

## NOTES ON THE SANDRINGHAM FLORA.

BY C. S. SUTTON, M.B.

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THE species composing the native vegetation now covering the area lying between Sandringham and Mordialloc, and extending back from the sea a varying distance, as far as the neighbourhood of Oakleigh and Spring Vale, are collectively known to us as the "Sandringham flora." Although the present limits of the "formation" cannot now be exactly defined, it may be said, speaking roughly, that originally it ranged to St. Kilda, Sandridge, and Emerald Hill, and covered a great part of what is now Prahran, Malvern, and Caulfield, and a perhaps smaller portion of Hawthorn and Camberwell.

Bunce, in his "Australasiatic Reminiscences" (1857), says:—"After crossing Gardiner's Creek, leaving the river on our left, we travelled over a piece of rising, sandy ground, which formed a belt between the Yarra Yarra and the sandy heath which we found in the neighbourhood of Brighton. This place was richly covered with low shrubs and plants of a heathy nature. *Leucopogon* (several species), *Astroloma* (or native cranberry), *Epacris* (white and red), a dwarf species of *Casuarina*, *Tetradlea*, *Eriostemon*, several species of dwarf integral-leaved *Acacia* or wattles, *Leptospermum*, *Hippuris* (or Mare's Tail), *Daviesia*, *Pultenæa*, and *Pleurandria*, were among the most prominent."

Further evidence of the close approach of the heath "formation" to Melbourne is to be found in Hannaford's "Jottings in Australia" (1856), where such important constituents of the flora as *Epacris impressa*, Labill., *Leucopogon Richei*, Br., *Correa virens*, Sm. (*C. speciosa*, Andr.), *Aotus villosa*, Sm., *Cassytha pubescens*, Br., *Rhagodia Billardieri*, Br., *Senecio rupicola*, Lesson and Richard (*Senecio lautus*, Forst.), *Trachymene diversifolia*, F. v. M. (*T. heterophylla*, F. v. M.), and *Erythræa australis*, Br., are noted as occurring at St. Kilda, and *Pleurandria sericea*, Br. (*Hibbertia densiflora*, F. v. M.), *Hibbertia prostrata*, Hook. (*H. fasciculata*, Br.), *Ricinocarpus sidæiformis*, Ferd. v. Mueller (*R. pinifolius*, Desf.), *Bossia cinerea*, Br., *Leucopogon virgatus*, Br., and *Didiscus pilosus*, Benth., at or near Liardet's Beach, or Sandridge, now Port Melbourne.

The Sandringham flora has thus, in the first place, a sentimental interest to us, in having at one time occurred over nearly the whole area now covered by the southern suburbs of Melbourne.

The flora is practically interesting in being the richest and most convenient to us for purposes of collection and study, affording, as it does, seashore, land, and (to a lesser degree)

water plants, and containing a comparatively large number of species representing the most important and characteristic orders of Victorian plants; hence, a knowledge of its members means a good insight into the larger Victorian flora. To many of us living in the metropolis, indeed, it serves as the principal standard by which we measure the floras of other more distant localities. Unfortunately, what remains of it is so rapidly passing away with the extension of the city southward that in another ten years, perhaps, fragments alone will be left of it. For this reason alone, if for no other, it seems worth while to attempt its description in terms of the œcologists, and to put on record, as completely as possible, a census of its species.

As far as can be found the only efforts that have been made to more or less systematically describe this flora are those of Mr. C. A. Topp, M.A., F.L.S., in "The Handbook of Melbourne," for the use of the members of the Australasian Association for the Advancement of Science, Melbourne meeting, 1900, and that of Mr. G. Weindorfer in his short but interesting description of an excursion to Sandringham in December, 1903, contained in vol. xx. of the *Victorian Naturalist*.

The type of vegetation covering the district mentioned, excepting certain small areas within it, the foreshore, and the cliffs and their vicinity, is one which, according to Schimper, is common to mild temperate regions, where the bulk of the rainfall happens in winter, the summers are dry, and where the substratum is a sandy soil liable to become parched in the dry season. Although its general character is due to these factors, which are all present, and to some others of lesser importance, the fact that the formation corresponds more or less closely with the low, undulating geologic area known as the 'red beds,' the upper part of which has been leached of its iron, leaving a surface of loose sand, makes it an 'edaphic' rather than a 'climatic' formation.

A varying significance has been attached to the term 'formation' by œcologists, but Warming defines it as a community of species which have become associated together by definite edaphic or climatic conditions, and which has a certain fixed appearance, or 'physiognomy,' dependent on the dominant growth forms, the density, height, and colour of the vegetation, the number and duration of life of the species, and their seasonal relationships. The one under consideration at first seems referable to his 'dwarf shrub formation,' and, from the continual occurrence of several species of Epacrids, might in that case be described as a dwarf shrub 'heath'; but the thick layer of raw humus, the most characteristic feature of heath grounds, is not apparent here, and the formation is both taller and more complex than in European 'heaths.'

Rather, it would appear to have much closer affinities to the *maqui* (sclerophyllous scrub-land) of parts of the Mediterranean coast (1 to 3 metres), and particularly to the *maqui* of South Africa, this, according to the authority above-mentioned, representing 'a transition from the low, dwarf, shrub heath of the north to the xerophytic bush-land of the tropics.'

