Victorian Year-Book, 1927-28.

INTRODUCTION.

GEOGRAPHICAL POSITION, AREA, AND CLIMATE.

Area of Victoria.

Victoria is situated at the south-eastern extremity of the Australian continent, of which it occupies about a thirty-fourth part, and it contains about 87,884 square miles, or 56,245,760 acres. It is bounded on the north and north-east by New South Wales, from which it is separated by the River Murray, and by a straight line running in a south-easterly direction from a place near the head-waters of that stream, called The Springs, on Forest Hill, to Cape Howe. On the west it is bounded by South Australia, the dividing line being about 242 geographical miles in length, approximating to the position of the 141st meridian of east longitude, and extending from the River Murray to the sea. On the south and south-east its shores are washed by the Southern Ocean, Bass Strait, and the Pacific Ocean. It lies between the 34th and 39th parallels of south latitude and the 141st and 150th meridians of east longitude. Its extreme length from east to west is about 420, its greatest breadth about 250, and its extent of coast-line nearly 600 geographical miles. Great Britain, exclusive of the islands in the British Seas, contains 88,756 square miles, and is therefore slightly larger than Victoria.

The southernmost point in Victoria, and in the whole of the Australian continent, is Wilson's Promontory, which lies in latitude 39 deg. 8 min. S., longitude 146 deg. 26 min. E.; the northernmost point is the place where the western boundary of the State meets the Murray, latitude 34 deg. 2 min. S., longitude 140 deg. 58 min. E.; the point furthest east is Cape Howe, situated in latitude 37 deg. 31 min. S., longitude 149 deg. 59 min. E.; the most westerly point is the line of the whole western frontier, which, according to the latest correction, lies upon the meridian 140 deg. 58 min. E., and extends from latitude 34 deg. 2 min. S. to latitude 38 deg. 4 min. S., a distance of 242 geographical miles.

Climate.

From its geographical position, Victoria enjoys a climate more suitable to the European constitution than any other State upon the Continent of Australia. In the seventy-two years ended with 1927 the maximum temperature in the shade recorded at the Melbourne Observatory and the Weather Bureau was 111·2 deg. Fahr.,

on the 14th January, 1862; the minimum was 27 deg., on the 21st July, 1869; and the mean was 58·4 deg. Upon the average, on only four days during the year does the thermometer rise above 100 deg. in the shade, and on 19·4 days the temperature reaches 90 deg. or over; generally, on about two nights during the year it falls below freezing point. Sultry nights are of rare occurrence. It is only occasionally that a high minimum is recorded. The minimum reading approximates to 70 deg. on an average on only two nights in any one year. The maximum temperature in the sun ever recorded (i.e., since 1859) was 178·5 deg., on the 14th January, 1862. The mean atmospheric pressure noted, first at the Observatory 91 feet above the sea level, and later at the Weather Bureau 115 feet above sea level, was, during the seventy years ended with 1927, 30·012 inches; the average number of days on which rain fell each year was 138, and the average yearly rainfall was 25·47 inches. The mean relative humidity of the atmosphere is 68 per cent.; on very warm days it is often 12 per cent., and it has been as low as 2 per cent. The severity of the heat is not felt so much as it would be if there were a relatively high wet bulb, as the temperature by such bulb seldom exceeds 75 deg. The average number of hours of sunshine daily is 5·3, and fogs occur, on an average, on only 19 days in the year.

MOUNTAINS AND HILLS, RIVERS AND LAKES.

Mountains and Hills.

The highest mountain in Victoria is Mount Bogong,* situated in the county of the same name, 6,509 feet above the sea-level; the next highest peaks are—Mount Feathertop, 6,306 feet; Mount Nelson, 6,170 feet; Mount Fainter, 6,160 feet; Mount Hotham, 6,100 feet; Mount McKay, 6,030 feet; and Mount Cope, 6,027 feet; all situated in the same county; also the Cobboras, 6,030 feet, situated between the counties of Benambra and Tambo. These, so far as is known, are the only peaks which exceed 6,000 feet in height; but, according to a list which appears in the *Year-Book* for 1915-16, there are 39 peaks between 5,000 and 6,000 feet high, and 40 between 4,000 and 5,000 feet high; it is known, moreover, that there are many peaks rising to upwards of 4,000 feet above the level of the sea whose actual heights have not yet been determined.

Rivers.

With the exception of the Yarra, on the banks of which the metropolis is situated; the Murray; the Goulburn, which empties itself into the Murray about eight miles to the eastward of Echuca; and the La Trobe and the Mitchell, with, perhaps, a few other of the Gippsland streams, the rivers of Victoria are not

* The highest mountain on the Australian Continent is Mount Kosciusko, in New South Wales, one peak of which is 7,328 feet high.

navigable except by boats. They, however, drain the watershed o large areas of country, and many of the streams are used as feeders to permanent reservoirs for irrigation and water supply purposes. The Murray, which forms the northern boundary of the State, is the largest river in Australia. Its total length is 1,520 miles, for 1,200 of which it flows along the Victorian border. Several of the rivers in the north-western portion of the State have no outlet, but are gradually lost in the absorbent tertiary flat country through which they pass.

Lakes. Victoria contains numerous salt and fresh-water lakes and lagoons; but many of these are nothing more than swamps during dry seasons. Some of them are craters of extinct volcanoes. Lake Corangamite, the largest inland lake in Victoria, covers 90 square miles, and is quite salt, notwithstanding that it receives the flood waters of several fresh-water streams. It has no visible outlet. Lake Colac, only a few miles distant from Lake Corangamite, is a beautiful sheet of water, 10½ square miles in extent, and quite fresh. Lake Burrumbeet is also a fine sheet of fresh water, embracing 8 square miles. The Gippsland lakes—Victoria, King, and Reeve—are situated close to the coast, and are separated from the sea by only a narrow belt of sand. Lake Wellington, the largest of the Gippsland lakes, lies to the westward of Lakes Victoria and King, and is united to the first-named by a narrow channel. South-east of Geelong is Lake Connewarre, which is connected with the sea at Point Flinders.

A list of mountains and hills, rivers and lakes in Victoria appears in the *Victorian Year-Book* for 1915–16. This was revised by the late Surveyor-General, Mr. A. B. Lang, and contains information in regard to heights, lengths, and areas respectively.

FLORA OF VICTORIA.

By J. W. Audas, F.L.S., F.R.M.S. (National Herbarium, Melbourne).

DISTRIBUTION.

The flora of the State of Victoria is composed of five main divisions or districts, each having distinctive features. The North-west—a dry area with moderate rainfall, including the Mallee, and its halophytic and xerophytic characters linking up the flora with that of the Central Australian desert flora. The South-west, comprising a good deal of country with surface soil area west of Cape Otway. The South, comprising the coastal area of Port Phillip and adjacent plains, and extending from the vicinity of Cape Otway to the western boundary of Gippsland. The East, with types of vegetation intrusive along the Pacific sea-board. The North-east to the Upper Murray, including the Alpine regions which link it in some measure with Tasmania and Antarctica in the character of the flora.

CLASSIFICATION.

In the State of Victoria there are 609 genera and 2,113 species of endogenous and exogenous plants systematically arranged under the natural orders as adopted from Engler's Pflanzenfamilien.

	Genera.	Species.
PTERIDOPHYTA—		
Filicales—		
Hymenophyllaceae	2	7
Cyatheaceae ..	3	4
Polypodiaceae ..	23	52
Gleicheniaceae ..	1	4
Schizaeaceae ..	1	2
Osmundaceae ..	1	1
Salviniaceae ..	1	2
Marsiliceae ..	2	3
Ophioglossaceae ..	2	3
Lycopodiales—		
Lycopodiaceae ..	2	7
Psilotaceae ..	2	2
Selaginellaceae ..	1	2
Isoetaceae ..	1	1
SPERMATOPHYTA—		
Gymnospermae—		
Coniferae—		
Taxaceae ..	1	1
Pinaceae ..	1	6
Angiospermae—		
Monocotyledonae—		
Typhaceae ..	1	1
Sparganiaceae	1	2
Potamogetonaceae ..	6	16
Naiadaceae ..	1	1
Scheuchzeriaceae	1	7
Alismataceae ..	2	2
Hydrocharitaceae ..	4	4
Gramineae ..	51	129
Cyperaceae ..	20	112
Palmaceae ..	1	1
Lemnaceae ..	3	5
Restionaceae ..	5	13
Centrolepidaceae	3	9
Xyridaceae ..	1	2
Eriocaulaceae ..	1	2
Philydraceae ..	1	1
Juncaceae ..	2	18
Liliaceae ..	26	47
Amaryllidaceae	3	6
Iridaceae ..	4	8
Orchidaceae ..	24	145
SPERMATOPHYTA—*continued.*		
Dicotyledonae—		
Archichlamydeae (Polypetalae and Incompletae)		
Casuarinaceae ..	1	8
Fagaceae ..	1	1
Urticaceae ..	3	3
Proteaceae ..	10	55
Polygonaceae ..	4	16
Olacaceae ..	1	1
Loranthaceae ..	2	10
Santalaceae ..	6	14
Chenopodiaceae ..	14	63
Amarantaceae ..	3	9
Nyctaginaceae ..	1	1
Phytolaccaceae ..	2	2
Aizoaceae (Ficoideae) ..	3	7
Portulacaceae ..	4	9
Caryophyllaceae	9	18
Nymphaeaceae ..	1	1
Ceratophyllaceae	1	1
Ranunculaceae ..	4	14
Menispermaceae	2	2
Winteraceae ..	1	1
Anonaceae ..	1	1
Monimiaceae ..	2	2
Lauraceae ..	1	5
Papaveraceae ..	1	1
Cruciferae ..	17	32
Droseraceae ..	1	9
Crassulaceae ..	1	7
Saxifragaceae ..	1	2
Pittosporaceae ..	5	11
Cunoniaceae ..	1	1
Rosaceae ..	5	8
Leguminosae ..	30	202
Geraniaceae ..	3	6
Oxalidaceae ..	1	2
Linaceae ..	1	1
Zygophyllaceae ..	3	10
Rutaceae ..	11	47
Tremandraceae ..	1	4
Polygalaceae ..	2	8
Euphorbiaceae ..	10	27
Callitrichaceae ..	1	2

