Tuhinga 13: 45–69

The Grasses John Buchanan Illustrated in *The Indigenous Grasses of New Zealand* (1878–1880)

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Abstract: Modern names are given to the numbered specimens of the grasses that John Buchanan (1819–1898) used for the nature-printed illustrations in *The Indigenous Grasses of New Zealand* (published between 1878 and 1880). The specimens are mounted in a guard book with the original drawings of the dissections; the collection is deposited in the Herbarium of the Museum of New Zealand (WELT). Fifty endemic, 18 indigenous, and 9 naturalised species were illustrated, some of them under two names.

The Imperial Quarto edition, with 64 plates, and the smaller Royal Octavo edition met the practical agricultural needs of colonists for access to information on native grasses, but over-dramatised their possible future utilisation.

Keywords: grasses, illustrations, New Zealand, Buchanan, modern nomenclature for nineteenth century illustrations.

Introduction

The preparation of an illustrated book on the native grasses of the Colony of New Zealand was promoted by Sir George Grey K.C.B. in the House of Representatives in 1876 (Parliamentary Debates **20**: 217–219, 340). John Buchanan F.L.S. (Fig 1) of the Geological Survey Department undertook the task.[i] The essential feature was that the book '...should be prepared, with nature-printed plates, and descriptions of each species ...' (Hector 1878). The basis for the arrangement of species of grasses was to be that of J. D. Hooker in his *Handbook of the New Zealand Flora* (1864).

The work comprised six parts and appeared in three fascicles, the first fascicle of 20 plates in June 1878, the second of 23 plates in June 1879, and the third of 21 plates in 1880 (Buchanan 1878, 1879, 1880a). The fact that the grasses were to be nature-printed and thus natural size '...rendered it necessary to publish the work in this large size [Imperial Quarto], which is both inconvenient and expensive; but, ... only a small edition will be published in this form ...' (James Hector, June 1878, in the Preface to the first fascicle). Armstrong (1879) lamented that the first fascicle was '...already difficult to procure'.

In the Eleventh Annual Report of the New Zealand Institute, dated 21 July 1879, James Hector (1880b) recorded that:

> The illustrated work on the Grasses of New Zealand, by Mr Buchanan, is making good progress, considering the difficulties to be contended with in bringing out such an extensive and laborious work. Parts I and II, comprising twenty-one folio plates were issued last year, and Parts III and IV are now ready for the binder. The letterpress of the remainder of the work is now in the printer's hands, but some months will be required to complete the plates.
>
> The whole of the work is being reprinted in a cheaper form, in octavo, for general circulation, the folio prints being reduced by photolithography as soon as impressions are obtained, so that the small-sized volume will be ready for issue immediately on the completion of the larger work.

i Buchanan is cited as 'Draftsman' on the title page of the Imperial Quarto folio edition of 1880. On the title page of the *Manual of the Indigenous Grasses of New Zealand* (1880), Buchanan is 'Botanist and Draughtsman to the Geological Survey', his status having improved.

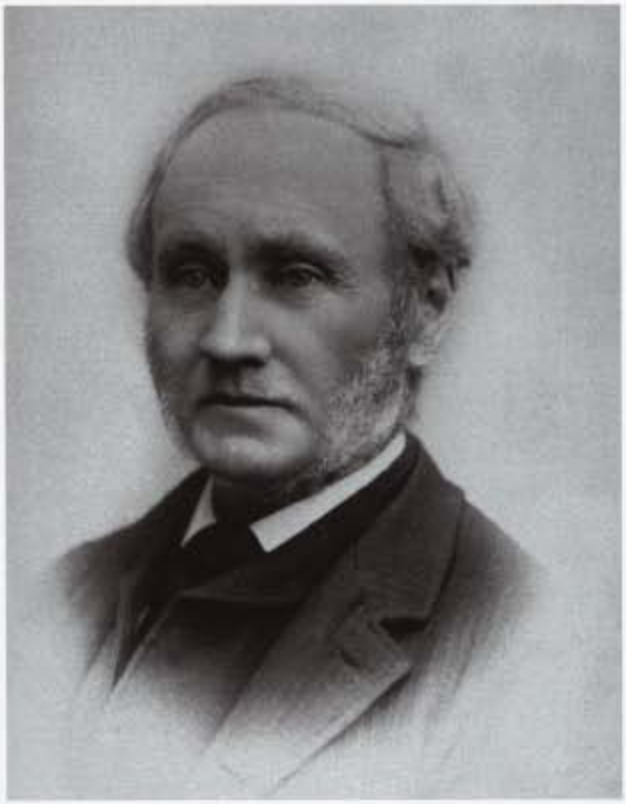

Fig 1. John Buchanan F.L.S. Hocken library, Uare Taoko o Hakena, University of Otago, Dunedin; E 2992/18; undated.

The consolidated Imperial Quarto edition was Published by Command in 1880 as *The Indigenous Grasses of New Zealand* (price 3 guineas) and also as the *Manual of the Indigenous Grasses of New Zealand* in Royal Octavo in 1880 (price 7s 6d). The *Manual* consisted of all the plates in the Imperial Quarto edition together with a newly set letterpress. We have not compared each page of the two printings word for word to ensure that the texts of the two are identical. However, the contents in the *Manual* differ from the Imperial edition by (i) a Modified Preface by James Hector incorporating some of his Postscript to the Imperial edition, (ii) a rearranged positioning of an Artificial Key to the Genera Represented in New Zealand, (iii) the omission of Remarks on the Distribution of Grasses in New Zealand, and (iv) numbered letterpress pages — evident only on verso pages. Of these differences, only the absence of the remarks on distribution and of species considered '... to be most worthy of cultivation for the purposes stated' seem important for the times.

The exact date of publication of the fascicles, a critical fact in nomenclature, was not helped by Hector's date of 1877 for the first fascicle (Hector 1880a), not 1878 as given in his Preface to the first fascicle.

Here we propose to give, as an appendix, an annotated list of taxa in Buchanan's Plates. This is essentially a list of modern identifications of the specimens used by Buchanan to illustrate the taxa he included in his books. The task is made easier because the specimens used in nature printing are mounted in a guard book referred to as 'Buchanan's printer's set' by Zotov (1963), or as 'Buchanan's Folio' by Edgar & Connor (2000). We are concerned solely with the specimens in the Folio to the exclusion of all else – duplicates or other collections that may have been available to him. The guard book is deposited in the Herbarium of the Museum of New Zealand (WELT).

We shall use the names for taxa to be discussed here that we accepted in *Flora of New Zealand Vol. V. Gramineae*, except when it is essential to employ the nomenclature used by Buchanan, as for example in discussion on holotypes (p. 49) and plate numbering (p. 49). We shall use 't.', the internationally acceptable form for Plate, and Arabic numbers rather than the long form of Roman numerals used by Buchanan.

The Specimens and the Collectors

Specimens

The specimens used by Buchanan are mounted in a guard book, which is a book whose pages are protected from injury by a welt inserted between the leaves. The pages bear the same titles as the plates, and are in the order of the plates, except that the specimen for t.24B precedes that for t.24A. Specimens were numbered within the oval Colonial Museum Herbarium stamp by Fiona D. H. Pitt in the late 1970s.

Some specimens are mounted exactly as mirror images of the printed plates, eg, in *Poa* the match is perfect for t.44B and WELT 59596 *P. anceps*; t.46E and WELT 59600 *P. pusilla*; t.48B and WELT 59603 *P. colensoi*; t.50A and WELT 59606 *P. pygmaea*; t.50B and WELT 59607 *P. incrassata*; but for t.50C *P. buchananii*, WELT 59608 is mounted inked side down and thus is not a mirror image.

Other specimens do not match the plates. *Hierochloe novae-zelandiae* (t.7) shows three inflorescences attached to appropriate culms, but on WELT 59547 there

are only two. *Zoysia pauciflora* (t.13A) is of two independent shoot systems, but in WELT 59554 the two shoots appear to be united as one plant quite unlike t.13A. WELT 59558 and t.16 are quite different; as illustrated, there are three shoots, each with an inflorescence: 1 from Auckland, 1′ from Kawau Island, and 1″ from the Wellington Domain. WELT 59558 comprises three inflorescences severed from their subtending culms and one shoot with a loose panicle mounted between two truncated culms, a total of four panicles. Joining appropriate parts indicates that the shoot on the far right of the sheet is the central part of t.16 that originated in the Domain at Wellington, ie, 1″; Figures 2–9 are drawn from it. That specimen is *Dichelachne sieberiana*, the others are *D. rara*.

Dichelachne crinita in t.15 and on WELT 59557 fares a little better than t.16 and WELT 59558; the panicle of 1 (locality unrecorded) has been detached from its long subtending culm and is mounted between two shoots; the pencilled connection between the inflorescence and a culm is quite incorrect. All that remains of 1′ from the Wellington Domain is a panicle.

Mounting of loose inflorescences as if they were an exact part of the accompanying vegetative shoot is evident in WELT 59570 *Deyeuxia youngii*, in WELT 59622 *Achnatherum petriei*, and in WELT 59605 *Simplicia buchananii*.

Hairs have been added to the leaf-blades in t.29.2 *Chionochloa ovata*; WELT 59578 has glabrous leaves. No florets now remain between the glumes of this specimen, which is the holotype for that species. Similarly the holotype for *Danthonia pilosa* var. *stricta* WELT 59581 has glabrous leaf-blades, but in t.33.2A hairs have been added.

There was no obligation on Buchanan's part to ensure that the specimens and the illustrations corresponded in every positional detail, as the specimens could only be mounted after the nature-printing procedures had been completed. The obligation was to ensure that the plants he used in nature-printing became the specimens mounted in the guard book.

In four figures here we illustrate Buchanan's plates as published together with the corresponding WELT specimen in Buchanan's Folio (Figs 2–5). Of the five grasses, two are holotypes and two are lectotypes (see Table 1). The specimens show the variety of mounting, the similarity or dissimilarity between them and the plates, and their mirror image quality.

The Collectors

Hector (1880c) makes it clear in the Preface to the *Manual* that Buchanan made his own collections, and that where the collectors were other botanists they were duly acknowledged. Buchanan is clearly indebted to A. McKay, especially for gatherings on the Mount Arthur Plateau; see, for example, *Poa uniflora*, *P. kirkii*, and *P. anceps* var. *minima*, and, in Nelson, *Danthonia semi-annularis* var. *alpina*. Some, but not all, of McKay's specimens have the status of holotype. H.H. Travers, of Wellington, is frequently cited as a collector for the Tararua Range and for Nelson Province.

Donald Petrie sent specimens to Buchanan that are now holotypes, eg, *Danthonia thomsoni* from Mount St Bathans, *Stipa petriei* from Cromwell, *Poa pygmaea* from Mount Pisa, and what was eventually recognised as *Pyrrhanthera exigua* from Mount St Bathans. J. Morton's collections on Mount Eglinton are (i) holotype for *Danthonia ovata* and (ii) lectotype for *Poa foliosa* var. γ.

Buchanan himself collected on Kawau Island, and at Tauranga, Mount Egmont, the Kaikoura Mountains, and Wellington, and his collections are frequently cited in the text, among those of Hector and Buchanan, Kirk, Colenso, and Sinclair and Haast. Despite Hector's assurances, 27 specimens in Buchanan's Folio are devoid of information on collectors and/or the locality. Critical specimens deficient for these data include the holotypes or lectotypes WELT 59581 *Danthonia pilosa* var. *stricta*, WELT 59602 *Poa intermedia*, WELT 59604 *P. acicularifolia*, and WELT 59620 *Agropyron scabrum* var. *tenue*. When we are unable to designate the name of the collector or the origin of the specimen, there is no entry after a WELT number in the annotated list below.

Nevertheless, some specimens may be intuitively accounted for, eg, Zotov (1971b) considered that *Zoysia pauciflora* WELT 59554 came from Tauranga, and Zotov (1963) interpreted Wellington as the *locus classicus* for *Cortaderia fulvida* from within the distribution given as 'North Island: Poverty Bay, shores of Wellington Harbour and Cook Strait near Wellington'. Others that lack the precision of a collector's name may well be Buchanan's own, as Hector has indicated, but we cannot make an authoritative statement on them all.