The Sandringham *maqui*, then, consists of a dominant xerophytic vegetation of dull greyish, evergreen, woody plants, close set, of an average height of little more than a metre, and contains a rich admixture of species ('compound' formation), the frequent occurrence of several Epacrids being a marked feature. The leaves are such as are found in plants growing under conditions where excessive transpiration is to be guarded against. Many of the plants are aphyllous, or nearly so—Cassythas, Amperea, Casuarinas, Exocarpus, Sphærolobium, Viminaria. With few exceptions, the leaves are small, thick, simple, entire, very frequently linear, and often with rolled edges, as in Ricinocarpus, *Pultenæa paleacea*, Dillwynias. Sclerophylly is more particularly seen in Hakeas, Epacrids, *Daviesia ulicina*, *Platylobium obtusangulum*—all of which, in addition to many others, are armed with pungent points. Filling the gaps between the taller hard plants is a subordinate lower stratum of softer herbs (in which segmented leaves are frequent), grasses, and tuberous plants.

The vegetation of the main portion of the area having thus been briefly sketched, its individual species will be referred to later.

In considering the Sandringham plants with some detail, they may be naturally divided into four zones. The first is submarine, covering the ground below low water mark, and, apart from the algæ and lower vegetable forms (*plankton* and *benthos* formations), possibly includes among spermophytes the Sea-tassel, *Ruppia*; Grass-wrack, *Zostera*; and Sea-nymph, *Cymodocea* (enhalid formation). It need not be further considered here.

The second zone, occurring between low water mark and the cliff base, is subject to periodical or intermittent inundation, and mostly comprises species of very wide, even world-wide, distribution, with representatives of families well known to be partial to saline situations or capable of growing in these as well as in other places (halophyte formation). These plants present certain peculiarities, such as reduction of surface, succulence, lignification, and a prostrate habit, among others, which have been found protective against excessive transpiration, and are probably required, according to Schimper, owing to the difficulty the plants find in absorbing water containing

too great a proportion of salt. It is interesting to note that these peculiarities are not found in halophytes only, but are also present in plants growing in very different situations and under widely different conditions, where, owing to acidity (in peat bogs), extreme coldness (in arctic and alpine places), or aridity (in deserts, on rocks, or the bark of trees), the same difficulty of absorption exists and the same necessity for conservation of absorbed water obtains. The soil or substratum being in all these cases either actually (physically) or physiologically dry.

Of the families usually described as markedly halophilous, nearly all are represented. The few exceptions are the Tamarinaceæ, Rhizophoraceæ, and Asparageæ, which would not be looked for; Plumbaginaceæ, of which the world-wide "Sea Lavender," *Statice taxanthea*, is found elsewhere on the shores of Port Phillip; and the Zygophyllaceæ, the Victorian members of which are confined, with two exceptions, to the north-west of the State.

Perhaps the most interesting of the foreshore plants are those found about Picnic and Rickett's Points and other places towards Beaumaris, growing in the cracks and crevices of the flat reefs periodically covered by the tides. They may be said to constitute an 'association' of lithophilous halophytes—chasmophytes—and, save in the salt marshes near the Yarra mouth, where some of them are abundant, and near the Albert Park Lagoon, where a couple of them are still existent, they hardly occur elsewhere. At a little distance they show, in size, succulence, and habit, a strong family likeness, although widely separated systematically. They have, in fact, in adapting themselves to the surroundings, come to possess similar 'growth forms' (epharmonic convergence). Two of them belong to the Salsolaceæ, most halophilous of all plant families—the "Sea Crab-grass," *Salicornia australis*, occurring abundantly, and that veritable cosmopolite, the "Sea-blite," *Suaeda maritima*, only infrequently. Every here and there the "Smooth Sea-heath," *Frankenia laevis*, almost as widespread a plant as the last, is found. No other is so venturesome, and in December its pretty pinkish-white flowers were seen blossoming even under the wave. Another wide ranger, the "Creeping Brookweed," *Samolus repens*, of the Primulaceæ, is closely associated with *Wilsonia rotundifolia*, of the Convolvulaceæ, and the Amaranth, *Hemichroa (Polycnemon) pentandra*. About Ricketts Point these three seem to be equally prevalent, and the two latter are notable as having a more restricted endemism than any of the others, not extending beyond Australia. Of the rest, *Mesembryanthemum australe*, the "Austral Pig-face," strays here from the cliff, and

the tiny little "Sand Club-rush," *Scirpus arenarius*, of the Cyperaceæ, occasionally makes its appearance.

Turning now from the rocks, we find in the loose sand another association—psammophilous halophytes—in which the Sal-solaceæ is again well represented by the "Grey Saltbush," *Atriplex cinereum*, with glaucous foliage and purplish flower masses; the "Prickly Glasswort," *Salsola kali*, another real cosmopolite; the "Saloop Saltbush," *Rhagodia hastata*; the "Fat Hen," *Chenopodium album*; and the "Oak-leaved Goose-foot," *C. glaucum*. With these is frequently found a crucifer, the "Sand Rocket," *Cakile maritima*, again of world-wide range. The most striking grass is the curious sprawling *Spinifex hirsutus*, the "Hairy Spinifex," patches of which, bearing flowers of different sex, may be found widely separated. It is, however, much more abundant in the sand hummocks near Brighton Beach. Two noticeable introduced plants are just here making themselves very much at home—the "Horned Poppy," *Glaucium luteum*, in particular, with its handsome hoary foliage, bright yellow flowers, and inordinately long fruits, is spreading widely, while the other, *Nolana prostrata*, a succulent prostrate plant of the Campanulaceæ, with bluish bell-shaped flowers, is more slowly extending its influence.