—	Genera.	Species.
SPERMATOPHYTA — *continued.*		
Dicotyledonae—continued.		
Celastraceae ..	1	1
Stackhousiaceae	1	5
Sapindaceae ..	3	13
Rhamnaceae ..	5	26
Vitaceae ..	1	1
Elaeocarpaceae ..	1	2
Malvaceae ..	6	11
Sterculiaceae ..	5	11
Dilleniaceae ..	1	13
Eucryphiaceae ..	1	1
Guttiferae ..	1	2
Elatinaceae ..	2	2
Frankeniaceae ..	1	5
Violaceae ..	3	8
Passifloraceae ..	1	1
Thymeleaceae ..	1	22
Lythraceae ..	2	3
Myrtaceae ..	15	140
Oenotheraceae ..	2	5
Halorrhagidaceae	3	22
Araliaceae ..	2	2
Umbelliferae ..	16	36
Metachlamydeae (*Sympetalae*)—		
Ericaceae ..	2	2
Epacridaceae ..	15	52
Myrsinaceae ..	1	1
Primulaceae ..	3	4
SPERMATOPHYTA—*continued.*		
Metachlamydeae (*Sympetalae*)—cont.		
Plumbaginaceae	1	1
Oleaceae ..	2	3
Loganiaceae ..	2	11
Gentianaceae ..	5	7
Apocynaceae ..	2	2
Asclepiadaceae ..	3	4
Convolvulaceae ..	6	11
Borraginaceae ..	7	12
Verbenaceae ..	3	3
Labiatae ..	10	34
Solanaceae ..	4	13
Scrophulariaceae	8	25
Bignoniaceae ..	1	1
Orobanchaceae ..	1	1
Gesneriaceae ..	1	1
Lentibulariaceae	2	4
Myoporaceae ..	3	18
Plantaginaceae ..	1	2
Rubiaceae ..	7	24
Caprifoliaceae ..	1	2
Cucurbitaceae ..	2	2
Campanulaceae ..	4	13
Goodeniaceae ..	5	34
Brunoniaceae ..	1	1
Stylidiaceae ..	2	7
Compositae ..	52	234
Total ..	609	2,113

The Pteridophyta, or Fern, family contains 37 genera, and 57 species indigenous to Victoria. They are flowerless plants, and the fructification consists of spore-cases, usually small and collected in clusters called sori, which are either naked, or covered with an indusium. The manner in which the sori are placed on the fronds, and the presence or absence of an indusium, afford characteristics whereby the species can be classified. Ferns which are abundantly dispersed throughout the world, diminishing, however, in numbers in dry or cold countries, are amongst the most elegant and graceful of plants, delighting the eye by their external appearance, and afford by their minute structure endless material for anatomical investigation. The Victorian ferns, scattered as they are abundantly on the mountain ranges, in the deep gullies, or in the damp shady scrubs, comprise upwards of 75 species, including the following tree ferns, such as *Todea barbara* (King Fern), *Alsophila australis* (Rough Tree Fern), *Cyathea Cunninghamii* (Slender Tree Fern), *Cyathea medullaris* (Black Tree Fern), and *Dicksonia antarctica* (Soft Tree Fern).

Family Lycopodiales.

Lycopodiales, or "Club Mosses," are usually moss-like plants, with creeping stems and imbricated leaves. They are intermediate, as it were, between ferns and conifers on the one hand and ferns and mosses on the other.

SPERMATOPHYTA.

Gymnospermae.

Coniferae.

Family Taxaceae.—*Podocarpus alpina*—"Mountain Plum Pine"—a straggling alpine species occurring on our Victorian Alps.

Family Pinaceae.—Of the genus Callitris five species are indigenous to Victoria.—*C. cupressiformis*, *C. gracilis*, *C. calcarata*, *C. robusta*, *C. verrucosa* and *C. propinqua*. Some of the species grow to a considerable size, and the timber is of excellent quality.

ANGIOSPERMAE.

Monocotyledonae.

The families Typhaceae, Sparganiaceae, Potagometonaceae, Naiadaceae, Scheucharitaceae, Alismataceae, and Hydrocharitaceae, are aquatic plants, many of them are abundant in rivers, lagoons, and ponds.

Family Gramineae.—The Gramineae, or grasses, is a very important family; about 128 species are indigenous to Victoria. As forage plants the grasses perform a most useful part in the economy of nature, whilst many of them afford food and clothing to man, as well as material for many industrial purposes. With the exception of *Lolium temulentum* or "Darnel Grass," which is not indigenous to Victoria, no species of grass is known to possess deleterious properties, and many are much improved by cultivation. Amongst the most valuable and nutritious grasses in this State are the following:—Five species of Andropogon, all of which are splendid forage grasses; fourteen species of Panicum, including the famous "Umbrella Grass," which is highly prized for its fattening properties. *Themeda triandra*, "Kangaroo Grass," and *T. anenacea*, "Oat Kangaroo Grass"—both excellent fodder grasses. *Danthonia penicillata*, "Wallaby Grass," a valuable pasture grass, and *Festuca duriuscula*, one of the widely dispersed forms of the "Sheep's Fescue Grass."

Family Cyperaceae.—The Cyperaceae, or Sedges, as a family is closely allied to the Gramineae, but differs in having a solid stem, frequently angular, and being destitute for the most part of the nutritive qualities of which grasses are remarkable. The species are generally found in marshes, ditches, running streams, barren heaths, or on the sea shore. Some of the sedges have edible roots or tubers, and others are useful for industrial purposes, such as manufacture of paper, mats, ropes, baskets, chair-bottoms, &c.

Family Palmaceae.—The only representative of the Palm family occurring in this State is *Livistona australis*, "Austral Cabbage Tree Palm." It is found in East Gippsland.

Family Restionaceae.—The species of this family resemble those of the Cyperaceae Centrolepidaceae, and Juncaceae, but they can be readily distinguished from these families by the pendulous ovules and seeds.

Family Liliaceae.—The family Liliaceae as now classified, include the rush-like Lomandra, and the Xanthorrhoea, or "Grass-tree," and they number in Victoria 47 species. Some of them extend to New Zealand, and the Pacific Islands. Lomandra, formerly connected with Juncaceae, has dioecious flowers and harsh tufted or radical leaves. The following species are found from the coast to the interior:—*L. longifolia, L. multiflora, L. sororia, L. effusa, L. micrantha, L. filiformis, L. glauca, L. juncea and L. leucocephala.* The grass-trees, some small and others assuming an arborescent size, and forming a peculiar feature to the Victorian vegetation, are limited to Australia. Those occurring in Victoria are *Xanthorrhoea minor* "Small Grass Tree," *X. hastalis* "Spear Grass Tree," and *X. australis* "Austral Grass Tree."

Family Amaryllidaceae.—This family is more abundant in Western than Eastern Australia. *Hypoxis glabella* "Yellow Star" and *H. hygrometrica* "Golden Weather Glass" are small herbs with yellow flowers. *Crinum flaccidum* "Darling Lily" is a plant with white flowers in umbels, scape two feet high, and elongated leaves. *Calostemma purpureum* "Garland Lily" is a bulbous plant with linear leaves, flowers white, pink or purple, in umbels and a corona reaching to about half the length of the segments.

Family Iridaceae.—In the Iris family the following plants occur in this State, e.g., *Diplarrhena Moraea* "Butterfly Flag" with large white flowers sometimes tinged with violet and yellow. *Patersonia glauca, P. sericea, P. glabrata and P. longiscapa* with blue or purple flowers. *Libertia paniculata* and *L. pulchella* with white flowers clustered in the axils of sheathing bracts and leaves almost radical.

Family Orchidaceae.—Orchids are amongst the most admired of monocotyledonus plants. The peculiarity of their structure in the consolidation of stamens and pistil into one mass, the unusual figure of their flowers, sometimes resembling an insect or reptile, and the general distribution of species— occurring as they do in all parts of the world excepting the coldest regions—all these circumstances combine to make the family a favorite one amongst observers and floriculturists. There are about 130 species of orchids indigenous to Victoria. Caladenia contain many pretty little plants of different colours, varying considerably in size, the rows of glands on the labellum, a solitary linear leaf, and in some species with long sepals which have gained for the flowers the name of "Spider Orchids," Pterostylis, or "Green Hoods," have green helmet-shaped flowers, leaves either cauline or radical, and for the most part a winged column. Praophyllum, or "Leek Orchids," may be reckoned among the tallest of our native orchids. Thelymitra, or

"Sun Orchids," contain some showy and interesting plants, and their flowers vary from blue to purple or red. Diuris, which is characterized by its narrow lateral sepals, is similar to Thelymitra in habit, but has white, yellow, or purplish flowers. Calochilus, or "Bearded Orchids," are remarkable for their densely-fringed labellum.

Dicotyledonae.

Archichlamydeae.

Family Casuarinaceae.—Casuarinaceae, or Sheoaks, have eight species occurring in the State. The branchlets of the shrubby kinds have a sub-acid flavour, and are relished by cattle.

Family Fagaceae.—This family in Victoria is limited to a single species, viz.—*Nothofagus Cunninghamii*, or "Myrtle Beech"—an elegant tree, rising sometimes to a height of 150 feet, with a trunk of 50 feet to the branches. It is a valuable timber and used by carpenters and artisans.

Family Proteaceae.—This large and interesting family, which numbers 10 genera and 54 species in this State, is a very characteristic one; for, although with two exceptions the genera are found to extend on the one hand to New Caledonia, the Indian Archipelago and tropical Asia, and on the other to South America, yet they are principally found in Australia, and form in parts a peculiar feature to the vegetation.

Family Loranthaceae.—Loranthaceae, or "Mistletoe," family may be regarded as parasitical (though in Australia there are two exceptions). Some of these plants have rather showy flowers, and as they hang from the bush trees they have an interesting appearance amidst the diversity of foliage with which they are associated. Eight species of the genus Loranthus are native to Victoria.

Family Chenopodiaceae.—The Saltbush, or Goosefoot, family (Chenopodiaceae) is a very important one in this State, seeing that in dry seasons the species afford wholesome nourishment to sheep and cattle. Chenopodium has seven species native to Victoria, several of which are splendid forage for stock. Rhagodia, seven species, which are more or less available for pasture. Kochia consists of small shrubs, amongst which are reckoned the "Cotton bush" and famous "Bluebush." *Enchylaena tomentosa* and *Threlkeldia diffusa* are shrubs widely diffused. *Arthrocnemum arbusculum*, "Samphire" is common in marshy places near the sea-shore.

Families Amarantaceae—
Phytolaccaceae
Aizoaceae
Portulaccaceae
Caryophyllaceae
Ranuncluaceae
Papaveraceae
Cruciferae
Droseraceae
Crassulaceae
} The indigenous plants of these families in Victoria may be regarded as of no economic value.

Family Pittosporaceae.—This family is well known to gardeners as furnishing several species for shrubberies. The Pittosporums occurring in this State are *P. undulatum* (with sweet scented flowers) *P. bicolor* and *P. phillyraeoides*. The latter is a very graceful shrub with a drooping habit. Bursaria spinosa is a thorny shrub with a profusion of white flowers and purse-like capsules. *Marianthus procumbens* is a small heath-like shrub, with white flowers. *Billardiera scandens*, *B. longifolia* and *B. cymosa* are shrubs with a climbing habit, greenish yellow flowers, and edible berries. *Cheiranthera linearis* is an under-shrub with showy blue flowers.

Family Rosaceae.—Though a numerous family in the more temperate parts of the Northern Hemisphere, is very limited in this State, eight species only occurring here, and may be regarded as of no economic value.

