Forma *rubra*. Stems red, corolla white with longitudinal red stripe.

Hab. Antipodes Island: *T. Kirk.*

The strict fastigiate habit of this plant and the lingulate leaves readily distinguish it from any other New Zealand species. Although the flowers are produced in great abundance they are not easily detected at first sight, partly from their being much obscured by the overtopping bracts, but chiefly from the peculiar coloration, the form with red stems developing white flowers vertically streaked with red, and the form with yellow stems exhibiting delicate white flowers.

EXPLANATION OF PLATES XXVII.–XXVIIc.

PLATE XXVII.

Gentiana lineata, T. Kirk. Natural size.

PLATE XXVIIa.

Gentiana spenceri, T. Kirk. Natural size.

PLATE XXVIIb.

Gentiana spenceri, T. Kirk.

Fig. 1. Flower, enlarged.
Fig. 2. Capsule with bracts.
Fig. 3. Ovary, enlarged.

PLATE XXVIIc.

Gentiana saxosa, Forster. Natural size.

Fig. 1. Flower, enlarged.

Art. XLI.—*On the New Zealand Species of* Gunnera, *L.*

By T. Kirk, F.L.S.

[*Read before the Wellington Philosophical Society, 28th November, 1894.*]

Gunnera, which was constituted by Linnæus in 1767, is, perhaps, the most neglected genus of flowering plants in New Zealand. The first species recorded as a native of the colony was described by Raoul in 1844, and beautifully figured in "Choix de Plantes de la Nouvelle-Zélande" in 1846. A second species, *G. prorepens*, was published by Sir Joseph Hooker in the "Flora of New Zealand" in 1853, and a third by the same author in his "Handbook of the New Zealand Flora" in 1864. No further addition was made to our knowledge of the local species until

1882, when the Rev. W. Colenso described a form of *G. monoica* which he considered worthy of specific honours, in the fifteenth volume of Transactions of the New Zealand Institute. The name of another plant, *G. hamiltonii*, was published by its discoverer in the seventeenth volume, but without description; while Mr. Colenso described a remarkable species as *G. flavida* in the following year; and in the twenty-fifth volume Mr. Petrie described his *G. "ovata,"* which unfortunately comprised two distinct plants. As showing the small amount of attention which these plants have received, it may be pointed out that, although *G. prorepens*, a common species in some districts, was published more than forty years ago, its flowers are still unknown. This neglect is due to various causes, amongst which may be enumerated the absence of the genus from large districts, especially in the populated parts of the North Island and near the centres of population in the South Island; their restriction to swampy or watery places, and their flowering in the early spring, when such places are usually difficult of access; their remarkably inconspicuous flowers, which are almost invariably hidden amongst the leaves; and especially their monœcious or dioœcious character, which renders it difficult to obtain complete series of flowers and fruit. Although the three species included in the Handbook are increased in this paper to nine, only one of these is described in a satisfactory manner, owing to the imperfect material at my command. It may, however, be hoped that this extended notice will attract greater attention to this interesting genus, and lead not only to fuller descriptions, but to a detailed account of the complicated anatomy and histology of each species.

All the species are more or less tufted, their creeping rhizomes often forming matted patches. The Chilian *G. scabra* has leaves from 4ft. to 8ft. in diameter, carried on petioles 6ft. in length; but the New Zealand species are lowly herbs, with inconspicuous unisexual flowers, which may be monœcious or dioœcious: sometimes male and female flowers are developed on the same scape, when the lower flowers are pistillate and the upper staminate; both staminate and pistillate flowers have a bract at the base of each, and a perianth of two, or rarely four, very small segments. The anthers, two in number, are sometimes destitute of filaments, and the pistillate flowers are invariably furnished with two styles, which may be elongated and almost capillary, or stouter and compressed at the base, but invariably covered with minute papillæ. The ovary is one-celled, and contains a single pendulous ovule, while the fruit is a small, fleshy drupe, white, orange-coloured, or red, with a very minute embryo and oily endosperm. In the majority of species both flowers and fruit are wholly hidden amongst the leaves, but in *G. flavida* and

others the scapes become elongated as the fruit matures, and the showy yellow or crimson drupes are elevated above the leaves. In at least one species the drupes are of different shapes at different periods of the growing-season: in the early spring the drupes are ovate or ovoid, and form a compact obtuse mass hidden at the base of the leaves; later in the season erect scapes are developed on the same plant, and produce lax pendulous clavate drupes.

