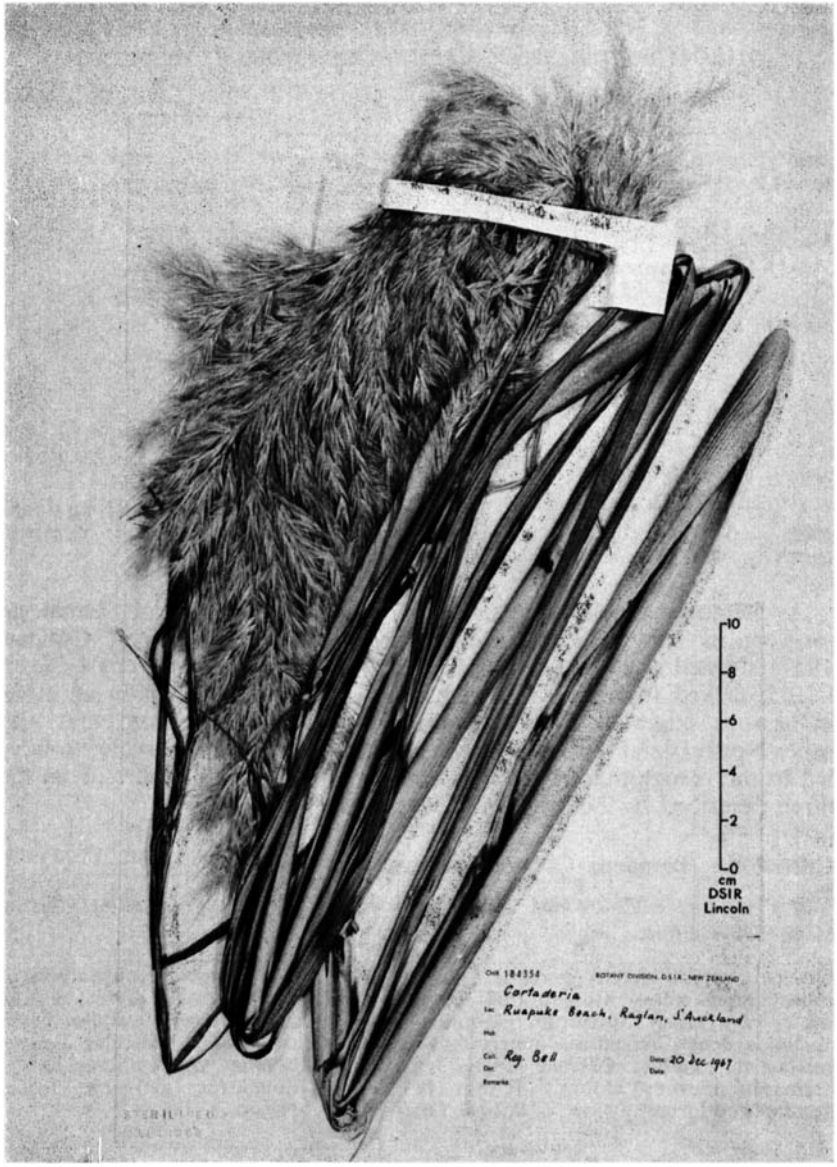

photo: J. S. Cocks

FIG. 1—Holotype of *Cortaderia splendens.*

Tall tussocks with very stout shoots, some of them extending horizontally several metres through sand. Culms up to 6 m tall, white, shining. Sheaths of basal leaves with a thick layer of white wax covering the pale green surface, usually clothed with long hairs or sometimes with hairs along margins, occasionally glabrous; sheaths of culm leaves white; sheaths with a short line of long hairs immediately below leaf collars. Leaf blades up to 3 m long, 3–5 cm wide, flexible, with dense short hairs extending up the middle nerve from the ligule, margins slightly scabrid. Panicle erect or nodding, dense, shining, about 75 cm long. Glumes 22–50 mm long, exceeding the floret. Lateral lobes of lemma 4–7 mm long. Palea often with a small tuft of long hairs near each margin. Flowers ☿ and ♀ on separate plants (gynodioecious); anthers of ☿ (4.0) – 5.0 – (6.3) mm long, of ♀ (2.6) – 3.2 – (4.3) mm long; gynoecium of ♀ (2.1) – 2.4 – (3.0) mm long, of ♀ (3.6) – 4.2 – (5.0) mm long. Caryopsis of ☿ (2.5) – 2.9 – (3.2) mm long, of ♀ (3.2) – 3.8 – (4.6) mm long. Chromosome number 2n = 90.