Buchanan listed some taxa of which there were no specimens in the Colonial Herbarium and that therefore could not be illustrated, eg, *Triticum youngii* (p. 167

Table 1. Holotypes and lectotypes (*) in Buchanan's Folio (details in text)

Buchanan's published name	t. No	WELT No.	Current name
1872			
Danthonia raoulii subsp. *australis*	31	59576*	*Chionochloa australis*
1874			
Arundo fulvida	28	59373	*Cortaderia fulvida*
1879			
Danthonia ovata	29.2	59578	*Chionochloa ovata*
D. pilosa var. *stricta*	33.2A	59581	*Rytidosperma clavatum*
D. pilosa var. *racemosa*	33.2B	59580	*R. racemosum*
D. semiannularis var. *alpina*	34.2A	59583	*R. setifolium*
1880			
Poa foliosa var. γ	43B	59594c*	*Poa novae-zelandiae*
P. anceps var. ε *debilis*	46E	59600	*P. pusilla*
P. anceps var. ζ *minima*	46F	59599	*P. pusilla*
P. intermedia	48A	59602*	*P. colensoi*
P. acicularifolia	49A	59604	*P. acicularifolia*
P. uniflora	49B	59605	*Simplicia buchananii*
P. pygmaea	50A	59606	*Poa pygmaea*
P. mackayi	51A	59609*	*P. kirkii*
P. kirkii	51B	59610	*P. kirkii*
Agropyron scabrum var. *tenue*	57B	59620	*Elymus tenuis*
Stipa petriei	17.2	59622	*Achnatherum petriei*
Danthonia thomsonii	36.2	59624	*Rytidosperma thomsonii*

Manual), *Poa ramosissima* (p. 109 *Manual*), *Agrostis antarctica* (p. 41 *Manual*), which shows his dependence on external collectors and older pressed material.

Buchanan was somewhat careless in the spelling of the name of one of his important collectors, that of his contemporary at the Geological Survey, Alexander McKay. He cites him as McKay (twice), Mackay (once), and as A. Mackay (8 times). From t.49B, *Poa uniflora*, it is clear that he is referring to A. McKay even though he wrote 'The present species recently discovered by Mr A. Mackay, of the Geological Survey ...' In the second (1879) fascicle McKay has his name spelled correctly; only in the third (1880) fascicle does the error arise. We will use the form A. McKay throughout, as we should have in Edgar & Connor (2000) on pp. 165, 177, and 291.

Petrie is referred to on several occasions as a collector especially from Otago, but Buchanan gives his name as W. Petrie. Throughout we use the correct form, D. Petrie.

Holotypes and Lectotypes

We list here (Table 1) those specimens in Buchanan's Folio that have the special status of holotype (holotypus) '... the type of the name of a species or infraspecific taxon ...', or the status of lectotype, one designated as the nomenclatural type in the absence of a holotype. At the time of Buchanan's books, holotypes were not listed as such, nor as 'Type Specimen' or some similar expression. Neither had the concept of protologue developed by then. For each of his newly defined taxa, Buchanan's specimens, illustrations, distribution data, and commentaries are all parts of the protologue.

Holotypes remain permanently associated with the bi- or trinomial they typify: thus, *Danthonia ovata* Buchanan has WELT 59578 as the holotype for its published name and as that of the basionym for its currently accepted name *Chionochloa ovata* (Buchanan) Zotov, and WELT 59624 is the holotype of *Danthonia thomsonii* Buchanan and for the currently accepted name *Rytidosperma thomsonii* (Buchanan) Connor & Edgar. All the names typified by specimens in Buchanan's Folio are readily associated with the currently used bi- or trinomial contained in Edgar & Connor (2000).

For convenience, we list the original published name and the currently accepted name together with Buchanan's plate numbers and the herbarium number at WELT in Table 1. The order is that of plate number and year of publication.

The Plates

The plates were prepared by what Sampson (1985) described as 'A less sophisticated method [of nature-printing] ...' where '... the specimens of various grasses were lightly inked, and faintly impressed on the prepared surface of the lithographic stone'. (Hector 1878). Details were filled in by hand. A straw-coloured background was added from another stone for the Imperial edition. In Sampson's opinion, 'The plates are of very high quality indeed – a tribute to John Buchanan's skill and to supervision by J. Earle, the Government lithographer.'

The *Manual*, where the plates are quarter size by photolithographic reduction, is printed in olive-green ink; there is no background tinting.

Plate Numbering

Buchanan's system for numbering his plates is simple in the first fascicle (1878). Where two species are illustrated on the one plate, A and B designate them. If there are several species in a genus, as in *Microlaena*, the order of plates follows 'Arrangement of the Species', effectively his key to species: thus 1. *M. stipoides*, 2. *M. avenacea*, 3. *M. polynoda*, and, in *Dichelachne*, 1. *D. stipoides*, 2. *D. crinita*, 3. *D. sciurea*.

It is not quite as simple in the second and third fascicles, where taxonomic reasoning seems to take over. Thus in *Danthonia*: t.29 is followed by t.29.2, which is a new species *D. ovata*; in *D. pilosa* t.33 is followed by t.33.2A and B where these are two newly described varieties of that species; in *D. semiannularis* t.34.2A is of var. *alpina*, a new variety, and Hooker's var. *gracilis* is t.34.2B. *Poa* is more complex in parts of its presentation in the third fascicle of 1880. All varieties of *P. anceps* bear consecutive letters and follow the Greek alphabetical sequence adopted by Hooker: thus t.44A and B are *P. anceps* var. α *elata*, and var. β *foliosa* respectively; t.45C is var. γ *breviculmis* and D is var. δ *densiflora*; t.46E is *P. anceps* var. ε debilis, and t.46F var. ζ *minima*.

There are three plates in the 'Addenda' of 1880; their plate numbers fit with genera illustrated earlier, t.17.2 to follow t.17, t.26.2 *Deyeuxia youngii* to follow *D. avenoides* in t.26, and t.36.2 to follow after his *Danthonia* spp. in t.36A and B. In our Annotated List below we have inserted them in the sequence Buchanan provided for.

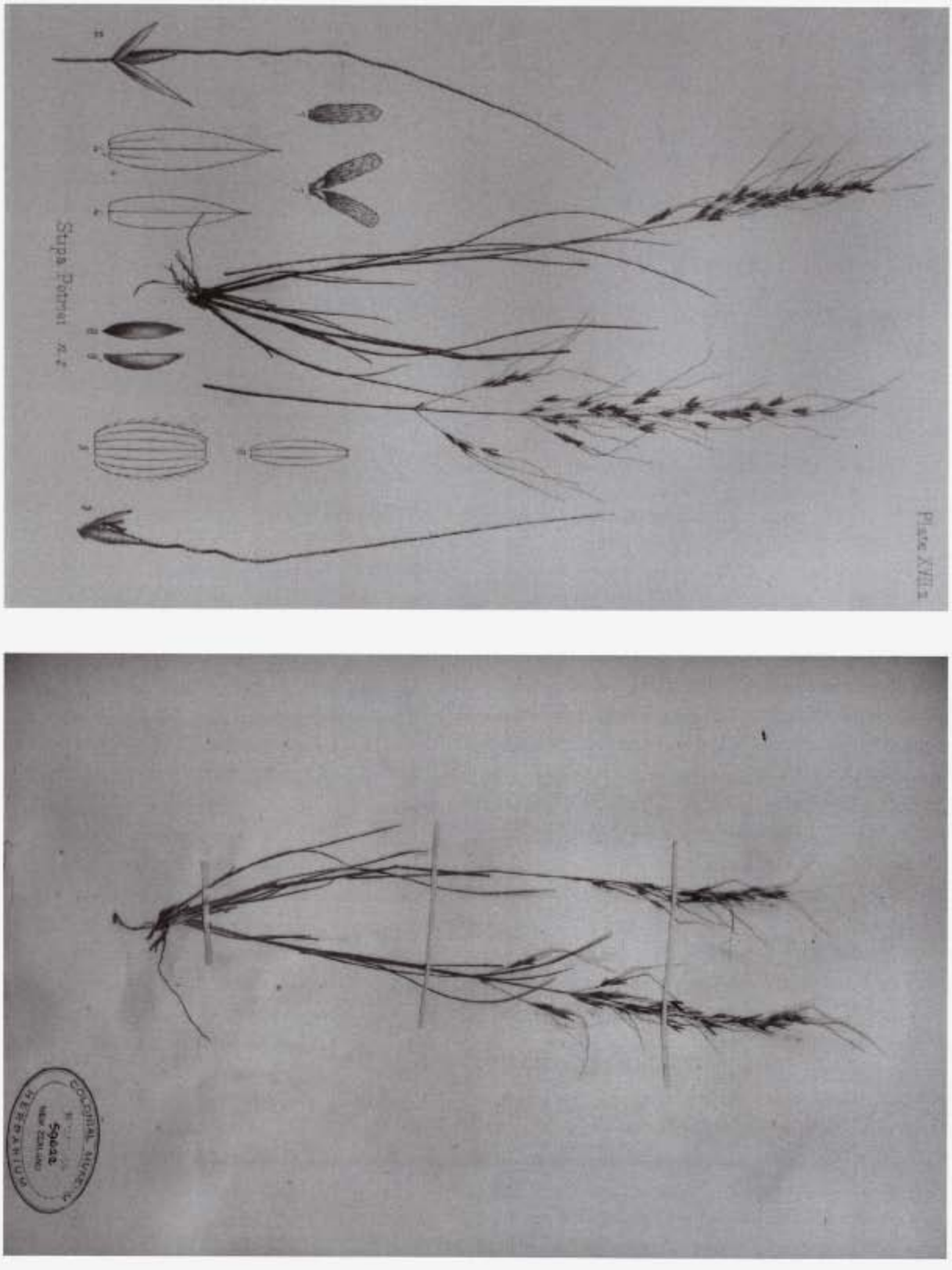

Fig 2. (1) t.17.2: *Stipa petriei* n.s. (2) WELT 59622 *D. Petrie* Cromwell. Holotype. (*Achnatherum petriei*). Photos R. Lamberts.

The Figures

Included on each plate are a series of 'Figures'. Fig 1 is always the habit illustration from nature-printing. The others, almost 700 of them, are from line drawings of dissections prepared by Buchanan. These original line drawings, in pencil or ink, are mounted in Buchanan's Folio opposite the specimen, ie on the verso side of the page bearing the preceding specimen. Fig 2 is usually a habit drawing of a spikelet, perhaps at anthesis. Fig 3 is always a single floret and is invariably shown at anthesis, ie chasmogamous, even in flowers known to be cleistogamous. Fig 4 outlines glume(s) shape, but is drawn especially to show the number of nerves and their relative length. Fig 5 is usually the lemma and Fig 6 its corresponding palea. Figs 4, 5, and 6 are somewhat stylised, and are dorsal, abaxial, views. Fig 7 is usually of lodicules. Fig 8 may be the gynoecium or the caryopsis, depending on availability.

In some exceptional cases, there are 10, 11, or even 12 figures, mostly in taxa with florets of differing sex form or sterility. We note here that t.20B lacks Fig 6; t.26B has figures from proliferating spikelets; t.33.2B includes an inexplicable Fig 3, and that in t.17 Fig 9 is of a caryopsis to which there is no reference.

Illustrations of glumes, lemmas, paleas, and lodicules are sometimes at variance with reality. We discuss each separately.

Glumes: In *Agrostis* glumes are 1-nerved, but are shown as 3-nerved in t.19 Fig 4, t.20A Fig 4, t.20C Fig 4. Glumes are also 1-nerved in *Deyeuxia* and correctly drawn in t.24A Fig 4, but not in one glume of t.26.2 Fig 4′ or t.24B Figs 4 and 4″. *Deschampsia*, also Agrostideae, bears 1-nerved glumes, but in t.41.A these are drawn shortly 3-nerved.

Buchanan always referred to the 'Nervation of empty glumes' and we have restricted our comments to nerves even though margins that are glabrous are shown otherwise, eg t.50A *Poa pygmaea*.

Lemma: One of the characteristics of the lemmas in *Chionochloa* is nerves anastomosing below the sinus; nowhere in t.29–t.32 (5 taxa) are they so drawn. Nerves united below the lemma apex are not a characteristic of *Oplismenus*, although they are so illustrated in t.11. Lemmas in some *Poa* spp. are 3-nerved; in *P. subvestita* short inner lateral nerves are not present as drawn in t.43A Fig 5; inner lateral nerves failing to reach the base of the lemma are incorrect as presented for four species of *Poa*, namely *P. colensoi*, *P. pygmaea*, *P. incrassata*, and *P. kirkii*.

Lemma margins should be shown smooth rather than scabrid in *Poa pusilla* t.46F Fig 5, *P. pygmaea* t.50A Fig 5, *P. incrassata* t.50B Fig 5, and *P. kirkii* t.51B Fig 5.

