

Studies in New Zealand Carices

I. The Section *Acutae* Fries

B. G. HAMLIN,

29 Ohiro Road, Wellington.

[Communicated to the Wellington Branch by J. T. Salmon and read by title on October 28, 1953, received by the Editor, October 29 1953.]

Abstract

THE taxonomy and nomenclature of all published taxa in New Zealand of the Section *Acutae* Fries of the Genus *Carex* are revised. Name changes in accordance with the International Rules include *C. geminata* Schkuhri (*C. ternaria* Forst f. ex Boott), *C. darwinii* var. *aristata* C. B. Clarke ex Kukenth. (*C.d.* var. *usolepis* (Franch.) Kukenth.), Taxonomic changes are *C. confusa* n.sp. = *C. ternaria* var. *gracilis* Cheesem.; and *C. coracea* n.sp. = *C.t.* var. *pallida* Cheesem.

INTRODUCTION

THE Section *Acutae* Fries of the genus *Carex* L. has presented considerable difficulty to New Zealand botanists owing to the apparent polymorphy of its members. In 1884 Cheeseman made an attempt to sort out the confusion, a treatment which Kukenthal, in his monograph of the genus, largely maintained, although he made several changes in rank of Cheeseman's taxa. The only source of information for most New Zealand botanists has been the Second Edition of Cheeseman's Manual which follows the 1884 treatment.

The group is therefore long overdue for revision and the present paper is a preliminary attempt to clarify the position with regard to the names already published. Sufficient information has not yet been gathered, either as specimens in herbaria or in the form of field notes, to enable a more comprehensive revision to be made at this date. A far more searching study of all the forms occurring will be necessary before the group can be considered satisfactory both from taxonomic and ecological points of view.

The main difficulty has been the lack of recognition of useful characters for delimitation of the various taxa. Examination of available material reveals certain bases for determination which have been set out in the key to the species and further outlined in the descriptions.

The variability of the species, as previously understood, makes the recognition of taxa extremely difficult, and without a considerable range and number of specimens an analysis is almost impossible, but it is found that on the basis of the characters here employed the specimens sort out into very distinct groups with remarkable uniformity, the difficulties being largely confined to *C. ternaria* Forst. f. ex Boott, defined below as *C. geminata* Schkuhr. Although the majority of the specimens clearly refer to this species there are a number of specimens possessing a wide range of minor characters whose taxonomic positions are not yet certain. No attempt is made to describe these latter as a hasty publication probably requiring later emendation would, far from clarifying the position, only lead to further taxonomic and nomenclatural confusion.

Name changes have been made where required by the International Rules, 1936.

DISTRIBUTION

Sufficient material has not yet been gathered to give an accurate picture of distribution, and published accounts where unsupported by herbarium specimens are unreliable owing to the confusion in nomenclature. Herbarium specimens from the principal New Zealand herbaria have therefore been cited as the most reliable aid in this respect, from which it will be seen that much remains to be done on the geography of even such a common species as *C. geminata*.

KEY TO THE SPECIES

1	Basal spikelets solitary, erect	2
	Basal spikelets, geminate, ternate or quaternate, pendulous	4
2.	Spikelets sessile, lowest bract-sheath and prophyll open	<i>C. gaudichaudiana</i>	
	Lowest spikelets stalked, bract-sheath closed	3
3	Utricles obovate, contracted above, 3-5 nerved, glumes not or very shortly awned	<i>C. sinclairii</i>
	Utricles ovate, tapering, 5-8 nerved, awns .5-1.5 mm.	<i>C. subdola</i>
4.	Utricles not coriaceous, glumes emarginate	5
	Utricles coriaceous, glumes entire	6
5	Utricles broad, beaked, 6-10 nerved	<i>C. geminata</i>	
	Utricles narrow, not beaked, nerves 3-5, becoming obscure at maturity	<i>C. confusa</i>
6.	Spikelets lanceolate, stout, glumes lanceolate	<i>C. darwinii</i>	
	Spikelets linear, slender, glumes ovate	<i>C. coriacea</i>	

Section ACUTAE Fries

Female spikelets with male flowers, when present, at the apex. Utricles planoconvex or biconvex, usually nerved, beak when present with an almost entire mouth. Style branches 2. Nuts lenticular.

Subsection VULGARES Aschers.

Basal sheaths laminate, without transverse fibrils. Culms slender. Spikelets 4-6, upper 1-2 male, remainder female, sessile or subsessile. Glumes awnless. Utricles suberect, membranaceous, nerved.

Carex gaudichaudiana Kunth Enum. ii (1837) 417; Steudel Syn. Glum. ii Cyper. (1855) 212; Hook. f. Fl. Tasm. ii (1858) 99, t. 151A; Handb. N.Z. Fl. i (1864) 313; Cheesem. Man. N.Z. Fl. i (1906) 818; Kükenth. in Engler's Pflanzenr. Heft 38 (1909) 312; Cheesem. Man. N.Z. Fl. ii (1925) 263.

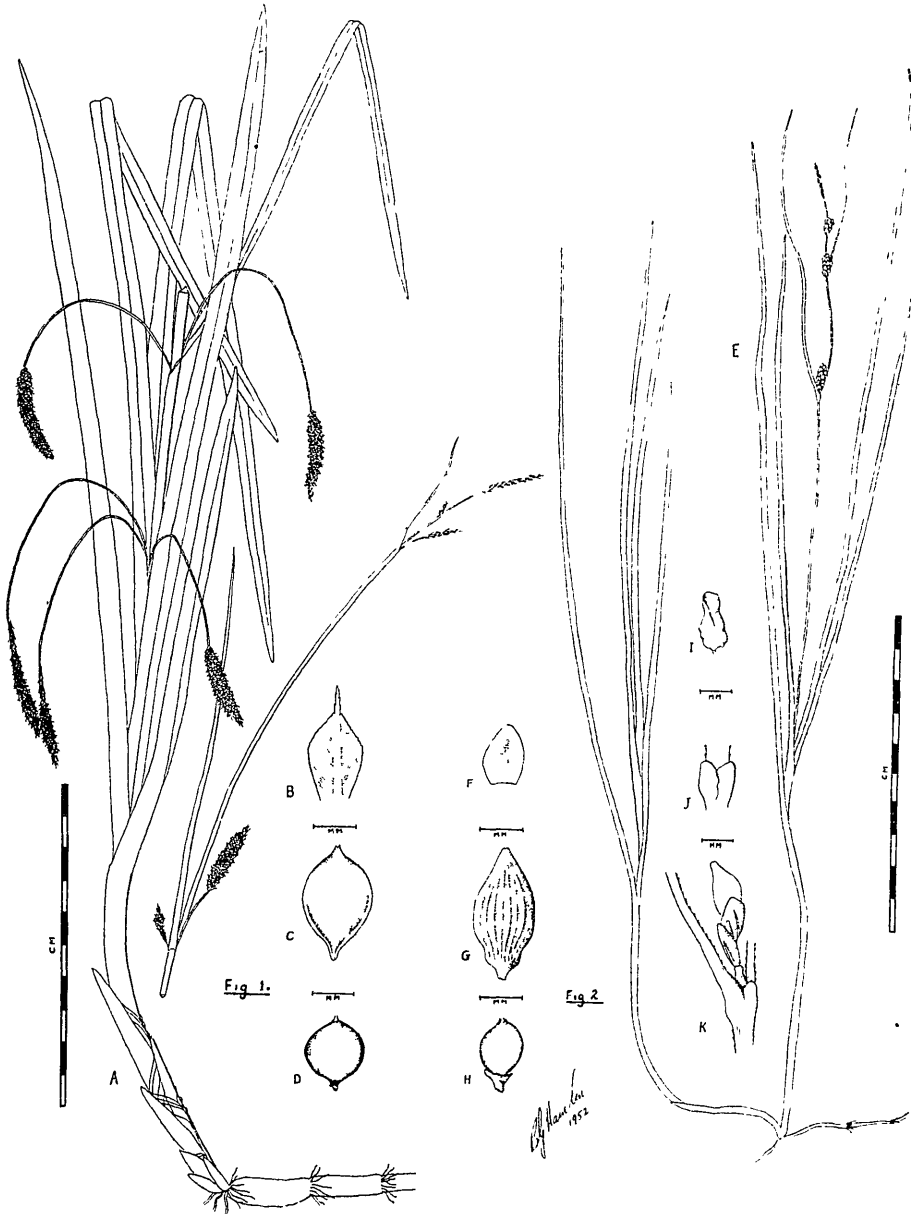
C. vulgaris var. *gaudichaudiana* (Kunth) Boott III Cat. iv (1867) 169, t. 567; Benth. Fl. Austral. vii (1878) 442; Cheesem. Trans. N.Z. Inst. xvi (1884) 429

