

# Part 1

## HISTORY AND ENVIRONMENT

### *History of Victoria*

#### **Discovery**

The history of Victoria as a political community commenced in 1835 when the rival parties of John Batman and John Pascoe Fawkner, unauthorized by the Government in Sydney, settled upon the site of Melbourne. But we have to look back to a period before the dawn of the nineteenth century to reach the beginning of our knowledge of this part of Australia. The southern coasts of the continent were the last to be discovered and explored. The Dutch navigators who in the seventeenth century pieced together an outline of the west, north west and northern coasts knew nothing of the south, because it lay outside the track of their vessels which made voyages between Europe and Java. Tasman in 1642 touched the south of Tasmania and sailed thence for New Zealand; but after this date we have to skip over a century and a quarter before we meet with a navigator who sailed even near the Victorian coast.

In 1770, James Cook, on his famous voyage in the *Endeavour*, was in the South Seas. His primary purpose was to convey a scientific party to Tahiti to observe a transit of Venus. His instructions left him free, after leaving that island, "to prosecute the design of making discoveries in the South Pacific Ocean", and to return to England by whatever route he thought proper. Cook knew of the western coasts of New Holland from Dutch charts, but the eastern coasts were unknown. He therefore resolved to sail till he fell in with the east of this continent, "and then to follow the direction of that coast to the northward or whatever direction it might take us". After exploring and charting New Zealand, he ran west toward New Holland. On 19th April, 1770 (by nautical reckoning; on 20th April by the almanac), at 6 o'clock in the morning, Lieutenant Hicks, who was on watch, sighted land. The *Endeavour* was then opposite the cape which is now marked as Cape Everard. This was the first part of the coast of Victoria to be seen by any European, as far as we know. After making the land thus, Cook sailed along it northward, discovering Botany Bay and the entire eastern coast of Australia.

New South Wales was settled as a place of punishment for convicts in 1788, and the commission of the first Governor, Arthur Phillip, gave him jurisdiction over the territory extending from Cape York to South Cape, and "all the country inland westward as far as the one hundred and thirty-fifth degree of east longitude". That definition brought the whole of Victoria within the scope of the New South Wales governorship.

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This article is based on "The History of Victoria", by Professor (Sir) Ernest Scott in the Year Book of 1916-17. Scott's article has been revised and extended by members of the Department of History of the University of Melbourne.

As yet, however, the British had no use for more land than was easily available in the vicinity of Port Jackson. Not for ten years after the first settlement was there even energy to spare for making an investigation of the unknown southern coasts.

The first Europeans to traverse any part of Victoria were the shipwrecked crew of the *Sydney Cove*, a vessel sailing from Bengal to Port Jackson in 1797. She was lost on one of the islands of the Furneaux Group. Seventeen of the crew, in the ship's longboat, in attempting to make their way to the settlement, were dashed ashore and wrecked near Point Hicks. They endeavoured to traverse the coast, through the wilds of Gippsland, from that point to Port Jackson, but only three were saved.

In the year after this tragedy, the discovery of the Victorian coastline commenced, and was rapidly completed. George Bass, the surgeon of H.M.S. *Reliance*, having some time on his hands and being desirous of making discoveries, in 1798 persuaded Governor Hunter to grant to him the use of a whaleboat and a crew of blue-jackets, in order that he might make an examination of the unexplored coasts southward of Botany Bay. Thus furnished, Bass entered upon his highly adventurous voyage, which resulted in the discovery of the whole of the Gippsland coast, Wilson's Promontory and Western Port, which Bass entered on 5th January. "I have named the place, from its relative situation to every other known harbour on the coast, Western Port", wrote Bass in his journal. He believed, too, from the strength and rapidity of the tide and the long swell which continually rolled in upon the coast from the west, that there was a strait dividing the continent from Van Diemen's Land; but this fact was not demonstrated till later in the same year, when Bass and his friend, Matthew Flinders, in the sloop *Norfolk*, sailed through it and circumnavigated Van Diemen's Land. The strait was named after Bass at the instance of Governor Hunter.

The first ship to sail through Bass Strait from the westward was the *Lady Nelson*, under the command of Lieutenant James Grant, in 1800. Grant brought the vessel out from England, with instructions to traverse the strait, news of the discovery of which reached the Admiralty in 1799. In so doing, he discovered the coastline of Victoria westward of Port Phillip, and gave names to the principal coastal features.

By the beginning of the nineteenth century, therefore, the Victorian coast was known, between the New South Wales border and Western Port on the east, and between the South Australian border and Cape Otway on the west. The intervening gap, at the head of which lies Port Phillip, had not been examined by Grant, though he had called it Governor King's Bay on his chart. In 1801, Lieutenant John Murray, in command of the *Lady Nelson*, was despatched on an exploring expedition, with particular instructions to investigate this gap. At the end of January, 1802, in pursuit of this task, Murray lay in Western Port, whence he sent the launch in charge of the mate, Bowen, to find a channel into the opening which had previously been seen from the masthead, and which "had the appearance of a harbour". Bowen, who set out on 31st January, returned on 4th February, with the report

that there was a good channel into "a most noble sheet of water, larger even than Western Port, with many fine coves and entrances in it, and the appearance and probability of rivers". On 15th February, Murray brought the *Lady Nelson* into this new harbour, which he named "in honour of Governor P. G. King, under whose orders I act"; but King afterwards altered the name to Port Phillip, desiring thus to honour the first Governor of New South Wales. On 8th March "the united colours of the Kingdom of Great Britain and Ireland were hoisted on board", and possession was taken of the port "in the name of His Sacred Majesty, George the Third".

But the discovery of Port Phillip did not at once conduce to the extension of permanent settlement there. Captain Flinders, who visited it in May, 1802, in H.M.S. *Investigator*, and, surveying it from the top of Station Peak, one of the You Yangs, realized the importance of it, did indeed report upon "the goodness of the soil and natural advantages". But there was not yet any real necessity to expand beyond the environs of Sydney; and it is not probable that any effort would have been made to occupy positions elsewhere, on the mainland or in Van Diemen's Land, had there not been a fear that if the British did not take possession of desirable positions the French would. In 1802 two French discovery ships visited Australian waters under the command of Commodore Baudin. They spent some weeks in Port Jackson, where Governor King entertained the suspicion that, though their ostensible object was scientific research, their real purpose was to spy out the land with a view to French colonization. "This", he wrote to the Secretary of State, "I cannot help thinking, is a principal object of their researches."

It was to frustrate this supposed design that the British Government ordered the establishment of the first Port Phillip settlement. Suspicion of Napoleon Bonaparte was at that time deeply rooted in the minds of Englishmen, and Bonaparte, then First Consul of the French Republic, had authorized the despatch of Baudin's expedition. A few years later (1807), when an official history of the voyage was published in Paris, the whole coast of Victoria from Wilson's Promontory westward formed part of the region which the French designated *Terre Napoléon*. That Bonaparte ever intended to form a French colony in Australia there is no evidence to show; but that it should have been believed that he did was quite natural.

### Early Settlements and Land Exploration

In 1803, a complete survey of Port Phillip had been made by Charles Grimes in the schooner *Cumberland*, under the command of Lieutenant Robbins. Grimes and his assistants discovered the River Yarra, which they ascended in a boat beyond the present site of Melbourne. But their report and chart had not reached England by the time the two ships which carried the first settlers set sail. These vessels, the *Calcutta* and the *Ocean*, conveyed nearly 400 persons, including 299 male convicts, the whole under the command of Lieutenant-Colonel David Collins.

They arrived in Port Phillip in the first week of October, and Collins chose to land them on the sandy Nepean peninsula, about half-a-mile to the east of Sorrento. There was no adequate supply of fresh water, sand and thick scrub were abundant, there was neither good timber for building nor grass for cattle. Collins, indeed, put no heart into the enterprise. He did not like his task, and seems to have been eager to justify an early abandonment of it by demonstrating that Port Phillip was not worth occupying. The bay, in his opinion, was "wholly unfit" for occupation; it was situated "in a deep and dangerous bight"; if he removed the settlement to the upper part of the harbour, the blacks were so numerous and so savage there that he would require four times the force he then had to act as a guard; and, in short, it was such an "unpromising and unproductive country" to which he had come that the sooner he got away from it the better he would be pleased. Governor King, in view of these pessimistic reports, authorized the abandonment of the settlement, and on 30th January, 1804, Collins took his people away to Hobart, after a disappointing and unenterprising experiment of less than four months.

There was one other abortive settlement on Victorian soil before systematic occupation commenced. In 1826, the British Government became aware that a fresh French expedition of discovery was to visit the south seas, under the command of Dumont D'Urville, in the ship *Astrolabe*. Napoleon had died in 1821, and assuredly Great Britain had no fear of the restored Bourbon monarchy. But still it was considered advisable to be cautious, though the French professed that they had none but scientific ends in view. Governor Darling was therefore warned to take steps to establish posts on the south coast and the west of the continent. He at once ordered the despatch of a party to Western Port to occupy it. The place where they established themselves was at Settlement Point (otherwise called Red Point), on the western side (24th November, 1826). As a device for preventing the French from settling, if that had been the intention, the expedition of 1826 was a total failure, because in fact the *Astrolabe* had already called at Western Port, made such scientific investigations as the French captain desired, and departed. There was therefore no object in maintaining the settlement. Governor Darling consequently ordered its withdrawal, and Captain Wright and his party returned to Sydney in January, 1828, after an occupation of only a little over a year.