Family Leguminosae.—The Leguminosae, the largest family in Australia, and having for the whole continent upwards of 1,340 species. This family is divided into three divisions :—(1) Papilionaceae (with pea flowers) ; (2) Caesalpinieae (with regular or irregular flowers and free stamens) ; and (3) Mimoseae (with small regular flowers sessile in spikes or heads. Few of the division (Papilionaceae) assume a tree-like appearance most of them being small shrubs.

(2) Caesalpinieae.—In this division (flowers usually with five petals, stamens ten or fewer and all free), the genus Cassia has seven species native to this State, viz.—*C. australis*, *C. phyllodinea*, *C. eremophila*, *C. artemisioides*, *C. Sturtii*, and *C. desolata*. The flowers of these are for the most part yellow or orange, the leaves pinnate with opposite leaflets, and the pods cylindrical or flat.

(3) Mimoseae.—The flowers of this division are small, regular, and sessile in spikes or heads ; and, in proportion to the number of species, the genera are few. A good idea may be obtained from the flowers of the Silver Wattle, *Acacia dealbata*.

Family Linaceae.—The Flax family (Linaceae) is represented by a solitary species, viz. :—*Linum marginale*, a plant common to all the Australian States. It has blue flowers, and the bast is of considerable strength, and well adapted for textile fabrics.

Family Rutaceae.—The Rutaceae contain some of our most esteemed flowers including Boronia and Eriostemon. Forty-five species occur in Victoria. *Boronia pinnata* is remarkable for having dimorphous stamens, *Eriostemon myoporiodides* for its very strong scent, and *E. obovalis* for having occasionally double flowers. Many of the Rutaceae are mere shrubs, remarkable rather for the beauty of their flowers than for their industrial or medicinal properties. A few, however, attain some size, and afford useful timber.

Family Tremandraceae.—The Tremandraceae is entirely peculiar to Australia. Four species of the genus Tetratheca occur in Victoria, viz. :—*T. ericifolia*, *T. ciliata*, *T. pilosa* and *T. subaphylla*. The species have purple flowers, four-celled anthers, and heath-like flowers.

Family Euphorbiaceae.—In the extensive family (Euphorbiaceae) the species vary from minute herbs to large trees, but they may generally be recognized by their unisexual flowers, milky juice, and tricoccous fruit. Twenty-seven species are indigenous to Victoria.

Family Celastraceae.—The Celastraceae, or Spindle-tree family is represented only in this State by *Gymnosporia australis*—a tall, woody climber.

Family Stackhousieae.—The Stackhousieae family may be regarded as almost exclusively Australian, for only two species of Stackhousia are known out of the Continent, viz. :—One in New Zealand, and the other in the Philippine Islands. The genus Stackhousia (with five species occurring in this State) consists of herbs with spikes of pentandrous flowers, and minute bracts at the base.

Family Sapindaceae.—The Sapindaceae, or Soapworts, are composed of a great variety of species differing widely from each other, some being climbing shrubs and others forest trees. The flowers are usually polygamous and small. The genus Dodonaea (with eleven Victorian species) consists principally of shrubs, with dioccious flowers and hop-like fruits. *Heterodendron oleifolium*—a shrub with simple leaves and racemes of small flowers without petals, occurs in the north-western parts of the State.

Family Rhamnaceae.—This family is characterized by flowers with a fleshy disc, and stamens opposite the petals. There are twelve species of Pomaderris native to this State, and some of these have flowers in dense corymbs or panicles, and in a shrubbery they are rather ornamental.

Family Malvaceae.—The Malvaceae or Mallow family, which may be distinguished from all other orders by its valvate calyx and monodelphous hypogynous stamens, is one largely distributed all over the world, and comprises among its species many medicinal plants, as well as some of the commonest weeds. There are eleven Victorian species and some are well worthy of cultivation.

Family Sterculiaceae.—The Sterculiaceae contains among its members the trees known as "Currajong," "Flame Tree," and "Bottle Tree." The flowers are generally small, without petals, the stamens usually united into a ring or tube, with five terminal teeth, and the leaves frequently covered with stellate hairs. There are ten species indigenous to this State.

Family Dilleniaceae.—The Dilleniaceae, or Guinea-flowers, are represented by thirteen species of Hibbertia indigenous to Victoria. These have yellow flowers, simple leaves, and a shrubby habit.

Family Violaceae.—The Violaceae, or Violet family has four species of Viola native to this State. They are similar to the cultivated violets, but deficient in scent. The genus Hybanthus has a singular appearance, arising from the large size of the lower petal. The flowers are blue or purple, and the leaves are either alternate or opposite. *Hymenanthera dentata* is a large shrub growing on the banks of rivers nd creeks.

Family Myrtaceae.—This is the most important family in the State, whether considered in reference to the value of its timber, or the medicinal and industrial properties of its species. Nearly all the trees of the forest belong to it, and also many beautiful shrubs. The family is well defined by its many-celled ovary, many-petalled, or, in some genera apetalous flowers, imbricated calyx, numerous stamens, and usually by opposite dotted leaves with a marginal vein. The flowers are red, white or yellow, and the family naturally divides itself into two sections, viz. :—that with capsular and that with baccate fruit. The most spectacular of the Myrtaceae are the various species of Callistemon; but the genera Melaleuca, Leptospermum, Calytrix, Baeckea, Thryptomene, and Eugenia present many beauties to the admirers of nature. Amongst the larger trees the Eugenia and Tristania might be mentioned as affording timber for various purposes; but the Eucalypts far surpass them in importance. Of the genus there are upwards of eighty well-defined species in Victoria, which under the common names of "Red Gum" "Blue Gum," "Silvertop" "White Mountain Ash," "Grey Box," "Bloodwood," &c., afford the principal timber for building material and cabinet-making, &c. Experiments have proved that the volatile oils contained in the leaves are highly valuable, and will yield charcoal, vinegar, tar, and non-condensible gases.

Family Araliaceae.—The Araliaceae family in Victoria consists of two genera and two species. *Astrotricha ledifolia* is a tall shrub, clothed more or less with stellate tomentum, and having large terminal panicles of small flowers articulate on the pedicel. *Tieghemopanax sambucifolius* is a tall shrub or tree often rising to the height of 50 feet without a branch, and throwing out pinnate leaves and large panicles of flowers from the top.

Family Umbelliferae.—The Umbelliferae family are either herbaceous or shrubby. There are fifteen genera and 36 species native to Victoria.

Metachlamydeae (*Sympetalae*).

Family Epacridaceae.—The species of Epacridaceae, which for the most part are limited to Australia, are amongst the most admired of native plants. The various species of Epacris are favorites with horticulturists, and the occasional double flowers of *E. impressa* and *E. microphylla* have rendered them objects of peculiar interest.

Family Myrsinaceae.—Of the Myrsinaceae *Rapanea variabilis* or "Mutton-Wood" is the only representative of this family in Victoria. It is a tree sometimes attaining 30 feet in height, and having globular purplish berries.

Family Apocynaceae.—This family is well characterized by its singular stigma, which is generally expanded at the base into a circular membrane or inverted cup, and is contracted somewhere near the

middle. To this stigma the anthers adhere firmly. *Alyxia buxifolia* or "Sea Box" is a glabrous shrub with leaves in whorls of three or four, and flowers in small heads or clusters. *Lyonsia straminea* or "Twining Silkpod" is a woody climber.

Family Asclepiadaceae.—In this family the species have the anthers and stigma consolidated into a column, and they are for the most part twining plants with a milky juice and follicular fruit. Three genera and five species are native to Victoria.

Family Convolvulaceae.—The family of Convolvulaceae, which may be briefly characterized by its pentandrous flowers, twining habit, and leafy doubled up cotyledons, differs considerably in the size and habit of the species, some having showy flowers and climbing amongst trees, and others being small prostrate herbs with inconspicuous flowers. There are six genera and eleven species native to this State.

Family Borraginaceae.—The great majority of this family are herbs, Halgania *cyanea* and *H. lavendulacea* have showy purple flowers, and the following may be reckoned amongst the native "Forget-me Nots," *Myosotis australis*, *M. suaveolens*, *Eritrichum australasicum*, *Lappula concava*, *Rochelia plurisepala*, *Cynoglossum latifolium*, *C. suaveolens*, and *C. australis*. Most of these plants are rough with coarse hairs, and the flowers are in one-sided spikes or racemes, often forked.

Family Labiatae.—The family of Labiatae, which for the most part consists of herbaceous plants, is well defined by a monopetalous bilabiate corolla, on which are inserted the stamens (usually four, but sometimes only two), by opposite leaves replete with volatile oil, and a four-lobed ovary, and with a solitary style rising from the base of the lobes. The species are generally distributed throughout the world, but, with the exception of the genus Prostanthera which is endemic to Australia, they are neither numerous or important in Victoria.

Family Verbenaceae.—This family differs from the Labiataes in the concrete carpels of the species, their terminal style, and the usual absence of volatile oil in the leaves, but some of them are difficult to distinguish, the two orders being closely allied.

Family Solanaceae.—The Solanaceae, or the Solanum family is common to the temperate and tropical parts of the world. Most of the species are pentandrous with alternate leaves; they are herbaceous or shrubby, and their fruit is either a two- or four-celled capsule, or a many-seeded berry.

Family Scrophulariaceae.—The plants of this family are distinguished by their irregular flowers, stamens usually two or four, and two-celled capsule. There are eight genera and 21 species native to Victoria.

Family Rubiaceae.—Rubiaceae is a family well characterized by epipetalous stamens, straight anthers bursting lengthways, and opposite leaves. Some of the species are worthy of cultivation for the beauty of their flowers, whilst others possess medicinal and industrial properties.

Family Campanulaceae.—This family is not numerous in Australia as in the Northern Hemisphere, but amongst the native species are some pretty plants worthy of cultivation. The flowers are mostly blue, equal or unequal in the lobes of the corolla and pentandrous.

Family Goodeniaceae.—The Goodeniaceae, which is nearly limited to Australia (a few species only inhabiting India, &c.) is characterized by the peculiarity of the stigma, which is seated at the bottom of a cup or covering called the indusium. The flowers are yellow, blue or purple.

Family Brunoniaceae.—The Brunoniaceae is peculiar to Australia and contains only one genus and one species, viz. :—*Brunonia australis* or "Blue Pincushion." It is common throughout the State.

Family Stylidiaceae.—This family is a very singular one, the structure of the column into which the stamens and style are blended being different from anything in the vegetable kingdom, except the orchids. The column is very irritable, and in dry weather springs up when touched.

Family Compositae.—The Compositae is one of the most natural and widely distributed families in the vegetable kingdom. It is distinguished from all others by an inferior ovary, with a single ovule, filiform style usually divided at the top, syngenesious stamens and capitate flowers. The species, of which upwards of 10,000 known are found in every part of the world, and of these 230 occur in Victoria. All plants of what are called the daisy and everlasting kind belong to this family, and although many of them are insignificant herbs or weeds, yet from a scientific point of view they throw much light on the character of the soil where they abound and demonstrate their peculiar adaptation to seasons of aridity.

General Remarks on the Flora.