C. caespitosa R. Br. Prodr. (1810) 243 non Gooden

C. vulgaris Fries, F. Mueller. Fragm. viii (1874) 257 in error

Basal sheaths laminate. Leaves 2 mm. x 4-20 cm. Culms slender, sheath of lowest bract open in front, margins sometimes overlapping, prophyll of lowest spikelet inflated, open adaxially. Spikelets sessile, 1-1.5 cm. x 0.5 cm. Glumes ovate, subacute, not awned, dark-brown to black with a green midrib not reaching to the hyaline margins. Utricles ovate, nerved, yellow when mature, mouth entire. Nut orbicular. Text-fig. 1, Fig. 2

ПАВЛТАТ: Watercourses in open country up to 5,000 feet.



TEXT-FIG. 1—FIG. 1—*Carex coriacea*. A, habit; B, glume; C, utricle; D, nut. [Drawn from Bot. Div. 73856.] FIG. 2—*C. gaudichaudiana*. E, habit, F, glume, G, utricle, H, nut; I-K, details of lowermost bract sheath. [Drawn from Bot. Div. 71445 (E) & Bot. Div. 68656 (F-K).]

SPECIMENS EXAMINED

Herb. Bot. Division: 1066 Lammermoor Mountains, H. H. Allan; 9742 Perpendicular Point, V. D. Zotov; 9997 and 17407 Dart River, V. D. Z.; 17611 Kelly's Hill, Geo. Simpson; 21048 Lochinvar, Lake Tekapo, tarns, A. J. D. Barker No. 368.1; 22013 and 22015 Mossburn, H. H. Allan; 22389 Tauranga Bay, A. L. Poole; 56285 Molesworth, Awatere Valley, H. H. Allan; 60509 Lake Haupiri, headwaters of Ahaura River, W. Mackay; 67576 and 67587 Leslie Clearing, Caswell Sound, 2,000 feet, A. L. Poole; 68656 Ngamatea Swamp, Inland Patea, B. G. Hamlin; 71445 Cass, Canterbury, R. Mason No. 676; 71674 Lake Grassmere, R. M. No. 703; 74215 Mokai Patea, Ruahine Range, c. 5,000 feet, A. P. Druce; 74229 Ngamatea, Inland Patea, A. P. D.; 75346 and 75353 Motutapu, Lake Wanaka, V. D. Zotov; 79419 Aniwanuiwa Valley, 2,200 feet, Waikaremoana, A. P. Druce; 80124 Mokai Patea, Ruahine Range, 4,700 feet, A. P. Druce; 81263 seaward of Carter's Beach Road, Buller County, swampy paddock, R. Mason & N. T. Moar No. 1678; 81274 ditto R. M. and N. T. M. No. 1689; 81520 Fairdown, Buller Cy. R. M. and N. T. M. No. 2063.

Herb. Dominion Museum: Western Amuri County, D. Petrie, W. G. Morrison; near Charleston, D. P.; Lake Brunner, L. Cockayne No. 1578; Westland, P. G. Morgan; Mt. Rockfort, Westport, W. Townson; Castle Hill, Canterbury, 731m., L. Cockayne No. 1594; Maniototo District, B. C. Aston, D. Petrie

Herb. Auckland Museum: 2605 Red Hills, Wairau Valley, Marlborough, 3,500 feet, T. F. Cheeseman; 2608(7) Hammer Plains, T. F. C. (a mixed sheet of which the central specimen is included here, the rest being *C. sinclairii*); 2565 Lake Waihi, Waikato, T. Kirk; 2566 Mt. Arthur Plateau, 4,000 feet, T. F. C.; 2567 Mountains near Westport, W. Townson No. 470; 2569 Hammer Plains, T. F. C.; 2571 Lake Wakatipu, 1,100 feet, D. Petrie No. 39; 2572 Otago, J. Buchanan; 2574 shores of Lake Tekapo, 2,500 feet, T. F. C.; 35861 Kerikeri Inlet, R. Cooper, R. Mason and N. T. Moar.

Herb. Canterbury Museum: Museum index 91.14.18.1 Castle Hill, A. Wall; Mt. Cardrona, 6,000 feet, A. Wall; in Herb H. Carse 421/1 Waikaremoana, E. A. Hodgson (a mixed sheet including *C. sinclairii*); 421/2 Hammer Plains, 1,200 feet, T. F. Cheeseman; 421/5 Waimakariri tableland, 600m., L. Cockayne, No. 1594.

Also in Australia. The Asian plants, previously referred to this species by Kuenthal et al. are now separated as *C. thumbergii* Steudel.

I have seen no specimens in which the utricles are granular-papillose as described by Cheeseman, nor is this character present in Australian material recently received from Mr. R. H. Anderson of the National Herbarium of New South Wales. The clavate character of the male spikelet is also lacking in most of the New Zealand specimens which I have examined although present in the above Australian plants.

C. gaudichaudiana var. *humilior* Kuenthal in Engler's Pflanzenr. Heft 38 (1909) 313 is based on five specimens, one from Mt. Kosciusko, New South Wales, one from Tasmania and the rest from New Zealand. One of the latter, Cockayne No. 1594, I have examined and can find nothing, other than size, to separate it from the type variety as it is known in New Zealand. This is also the opinion of S. T. Blake (Journ. Arn. Arb. XXVIII (1947) 107) with respect to the Australian and New Guinea plants.

Certain forms of this species, although appearing at present to be merely ecological, will require further study.

Subsection CRYPTOCARPAE Tuckerm.

Basal sheaths elaminate, with transverse fibrils. Culms slender or stout. Spikelets 5–20, upper 1–6 male, remainder female, pedunculate, solitary or grouped at the nodes. Glumes usually mucronate. Utricles membranaceous or coriaceous.

Carex sinclairii Boott ex Cheesem. *Man. N.Z. Fl.* i (1906) 820; ii (1925) 265.