Attention must now be directed to the four principal land journeys by which the value of the province south of the Murray was made known.

In 1824, Hamilton Hume, an experienced bushman, and Captain Hovell, a retired seaman, organized and led the first expedition to traverse Victoria. On 16th December they reached the seashore, and both of them believed they were at Western Port. In fact, however, they had mistaken their whereabouts, and had reached the shores of Port Phillip Bay, within 10 miles of the site of Geelong. The journey, despite the mistake of the leaders, was of very great importance. They discovered the River Murray (which they named the Hume), the Mitta Mitta, the Ovens and the Goulburn; and they named Mount Disappointment. It was from a word picked up by Hume and Hovell from the aboriginals that the town of Geelong derives its name. "Jillong" was the name of the bay upon which the town now stands.

In 1829, the most famous of Australian inland explorers, Charles Sturt, traversed the whole course of the River Murray from its junction with the Murrumbidgee to the sea, and gave the great river the name it bears—which was that of Sir George Murray, the Colonial Secretary at the time. It should be insisted, however, that Hume and Hovell were the discoverers of the river, though they did no more than cross it.

The second important land journey across Victoria was that of Major Mitchell, in 1836. Mitchell, who was the Surveyor-General of New South Wales, was instructed to trace the course of the Darling till it joined the Murray, and then to examine the country to the south of the main stream. After completing the first part of his task, Mitchell traversed the course of the Murray upstream to a point a few miles beyond the inflow of the Murrumbidgee, and then crossed to the south side. He kept fairly close to the left bank till he reached the Loddon at Swan Hill, when he decided to follow the valley of that river inland. That course opened out upon the broad rich pastures watered by the southern tributaries of the Murray. Ascending Pyramid Hill, Mitchell saw on all sides far-spreading plains shining "fresh and green in the light of a fine morning". Travelling south-west and south through the extreme Western District of Victoria, the explorer at length came upon the Glenelg, and followed it to the sea. When he turned homeward, determining to take a more easterly route, he halted his party for a rest in a pleasant spot about 15 miles north of Portland, while he with a few companions rode down to have a look at that harbour. There, to his great surprise, he found the Henty brothers in occupation, with huts built, livestock prospering, land under cultivation, and a serviceable whaling schooner at anchor in the bay. On the return journey Mitchell ascended Mount Macedon, which he named, crossed the Campaspe, the Goulburn and the Ovens, and negotiated the Murray about 20 miles west of Albury.

The penetration of the difficult mountainous district of Gippsland was the work of a small group of explorers. In 1835, George McKillop, of Hobart, in search of pastures, crossed the Monaro tableland and the Snowy River, and got as far as Omeo. Andrew Hutton, in 1838, during a drought, brought 500 head of cattle along the coast of Gippsland as far as Lakes Entrance. But the aboriginals were very troublesome, spearing the cattle and menacing the whites. At length, Hutton and his companion, to save their lives, had to retire, leaving the blacks in possession of the stock. In 1839, Edward Bayliss followed the valley of the Snowy River as far south as Buchan, also in search of pastures. In 1839–40, Angus McMillan, an adventurous young highlander, made three very courageous journeys along the Tambo valley, determined not only to open up pasture lands, but also to find a port whence cattle might be shipped. With severe labour he did at length cut his way through to Port Albert, where afterwards a township was founded. Gippsland received its name, however, from the Polish savant, Count Strzelecki, who, pursuing geological researches in 1839–40, followed McMillan's tracks down the Tambo, skirting Lake Wellington, where he struck off practically along the route of the present Gippsland Railway, and reached the infant town of Melbourne on foot on 28th May, 1840.

**Pastoral Foundations**

In the decades before Victoria was finally settled, small groups of sealers and whalers landed for short periods at several points along the coast while pursuing their trade. Very little is known of their activities; some of them were certainly escaped convicts. One of the centres of activity was Portland Bay and here, in 1833, a young man arrived in search of suitable land for permanent settlement. Edward Henty was one of a family which had spent four discouraging years in Western Australia and Van Diemen's Land searching for good, cheap land. The reconnaissance was encouraging.

The Hentys were the forerunners of a dynamic pastoral expansion from Van Diemen's Land to the mainland shores. Many Launceston people knew about the quality of the country on the other side of Bass Strait, from sealers and from the Henty family, not to speak of the published accounts of Hume and Hovell's expedition. Indeed, as early as 1827 two Launceston men, J. T. Gellibrand and John Batman, had unsuccessfully applied to Governor Darling for grants of land at Western Port. A syndicate of fifteen Launceston men—the Port Phillip Association—fitted out an expedition to explore Port Phillip for pastoral purposes; and on their behalf, Batman set sail in May, 1835. He landed near Indented Head, and traversed country which filled him with astonishment. He had never seen anything to equal it. On several successive days he made excursions, and on one of these, at a place which the best analysis of the evidence identifies as being on the Plenty River, 2 or 3 miles above its junction with the Yarra, Batman went through the form of negotiating with seven alleged chiefs of the aboriginals the purchase of 600,000 acres of land, in return for a parcel of mirrors, knives, beads and other cheap goods. Before returning to Launceston, Batman took a boat up the Yarra to get fresh water; and there, when he saw the slope upon which Melbourne is built, he wrote in his diary, "This will be the place for a village". Meanwhile, another Launceston group, under the leadership of John Pascoe Fawkner, had fitted out a rival expedition to explore Port Phillip. The employees of this syndicate entered the Bay in August, 1835, and decided to settle on the very spot which Batman had marked down as his "village".

By the beginning of 1836 men and sheep were beginning to pour in through the gateways of Melbourne, Geelong and Portland and were fanning out into the interior. Soon after Mitchell's return to Sydney, the first overlanders began to cross from the Sydney side. Within five years the whole of the Port Phillip District, except for rough country, was occupied by the "squatters".

In the eye of the Government in Sydney all these unauthorized "squatters" on Port Phillip lands were trespassers, and neither Batman's "treaty" nor the claims of the Hentys and others were recognized as valid. But it was impossible to keep off "intruders" merely by issuing warnings. The Colonial Office in England was at this time sternly opposed to the extension of settlement. It already had enough Australian colonies on its hands, and they had been a

source of expense and vexation. But the Governor in Sydney knew that it was impossible to stem the tide. Valuable pasture lands were unoccupied, and owners of flocks and herds were eager to avail themselves of them. The number of settlers increased, notwithstanding Sir Richard Bourke's solemn proclamation, with its threats. Disputes with natives occurred, and some blood was shed. A police magistrate was sent to report, and in June, 1836, he found nearly 180 white people residing on the banks of the Yarra, with sheep, cattle, horses and farm implements to a total estimated value of £80,000. Since it was clearly impossible to prevent people from living there, it was necessary to provide for governing them, and that Governor Bourke did in September.

He sent over from Sydney Captain William Lonsdale to act as magistrate, and to take "the general superintendence in the new settlement of all such matters as require the immediate exercise of the authority of the Government". Lonsdale arrived in Port Phillip on 29th September. One of his first tasks was to determine whether the permanent settlement should be where Batman's and Fawkner's people had already built their huts. In some respects Lonsdale considered Gellibrand's Point (Williamstown) to be preferable; but the water supply there was inadequate. Finally, he "fixed upon the place already chosen as the settlement, where the greatest number of persons reside". Governor Bourke, who visited the settlement in March, 1837, confirmed the choice, and named the "village" Melbourne, after the Prime Minister. The surveyor, Hoddle, who came over from Sydney with the Governor, laid out the streets on a well-considered plan, and the first land sale was held on 1st June.

Lonsdale continued to administer the settlement till October, 1839, when C. J. La Trobe took charge as Superintendent. Population increased rapidly. Melbourne spread beyond the limits of Hoddle's survey and formed suburbs. The Port Phillip District, as the province south of the Murray was called, prospered greatly. In 1842, Melbourne was incorporated as a town, with a mayor and councillors. The first mayor was Henry Condell, brewer.

The first matter of public policy upon which there was strong feeling in the new province related to the admission of convicts. The Port Phillip District was, of course, a part of New South Wales, and that colony had been founded primarily as a place for the reception of persons transported for breaches of the law of England. The early landowners had convicts "assigned" to them as servants. Indeed, there was scarcely any other labour available for country industries. But an antagonism to convict labour was growing in Australia, and especially in Port Phillip was there a decided feeling against it. In 1839, the British Government came to the conclusion that a change ought to be made in the system, and Orders in Council were issued which put an end to the introduction of transported persons to New South Wales, though still permitting them to be taken to Van Diemen's Land. This change had two effects. It glutted Van Diemen's Land with convict labour, and at the same time it dried up the source whence the squatters of the mainland had hitherto drawn their labour supply. Many Port Phillip pastoralists complained. They did not like convict labour, but they said they could get no other.

