

stay on the islands; none of these have I yet seen, as they were not arranged for distribution. But the Algæ of Mr. Travers' first collection have been elaborated with masterly knowledge by Professor J. G. Agardh of Lund (in "Ofrirsigt af Kongl. Vetenskaps Akademiens Förhandlingar," Stockholm, 1870), and from manuscript notes of Professor Agardh a list of these Algæ appeared also in the third volume of the *Transactions* of the New Zealand Institute, p.p. 213–215. The cotyledonous plants and ferns, now kindly placed at my disposal for examination, as supplementary to those enumerated in my "Sketch of the Vegetation of the Chatham Islands," comprise the following genera new to the group:—*Ranunculus*, *Cardamine*, *Nasturtium*, *Lepidium*, *Viola*, *Drosera*, *Stellaria*, *Dodonæa*, *Discaria*, *Acæna*, *Callitriche*, *Tillæa*, *Haloragis*, *Myriophyllum*, *Daucus*, *Crantzia*, *Hydrocotyle*, *Oreomyrrhis*, *Apium*, *Brachycome*, *Craspedia*, *Erechtites*, *Helichrysum*, *Gnaphalium*, *Hypochæris*, *Wahlenbergia*, *Myosotis*, *Dichondra*, *Parietaria*, *Rumex*, *Atriplex*, *Rhagodia*, *Chenopodium*, *Salicornia*, *Triglochin*, *Ruppia*, *Potamogeton*, *Acianthus*, *Corybas*, *Thelymitra*, *Microtis*, *Schœnodum*, *Scirpus*, *Cladium*, *Chæto-spora*, *Isolepis*, *Uncinia*, *Danthonia*, *Hierochloa*, *Trisetum*, *Dichelachne*, *Poa*, *Tmesipteris*, *Schizæa*, *Ophioglossum*, *Lindsæa*.

All these genera are represented also in the vegetation of the New Zealand islands. The species and their relations, geographically and phyto-logically, will become the subject of a special treatise.

The following list of Mosses has been named by Dr. E. Hampe, of Blankenburg:—

<i>Sphagnum molliculum</i> , <i>Wilson</i> .	<i>Rhizogonium bifarium</i> , <i>Schimper</i> .
<i>Funaria connivens</i> , <i>Hampe</i> .	<i>Hypnum aviculare</i> , <i>Bridel</i> .
<i>Dissodon purpurascens</i> (<i>Splachnum purpurascens</i> , <i>J. Hook. & Wils.</i>)	<i>Hypnum spininervium</i> , <i>Hook</i> .
<i>Dissodon cuspidatus</i> (<i>Splachnum cuspidatum</i> , <i>J. Hook. & Wils.</i>)	<i>Hypnum ramulosum</i> , <i>Mitten</i> .
<i>Dicranum trichopyllum</i> , n.s., <i>Hampe</i> .	<i>Cyathophorum bulbosum</i> , <i>Bridel</i> .
<i>Campylopus introflexus</i> , <i>Bridel</i> .	<i>Catharomnion ciliatum</i> , <i>J. Hk. & Wils.</i>
	<i>Racopilum australe</i> , <i>C. Mueller</i> .

ART. XXXIX.—*On the Origin in New Zealand of Polygonum aviculare*, L.
By W. T. L. TRAVERS, F.L.S.

[Read before the Wellington Philosophical Society, 23rd October, 1872.]

IN the fourth volume of the *Transactions* of the New Zealand Institute, at p. 238, will be found a paper on this subject by Mr. Kirk, written, as it appears, in consequence of some observations of mine at p. 336 of the previous

volume, in which I assumed both the typical form of *Polygonum aviculare* and the variety *dryandri* to be of exotic origin. Notwithstanding Mr. Kirk's arguments I still disagree with the conclusions he has arrived at, and chiefly for the following reasons.