C. ternaria Forst. f.; *Kukenth. in Engler's Pflanzenm.* Heft 38 (1909) 369 in error.

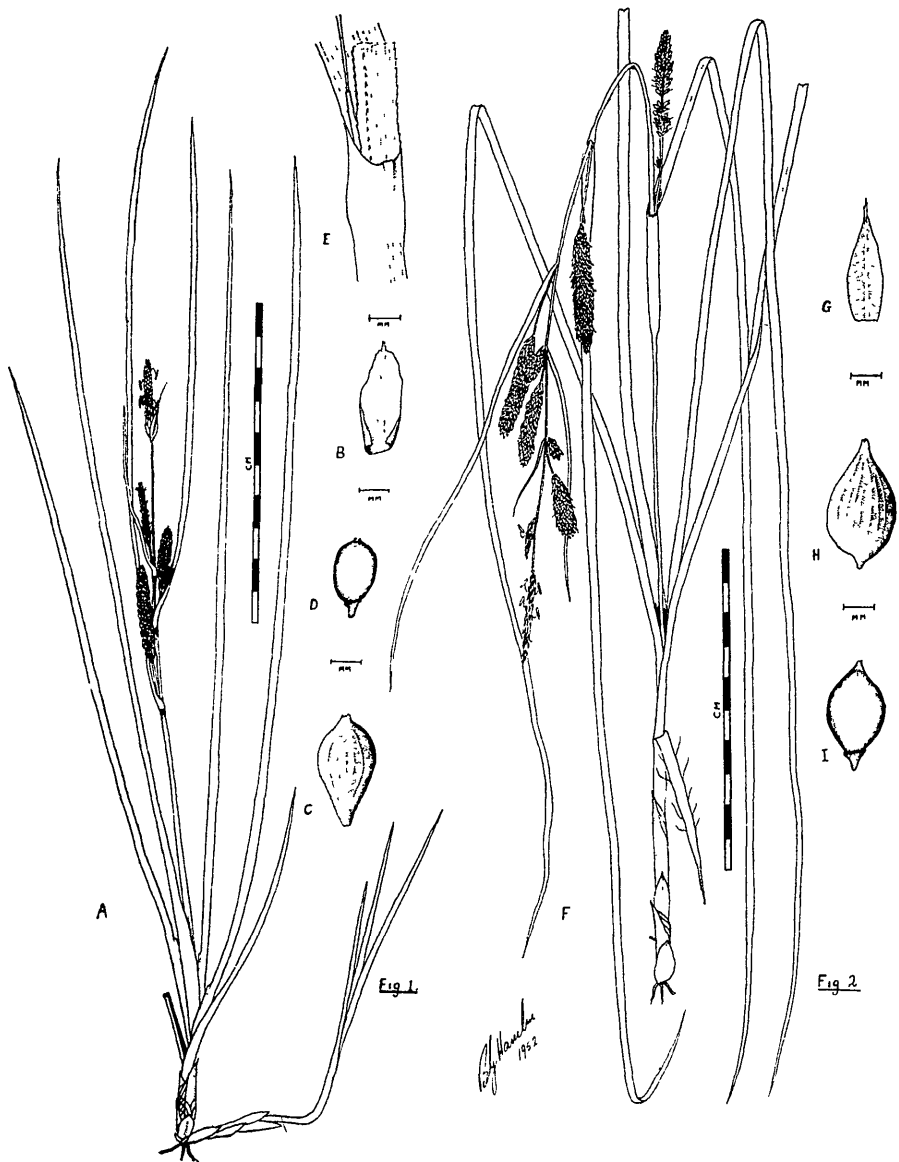
Basal sheaths elaminate or very shortly laminate. Leaves 3 mm. x 10–30 cm. Culms rather slender, sheath of lowest bract closed, usually very short, prophyll of lowest spikelet not inflated or split. Spikelets, at least the lowest, stalked, 2–3 cm. x 0.5 cm., 4–6 in number, the terminal one male. Glumes ovate, obtuse or subacute, brown with a yellow 3-nerved midrib reaching to the margin or produced into a very short awn 0.5 mm. long. Utricles obovate to almost ovate, shortly beaked, faces with 2–5 prominent nerves, lateral ridges rather obscure. Nut broadly oblong. Text-fig. 2, Fig. 1.

HABITAT: Watercourses in mountain areas from 1,000–4,800 feet.

SPECIMENS EXAMINED

Herb. Bot. Division: 1693 Spey Valley, W. A. Thomson; 1742 Hinds River, H. H. Allan; 1743 Lake Sarah, Cass, H. H. A.; 9610 bush above Routeburn huts, V. D. Zotov; 20960 bog on Mt Hamilton, A. J. D. Barker No. 507; 28828 Mt. Arthur tableland, Nelson, 4,000 feet, R. Mason; 28830 Starvation Ridge, Tasman Mountains, 4,000 feet, R. M.; 34804 Scarface, Tawera County, R. M.; 41479–41482 Waimakariri River near Kaiapoi, A. J. Healy; 51645 Otaitai Bush, River-ton, A. J. H.; 56011–56013 Ada Saddle, N. Talbot; 63235–63238 north-east Ruahine Range, 3,900–4,800 feet, A. P. Druce; 64895 Reporoa Bog, Ruahine Range, W. F. Harris; 67573 and 67577 Leslie Clearing, Caswell Sound, A. L. Poole; 70084 Saddle between Rongatea and Colenso, Ruahine Range, c. 3,500 feet, N T Moar No. 645; 70134 Ngamatea, Inland Patea, N. T. M. No. 684; 71115 Leslie Clearing, Caswell Sound, V. D. Zotov; 73153 Lake Harris near L. Wakatipu, D. Petrie; 74524 Motutapu, Lake Wanaka, V. D. Zotov; 74583 Lake Lochie, Eglinton Valley, V. D. Z.; 74622 Old Man Range above 4,000 feet, V. D. Z.; 74919 Red Lake, Mt. Sebastopol, R. Mason No. 1446; 75443 Molesworth, Awatere Valley, L. B. Moore; 75915 Berwick-Henly Road, Taieri Plain, R. Mason & N T Moar No. 930; 76658 head of Otapiri Stream, R. M. & N. T. M. No. 1156; 77211 Molesworth, L. B. Moore; 77784 upper Okuru River, Westland, M. J. A. Simpson; 79422 and 79429 Aniwanui Valley, Waikaremoana, 2,100 feet, A. P. Druce; 79423–79425 Maungawaru Plateau, 4,500 feet, A. P. Druce; 81800 Base Camp, Stillwater River, Caswell Sound, V. D. Zotov; 82075 Boyle River, Canterbury, A. J. Healy; 81526 Fairdown, Buller County, R. Mason and N T. Moar No. 2069; 82613 Takahe Valley, J. H. Sorensen.

Herb. Dominion Museum: Western Amuri County, W. G. Morrison; Dee Valley, Clarence River, B. C. Aston; Mt. Arthur Plateau, A. Wall, T. F. Cheeseman; Nelson District, F. G. Gibbs; Lake Brunner, L. Cockayne No. 1578; Castle Hill, Canterbury, T. Kirk, L. Cockayne No. 1603, J. D. Enys; Starvation Gully,



TEXT-FIG. 2.—FIG. 1—*Carex sinclairii*. A, habit; B, glume; C, utricle; D, nut; E, sheath of lowermost bract. [Drawn from Bot. Div. 41480 (A, B, D and E) and Bot. Div. 73153 (C).] FIG. 2—*C. subdola*. F, habit; G, glume; H, utricle; I, nut. [Drawn from Bot. Div. 73149.]