The British Government, in face of this situation, determined to reintroduce convictism in another form. The "conditional pardon system" purported to subject offenders to a course of discipline in an English prison, and then to land them in specified colonies, where they would be unrestrained, provided that they did not return to England during the currency of their sentences. Under this system a shipload of convicts was landed in Port Phillip in 1844. There was intense indignation in Melbourne, but the Government in England ignored the protests of the inhabitants. The conditional pardon system, however, was not a success, and in 1848 it was determined that convicts should be sent out with tickets of leave, the holders of which would have to report themselves to the police at stated intervals. Again Port Phillip was to be a receptacle for the offenders. But now the indignation of the Melbourne people blazed up angrily. Excited meetings of protest were held, and the newspapers and public men demanded that resort should be had to force to resist the landing of any more convicts. When the ship *Randolph* entered Port Phillip on 8th August, 1849, with a cargo of ticket-of-leave men on board, the menace of resistance on the part of the public was so serious that La Trobe took upon himself the responsibility of ordering the captain not to land his freight but to take them round to Sydney. The same was done when the *Hashemy* arrived with a similar company in May. The strong feeling aroused on this subject and the formation and leadership of a solid body of public opinion on a crucial matter of public importance, did much to engender an independent political spirit among the Port Phillip people. Already there was a feeling that the connexion with New South Wales should be severed.

### **Separation from New South Wales**

Since 1842 the Port Phillip District had had representation in the Legislative Council of New South Wales. In that year an Act of the Imperial Parliament set up a Council of 36 members, of whom 24 were to be elected and twelve nominated. Six of the elected members were allotted to the Port Phillip District, and one of these was to represent the town of Melbourne. There were two candidates for the Melbourne seat at the election in June, 1843—Edward Curr and the mayor, Condell. Sectarian bitterness was introduced to the contest, Curr being a prominent Roman Catholic, while Condell was put forward as the Protestant champion. When the poll was declared, and Condell was elected by 34 votes (295 to 261), there was some rioting, which had to be suppressed by the military.

But representation in the Legislative Council of New South Wales was never a real thing to the Port Phillip people. Sydney was far away and difficult of access, and there were very few men with an aptitude for politics who could spare the time and afford the expense of detaching themselves from their business interests and residing in Sydney while the Council was in session. Consequently the representatives elected were generally Sydney men. Indeed, before the end of 1844, not a single Port Phillip resident was among the six representatives. Dissatisfaction with the system increased. The Port Phillip people felt more and more that their interests were different



from those of persons who lived nearer to Sydney. They complained that a large part of the land and general revenue collected in their province was expended on the Sydney side, that their requirements were neglected, that the disposition of the Council was to thwart the development of Port Phillip. The nature of the feeling may be illustrated by the fact that, at a "separation banquet" held in Melbourne in 1846, there was exhibited over the chairman's table a painting representing Prometheus chained to the rock and a vulture gnawing at his liver; and one of the contemporary newspapers observed that "a very forcible parallel exists between this famous supposition of ancient mythology and the treatment Port Phillip receives from Sydney". These discontents were more emphatically pronounced in 1848, when the electors of Melbourne chose Earl Grey, the Secretary of State for the Colonies, to represent them in the New South Wales Council; not, of course, that they expected that he would ever take his seat, but because they desired by means of a farcical election to express their sense of the futility of the existing system. Earl Grey continued to be the member for Melbourne till 1850, when William Westgarth was elected. An attempt was also made to induce the electors of Port Phillip—apart from Melbourne—to elect the Duke of Wellington, Lord Palmerston, Lord Brougham, Lord John Russell, and Sir Robert Peel, but this failed.

The action which had been taken, however, sufficed to concentrate attention upon the dissatisfaction of the Port Phillip people. The result was that, by an Act passed by the Imperial Parliament in 1850, the Port Phillip District was separated from New South Wales. The Privy Council Committee of Trade and Plantations, which reported generally on the subject of Colonial Government in 1849, and which recommended that a new colony should be formed of Port Phillip, advised Queen Victoria to confer her name upon it, and the Queen signified her acquiescence.

The Act of 1850, which gave to Victoria separate political existence, at the same time conferred a constitution upon the colony. It came into operation on 13th January, 1851; but the Legislative Council of New South Wales, which was still the properly constituted legislative authority, had to make provision for dividing the colony into electoral districts before practical effect could be given to it. The Governor of the parent colony issued the necessary writs for the election of members of the new Victorian Council on 1st July, 1851, and that date for long was celebrated as "Separation Day" in Victoria.

The constitution placed at the head of the Government of Victoria a Lieutenant-Governor, and to this office the former Superintendent, La Trobe, was appointed. There was one house of legislature—the Legislative Council—consisting of twenty elected and ten nominated members. The franchise was conferred upon owners of freehold property to the value of £100, householders whose dwellings were valued at £10 per annum and upwards, holders of pastoral licences, and leaseholders of property valued at more than £10 per annum. Of the ten nominated members, five were official, and formed the Executive of the colony.

### **The Gold Rushes**

The new Government had scarcely got to work when the whole complexion of Victorian affairs was changed by the startling gold discoveries. A pastoral community suddenly found itself rushed by a motley population attracted from the ends of the earth, the quiet little port of Melbourne became crowded with shipping, and the rulers of the country were confronted with new and unexpected problems. Important gold discoveries had been made in the Bathurst district of New South Wales only a few weeks before the first Executive Council was sworn in. People in Victoria now began to attach significance to finds of pieces of gold which had from time to time been made within a few miles of Melbourne. As early as 1847 a shepherd had picked up a nugget in the roots of a tree which the wind had blown down. Another shepherd had brought in 22 ounces from a gully at Mount Buninyong. Small parties went out and searched in the Plenty Ranges, the Pyrenees, and along the Upper Yarra. A committee of Melbourne citizens formed in 1851 under the chairmanship of the Mayor, William Nicholson, reported that there was undoubted evidence of the existence of gold-bearing rocks. A reward was offered to whomsoever should discover a payable gold mine within 200 miles of Melbourne. Very soon there was no need to offer the stimulus of rewards; the exciting hunt for gold and the exceeding great yields were an ample recompense to many thousands.

The great rush commenced after August, 1851, when sensational discoveries were made at the hamlet of Buninyong, close to what was soon to be known throughout the world as the wonderful Ballarat gold-field. In October of that year La Trobe reported that "a very considerable amount of gold" was coming from the Buninyong neighbourhood, and that eager searchers were "pouring into the district". In November the rich deposits of Mount Alexander were tapped; in the same month came startling tidings of the auriferous wealth of Bendigo. Shepherds and farm hands fled to the diggings; tradesmen threw down their tools, bought picks and shovels, and hurried off to Bendigo, Castlemaine, or Ballarat; civil servants gave up their appointments to go digging. Before the end of 1851 nearly a million pounds' worth of pure gold had been won. "I can contemplate no limit to the discoveries or the results of the opening of these fields," wrote La Trobe in a despatch at the end of the year; "meanwhile, the whole structure of society and the whole machinery of government is dislocated". It was so; and naturally. The machinery of government in this infant colony, which less than twenty years before had contained no white inhabitants, and which had an independent administration of its own for only a few months, had been constructed for the purposes of a country in which there was only one considerable town, where the settlement beyond the centre was sparse and scattered, where there were few roads, where the police force was small, and the revenue trifling. At the census taken in March, 1851, the total population was 77,000, of whom 46,000 resided outside the two towns of Melbourne and Geelong. Before the end of that year it had increased by 20,000; and by the end of 1852 it had risen to 168,000. The incursion of this

sudden flood of eager, jostling, excited people from Great Britain, the continent, and the United States, and elsewhere, virtually swept the Government off its feet.

A despatch from the Imperial Government informed La Trobe's ministry that, as they were responsible for the maintenance of law and order, they were at liberty to make such regulations as they pleased for deriving revenue from gold mining; and it was but reasonable that the large extra expense thrown upon the Government by the opening of the diggings should be largely borne by the rich yields of the mines. Legally the gold belonged to the Crown, and the Government had a right to demand a proportion of it. But how to obtain a fair share, and not do injustice, did not seem to be easy to determine. In New South Wales the Government had adopted the expedient of issuing licences to diggers, charging a fee of 30s. a month. The Victorian Legislative Council adopted the same plan. The collection of the licence-fees was entrusted to the police. The police were charged with being rough and overbearing in pursuit of their duty, and there is evidence that in many instances they were. But they had a very rough task. Among the diggers were ex-convicts as well as many eminently respectable men; and the licence system became so unpopular that it was almost inevitable that bitter feeling should arise between those who had to collect and those who had to pay. Undoubtedly cases of injustice occurred; and the magistrates were prone to accept the word of the police whenever a digger was brought before them. But, apart from the angry disposition thus generated, the licence system was inherently unjust. The element of luck played a great part in gold mining, and those who had the good fortune to possess a good claim could pay 30s. per month easily. But those whose labour was not well rewarded, could ill afford the impost; and the cost of the necessaries of life on the diggings was very high.