On looking into the history of botanical research in New Zealand we find that these plants are not mentioned by any collector before Raoul, who obtained the typical form at Akaroa and the Bay of Islands about 1840, whilst Lyall obtained the variety at Port Cooper some eight or ten years later. Now it would be somewhat singular that, if these plants really belonged to the indigenous flora, they should have been overlooked by Banks and Solander in 1769, by the Forsters and Dr. Sparrman in 1772, by Alexander in 1777, and by Menzies in 1791. I admit, however, that Alexander, whose collections were very limited, and Menzies, who directed himself almost exclusively to the *Cryptogamia*, might have overlooked these plants, though the fact would still remain a singular one. But with Banks and Solander and the Forsters and Dr. Sparrman the omission would be strange indeed, for each of these botanists enjoyed abundant opportunities of collecting in localities in which the typical form at all events could scarcely have failed to be found if it then existed in the country. It is still more remarkable too that neither plant is mentioned by D'Urville, who collected in 1822, by Frazer in 1825, by Allan Cunningham in 1826, nor by Lesson in 1827; but whilst their silence may be accounted for in a manner which will be mentioned in the sequel, the same reasons are in no degree applicable to the case of the earlier botanists.

It appears to me that Mr. Kirk has quite overlooked the great length of time which has elapsed since various European seeds, of classes likely to include, at all events, as accidental company those of *Polygonum aviculare*, have been introduced into New Zealand. In the first place there was, between 1793 and 1840, a constant intercourse on all parts of the east coast of the two main islands between the crews of whale and other ships from the colonies of New South Wales and Van Diemen's Land and the natives, during which time the seeds of a large variety of European herbaceous plants were introduced. As a notable instance we know that the seed of the English dock was sold to natives in various parts of the islands as the seed of the tobacco plant.

But outside of this, as possibly accounting for the presence of the plant in question, I call Mr. Kirk's attention specially to the fact that both in 1810 and in 1814 large quantities of European seeds were introduced into the Bay of Islands, and into various parts of the North Island lying between that district and Poverty Bay, by the missionary band of which the Rev. Mr. Marsden was the head. In the latter year particularly the brig "Active,"

which brought down Mr. Marsden and his companions to form the permanent missionary establishment, also brought down horses, cattle, sheep, pigs, goats, cats, dogs, and poultry of several species, in numbers sufficient to give the vessel the appearance of an ark, besides a great variety of seeds, especially wheat, barley, oats, Indian corn, and garden and grass seeds of various kinds, whilst considerable quantities of hay and other fodder, for the use of the animals during the voyage, also formed part of the general cargo. On 16th December, 1814, the vessel passed the Three Kings, and anchored on the coast some days afterwards, and between that time and the latter end of February, 1815, the voyagers landed in various places on their way down, distributing seeds, etc., and explaining their uses to the natives, who accepted them eagerly and expressed a great willingness to cultivate them. Mr. Kirk will find very valuable information in reference to this voyage and its incidents in "Nicholas' Evidence before the House of Lords Committee on 3rd April, 1837," p. 4. Now it is well known that the pigs and poultry then introduced increased with enormous rapidity, the former indeed to such an extent that in 1819 and 1820 they formed the principle articles of barter between the natives and the crews of the whale and other ships visiting the coast, in exchange for arms and ammunition, the natives even then hunting and catching them with dogs.

From the mission stations as centres down the East Coast as far as Poverty Bay, the seeds of numbers of the European plants, and the progeny of many of the animals also, were rapidly distributed. Major Cruise, in his account of the visit of the "Dromedary" in 1820, particularly mentions that nearly every war canoe carried a cock, a bird to which the natives took a great liking, in consequence of his crow and his bold bearing. I could multiply evidence to show the possibility of the introduction and rapid spread of the plant in question in the northern habitat mentioned by Mr. Kirk, at least twenty-six years before the colonization of Auckland; but I think the above facts, added to the silence of the earlier botanists, will satisfy him that something more is required than he has advanced in his paper, in order to prove that they are natives of the soil. But he will say that these facts do not dispose of the case of Banks Peninsula. Well, in regard to that locality, Mr. Kirk is probably not aware that besides the constant visits, before alluded to, of numbers of whale and other ships from Hobart Town and Sydney to the harbours of Akaroa and Port Cooper, large tracts of the pastoral country in the vicinity of both harbours were occupied by European settlers, with cattle and horses, so long ago as 1832. These animals were chiefly brought from Tasmania by the Greenwoods, and the hay and fodder necessary for their use during the voyages were almost certain to contain seeds of the plants in question, even if they did not occur amongst those which had been introduced

by the whalers, or amongst those of the various plants which were brought down by the Greenwoods and others mentioned.