Mt. Torlesse, L. Cockayne No 8395; Arthur Pass, T. F. Cheeseman; Lake Pearson, T. Kirk; Bealey Valley, W. R. B. Oliver; Westport, W. Townson; Catlins River, T. F. Cheeseman; Mt. Ida, B. C. Aston; Taieri, D. Petrie; Lake Harris, D. P.; Sealey Range, D. P.; Naseby, D. P.; Longwood Range, D. P.; The Hump, T. Crosby Smith; Mt. Cleghorn, Waiau River, Southland, T. Crosby Smith; Ada Saddle, R. M. Laing.

Herb. Auckland Museum: 2597 Lake Tekapo, T. F. Cheeseman; 2600 Patetere Plateau, T. F. C.; 2601-2603 Mt. Arthur Plateau, 3,500-4,000 feet, T. F. C.; 2604 Boundary Peak, Nelson, 4,000-4,500 feet, W. Townson No. 87B; 2602 Red Hills, Wairau Valley, Marlborough, 3,500 feet, T. F. Cheeseman; 2607 Broken River, Canterbury, 2,500 feet, T. F. C.; 2608 Hanmer Plains, T. F. C.; 2609 Lake Alexandrina near L. Tekapo, T. F. C.; 14531 Mt. Cook, J. Adams

Herb. Canterbury Museum: Mt. Arthur Plateau, Nelson, A. Wall; Routeburn, A. Wall; Museum index 91.14.21.1 Castle Hill, A. Wall; 91.14.21.2 Starvation Gully, Mt. Torlesse, L. Cockayne; in Herb. H. Carse 421/1 Waikaremoana, E. A. Hodgson (a mixed sheet including *C. gaudichaudiana*); 421/3 Manototo, Otago, B. C. Aston; 421/4 Peel Forest, Canterbury (?) H. H. Allan; 422/10 Waimakariri tableland 600m. L. Cockayne No. 1603; 425/1 Nelson Mountains, F. G. Gibbs; 425/2 western part of Amuri County, W. G. Morrison

A much misunderstood species, usually mistaken for *C. subdola*, although small plants have been referred in the past to *C. gaudichaudiana*. Kükenthall made this mistake, as witness L. Cockayne No. 1603 which he places in *C. subdola* and again L. C. No. 1578, which he cites as *C. gaudichaudiana*, although he referred *C. smclairii* to *C. ternaria* as differing only in secondary characters from the latter.

I have had the opportunity of examining those specimens forwarded to C. B. Clarke by Cheeseman and annotated by the latter on the former's notes. These specimens, Nos. 2603, 2606 and 2609 in Herb. Auckland Museum agree admirably with my concept of the species.

Carex subdola Boott in Proc Linn Soc. i (1845) 255; Trans. Linn. Soc. xx (1846) 142; in Hook. f. Fl. Nov. Zel. i (1853) 282; Steudel Syn. Glum. ii Cyper. (1855) 216; Hook. f. Handb. N.Z. Fl. i (1864) 314; Cheesem. Trans N.Z. Inst. xvi (1884) 430; Man. N.Z. Fl. i (1906) 819; Kükenth. in Engler's Pflanzenr. Heft 38 (1909) 366; Cheesem. Man. N.Z. Fl. ii (1925) 263.

Basal sheaths elminate. Leaves 3-4 mm. broad, longer than the culms. Culms rather stout, sheath of lowest bract closed, usually longer than broad. Spikelets stalked, 3-5 cm. x 0.5 cm., 5-8 in number, the lowest solitary, terminal 2-3 male rarely solitary. Glumes 3 mm. x 1 mm., narrow-ovate, awned. Utricles ovate, tapering above, 3-5 mm. x 2 mm., narrowly biconvex, many-(5-8) nerved on both faces, the lateral ridges rather prominent, faces typically ferruginous when mature, the mouth with two minute teeth or entire. Nut ovate, plano-convex. Text-fig 2, Fig. 2

HABITAT · Lowland swamps below 2,000 feet.

SPECIMENS EXAMINED

Herb. Bot. Division. 1767 Kaitaia, H. Carse; 22334 Westport, A. L. Poole; 22385 Waimangaroa, Nelson, A. L. P.; 65796 bridge near Babylon Road, Northland, R. Mason and N. T. Moar No. 57; 69460 Wairoa Stream, Northland, R. M.

and N. T. M. No. 199; 73149 Westport, D. Petrie; 73152 Te Kuiti, Waipa River, D. P.; 73154 St. John's Lake, Auckland, D. P.; 82083 nine miles west of summit of Lewis Pass, North Canterbury, A. J. Healy.

Herb. Dominion Museum: Wairua Falls, Whangarei, H. Carse; Waipa River, Te Kuiti, D. Petrie; Waihi Lake, Waikato, T. Kirk; Great Barrier Island, T. Kirk; Tirau, Thames Valley, D. Petrie; Hangitiki near Otorohanga, D. P.; Te Whaiti near Whakatane, D. P.; Mercer, D. P.; Rahui near Charleston, D. P.; Westport, D. P.

Herb. Auckland Museum: 2575 Mangatapere, Whangarei, H. Carse; 2576 and 2577 St. John's Lake, Auckland, T. F. Cheeseman; 2578 Mercer, T. F. C.; 2579 Patetere Plateau, T. F. C.; 14533 Te Aroha, J. Adams; 14540 Thames District, J. Adams; Te Aroha-Tairua, J. A.

Herb. Canterbury Museum: Waikato, T. Kirk No. 883; in Herb. H. Carse 422/1 near Kaitaia, H. B. Matthews and H. Carse; 422/2 Wairua Falls, Whangarei, H. C.; 422/3 Maungatapere, Whangarei, H. Carse; 422/4 vicinity of Auckland, T. F. Cheeseman No. 1828; 422/5 and 422/6 Mauka, Franklin County, H. Carse; 422/7 and 422/8 Tauhei, Piako County, H. Carse; 422/ (no specimen No.) Penrose, Auckland, H. Carse.

Carex geminata Schkuhr Riedgr. i (1801) 65, t. cclxxxvi W. No. 75; ii (1806) 28; Kunth Enum. ii (1837) 418; Steudel Syn. Glum. ii Cyper. (1855) 206.

C. polystachya A. Rich. Fl. Nouv. Zel. (1832) 118, t. 21 non Wahlenb.

C. ternaria Sol. ex Forst. f. Prodr. (1786) 92 nomen nudum; Forst. f. ex Boott in Hook. f. Fl. Antaret. i (1844) 89; in Hook. f. Fl. Nov. Zel. i (1853) 282; Hook. f. Handb. N.Z. Fl. i (1864) 314; Boott Ill. Car. iv (1867) 176, t. 596; Boeckel. in Linnæa xli (1877) 176; Cheesem. in Trans. N.Z. Inst. xvi (1884) 431; Man. N.Z. Fl. i (1906) 820; Kükenth in Engler's Pflanzenr. Heft 38 (1909) 369, t. 59; Cheesem. Man. N.Z. Fl. ii (1925) 265.