The agitation for the abolition or reduction of the licence-fee was intermingled with a demand for political reforms. The miners were not entitled to the franchise under the existing Victorian constitution, and they protested against the exclusion from direct representation in the legislature of a class whose industry furnished about one-half of the total revenue of the colony. So strong did the discontent become that placards were erected on the diggings declaring that any miner who paid the 30s. fee should be treated as a traitor, and be warned to quit the gold-fields. A Bill passed in 1853 reduced the amount of the fee to £1, but still left the collection of it in the hands of the police, and, therefore, only modified the ill-feeling to a trifling extent.

Discontent arising from these and other causes culminated in 1854 in the famous incident of the Eureka Stockade. The basic cause of the outbreak was the license system; but mixed up with it was political agitation on the lines of the English Chartist programme.

The Ballarat Reform League pressed forward a programme of sweeping constitutional reconstruction. A new Lieutenant-Governor, Sir Charles Hotham, had arrived in Victoria in June 1854, La Trobe having resigned office in a depressed and disappointed condition of mind. Fearing that the police force at Ballarat was inadequate to

maintain order, Hotham, in November, sent up 80 men of the 40th Regiment to reinforce them. The arrival of the advance guard aroused anger and suspicion, and a crowd of armed diggers set out to intercept the main body. An altercation with the officer in charge, Captain Wise, was followed by a sudden attack upon the contingent. The soldiers were overpowered, the ammunition waggon was captured, the baggage cart was overturned, and the troops, surprised and outnumbered, were driven in flight to their camp. After this violent rupture, further trouble was to be expected. When in a state of great tension a provocative "digger-hunt" was carried out, Peter Lalor, foremost among the leaders of the diggers—for he was a man of commanding presence and convincing speech—urged that the miners should organize themselves to resist, and should solemnly pledge themselves to pay no more licence-fees. Companies of armed men drilled, and a rough kind of fort was built of logs and slabs on a piece of land known as the Eureka lead, flanking the main road from Geelong to Ballarat. On the night of Saturday, 2nd December, there were about 200 men inside the stockade. Captain Thomas resolved to force the issue forthwith. At 4 o'clock on the Sunday morning, his little company of 276 men—182 troops and 94 police—was quietly marched to the stockade. The alarm was given by a sentry when the assailants were about 300 yards away. When the soldiers and police had covered half the remaining distance, a volley from the stockade killed an officer (Wise) and two privates. An answering volley from the Government forces swept the logs, the order to charge was given, and in the grey light of early dawn the rough defences of the stockade were rushed. In a few seconds the well-armed and disciplined company was in among the defenders, many of whom had nothing better than pikes to fight with. There was a smart struggle for about a quarter of an hour, when the garrison of the Eureka Stockade were completely defeated. Twenty-four are known to have been killed, and probably others died of wounds while in hiding. Four of the troops were killed, and a dozen wounded. The sympathy of the mass of the population of Victoria was with the insurrectionists; and, though thirteen men were put on trial for participation in the rebellion, not one of them was convicted. Peter Lalor, who was severely wounded in the fight, was hidden in a hole covered with slabs, and was afterwards helped to escape. He was held in high honour by the Ballarat miners, was elected to Parliament by them, and eventually became Speaker of the Legislative Assembly in 1880. One result of this unfortunate quarrel was that the obnoxious licence-fee system was abolished, and there was substituted for it an export duty and a miner's right, for which the digger paid £1 per annum, and which conferred upon the holder ownership of his claim and of the gold extracted from it. A further redress of grievances took the form of direct representation of the goldfields' population in the Victorian Legislative Council. The size of the Council had been extended first in 1853 by the addition of 24 seats, of which sixteen were elective and eight nominee; and now again, after the Ballarat troubles, in 1855 twelve new seats were created, eight of which were given to mining districts, whilst the franchise was extended to any man who had occupied or mined on Crown land for upwards of three months. These extensions brought the size of the first Victorian Legislative Council up to 66 members in 1855, the last year of its existence.

### Responsible Government

The time, indeed, was ripe for a complete change in the constitutional system of the country; and that change must be attributed, not to the events which have just been described, but to a general liberalizing process which affected the whole of the Australian colonies. The year 1855, indeed, is the year of the attainment of responsible government by the Australian people. As far as Victoria is concerned, the offer of responsible government was made from England, not conceded in response to a local demand. The constitution of 1850 had not given complete satisfaction in New South Wales, where Wentworth had powerfully advocated the substitution of a form of government on the British model—with two legislative houses, and a cabinet of ministers responsible to the popularly elected house—for government by Governor and appointed ministers in co-operation with a partly elective, partly nominee Council. New South Wales, through its Council, was invited to construct a constitution for itself, taking the Canadian constitution for a model; and the Secretary of State for the Colonies, when conveying this intimation to New South Wales, at the same time sent a despatch to the Victorian Lieutenant-Governor, “offering to the colony of Victoria the same concession on the same terms”. A committee of twelve members of the Legislative Council was appointed to prepare a draft constitution, which was produced in December, 1853. The scheme was considered by the whole Council in 1854, and was sent to England in the form of a Bill in March of that year. Lord John Russell, then Colonial Secretary, submitted to the House of Commons a Bill to enable the Queen to assent to a Bill “to establish a constitution in and for the colony of Victoria”, and this measure received the Royal assent in July, 1855. Some alterations were, however, made in the measure by the Imperial Government and Parliament, principally because the Bill sent to England exceeded the powers conferred upon the Victorian Legislative Council by the constitution of 1850. It repealed certain Imperial statutes, and it handed over the disposal of Crown lands to the proposed new Victorian legislature. The new constitution was brought into operation by proclamation in the *Government Gazette*, dated 23rd November, 1855. The first Premier (Colonial Secretary) was William Clark Haines.

The constitution thus brought into existence set up two houses of legislature: a Legislative Council and a Legislative Assembly. The Council consisted of 30 members, elected by six large provinces. A member was elected for ten years, and the Council as a whole could not be dissolved. One member for each district was to retire every two years. The elective principle for the Council was deliberately adopted, in contrast with the course followed under the New South Wales constitution of 1855, where the system of nomination was preferred. The qualification for election to the Council was the possession of freehold property to the value of £5,000, or worth £500 a year; a member had, also, to be 30 years of age. The Council could not amend a Bill for appropriating revenue or for imposing any duty or tax; but it was empowered to reject such a measure.

The Legislative Assembly under the 1855 constitution was composed of 60 members, and there were 37 constituencies. It was elected for five years. The qualification for membership was possession of freehold

property to the value of £2,000, or worth £200 a year. The qualification of electors was possession of freehold property worth £50, or £5 per annum; or occupation of leasehold property worth £10 per annum; or the earning of a salary of £100 per annum; or the occupation of Crown lands for pastoral or mining purposes for the space of twelve months. The Legislative Assembly was entrusted with the exclusive power of origination of all Bills appropriating revenue or imposing taxes, duties, and imposts.

With this legislative machinery Victoria commenced at the end of 1855 to manage its own affairs under responsible government. It had at that time a population of nearly 320,000—as many as the rest of Australia held before the gold rushes—and a public revenue of about £3,000,000. It was given complete control over an estate of 87,884 square miles—nearly the size of Great Britain. It was mining one-third of the world's gold production. As yet few manufacturing industries had been established. Five years before the dawn of responsible government it had possessed little more than the pastoral industry and minor avocations consequent and dependent upon it. But the economic as well as the political character of the country had undergone rapid and sweeping changes. As a whole the new migrants, in terms of education and manual skills, were amongst the best ever to leave Great Britain. The enormous inrush to the goldfields brought fresh ideas, additional requirements and a powerful impetus to reconstruction almost before the new constitution had begun to work.

### **Constitutional Changes**

Even before responsible government came into being, Victoria had made one of those changes which, from time to time, have invested her legislative experiments with interest for students of politics in other parts of the world. When, during the last weeks of the existence of the old Legislative Council, an Electoral Bill was under consideration for the purpose of bringing the new Parliament into existence, William Nicholson proposed that voting should be by ballot. Haines, who had only very recently been selected by the Governor to be the first head of a constitutional Government, not only opposed the motion, but chose to make it a vital matter of ministerial policy. Nicholson did not wish to displace the Government, but he insisted on pressing his ballot motion, which was carried by 33 votes to 25. Thereupon Haines resigned (December, 1855). The Governor, following constitutional usage, sent for Nicholson, who, however, was unable to form a workable Ministry. Haines thereupon agreed to resume office, and accepted the ballot clauses in the Electoral Bill. At this time, the ballot had not been adopted in connexion with electoral machinery in any part of the world. Subsequently, in England and America, when the ballot was proposed, it was generally referred to as the Victorian or Australian ballot. Indeed, the new system was a signal success.

The Constitution gave power to the Victorian Parliament “to repeal alter or vary” the Act itself; provided that the second and third readings of amending Bills were passed by an absolute majority of the Council and Assembly. The Parliament very soon exercised its power of amendment. In 1857, the property qualification for membership of

the Legislative Assembly was abolished, and manhood suffrage was adopted; and in 1859 the duration of Parliament was reduced from five years to three. The number of members of the Assembly was increased from 60 to 78 (1858). A further increase to 86 members was made in 1876, and to 95 members in 1888. The number of members was reduced in 1903 to 68 and in 1906 to 65, and was increased to 66 in 1953.