Many other plants venture from the cliff base a little distance, where the sand has been bound by material washed from the cliffs above, and more widely where the "Salt-grass," *Distichlis maritima*, the "Couch-grass," *Cynodon dactylon*, the "Spinifex," the "Curved Snake-tail Grass," *Lepturus incurvatus*, and especially the introduced "Sea-lime Grass," *Elymus arenarius*, have reduced the shifting grains to stability, and so paved the way for their coming. Of the species found in this debatable ground, which is only rarely flooded, may be first mentioned the umbelliferous, lush green "Sea Celery," *Apium prostratum*, corresponding to the garden celery, *A. graveolens*, wild on old-world coasts. It is the first halophil, except the *Glaucium*, met with, having divided leaves. The "Coast White-bush," *Calocephalus Brownii*, is often noticed here, less often the grey "Coast Aster," *Aster axillaris*, not infrequently the little "Grass Daisy," *Brachycome graminea*; *Stuartiana Muelleri*; the "Jersey Cudweed," *Gnaphalium luteoalbum*; the coast form of the "Sow Thistle," *Sonchus oleraceus*, coarser and more succulent than in the inland form, and several other introduced composites. *Lobelia anceps* is also here, and the "Swampweed," *Selliera radians*, the "Rayed Carrot," *Daucus brachiatus*, the "Kidney Weed," *Dichondra repens*, and even the "Water Dock," *Rumex bidens*, and the "Spreading Flax-lily," *Dianella revoluta*. Now and again, too, the big brother of the "Austral Pigface," *Mesembryanthemum æquilaterale*, "the Angled Pig-

face," comes down, and the "Warrigal Cabbage," *Tetragona implexicoma*, and the "Sea Berry," *Rhagodia Billardieri*, which vie with one another in forming dense screens and entanglements among the shrubs on the cliff above, hang down and venture in the sand. Others which may be mentioned as occurring here, not naming many aliens, are the "Knotted Club-rush," *Scirpus nodosus*; the "Spreading Sedge," *Carex pumila*; the "Hairy Centrolepis," *C. strigosa*; and the grasses *Stipa semibarbata*, the "Fibrous Spear-grass," *Dichelacne crinita*, the "Long-hair Plume-grass," *Poa Labillardiere*, the "Blue Meadow-grass," and *Stipa teretifolia*, the dense, tussocky "Round-leaved Spear-grass."

Having dealt with the foreshore plants, we now arrive at the consideration of the third zone—the belt of vegetation densely covering the cliff slopes (where they are not too steep), from base to crest, and extending inland, more or less, into the scrub-land. Here we find trees of low growth, shrubs, and smaller plants, and in it the grey "Coast Tea-tree," *Leptospermum lævigatum*, is so dominant that it impresses its name on the formation as a 'leptospermetum.' Very frequently it grows so thickly, and without admixture of other species, as to make absolutely 'closed communities' within the formation, not even a *Pterostylis* finding it possible to exist in the dense shade caused by the matted foliage. The other tree forms, usually more robust and rather taller, are the "White" or "Coast Banksia," *B. integrifolia*; the "Drooping Sheoak," *Casuarina quadrivalvis*, perhaps the most graceful of the Victorian species; the "Cypress Ballart," *Exocarpus cupressiformis*, rather infrequently; and the "Manna Gum," *Eucalyptus viminalis*, which far outnumber the two other eucalypts occasionally noticed further inland; *E. Gunnii*, var. *acervula*, and *E. amygdalina*. Of lower growth, constituting a second stratum are the "Boobialla," *Myoporum insulare*, which, with its fellow, *M. viscosum*, sometimes overhangs the sand; the sprawling "Coast Acacia," *A. longifolia*, var. *sophoræ*; two *Styphelias*, *S. Richei* and *S. australis*; the "Tonga-bean wood," or "Sea Box," *Alyxia buxifolia*; the shrubby *Goodenia ovata*, sometimes called the "Pipeclay Bush"; only rarely the "White Correa," *C. alba*, and a couple of grey shrubby composites, the "Twiggy Aster," *Aster ramulosus*, and the "Coast Aster," *A. axillaris*.

Though not taking any part in giving character to the 'leptospermetum,' the "White Velvet-bush," *Lasiopetalum Baueri*, may be mentioned as growing only in the vicinity of the Red Bluff, just below the brow of the cliff, and a clump of *Oxylobium ellipticum*, the "Golden Shaggy Pea," at the back of the Ebden estate. In addition to the *Tetragona* and

Rhagodia already mentioned as finding support among the plants of the "leptospermetum," and rising to the height of a few feet only ("semi-lianes" or "scramblers"), three other lianes are often seen mixed with the foliage of the highest shrubs. The "Large" or "Black Dodder laurel," *Cassytha melantha*, and the "Climbing Lignum" or "Macquarie Harbour Vine," *Muehlenbeckia adpressa*, are 'twiners,' and the "Coast Clematis," *C. microphylla*, a 'leaf climber.'