Buchanan illustrated lemmas in two ways: (i) in Fig 3 in a floret and (ii) in Fig 5 in outline with nervation. He was not concerned with vesture, but he captured lemma hairiness in *Bromus arenarius* (t.56A). Among Danthonieae lemma vesture in *Rytidosperma* is especially well represented in t.34, *R. unarede*, and in t.36A and t.36.2, both *R. thomsonii*; in *Chionochloa* spp. lemma hairs are shown at margins only and do not create true representations. The treatment of *Poa* spp. is uneven. Buchanan intended Fig 5 to show nervation; ornamentation was incidental.

Palea: Paleas are usually 2-nerved and shown so for most taxa, and correctly 1-nerved in *Microlaena* and 2-nerved in related *Zotovia*, but the apex of the palea in both *Elymus solandri* and *E. tenuis* should be pointed and bifid. Buchanan always referred to nervation of the palea, and it may be unreal to criticise his figures for other shortcomings.

Lodicules: The most imaginative of all the figures are those of the lodicules. Mostly they seem to be exaggerations. In *Chionochloa* and *Rytidosperma* lodicule nervation and long hairs are characteristic, and in Buchanan's figures they are correctly shown as nerved. Nerves and hairs are independent, but Buchanan establishes a relationship between lodicule nerves and the long marginal and apical hairs by sometimes drawing the hairs as continuations of the nerves – almost as excurrent nerves – as in t.31 *C. australis* and t.34 *R. unarede*.

The lodicules of *Trisetum lepidum*, as illustrated in t.39 Fig 7, bear bold strong hairs; dissection of florets of WELT 59589 shows glabrous lodicules and that the illustrations prepared by Buchanan but crossed out and replaced by the published version were correct. Certainly t.39 Fig 7 is not the lodicule of *T. lepidum*.

Because lodicules are notoriously difficult to describe and measure, or examine to establish the presence of nerves and of apical, marginal, or body hairs, much of this criticism is probably undeserved. In *Fl. N.Z. V Gramineae* we are at times ambivalent about lodicule vesture, even though we are helped by modern microscopes and the work of Jirásek and Jozifóva (1968) on lodicule morphology.

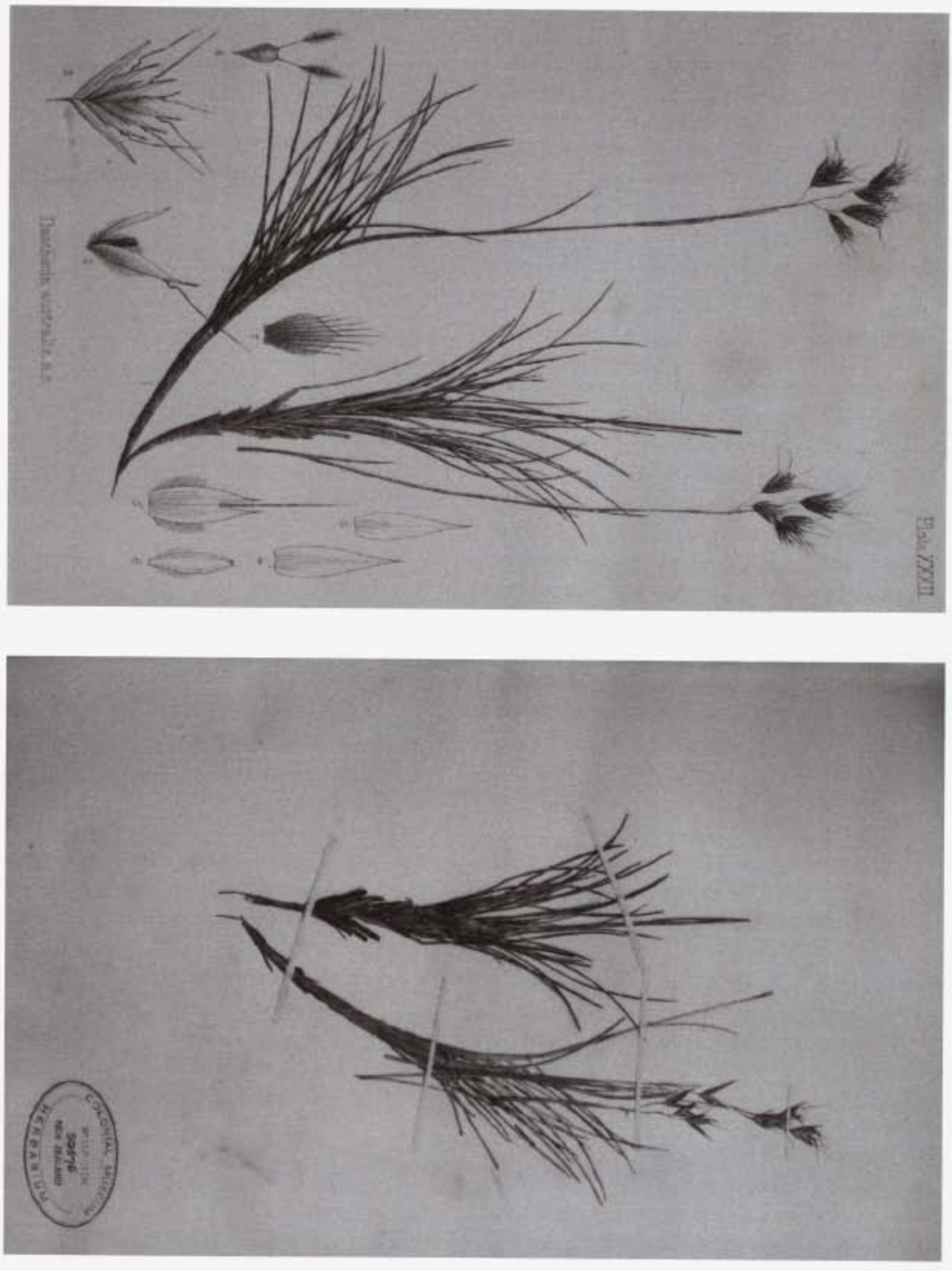

Fig. 3. (1) t.31[32]: *Danthonia australis* n.s. (2) WELT 59576 *J. Buchanan* Kaikoura Mountains. Lectotype. (*Chionochloa australis*). Photos R. Lamberts.

Transposed Figures

Two species, *Glyceria stricta* (*Puccinellia stricta*) and *Catabrosa antarctica* (*Deschampsia tenella*), comprise t.41. The Figs 1 are correct as labelled, but Figs 2–8 are transposed one species for the other; A2–8 are those of *D. tenella* and B2–8 are those of *P. stricta*. This is the only example of this kind of confusion; it is immaterial how it arose.

Duplicate Plates

Based on our identifications of the specimens, it is clear that some species are illustrated twice, though each time under a different name. *Deyeuxia youngii* was illustrated under that name in t.25, and a second time under the name *D. scabra* in t.26.2. In several ways the figures on the two plates are inconsistent; eg t.25 Fig 8 shows a glabrous apex to the ovary, but in t.26.2 Fig 8 the ovary apex is pubescent. Lemma apices are shown shortly awned in t.26.2 and awnless in t.25.

Deyeuxia avenoides is illustrated in t.24A under that name, and in t.26A under the name *D. quadriseta*. There is general agreement between t.24A and t.26A except that lodicules (scales) in the former are nerved (incorrect) and in the latter nerveless (correct). A proliferating inflorescence and its florets are shown in t.26B.

Rytidosperma thomsonii is illustrated twice (i) as *Danthonia nuda* t.36A (1879) and (ii) as *D. thomsonii* t.36.2 (1880a), where Buchanan alluded to its alliance with *D. nuda* as he understood that taxon. The only significant difference between the two plates lies in Fig 5 of t.36.2, where two pairs of lateral tufts of lemma hairs are shown relative to one pair in t.36A.

In *Poa anceps* six varieties were presented by Buchanan; Edgar (1986) interpreted t.44A, t.44B, and t.45D as *P. anceps* s.l., and t.46E and t.46F as *P. pusilla*; t.45C is the naturalised *P. pratensis*.

Edgar (1986) treated *P. kirkii* Buchanan and *P. mackayi* Buchanan as synonymous under *P. kirkii*. WELT 59609 and t.51A comprise two different plants – on the left *P. mackayi*, typified by Travers' specimen from the Tararua Mountains, and on the right, and taller, *P. celsa* from Mount Arthur. *Poa kirkii*, t.51B, is typified by WELT 59610 from the Mount Arthur Plateau. The differences are presumably in the size of florets and their associate features; after all Buchanan was interpreting them as two distinct species.

Poa colensoi, t.48B, and *P. intermedia*, t.48A, which differ in the size of the panicles and the length of leaves, are both treated as *P. colensoi* by Edgar (1986).

Taxa Illustrated

Buchanan's overall task was an illustrated book of New Zealand's indigenous grasses. An analysis of his plates using current nomenclature and status shows: 50 endemic species, 18 indigenous species, and 11 naturalised species were illustrated, and 6 species were illustrated twice, and one three times.

Hooker (1864) was Buchanan's checklist of grass species to be illustrated. Of Hooker's list he failed only with *Poa ramosissima*, *P. litorosa*, and *Hierochloe brunonis* – all three from the subantarctic islands – *Chionochloa bromoides* of Northland coasts, *Triticum youngii*, and *Agrostis magellanica*.

More species were illustrated than are contained in Hooker's *Handbook of the New Zealand Flora*. These were mostly species Buchanan described himself, eg, *Achnatherum petriei* (t.17.2), *Chionochloa australis* (t.31), *C. ovata* (t.29.2), *Poa acicularifolia* (t.49A), *P. kirkii* (t.51B), *P. pygmaea* (t.50A), *Rytidosperma thomsonii* (t.36.2), and *Simplicia buchananii* (t.49B). After 1880 Buchanan described no new grasses. The taxonomic fate of the 20 taxa he had erected at various ranks between 1874 and 1880 is reflected in the annotated list below. An appreciation of his contribution to grass taxonomy in New Zealand is in Connor & Edgar (2002).

A direct comparison of the names we accept as current binomials and those in Buchanan's books may suggest very serious disagreement 120 years later. But this is not always the case, as Buchanan used many names current for his times; thus *Apera arundinacea*, used for t.17 is one of the heterotypic synonyms of *Anemanthele lessoniana*; *Schedonorus littoralis*, the name used for t.54, is one of five homotypic synonyms of *Austrofestuca littoralis*; and *Stipa teretifolia* of t.14 was the name in general use in Australasia until late last century, but is now regarded as a heterotypic synonym in *Austrostipa stipoides*. In all, there are almost 20 such names (see annotated list below).

Two important species of endemic genera that Buchanan illustrated bear names that are clearly difficult just to transpose: (i) *Pyrrhanthera exigua* was originally illustrated under the Australian name *Danthonia pauciflora* and was later given its first correct name *Triodia exigua* by Kirk; (ii) *Simplicia buchananii* was first described and