DISTRIBUTION: Coastal, on sand hills, consolidated sands, rocks and cliffs on west coast North Island from Cape Reinga to Kawhia; Three Kings Is and east coast offshore islands to Coromandel Peninsula (Fig. 2).

C. splendens has formerly been included with *C. toetoe* Zotov, and is referred to as Raglan C. *toetoe* in Martin-Smith *et al.* (1967). Martin-Smith, Ahmed and Connor (1971) use the form *Cortaderia* "Raglan". Principal distinguishing features are tabulated; measurements of floret characters are given in form of ranges and means (as also in the description above).

		C. splendens	*C. toetoe*
Leaves		3–5 cm wide; flexible; only somewhat scabrid on margins and upper third of leaf; hairs above ligule chiefly on main nerve; sheath below leaf collar with a short line of long hairs, sheath usually hairy.	1–3 cm wide; stiff; very scabrid on margins and upper third of leaf; hairs above ligule spread across blade; sheath glabrous.
Panicle		Erect or nodding.	Erect.
Glume length		(22) – 32 – (50) mm	(15) – 19 – (24) mm
Palea length		(6.1) – 7.3 – (9.0) mm	(5.0) – 5.5 – (6.5) mm
Anther length	☿	(3.8) – 5.0 – (6.3) mm	(3.2) – 4.0 – (4.7) mm
	♀	(2.6) – 3.2 – (4.3) mm	(2.0) – 2.3 – (2.7) mm
Stigma-style length	☿	(1.3) – 1.4 – (2.1) mm	(1.2) – 1.4 – (1.5) mm
	♀	(2.7) – 3.6 – (4.3) mm	(2.3) – 2.7 – (3.5) mm
Flowering		Early December, though earlier on some offshore islands.	Mid January.
Habitat		Coastal sand hills, rock and cliff faces.	Swamps and damp places, but also in sand hills.
Distribution		North Is, North Cape to Kawhia and on offshore Islands, coastal.	North Is, from the latitude of Lake Taupo to Wellington, coastal and inland.