Thickly covering the ground where the larger 'sclerophyllous' plants are not too densely set and the sun can freely penetrate, is a third story or stratum of, mostly, softer herbs, among which are many orchids. Some of these have been referred to as encroaching on the beach below, but, among many others, perhaps the most prevalent are the "Hairy Crane's-bill," *Geranium pilosum*; the "Nodding Saltbush," *Rhagodia nutans*; the "Ground" or "Cranberry," *Styphelia humifusa*; the "Common Pennywort," *Hydrocotyle vulgaris*; the "Rayed Carrot," *Daucus brachiatus*; the "Tall Daisy," *Brachycome diversifolia*; *Millotia tenuifolia*; the "Kidney Weed," *Dichondra repens*; the "Pellitory," *Parietaria debilis*; and the "Common Green Buttons," *Cotula australis*. Of a still lower growth are such minute plants as *Hydrocotyle callicarpa*, the Leeuwenhoekias, and *Mitrasacme paradoxa*. Not the least charm about the Sandringham flora lies in the profusion of orchids contained in it, and probably no other locality in the State presents such a variety and abundance of species. Over 63 per cent. of the terrestrial species have been reported, and 17 genera out of 21 are represented. Among 20 species of *Pterostylis*, only two are absent, and, with one or two exceptions, all of these prefer the shelter of the "leptospermetum," where the milder temperature, still air, and soft, moist sand seem to provide conditions peculiarly favourable to the growth of these tender herbs. Even when no orchids are in flower the eye cannot fail to be attracted by the hosts of heart-shaped leaves close pressed to the ground, those with purple underpage indicating the "Mosquito Orchid," *Cyrtostylis reniformis*; others, smaller and equally green on both sides, the "Gnat Orchid," *Acianthus exsertus*; larger still, and coarser, the "Flower of Sadness," *Lyperanthus nigricans*; and again, in deep shade, the green shields of the "Red Helmet," *Corysanthes pruinoso*. Numberless rosettes show the presence of the various species of *Pterostylis*, and single long hairy leaves mark the spots where the tubers of the *Caladenias* are gathering their forces so as to be able to send up their delightful blossoms at the fitting time.

Returning now to the consideration of what is popularly known as the heath country, already referred to as "sclerophyllous scrub," or *maqui*, it will be appropriate to mention

first, among the dominant plants, responsible for the general physiognomy of the formation, those which are also most characteristic of this and of similar formations. They are the "Stunted Sheoak," *Casuarina distyla*; the "Pink Tea-tree," *Leptospermum myrsinoides*; the "Wedding Bush," *Ricinocarplus pinifolius*; the "Common Correa," *C. speciosa*; a stunted form of *Banksia marginata*; several of the Leguminosæ, the absence of which is so noticeable in the "leptospermetum," except where it commences to merge into the wider formation, the "Hairy Aotus," *A. villosa*; the "Grey Bossiæa," *B. cinerea*; three of the handsome Dillwynias—the "Heathy Parrot-pea," *D. ericifolia*, "Crowded Parrot-pea," *D. floribunda*, and "Grey Parrot-pea," *D. cinerascens*; three Acacias—the "Juniper Wattle," *A. juniperina*, the pale, early-flowering "Sweet Wattle," *A. suaveolens*, and the "Spike Acacia," *A. oxycedrus*; the lovely white "Common Heath," *Epacris impressa*; the "Prickly Geebung," *Persoonia juniperina*; the "Furze Hakea," *H. ulicina*; and the "Common Bracken," *Pteris aquilina*. Others frequently met are the "Manuka," *Leptospermum scoparium*; the "Honey-bags," *Styphelia scoparia*; where the ground is more continuously moist, *Sprengelia incarnata*; the "Swamp Paper-bark," *Melaleuca ericifolia*; and the "Scented Paper-bark," *M. squarrosa*, all growing in close communities; and the "Gorse Bitter-pea," *Daviesia ulicina*.

Among the plants of lower growth, and hence sub-dominant, the charming little "Twiggy Heath," *Styphelia virgata*; the three Hibbertias—the "Silky Guinea-flower," *H. densiflora*, the "Rigid," *H. stricta*, and the "Bundled Guinea-flower," *H. fasciculata*; the two Pimeleas—the "Downy Rice-flower," *P. octophylla* and *P. phyllicoides*; the "Broom Spurge," *Amperea spartioides*; the "Horny Cone-bush," *Isopogon ceratophyllus*; the "Short Purple-flag," *Patersonia glauca*; and the "Faded Rope-rush," *Calostrophus (Hypolæna) fastigiatus*, from their very frequency, play no small part in building up the character of the vegetation.

Of the subordinate second story, softer plants, the most common, perhaps, are the lilies—the "Blue Squill," *Chamæscilla corymbosa*; the "Milkmaids," *Burchardia umbellata*, and the "Nodding Silverweed," *Bartlingia sessiliflora*. Most frequent among others are the "Yam," or "Murrnong," *Microseris Forsteri*; the "Running Postman," *Kennedyia prostrata*; the "Bending Golden-hands," *Goodenia geniculata*; the "Billy Buttons," *Craspedia Richea*; *Helichrysum scorpioides*, *Leptorhynchos squameus*, and the "Blue-bell," *Wahlenbergia gracilis*. Climbers are not many, and two Cassythas, the "Tangled" and the "Downy Dodder-laurels," *C. glabella* and *C. pubescens*;



the "Climbing Sundew," *Drosera Menziesii*; the "Love Creeper," *Comesperma volubile*; and the "Twining Fringe-lily," *Thysanotus Patersoni*, are those most often noticed.

The orchids found here are mostly of genera not represented in the 'leptospermetum'—*Thelymitra*, *Diuris*, *Prasophyllum*, *Eriochilus*, *Microtis*, &c. The "Spider Orchid," *Caladenia Patersoni*, is equally at home in both places. The "Tiny" and the "Bearded Helmet-orchid," *Pterostylis parviflora* and *P. barbata*, are seemingly the only ones of the genus preferring the scrub-land. The "Yellow Hood-orchid," *Thelymitra antennifera*; the "Larger Glossodia," *G. major*; the "Flower of Sadness," *Lyperanthus nigricans*; the "Tall Leek-orchid," *Prasophyllum elatum*; and a couple of the *Diuris*, are the most abundant. The only grass conspicuous is the "Fibrous Spear-grass," *Stipa semibarbata*, which may be seen waving its plumes well above the shrubs. The formation is too close for grasses, but the "Kangaroo Grass," *Anthistiria ciliata*, and others, occur here and there in favourable situations. Ferns, too, apart from the bracken, are rarely met with, the "Screw Fern," *Lindsaya linearis*, alone prevailing widely.