All the New Zealand species are endemic, but their distribution is unequal, and it must be mentioned that *G. monoica*, found as far north as Mongonui, *G. prorepens* which finds its northern limit at the Hunua (Auckland), *G. flavida* which has not been found north of Hawke's Bay, and *G. dentata* which extends northward to Tongariro, alike exhibit a more robust habit as they approach their southern limit in Otago or Stewart Island: the remaining species except the local *G. arenaria* are restricted to the South Island, one or two being rather local. *G. flavida* and others occur most plentifully in Sphagnum bogs.

The genus comprises about twenty-five species, and is almost completely restricted to the Southern Hemisphere. Outside the New Zealand species, one is found in Tasmania, others extend to the Falkland Islands, Fuegia and other parts of South America, Central America, Juan Fernandez, the Sandwich Islands, Java, Abyssinia, and South Africa.

1. **Gunnera monoica**, Raoul. In Ann. Sc. Nat., ii., 117 (1844), and Choix de Pl. de la Nouv.-Zélande, xv., t. 8.

A slender tufted plant with creeping rhizomes, glabrous or almost strigose. Leaves reniform or orbicular, with few short hairs on both surfaces, $\frac{1}{3}$in.–$\frac{3}{4}$in. in diameter, 3–5-lobed, or crenate, or crenate-dentate only; petioles slender, 1in.–2in. long. Panicle 1in.–3in. long, very slender, male flowers above; female with few short, often crowded branches; staminate flowers sessile or shortly pedicelled, perianth of two minute narrow acuminate segments; female segments 2, acute; styles elongated, capillary. Fruits minute, spherical, forming a compact spike or panicle hidden amongst the leaves. Hook. f., Fl. N.Z., i., 65; Handbook N.Z. Fl., 67. D C., Prodr., xvi., ii., 599. *G. prorepens*, Hook. f., Fl. Antarc., ii., 274 (in note; not of Hook. f., Fl. N.Z., i., 66).

Hab. In cool, moist situations, Mongonui to Stewart Island, but often rare and local.

Var. **strigosa**, sp. Colenso. In Trans. N.Z. Inst., xv. (1882), 322.

Whole plant more hairy, especially the rhizomes and petioles, which are often strigose. Leaves sometimes crowded at the nodes.

Hab. North Island: In rather dry places, Hawke's Bay; *Colenso!* Mungaroa, Wellington; *T. Kirk.*

Var. **ramulosa.**

Stems rather stout, clothed below with the bases of old petioles. Panicle much-branched above and below; upper branches 1in.–1½in. long; drupes not seen.

Hab. South Island: Broken River, 2,600ft.; *J. D. Enys!*

(?) Var. **albocarpa.**

Rhizomes more robust, sometimes thicker than a goose-quill. Leaves larger than in the type; flowers not seen. Fruiting panicles much-branched, branches 1in.–1½in. long, lax or compact; drupes minute, spherical, milk-white, tipped with the black perianth segments.

Hab. Southland, Kew (1880), Sandy Point, &c.

This will probably prove distinct from *G. monoica;* but in the absence of flowers I refrain from raising it to specific rank. A remarkable form of this plant collected at Kew and Woodend in 1880 has erect or suberect branches 12in.–18in. long, with from 4 to 6 shortly-petioled fleshy leaves, crowded at each node.

2. **G. mixta,** n.s.

Rhizomes slender; leaves 1½in.–2½in. long, with weak scattered hairs on petiole and blade; blade ovate or slightly cordate, rounded at the apex, crenate but not lobed. Scape very slender, unbranched, exceeding the leaves; upper flowers lax, sessile or shortly pedicelled; staminate, pistillate, and hermaphrodite flowers intermixed, staminate mostly pedicellate; perianth segments 2, narrow linear-oblong, obtuse; female perianth segments 4, ovate, unequal, sometimes with two linear-oblong processes springing from the base of the segment; hermaphrodite flowers with ovate segments, alternating with two linear-oblong; filaments short, anthers apparently abortive. Fruit not seen. *G. ovata,* Petrie, in Trans. N.Z. Inst., xxv. (1892), 274 (in part), leaves only.

Hab. South Island: Otago; *J. Buchanan! A. Hamilton! D. Petrie.*

A curious plant, resembling small states of *G. prorepens,* but essentially separated by the simple, lax, subracemose scape exceeding the leaves, which distinguishes it from all other species. The flowers may be either male or female primarily, but in either case one or two of the complementary form and one or two hermaphrodite will be found on each rhachis; rarely from three to five female flowers may be found at the base, the upper being staminate. Better and more copious material is required to form a satisfactory diagnosis.

3. **G. prorepens,** Hook. f., Fl. N.Z., i., 66.