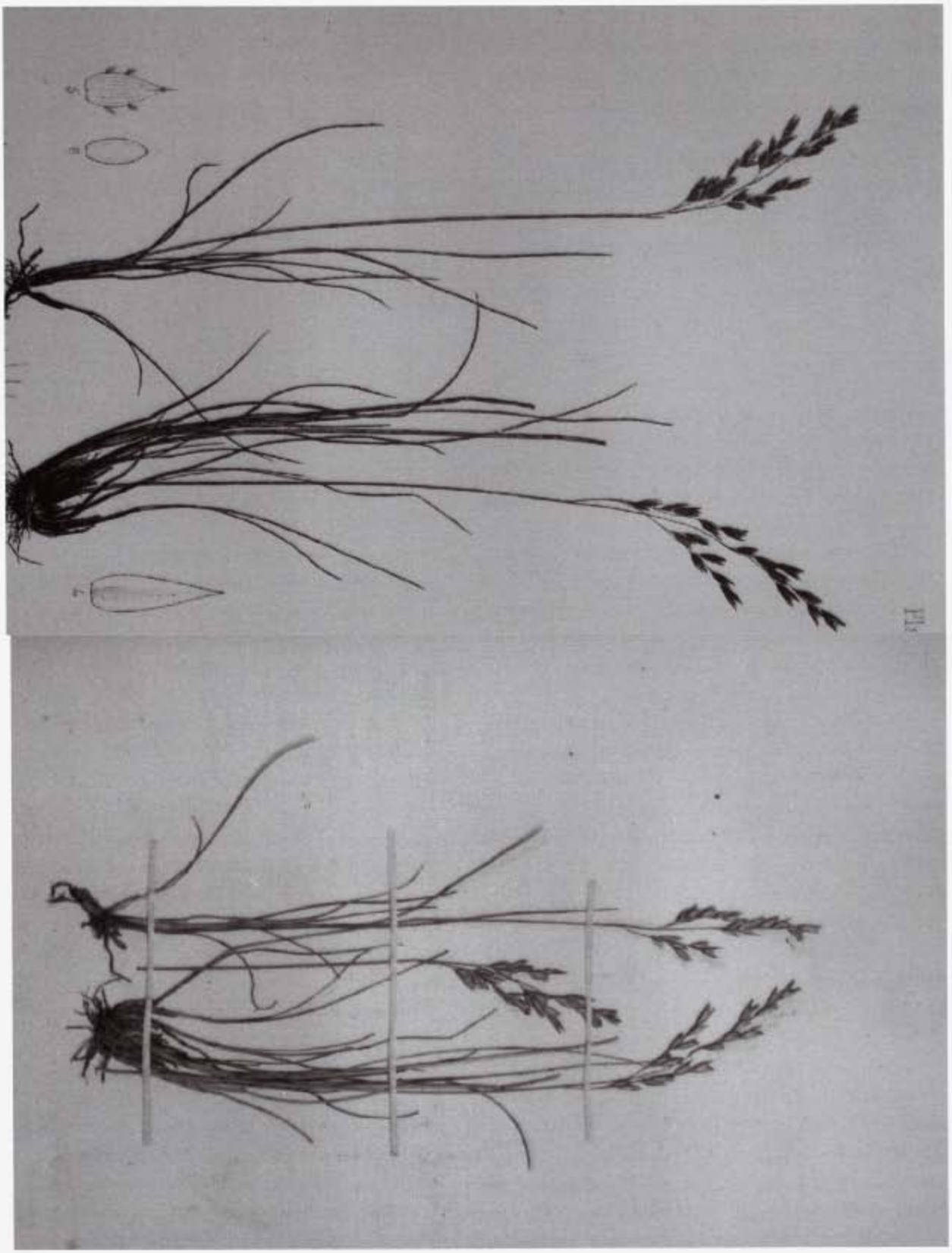

Fig 4. (1) t.36.2: *Danthonia thomsonii* n.s. (2) WELT 59624 *D. Petrie* Mount St Bathans. Holotype. (*Rytidosperma thomsonii*). Photos R. Lamberts.

illustrated as *Poa uniflora* sp. nov., a name that was illegitimate at publication. It was restored to the specific rank and eponym given by V.D. Zotov on final transfer from *Poa* to Kirk's genus *Simplicia*.

The long lists of synonyms for endemic and indigenous grasses in Edgar & Connor (2000) will account for similar examples. In the annotated list below we indicate Buchanan's use of what we regard as basionyms and veritable homotypic or heterotypic synonyms; correct entries remain as such.

Five endemic genera are accepted by Edgar & Connor (2000). They are all illustrated by one species each: *Anemanthele* t.17 (as *Apera*), *Simplicia* t.49B (as *Poa*), *Stenostachys* t.58 (as *Gymnostichum*), *Pyrrhanthera* t.36B (as *Danthonia*), and *Zotovia* t.1 (as *Ehrharta*).

Public Notice of the Book

Nowhere in New Zealand was there a review of Buchanan's books, neither in the newly begun *New Zealand Journal of Science* nor in the *New Zealand Country Journal*, which reviewed T.H. Potts' *Out in the open in New Zealand* and Miss E.A. Omerod's *Manual of injurious insects and methods of prevention*. On the question of the merits of native grasses, J. B. Armstrong (1879) wrote, 'But the best of all publications on the subject is the splendid illustrated work of Mr Buchanan, the first of which was issued last year; and when the remaining parts are published, will contain excellent drawings and descriptions of all the known native grasses. It is to be regretted, however, that so very few copies were printed, the work being already difficult to procure.' Sir George Grey had indicated its restricted availability in August 1878 (Parliamentary Debates **28**, p. 330), noting that the '... expenditure on the large edition was so considerable, and the number of copies struck off so inadequate...', but he did say there would be another edition. 'The small edition was octavo – a most useful size – and a most beautiful work: in fact he thought it would surpass the large edition.' That was Grey's last recorded remark on Buchanan's books which he had sponsored in 1876. *The Gardeners' Chronicle* for 24 August 1878, page 246, commented anonymously on the first fascicle that '... the work is certainly a very handsome and useful one. Its large size is against it for practical use, but fortunately an octavo edition will be published.' The dissections of florets were thought '... of little importance to practical farmers, for whose benefit the work was undertaken'. We could find no further notice in the *Chronicle*.

The *Transactions of the New Zealand Institute* were silent. Hector never again wrote about *The Indigenous Grasses* after his July 1879 managerial report of the New Zealand Institute (Hector 1880b). There were two notices in German botanical journals: (i) an author entry under Neue Literatur in *Botanische Zeitung* 38: 607 (August 1880) and (ii) B.A.E. Koehne's notice of the *Manual* under 'Floristics' in *Botanische Centralblatt* 7: 11–12 (1880) where he described the illustrations as very life-like. For his readers' information he included the list of taxa illustrated together with a not quite complete list of the new taxa described there by Buchanan. The *Manual* reached Germany quickly.

In 1880 Thomas Kirk was the most widely experienced botanist in New Zealand and the logical reviewer for the grass books. Petrie had described his first grass (Petrie 1880) and just begun his work in agrostology. T. F. Cheeseman (then aged 37 years), who had been Curator at the Auckland Museum since 1874, may not have been asked for a commentary. W.T.L. Travers, active in New Zealand botany since the 1850s and an experienced field botanist, could have undertaken the role of reviewer. The importance of the books may be an exaggeration on our part, though initially not to Sir George Grey; they had no effect outside New Zealand other than in the erection of new grass taxa.

Kirk wrote no review or commentary on the work as a whole, but in 1882 entered into a public exchange of letters with Buchanan in the *New Zealand Journal of Science* about some of the taxa Buchanan had illustrated. It began over *Agrostis muscosa* Kirk sp. nov. (1881) relative to *A. subulata*, t.20B, and the discussions concluded on that species among others in 1882.

Although Moore (1973) said of Kirk that 'He had an obvious affection for Buchanan whose botanical errors and omissions he corrected gently though always fairly', the tone of the Kirk–Buchanan exchange suggests that the words brutal and pompously righteous might correctly describe Kirk's behaviour to Buchanan. 'I would suggest to Mr Buchanan the propriety of adopting a more courteous tone in any further communication ... He offers as an excuse for one of his errors what he is pleased to term "a lapse of the reasoning faculties". The fact of his being constrained to make an excuse of this kind should at least prevent him from imputing to me, even indirectly, a desire to bring discredit to the Colonial Museum, when correcting

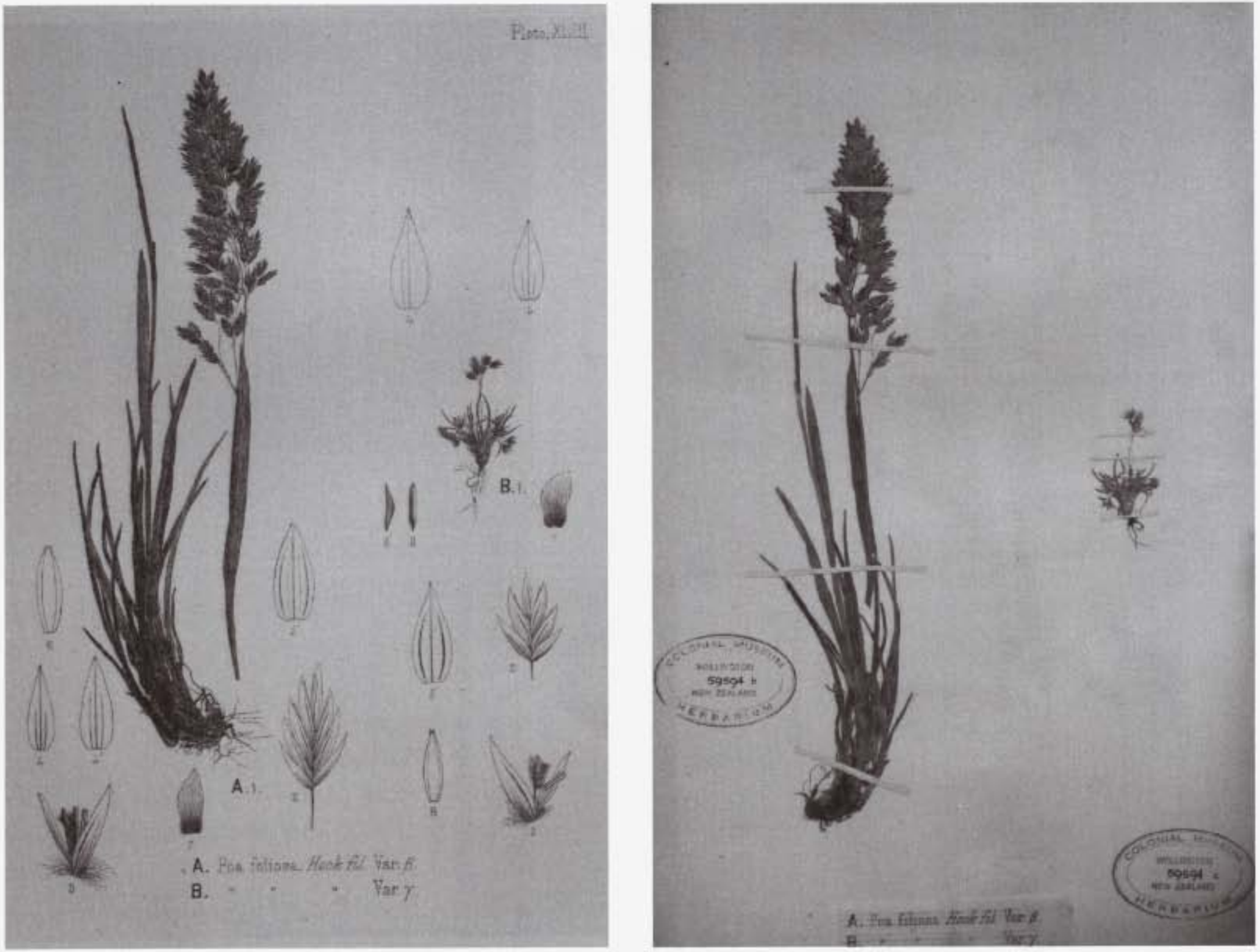

Fig 5. (1) t.43A: *Poa foliosa* var. β; t.43B: *Poa foliosa* var. γ (2) WELT 59594b (*P. subvestita*); WELT 59594c *J. Morton* Mount Eglinton. Lectotype. (*P. novae-zelandiae*). Photos R. Lamberts.

his errors, an imputation which comes from him with a peculiarly bad grace.' (Kirk 1882d).

We detect in Buchanan's letter (1882) the imputation of discrediting the Museum in the flurry about 'reckless assertions' and New Zealand olives. But Buchanan wrote of the grasses in the concluding paragraph of his only public letter that 'Mr Kirk cannot complain that the "Handbook of the New Zealand grasses"[ii] has not afforded him a good field for criticism; but that it may not have proved so satisfactory to himself as he expected can only be regretted.' Where it is appropriate the important arguments between Kirk and Buchanan are discussed under the heading of the particular species, especially t.17.2 *Achnatherum petriei*, t.20B *Agrostis muscosa*, t.35 *Hierochloe equiseta* (the 'lapse of the reasoning faculties' referred to above), t.36B *Pyrrhanthera exigua*, and t.54 *Austrofestuca littoralis*.

Conclusions

In its two formats, Buchanan's grass book met the needs of the colonists of the times; most of the difficulties we have discussed were not immediately evident, except those detected by Kirk, especially the '*Danthonia buchananii* incident'. For the greater part he interpreted Hooker's account of the grasses recorded in the *Handbook of the New Zealand Flora*, but he went beyond Hooker by including 20 taxa of his own construction, a number he reduced of his own volition to 18. Commendably, the book proceeded apace – initiated in 1876, first fascicle in 1878, and completion in 1880.

The specimens that are the basis of the nature-printed illustrations are preserved in Buchanan's Folio. We have identified the specimens and given them modern names in an annotated list appended to this paper. Our estimate is that 50 endemic, 18 indigenous, and 9 naturalised species were featured, although by his own count Buchanan included illustrations of 89 taxa, 14 at varietal level. One or two taxa were illustrated incidentally, eg *Dichelachne rara* in t.16 and *Poa celsa* in t.51A.