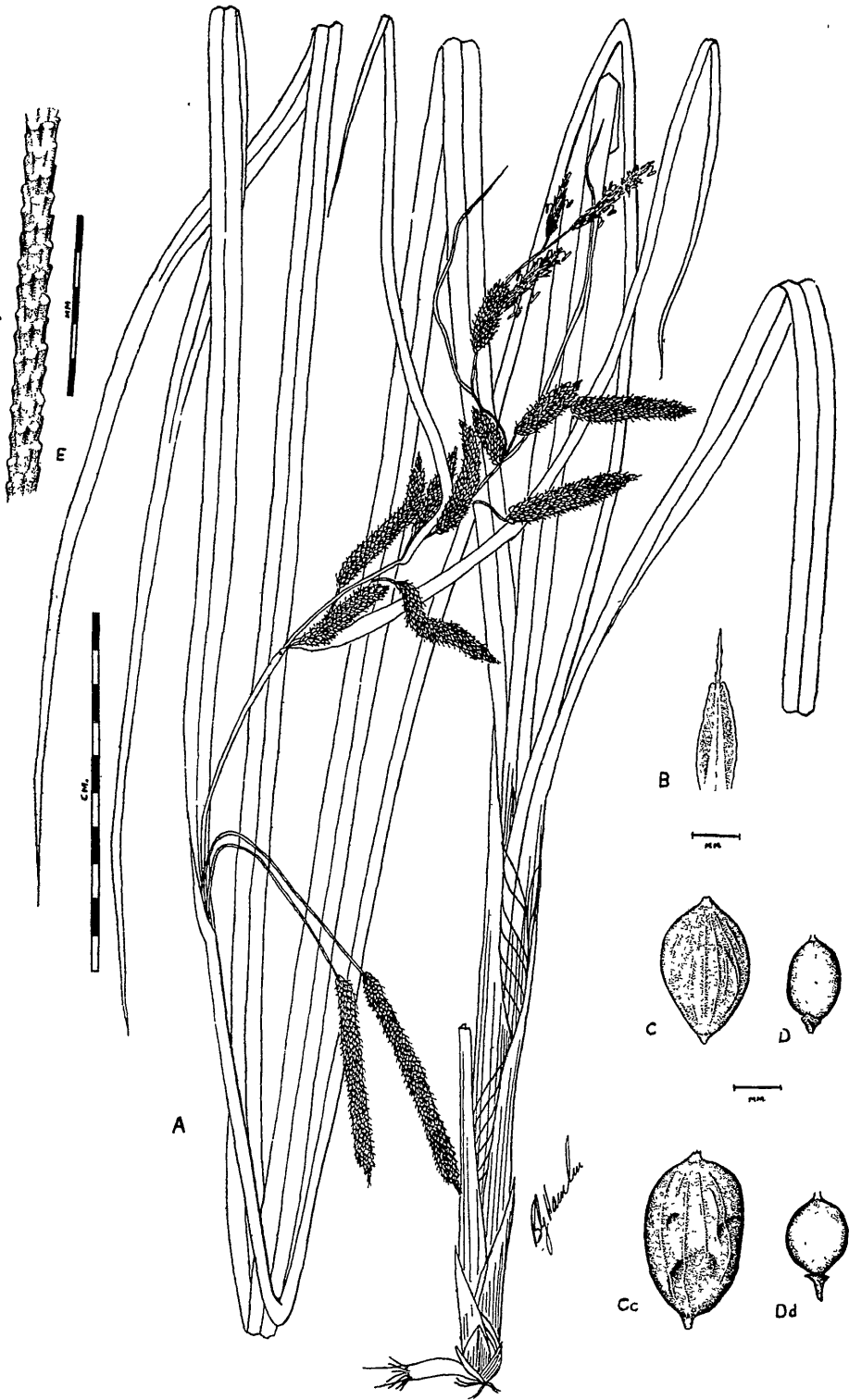
C. lessoniana Steudel Nomencl. ed. II (1840) 292; Syn. Glum. ii Cyper. (1855) 217.

Leaves 60–100 cm. x 1 cm. Basal sheaths with prominent transverse fibrils. Culms shorter than the leaves, stout, becoming slender above the lowest bract. Spikelets 10–18, geminate, ternate or quinate, often more or less approximate, the lowest 5–7 cm. x 0.5 cm., the remainder shorter, upper 3–6 male occasionally with a few female flowers admixed, remainder female with male flowers at the apices, pendulous on filiform peduncles or the upper ones sessile. Glumes ovate, shorter than the utricles, obtuse to truncate to emarginate with a hispid awn of variable length, margins narrowly hyaline. Utricles 2.5–3 mm. x 1.7–2 mm., saccate, inflated or unequally compressed, thin, soft, ovate to oblong, with a short beak, 6–10 nerved, olive-green becoming ferruginous at the apex when mature but not mealy as in *C. confusa*, lateral ridges prominent. Nut ovate to almost oblong, in lower half of utricule. Text-fig. 3.

HABITAT: Coastal swamps and lowland areas up to 2,000 feet.

SPECIMENS EXAMINED

Herb. Bot. Division. 1638 sea coast, Wellington, H. H. Travers; 1741 Whangaripo Valley, Rodney County, D. Petrie; 22275 Waimangaroa, Nelson, A. L. Poole; 25077 eastern area, Manawatu River, H. H. Allan; 25110 and 25114 Kensington Valley, Okaramio, Marlborough, A. J. Healy; 37201 north of Paekakariki, I. W. Davey; 41436 Saltwater Creek near Kaiapoi, A. J. Healy; 51084 and 51085 Raumati Forks, I. W. Davey; 74769 Moutoa Estate, Foxton, A. J. Healy; 63233 and 63234 Manawatu Gorge, c. 300 feet, A. P. Druce; 79427 Mt.



TEXT-FIG. 3.—*Carex geminata*. A, habit; B, glume; C and Cc, utricles, with corresponding nuts, D and Dd; E, rachis. [Drawn from Bot. Div. 74769 (A-D), Bot. Div. 25424 (Cc and Dd) and Bot. Div. 81839 (E).]

Arowhana, 3,500 feet, A. P. D.; 81218 north of Birchfield, Buller County, R. Mason and N. T. Moar No. 1621; 81242 and 81243 Carter's Beach Road, Buller County, R. M. and N. T. M. No. 1656; 81803 Moutoa Estate, Foxton, A. J. Healy

Herb. Dominion Museum: Auckland, T. Kirk; Great Barrier Island, T. K.; Waihi Lake, Waikato, T. K.; Te Whaiti near Whakatane, D. Petrie; Tirau, Thames Valley, D. P.; Horahora, Waikato, D. P.; Miramar, Wellington, W. R. B. Oliver; Lake Ferry, Wairarapa, B. C. Aston; Pelorus Sound, T. Kirk in *Herb. L. Cockayne* No. 9012; Puketutu Bay, D'Urville Island, W. R. B. Oliver; Cedar Creek, Denniston, D. Petrie; Westport, P. G. Morgan; Canterbury, R. M. Laing, Whangaripo Valley, Rodney County, D. Petrie; near Dunedin, D. P.; Chatham Islands, W. Martin, W. R. B. Oliver.

Herb. Auckland Museum: 2580 Mangataperi, Whangarei, H. Carse; 2582 St. John's Lake, Auckland, T. F. Cheeseman; 2587 Okarito, Westland, A. Hamilton; 2589 Dunedin and coast uplands, D. Petrie; 30505 "New Zealand 1769-70 Banks and Solander".