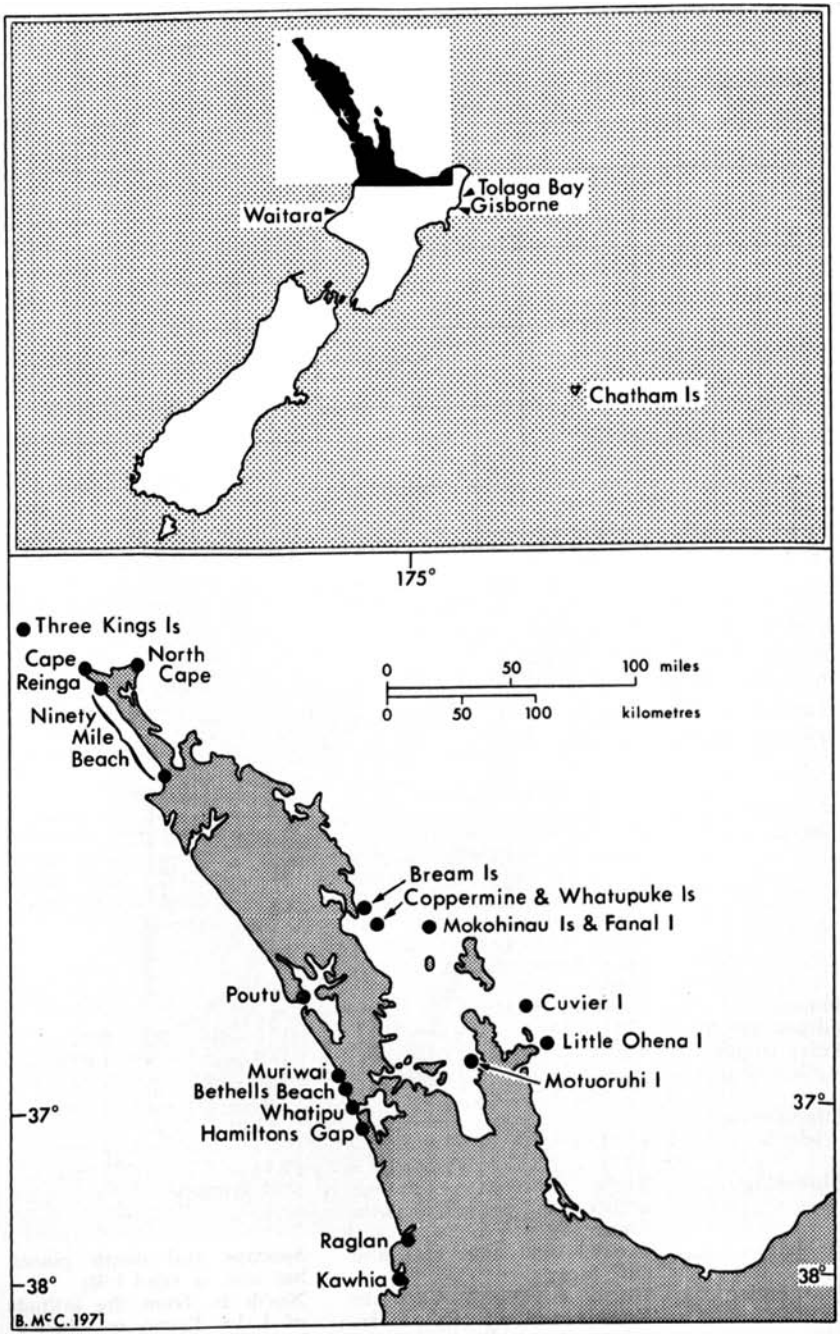

FIG. 2—Distribution map for specimens examined of *Cortaderia splendens*.

SIZE OF FLORAL ORGANS: Anthers in *C. splendens* whether fertile or sterile are the largest recorded in the genus, though the stigma-style length of hermaphrodites is not as large proportionately as would have been anticipated from the broad array of species studied.

FREQUENCY OF SEX FORMS: One population, Muriwai Beach, was sampled and this consisted of 61% hermaphrodites and 39% females. Such values lie within the ranges for *C. richardii* (Connor 1963) and are about equal to the frequencies in a sample of *C. toetoe* from Plimmerton swamp (near Wellington) that comprised 57% hermaphrodites and 43% females.

SEEDLING GROWTH HABIT: Seedlings of *C. splendens* are much stouter than those of other species, and tillering occurs later when grown in the uniform environment of the Botany Division experimental gardens, Lincoln, Canterbury. These two characters are dominant in F_1 *C. richardii* × *C. splendens*.

CHEMOTAXONOMY: Martin-Smith *et al.* (1967, 1971) showed that the *n*-alkane fractions of leafwax from *C. splendens* are comparable with other New Zealand species but different from South American species. On the other hand, *C. splendens* does not synthesise triterpene methyl ethers as do all other mainland species. Arundoin—fernenol methyl ether—is synthesized by *C. fulvida*, *C. richardii* and *C. toetoe*, and by hybrids betwen *C. splendens* and *C. richardii*.

CHROMOSOME NUMBER: *C. splendens*, 2n=90 (Beuzenberg pers. comm.), is decaploid, as are all New Zealand species of *Cortaderia*.

HYBRIDISATION: F_1 hybrids *C. richardii* ♀ × *C. splendens* ♂ and *C. splendens* ♀ × *C. toetoe* ♂, have been produced from controlled pollinations. No natural hybrids have been seen although *C. fulvida* flowers at the same time not far away from *C. splendens*.

SPECIMENS SEEN:

North Island:

Kerr Point, North Cape, G. C. Kelly, April 1967, CHR 179812.

Dalbeths Road, North Cape, G. C. Kelly, April 1967, CHR 179811.

Te Weraki Beach, Cape Reinga, G. C. Kelly, December 1966, ☿ CHR 179807.

Ninety Mile Beach, G. C. Kelly, April 1967, CHR 156870. R. Mason and A. E. Esler, 25 November 1970, ☿ CHR 214398.

Poutu, Kaipara Harbour, D. Petrie, December 1904, ☿ WELT 40341. R. Mason and A. E. Esler, 20 November 1970, ♀ CHR 214680.

Muriwai Beach, near Woodhill Forest, N.Z. Forest Service, 10 August 1967, CHR 177882.

Bethell's Beach, V. D. Zotov, 22 March 1967, CHR 156866, ♀ CHR 156867, ♀ CHR 179806, ☿ CHR 179808.

Whatipu, H. E. Connor, 15 December 1966, ☿ CHR 179801, ☿ CHR 179802, ☿ CHR 179803.

Waiuku Peninsula, Hamilton's Gap, H. E. Connor, 16 December 1966, ☿ CHR 179804, CHR 179805.

Raglan, Ocean Beach, E. P. White, 12 March 1966, ♀ CHR 171351.