The *Indigenous Grasses* is among the last significant books with nature-printed plates. Elliott (1993) noted that '...nature-printing lapsed as a means of botanical illustration...' after the final volume of the *Herbier de la Flore Français* of 1876, '... the last important botanical work to use nature-printing ...'. Buchanan's *Indigenous Grasses* escaped his notice.

We have not commented on Buchanan's opinions on the possible utilisation of many native grasses in future agriculture nor their then current value to the pastoral industry. The former seem fanciful and the latter romantic. What is factual is that in the Imperial Quarto and Royal Octavo editions the illustration of so many native grasses was the nineteenth century colonists' greatest boon. It aided them in the recognition of many of the common species and alerted them to those only rarely seen.

The dedication by Elizabeth Edgar and Henry Connor of their recent grass flora 'To commemorate John Buchanan F.L.S. author and illustrator of the first book on New Zealand Grasses' is fitting, 120 years later.

Acknowledgements

We thank the Curator of Botany at WELT for the loan of the Buchanan Folio. We have benefited from discussions and notes from Eric J. Godley and Arthur J. Healy, formerly Director and Assistant Director, Botany Division, Department of Scientific and Industrial Research.

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ii Buchanan, citing the *Manual* three times, referred to it as the 'Handbook'; perhaps that was once its proposed title, or how he regarded it.

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Annotated List of Taxa in Buchanan's Plates

The plants nature-printed in Buchanan's volumes are identified under the names accepted by Edgar and Connor (2000). Those names Buchanan used follow immediately. For convenience we refer to the page numbers in the *Manual* – the more widely available of his two books – for his description, distribution, and general notes on suitability for agronomic use, and for synonymy.

Priority of publication dates from the original Imperial Quarto fascicles, but nomenclatural corrections in Addenda et Corrigenda date from 1880. Buchanan's author citations have been brought up to the standards of Brummitt & Powell (1992).

The specimen number in WELT (The National Museum, Te Papa, Wellington) is given, as is its status as holotype or lectotype where applicable, and its collector and locality when known.

We make no comment on the distribution data given by Buchanan. They were those of the times and in the contemporary style, ie the collector's name for particular localities and the more general distribution as 'common on both islands'.

Because the plate numbers are self-indexing, and we follow Buchanan's order, there is a concordant Index to the current names under which plates are found.

We use four conventions:

(1) *Manual* denotes the consolidated Royal Octavo edition of 1880 published as *Manual of the Indigenous Grasses of New Zealand*.

(2) 'Buchanan's Folio' is the guard book lodged at WELT in which the specimens that had been used in the nature-printing are mounted.

(3) Where Buchanan's name is the basionym for a modern name, * indicates it; where Buchanan cites his illustration under a veritable synonym, † indicates a homotypic synonym and ‡ a heterotypic synonym.

(4) The appropriate page number in *Flora of New Zealand V* (*Fl. N.Z. V*) follows the entry for the page numbers in the *Manual*.

t.1: **Zotovia colensoi** (Hook. f.) Edgar et Connor, *N.Z. J. Bot.* 36: 571 (1998): in 1878 as *Ehrharta colensoi* Hook.f.†
Manual: p. 1; *Fl. N.Z. V* p. 54
Specimen: WELT 59541
Status: Endemic
Note: *Zotovia*, of three species, is one of five endemic grass genera in New Zealand.

t.2: **Microlaena stipoides** (Labill.) R.Br., *Prodr.* 210 (1810): in 1878 as *M. stipoides* R.Br.
Manual: p. 3; *Fl. N.Z. V* p. 50
Specimen: WELT 59542
Status: Indigenous
Notes: (1) Stigmatic branches reach to the base of the styles in *M. stipoides* but in Fig 8 do not. (2) This plate is reproduced as Fig 26 in Sampson (1985).

t.3: **Microlaena avenacea** (Raoul) Hook.f., *Handb. N.Z. Fl.* 320 (1864): in 1878 as *M. avenacea* Hook.f.
Manual: p. 5; *Fl. N.Z. V* p. 45, Fig 2
Specimen: WELT 59543
Status: Indigenous

t.4: **Microlaena polynoda** (Hook.f.) Hook.f., *Handb. N.Z. Fl.* 320 (1864): in 1878 as *M. polynoda* Hook.f.
Manual: p. 7; *Fl. N.Z. V* p. 49
Specimen: WELT 59544
Status: Endemic

t.5: **Alopecurus geniculatus** L., *Sp. Pl.* 60 (1753): in 1878 as *A. geniculatus* L.
Manual: p. 9; *Fl. N.Z. V* p. 244
Specimen: WELT 59545
Status: Naturalised

t.6: **Hierochloe redolens** (Vahl) Roem. et Schult., *Syst. Veg.* 2: 514 (1817): in 1878 as *H. redolens* R.Br.
Manual: p. 11; *Fl. N.Z. V* p. 349, Fig 11
Specimen: WELT 59546
Status: Indigenous
Notes: (1) Figs 2 and 3 with evident stigmas visible in apical florets illustrate either protogyny or long-persistent stigmas. (2) Fig 11 correctly shows a beaked ovary, but the styles above should be shown fused; Fig 12 the caryopsis lacks a beak.

t.7: **Hierochloe novae-zelandiae** Gand., *Bull. Soc. Bot. France* 66: 300 (1919): in 1878 as *H. alpina* Roem. et Schult. but corrected in 1880 Corrigenda to *H. redolens* var. *fraseri* with the comment '...this change appears injudicious'.
Manual: p. 13; *Fl. N.Z. V* p. 347
Specimen: WELT 59547

Status: Endemic
Notes: (1) The apical flower in Fig 11 shows three stamens; in this species and all other species in New Zealand, there are two stamens in the apical floret and three in both florets below. (2) Figs 2 and 3, with evident stigmas shown in apical florets, illustrate either protogyny, which occurs there, or long-persistent stigmas.

t.8: **Spinifex sericeus** R.Br., *Prodr.* 198 (1810): in 1878 as *S. hirsutus* Labill.
Manual: p. 15; *Fl. N.Z. V* p. 590
Specimen: WELT 59548 _
Status: Indigenous
Note: The floral diagram, Fig 9, misinterprets the upper floret.

t.9: **Spinifex sericeus** R.Br., *Prodr.* 198 (1810): in 1878 as *S. hirsutus* Labill.
Manual: p. 15; *Fl. N.Z. V* p. 590
Specimen: WELT 59549 »
Status: Indigenous
Notes: (1) The illustration of the flower with sterile anthers on long filaments, Fig 9, is unusually accurate for the times (see Connor 1996). (2) Styles connate or free at base are both present in Figs 9′ and 9 respectively.

t.10A: **Paspalum orbiculare** G.Forst., *Prod.* 7 (1786): in 1878 as *P. scrobitulatum* L.
Manual: p. 17; *Fl. N.Z. V* p. 568
Specimen: WELT 59550
Status: Naturalised

t.10B: **Paspalum vaginatum** Sw., *Nov. Gen. Sp. Pl.* 21 (1788): in 1878 as *P. distichum* Burmann
Manual: p. 19; *Fl. N.Z. V* p. 570
Specimen: WELT 59551
Status: Naturalised

t.11: **Oplismenus hirtellus** subsp. **imbecillis** (R.Br.) U.Scholz, *Phan. Monogr.* 13: 127 (1981): in 1878 as *Panicum imbecille* Trin. but changed in 1880 Corrigenda to *O. setarius* Roem. et Schultes
Manual: p. 21; *Fl. N.Z. V* p. 556, Fig 22
Specimen: WELT 59552
Status: Indigenous
Note: Nerves of lower and upper lemmas are incorrectly illustrated as united below apex in Figs 5 and 6.

t.12: **Isachne globosa** (Thunb.) Kuntze, *Rev. Gen. Pl.* 2: 778 (1891): in 1878 as *I. australis* R.Br.‡
Manual: p. 23; *Fl. N.Z. V* p. 596, Fig 23
Specimen: WELT 59553
Status: Indigenous
Note: Figs 2 and 3 both illustrate two stamens in the male basal floret, and there are, correctly, 3 anthers, as in Fig 23 of Edgar & Connor (2000).

t.13A: **Zoysia pauciflora** Mez, *Feddes Repert.* 17: 145 (1921): in 1878 as *Z. pungens* Willd.
Manual: p. 25; *Fl. N.Z. V* p. 517
Specimen: WELT 59554, no locality but Tauranga suggested by Zotov (1971b).
Status: Endemic
Notes: (1) t.13A illustrates two plants: (i) Fig 1 is of tall shoots and inflorescences with many spikelets, and was especially mentioned by Zotov (1971b) and included in *Z. planifolia* Zotov; Edgar & Connor (2000) interpret *Z. planifolia* as a shade form of *Z. pauciflora*. (ii) Fig 1′ is a short shoot attached to a rhizome and has inflorescences of few spikelets; it is *Z. pauciflora* of open sites. (2) As illustrated in Fig 2, protogyny occurs in *Z. pauciflora*.

t.13B: **Echinopogon ovatus** (G.Forst.) P.Beauv., *Ess. Agrost.* 42, 148, t.9, Fig 5 (1812): in 1878 as *E. ovatus* Beauv.
Manual: p. 27; *Fl. N.Z. V* p. 263
Specimen: WELT 59555
Status: Indigenous

t.14: **Austrostipa stipoides** (Hook.f.) S.W.L. Jacobs et J.Everett, *Telopea* 6: 589 (1996): in 1878 as *Dichelachne stipoides* Hook.f. but corrected in 1880 Corrigenda to *Stipa teretifolia* Steud.‡
Manual: p. 29; *Fl. N.Z. V* p. 77
Specimen: WELT 59556
Status: Indigenous

t.15: **Dichelachne crinita** (L.f.) Hook.f., *Fl. N.Z. 1*: 293 (1853): in 1878 as *D. crinita* Hook.f.
Manual: p. 31; *Fl. N.Z. V* p. 256
Specimen: WELT 59557, 1 without locality; 1′ Wellington Domain.
Status: Indigenous
Notes: (1) No difference is detectable between the two specimens; both have 1-anthered florets, not 2-anthered as in Figs 2 and 3. (2) Chasmogamous flowers are illustrated

in Figs 2 and 3; cleistogamy is also common in this species. (3) The problems with the mounting of the two specimens on this sheet was discussed above (p. 47).

t.16: **Dichelachne sieberiana** Trin. et Rupr., *Mém. Acad. Imp. Sci. Saint-Pétersbourg VI*, Sect. Nat. 5: 2 (1843), and **D. rara** (R.Br.) Vickery, *Contrib. N.S.W. Natl Herb.* 1: 337 (1950): in 1878 as *D. sciurea* Hook.f.
Manual: p. 33; *Fl. N.Z. V* p. 261
Specimen: WELT 59558; 1 *T.Kirk* near Auckland; 1′ *J.Buchanan* Kawau Island; 1″ *J.Buchanan* Domain, Wellington.
Status: Naturalised
Notes: (1) t.16 is composed from three flowering shoots originating at three North Island localities. As mounted on WELT 59558 it is possible to be sure only of 1″ (Wellington) mounted on the far right; it is the most readily identifiable part of the illustration. (2) Figs 2–9 are from the flowering shoot of 1″ and are those of *D. sieberiana*. (3) The three other inflorescences are of *D. rara*, that on the far left, which is probably of 1′ (Kawau Island), is the 1-anthered floral form, and the two mounted centrally are 3-staminate; *D. rara* is both 1- and 3-staminate. (4) The problem with the elements mounted on WELT 59558 was discussed above (p. 47). (5) Edgar & Connor (1982) interpreted WELT 59558 as comprising three inflorescences of *D. rara* and the inflorescence on the right as *D. micrantha*; here we regard this latter as *D. sieberiana*. (6) Buchanan's specimen constitutes the first recorded specimen of *D. sieberiana* for New Zealand.

t.17: **Anemanthele lessoniana** (Steud.) Veldkamp, *Acta Bot. Neerl.* 34: 108 (1985): in 1878 as *Apera arundinacea* Hook.f.†
Manual: p. 35; *Fl. N.Z. V* p. 67
Specimen: WELT 59559
Status: Endemic
Note: *Anemanthele* is one of five endemic grass genera in New Zealand and is monotypic.