Herb. Canterbury Museum: In *Herb. H. Carse* 423/1 Ashburton ? H. H. Allan; 423/3 Mt. Arthur, Nelson, G. O. K. Sainsbury; 423/4 Kaweka Range, B. C. Aston; 423/5 Waimarino Plain, H. Carse; 423/6 near Wairoa, Hawke's Bay, G. O. K. Sainsbury; 423/7 Mauku, Franklin County, H. Carse; 423/8 near Waikumete Creek, Glen Eden, Auckland, H. C.; 423/9 Maungatapere, Whangarei, H. C.; 423/10 Fairburn, Mangonui, H. C.; 423/11 Kaiaka, Mangonui, H. C.; 423/12 Mt. Maungataniwha, c. 1,500 feet, Mangonui, H. C.; 424/4 Mauku, H. C.; 424/9 Lower Waikato, H. C.

The spikelets of this and the following species present very different appearances owing to the character and arrangement of the utricles. In the above species the ripe utricles are closely packed tending to spread at a greater angle from the rachis than in the following species. This difference in arrangement is shown in the relative density of scars on the rachis, typical examples of which are illustrated on the accompanying plates.

As Forster's publication of Solander's manuscript name, *C. ternaria*, was without a description, the first valid publication of this name is in Hooker's *Flora Antarctica* which is predated by Schkuhr's *C. geminata* in "Beschreibung und Abbildungen der Riedgrasern". The latter, therefore, must stand as the valid name.

C. ternaria var. *minor* Boott (Ill. Car. iv (1867) t. 597 right-hand side of plate) as emended by Kukenthal (*loc. cit.*) is a depauperated state of *C. geminata* although in certain areas where ecological conditions are unfavourable it may be the prevailing form. This appears to be the case in Fiordland.

Carex confusa sp. nov.

C. ternaria var. *gracilis* Cheesem. in *Trans. N.Z. Inst.* xvi (1884) 431; *Man. N.Z. Fl.* 1 (1906) 820; Kukenth. in *Engler's Pflanzen.* Heft 38 (1909) 369; Cheesem. *Man. N.Z. Fl.* ii (1925) 265.

Leaves up to 70 cm., longer than the culms. Culms stout below the lowest bract, slender and nodding above. Spikelets 12-20, rather distant, 5-10 cm. x 0.3-0.7 cm., upper 3-6 male on slender peduncles, remainder female, with male flowers at the apices, geminate, ternate, or quinate, peduncles slender, often exceeding the spikelets. Glumes 3 mm. x 1 mm., oblong, truncate or emarginate with a short hispid awn 0.5 mm. long. Utricles 4 mm. x 1.5 mm., narrow-

ovoid to lanceolate, 3-5 nerved when young, mealy and brown or yellow when mature, lateral ridges obscure, beak absent, mouth entire. Nut ovate, filling lower half to two-thirds of the utricule. Text-fig. 4.

HABITAT: Coastal swamps and lowland areas up to 2,000 feet.

SPECIMENS EXAMINED

Herb. Botany Division. 7717 Manawatu Gorge, V. D. Zotov; 22734 Moutoa Estate, Foxton, A. J. Healy; 25106 Portage, Pieton, A. J. H.; 37059 Feilding, A. J. H.; 40715 Thames, L. B. Moore; 51089 Ica Station, Whareama River, Castle Point County, V. D. Zotov; 51908 Golgotha, Wairarapa, A. P. Druce; 63231 and 63232 Manawatu Gorge, 300 feet, A. P. D.; 64938 Gollan's Valley, Eastbourne, Wellington, N. T. Moar No. 3; 78435-78437 Moutoa Estate, Foxton, A. J. Healy; 71112 Leslie Clearing, Caswell Sound, V. D. Zotov, 81276 seaward of Carter's Beach Road, Buller County, R. Mason and N. T. Moar No. 1691; 81299 and 81300 Buller Coalmine Reserve, R. M. and N. T. M. No. 1598.

Herb. Dominion Museum: Auckland Domain, T. Kirk; Waihi Lake, Waikato, T. K.; Whangape, T. K.; Haumurama, Lake Rotorua, D. Petrie; Pukeatua, western Taupo County, D. P.; Cox's Creek, Auckland, T. Kirk; Patetere Plateau, T. F. Cheeseman, Opunake, Taranaki, W. R. B. Oliver; Kapiti Island, W. R. B. O.; Horoeka, Puketoi Mountains, B. C. Aston; Hokitika, T. Kirk; Frying Pan Flat, L. Cockayne No. 956; Half-Moon Bay, Stewart Island, W. R. B. Oliver; Port Fitzroy, W. R. B. O.

Herb. Canterbury Museum. In Herb. H. Carse 424/1 off Manukau Road, Avondale South, Auckland, H. Carse; 424/2 Titirangi, Auckland, H. C., 424/3 near Cornwallis Beach, Manukau Harbour, J. Bishop and H. Carse; 424/5 Lower Waikato, H. Carse; 424/6 Tauhei-Motumaohi Road, Piako, H. C.; 424/7 Palmerston North, H. C., 424/8 Maritime Marsh, near Blockhouse Bay, Manukau Harbour, H. C.; 424/10 Mauku, Franklin County, H. C.

TYPE. In making his *C. ternaria* var. *gracilis* Cheeseman designated no particular specimen which might be considered the Type. The only specimen of Cheeseman's cited by Kukenthal as *C. ternaria* var. *gracilis* is from Lake Whangape but not now in the Auckland Museum Herbarium.