In several previous articles by Messrs. G. Weindorfer, C. A. Topp, M.A., Professor A. J. Ewart, D.Sc. and myself, the Flora of Victoria has been dealt with very fully in regard to its general features as determined by geological and climatic influences, the different zones or areas of vegetation, the distribution of families therein, the character of the plants, and the outstanding features and peculiarities of structure, growth and habit, as well as the economic value of different families such as the Myrtaceae and Leguminosae.

Human Agencies as Affecting the Flora.

In reviewal of this flora from time to time over the period of occupation and settlement of the State, one cannot but be impressed with the great changes which have taken place in its general composition, character, and extent and with the rapid depletion of the originally bountiful forest resources. Many factors have been in operation, effectually producing these modifications and marked changes which distinguish the existing flora from that of the early days of settlement, with man as the chief agent in determining them.

Disturbing Factors.

The first factor in altering the original character was the introduction of sheep and cattle over widespread areas, the effects of which during the course of years has been the extinction of some species of plants having a limited range, the restriction of growth in others, and a general impoverishment of the indigenous flora in the areas given over to long continued grazing. On sheep runs this is most noticeable in regard to plants of meadow and plain, scrub growth and hill-side vegetation. Cattle do more harm in destroying shrubs and young trees until replacement by natural growth almost ceases. On land that has been long in use for grazing purposes, the original flora has almost disappeared.

Then in 1851, the catastrophe of the great and wide-spread bush-fires of Black Thursday and others in later years whilst beneficial in some respects did irreparable loss both to our distinctive flora and fauna.

The discovery of gold brought to our shores a shifting population of many thousands of adventurers whose operations at one field after another changed the surface of the earth where they prospected, destroying the soil, the undergrowth, and the arboreal covering for miles around, leaving a devastated area. Where quartz mining was successfully pursued, the timbered slopes in the vicinity were laid bare for firewood and timber for the mines, so that even on long-abandoned gold-fields, the vicinity is bare and the vegetation scant.

Mistaken Policy and its Results.

Then came agricultural settlement. The open and lightly-timbered areas had long been in pastoral occupation and generally less readily available than the densely forested areas, many of which should have been permanently reserved for their valuable timber supplies. The dense forests of South and Western Gippsland and of Cape Otway were indiscriminately sacrificed and their distinctive floras with their unequalled arboreal wealth disappeared beneath the axe and the flame, sometimes leaving in place treeless areas of impoverished land. Byron says "Man marks the earth with ruin," and this is frequently the case in his dealings with nature's handiwork. On many river

frontages the unwise and ill-considered destruction of the protecting fringing scrub has not only been harmful to the flora, but also the cause of extensive riparian denudation and destructive floods in the areas affected. In some places where the "White Mountain Ash" *Eucalyptus regnans*, probably the highest tree in the world, lorded itself over the closely-clothed forest growth underneath as at Neerim and the Narracan Valley in West Gippsland, denuded, windswept hills and slopes over which the useless bracken fern encroaches, speak of the wasteful and improvident policy of land settlement in the past. The harmful effect of issuing grazing licences at a nominal rate for mountains and high plains is seen in the gradual diminution of the flora and the wanton destruction of the timber by fire.

Alien Plants.

Then there is the steady accumulation of alien plants and weeds, some of which like "Blackberry" *Rubus fruticosus* on the streams of Gippsland, Dandenong, and other places of assured rainfall grow riotously luxuriant, overwhelming the natural flora of the beautiful fern-gullies. The "Cape Weed" *Cryptostemma calendulaceum* displaces and chokes the plants of pasture lands, "St. John's Wort" *Hypericum perforatum* becomes a troublesome pest in the Ovens and Dargo district, and a host of other useless, noxious, irritating, but vigorous, intrusive plants gain a footing, which the humbler native plants are not able to withstand. In some cases, however, native plants of worthless character such as "Chinese Scrub" *Cassinia arcuata* and the "Prickly Acacia" *A. armata*, &c., have become troublesome pests on places where the original flora has been removed or destroyed.

Amelioration of Conditions of Growth.

Man's operations, however, are not wholly destructive or subversive of nature's working. Frequently by helpful action he makes "the desert to blossom like the rose." By the drainage of swamps and morasses, by conservation of water, and its effective application in reticulation and irrigation, he may improve conditions for inducing, improving or stimulating growth in plant life, or prepare for the occupation of areas by plants more highly developed and better fitted to flourish under the improved conditions.

Limitation in Habitats of Plants.

Undoubtedly many species of plants have entirely disappeared for ever under the destruction brought about by the exigencies of settlement. Many plants have only a limited range which a bush-fire may fatally ravage and the species be entirely destroyed as in the case of "Serra Grevillea" *G. Williamsonii* of which only type specimens now exist. Areas of growth of native flora with few exceptions contract or even vanish with increasing settlement. Melaleucas, Acacias, and Tea-trees once grew at Prince's Bridge; a thick scrub in which people could lose their way extended over towards Jolimont; Orchids were

at one time gathered at Batman's Hill, Richmond, and Collingwood. The "Wedding-bush" *Ricinocarpus pinifolius*, "Golden Bush-pea" *Pultenaea Gunnii*, and "Common Epacris" *E. impressa* once bloomed at St. Kilda; but further and ever further from cities and towns retreat the plants that grew where mart, or street now is.

Need for Retention, Conservation and Reafforestation.

Change is inevitable farms, dairies, orchards, vineyards, pastures and homesteads are necessary, cultivation must go on at the expense of natural vegetation. What can we do to retard the passing of our native flora to arouse a general desire for its retention, and a feeling of pride in its beauty and charm; and to prevent its spoilation by the thoughtless and inconsiderate? The forest conscience is not yet deeply aroused, or more reservations of diminishing forest areas, permanent retention, and stricter conditions of usage would be insisted upon. We need more sanctuaries and reservations of typical areas possessing distinct plant associations, e.g., the East Gippsland almost sub-tropical flora with its northern intrusive species; the jungle growth of moist secluded gullies on the southern slopes; the densely forested hills and cool fern-glades; and Alpine flora of the North-east; the vanishing Mallee types; the river red-gum area; the Grampians wealth of floral bloom; the coastal scrub of which Sandringham is the type; the Whipstick scrub; the Ironbark area of auriferous ranges, &c. Of our reservations, Wilson's Promontory provides a good example of requirement in this connexion. Provision might also be made under direction for the special protection of plants having only a restricted habitat, e.g., "Gum Myrtle" *Angophora intermedia*, and "Bloodwood" *Eucalyptus gummifera* in the Mallacoota district; the "Gippsland Waratah" *Telopea oreades* in central Gippsland; the "Austral Cabbage Palm" *Livistona australis*; the "Rosy Bush Pea" *Pultenaea subalpina* of the Grampians; the "Dotted Heath Myrtle" *Thryptomene Miqueliana* of Sperm-Whale Head, &c.

Forces making for extinction, restriction, deterioration in species are ever at work. Against these we need the creation of an enlightened and sympathetic public sentiment in regard to our native flora, a sane outlook and definite action in order to preserve it. We need the enforcement by legal enactment of well-considered repressive measures to prevent wanton destruction of the flora when in attractive foliage or bloom; and also to check the growing practice of wholesale disposal of native flowers for gain; a practice the continuance of which threatens the extinction of many plants in popular favour for the beauty of their blooms, such as the "Fairy Wax Flower" *Eriostemon obovalis*, and "Bushy Heath Myrtle" *Thryptomene calycina*. Preservation of existing unspoiled areas wherever possible, retention and extention of forests, and reafforestation of denuded expanses with Australian trees and shrubs suitable to the district are desirable aims worthy of encouragement.

Federal Action.

It is encouraging to observe that through the Research Council, Federal action has been taken to combat the noxious weeds, and also to reduce the ravages made by destructive insects on our flora.

It is also proposed that the scientific method which has been so successfully applied in producing drought-resistant wheats should be applied in producing grasses which would have the same valuable property of resistance and thus increase the value of the dryer pastoral areas.

NEW PLANTS RECORDED DURING 1927–28.

Five introduced plants have been recorded as growing wild for the first time, viz. :—

Calandrinia pilosiuscula, D. C. "Chilian Calandrinia" (Portulacaceae), native to South America. It has no economic value.

Kochia scoparia Schrad., "Broom Cypress" (Chenopodiaceae). A native of Europe and North America. An ornamental plant, an escape from cultivation.

Rosa bracteata Wendl., "MacCartney's Rose" (Rosaceae). A native to China. An escape from cultivation.

Helotropium supinum Schrad., "Bent Heliotrope" (Borraginaceae). Native to South Europe and North Africa. It has no economic value.

Anchusa officinalis L., "Bugloss" (Borraginaceae). A native to Europe. It has no economic value.

New Record of Native Flora.

During the period nineteen species not previously recorded for this State have been added to the list of Victorian flora, viz. :—

Hymenophyllum rarum R. Br., "Rare Filmy Fern" (Hymenophyllaceae); *Cheilanthes Sieberi*, "Creeping Rock Fern" (Polypodiaceae); *Thelymitra Elizabethae* F.v.M., "Tiny Sun Orchid" (Orchidaceae); *Bertya rotundifolia* F.v.M., "Round-leaf Bertya" (Euphorbiaceae); *Ruelingia prostrata* Maiden & Betche, "Dwarf Kerrawang" (Sterculiaceae); *Eucalyptus nitida* Hk.f. "Radiant Gum" (Myrtaceae); *Callistemon pallidus* D.C. "Lemon Bottle Brush" (Myrtaceae); *Euphrasia antarctica* Bth., "Alpine Eye-bright" (Scrophulariaceae); *Goodenia subintegra* F.v.M., "Mallee Goodenia" (Goodeniaceae); *Malacocera tricornis* (Benth.) Anderson, (Chenopodiaceae); *Pittosporum revolutum* Ait., "Genoa Pittosporum" (Pittosporaceae); *Acacia oreophila* Maiden & Betche A. Walteri, Maiden & Betche, "Two Gland Acacia"; *Swainsona Morrisoniana* J. M. Black, "Slender Swainson Pea"; *S. reticulata* J. M. Black, "Netted Swainson Pea"; *S. Behriana* J. M. Black, "Hairy Swainson Pea" (Leguminosae); *Kochia pentagona* Anderson, "Slender Blue-bush"; *K. crassiloba* Anderson, "Cushion Blue-bush" (Chenopodiaceae); *Eriochloa punctata* Hamilt., "Dotted Eriochloa" (Gramineae).

A number of species new to Science were added to the list of the flora during the year 1927–28—

Trichomanes caudatum Brack., "Large Bristle Fern" (Hymenophyllaceae).

Potamogeton australiensis A. Bennett, "Thin Pond Weed" (Potamogetonaceae).

Sparganium ramosum Hudson, "Branched Bur Reed" (Sparganiaceae).

Carex stellulata Good, "Star Sedge" (Cyperaceae).

Prasophyllum Hartii Rogers, "Chocolate Leek Orchid."

Calochilus imberbis Rogers, "Beardless Calochilus."

Caladenia alpina Rogers, "Mountain Caladenia."