With regard to the silence of D'Urville, Fraser, Allan Cunningham, and Lesson, it must be remembered that all these observers saw the extensive cultivations of the missionaries at the Bay of Islands and elsewhere, and if they did notice *Polygonum aviculare* at all, they would probably look upon it as having been introduced amongst the other European seeds which they saw flourishing there. In this connection Mr. Kirk will probably call to mind the interesting description given by Darwin of the appearance of the mission station at Waimate, in 1836, and no doubt any English botanist collecting at that time in that district would at once have treated our plants as exotic.

It must be remembered, moreover, that when Banks and Solander, and the Forsters, and Dr. Sparrman visited New Zealand, the cultivations of the natives were greatly more extensive than they are at present; and it is extremely improbable that neither in the numerous large tracts of cultivated land nor in the vicinity of the many extensive pas which they visited, nor along the many tracks which the natives then travelled, should specimens of a plant possessing the habits of *Polygonum aviculare* have been found, if it then existed at all as part of the indigenous flora of the islands.

No doubt many indigenous plants have increased with extraordinary rapidity of late years. I may instance for example the *Chrysobactron hookeri*, which has spread and is still spreading over thousands of acres of moist ground, on the higher part of the South Island pastoral country, owing to the removal by fire of a vegetation which does not renew itself after fire,—such as the sub-alpine species of *Dracophyllum*, *Discaria*, and *Veronica*—which in mingled growth usually cover the terraces and mountain sides in such valleys as those of the Acheron, the Clarence, the Upper Waiau, etc., in the Nelson province.

Even more remarkable is the extraordinary spread of *Triticum scabrum* (blue-grass of the settlers) which over hundreds of thousands of acres of the same class of country is gradually displacing the native grasses that first follow the destruction of the sub-alpine growth.

But none of these cases can be said to be strictly analogous to that of the *Polygonum*. In regard to each of the former certain checks have been removed, and the plant is profiting by such removal. In the latter the plant is always associated with the immediate occupation of land by man, making its habitation either in places which he has disturbed and then suffered to lie waste, or along the sides of the tracks which he makes over virgin country.

The spread of the *Polygonum* is more analogous to that of the plant commonly termed the Maori cabbage. In every part of the South Island in which we find any traces of native occupation or travel, even high amongst

the gorges of the Southern Alps, we also find the latter plant; but I doubt whether this evidence alone would satisfy Mr. Kirk that it is not a modified descendant of some form of *Brassica* originally introduced by Cook.

But in addition to the foregoing evidence I call Mr. Kirk's attention to the case of the Chatham Islands. Ever since 1836 these islands have been visited by whaling ships, hailing during the earlier years exclusively from Hobart Town. In the year 1854 several vessels from Melbourne and Sydney, freighted with horses and cattle, went down to those islands, making very profitable trade with the Maoris who then occupied them, the trade being chiefly in potatoes, then in good demand at the several diggings. For one entire horse the Maoris paid £250, whilst they gave correspondingly good prices for the other animals. Now soon after this trade began a considerable number of common English weeds, and amongst them *Polygonum aviculare*, made their appearance on the islands. These facts are given on the authority of Mr. Hunt and others who have long resided there, and have had ample opportunities of observing them, and they are quite analogous to those which I have mentioned above as applying to New Zealand.

I do not think it necessary to follow Mr. Kirk in his criticisms upon the value of the Maori evidence in favour of the exotic origin of the plants in question, but I think I could satisfy him that such evidence is of more value when obtained from southern natives than if obtained from natives in the north.

I cannot, moreover, close these observations without mentioning what will probably interest and surprise Mr. Kirk, namely, that I have always considered *Azolla rubra* as a foreign plant. I remember perfectly noticing its first appearance in Nelson, and it was then looked upon as having been brought from Tasmania with many other introductions of a more unsatisfactory character.

NOTE.—22nd February, 1873. Since the foregoing paper was read I have seen Mr. Kirk's reply to my observations (see Art. XL.), but, in reference to Anderson's mention of a knot-grass, it appears to me that Mr. Kirk has overlooked the fact that *Polygonum decipiens* was collected by Banks and Solander, and would no doubt have been called a knot-grass by Anderson.—
W. T. L. TRAVERS.