The franchise was conferred upon women by the Adult Suffrage Act of 1908, which applied to both Houses of the Legislature. In 1899, plural voting for the Assembly was abolished, it being provided that no person should on any one day vote in more than one electoral district. Plural voting was abolished for the Upper House in 1937.

### **The Land Question**

In the 1850's land legislation began to assume an importance which transcended interest in constitutional reform. There had never been, on the south side of the Murray, those enormous alienations of land, as free grants or on very cheap terms, which had characterized public administration in the early years of New South Wales. Batman's widow was not even allowed to keep the little plot of ground upon which he had erected a modest wooden cottage in his "village", and the claims of the Henty family to the land which they occupied at Portland were rather haughtily scorned by the austere authorities. Ultimately, after persistent appeals, the Hentys were granted land and some monetary compensation.

The first colonists of Victoria, in fact, were subject to the Land Regulations of 1831, which ordered that public lands were not to be disposed of otherwise than by public sale at auction at a minimum price of 5s. per acre. In 1840 an unfortunate experiment was tried: lands outside a 5-mile radius of the towns were sold at a fixed price of £1 an acre. Valuable suburban lands were thus alienated at absurdly low prices, especially to a few holders of "Special Surveys" who were allowed to select 5,120 acres each. In 1842 the auction principle was re-introduced, but at a starting-point of £1 an acre. Before the gold rushes less than 250,000 of the colony's 56,000,000 acres were alienated. By 1860, when the first Selection Act was passed, about 4,000,000 acres had been sold.

For a long time the pastoralists were not interested in buying land, but were concerned primarily to gain secure leases of their runs. From the late 1830's they held their runs under an annual £10 licence and they also paid a stock tax. After much agitation among interested persons, in England as well as in Australia, regulations were issued in 1847. These regulations applied to the whole of New South Wales, including the Port Phillip District, and they divided the whole of the lands into three categories—settled, intermediate and unsettled. In "settled" areas pastoral runs might only be leased for one year; in "intermediate" areas for no longer than eight years; in "unsettled" areas for fourteen years. First right of purchase of parts of their runs was also granted. For various reasons the leases were never issued in the intermediate and unsettled districts; the squatters continued to

hold their runs on annual licence. Nevertheless, the effect of the Order, in the great majority of cases, was to give the squatter security in his run until the selection period of the 1860's. By 1855, 5,000,000 sheep and close on 500,000 cattle were depastured on about 1,000 runs. In the early 1850's most squatters exercised their right of pre-emption on their homestead areas and those who could afford to, purchased additional parts of their runs.

When responsible government was conferred upon Victoria (1855), the Imperial Parliament repealed the Crown Land Acts, and thus threw upon the newly-elected Parliament of the colony the whole responsibility for land legislation. The list of Land Bills considered and Acts passed, from the time of the first Haines Ministry, is very long; and the purposes which the various measures were intended to secure illustrate the phases of development through which Victoria has passed. Efforts to provide easy facilities for men of small means to settle on farms were made as early as the Land Act of 1860. The Duffy Land Act of 1862 opened 10,000,000 acres of land for settlement in agricultural areas, and permitted selectors to pay for their holdings on easy terms; but they were required to make substantial improvements. The Act failed in its objectives; the squatters were able to buy cheaply almost the whole of the Western District. Later Acts were more successful. An amending Act of 1865 was designed to prevent settlers from selling their holdings, and it did not permit the fee-simple to be acquired till the settler had resided three years and effected improvements to the value of £1 per acre. A consolidating Land Act of 1869 reduced the size of agricultural areas from 640 to 320 acres, and made improvements in details of administration, always with the object of promoting agricultural settlement and increasing the stability of the farming class. A new class of measure appeared in 1883, in the shape of the first Mallee Lands Act. The north-western area of Victoria, a light soil covered with mallee scrub, had been regarded in earlier years as useless country. But pastoralists were extending their operations, and discovered that the Mallee contained valuable grazing land. A little later, large wheat-growing areas were opened up in the same part of the country. A large consolidating Lands Act, of 1890, classified the lands of the colony into eight divisions, according to their quality and capabilities. Another phase of land legislation commenced in 1898, when the first of a series of measures was introduced to enable privately-owned lands to be purchased by the Government for purposes of closer settlement.

Thus, within a little over half a century, the country passed through a series of remarkably rapid changes in regard to its territory. First, there was the period of unauthorized occupation; next, the period of regulated occupation in large areas for pastoral purposes; thirdly, the period of the beginning of agricultural settlement; fourthly, the period of the rapid absorption of the most fertile land by selectors and other purchasers; fifthly, the period when the demand for cultivable areas was in excess of the supply, and the attention of Governments had to be directed to schemes of repurchase.

Although the early Selection Acts had had such limited success, in the 1870's the Wimmera was largely occupied by farmers. By 1875, Victoria at last became self-supporting in wheat; in 1890, with the



settlement of parts of the Mallee and the dry northern plains, Victoria was Australia's biggest wheat producer. Many thousands of farmers had failed financially, but the area under crop had been multiplied by five between 1860 and 1890 and was more than twice as great as that in New South Wales.

In the period between 1860 and 1890, the mining industry gradually collapsed. In the early 1860's Victoria lost population when many miners were attracted to New Zealand. In 1858 there were 147,000 miners; by 1891 only 23,000. From the late 1850's the number of individual miners working on alluvial rapidly declined and most came to work for companies on deep alluvial or quartz leads. A very few companies proved to be enormously successful; thousands never paid a dividend. On the major goldfields important towns, especially Ballarat and Bendigo, grew up, and in them were nurtured a large proportion of the most distinguished Victorians.

### **Constitutional Quarrels**

For about sixteen years, from 1864 to 1880, Victoria was in a condition of bitter political turmoil, arising out of disputes between the two Legislative Houses; and these disputes themselves afforded violent evidence of the emergence of new political forces which completely changed the policy of the country. A strong party had arisen, consisting largely of workers in town industries and miners, which advocated the imposition of customs duties on goods which could be manufactured in Victoria. Its purpose was to protect local manufactures. This party was strong enough at a general election in 1864 to return to the Legislative Assembly a majority favourable to the protective policy; and the Ministry of James McCulloch, which had come into office before the election, and was strengthened by the verdict of the country, determined to bring forward a protective tariff. The opposition to this policy was, however, very vigorous and influential, and McCulloch was aware that it was well represented in the Legislative Council. A measure which he introduced to reform that House by reducing the property qualification and shortening the ten years' period for which its members were elected to five met with so swift a rejection from the Council that McCulloch was left in no doubt about the attitude of the House towards the policy of his Government. Calculating that the tariff would meet with a similar fate, he determined to adopt the bold course of "tacking" it to the annual Appropriation Bill. There was no provision of the written Victorian Constitution which forbade this device, though "tacking" was repugnant to British constitutional practice. The Council was debarred from amending a Bill imposing taxation or appropriating revenue, though it might reject such a measure. The "tack" was, however, taken as a challenge to the Council's legislative powers, and the House refused to pass the Bill, on the ground that it was contrary to constitutional usage and to the practice of Parliament "to introduce any clause or clauses of aid or supply, or any foreign matter, into a Bill of appropriation" (May, 1865). Thus commenced one of the bitterest constitutional struggles in modern history, and one which has ever since been a subject of interest to writers on parliamentary government.

McCulloch's device of borrowing money from a bank to carry on the ordinary functions of government, and allowing the bank to sue for its recovery; the sending up of the tariff apart from the Appropriation Bill, and its rejection because of its inclusion of clauses which the Council held to be foreign to its purpose; the appeal to the country at a general election (1866), and the return of a majority of the Assembly favourable to McCulloch's policy; the rejection again of the tariff by the Council; McCulloch's resignation, and the formal pledge of the Assembly that it would withhold support from any Ministry which did not press forward an Appropriation Bill containing the tariff; and the final conference between the two Houses, which led to the elimination of the offending provisions from the Appropriation Bill, and the acceptance of the tariff by the Council as a separate measure—all these were the main features of a parliamentary conflict which was full of exciting incidents.

The tariff struggle was immediately followed by another, no less intense in bitterness, with reference to a grant voted by the Assembly to Governor Darling. He had incurred the censure of the Colonial Office for his management of affairs during the tariff quarrel, and the condemnation was conveyed in such terms as made it plain that he would not receive another appointment after his recall from Victoria. The proposed grant took the form of a sum of £20,000 to be paid to Lady Darling. But the Government included the item in the ordinary Appropriation Bill, whereas the Legislative Council held that it ought to have formed the subject of a separate measure. Thus another furious quarrel was precipitated, which, fortunately, the Imperial Government ended in 1868 by granting to Sir Charles Darling a pension of £1,000 per annum for life.