On account of the sandy, porous nature of the substratum, there are few places where permanent water is found. Still, there are many localities where it persists during a great portion of the year, and where the soil never becomes quite dry. Here may be studied examples incompletely representing the various formations of water-loving plants—'hydrophytes' and 'helophytes,' or marsh plants, and many of their adaptations, such as creeping axes, slenderness of stem, lengthening of internodes, deficiency of root formation, and peculiarity of leaf shape and structure, can be noted.

Of the true aquatic plants, the free-floating "Lesser Duckweed," *Lemna minor* and the 'Red Azolla,' *A. rubra*, alone represent the Pleuston (hydrocharid formation). The fixed water plants (Benthos), constituting what is termed the "Limnæa formation," with leaves submerged or floating, are the "Floating" and "Curly Pond-weed," *Potamogeton natans* and *P. crispus*; *Ottelia ovalifolia*; the yellow-flowered Gentian, *Limnanthemum exaltatum*, oftener seen in blossom after the water has dried up; the "Giant Arrow-grass," *Triglochin procera*, with long, ribbon-like leaves, partly submerged and part floating; the "Water Starwort," *Callitriche verna*; the "Water Milfoil," *Myriophyllum variifolium*, forming "social" growths, often completely filling up a pond, and showing a difference in submerged and emerged leaves; and the beautiful little "Branching Bladderwort," *Utricularia dichotoma*, oftener noticed growing in wet ground.

The plants normally rooting in water or wet soil, but without

submerged leaves — ‘helophytes,’ or marsh plants—are a much larger company. Many of these possess horizontal rhizomes, as in the little blue-flowered *Isotoma fluviatilis*; the “Brooklime,” *Gratiola Peruviana*; the “Swampweed,” *Selliera radicans*; the “Small Loose Strife” *Lythrum hyssopifolia*; the common yellow-flowered “Water Buttons,” *Cotula coronopifolia*; *Mazus pumilio*; the “Creeping Monkey-flower,” *Mimulus repens* (rare); the “White Purslane,” *Claytonia australasica*; and the “Joyweed,” *Alternanthera triandra*.

The “Common Reed,” *Arundo phragmites*, and the “Slender Knotweed,” *Polygonum minus*, grow in water. The “River Buttercup,” *Ranunculus rivularis*; the “Willow Herb,” *Epilobium glabellum*; the tall, leafless “Golden Spray,” *Viminaria denudata*; several of the rushes, Juncæ; and even the composites, the “Swamp Daisy,” *Brachycome cardiocarpa*, and “Billy Buttons,” *Craspedia Richea*, are often seen in flooded ground. The “Dwarf Arrow-grass,” *Triglochin centrocarpa*, and the centrolepids, *C. aristata* and *C. strigosa*, the Sundews (Droseras), the “Tender Bubble-plant,” *Polypompholyx tenella*, and other minute plants, as the Leeuwenhoekias, “Drummond’s Club Moss,” *Phylloglossum Drummondii*, the “Curious Mitrewort,” *Mitrasacme paradoxa*, and the “Tiny Trigger-plant,” *Candollea perpusilla*, are oftenest seen in moist ground. It is difficult, or impossible, to exactly define the formations or associations. There is almost always overlapping between them. Always there are members capable of growing under different conditions, and hence halophytes mix with non-halophytes, the ‘leptospermetum’ merges into the scrub-land, and the water plants, by way of the marsh plants, into those of the dry land.

In attempting to deal with the subject of this paper in an œcological way, it is felt that, in translating the vegetation into modern terms, only a very moderate success could have been expected. But the effort was certainly worth making. So far, we have almost entirely contented ourselves with the mere enumeration of species noticed, and it would seem to be better if, in future Club excursions, a particular attention were devoted to them in regard to their associations.

A remark by Clements, an American writer quoted by Warming in his “œcology of Plants,” shows that we have not been alone in our neglect of this matter. He says “that vagueness of grouping is due to the fact that œcology is only in its infancy, and that very few detailed investigations of plant communities have been conducted, the published descriptions of vegetation being nearly always one-sided and floristic, as well as very incomplete and unsatisfactory from an œcological standpoint.”

An analysis of the 387 plants in the census will show that the numbers contained in the zones described, more or less correspond with their comparative wideness, and that about 6 per cent. belong to the foreshore, 27 per cent. to the leptospermetum, and 67 per cent. to the scrub-land. Further, according to Baron von Mueller's "Second Census," it is found that a great majority of the Sandringham plants have a very wide range, only three—*Leeuwenhoekia Sonderi*, *Thelymitra epipactoides*, and *Pterostylis Mackibbinii*—being endemic to the State; that 112 species extend beyond Australasia (88 of these also to New Zealand), and that about 69 of these, being described from at least two other continents, may fairly be termed "ubiquists." Of those endemic to Australasia, only 43 are set down as occurring in fewer than four States.

It is interesting to note that while 15 per cent. of Australasian plants extend to other countries, and a little more than 3 per cent. only to New Zealand, the proportions in the case of the Sandringham plants are respectively more than 28 per cent. and 22 per cent.

In the compilation of the census the first name is always that occurring in the late Baron Von Mueller's "Key to the System of Victorian Plants," and as there is likelihood of many of the synonyms in "The Flora Australiensis" being adopted subsequently, these have also been added in parentheses. The list is as far as possible complete, names having been taken from several sources, and grateful acknowledgment for suggestions and revision of the lists is here made to several members of the Club, and more particularly to Messrs. P. R. H. St. John and C. French, jun., whose familiarity with the district is so well known.