Rhizomes rather stout; leaves 3in.–5in. long, ovate or ovate-oblong or rarely elliptic, rounded at the apex, margins entire or crenate; more or less clothed with scattered hairs; petioles strigose or hairy. Scapes much shorter than the petioles, wholly hidden among the leaves, strigose, stout, unisexual. Male flowers not seen. Female perianth segments 4, linear-obovate, obtuse, concave, cucullate; styles short, stout, slightly compressed. Drupes sessile or very shortly pedicelled, forming a compact spike less than an inch in length, broadly obconic, with a shallow groove at the apex, red. Hook. f., Handbook N.Z. Fl., 68; D C., Prodr., xvi., ii., 599.

Hab. In moist lowland and subalpine localities. North Island: Wairoa Falls, Hunua; *T. Kirk.* Taupo district; *Captain Gilbert Mair! Colenso.* South Island: Nelson to Southland; Stewart Island; *T. Kirk.*

The short, stout spike and broadly obconic drupes distinguish this species from all others, although the leaves of several bear a close resemblance. As in the next species, my flowering specimens are too far advanced to allow of a complete diagnosis being drawn.

4. **G. flavida,** Colenso. In Trans. N.Z. Inst., xviii. (1885), 261.

Densely tufted; rhizomes rather stout. Leaves 1in.–4in. long, blade ovate or slightly ovate-cordate, rarely elliptic, rounded at the apex, margins entire or slightly sinuate, or rarely crenate at base, glabrous or with few weak hairs on petiole; petioles and peduncles red. Scape unisexual, 1in.–4in. long, usually exceeding the leaves when in fruit. Male flowers not seen. Female, $\frac{1}{4}$in.–$\frac{1}{2}$in. long, segments 4, the two innermost ovate or oblong, ciliate at the apex; outer larger, obovate, cucullate, caducous. Drupes obconic, sessile or very shortly pedicellate, crimson or lemon-coloured, forming a lax spike, sometimes 2in. long, overtopping the leaves. *G. ovata,* D. Petrie, Trans. N.Z. Inst., xxv. (1892), 274 (*in part*), fruits only. *G. elongata,* T. Kirk, MSS.

Hab. North Island (collected by *Mr. Hill*): *Colenso!* probably not uncommon in the Taupo district. South Island: Common in Otago, Southland, and Stewart Island; *T. Kirk.* Frequent amongst Sphagnum.

Easily recognized by the red petiole and peduncles, and especially by the obconic drupes, which are usually elevated above the leaves. Mr. Colenso describes the fruiting state only. I gladly take the opportunity of expressing my thanks for one of his type-specimens: it has small elliptic leaves on filiform petioles, but, as the drupes of both are identical, I

have no hesitation in uniting the more robust southern plant with it, although elliptic leaves are comparatively rare in the latter. Exactly the same dimorphism is exhibited by the leaves of *G. prorepens*. If, however, the flowers of Mr. Colenso's plant, when discovered, should exhibit unexpected differences of sufficient importance to warrant its separation from the southern plant, the latter might be called *G. elongata*, specimens having been distributed under that name before I recognized its identity with *G. flavida*. *G. "ovata,"* as described by Mr. Petrie, consists of two distinct plants, which are here separated as *G. mixta* and *G. flavida:* the leaves belonging to the former, and the fruit to the latter. On the authority of Mr. N. E. Brown, of Kew, Mr. Petrie considers the plant mentioned at p. 68 of the Handbook, and there stated to have been discovered by Lyall in the Middle Island, and at the base of Tongariro by Colenso, to be identical with *G. "ovata";* but the plant of those observers is said to have the leaves of *G. densiflora* and the fruits of *G. monoica*, thus differing widely in both points from either of the plants included by Mr. Petrie. It is, however, extremely difficult to identify imperfect specimens of *Gunnera*.

5. **G. dentata**, n.s.

Rhizomes rather stout, tufted. Leaves 1in.–2in. long or more, petioles hairy or strigose at base, blade ½in. long or less, membranous, ovate-lanceolate or ovate, acute, with weak scattered hairs on both surfaces or nearly glabrous, margins dentate. Scapes unisexual, monœcious. Male very slender, slightly exceeding the leaves, flowers sessile; perianth segments linear-oblong, cucullate; anthers broad, obtuse. Female about ½in. long, wholly hidden amongst the leaves, silky at the base, spike ¼in. long; perianth segments 2, broadly oblong, obtuse, style very long, stout, much compressed at base; scape elongating in fruit 1in.–2in. high, exceeding the leaves, slender, lax or rarely short and sessile. Drupes on stout pedicels, clavate, patent or pendulous. *G. prorepens*, β, Hook. f., in Handbook N Z. Fl., 68.

Hab. North Island: *Colenso* (in Handbook); *Petrie.* South Island: Nelson to Southland, but often local; 1,000ft.–3,000ft.

6. **G. densiflora**, Hook. f. In Handbook N.Z. Fl., 68.