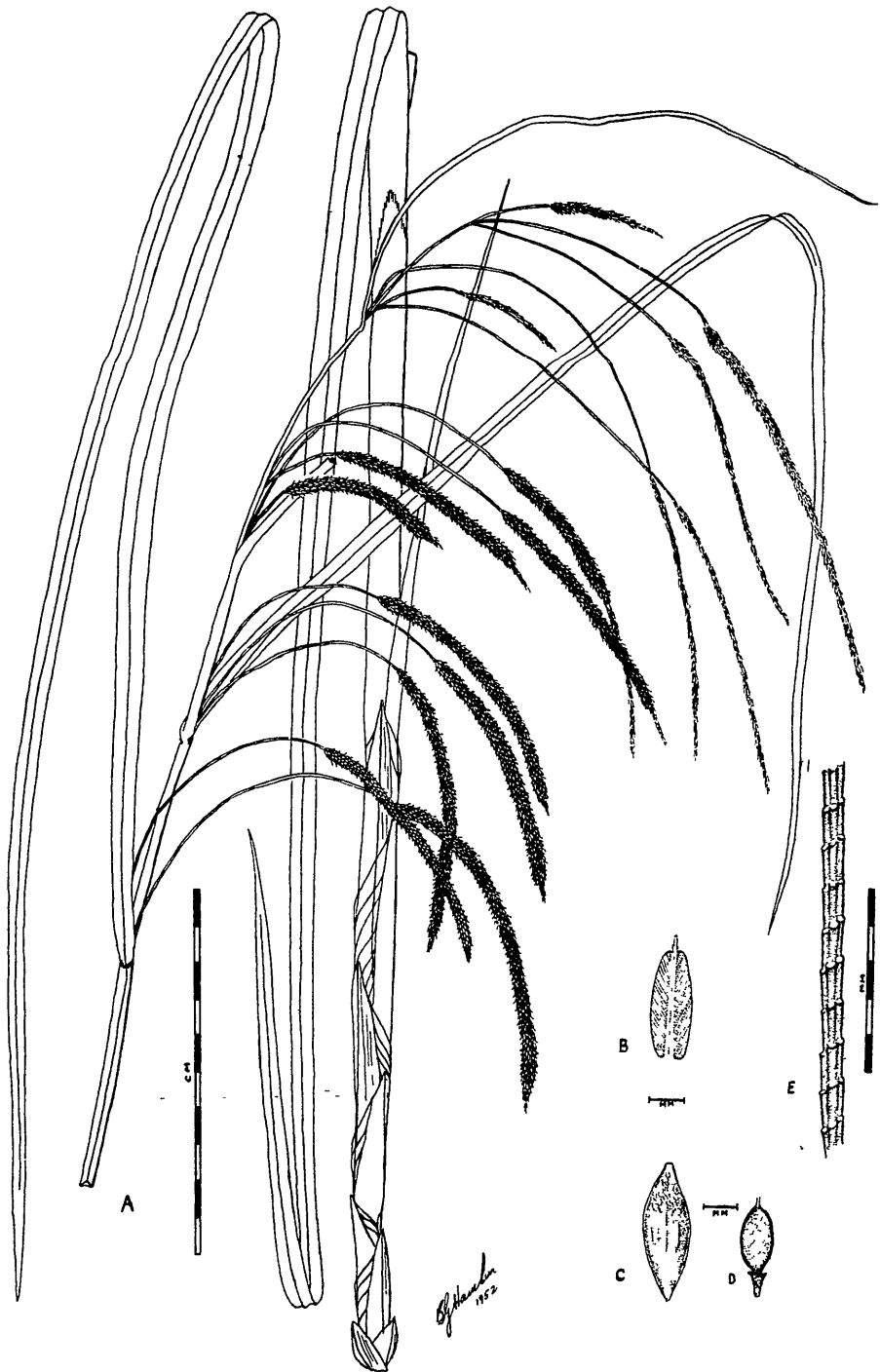
Four specimens are now in the Herbarium labelled by Cheeseman *C.t.* var. *gracilis* and of these, Nos. 2591 and 2593 are in a very early stage of development so that the floral characters cannot be determined. No. 2592 has three separate inflorescences of differing appearances none of which approach my concept and obviously unsuitable for selection as the Type.

Sheet No. 2590 (Lake Waihi, Waikato, T. F. Cheeseman) is a single inflorescence without basal leaves which agrees well with Cheeseman's brief description. I therefore select this specimen as the *Type* of the present species.

In his "Revision of the New Zealand Species of *Carex*" in 1884, Cheeseman described his *C. ternaria* var. *gracilis* as follows:—

"Var β *gracilis*—Tall, slender; leaves $1\frac{1}{2}$ inch; spikelets usually numerous, long, often over 4 inches, very slender, sometimes hardly $\frac{1}{2}$ inch in diameter. Approaches *C. subdola*."

In his notes to the species he added "var *gracilis* is usually found in woods. Small forms appear to pass into *C. subdola*; but ordinarily it can be distinguished by the longer awns to the glumes, and more numerous ternate or quinate spikelets."



TEXT-FIG. 4.—*Carex confusa*. A, habit; B, glume; C, uticle; D, nut; E, rachis. [Drawn from Bot. Div. 63232 (A-D) and Bot. Div. 40715 (E).]

The description, which is essentially the same as that given in the Manuals, is very vague and can be applied to a number of different forms as seems to have been the case with the two herbarium specimens mentioned above. I have therefore emended the descriptions to apply to the plant with fusiform utricles, a character not mentioned by Cheeseman.

Regarding the similarity to *C. subdola* I can find nothing to support this view either from Cheeseman's or any other specimens. The habit, spikelets and utricles of the two are very different and are readily separable on spikelet colour alone, *C. subdola* spikelets being reddish brown while those of the present species are greyish green or yellow.

The combination *C. gracilis* is already occupied by *C. gracilis* Curt. necessitating the provision of the above new name.

The species is illustrated by Boott under *C. ternaria* (Ill. Car. iv (1867) t. 598).

Carex darwinii var. **aristata** C. B. Clarke ex Kukenth. in Engler's Bot. Jahrb xxvii (1899) 529.

C. darwinii var. *urolepis* (Franch.) Kukenth. in Engler's Pflanzenr. Heft 38 (1909) 367; Cheesem. Man. N.Z. Fl. ii (1925) 264.

C. urolepis Franch. in Miss. Sc. Cape Horn v (1889) 376, t. 5

C. darwinii Boott in Proc. Linn. Soc. 1 (1845) 261, in Hook f. Fl. Antaret. ii (1846) 364, t. 144; Ill. Car. iv (1867) 156, t. 504-5; Cheesem. Man. N.Z. Fl. 1 (1906) 1154

C. martin Petrie in Trans. N.Z. Inst. lvi (1926) 7 non Léveillé and Vaniot.

Stems stout up to 80 cm. long, drooping. Leaves 12 mm. broad, longer than the culms, long sheathing. Culms stout below lowest bract, slender above, triquetrous. Bracts short-sheathed, exceeding the culms. Spikelets up to 16, distant, geminate or ternate, shorter than the peduncles, 10 cm. x 1.5 cm., lanceolate, upper 3-4 nodes with entirely male spikelets, remainder female with male flowers at the apices. Glumes lanceolate, 5 mm. x 1.5 mm. with a hispid awn up to 3 mm. long. Utricle 4 mm. long, ovoid, plano-convex or biconvex, turgid and coriaceous, 5-nerved and spotted on the basal half, lateral ridges obscure, beak evident but short, mouth entire. Styles 2. Nut obovate, stipitate. Text-fig. 5.

HABITAT: Swamps in lowland areas.

SPECIMENS EXAMINED

Herb. Bot. Division: 82988 Mouth of Wairau River, Marlborough, M. M. Small.

Herb. Dominion Museum: Chatham Islands, L. Cockayne, W. R. B. Oliver, W. Martin, Auckland Islands, F. R. Chapman; Antipodes Islands, B. C. Aston.

—Signor Carlos Munoz Pizarro, Director Departamento de Investigaciones Agrícolas, Santiago, has courteously supplied me with photographs and portions from the following specimens:—

Carex darwinii Boott SGO 58695, Tierra del Fuego, C. Skottsberg, 1908.

C. darwinii var. *aristata* C. B. Clarke ex Kukenth. SGO 46025, Rio Cruces in Patagonia, Ramon Vidal, 1874*

C. serranoi Phil. in *Audibus inter fluminis Palena et Rinihue*, F. Delfin, 1887 TYPE

These specimens support Kukenth's identification of the Chatham Island plant except that the latter lack the distinctive papillose surface to the utricles which is present in the South American specimens. This may be due to the more advanced age of the New Zealand specimens examined.

* Identified by Kukenth as *C. darwinii* var. *urolepis*.



TEXT-FIG 5—*Carex darwini* var. *aristata*. A, habit; B, glume. C, utricle; D, nut. [Drawn from Dominion Museum specimen collected in Chatham Islands by W. Martin, January, 1924. Identified as *C. martini* Petrie by D. Petrie.]