Kawhia, R. Bell, 1 April 1967, ♀ CHR 156863, ♀ CHR 156864; R. Bell, 29 November 1970, ♀ CHR 217904, ♀ CHR 217905.

Zotov (1963, p. 85) refers to "*Arundo sericea* Solander, Primitiae Florae Novae Zelandiae p. 416, MS, based on specimens from Teoneroa [Gisborne] and Tolaga Bay (S. Kensington; dupl.: Wellington)." I have examined the hermaphrodite panicle at WELT (s.n.) and consider that it belongs to *C. splendens*, but I have seen no other authentic specimens from these localities.

WELT 40358, from the Petrie Herbarium, bears a label in Petrie's writing stating "*A.conspicua* Forst.f Waitara Taranaki, Feby 1901. Wellington: S. coast of. D.P." The specimen itself carries a small sticker stating "Wellington", again in Petrie's writing. The sheet is further annotated "originally with 40357". WELT 40357 consists of, from left to right, a hermaphrodite panicle, a section of culm and a leaf, a portion stripped from a female panicle, and another piece from a hermaphrodite panicle, obviously from WELT 40358. WELT 40357 is therefore a composite sheet from three separate plants. The specimen WELT 40358 is a hermaphrodite *C. splendens* but the locality from which it was gathered is uncertain.

OFFSHORE ISLANDS:

Three Kings Is Entomology Division Expedition, November 1970, ☿ CHR 217903.

Bream Is M. A. and I. M. Ritchie, 24 October 1968, CHR 186628.

Coppermine I. I. A. E. Atkinson, November 1965, ☿ CHR 156760: M. A. and I. M. Ritchie, 25 October 1968, CHR 186630.

Whatupuke I. M. A. and I. M. Ritchie, 27 October 1968, CHR 186629: E. K. Reynolds, 20 January 1968, ♀ CHR 184383.

Fanal I. D. V. Merton, 5 February 1968, ♀ CHR 184384.

Mokohinau Is M. E. Gillham, August 1957, ♀ CHR 111618: M. E. Gillham, 1957, ♀ CHR 96186: G. I. Collett, August 1965, ♀ CHR 192597.

Cuvier I. I. A. E. Atkinson, 14 June 1960, CHR 117204: I. A. E. Atkinson, 15 June 1970, ☿ CHR 208501.

Little Ohena I. I. A. E. Atkinson, June 1970, CHR 208502, CHR 208503.

Motuoruhi I. (Goat I.) F. J. Newhook, 20 December 1970, ♀ CHR 217901, ☿ CHR 217902.

Material from the offshore islands in eastern northern waters (Lat. S34° 20′ to S36° 40′) is all of smaller stature and often has shorter glumes and smaller spikelets than that from the mainland. This may be accounted for by habitat differences (several of them are noted as being collected from cliffs) but no plants have been available to grow experimentally. Anther and gynoecium lengths of both sex forms, however, lie within the ranges for mainland *C. splendens*.

CHATHAMS PLANTS

Plants raised from seed from Chatham Islands do not synthesize triterpene methyl ethers, and in this respect they are similar to *C. splendens* (Martin-Smith *et al.* 1971). By comparison with other New Zealand species, *C. splendens* and Chathams plants could be considered biochemically related, and in general the two look alike. Closer examination reveals significant points of difference. The most characteristic

feature of Chathams material is the presence of long hairs on many parts of the plant; glumes, pedicels and panicle branches, sheaths and laminae bear long hairs in a manner that is not common to other New Zealand material. Hairs are present on both sides of the lamina; on the adaxial surface thinly scattered all over in no particular pattern, but on the abaxial surface they occur at the base and towards the margins. Five gatherings are available in herbaria and are all conspicuously alike; three bear flowers and these are hermaphrodite. Anthers are quite small (average = 2.4 mm) for hermaphrodites relative to other New Zealand species, Glume length and floret measurements are smaller than in *C. splendens.*

Ecologically, Chathams plants would match all the other New Zealand species rather than *C. splendens* in that they grow in wet conditions.

It is premature to suggest a taxonomic rank for this Chathams material but it seems appropriate here to draw attention to it. Plants of this kind are referred to as *Cortaderia* "Chathams" in Martin-Smith *et al.* (1971).

Material examined is: CHR 187596, CHR 187578 M. A. and I. M. Ritchie, 19 September 1968; CHR 176529 Entomology Division Expedition, 25 February 1967 ♀; WELT 33756 H. H. Travers, ♀; WELT 40353 T. Kirk, ♀.

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