Another constitutional quarrel began in 1877, with reference to a proposal to make payment of members the permanent rule in Victoria. Two Acts had previously been passed (1870 and 1874) making provision for the payment of members temporarily, but the Council was not favourable to the principle, and had been reluctant to pass a permanent measure for the purpose. The Ministry of Graham Berry, which came into office in May, 1877, proposed to give permanence to the policy, and chose to do it by including the necessary money (£18,000) in the Appropriation Bill. The Council, maintaining its attitude of refusal to permit extraneous measures to be included amongst votes for ordinary annual services, laid aside the Bill. Again public feeling was intense. The memorable feature of this struggle was the pressure put upon the Council by Berry through the dismissal from office of a large number of public servants, including County Court Judges, police magistrates, departmental secretaries, and others. These dismissals were announced on the evening of 8th January, 1878; the next day, when they became known to the public, was called "Black Wednesday". Berry's professed reason was that it was necessary to reduce expenditure because of the refusal of the Council to pass the Appropriation Bill. It was not doubted, however, that his real purpose was to exercise pressure. The immediate effect of the wholesale dismissals was to reduce the value of property and securities and cause a mild commercial panic. In order to meet necessary and urgent demands upon the Treasury, Berry induced the Assembly to resolve that "all votes or grants passed in Committee of Supply

become legally available for expenditure immediately the resolutions are agreed to by the Assembly". In accordance with this resolution, Governor Bowen signed "Treasury warrants", which enabled Berry to draw upon the revenue without the authority of an Appropriation Act. Shortly afterwards intermediaries arranged a means of settlement, and the Assembly withdrew the extraneous items from the Appropriation Bill, whilst the Council passed the Payment of Members Bill as a separate measure (March, 1878). Subsequently the legal advisers to the Imperial Government, who reviewed the facts of the case, laid down the principle that the Legislative Assembly was not justified in inserting a question of principle into an ordinary Appropriation Bill; and that public officials were not warranted in collecting taxes on the mere vote of the Legislative Assembly, nor in making payments which had not been authorized by statute.

### **Industrial Legislation**

One of the reasons advanced for the Payment of Members Bill was that it would enable the industrial classes, miners, and farmers to secure direct representation by men of their own kind in the legislature. The fact that such a demand was made, together with the achievement of the protective policy, indicate that Victoria had passed far over the threshold of the grazing and agriculture stage of development, and that manufacturing interests were now prominent in the community. Five years after the inauguration of responsible government, there were only 4,000 factory hands in Victoria. In 1880 there were over 28,000. This development necessitated legislation for the proper conduct of factories and workshops.

The first Victorian Factories Act was not passed till 1873. It was a very mild measure, prohibiting the employment of women in factories for more than eight hours, and its administration was entrusted to the local Boards of Health. A much more comprehensive Factories Act was passed in 1885, by which time there had been a marked expansion of industrial activities. The Act followed English legislation in making provision for government inspection, ensuring sanitary conditions and the general regulation of workshops. This was the foundation measure upon which several amendments were made in later years.

But the Victorian industrial legislation which has attracted most attention from students in other parts of the world is the Wages Board system. A Board of Inquiry appointed to inquire into the subject of "sweating" in certain industries revealed a condition of affairs so unsatisfactory that the Turner Government in 1895 considered that machinery was required for ensuring humane conditions of employment. The Chief Secretary in that Administration, Alexander Peacock, devised the system of appointing Boards, consisting of equal numbers of employers and employees, presided over by independent chairmen, in particular trades. As an experiment in industrial politics the project evoked great interest, and the working of it has been carefully studied by many sociologists. In the Act of 1896, provision for the appointment of Wages Boards was made only in respect of a small number of industries; but the success of the experiment led to the extension of the method to about 130 industries.

### **Political**

The line of party cleavage in Victorian politics shifted several times, and each change naturally corresponded with the broadly marked periods of the country's development. In the early years of responsible government, land questions were of pre-eminent importance. The interests of squatters, who required land in large areas for grazing, clashed with those of farmers who desired land for cultivation purposes; "unlock the lands" was the battle cry in the 1850's and early 1860's. When alluvial gold mining declined in yield and thousands of miners had to seek other avocations, the desire to extend the range and variety of the industries of Victoria presented itself in the form of a demand for protection. Both demands—for land legislation and protection—reflected the interests of the new generation of gold-migrants against the long-standing pastoral residents who dominated the Legislative Council. These issues largely defined political divisions until the 1880's when a long period of coalition government occurred.

In the 1890's a new group appeared on the political scene. Trade unions had been in existence as early as the 1840's. In the mid-1850's some twenty unions met with considerable success in their aims of improved working conditions and higher wages. The eight hours' day was accepted widely in industry in 1856 and the following years. A representative of the unions was returned to Parliament in 1859. But the gains achieved by the unions were not maintained in the 1860's. It was not until the 1880's that the unions came again in strength.

Payment of members did, as it was intended to do, enable the working classes to send their own representatives to Parliament; but the early Labour members, though acting together, were virtually an advanced wing of the Protectionist Party, with a natural inclination to emphasize the interests of trade unionists. They were hardly a separate party in the sense of having aims distinct from those of the party with which they almost invariably worked and voted. Thus, W. A. Trenwith, who was President of the Melbourne Trades Hall Council in 1888, and afterwards member for Richmond in the Legislative Assembly, acted as leader of the Labour Party in Parliament, but was not an advocate of independent Labour Party action. The distinct cleavage between Labour politics and other parties and groups in Victoria occurred after the establishment of the Commonwealth. Numerically, however, the Labour Party was strengthened after the great maritime strike of 1890, which commenced in Melbourne, and showed its effects so widely as to affect every industry and every colony in Australia. In the 1890's the Labour group supported the Liberal Party.

### **Chinese**

After the responsible government era, the influx of Chinese created alarm. The gold-fields attracted over 25,000 Chinese immigrants within four years, and they continued to arrive by every ship. The first Legislative Council sought to stem the tide by imposing a poll

tax of £10 per head on every Chinese immigrant. Further legislation was passed from time to time, but the poll tax was abolished in 1865. The agitation against the Chinese again became intense at the beginning of the 1880's. By that time, the thousands who had in earlier years found a living on the gold-fields had, owing to the decline of alluvial diggings, drifted into other avocations, and several city industries, notably cabinet-making, felt the pinch of cheap labour competition. In 1881 the Victorian Parliament, acting in conjunction with that of New South Wales, not only reimposed the £10 poll tax, but prohibited ships from bringing in more than one Chinese passenger for every 100 tons of the vessel's burthen. The validity of this legislation was tested in the case of *Ah Toy versus Musgrave*. In 1888, Ah Toy, a Hong Kong merchant, was debarred from entering Victoria, and he brought an action against the Collector of Customs, Musgrave, who administered the Exclusion Act. A majority of the Judges of the Supreme Court of Victoria decided in his favour; but the Government appealed to the Privy Council, which reversed the decision and laid down the principle that British colonies were empowered to legislate to exclude aliens. An Act of 1888 imposed stricter limitation on Chinese immigration. After Federation, the control of immigration passed into the hands of the Commonwealth Government.

### Boom and Depression

The rapid commercial expansion of Victoria was checked by several financial crises. The first of these happened in 1841-3, and was a consequence of gambling in land values, falling wool prices and other international and intercolonial pressures. The next crisis occurred during the flush of the gold discoveries. The sensational finds, and the overwhelming inrush of population, occasioned an enormous flow of imports to Victoria. Goods arrived faster, and in greater bulk, than they could be handled. The normal channels of trade were swollen and gorged with merchandise. Commodities deteriorated on the wharfs because they could not be conveyed to the distant places where they might have been sold. The goods which did get released were not always those which were useful. The imports in these years totalled over £70 a head of the population. (For purposes of comparison it may be noted that the total Victorian imports in 1900 were valued at £15 per head of the population). The losses were severe. It has been calculated that at least 20 per cent. of the imports were lost or destroyed, so that, notwithstanding the enormous gold exports, Victoria was left, during the years of glut, with a heavy trade balance against her.

The greatest period of commercial depression and financial paralysis sustained by Victoria occurred in 1892-3, following what was popularly known as the Land Boom. Extraordinary amounts of borrowed capital had poured into the colony during the seven or eight preceding years. The Government, municipalities, and public bodies borrowed millions from Great Britain, especially for railway construction. At the same time, millions of pounds were privately borrowed for investment. Land banks and building societies were created, with abundant money to lend, and extraordinary competition for suburban lands sent up values to unheard of heights. When the regular banks at last became cautious and refused to advance more money on the

security of real estate, the newly created land banks readily obtained more millions from speculators in Great Britain; and more and more suburban lands were sold. Melbourne, by now, was a city of almost half a million people. A sharp financial crisis in London in 1890—due to the failure of the great house of Baring—suddenly restricted lendings to Victoria. The greater part of the money already lent had not been invested in remunerative industries, but had been used to inflate land values for speculative purposes. When one of the most active of the building societies, which had received hundreds of thousands of pounds from investors, suspended payment, and it was found that its realizable assets were of trifling value, public confidence was shaken, and soon the whole edifice of credit was shattered. Bankruptcies were numerous, many of the so-called banks collapsed, and the shock of the failure was so severe that in 1893 most of the ordinary banks were forced into reconstruction. The blow to credit caused by the collapse was severe, and the efforts of legitimate industry were partially paralyzed. Victoria took long to recover from this demoralizing setback.