The present author suspects, on the basis of the above difference and also that of size, that the New Zealand and South American plants are not con-varietal but as the specimen SGO 46025 is unfortunately in a very immature state it has not been deemed advisable to venture any opinions until more conclusive evidence is available.

Carex coriacea sp. nov.

C. ternaria var. *pallida* Cheesem. in Trans. N.Z. Inst. LXVI (1884) 431; Man. N.Z. Fl. i (1906) 820; Man. N.Z. Fl. ii (1925) 265.

C. t. var. *minor* Boott forma *pallida* (Cheesem.) Kükenth. in Engler's Pflanzenr. Heft 38 (1909) 369

C. ternaria var. *minor* Boott III Car. iv (1867) 176, t. 597 pl. sinistra.

Rhizomes stout, long, producing tufts of leaves at intervals of 15–20 cms. Leaves 20–40 cm. x 0.3–0.5 cm., strict, hard and coriaceous, shining, lower leaves tapered rather abruptly above, much exceeding the culms. Culms slender, nodding. Spikelets 8–10, 2–3 cm. x 0.3–0.5 cm., geminate or ternate, upper 2–4 male, more or less clavate, remainder female, sometimes with male flowers at the apices. Glumes ovate or obovate, 2 mm. x 1 mm. with a short hispid awn 0.5–1 mm. long, brown with a light 3-nerved midrib and hyaline margins, occasionally pale to almost completely hyaline. Utricles orbicular to broadly ovoid, stipitate and narrowed above into a beak, turgid, coriaceous, smooth and shining with prominent lateral ridges which are sometimes scabrid on the beak. Nut ovate to broadly ovoid to orbicular, completely filling the utricle. Text-fig. 1, Fig. 1.

HABITAT: Watercourses and river banks in open tussock country, 1,000–4,000 feet.

SPECIMENS EXAMINED

Herb. Bot. Division: 17483 Ben More, H. H. Allan; 17601 Lewis Saddle, G. Simpson; 21765 Flock House Estate, Bulls, A. L. Poole; 22481 Tapui-o-maruhé Hut, Ngaruroro River, Kaimanawa Range, 3,500 feet, A. L. P.; 28278 Blue Mountains, L. B. Moore; 33862 Red Hills, Wairau Valley, Marlborough, J. H. McMahon; 37089 Arthur Pass, V. D. Zotov; 37209 Waiiau, Marlborough, A. J. Healy; 37210 North Branch, Kowai River, North Canterbury, A. J. H.; 58378 Upper Clarence Valley, R. Mason; 64897 Reporoa Bog, Ruahine Range, W. F. Harris; 67581 Leslie Clearing, Caswell Sound, 2,000 feet, A. L. Poole; 68661 Ngamatea Swamp, Inland Patea, B. G. Hamlin; 68884 Tikitiki Bush, Ngamatea, Inland Patea, B. G. H.; 73856 Molesworth, Awatere Valley, B. G. H.; 74525 Motutapu, Lake Wanaka, V. D. Zotov; 75257 Shag River near Palmerston, Otago, V. D. Z.; 75444 Molesworth, Awatere Valley, B. G. Hamlin; 75352 Motutapu, Lake Wanaka, V. D. Zotov; 75831 Reserve Road south of Timaru, R. Mason and N. T. Moar No. 923; 75898 Blue Mountains, Tapanui, R. M. and N. T. M. No. 1264; 76623 Clinton-Mataura Road, R. M. and N. T. M. No. 1048; 76634 Waikaka Valley, Southland, R. M. and N. T. M. No. 1112; 76732 Oreti Beach, Southland, R. M. and N. T. M. No. 1242; 76746 Blue Mountains, Tapanui, R. M. and N. T. M. No. 1279; 79496 Moawhanga River, S.W. Kaimanawa Range, B. G. Hamlin and A. P. Druce; 82684 Otautau, Southland, raised bog, N. T. Moar No. 2467.

Herb. Dominion Museum: Waimarino, D. Petrie; South-West Nelson and Buller River, W. Townson; Cedar Creek, Denniston, P. G. Morgan; Lake Rotoiti, Nelson, 1,800 feet, T. F. Cheeseman; Upcot, Awatere Valley, D. Petrie; Hanmer Plains, C. Christensen; western part of Amuri County, W. G. Morrison; Bealey

River near Mingatua Junction, W. R. B. Oliver; Castle Hill Hotel, L. Cockayne, No. 1601; North Poulter, 900 m. L. Cockayne No. 1621; Dunedin, D. Petrie; Bluff, J. Crosby Smith.

Herb. Auckland Museum: 2583 Rangipo Desert, swamp at foot of Mt. Ruapehu, H. Tryon; 2594 Lake Rotoiti, Nelson, T. F. Cheeseman; 2596 Lake Tekapo, T. F. C.; 2598 Gimmerburn, B. C. Aston; 2599 Lawrence, Otago, D. Petrie No. 31.

Herb. Canterbury Museum: Marlborough, J. H. McMahon; Waimarino, A. Wall.

TYPE: *Herb. Auckland Museum* No. 2596 from Lake Tekapo, 2,500 feet, collected by T. F. Cheeseman, January, 1883.

This specimen or a duplicate thereof was sent to Kükenthal as representing *C. ternaria* var. *pallida* and must therefore be taken as conforming to Cheeseman's concept of his variety. Mr. R. Cooper has previously selected this specimen as the type in a published list of types in the Auckland Museum Herbarium (Rec. Auckl. Inst. Mus. 3:6 (1949) 399).

Kükenthal confined his concept to the form with pale glumes but I have included in the above species the much commoner dark-glumed form. Cheeseman apparently adopted the name on account of the pale spikelets, the colour being due to the yellowish utricles, which, when ripe, almost completely hide the glumes.

C. coriacea is a most distinct plant in the field with its long rhizomes, tufted habit and broad strict leaves. On the banks of watercourses the rhizomes ramify through the soil at a depth of up to 20 cm. giving a dense stand which contributes very considerably to preventing erosion of the soil.

The spikelets are usually completely hidden by the leaves and it is possible to walk through a stand without seeing them even though the plants are in full flower or fruit.

The species is illustrated by Boott (Ill. Car. iv (1867) t. 597 on left-hand side of plate) on the same plate as his *C. ternaria* var. *minor* and apparently including it but, as the illustrations show, the two plants are quite distinct.

C. t. var. *minor* forma *nigrescens* Kükenth. in Engler's Pflanzenr. Heft 38 (1909) 369, based on a single specimen (Cockayne No. 1535) from Arthur Pass, is of rather doubtful validity. A specimen, possibly a duplicate, in *Herb. Auckland Museum*, is very immature and the utricles characters cannot be determined. The glumes are black, larger than in *C. coriacea* and with a red midrib which is produced into a long awn, equalling or exceeding the glume length. The vegetative characters agree with *C. coriacea*. It may be an aberrant form but much more material will be necessary before an opinion can be formed.

The name *C. coriacea* is proposed as the combination *C. pallida* is invalidated by *C. pallida* C. A. Mey.

ACKNOWLEDGMENTS

The author wishes to thank the following for their valuable assistance during the course of this study:—

The Directors and staff of the Dominion, Auckland and Canterbury Museums for permission to examine and borrow specimens; successive Directors of the Botany Division, Department of Scientific and Industrial Research and staff for assistance and encouragement; Mr. V. D. Zotov for personal advice and assistance in the examination of material and preparation of the manuscript.