C. Audasii Rogers, "McIvor Caladenia."

Diuris fastidiosa Rogers, "Proud Diuris."

Pterostylis gracilis Nicholls, "Slender Green-hood."

P. robusta Rogers, "Sharp-leaf Greenhood" (Orchidaceae).

Boronia Muelleri Cheel "Pink Boronia" (Rutaceae).

Asperula europhylla Sk. & Tur., "Broad-leaf Woodruff."

A. helix Sk. & Tur., "Desert Woodruff."

A. pusilla Sk. & Tur., "Dwarf Woodruff" (Rubiaceae).

Brachycome alpina P.F., Morris, "Alpine Daisy" (Compositae).

Grevillea chrysophaea Williamson, "Golden Grevillea."

G. polybractea Williamson, "Crimson Grevillea" (Proteaceae).

Pultenaea angustifolia Williamson, "Narrow-leaf Bush-pea."

P. patellifolia Williamson, "Mt. Byron Bush-pea" (Leguminosae).

Corrections.

The following corrections have been made in the census of Victorian plants to conform with the rules of Vienna Conference.

Scirpus americanus Pers. for *Scirpus pungens* Vahl.

Cladium Mariscus F.v.M. for *Cladium jamaicense* Crantz.

Gymnoschoenus sphaerocephalus Poir. for *Gymnoschoenus adustus* Nees.

Eriochilus cucullatus (Lab.) Reichb.f. for *Eriochilus autumnalis* R. Br.

Cryptostylis subulata (Lab.) Reichb.f. for *Cryptostylis longifolia* R. Br.

Rumex dumosus A. Cunn. for *Rumex flexuosus* Sol.

Muehlenbeckia declina (F.v.M.) J. M. Black for *Muehlenbeckia stenophylla* F.v.M.

Bassia uniflora (R. Br.) F.v.M. for *Bassia diacantha* F.v.M.

Pachycornia triandra (F.v.M.) J. M. Black for *Pachycornia robusta* Hk. f.

Kochia tomentosa (Moq.) F.v.M. for *Kochia villosa* Lindl.

Suaeda australis (R. Br.) Moq. for *Suaeda maritima* Dum.

Colobanthus apetalus (Lab.) J. M. Black for *Colobanthus Billardieri* Fenzl.

Brasenia purpurea Casp. for *Brasenia peltata* Pursh.

Ranunculus trichophyllus Chaix. for *Ranunculus aquatilis* L.
Drimys lanceolata (Poir.) Baill. for *Drimys aromatica* F.v.M.
Cakile edentula Bijel. for *Cakile maritima* Scop.
Acacia aculeatissima MacBride for *Acacia tenuifolia* F.v.M.
Acacia botrycephala Desf. for *Acacia discolor* Willd.
Acacia linearis (Wendl.) Macbrid. for *Acacia linifolia* Willd.
Abutilon Theophrasti Medic. for *Abutilon Avicennia* Gaertn.
Hibbertia sericea (R. Br.) Benth. for *Hibbertia densiflora* F.v.M.
Hibbertia ovata (Labill.) F.v.M. for *Hibbertia Billardieri* F.v.M.
Kunzea ambigua Druce for *Kunzea corifolia* Reichb.
Lhotzkya alpestris (Lindl.) J. M. Black for *Lhotzkya genetylloides* F.v.M.
Myriophyllum propinquum A. Cunn. for *Myriophyllum intermedium* D.C.
Didiscus pusillus F.v.M. for *Didiscus pilosus* (Smith) Domin.
Didiscus pilosus Bth. for *Didiscus Benthamii* Domin.
Apium australe Thou. for *Apium prostratum* Labill.
Apium Ammi (Jacq.) Urb. for *Apium leptophyllum* F.v.M.
Daucus glochidiatus (Lab.) Fisch. for *Daucus brachiatus* Sieber.
Leucopogon parviflorus (Andr.) Lindl. for *Leucopogon Richei* Labill.
Acrotriche cordata (Labill.) R. Br. for *Acrotriche ovalifolia* R. Br.
Logania vaginalis (Lab.) F.v.M. for *Logania longifolia* R. Br.
Villarsia exaltata (Sims) F.v.M. for *Villarsia reniformis* R. Br.
Rochelia plurisepala (F.v.M.) J. M. Black for *Rochelia Maccoya* F.v.M.
Anthocercis frondosa (Miers) J. M. Black for *Anthocercis Eadesii* F.v.M.

PLANTS REMOVED TO ANOTHER GENUS.

Acianthus reniformis Schlecht (*Crytostylis reniformis* R. Br.).
Eucarya Murrayana Mitch. (*Fusanus persicarius* F.v.M.).
Eucarya acuminata Sprague (Fusanus acuminatus R. Br.).
Phrygilanthus celastroides Eichel (*Loranthus celastroides* Sieb.).
Malacocera tricornis Anderson (*Bassia tricornis* F.v.M.).
Bassia brachyptera F.v.M. (*Kochia brachyptera* F.v.M.).
Threlkeldia salsuginosa F.v.M. (*Osteocarpum salsuginosum* F.v.M.).
Turritis glabra L. (*Arabis glabra* Crantz).
Arabidella trisecta (F.v.M.) Schultz (*Blennodia trisecta* Bth.)
Micromystria nasturtium Schultz (*Blennodia nasturtioides* Bth.).
Cachymitus cardaminoides Schultz (*Blennodia cardaminoides* F.v.M.).
Harmsiodora brevipes Schultz (*Blennodia Brevipes* F.v.M.).
Harmsiodora blennodioides Schultz (*Blennodia lasiocarpa* F.v.M.).
Drabastrum alpestre (F.v.M.) Schultz (*Blennodia alpestris* F.v.M.).
Hutchinsia procumbens (L.) Desr. (*Capsella procumbens* Fries).
Hutchinsia australis Hk.f. (*Capsella antipoda* Hk.f.).
Cryptandra leucophracta Schl. (*Stenanthemum leucophractum* Reiss).
Centella asiatica (L.) Uarb. (*Hydrocotyle asiatica* L.).
Lilaeopsis australica (F.v.M.) A. W. Hill (*Crantzia lineata* L.).
Alyxia buxifolia R. Br. (*Gynopogon buxifolius* K. Schum.).

PHYSICAL GEOGRAPHY AND GEOLOGY OF VICTORIA.

By W. Baragwanath, Esq., Director of Victorian Geological Survey.

This article, which appeared in *Year-Book* 1925, has been revised and brought up to date.

PHYSICAL GEOGRAPHY.

Roughly triangular in outline, with the 141st meridian for a base and Cape Howe for the apex, and the sides formed on the north by the Murray River and on the south by the waters of the Southern Ocean, the State of Victoria occupies the most southerly portion of the Continent of Australia. Its area is approximately 88,000 square miles, and presents a diversity of topographical and geological features, which compares favorably with that of the larger States.

Medially dividing the State in an east-west direction is the main watershed which separates the streams flowing north to the Murray from those flowing south towards the ocean A north and south meridian line from Melbourne at the head of Port Phillip Bay reaches the Murray River near Echuca at the narrowest part of the State which it subdivides into two areas differing widely in physiographical as well as geological features. Eastwards of this line the area of greatest mean altitude occurs with a well-marked " divide " or watershed line, while westwards the mean elevation is considerably lower and the water-partings often ill-defined, especially where they occupy plateau-like areas. The Lower Ordovician strata, containing the principal gold-fields of the State, occupy three-fourths of the area of exposed rocks westwards of the meridian of Melbourne ; eastwards similar strata are only known at a few small and isolated localities. The older volcanic rocks of early tertiary age are more developed in the eastern part of the State, and the underlying and overlying lignitic beds which form extensive deposits eastward of Melbourne are little represented in the western half of the State. The newer volcanic rocks, while conspicuous in the western portion of the State, are but little in evidence in the eastern part.

The main physiographical features are :—

(1) Central highlands—
  (*a*) The eastern highlands ;
  (*b*) The western uplands.

(2) Southern highlands—
  (*a*) The South Gippsland ranges ;
  (*b*) The Otway ranges.

(3) Great Valley—
  (*a*) The Gippsland Valley ;
  (*b*) The Corangamite Valley.

(4) Murray Valley—
  North-western plains and the Mallee.

The central highlands form the main divide, and the southern highlands are parallel to and 50 to 100 miles distant from it. Between these parallel ridges is the great valley of Victoria; it extends westward from the Gippsland Lakes, and is, with the exception of a volcanic barrier near Warragul separating the waters of the Koo-wee-rup and Moe Swamps, traceable to Port Phillip Bay. Westward of Port Phillip Bay the extension of this valley, filled in part with newer volcanic rocks and recent sediments, embraces Lake Corangamite, the largest in the State, and numerous smaller lakes. The northern edge of the great valley passes on south of the Grampians and the Serra Range to the western boundary of the State.

On the northern side of the main watershed line, the southern edge of an extensive plain embracing the whole of the north-western portion of the State leaves the Murray River about 60 miles eastward of the meridian of Melbourne, and follows a general south-westerly course towards the western boundary of the State to a point about 90 miles from the coast.

The Gippsland Valley ranges from 50 to 450 feet, the Corangamite Valley from 300 to 450 feet, and the Mallee plains from 200 to 450 feet above sea level; but, though all three are at about the same level, they differ considerably in geological features. The Gippsland Valley consists of recent deposits of fluviatile, lacustrine, or estuarine origin; the Corangamite basin, almost entirely of lava flows with depressions along the margins of or between the coalescing lava streams; and the Mallee plains of sandy ridges of fluviatile or wind-blown origin overlying the marine tertiary beds of the great inland sea.

The highlands of the eastern portion of the State are mainly sedimentary and igneous rocks of Ordovician, Silurian, and Devonian age now forming narrow "razor-back" ridges, at places 2,000 feet above the neighbouring rivers. The main river valleys are of considerable width, and extend to within a comparatively short distance of the main divide. Following the north and south course of the streams, parallel ridges, due to a combination of major folding, the north-west strike of which incidentally brings into contact beds of varying resistance to erosion, faulting, igneous intrusion, and unequal weathering, are well developed. One stream flows easterly, viz., the Latrobe and one westerly—the Yarra; both composite streams diverted by capture of their southerly flowing components.

Evidence of peneplanation at several altitudes is pronounced. Plateaux are of small extent, and owe their preservation to a covering of harder rocks, such as the Dargo High Plains, or to areas where the catchment for denudation is relatively small, as at the Baw Baw plateau and the Snowy Plains, between the Wonnangatta and the Macallister rivers.

The general altitude of the eastern highlands ranges from 4,000 feet to over 6,000 feet, prominent peaks being Bogong (6,509 feet),

Feathertop (6,306 feet), and Hotham (6,100 feet). The Mount Baw Baw granite area, the highest isolated plateau south of the main divide is 30 square miles in area, and has a mean altitude of 4,500 feet, its highest point being 5,130 feet. The Snowy Plains, consisting of Upper Devonian or Carboniferous flat-bedded rocks, has a general altitude of over 4,000 feet and connect Mount Wellington to the main divide.