#### CENSUS OF SANDRINGHAM FLORA.

*h* indicates plants found on the foreshore; *l*, those of the "leptospermetum;" *s*, of the scrub-land; *a*, aquatic plants and those in wet ground; \*, plants rarely met with.

##### DILLENIACEÆ—

- s* *Hibbertia densiflora*, F. v. M.  
(*H. sericea*, Benth.)
- s* ,, *stricta*, R. Br.
- s* ,, *acicularis*, F. v. M.
- s* ,, *fasciculata*, R. Br.

##### RANUNCULACEÆ—

- l* *Clematis microphylla*, D.C.
- a* *Ranunculus rivularis*, B. & S.
- s* ,, *lappaceus*, Sm.

##### LAURACEÆ—

- s* *Cassytha glabella*, R. Br.
- s* ,, *pubescens*, R. Br.
- s l* ,, *melantha*, R. Br.

##### CRUCIFERÆ—

- l* *Stenopetalum lineare*, R. Br.
- s* *Lepidium ruderales*, L.

- h* *Cakile maritima*, Scop.

##### VIOLACEÆ—

- s* *Viola hederacea*, Labill.
- s* ,, ,, var. *Sieberiana*

##### PITTOSPOREÆ—

- l* *Bursaria spinosa*, Cav.
- l* *Billardiera scandens*, Sm.

##### DROSERACEÆ—

- s* *Drosera glanduligera*, Lehm.
- s* ,, *pygmæa*, D. C.
- s* ,, *spathulata*, Labill.
- a* ,, *binata*, Labill.
- s* ,, *Whittakeri*, Planch.
- s* ,, *auriculata*, Back.
- s* ,, *peltata*, Sm.
- s* ,, *Menziesii*, R. Br.

## HYPERICINEÆ—

s *Hypericum japonicum*, Thunb.

## POLYGALEÆ—

s *Comesperma volubile*, Labill.

s „ *ericinum*, D. C.

s „ *calymega*, Lab.

## TREMANDREÆ—

s *Tetradlea ciliata*, Lindl.

## RUTACEÆ—

\*s *Boronia parviflora*, Sm.

\*l *Correa alba*, Andr.

s „ *speciosa*, Andr.

## LINACEÆ—

s *Linum marginale*, Cunn.

## GERANIACEÆ—

l *Geranium Carolinianum*, L.  
(*G. dissectum*, L.)

s *Erodium cygnorum*, Nees.

s *Pelargonium australe*, Willd.

s l *Oxalis corniculata*, L.

## STERCULIACEÆ—

\*l *Lasiopetalum Baueri*, Steetz.

## EUPHORBIACEÆ—

s\* l *Poranthera ericoides*, Klotzsch.

s l „ *microphylla*, Brong.

s *Ricinocarpus pinifolius*, Desf.

s *Amperea spartioides*, Brong.

## URTICACEÆ—

l *Parietaria debilis*, G. Forst.

## CASUARINEÆ—

s l *Casuarina quadrivalvis*, Lab.  
(*C. stricta*, Ait.)

s „ *suberosa*, O. & D.

s „ *distyla*, Vent.

## STACKHOUSIÆ—

s *Stackhousia linarifolia*, Cunn.  
(*monogyna*, Lab.)

\*h „ *spathulata*, Sieb.

## FRANKENIACEÆ—

h *Frankenia lævis*, L. (*F. pauciflora*, D. C.)

## PORTULACAEÆ—

h *Portulaca oleracea*, L.

l s *Claytonia calyptrata*, F. v. M.  
(*Calandrinia calyptrata*, Hook.)

a „ *australasica*, Hook. f.

## CARYOPHYLLEÆ—

l *Stellaria pungens*, Brong.

l *Spergularia rubra*, Presl.

l *Polycarpon tetraphyllum*, Loef.

## AMARANTACEÆ—

a *Alternanthera triandra*, Lam.  
(*A. nodiflora*, R. Br.)

h *Polycnemum (Hemichroa) pentandrum*, F. v. M.

## SALSOLACEÆ—

h *Atriplex crystallinum*, Hook. f.

h „ *cinereum*, Poiret.

l *Rhagodia Billardieri*, R. Br.

h „ *hastata*, R. Br.

l „ *nutans*, R. Br.

h l *Chenopodium album*, L.

l „ *murale*, L.

h l „ *glaucum*, L.

l *Enchylæna tomentosa*, R. Br.

h *Salicornia australis*, Sol.

h s „ *arbuscula*, R. Br.

h *Suaeda maritima*, Dumort.

h *Salsola kali*, L.

## FICOIDEÆ—

l *Mesembryanthemum æquilaterale*, Haworth, and var. *album*

l h *Mesembryanthemum australe*, Sol.

h *Tetragona expansa*, Murray.

l „ *implexicoma*, Hook. f.

## POLYGONACEÆ—

a *Polygonum minus*, Hudson.

l *Muehlenbeckia adpressa*, Meissn.

## THYMELEÆ—

s *Pimelea glauca*, R. Br.

s „ *humilis*, R. Br.

s „ *octophylla*, R. Br.

s „ *phylicoides*, Meiss.

## LEGUMINOSÆ—

\* *Oxylobium ellipticum*, R. Br.

s *Gompholobium Huegelii*, Benth.

s *Sphærolobium vimineum*, Sm.

a *Viminaria denudata*, Sm.

s *Daviesia ulicina*, Sm.

s *Aotus villosa*, Sm.

s *Pultenæa paleacea*, Willd.

s „ *dentata*, Lab.