### **Victoria and the Commonwealth**

The movement for the Federation of Australia received powerful support in Victoria. Indeed, the impetus which at length drove the movement to successful fruition, had its origin in this State. That this should have been so is remarkable, in view of the very strong insistence on the separation of the Port Phillip District from New South Wales just before the end of the first half of the nineteenth century. The two tendencies—one separatist, the other Federal—might at first glance seem to be inconsistent. But in reality they were not. In the 1840's, when communication between Sydney and Melbourne was slow, the interests of the two communities were different. Over 600 miles of territory lay between them. South of the Murrumbidgee, the natural "pull" of trade was towards Melbourne; north of the river, it was towards Sydney. But railways and improved sea carriage, in effect, cut down the distance. Moreover, the development of the industries of Victoria soon enabled manufacturers to meet the demands of the local market, whilst their capacity for production was in excess of local demands. They required the wider scope which free trade between the States—a necessary concomitant of Federation—would secure for them. The Australian Natives Association, too—an organization of Victorian origin—was eager for Federation. The early history of the Federal movement, and its several misfortunes, are connected principally with the politics of New South Wales; but it was a Victorian, John Quick, who in 1893 furnished the scheme by which at length the cause advanced until the Commonwealth of Australia came into being in 1901. Quick propounded the plan of electing a Federal Convention, representative of the people of all the States, charged with the duty of preparing a constitution; and this constitution was to be submitted directly to the people for their acceptance or rejection. The plan worked, despite some delays and hindrances. New South Wales, after the Bill had passed the Convention, took exception to the provision in it which would have enabled the Federal Parliament to exercise a free choice in the selection of a Federal Capital. At the first referendum, in 1898, whilst in Victoria

100,520 votes were cast for the Bill and only 22,099 against it, in New South Wales, 71,965 affirmative and 66,228 negative votes were cast. The New South Wales Parliament, however, had insisted that at least 80,000 affirmative votes should be recorded in order that the Commonwealth Bill might be accepted, and as this number was not recorded, the 1898 referendum simply brought matters to a standstill. Ultimately, after renewed negotiations and amendments to the draft constitution, agreement was reached between the Premiers, and at the second referendum in June, 1899, the Bill was carried in New South Wales by 107,420 votes to 82,741. In Victoria the affirmative majority was larger than before, there being 152,653 votes for the Bill and 9,805 against it.

### **Development until 1914**

As well as convenience, there was perhaps justice—considering the energy of her politicians in the federal struggle—in Melbourne's becoming in 1901 (until 1927) the temporary administrative centre of the Commonwealth. Victorian morale, still shaken by the broken promise of the boom years, received a welcome fillip from the new prestige; consolation, too, lay in the reflection that, despite economic misfortune, there was still a real sense in which Melbourne was the financial capital of Australia. Nevertheless, the prospect faced by State politicians as they left Parliament House to begin their deliberations in the Exhibition Buildings was not a cheering one. New South Wales had overtaken Victoria's lead in population. In fact, between 1891 and 1910 the net emigration from Victoria was 161,000 people; the rate of natural increase of population dropped sharply and for decades to come Victoria's rate of natural increase was to continue to be the lowest of all the States. Drought—culminating in the worst season on record in 1902—added to the bleak legacy of the depression years: to balance the budget, reduce unemployment and stimulate a flagging economy necessarily became the concern of all political groups.

Orthodoxy triumphed in 1902, with the formation of the Irvine Government, committed to the notion that "the expenditure for the ordinary purposes of government should be confined within the narrowest limits so that the largest share possible of the funds derived from taxation shall be available for assisting national industries and developing the agricultural and mining resources of the State". It was a policy in line with the demands of reformers who were carrying out a powerful electoral campaign for retrenchment. Irvine hacked at civil service salaries, reduced the size of Parliament and dealt coldly with the protests of those for whom "retrenchment" was not an abstract principle, but a matter of bread and butter. The Government carried a constitutional amendment (which was soon repealed) depriving civil servants of the right to participate in elections beyond voting for three candidates to represent them directly in Parliament, and ruthlessly put down the railway strike precipitated in 1903 by the wage issue.

Radical alarm at such measures was assuaged somewhat when Irvine simultaneously tried to neutralize other forms of resistance to his programme, making the traditional stab at privilege by trying to reform the Legislative Council, though—traditionally again—that

House so amended the proposals as actually to strengthen its position. More important, the policy of assisting producers resolved itself into beginning a phase of intensified State socialism, destined, when sustained by subsequent Liberal Premiers, to keep the Labour Party weak by robbing it of a major political demand. The pattern was set by the Water Act of 1905, which consolidated previous Acts relating to water conservation and irrigation, outlined plans for new development and construction, and vested control of all projects in an independent statutory body, the State Rivers and Water Supply Commission. In the next twenty years, the State greatly developed its activities in the fields of road building, harbours, suburban transport, the planning and construction of power undertakings and the fostering and financing of closer settlement on the land. In each case incorporated bodies largely removed from political influence directed the new activities.

Recovery from the depression was slow. Better seasons helped to make "economy" effective, and Irvine had balanced his budget by 1904. However, the successive Premiers Bent, Murray, and Watt still faced lean years to 1914: the post-1893 exodus of Victorians to other States was only gradually stanching, agricultural recovery involved painful readjustments and a promising revival of goldmining proved to be shortlived. Industry, however, profited from both the Commonwealth decision to adopt protective tariffs, and the unemployed labour potential, and factory workers doubled in numbers between 1901 and 1914. Melbourne's population increased by 30 per cent. in the same period, and as a pale reflection of the building boom of the 1880's developed, municipal and State authorities still failed to agree on major plans to control the suburban sprawl. Meanwhile, strengthening unionism and the operation of the new arbitration system spread to some degree the benefits of recovery, while liberal reformers fought with enthusiastic Labour support for social betterment in fields like that of education. Already the Fink Royal Commission (1899 to 1901) had fostered reforms in primary schools and stimulated interest in technical education. Concern to extend the benefits of secondary education—prodded by the untiring work of Frank Tate, the first Director of Education—steadily overcame short sighted notions of "economy", and in 1910 the Murray Government won legislation laying the basis for a system of State secondary schools.

### **Land Settlement**

Before the First World War government policy placed much emphasis on the extension and diversification of primary industry as a means of injecting life into a stagnant economy. There were many reasons why this policy—broadly termed Closer Settlement—was adopted and widely supported. Large sections of the population still dreamed of a farm of their own; the farming interest was growing in independence and power at the political level; the depression had fully exposed the lop-sidedness of the Victorian economy and the encouragement of different types of farming seemed the easiest and quickest way to achieve greater equilibrium.

Before 1914 wheat farmers had spread over the Mallee, dairying became firmly established in Gippsland, the area of irrigated land was considerably extended and much land that had been already alienated



was resumed by the Government and subdivided for closer settlement. Increased production was achieved—especially in wheat and dairying—but the cost was great. The failure rate amongst farmers was high, many kept only a precarious grip on their holdings, rural poverty was widespread and governments were forced to write off large sums of money paid out for resumed land. By 1915, 80,000 out of 453,984 acres of resumed land had proved unadaptable for closer settlement. The chief reasons for the high failure rate were the unsuitability of much of the land for the use to which it was put, the poverty of farmers, lack of knowledge of both farmers and planners, and the uneconomic size of the holdings. Governments had yet to be convinced that subsistence or peasant farming could not be successful on a large scale.

For much the same reasons many soldier settlers after the First World War merely struggled along until falling prices in the later 1920's and the depression of the 1930's ended their farming careers. Between 1917 and 1937 ex-soldiers had been settled on more than 2,000,000 acres of land, civilians on a little more than 1,000,000 acres—much of it Mallee country. By 1937, 30 per cent. of these assisted settlers had left their holdings.

Since the depression, especially during the 1940's and 1950's, farming in Victoria has undergone what might justly be called a transformation. The ideal of subsistence farming has been almost abandoned; in practice much larger holdings are now the rule. This change has been achieved chiefly because of rising prices for farm products and increasing technical knowledge and sound planning by such bodies as the Department of Agriculture, the Commonwealth Scientific and Industrial Research Organization, the Soil Conservation Authority, the Lands Department and the State Rivers and Water Supply Commission. The application of a new approach to farming may be seen clearly in the planning and implementation of the Soldier Settlement Scheme during the 1940's and 1950's.

### **Industrialization**

Despite the temporary dislocation brought by war and its immediate aftermath of reconstruction, 1919 marks the beginning of a boom period in which Victorian population and industrial production both increased at a rapid rate. The uncertainty of coal supplies from the disturbed New South Wales fields helped to impel governments to develop local sources of power. The State coal mine at Wonthaggi had been a beginning in 1908, but more significant was the establishment of the State Electricity Commission in 1918, and the first intensive exploitation of the brown coal deposits of the Latrobe Valley. After initial teething troubles, the Commission was generating power at Yallourn in 1924, and steady extension of its works—reaching spectacular proportions in recent times—has given Victoria a sound and flexible source of cheap power on which to base industrial advance.