t.17.2: **Achnatherum petriei** (Buchanan) S.W.L.Jacobs et J.Everett, *Telopea* 6: 582 (1996): in 1880 as *Stipa petriei* Buchanan sp. nov.*
Manual: p. 171; *Fl. N.Z. V* p. 66
Specimen: WELT 59622 *D. Petrie* Cromwell. Holotype
Status: Endemic
Notes: (1) Kirk (1882b) asserted that the plant illustrated as *Stipa petriei* Buchanan '… must be referred to *Stipa setacea* R.Br. of Australia.' In his final statement he suggested that 'It is not improbable that this species is merely naturalized in Otago….' Buchanan's response (1882) was that Kirk '… ignores this grass as a new species, [because] he has probably never seen a specimen of it.' Petrie had sent specimens of *S. setacea* to both Buchanan and Kirk, as well as specimens of the plant Buchanan described as *S. petriei*. Kirk (1882d), forcefully in reply, held to his view. Petrie (1882) could only report his finds (as *S. setacea*) at two localities in Otago and noted '… we may safely conclude that it is a casual immigrant from Australia or Tasmania'. In our opinion *S. setacea* s.s. has never been seen in New Zealand and the plants to which Kirk and Petrie refer are *Austrostipa nodosa* (S.T.Blake) S.W.L. Jacobs et J.Everett. (2) Buchanan's plate and the original specimen are reproduced here in Fig 2 (p. 50).

t.18: **Sporobolus africanus** (Poir.) Robyns et Tournay, *Bull. Jard. Bot. Brux.* 25: 242 (1955): in 1878 as *S. elongatus* R.Br. but changed in 1880 Corrigenda to *S. indicus* R.Br.
Manual: p. 37; *Fl. N.Z. V* p. 531
Specimen: WELT 59560
Status: Naturalised

t.19: **Agrostis personata** Edgar, *N.Z. J. Bot.* 29: 149 (1991): in 1878 as *A. canina* L.
Manual: p. 43; *Fl. N.Z. V* p. 238
Specimen: WELT 59561
Status: Endemic
Note: The left-hand specimen on WELT 59561 is diseased.

t.20A: **Agrostis muelleriana** Vickery, *Contrib. N.S.W. Natl Herb. 1*: 103 (1941): in 1878 as *A. canina* var. *β gelida* Buchanan but corrected in 1880 Corrigenda to *A. muelleri* Benth.
Manual: p. 45; *Fl. N.Z. V* p. 234
Specimen: WELT 59563
Status: Indigenous

t.20B: **Agrostis muscosa** Kirk, *T.N.Z.I.* 13: 385 (1881): in 1878 as *A. canina* var. *γ subulata* (Hook.f.) Buchanan but corrected in 1880 Corrigenda to *A. subulata* Hook.f.†
Manual: p. 47; *Fl. N.Z. V* p. 235
Specimen: WELT 59564
Status: Endemic
Notes: (1) The reduction of *A. subulata* Hook.f. to varietal status by Buchanan in 1878 as *A. canina* var. *γ subulata*

(Hook.f.) Buchanan is unrecorded in Edgar & Connor (2000). It was a valid combination even though withdrawn in 1880. (2) Kirk (1881), in a paper read before the Wellington Philosophic Society on 4 December 1880, erected *Agrostis muscosa* as a new species and noted that t.20B in Buchanan was of that same species and not *A. subulata*, as Buchanan had indicated in the Corrigenda.

Buchanan (1882) rather inadequately attempted a nomenclatural response stoutly asserting that his '... *Agrostis subulata* (Buch.) takes precedence of *Agrostis muscosa* (Kirk) by priority of time'. Kirk (1882d) replied thus '... but unfortunately for Mr Buchanan's view of the case ... It is evident that Mr. Buchanan has never seen the true *A. subulata*, and is not aware that it is found in the South Island.'

As interpreted by Edgar & Forde (1991) *A. subulata* is as Hooker originally had it – a species of the subantarctic islands and nowhere on the main New Zealand islands.

t.20C: **Agrostis dyeri** Petrie, *T.N.Z.I. 22*: 441 (1890): in 1878 as *A. parviflora* R.Br. but corrected in 1880 Corrigenda to *A. scabra* Willd.
Manual: p. 49; *Fl. N.Z. V* p. 230
Specimen: WELT 59562
Status: Endemic

t.21: **Lachnagrostis filiformis** (G.Forst.) Trin., *Fund. Agrost.* 128 t.10 (1820): in 1879 as *Agrostis aemula* R.Br. but corrected in 1880 Corrigenda to *Deyeuxia forsteri* Kunth†
Manual: p. 51; *Fl. N.Z. V* p. 271
Specimen: WELT 59565
Status: Indigenous
Notes: (1) In Addenda et Corrigenda (1880) Buchanan added *A. aemula* 'var. c. *spathacea*, n. sub-spec., Berggren, Report Royal Society, Lund, 1878' to the synonymy of *D. forsteri*. (2) Edgar & Forde (1991) treated Berggren's name in the synonymy of *Agrostis muscosa*.

t.22: **Lachnagrostis pilosa** (Buchanan) Edgar, subsp. **pilosa** *N.Z. J. Bot. 33*: 27 (1995): in 1879 as *Agrostis pilosa* A.Rich. but corrected in 1880 Corrigenda to the new name *Deyeuxia pilosa* Buchanan*
Manual: p. 53; *Fl. N.Z. V* p. 278, Fig 9
Specimen: WELT 59566, Dunedin
Status: Endemic
Notes: (1) *Agrostis pilosa* Retz. (1791) antedates *A. pilosa* A.Rich. (1832). (2) As a new name, Buchanan's name of 1880, *Deyeuxia pilosa*, becomes the basionym for the taxon.

t.23: **Lachnagrostis billardierei** (R.Br.) Trin., *Fund. Agrost.* 128, t.10 (1820): in 1879 as *Agrostis billardieri* R.Br. but corrected in 1880 Corrigenda to *Deyeuxia billardieri* Kunth†
Manual: p. 55; *Fl. N.Z. V* p. 269
Specimen: WELT 59567, Dunedin
Status: Indigenous

t.24A: **Deyeuxia avenoides** (Hook.f.) Buchanan, *Indig. Grasses N.Z.* Add. et Corrig. 11 (1880); in 1879 as *Agrostis avenoides* Hook.f. but corrected in 1880 Corrigenda to *D. avenoides* where the comb. nov. was effected.
Manual: p. 59; *Fl. N.Z. V* p. 250
Specimen: WELT 59569
Status: Endemic
Notes: (1) Florets in Figs 2 and 3 are chasmogamous, as is common in this taxon; cleistogamy is also frequent. (2) See t.26A, which is also *D. avenoides*.

t.24B: **Deyeuxia aucklandica** (Hook.f.) Zotov, *Rec. Dom. Mus.* 5: 139 (1965): in 1879 as *Agrostis setifolia* Hook.f. but corrected in 1880 Corrigenda to *Deyeuxia setifolia* Hook.f.‡
Manual: p. 57; *Fl. N.Z. V* p. 248
Specimen: WELT 59568 *H.H. Travers* Tararua Mountains
Status: Endemic

t.25: **Deyeuxia youngii** (Hook.f.) Buchanan, *Indig. Grasses N.Z.* Add. et Corrig. 11 (1880): in 1879 as *Agrostis youngii* Hook.f. but corrected in 1880 Corrigenda to *D. youngii*, where the comb. nov. was effected.
Manual: p. 61; *Fl. N.Z. V* p. 253
Specimen: WELT 59570
Status: Endemic

t.26A and B: **Deyeuxia avenoides** (Hook.f.) Buchanan, *Indig. Grasses N.Z.* Add. et Corrig. 11 (1880): in 1879 as *Agrostis quadriseta* Hook.f. but corrected in 1880 Corrigenda to *D. quadriseta*.
Manual: p. 63; *Fl. N.Z. V* p. 250
Specimen: WELT 59571 *T. Kirk* Amuri for t.26A; *H.H. Travers* Mount Guyon, Nelson for t.26B.
Status: Endemic
Notes: The specimen for t.26B has proliferation in its florets.

t.26.2: **Deyeuxia youngii** (Hook.f.) Buchanan, *Indig. Grasses N.Z.* Add. et Corrig. 11 (1880): in 1880 as *D. scabra* Benth.
Manual: p. 173; *Fl. N.Z. V* p. 253
Specimen: WELT 59623 *D. Petrie* Swampy Hill, near Dunedin

Status: Endemic
Notes: (1) See also t.25 for *D. youngii*. (2) WELT 59623 is part of the original gathering of *Deyeuxia youngii* var. *petriei* (Hack.) Cheeseman. Holotype: W 29192 *D. Petrie* Swampy Hill, 1500 ft, Dunedin (No. 1190 to Hackel). Edgar (1995) included var. *petriei* in the synonymy of *D. youngii*.

t.27: **Cortaderia toetoe** Zotov, *N.Z. J. Bot.* 1: 85 (1963): in 1879 as *Arundo conspicua* Forst.
Manual: p. 65; *Fl. N.Z. V* p. 500
Specimen: WELT 59572 »
Status: Endemic
Notes: (1) WELT 59572 has no vegetative shoot as illustrated in t.27. (2) The specimen is » , and the long anthers in Fig 3 are male-sterile.

t.28: **Cortaderia fulvida** (Buchanan) Zotov, *N.Z. J. Bot. 1*: 84 (1963): in 1879 as *Arundo fulvida* Buchanan*
Manual: p. 67; *Fl. N.Z. V* p. 494, Fig 17
Specimen: WELT 59573 *J. Buchanan* Wellington. » . Holotype of species described in *T.N.Z.I.* 6: 242 (1874).
Status: Endemic
Note: t.28 is the frontispiece to Allan H.H. *An introduction to the grasses of New Zealand* (1936).

t.29: **Chionochloa conspicua** (G.Forst.) Zotov, subsp. **conspicua** *N.Z. J. Bot.* 1: 92 (1963): in 1879 as *Danthonia cunninghamii* Hook.f.
Manual: p. 71; *Fl. N.Z. V* p. 435
Specimen: WELT 59574
Status: Endemic
Notes: (1) Correctly, the caryopsis Fig 9 bears the remnant of an ancestral third style, but the ovary, Fig 8, lacks it. (2) The piece of culm as part of Fig 1 is missing from WELT 59574.

t.29.2: **Chionochloa ovata** (Buchanan) Zotov, *N.Z. J. Bot.* 1: 104 (1963): in 1879 as *Danthonia ovata* Buchanan sp. nov.*
Manual: p. 73; *Fl. N.Z. V* p. 447
Specimen: WELT 59578 *J. Morton* Mount Eglinton. Holotype
Status: Endemic
Notes: (1) 'The leaves of this specimen are glabrous despite text and plate' (Zotov 1963 p. 104). (2) There are now no florets remaining on the specimen, only glumes.

t.30: **Chionochloa rubra** subsp. **cuprea** Connor, *N.Z. J. Bot. 29*: 256 (1991): in 1879 as *Danthonia raoulii* Steud.
Manual: p. 75; *Fl. N.Z. V* p. 453
Specimen: WELT 59575
Status: Endemic

t.31: **Chionochloa australis** (Buchanan) Zotov, *N. Z. J. Bot.* 1: 103 (1963): in 1879 as *Danthonia australis* Buchanan comb. nov.*
Manual: p. 77; *Fl. N.Z. V* p. 430
Specimen: WELT 59576 *J. Buchanan* Kaikoura Mountains. Lectotype designated by Zotov (1963 p. 103).
Status: Endemic
Notes: (1) Described by Buchanan as *D. raoulii* subsp. *australis* in 1872 and raised to specific level in 1879. (2) This plate is labelled t.32 in the Imperial edition. (3) Buchanan's plate and the original specimen are reproduced here in Fig 3 (p. 52).

t.32: **Chionochloa rigida** (Raoul) Zotov, subsp. **rigida** *N.Z. J. Bot* 1: 96 (1963): in 1879 as *Danthonia flavescens* Hook.f.‡
Manual: p. 79; *Fl. N.Z. V* p. 450 Fig 16
Specimen: WELT 59577
Status: Endemic
Notes: (1) 'The illustration by J. Buchanan in *The Indigenous Grasses of New Zealand* t.32, 1879 is composite. At least the panicle used for printing is made up from two separate plants. The accompanying dissections on the original drawings bear the word "Nelson", which is not mentioned in the "Distribution"' (Zotov 1963 p. 97). (2) The text bears the plate number t.32, but the plate is labelled t.33; there is a correction in Corrigenda et Addenda. (3) The stout shoot to right in t.32 is absent from WELT 59577, as is the leaf-blade of the piece of culm.