\*s „ *tenuifolia*, R. Br.

s *Dillwynia ericifolia*, Sm.

s „ *floribunda*, Sm.

s „ *cinerascens*, R. Br.

s *Platylobium obtusangulum*, H.

s *Bossia cinerea*, R. Br.

s „ *prostrata*, R. Br.

s *Hovea heterophylla*, Cunn.

s *Indigofera australis*, Willd.

s *Kennedyia prostrata*, R. Br.

s „ *monophylla*, Vent.  
(*Hardenbergia monophylla*, Benth.)

s *Acacia juniperina*, Willd.

s „ *armata*, R. Br.

s „ *acinacea*, Lindl.

\*s „ *retinodes*, Schlecht.

s „ *suaveolens*, Willd.

s „ *melanoxylon*, R. Br.

s „ *oxycedrus*, Sieb.

s „ *verticillata*, Willd.

s l „ *longifolia*, Willd., var. *sophoræ*

- l* *Acacia decurrens*, Willd  
*sl* „ *mollissima*, Willd.  
 ROSACEÆ—  
*s* *Rubus parvifolius*, L.  
*sl* *Acæna ovina*, Cunn.  
*sl* „ *sanguisorbæ*, Vahl.  
 CRASSULACEÆ—  
*l* *Tillæa macrantha*, Hook. f.  
 \* „ *purpurata*, Hook.  
 ONAGREÆ—  
*a* *Epilobium tetragonum*, L. (E. *glabellum*, Forst.)  
 SALICARIÆ—  
*s a* *Lythrum hyssopifolia*, L.  
 HALORAGEÆ—  
*s* *Haloragis micrantha*, R. Br.  
*s* „ *tetragyna*, R. Br.  
*a* *Myriophyllum variifolium*, H.  
 CALLITRICHINÆ—  
*a* *Callitriche verna*, L.  
 MYRTACEÆ—  
*l* *Leptospermum lævigatum*, F. v. M.  
*s* „ *scoparium*, R. and G. Forster.  
*s* „ *myrsinoides*, Sch.  
 \**s* *Kunzea peduncularis*, F. v. M.  
*sa* *Melaleuca squarrosa*, Donn.  
*sa* „ *ericifolia*, Sm.  
*sl* *Eucalyptus pauciflora*, Sieber (coriacea, A. Cunn.)  
*sl* „ *amygdalina*, Lab.  
*sl* „ *viminalis*, Lab.  
*sl* „ *Gunnii*, var. *acer-vula*, Hook.  
 UMBELLIFERÆ—  
*sl* *Hydrocotyle vulgaris*, L.  
*s* „ *laxiflora*, D. C.  
*ls* „ *callicarpa*, Bunge.  
*s* *Didiscus pilosus*, Benth. (*Trachymene australis*, Benth.)  
*s* *Trachymene heterophylla*, F. v. M. (*Siebera heterophylla*, Benth.)  
*s* *Xanthosia pusilla*, Bunge.  
*a* *Eryngium vesiculosum*, Lab.  
*h* *Apium prostratum*, Lab. (A. *australe*, Thou.)  
*l* *Daucus brachiatus*, Sieb.  
 SANTALACEÆ—  
*sl* *Exocarpus cupressiformis*, Lab.  
*sl* „ *stricta*, R. Br.  
 LORANTHACEÆ—  
*sl* *Loranthus celastroides*, Sieb.  
*l* „ *pendulus*, Sieber  
 PROTEACEÆ—  
*s* *Isopogon ceratophyllus*, R. Br.  
*s* *Persoonia juniperina*, Lab.  
*s* *Hakea nodosa*, R. Br.  
*s* „ *ulicina*, R. Br.  
*s* *Banksia marginata*, Cav.  
*sl* „ *integrifolia*, L.  
 RUBIACEÆ—  
*s* *Opercularia varia*, Hook. f.  
 \**s* „ *ovata*, Hook. f.  
*ls* *Asperula oligantha*, F. v. M.  
 COMPOSITÆ—  
*ls* *Lagenophora Billardieri*, Cass.  
*ls* *Brachycome diversifolia*, Fisch.  
*sl* „ *graminea*, F. v. M.  
*s* „ *decipiens*, Hook. f.  
*a* „ *cardiocarpa*, F. v. M.  
*l* *Aster axillaris*, F. v. M. (*Olearia axillaris*, F. v. M.)  
*sl* „ *ramulosus*, Lab. (*Olearia ramulosa*, Benth.)  
*s* *Vittadinia australis*, A. Rich.  
*ls* *Stuartina Muelleri*, Sond.  
*ls* *Gnaphalium luteo-album*, L.  
*ls* „ *japonicum*, Thunb.  
 \* „ *indutum*, Hook. f.  
*s* *Podolepis acuminata*, R. Br.  
*s* *Leptorrhynchos squamatus*, Less.  
*s* „ [*tenuifolius*, F. v. M.]  
*s* *Helipterum dimorpholepis*, Benth.  
*s* *Helichrysum scorpioides*, Lab.  
*s* „ *lucidum*, Henck. (H. *bracteatum*, Willd.)  
*s* „ *apiculatum*, D. C.  
*s* „ *semipapposum*, D. C.  
*l* „ *cinereum*, F. v. M.  
*l* *Cassinia aculeata*, R. Br.  
*sl* *Rutidosis Pumilo*, Benth.  
*l* *Millotia tenuifolia*, Cass.  
 \* *Angianthus Preissianus*, Benth. (A. *eriocephalus*, Benth.)  
*h* *Calocephalus Brownii*, F. v. M.  
*s* *Craspedia Richea*, Cass.  
 \* *Cotula filifolia*, Thunb.  
*la* „ *coronopifolia*, L.  
*l* „ *australis*, Hook. f.  
*l* „ *reptans*, Benth.  
*a* *Centipeda Cunninghamsii*, F. v. M.  
*l* *Senecio lautus*, Soland.  
*s* *Erechtites arguta*, D. C.  
*s* „ *quadridentata*, D. C.  
*s* *Cymbonotus Lawsonianus*, Gaud.  
*s* *Microseris Forsteri*, Hook. f.  
 CAMPANULACEÆ—  
*sl* *Lobelia anceps*, Thunb.