Along the main divide in the eastern part of the State several low gaps or "saddles" occur, and of these the Omeo gap south-east of Omeo (elevation 2,400 feet); east of Mount Selma between the heads of the Goulburn and Barkly Rivers (elevation 3,100 feet); east of Mount Matlock between the Red Jacket Creek and the Goulburn (elevation 3,500 feet) and the Narbethong saddle between the Acheron and Watts River (elevation 1,500 feet) are the most important.

The western uplands show the same pronounced meridional arrangement of branch spurs, but, with the exception of the Grampians area, the great difference of altitude between the rivers and the spurs does not exist as in the eastern part of the State. The Grampians, Serra Victoria and Black Ranges are a series of north-south ridges at the western end of the western uplands. The western uplands are chiefly of strata of older Palaeozoic age, in part metamorphosed, and occasional newer volcanic cappings occurring as defined hills and broad plateaux. On the main divide "saddles" occur at relatively low altitudes. The saddle near Kilmore, through which the Melbourne-Sydney railway line passes, is 1,115 feet above sea, and north-west of Ballarat the divide has an altitude of 1,500 feet. Between these two points the watershed line attains an altitude of 3,000 feet. At 5 miles north of Buangor the divide between the head waters of the Wimmera and the Fiery Creek, a tributary of the Hopkins, has an altitude of 1,200 feet; eastward and westward of this saddle an altitude of 3,150 feet is attained. Westward of Ararat on the eastern edge of the Grampians which attain an altitude of nearly 4,000 feet the watershed between the heads of the western branch of the Hopkins and the Mount William Creek is only 950 feet above sea. West of Mount William the watershed between Fyan's Creek and the head of the Wannon the altitude is under 1,400 feet, while further westwards in the Victoria Valley the divide between the Glenelg and Wimmera Rivers is 700 feet above sea. Further west the Black Range rises to over 1,000 feet and beyond this no watershed is recognized, the country consisting of a low-lying area occupied by numerous lakes with no river system till the boundary of South Australia is reached.

The South Gippsland and the Otway Ranges are composed of rocks of Mesozoic age, and the watersheds show no defined or regular arrangement, steep slopes, narrow ridges, and V-shaped valleys prevailing. In the former area, which comprises two nearly-parallel ridges, an altitude of 1,500 feet is reached along the northern edge, where fault

action is evident, within 3 miles of the Gippsland Valley. A general altitude of nearly 2,000 feet is maintained for a length of 30 miles along the main crests of this range. In the Otway area similar conditions prevail; there is no regular stream system, and a coastal range 10 to 15 miles from and parallel to the sea-shore has steep slopes and elevations of nearly 2,000 feet.

Wilson's Promontory, an isolated granite massif with peaks of 2,400 feet, forms the most southerly point of the State. It is connected to the mainland by sand dunes slightly above sea-level. Between Wilson's Promontory and Tasmania is a submerged ridge only 200 feet below sea-level.

The Victorian lakes have been formed by (1) faulting or crust movements; (2) damming of water-courses by lava flows or the coalescing of lava streams, and (3) marine action. Lake Omeo and Lake Karng, near Mount Wellington, fall outside this category; the origin of the former is uncertain, but the latter has been ascribed to a landslip blocking a mountain stream.

Included within the lakes due to faulting is the typical crater lake of Tower Hill, near Koroit, and many of the Western District lakes appear to occupy sunken areas on the lava flows.

Lakes Burrumbeet, Corangamite, and others were formed by coalescing lava flows.

By tidal action a barrier of sand was thrown up, behind which the Gippsland lakes developed; they were originally larger, but siltation by river-borne material is in progress. Lakes now infilled occur as swamps scattered over the State, and were revealed in numerous places during the working of the alluvial leads or buried river systems.

GEOLOGICAL HISTORY.

The oldest fossiliferous strata comprise a series of volcanic tuffs and contemporaneous sediments. These are supposed to have been folded to form troughs, in which tens of thousands of feet in thickness of Ordovician and Silurian strata were deposited. The occasional conglomerates and grit beds represent fluctuations of the conditions of deposition; volcanic tuffs occur in the Silurian beds near Gould, and at the close of this period the intrusion of granite rocks contemporaneous with a general meridional series of main folds took place.

A lengthy period of denudation followed; the exposed outcrops were worn to a general level prior to the extensive volcanic outpouring of the Devonian period, represented by the Snowy River porphyries in the valleys of the Snowy and the Macallister Rivers, which appear to have occurred in valleys or depressed areas, and by the dacites of Dandenong and Macedon. That part of the surface which, prior to the volcanic activity, was a land area, is seen in the north-eastern portion of the State, where a defined river bed occurs beneath a layer of porphyry.

Following the porphyry and dacite outpourings, layers of conglomerate, often hundreds of feet in thickness, were accumulated. No direct evidence of glacial origin of these is yet available, but this has been suggested. Later deposits of limestone in shallow seas took place, and these were followed by alternating layers of conglomerate, sandstones, and shales, and in part volcanic flows (melaphyres) in the eastern part of the State, while sandstones and shales alone were deposited to form the present Grampian Range.

There is evidence of warping and faulting subsequent to deposition. The folding was on broad lines, the Grampian–Dundas beds forming portion of a broad syncline, while the Avon River–Mansfield series has a general northerly dip; the fossils in the deeper beds of the series as exposed on the Avon River and Iguana Creek have a Devonian aspect while those of the upper beds near Mansfield have a Carboniferous aspect.

Climatic changes followed the close of this period, and glacial conglomerates, sandstone, pebbly mudstone, and tillite of Permo-Carboniferous age were deposited. More genial conditions intervened with several successive glacial periods in the accumulation of a few hundred feet of strata, which probably covered much of the western and central portion of the State. Through subsequent denudation they now only exist in scattered areas, and as remnants faulted against older rocks. These fault movements provided general depressions, in which the thousands of feet of fresh-water felspathic sandstones and mudstones with coal seams accumulated, now forming the Jurassic coal measures of Gippsland, Otway, Casterton, and probably near Wangaratta.

The earliest recognizable tertiary phase is a system of deeply eroded valleys containing fluviatile deposits covered with basalt. A typical example is the high level lead beneath the older basalt of the Dargo High Plains. These beds contain fossil leaves and fruits indicative of a different flora to that existing now. Previous to the erosion of these valleys, the general surface of eastern Victoria was much higher; that of western Victoria less elevated.

In eastern Victoria lavas (the older basalt of the geological survey) occupied the valleys and covered the fluviatile beds, in some places, as at Flinders, to a depth of over 1,300 feet. Towards the close of or after the volcanic activity, extensive faulting occurred along the flanks of the main divide and started the erosion of what is, with modifications, the existing drainage system. It followed generally the trend of the pre-basalt system, but was influenced by the resistance to erosion of the basalt, and usually chose a course along its margin on the less resistant sediments. These valleys, rejuvenated and entrenched upstream from subsidences in their lower portions, were the deep basins in which marine tertiaries were deposited during every encroachment of the sea. Oscillation, with a predominating downward trend of what are now coastal areas, brought about, firstly, deposition of the lignites

(Altona lignites), followed by the first marine transgression (Balcombian or Oligocene), which ultimately ended in the Polyzoal phase (Janjukian or Miocene). Oscillation with a predominant upward trend continued to the Kalimnan (Lower Pliocene), the last important marine transgression, and on to the present. Since the Kalimnan terrestrial conditions have been almost interrupted. Elevation of the surface since the deposition of a particular marine bed has in some cases resulted in it being elevated to a considerable altitude. In Gippsland the older volcanic rocks, although originally resting on a gently sloping surface, are now seen to be inclined almost vertically in the vicinity of fault lines, and within short distances they have been found at a depth of several hundreds of feet below the original adjoining outcrops.

In western Victoria (west of the meridian of Melbourne) the older basalt is less extensively developed and is restricted to the Bacchus Marsh and Geelong areas. At Maude Janjukian (Miocene) marine tertiaries occur below and between an upper and lower flow of basalt. The flows are consequently Janjukian or younger and newer than at Mornington, where boring has proved that the Balcombian (Oligocene) marine clays rest on the Altona lignites, which in turn rest on the older basalt.

The greater part of western Victoria was subject to the same periodical transgressions of the tertiary sea as the eastern portion. During Balcombian and Janjukian times the western land surface was a peninsula projecting westwards as far as Stawell. The Grampians and Wannon areas were large islands separated by a narrow strait from this peninsula, and the Otway area was an island isolated from it by the great valley (p. 21 *ante*). North of this peninsula was the Mallee sea which covered the north-western portion of Victoria.

The newer lavas (newer basalt of geological survey) poured out first in the Pliocene and continued to the late Pleistocene. They sealed up the old river systems which contained the alluvial gold deposits, and a new drainage system is evolving precisely on the same lines as that which followed the older basalt. It has been accompanied and followed by extensive faulting which has been instrumental in forming Bass Strait, originally submerged estuaries heading towards Victoria and Tasmania and completely barred from the Pacific by the land bridge through Wilson's Promontory.

Founded on sound lines by Dr. A. R. C. Selwyn in 1856, the Victorian Geological Survey has carried out mapping and investigations continuously, except for a few months some 50 years ago. The main geological feature of the State have now been mapped out and some areas examined in detail, much assistance having been given by geologists and scientific workers outside the survey. Much still remains to be done, and many complex problems, which depend upon a detailed examination both in the field and in the laboratory, await solution.

The stratigraphical succession of the geological formations is—

Cambrian.—An area of regionally metamorphosed rocks, consisting of quartzites, chloritic, talcose and micaceous schists, and gneisses, in

the valley of the Glenelg and Wannon Rivers may be of this age or older, but there is no definite evidence available. At Heathcote a series of sedimentary and igneous rocks occur, and much controversy has arisen as to the age and stratigraphical relation of this Heathcotian series. Certain trilobite-bearing beds have been considered Upper Cambrian, and associated with these beds are cherts and diabases, the latter an altered volcanic tuff, not an intrusive rock. The cherts also are more or less silicified tuffs as evidenced by their contained radiolaria. Interstratified with the cherts there are shales containing graptolites of Lower Ordovician aspect.

At Mansfield an acutely folded series of sandstones, slates, cherts, and phosphate beds have yielded fossils, now proved to be of Upper Cambrian age by Mr. F. Chapman; brachiopods (Salterella) crustaceans, and radiolaria occur in the beds. Graptolites of Lower Ordovician type occur with the crustaceans and Salterella.

Near Mount Wellington certain beds in the vicinity of the serpentine area have been identified as Upper Cambrian. Similar lithological associations exist as at Heathcote and near Mansfield. The serpentine of this area is referrable to pre-Upper Ordovician age, and may be Cambrian.

There are several other areas of cherts and diabases regarded on lithological evidence as of similar age, but fossils have not yet been obtained in support of this contention.

In the Howqua Valley, cherts, jaspers, and diabases are associated with Ordovician strata.