t.33: **Rytidosperma pilosum** (R.Br.) Connor et Edgar, *N.Z. J. Bot.* 17: 326 (1979): in 1879 as *Danthonia pilosa* R.Br.†
Manual: p. 81; *Fl. N.Z. V* p. 480
Specimen: WELT 59579
Status: Naturalised
Note: Zotov (1963 p. 118) referred to this WELT specimen as an example of early collection in New Zealand of this naturalised species.

t.33.2A: **Rytidosperma clavatum** (Zotov) Connor et Edgar, *N.Z. J. Bot.* 17: 326 (1979): in 1879 as *Danthonia pilosa* var. *stricta* Buchanan var. nov. ‡
Manual: p. 82; *Fl. N.Z. V* p. 469
Specimen: WELT 59581. Holotype
Status: Endemic

t.33.2B: **Rytidosperma racemosum** (R.Br.) Connor et Edgar, *N.Z. J. Bot.* 17: 327 (1979): in 1879 as *Danthonia pilosa* var. *racemosa* Buchanan var. nov.
Manual: p. 82; *Fl. N.Z. V* p. 483
Specimen: WELT 59580 *J. Buchanan* probably Wellington *fide* Zotov (1963 p. 122). Holotype.
Status: Naturalised
Notes: (1) Buchanan's varietal name applies to an Australian species, and is independent of *Danthonia racemosa* R.Br. *Prodr.* 177 (1810). (2) The plant is illustrated as hairy but is glabrous; apical tufts of hairs on the sheath are exaggerated. (3) Buchanan's Fig 3 and his statement about the origin of the scales [lodicules] are incomprehensible.

t.34: **Rytidosperma unarede** (Raoul) Connor et Edgar, *N.Z. J. Bot.* 17: 328 (1979): in 1879 as *Danthonia semiannularis* R.Br.
Manual: p. 83; *Fl. N.Z. V* p. 488
Specimen: WELT 58582
Status: Endemic
Notes: (1) Zotov (1963 p. 122) noted 'The illustration shows hairy leaf sheaths. These are in fact glabrous in Buchanan's "printer's set" (Wellington).' (2) As a note to t.34.2B Buchanan stated that 'No specimen of *D. semiannularis* var. *B. Unarede* is in the Museum Herbarium, and therefore cannot be figured.'

t.34.2A: **Rytidosperma setifolium** (Hook.f.) Connor et Edgar, *N.Z. J. Bot.* 17: 316 (1979): in 1879 as *Danthonia semiannularis* var. *alpina* Buchanan var. nov.‡
Manual: p. 84; *Fl. N.Z. V* p. 484
Specimen: WELT 59583. Holotype
Status: Endemic
Note: Zotov (1963 p. 108) noted that, although the illustration shows pilose leaf-blades, they are glabrous.

t.34.2B: **Rytidosperma gracile** (Hook.f.) Connor et Edgar, *N.Z. J. Bot. 17*: 330 (1979): in 1879 as *Danthonia semiannularis* var. *gracilis* Hook.f.†
Manual: p. 85; *Fl. N.Z. V* p. 473
Specimen: WELT 59584
Status: Indigenous

t.35: **Hierochloe equiseta** Zotov, *N.Z. J. Bot.* 11: 568 (1973): in 1879 as *Danthonia buchananii* Hook.f.
Manual: p. 87; *Fl. N.Z. V* p. 345
Specimen: The specimen for this plate is missing.
Status: Endemic
Notes: (1) As an illustration of *H. equiseta* it is appropriate and fits Buchanan's description. (2) His error in Fig 3 of including stigmas in a staminiferous floret is corrected on p. 88 of the *Manual*. (3) Kirk (1882b) could not '…understand his [Buchanan's] having mistaken our plant [*Hierochloe alpina* var. *submutica*] for a *Danthonia*, especially *D. buchananii*.' Buchanan's explanation (1882) of '… a gross blunder on my part' is this: 'I can offer no better excuse for such an error than a lapse of the reasoning faculties – a not infrequent occurrence with scientific writers – and which may be accepted for some other writers' conclusions, unless they can credit them to bad microscopes. However, this psychological phenomenon of the mind is not peculiar to botanists, as it is also shadowed forth sometimes in learned treatises on Maori cave paintings, as well as in other abstruse subjects scattered through the literature of all scientific nations.' Kirk (1882d), all refinement, had the last say '… but it is a matter for regret that the admission is not made in a more graceful manner.' But *H. alpina* var. *submutica* (F.Muell.) Kirk *T.N.Z.I. 14*: 385 (1882) cannot apply to New Zealand plants after all (see Edgar & Connor, 2000 p. 346).

t.36A: **Rytidosperma thomsonii** (Buchanan) Connor et Edgar, *N.Z. J. Bot.* 17: 322 (1979): in 1879 as *Danthonia nuda* Hook.f.
Manual: p. 89; *Fl. N.Z. V* p. 487
Specimen: WELT 59585
Status: Endemic
Notes: (1) This taxon was illustrated a second time in t.36.2, which is where Buchanan formally erected *Danthonia thomsonii* in 1880; there he referred to its similarity to the plant he illustrated in this plate, t.36A (a not surprising comment). (2) See also Zotov (1963 p. 112).

t.36B: **Pyrrhanthera exigua** (Kirk) Zotov, *N.Z. J. Bot.* 1: 126 (1963): in 1879 as *Danthonia pauciflora* R.Br.
Manual: p. 91; *Fl. N.Z. V* p. 459
Specimen: WELT 59586 *D. Petrie* Mount St Bathans
Status: Endemic
Notes: (1) *Pyrrhanthera* is one of the five endemic grass genera in New Zealand; it is monotypic. (2) Kirk (1882a), ever quick at generic correction, accorded D. Petrie's recently collected plant illustrated in t.36B as *Danthonia pauciflora*, the new name *Triodia exigua*, noting that *D. pauciflora* had not been seen in New Zealand. Buchanan's response

(1882) was to the effect that *Danthonia* was the correct genus and not *Triodia*, emphasising that the lodicules are ciliate – '...the best generic character in *Danthonia* and never absent'. Kirk (1882a) had made it clear that lodicules are ciliate in *T. excigua*, but asserted that '... several species of *Danthonia* have non-ciliated lodicules'. (Kirk 1882d). He gratuitously assured Buchanan that 'Happily he can satisfy himself that he is mistaken in this matter with little trouble. An excellent drawing of the true plant [*D. pauciflora*] is given by Hooker in 'Flora Tasmanniae (sic) t.162.' (3) Nerved and ciliate lodicules remain one of the characteristics of the Danthonieae together with anastomosing lemma nerves and a relict third style. (4) *Triodia* R.Br., an Australian genus of ca 35 spp. is placed in the Eragrostideae. Lodicules there are glabrous and nerveless. (5) Several times New Zealand taxa were referred to *Triodia*, notably *Rytidosperma australis* and *R. thomsonii* as well as *Deschampsia chapmanii*, *Austrofestuca littoralis*, and *Puccinellia macquariensis*.

t.36.2: **Rytidosperma thomsonii** (Buchanan) Connor et Edgar, *N.Z. J. Bot.* 17: 322 (1979): in 1880 as *Danthonia thomsonii* Buchanan sp. nov.*
Manual: p. 175; *Fl. N.Z. V* p. 487
Specimen: WELT 59624 *D. Petrie* Mount St Bathans. Holotype
Status: Endemic
Notes: (1) See also t.36A, which illustrates the same taxon. (2) Buchanan's plate and the original specimen are reproduced here in Fig 4 (p. 54).

t.37: **Deschampsia cespitosa** (L.) P.Beauv. *Ess. Agrost.* 91, t.18, Fig 3 (1812): in 1879 as *D. cespitosa* P. Beauv.
Manual: p. 93; *Fl. N.Z. V* p. 307
Specimen: WELT 59587
Status: Indigenous

t.38: **Koeleria cheesemanii** (Hack.) Petrie, *T.N.Z.I.* 48: 192 (1916): in 1879 as *K. cristata* Persoon
Manual: p. 96; *Fl. N.Z. V* p. 318
Specimen: WELT 59588
Status: Endemic
Notes: (1) In the *Manual* there are two entries for 'Distribution of species': one starts on p. 96 and the other on p. 97; this second entry agrees with the Imperial edition. (2) Emphasis is added to the hairiness of the sheath and culm internode in Fig 1. (3) t.38 is reproduced as Fig 39 in Allan (1936).

t.39: **Trisetum lepidum** Edgar et A.P.Druce, *N.Z. J. Bot.* 36: 553 (1998): in 1879 as *T. antarcticum* Trin.
Manual: p. 97; *Fl. N.Z. V* p. 331, Fig 10
Specimen: WELT 59589
Status: Endemic
Note: For a comment on the lodicule, Fig 7, see p. 51

t.40A: **Trisetum spicatum** (L.) K.Richt., *Pl. Eur.* 1: 59 (1890): in 1879 as *T. subspicatum* P.Beauv.
Manual: p. 99; *Fl. N.Z. V* p. 333
Specimen: WELT 59590
Status: Indigenous

t.40B: **Trisetum youngii** Hook.f., *Handb. N.Z. Fl.* 335 (1864): in 1879 as *T. youngii* Hook.f.
Manual: p. 101; *Fl. N.Z. V* p. 336
Specimen: WELT 59591
Status: Endemic

t.41A: **Puccinellia stricta** (Hook.f.) Blom, *Acta Hort. Gothob.* 5: 89 (1930): in 1880 as *Glyceria stricta* Hook.f.†
Manual: p. 103; *Fl. N.Z. V* p. 200
Specimen: WELT 59592
Status: Indigenous
Notes: (1) Fig 1 is correctly labelled. (2) Figs 2–8 are of *Deschampsia tenella*, ie parts of Plate 41B; they are correctly labelled in Buchanan's Folio. (3) Figs B2–8 apply to *P. stricta*, which is cleistogamous, even though the floret in Fig 3 has been opened to make it appear chasmogamous.

t.41B: **Deschampsia tenella** Petrie, *T.N.Z.I.* 23: 402 (1891): in 1880 as *Catabrosa antarctica* Hook.f.
Manual: p. 105; *Fl. N.Z. V* p. 313
Specimen: WELT 59593
Status: Endemic
Notes: (1) Fig 1 is correctly labelled. (2) Figs 2-8 are of *Puccinellia stricta*, ie part of Plate 41A; they are correctly labelled in Buchanan's Folio. (3) Figs A2-8 apply to *D. tenella*.

t.42: **Poa tennantiana** Petrie, in Chilton *Subantarctic Is N.Z.* 2: 476 (1909): in 1880 as *P. foliosa* var. α Hook.f.
Manual: p. 111; *Fl. N.Z. V* p. 188
Specimen: WELT 59594a Snares Rock
Status: Endemic

t.43A: **Poa subvestita** (Hack.) Edgar, *N.Z. J. Bot.* 24: 436 (1986): in 1880 as *P. foliosa* var. β Hook.f.