- s* *Lobelia pratioides*, Benth.  
*a* *Isotoma fluviatilis*, F. v. M.  
*s* *Wahlenbergia gracilis*, D. C.
- CANDOLLEACEÆ—
- s* *Candollea serrulata*, Lab. (*Stylidium graminifolium*, Swartz)  
*a* „ *perpusilla*, F. v. M. (*Stylidium perpusillum*, Hook. f.)  
*ls* *Leeuwenhoekia dubia*, Sonder.  
*ls* „ *Sonderi*, F. v. M.
- GOODENIACEÆ—
- s* *Brunonia australis*, Sm.  
*a* *Selliera radicans*, Cav.  
*l* *Goodenia ovata*, Sm.  
*s* „ *geniculata*, R. Br.  
*\*s* „ *elongata*, Lab.  
*s* „ *pinnatifida*, Sch.  
*s* „ *humilis*, R. Br.
- GENTIANEÆ—
- a* *Limnanthemum exaltatum*, F. v. M. (*Villarsia reniformis*, R. Br.)  
*\*s* *Sebæa albidiflora*, F. v. M.  
*\*s* „ *ovata*, R. Br.  
*s* *Erythræa australis*, R. Br.
- LOGANIACEÆ—
- ls* *Mitrasacme paradoxa*, R. Br.
- PLANTAGINEÆ—
- s* *Plantago varia*, R. Br.
- PRIMULACEÆ—
- ah* *Samolus repens*, Pers.
- APOCYNÆÆ—
- l* *Alyxia buxifolia*, R. Br.
- CONVOLVULACEÆ—
- s* *Convolvulus erubescens*, Sims.  
*sl* *Dichondra repens*, R. and G. Forster.  
*ah* *Wilsonia rotundifolia*, Hook.  
*a* „ *Backhousii*, Hook.
- SOLANACEÆ—
- sl* *Solanum nigrum*, L.  
*sl* „ *aviculare*, Forst.
- SCROPHULARINEÆ—
- \*a* *Mimulus repens*, R. Br.  
*\*a* *Mazus pumilio*, R. Br.  
*a* *Gratiola Peruviana*, L.  
*s* *Veronica gracilis*, R. Br.  
*s* *Euphrasia Brownii*, F. v. M. (*collina*, R. Br.)
- LENTIBULARINEÆ—
- \*a* *Utricularia lateriflora*, R. Br.  
*a* „ *dichotoma*, Lab.  
*a* *Polypompholyx tenella*, Lehm.
- LABIATÆ—
- s* *Brunella vulgaris*, L. (*Prunella vulgaris*, D. C.)  
*s* *Ajuga australis*, R. Br.
- MYOPORINEÆ—
- l* *Myoporum insulare*, R. Br. (*M. serratum*, R. Br.)  
*l* „ *viscosum*, R. Br. (*M. serratum*, var. *glandulosum*, Benth.)  
*\*a* „ *humile*, R. Br. (*M. parvifolium*, R. Br.)
- ASPERIFOLIÆ—
- sl* *Cynoglossum suaveolens*, R. Br.  
*sl* *Myosotis australis*, R. Br.
- EPACRIDEÆ—
- sl* *Styphelia humifusa*, Pers. (*Astroloma humifusum*, R. Br.)  
*l* „ *Richei*, Lab. (*Leucopogon Richei*, R. Br.)  
*l* „ *australis*, F. v. M. (*Leucopogon australis*, R. Br.)  
*s* „ *virgata*, Lab. (*Leucopogon virgatus*, R. Br.)  
*ls* „ *serrulata*, Lab. (*Acrotriche serrulata*, R. Br.)  
*s* „ *scoparia*, Sm. (*Monotoca scoparia*, R. Br.)  
*\*s* *Brachyloma ciliatum*, Benth.  
*s* *Epacris impressa*, Lab.  
*as* „ *obtusifolia*, Sm.  
*as* *Sprengelia incarnata*, Sm.
- ORCHIDEÆ—
- l* *Dipodium punctatum*, R. Br.  
*\*s* *Spiranthes australis*, Lindl.  
*\*s* *Thelymitra ixioides*, Swartz  
*\*s* „ *aristata*, Lindl.  
*\*s* „ *epipactoides*, F. v. M.  
*s* „ *longifolia*, R. and G. Forster.  
*l* „ *carnea*, R. Br.  
*s* „ *flexuosa*, Endl.  
*s* „ *antennifera*, Hook. f.  
*s* *Diuris maculata*, Sm.  
*s* „ *pedunculata*, R. Br.  
*s* „ *sulphurea*, R. Br.  
*s* „ *longifolia*, R. Br.  
*s\** *Orthoceras strictum*, R. Br.  
*s* *Cryptostylis longifolia*, R. Br.  
*s* *Prasophyllum elatum*, R. Br.  
*s* „ *patens*, R. Br.  
*s* „ *fuscum*, R. Br.  
*\*s* „ *nigricans*, R. Br.  
*\*s* „ *Archeri*, Hook. f.  
*\*s* „ *intricatum*, C. Stuart