From the Heathcotian rocks the alluvial gold at McIvor Creek had its origin. Magnesite, steatite, copper, and manganese occur at Heathcote; corundum, limestone, and chrome iron at Mount Wellington and Heathcote; phosphates of aluminium and calcium near Mansfield and in the Howqua Valley.

Ordovician.—The rocks of this series are chiefly grits, sandstones, and slates. Conglomerates are rare, and limestone occurs in beds only a few inches in thickness. The beds have been closely folded and in places metamorphosed. Two types of metamorphism, regional and contact, are evident. The former type is widespread. Much of the north-eastern portion of the State is occupied by rocks of this age and character, comprising every gradation from micaceous schists to gneiss and gneissose granite.

At Stawell the metamorphic strata are gneissose, chloritic and graphitic schists, hornblendic gneiss, quartzite, and occasionally thin beds of marble.

The latter type is local, and is confined to areas surrounding intrusive igneous masses.

On fossil evidence the Ordovician strata are subdivided into a lower and an upper series. The Lower Ordovician rocks are confined, with the exception of areas on the Mornington Peninsula, Boolarra, Enoch's Point, and Loyola, near Mansfield, to the area west of the meridian of Melbourne. These beds have been subdivided into four

zones characterized by typical fossils, and are named after the type localities where they were first examined, e.g., Lancefield, Bendigo, Castlemaine, and Darriwil. The chief gold-fields in the western portion of the State occur in the three lower zones. Detailed palaeontological surveys by R. A. Keble have resulted in the Bendigo and Castlemaine zones being divided into sub-zones at Bendigo and in part also at Daylesford.

The Lancefield zone is characterized by gold occurrences of the Indicator class, a feature present at Dunolly, Tarnagulla, Inglewood, Maryborough, Elaine, and, though fossil evidence is wanting, probably at Ballarat.

The Bendigo zone has quartz lodes either bedded as saddle formations or occurring as fissure lodes; these are well developed on the Bendigo, Spring Gully, Castlemaine, Daylesford, and Steiglitz gold-field. The Bendigo zone has also been identified at Mornington.

The Castlemaine zone, more especially in its lower portions (the Wattle Gully beds) is noted for rich spurry quartz formations, from which the rich alluvial gold of the Chewton and Fryerstown gold-fields was derived.

The Darriwil zone has not yet been proved auriferous but to the east of Bendigo this zone has recently been noted in close proximity to auriferous country.

The Upper Ordovician series occur as meridional belts in the eastern part of the State, outcropping on anticlinal domes, such as exist on the Yarra track, Mount Easton; on the Black River, 12 miles east of Wood's Point; at Enoch's Point; Phosphate Hill, near Mansfield resting on Upper Cambrian; Dolodrook River, Mount Wellington; Sandy Creek, west of Bullumwaal; the Upper Murray, through the county of Benambra; and Nowa Nowa.

An area of Upper Ordovician extends through the central portion of Mornington Peninsula, and its relation to the Lower Ordovician beds which occur on a main fold to the westward has been determined. At Bald Hills westward of Waratah an area of Upper Ordovician occurs.

Besides the rich quartz and alluvial gold the Ordovician strata contain silver, lead, copper, iron, manganese, wolfram, scheelite bismuth, antimony, lodes of fluorspar, and veins of turquoise.

Silurian.—The rocks of this formation are conglomerate, breccia, grits, quartzites, phyllites, schists, slates, and shales, intercalated limestone and marble, and occasionally volcanic tuff. Some members like the Ordovician are acutely folded while others are bent in broad folds at lower angles and occasionally almost flat. They are metamorphosed where intruded by igneous masses. Structurally the Silurian beds form a large arc with a centre near Port Phillip. This is well shown by tracing the fossiliferous beds at Waratah Bay, strike N. 30°E through Turton's Creek. Westward of Walhalla similar strata strike N. and S. Further north near Wood's Point the strike is west of north and continues so to the granite of the Strathbogie Ranges. Near Benalla the strike is north-westerly but at Rushworth the continuation

of the arc shows with an east and west strike, and Silurian fossils are well represented in this vicinity. On fossil evidence the Silurian beds are divided into two series—Melbournian (lower) and Yeringian (upper). These rocks cover a large part of central eastern Victoria.

The gold-fields of Rushworth, Whroo, Walhalla, Wood's Point, Foster, Tanjil, Warrandyte, and Reedy Creek are in Silurian rocks. The gold is greatly influenced by igneous intrusive dykes. Gold-antimony ores occur at Costerfield, Ringwood, and Thornton ; limestone at Lilydale, Cooper's Creek, Waratah, and Howe's Creek, near Mansfield ; and phosphate of lime at Howe's Creek. Copper and small quantities of manganese, nickel, cobalt and platinum are recorded from dykes intrusive into this series.

Devonian.—Acutely folded sedimentary strata of Middle Devonian age occur in the vicinity of Taberraberra west of Bullumwaal and apparently conformable to the underlying Silurian and Upper Ordovician. This area has recently been examined and will afford an interesting section showing the relationship.

Towards the close of the Devonian period extensive volcanic accumulations, such as tuffs, conglomerates, lavas, and porphyry masses were formed in the Snowy River and Macallister-Wonnangatta valleys, and apparently contemporaneous with them extensive limestone beds were deposited. As these and later beds have not been subjected to the intense folding of the pre-existing formations in which the granites and granodiorites occur, the latter intrusions are classed as of Devonian age. In the Grampians area certain granite intrusions have been assigned to a later period.

Excepting a small rich gold occurrence near Briagolong, the Devonian strata have not proved gold-bearing. Silver, lead, copper, manganese iron, baryta, felspar, and building stones, such as marble, freestone, porphyry, and granite are the chief economic products.

Carboniferous.—The massive sandstones, with occasional shales, forming the Grampians, Mount William, Serra, and Dundas ranges in the west, and the purplish-red sandstones, mudstones, conglomerate and impure limestones at Mansfield, the Cathedral, and near Whitfield are lower Carboniferous. On the Avon River the red and yellow sandstones containing the fossil *Lepidodendron* probably belong to this series, although the underlying beds at Iguana Creek have a flora with a Devonian aspect. Both the Mount Wellington and the Grampians areas present a remarkable variety of scenery—canyons, bluffs, and gorges often several hundred feet deep.

In the Grampians a granodiorite-porphyritic intrusion in the Carboniferous sandstones is recorded, while the granitic mass of Mount Hump (Gippsland) is apparently older than the Avon River sandstones.

The Carboniferous formation only provides building stone, some of the freestone being of good quality.

Permo-Carboniferous.—Glacial conglomerate, pebbly mudstone, and tillite occur near Bacchus Marsh in the valley of the Werribee, at Greendale, Wild Duck Creek (near Heathcote), near Kyneton, Coleraine,

Carisbrook, Pitfield, Poseidon, Wangaratta, and other localities in the north-east district, and are apparently scattered remnants of formations more or less directly connected. Northward of Greendale an area of glacial beds occurs on the northern or upthrow side of the Greendale fault at an elevation considerably above the highest portion of the corresponding formation southward. At Bacchus Marsh several species of the fossil *Gangamopteris* were discovered in shale, intercalated with the glacial conglomerates, and on this evidence the beds have been provisionally classed as of Permo-Carboniferous age; recent observations by Mr. F. Chapman have revealed Triassic fossils in the uppermost beds of the series. In a small outcrop of strata near Yandoit fossils of Triassic age have also been identified.

Jurassic.—A thick bed of conglomerate, possibly glacial in part, forms the base of the Jurassic formations, and is followed by a series of felspathic sandstones, thick beds of mudstone, and thin seams of coal; these occur in South Gippsland, on the Latrobe River, in the Otway Ranges, and the valley of the Wannon. The black coal seams, though small, furnish portion of the supplies of the State. The coal seams are much faulted and frequently intersected by doleritic dykes. Quartz reefs occur in the Jurassic strata of the Otway district, but so far they have not proved auriferous. Freestones, dyke stones, useful for road material, shales suitable for tile manufacture, calcite, baryta, and black coal are the chief economic products of the Jurassics.

Lower Tertiary.—Fluviatile deposits underlying the older basalt at Berwick contain an abundant fossil flora, including such genera as *Eucalpytus*, *Lomatia*, *Fagus*, &c. In the fluviatile beds, under the older basalt at Dargo, *Gingko* is found. The predominant species in the brown coal deposits appears to be a *Cupressinoxylon*, or cypress wood.

Marls and limestones of Balcombian or Oligocene age, containing a representative molluscan fauna outcrop at Mornington (Balcombe Bay), and Muddy Creek, Hamilton, and occur at a depth at Altona and in a bore at Sorrento. At Altona they rest on brown coal, which in turn rests on sands.

Middle Tertiary.—Janjukian or Miocene marls and polyzoal limestone of Janjukian age are represented by a considerable thickness of beds at various localities. They outcrop at several places in the eastern and western portion of the State, and the main-water-bearing beds of the Mallee-Riverina basin are of this age. At Pitfield, during mining operations, fossil fruit were found in fluviatile beds, which seemed to merge into estuarine and ultimately into marine beds containing molluscan fauna.

Upper Tertiary.—Kalimnan or Lower Pliocene shell marls and sands occur at the Gippsland Lakes, on the shores of Port Phillip Bay, Muddy Creek, Hamilton, and the Mallee. The period is characterized by coarse marine and freshwater sedimentation. In the fossil fauna the remains of some gigantic mammals are found. Werrikooian or Upper Pliocene clays, sands and limestones outcrop at the Glenelg

and Moorabool rivers, and are known to exist at a depth in the Mallee. The extensive volcanic plains of western Victoria, comprised of lavas and tuffs, range in age from the Pliocene to within comparatively recent times. Many of the craters are perfect.

Recent.—Loam and sand deposits, dune sands, recent beaches, lake sediments, &c., in process of formation comprise the recent deposits.

Tertiary deposits have been responsible for a large quantity of the gold found in Victoria, particularly for the large nuggets which have made Victorian gold-fields famous. Stream tin, a moderate amount of wolfram and monazite, a considerable tonnage of pottery clays, sands for a variety of purposes, building stone, including basalt (much used locally for construction, paving, and macadam), lime, bauxite, iron ore, pigments, paper clays, jarosite, and chalk occur in the tertiary deposits of the State.

Extensive deposits of brown coal have been proved in the vicinity of Morwell, Traralgon, Rosedale, Hedley, west of Altona Bay, Lal Lal, and Bambra. The State is exploiting the Yallourn (Morwell) deposit as a source of electric power.

THE FAUNA OF VICTORIA.

An article on the "Fauna of Victoria," by the late T. S. Hall, M.A., D.Sc. (University of Melbourne), and J. A. Kershaw, Esq., F.Z.S., Curator of the National Museum, Melbourne, appeared in the *Year-Book* for 1916–17, and addenda thereto by Mr. Kershaw in the *Year-Books* for 1918–19 and 1920–21.

THE HISTORY OF VICTORIA.

An article on this subject contributed by Ernest Scott, Professor of History in the University of Melbourne, appeared in the *Year-Book* for 1916–17, pages 1 to 31.