Manual: p.113; *Fl. N.Z. V* p.185
Specimen: WELT 59594b
Status: Endemic
Notes: (1) The specimen is of a male plant of this dioecious species, but Fig 3 includes the stigmas of a perfect flower. (2) Buchanan's plate and the original specimen are reproduced here in Fig 5 (p.56).

t.43B: **Poa novae-zelandiae** Hack., *T.N.Z.I.* 35: 381 (1903): in 1880 as *P. foliosa* var. γ Buchanan var. nov.‡
Manual: p.115; *Fl. N.Z. V* p.174
Specimen: WELT 59594c *J. Morton* Mount Eglinton. Lectotype designated by Edgar & Connor (2000 p.175).
Status: Endemic
Notes: (1) This species is gynomonoecious, and Fig 3 is of an hermaphrodite lower floret. (2) Buchanan's plate and the original specimen are reproduced here in Fig 5 (p.56).

t.44A: **Poa anceps** G.Forst., subsp. **anceps** *Prodr.* 8 (1786): in 1880 as *P. anceps* var. α *elata* Hook.f.
Manual: p.117; *Fl. N.Z. V* p.138
Specimen: WELT 59595
Status: Endemic

t.44B: **Poa anceps** G.Forst., subsp. **anceps** *Prodr.* 8 (1786): in 1880 as *P. anceps* var. β *foliosa* Hook.f.
Manual: p.119; *Fl. N.Z. V* p.138
Specimen: WELT 59596
Status: Endemic

t.45C: **Poa pratensis** L., *Sp. Pl.* 67 (1753): in 1880 as *P. anceps* var. γ *breviculmis* Hook.f.
Manual: p.121; *Fl. N.Z. V* p.176
Specimen: WELT 59598
Status: Naturalised

t.45D: **Poa anceps** G.Forst., subsp. **anceps** *Prodr.* 8 (1786): in 1880 as *P. anceps* var. δ *densiflora* Hook.f.
Manual: p.123; *Fl. N.Z. V* p.138
Specimen: WELT 59597
Status: Endemic

t.46E: **Poa pusilla** Berggr., *Minneskr. Fisiog. Sällsk. Lund* Art. 8: 31 (1878): in 1880 as *P. anceps* var. ε *debilis* Buchanan var. nov.‡
Manual: p.125; *Fl. N.Z. V* p.177
Specimen: WELT 59600 *T. Kirk* Auckland district, hot springs. Holotype
Status: Endemic

t.46F: **Poa pusilla** Berggr., *Minneskr. Fisiog. Sällsk. Lund* Art 8: 31 (1878): in 1880 as *P. anceps* var. ζ *minima* as var. nov.‡ but corrected in 1880 Corrigenda to be treated as *P. pusilla* Berggr.
Manual: p.127; *Fl. N.Z. V* p.177
Specimen: WELT 59599 *A. McKay* Mount Arthur, Nelson [1874]. Holotype
Status: Endemic
Note: Buchanan erected var. ζ *minima* in 1880 but included it in synonymy in the same work in the same year.

t.47: **Poa cita** Edgar, *N.Z. J. Bot. 24*: 446 (1986): in 1880 as *P. australis* var. *laevis* Hook.f.
Manual: p.129; *Fl. N.Z. V* p.151
Specimen: WELT 59601
Status: Endemic

t.48A: **Poa colensoi** Hook.f., *Handb. N.Z. Fl.* 340 (1864): in 1880 as P. *intermedia* sp. nov.‡
Manual: p.131; *Fl. N.Z. V* p.153
Specimen: WELT 59602. Lectotype designated by Edgar, *N.Z. J. Bot. 24*: p. 440 (1986)
Status: Endemic
Note: *P. intermedia* Koeler (1802) antedates *P. intermedia* Buchanan (1880) which is thus a later homonym.

t.48B: **Poa colensoi** Hook.f., *Handb. N.Z. Fl.* 340 (1864): in 1880 as *P. colensoi* Hook.f.
Manual: p.133; *Fl. N.Z. V* p.153
Specimen: WELT 59603
Status: Endemic

t.49A: **Poa acicularifolia** Buchanan, *Indig. Grasses N.Z.* t.49A (1880): in 1880 as *P. acicularifolia* sp. nov.
Manual: p.135; *Fl. N.Z. V* p.137
Specimen: WELT 59604. Holotype
Status: Endemic

t.49B: **Simplicia buchananii** (Zotov) Zotov, *N.Z. J. Bot. 9*: 542 (1971): in 1880 as *Poa uniflora* sp. nov.†
Manual: p.137; *Fl. N.Z. V* p.291
Specimen: WELT 59605 *A. McKay* Mount Arthur Range, Nelson [1874]. Holotype

Status: Endemic
Notes: (1) Fig 2 is shown with 3 stamens but no gynoecium; the flowers are perfect. (2) This is one species of the ditypic endemic genus *Simplicia* erected by T. Kirk. (3) Zotov (1971a) provided a nom. nov. because *Poa uniflora* Muhlenberg (1870) antedates *P. uniflora* Buchanan. (4) The lemma and palea are illustrated as smooth, but both are scabrid.

t.50A: **Poa pygmaea** Buchanan, *Indig. Grasses N.Z.* t.50A (1880): in 1880 as *P. pygmaea* sp. nov.
Manual: p.139; *Fl. N.Z. V* p.179
Specimen: WELT 59606 *D. Petrie* Mount Pisa. Holotype
Status: Endemic

t.50B: **Poa incrassata** Petrie, *T.N.Z.I.* 34: 394 (1902): in 1880 as *P. exigua* Hook.f.
Manual: p.141; *Fl. N.Z. V* p.162
Specimen: WELT 59607 *D. Petrie* Mount Pisa, Otago and *Hector* and *Buchanan*, Otago Lake District 6000 ft.
Status: Endemic
Notes: (1) Hooker's name *Poa exigua* (1864) was antedated by Dumortier's *P. exigua* (1823); Petrie's *Poa incrassata* is not a nom. nov. but is based on a different type from the Auckland Is. (2) Buchanan noted that his description was '... chiefly made from a fragment of the plant [from Otago Lake District 6000 ft, *Hector* and *Buchanan*] originally described and named by Dr Hooker'. More recent specimens were '...collected by Mr. Petrie on Mount Pisa, Otago, at 4000 feet altitude, which differ chiefly in larger size and more numerous spikelets. Both specimens were figured in Plate L [t.50B].' On WELT 59607 the small tuft on the right is presumably the 'fragment' from Hector and Buchanan's plant. (3) t.50B bears the note *Poa exigua* n.s. though the text states unequivocally *P. exigua* Hook.f.

t.50C: **Poa buchananii** Zotov, *T.R.S.N.Z.* 73: 236 (1943): in 1880 as *P. albida* Buchanan nom. nov. but corrected in 1880 Corrigenda to *P. sclerophylla* Berggr.†
Manual: p.143; *Fl. N.Z. V* p.147
Specimen: WELT 59608
Status: Endemic
Notes: (1) *P. albida* Trinius (1831) antedates *P. albida* Buchanan (1880), and *P. sclerophylla* Kunth (1833) antedates *P. sclerophylla* Berggren (1878). (2) Zotov provided the eponymous nom. nov.; it is based on *P. anceps* var. ε *alpina* of Hooker (1864).

t.51A: **Poa kirkii** Buchanan, *Indig. Grasses N.Z.* t.51B (1880) and **P. celsa** Edgar, *N.Z. J. Bot. 24*: 463 (1986): in 1880 as *P. mackayi* sp. nov. ‡
Manual: p.145; *Fl. N.Z. V* p.165, 149 (*P. celsa*).
Specimen: WELT 59609 *H.H. Travers* Tararua Mountains. Lectotype (designated by Edgar, *N.Z. J. Bot. 24*: p. 461 (1986)
Status: Endemic
Notes: (1) WELT 59609 comprises two different specimens; the left-hand one, Tararua Mountains, 5000 ft, *H.H. Travers*, was designated by Edgar (1986, p.461) as lectotype of *Poa mackayi* Buchanan, the taller right-hand specimen, Mount Arthur, 4200 ft, *A. Mackay* [1874], is *Poa celsa*. (2) Although named in honour of A. McKay, the orthography *mackayi* is correct in terms of the International Code of Botanical Nomenclature.

t.51B: **Poa kirkii** Buchanan, *Indig. Grasses N.Z.* t.51B (1880): in 1880 as *P. kirkii* sp. nov.
Manual: p.147; *Fl. N.Z. V* p.165
Specimen: WELT 59610 *A. McKay* Mount Arthur [1874]. Holotype
Status: Endemic

t.52: **Poa lindsayi** Hook.f., *Handb. N.Z. Fl.* 340 (1864): in 1880 as *P. lindsayi* Hook.f.
Manual: p.149; *Fl. N.Z. V* p.168
Specimen: WELT 59611
Status: Endemic

t.53A: **Poa imbecilla** Spreng., in Biehler *Pl. Nov. Herb. Spreng.* 9, no.14 (1807): in 1880 as *P. breviglumis* Hook.f.
Manual: p.151; *Fl. N.Z. V* p.161
Specimen: WELT 59612
Status: Endemic

t.53B: **Poa breviglumis** Hook.f., *Fl. Antarct.* 1: 101 (1845): in 1880 as P. *imbecilla* G. Forst. but corrected in 1880 Corrigenda to *Eragrostis imbecilla* Benth.
Manual: p.153; *Fl. N.Z. V* p.146
Specimen: WELT 59613
Status: Endemic

t.54: **Austrofestuca littoralis** (Labill.) E.B.Alexeev, *Bjull. Moskovsk. Obšč. Isp. Prir., Otd. Biol.* 81: 55 (1976): as *Festuca littoralis* var. *triticoides* Benth. corrected in 1880

Corrigenda to *Schedonorus littoralis* (Labill.) P. Beauv.† and its var. *triticoides*
Manual: p.155; *Fl. N.Z. V* p.86
Specimen: WELT 59614
Status: Indigenous
Notes: (1) var. *triticoides* is West Australian, now known as *A. pubinervis*; it is not in New Zealand. (2) Lodicules are shallowly bilobed and ciliate, this latter absent from Fig 7. (3) The floret as drawn in Fig 3 with anthers applied to the ovary apex is not easily comprehended; flowers are chasmogamous and anthers finally fall away. (4) The curiously confounded debate between Kirk (1882c,d) and Buchanan (1882) about *Festuca scoparia – Poa foliosa* on the Chatham Islands may be a discussion about *A. littoralis*, a species that grows there. It could not be about the only Chatham Islands species of *Festuca*, *F. coxii*, which was unknown to both. Nor could it be about *P. foliosa* var. α, t.42 of the *Manual*, which is *P. tennantiana* and not on the Chathams. Nor yet is it about *F. scoparia*, which is *P. litorosa* and unknown from those islands. Buchanan's misalliance of *F. multinodis* as *F. scoparia* (t.55A) only complicated the already confused discussion since *F. multinodis* does not occur on the Chathams.

There may be no clear resolution to their argument, but *A. littoralis* has a taxonomic history of inclusion in *Poa* as *P. triodioides*, in *Festuca* as *F. littoralis*, and in *Schedonorus* as *S. littoralis* as used by Buchanan for t.54. Could Kirk and Buchanan have disagreed about the generic treatment of *A. littoralis*, a species both acknowledge as present on the Chathams?

t.55A: **Festuca multinodis** Petrie et Hack., *T.N.Z.I.* 44: 186 (1912): in 1880 as *F. scoparia* Hook.f.
Manual: p.157; *Fl. N.Z. V* p.115
Specimen: WELT 59615
Status: Endemic
Note: WELT 59615 is of mixed origin; the vegetative shoot and proximate inflorescence on its right is *F. multinodis*; a further inflorescence on the far right is of *F. rubra*.

t.55B: **Festuca rubra** L., *Sp. Pl.* 73 (1753): in 1880 as *F. duriuscula* L.
Manual: p.159; *Fl. N.Z. V* p.120
Specimen: WELT 59616
Status: Naturalised

t.56A: **Bromus arenarius** Labill., *Nov. Holl. Pl.* 1: 23, t.28 (1805): in 1880 as *B. arenarius* Labill.
Manual: p.161; *Fl. N.Z. V* p.360
Specimen: WELT 59617
Status: Naturalised

t.56B: **Elymus multiflorus** (Hook.f.) Á.Löve et Connor, *N.Z. J. Bot.* 20: 183 (1982): in 1880 as *Triticum multiflorum* Hook.f.†
Manual: p.163; *Fl. N.Z. V* p.396
Specimen: WELT 59618
Status: Indigenous

t.57A: **Elymus solandri** (Steud.) Connor, *N.Z. J. Bot.* 32: 140 (1994): as *Triticum scabrum* Labill. but corrected in Corrigenda to *Agropyron scabrum* P.Beauv.
Manual: p.165; *Fl. N.Z. V* p.399
Specimen: WELT 59619
Status: Endemic

t.57B: **Elymus tenuis** (Buchanan) Á.Löve et Connor, *N.Z. J. Bot.* 20: 183 (1982): in 1880 as *Triticum scabrum* var. *tenue* Buchanan var. nov. but corrected in Corrigenda to *Agropyron scabrum* var. *tenue* *
Manual: p.166; *Fl. N.Z. V* p.400
Specimen: WELT 59620. Holotype
Status: Endemic

t.58: **Stenostachys gracilis** (Hook.f.) Connor, *N.Z. J. Bot.* 32: 146 (1994): in 1880 as *Gymnostichum gracile* Hook.f.†
Manual: p.169; *Fl. N.Z. V* p.413
Specimen: WELT 59621 J. Buchanan
Status: Endemic
Note: *Stenostachys* is one of the five endemic grass genera.

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by current nomenclature; Buchanan's name in parentheses where necessary

Achnatherum petriei	17.2	(*Stipa petriei*)
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	45D	(*P. anceps* var. δ *densiflora*)
P. breviglumis	53B	(*Eragrostis imbecilla*)
P. buchananii	50C	(*P. sclerophylla*)
P. celsa	51A	(*P. kirkii*)
P. cita	47	(*P. australis* var. *laevis*)
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P. incrassata	50B	(*P. exigua*)
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