Rhizomes slender, tufted, monœcious, whole plant rather fleshy, glabrous or with few weak scattered hairs on the petiole. Leaves 1in.–1½in. long, ovate-cordate or orbicular-cordate, rarely cuneate at base, minutely crenate or almost serrate. Scapes unisexual, monœcious, stout, 1in.–3in. long, greatly exceeding the leaves. Male flowers on short stout

pedicels; perianth segments 2, linear-oblong-spathulate, cucullate, tips ciliate; anthers sessile, broad, slightly mucronate, ovary abortive. Female not seen. Drupes of two forms: in the early spring state narrow-ovoid on short pedicels forming short compact heads about ½in. long, wholly hidden by the leaves; later, clavate, pendulous, forming lax erect racemes 1in.–3in. high.

Hab. South Island: On blown sand, Cape Farewell, Nelson; *T. Kirk.* Seventy-mile Beach, Canterbury; *J. Buchanan!* Always littoral. I suspect that the inland plant from the Acheron and Clarence referred to this species in the Handbook belongs to *G. dentata*.

The dimorphism exhibited by the fruiting state is very remarkable, and may possibly be due to the plant being partially covered with a deposit of blown sand before the early fruit is fully formed.

Var. **depressa.**

Leaves shorter and broader than in the type, often suborbicular; scapes shorter than the leaves; drupes smaller, clavate when fully ripe. Flowers not seen.

Hab. Southland; *T. Waugh!*

7. **G. hamiltonii**, T. Kirk, MSS. W. S. Hamilton, in Trans. N.Z. Inst., xvii. (1884), 292 (name only).

Rhizome as thick as a goose-quill, tufted. Leaves forming dense rosettes 2in.–4in. in diameter, coriaceous, brown, glabrous or the petioles glabrescent, blade usually exceeding the petiole, ¾in.–1in. long, ovate, acute, gradually narrowed into a short, broad, winged petiole equalling or exceeding the lamina; margins minutely toothed, strongly nerved beneath. Scapes unisexual, monœcious(?). Male not seen. Female 1in.–1¼in. long, lower half naked, upper densely crowded; bracts large, broadly ovate, laciniate; perianth segments 4; stigma stout. Fruits not seen.

Hab. Hills near the mouth of the Oreti River, Southland; 300ft.; *W. S. Hamilton!*

Mr. Hamilton states, "The succulent leaves are extremely rich in lime and silica, and give off when old the epidermis as a grey paper; the anthers are sessile on very stout scapes, not crowded; the drupes on still stouter peduncles as thick as a goose-quill and 2in.–4in. long, bright red, almost sunk in the fleshy scape, not crowded, but occupying an inch or more of the top." A somewhat hasty search for this fine plant proved fruitless, and led me to the belief that it must be extremely rare and local. There is, however, reason to believe that it occurs in the Marsden district, Nelson.

The following are provisionally described pending the collection of further material :—

8. **Gunnera microcarpa,** n.s.

Rhizomes slender, tufted. Leaves 2in.–4in. long, petioles slender, hairy or strigose; blade about 1in. long, broadly ovate or ovate-cordate, with scattered hairs on both surfaces, crenate or crenate-lobed. Flowers not seen. Fruiting scapes 1in.–1½in. long, almost filiform, hidden amongst the leaves, bracts linear, ciliate at the apex. Drupes sessile, about the size of mustard-seeds, yellow or red; styles filiform.

Hab. Southland; *T. Waugh!*

Closely resembles *G. prorepens*, Hook. f., in general appearance, but differs essentially in the weak flexuous scapes, which are much longer than in that species, and especially in the minute drupes and filiform styles.

9. **G. arenaria,** T. F. Cheeseman. In MSS.

Rhizomes rather stout, stems clothed at base with the remains of old petioles. Leaves 1in.–2in. long, cartilaginous, glabrous except the petioles, which are sometimes coarsely pilose, blade about ½in. long, ovate or broadly ovate-cuneate, deeply crenate. Flowers not seen. Scape sessile or shortly pedunculate, forming a compact blunt head ½in. long; drupes ovate.

Hab. North Island: On sand-dunes, Waitakerei River; *T. F. Cheeseman!*

Closely related to *G. densiflora*, but differs in the larger leaves, subspherical or ovate erect drupes, and short obtuse spikes.

I am indebted to Mr. Cheeseman for specimens of this species.

In "Voyage au Pôle Sud: Botanique," ii., 76, *Gunnera magellanica*, Lam., is erroneously stated to have been collected in the Auckland and Campbell Islands.

It affords me great pleasure to express my thanks to Mr. Waugh, Curator of the Public Gardens, Invercargill, for his kindness in forwarding fruiting specimens of several species found in the plantations under his care.