CHRONOLOGICAL TABLE OF LEADING EVENTS.

The *Year-Book* for 1916–17 contained, on pages 31 to 50, a chronological table of leading events in Victorian history for the years 1770 to 1900 inclusive, and of leading events in Victorian and other history for the years 1901 to 1916 inclusive. The leading events in the ten years 1917 to 1926 were given in the volumes relating to those years.

Some of the principal events in Victorian and other history during 1927 are given in the table which follows:—

1927.	24th January	.. Mr. C. J. Lowe, barrister-at-law, appointed to a vacancy on the Supreme Court Bench.
	2nd February	.. Return of the Prime Minister (the Right Hon. S. M. Bruce) from a visit to Great Britain and Canada.
	22nd March	.. Sir Granville Ryrie, K.C.M.G., appointed High Commissioner for the Commonwealth in London.

1927.	24th March	.. The Bishop of London (Right Rev. A. F. Winnington-Ingram) arrived in Melbourne.
	26th March	.. H.R.H. the Duke and Duchess of York arrived in Sydney.
	9th April ..	.. Elections for the Legislative Assembly held throughout Victoria.
	21st April	.. H.R.H. the Duke and Duchess of York arrived in Melbourne.
	9th May ..	.. The Federal Parliament at Canberra opened by H.R.H. the Duke of York.
	20th May	.. Labour Ministry, under the leadership of the Hon. E. J. Hogan, assumed office.
	18th June	.. Federal finance plan, to take place of *per capita* payments, accepted by the States.
	4th July ..	.. Judge Wasley, of the County Court Bench, appointed acting Supreme Court Judge.
	6th July ..	.. The 29th State Parliament opened by His Excellency the Governor Lord Somers.
	15th August	.. Death of Mr. George Gordon McCrae, Australian poet and friend of Adam Lindsay Gordon, aged 94 years.
	17th September	.. Death of Sir John McWhae, former Agent-General for Victoria, at Yokohama, Japan, aged 69 years.
	24th September	.. The Broken Hill Proprietary Company temporarily suspended operations at Broken Hill owing to a decrease in the price of lead.
	28th September	.. A Federal surplus of £2,635,597 for the financial year ended 30th June, 1927, announced, making the accumulated surplus £2,921,494.
	17th October	.. Death of Sir Rupert W. J. Clarke, Bart., announced.
	22nd October	.. New bridge over the River Murray at Mildura opened by the British Secretary of State for Dominion Affairs (the Right Hon. L. C. M. S. Amery). The cost was about £150,000.
	28th October	.. The first pile of the Spencer-street bridge over the river Yarra driven by the Hon. J. P. Jones, Minister for Public Works. It is estimated to cost £200,000.
	3rd November	.. Disaster in Sydney Harbour. The ocean liner R.M.S. Tahiti rammed the ferry steamer Greycliffe, sinking the latter in 30 seconds. Thirty-seven lives were lost and 55 persons were injured.
	20th December	.. The Totalizator Bill passed by the Legislative Assembly was rejected by the Legislative Council by 19 votes to 12.

PROGRESS OF STATE SINCE 1850.

The following table has been prepared to illustrate the advance made by the State since 1850—the year immediately preceding the separation of the Colony from New South Wales. The subsequent years are census years except the last :—

STATISTICS OF VICTORIAN PROGRESS, 1850 TO 1927.

	1850.	1861.	1871.	1881.	1891.	1901.	1911.	1921.	1927.
Population, 31st December ..	76,162	541,800	747,412	879,886	1,157,678	1,209,900	1,239,893	1,550,686	1,741,390
Revenue .. .. £	259,433	2,592,101	3,734,422	5,186,011	8,343,588	7,712,099	9,372,637	19,054,475	27,128,700
Expenditure from Revenue £	196,440	3,092,021	3,659,534	5,108,642	9,128,699	7,672,780	9,362,291	18,941,698	27,744,903
Public Debt .. £	..	6,835,060	12,134,800	22,944,602	43,600,265	53,072,275	57,983,764	97,317,831	149,546,966
Gold produced .. oz.	..	1,967,453	1,355,477	858,850	576,400	789,562	542,074	114,602	41,839
Wool produced .. lbs.	16,345,468	22,640,745	37,177,646	45,970,560	76,503,635	73,235,138	101,803,644	90,250,571	121,299,621
Butter produced .. ,,	..	..	..	..	16,703,786	46,857,572	86,500,474	64,938,458	81,995,815
Agriculture—									
Land in cultivation acres	52,341	427,241	793,918	1,582,998	2,512,593	3,647,459	5,386,247	6,425,250	7,304,194
Wheat .. .. bushels	556,167	3,607,727	4,500,795	8,714,377	13,679,268	12,127,382	34,813,019	39,468,625	46,886,020
Oats .. .. ,,	99,535	2,136,430	3,299,889	3,612,111	4,455,551	6,724,900	9,699,127	10,907,191	4,884,006
Wine .. .. gallons	4,621	47,568	713,589	539,191	1,554,130	1,981,475	1,362,420	2,222,305	2,346,314
Live Stock—Horses No.	21,219	84,057	181,643	278,195	440,696	392,237	472,080	487,503	447,988
,, Cattle ,,	378,806	628,092	799,509	1,286,677	1,812,104	1,602,384	1,547,569	1,575,159	1,435,761
,, Sheep ,,	6,032,783	6,239,258	10,002,381	10,267,265	12,928,148	10,841,790	12,882,665	12,171,084	14,919,653
,, Pigs .. ,,	9,260	43,480	177,447	239,926	286,780	350,370	333,281	175,275	284,271
Total Imports—Value £	744,925	13,532,452	12,341,995	16,718,521	21,711,608	18,927,340	28,150,198*	..	..
,, Exports—Value £	1,041,796	13,828,606	14,557,820	16,252,103	16,006,743	18,646,097	29,896,275*	..	..
Imports, Oversea—Value £	..	10,991,377	9,201,942	11,481,567	13,802,598	12,686,880	21,850,963	57,608,777	55,560,899
Exports ,, ,, £	..	12,209,794	12,843,451	12,318,128	11,403,922	13,075,259	18,915,716	34,871,961	34,741,689
Shipping .. .. tonnage	195,117	1,090,002	1,355,025	2,411,902	4,715,109	6,715,491	9,907,046	9,214,944	14,367,895
Railways open .. miles	..	214	276	1,247	2,764	3,238	3,496	4,274	4,644
Telegraph wire .. ,,	..	2,586	3,472	6,626	13,989	15,356	16,405	31,243	46,241
Postal business—Letters No.	381,651	6,109,929	11,716,166	26,308,347	62,526,448	83,973,499	159,092,011	180,797,030	229,642,369
,, Newspapers ,,	381,158	4,277,179	5,172,970	11,440,732	22,729,005	27,104,344	36,125,728	31,660,611	46,829,110
Savings Bank Deposits £	52,697	582,796	1,117,761	2,569,438	5,715,687	9,662,006	18,213,040	48,262,058†	63,706,081†
Factories—									
Number of	..	531	1,740	2,488	3,141	3,249	4,873	6,532	7,690
Hands employed ..	..	4,395	19,468	43,209	52,225	66,529	102,176	140,743	161,639
Value of machinery, plant, land and buildings £	..	..	4,725,125	8,044,296	16,472,859	12,298,500	16,613,348	35,492,735	63,850,005
Value of articles produced £	..	..	..	13,370,836	22,390,251	19,478,780	36,660,854	106,098,294	127,397,951
State Education—									
Number of Primary schools	61	671	988	1,757	2,233	1,967	2,059	2,334	2,525
Expenditure on Education £	..	162,547	274,384	546,285	726,711	701,034	1,052,418	2,117,151	3,254,575
Total value of rateable property in municipalities .. £	..	29,638,091	50,166,078	87,642,459	203,351,360	185,101,993	265,083,727	399,502,745	606,322,402
Friendly Societies—									
Number of members ..	..	7,166	35,706	47,908	89,269	101,045	145,439	143,421	159,115
Total funds £	..	..	213,004	475,951	961,933	1,370,604	2,246,396	3,375,050	4,513,972

NOTE.—In a few instances in the earlier years, where it is not possible to give figures for the exact date or period shown, those for the nearest dates or periods are given. Gold was discovered in 1851, in which year the return was 145,137 oz. Butter figures were not collected prior to 1891.

* These figures relate to the calendar year 1909. Owing to the Commonwealth authorities having discontinued the keeping of records of Inter-State trade the value of the total imports and exports of the State are not available for a later year.

† Including deposits in the Commonwealth Savings Bank.

The population of the State at the end of 1850 was 76,162; at the end of 1927 it had increased to 1,741,350. During the period 1850–1927 the revenue steadily increased from £259,433 to £27,128,700. There was no public debt until after the separation of the State from New South Wales. In 1861 the State indebtedness was £6,835,060; in 1927 the funded debt had reached £149,546,966, which has been spent on revenue-yielding and other works of a permanent character. The land in cultivation in 1850 was 52,300 acres; it now amounts to 7,304,194 acres. The value of oversea imports in 1861 was £10,991,377; in 1926–27 it was £55,560,899. Oversea exports amounted to £12,209,794 in 1861, and to £34,741,689 in 1926–27. No railways or telegraphs were in existence up to the end of 1855; in 1861 there were 214 miles of railway open, and in 1927 there were 4,644 miles; 2,586 miles of telegraph wires had been erected up to 1861, and 46,241 miles up to the 30th June, 1927. Postal business in letters and newspapers has expanded rapidly during the period covered by the table, and there has also been a large increase in Savings Bank deposits, which rose from £52,697 in 1850 to £63,706,081 in 1927.

The expenditure on education amounted to £162,547 in 1861, and had increased to £3,254,575 in 1926–27. Members of friendly societies numbered 7,166 in 1861 and 159,115 in 1926–27—the funds amounting to £213,000 in 1871 and £4,513,972 in 1926–27. Hands employed in factories rose from 19,468 in 1871 to 161,639 in 1926–27. The total value of rateable property in municipalities, which was £29,600,000 in 1861, was £606,322,402 in 1926–27.

CONSTITUTION AND GOVERNMENT.

The Present Constitution.

Reform Act 1903.

After the establishment of the Federal Government it became evident that the representation of the States in the States Houses was excessive, and steps were taken to reform the States Constitutions. Accordingly an Act "to provide for the Reform of the Constitution" was passed in Victoria and reserved for the Royal assent on 7th April, 1903. After an interval of some months the Royal assent was proclaimed on 26th November, 1903. This Act, entitled *The Constitution Act* 1903, provided for a reduction in the number of responsible Ministers from ten to eight, and in their salaries from £10,400 to £8,400 (since increased to £10,000); and decreased the number of members of the Legislative Council from 48 to 35, including one special representative for the State railways and public servants; but increased the number of electoral provinces from fourteen to seventeen, each being now represented by two members elected for six years—one retiring every three years by rotation, except at a general election, when one-half of the members are to be elected for only three years. The