Probably the most striking feature of the Victorian economy since the First World War has been the rapid growth of secondary industry.

This has involved a change in emphasis within that field from comparatively simple processes, such as clothing and food production, to the more complex ones such as engineering and chemical industries.

The shortage of shipping and consequent reduction of imports during the war years stimulated manufacturing. In spite of the large number of men in the armed forces, factory employment rose sharply during the war. During the 1920's quick expansion in secondary industry continued with increasing population, availability of credit and a good deal of government assistance; at the Federal level this involved rising and spreading protective tariffs; at the State level, the lowest taxation in Australia until 1942, grants of land and money to new industries, subsidies on rail freights, &c. In this decade the value of production from secondary industry quickly passed that of primary industry and the gap between them widened. The first large-scale assembly unit in the motor vehicle industry was established in 1925 by the Ford Motor Company of Canada at Geelong, and that was followed in 1926 by General Motors Corporation at Fishermen's Bend. From these beginnings Victoria has become the main centre in Australia of motor vehicle manufacture. It marketed the first Australian mass-produced car in 1948 and exported it to New Zealand six years later. Production of radio receivers commenced at Melbourne in 1923 and the first major paper-mill began operating at Maryvale in the same decade.

Victoria suffered very badly from the depression of the early 1930's. Between March, 1929, and September, 1931, unemployment rose from 8·6 per cent. to 26·8 per cent., and by the end of the latter year 170,000 people were utterly dependent on unemployment relief. The prices of primary products on the world market dropped catastrophically and continued low throughout the 1930's. On the other hand, secondary industry soon commenced a steady recovery, aided tremendously by a tariff policy which slashed imports. In spite of this, however, 10 per cent. of trade union membership was unemployed in 1939.

### **Politics**

An outstanding feature of Victorian political history since the First World War has been the predominance of the Country Party whose first members were elected in 1917 and which first held the balance of power in 1920. Aided by the weighting of the rural vote, the Country Party achieved power between 1935 and 1945 when Sir Albert Dunstan, supported by both Opposition parties, was Premier almost without interruption.

Despite the difficulties of a three-party system, there was a fair measure of political stability in the years between the wars. Sir Harry Lawson was Premier from 1918 to 1924, John Allan (Country Party) from 1924 to 1927, E. J. Hogan (Labour) for all but a year of the period 1927 to 1932, Sir Stanley Argyle (United Australia Party) from 1932 to 1935. However, this stability was upset in 1945; thereafter, seven ministries were formed in seven years. In 1952, the first majority Labour administration, led by John Cain, followed. In 1953, the Country Party lost most of its influence when a scheme of electoral redistribution based on the federal electorates was introduced. Then, in 1955, the Hon. Henry Bolte (Liberal) was elected and still holds office.

Another major political reform was the introduction in 1950 of adult suffrage for the Legislative Council, which was supported by both the Labour and Country parties. The powers of the Council, however, remain unimpaired despite provisions passed in 1937 for resolving deadlocks between the Houses which in practice are unworkable. In 1947 the Council went so far as to dismiss a Labour Government by refusing Supply and forcing an election. The Council electorates remain weighted in favour of rural areas.

With the limited functions of State governments since Federation, it has become increasingly difficult to perceive, in terms of coherent policy, fundamental divisions between the political parties. This is especially true of government economic activity. Parties of every complexion have seen State regulation as the necessary solution to transport difficulties, marketing and export problems, and issues of social welfare; party differences here have tended to be matters of emphasis rather than of substance. Further, with the expansion of Commonwealth functions, more and more of the contentious issues of politics are fought in the Federal sphere, and State party labels tend to become meaningful in terms of the remoter conflict, a situation exemplified most strikingly, perhaps, in 1947, when the Victorian election hinged on bank nationalization, an issue of purely Federal concern.

The deteriorating financial position of the States in relation to the Commonwealth has been a burning issue for all Victorian governments. Dunstan's assertion in 1935 that "the States were subjected to humiliation by the difficulty they experienced in securing sufficient income for the proper discharge of their functions" typifies the feeling of the Treasurers of the 1930's, who became increasingly dependent for solvency on Federal grants as the Commonwealth intruded in new taxation fields. Commonwealth financial hegemony was sealed when the uniform taxation legislation of 1942, originating as a war-time measure, became permanent after 1946. Victoria had taken part in a first abortive appeal against uniform taxation in 1942, and in 1957 again challenged it unsuccessfully. In the meantime, alarm at the "disastrous effect upon the State" of Federal monopoly in the income tax field had become a regular refrain of budgetary statements. Victoria had fared badly under the original plan by which the Commonwealth returned a sum equal to the annual income-tax revenue of the State in 1939-41; and although the reimbursement formula has been subsequently revised to take account of the changing population and wage structure, Federal disbursements still remain, in the eyes of State authorities, sadly inadequate to cope with the strains of post-war expansion.

### **Post-war Development**

Nevertheless, in the years following the Second World War, rural prosperity has been unparalleled, general and prolonged; secondary industry has advanced at a far quicker rate than at any time previously, with notable advances in heavy engineering and chemical production. In consequence, large numbers of oversea migrants have been absorbed and full employment with high wages guaranteed. Between 1947 and 1954 Victoria's population increased by 19 per cent.; Victoria has

absorbed since the war relatively more migrants than any other State. Much oversea capital has been attracted for a variety of industrial enterprises. In recent years the shape of Victoria's economy has firmed: in proportion to its population, Victoria is the most industrialized State, the lowest wool producer of the mainland States, and by far the least significant mining State. Melbourne is still the headquarters of most of Australia's more important companies.

The work of the State Electricity Commission has gone a long way towards supplying all Victorian homes with electricity and towards making Victoria quite independent of outside supplies of electric power and solid fuels. Open-cut mining of brown coal in the Latrobe Valley has been extended to Morwell and now provides the State with immense supplies of the cheapest electricity on the mainland of Australia. In 1956 gas produced from brown coal was piped from Morwell to Melbourne. The S.E.C. has also been increasing the State's hydro-electric power—at Eildon and Kiewa. Victoria will also share electricity provided by the Hume Reservoir and the Snowy Mountain Scheme. The State Rivers and Water Supply Commission—claimed to be the forerunner of the great national water-planning authorities of which the Tennessee Valley Authority has become the most famous—now controls 25 large water storages, 250 small ones and more than 15,000 miles of water channels. Irrigation supplies about 750,000 acres of land.

During and after the Second World War governments have been actively encouraging decentralization of industry—by propaganda, concessions of various kinds, a large-scale programme of railways modernization—and since 1940 industrial employment beyond the Metropolitan Area has more than doubled. The centres to benefit most from this policy have been the Latrobe Valley towns, Geelong, Ballarat, Bendigo, Wangaratta and Warrnambool. Yet the over-all effect on the continued and mammoth growth of Melbourne has been almost negligible. In 1959, 63 per cent. of Victoria's population lived in the Melbourne Metropolitan Area, which accounted for 26 per cent. of the value of factory production of the Commonwealth and 78 per cent. of that of Victoria. Melbourne's population is now more than 1,750,000. This pattern seems unlikely to change very markedly and for a long time to come it may be at least partly true to say that Victoria is mostly Melbourne.

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## *Geographical Features*

### **Introduction**

Australia is situated in middle and lower-middle latitudes, with about two-fifths of its area lying between the Tropic of Capricorn and the Equator. It is, therefore, one of the warm continents and, since most of its area lies within the zone of the dry, sub-tropical anti-cyclones ("the horse latitudes"), it is for the most part a dry continent. Much of the continent has only small variation in temperature from season to season and receives low rainfall with marked concentration into either summer (in the north) or winter (in the south).

Victoria is, in these respects, not typically Australian. It has a cool to cold winter, and although there are hot periods in each summer, they are interspersed with pleasantly warm or even cool periods. Rainfalls are rather low in the northern parts of the State, and particularly in the north-west, but the greater part is well watered with no marked seasonal concentration. Most of Australia is plateau or plain country with little relief; Victoria has a larger proportion of high country in its total area than any other State except Tasmania and its highest mountains reach over 6,000 feet above sea level. Not surprisingly, it is often called the "most English" part of the mainland, although a closer climatic and agricultural analogy is probably south-western and south-central France. Victoria is in fact transitional between the sub-tropical situation of New South Wales and the temperate situation of Tasmania, between the high rainfall character of the south-eastern Australian coastlands and the arid interior. One finds, then, year-round, open-air dairying and livestock-and-grass farming in Gippsland and the Western District, and dry-farming of grains and irrigated horticulture of citrus fruits and vineyards in the north. Its climatic conditions made no difficulties for the establishment of secondary industry and, once its power-resource problem had been solved, Victoria reaped the advantages in interstate trade offered by its central position on coastal shipping routes.

Although European settlement in Victoria is little over one and a quarter centuries old, there have already developed distinctive regional characteristics in the various parts of the State, and most of these are recognized in popular speech by regional names. The Mallee is the north-western plain of ancient sand ridges, once waterless and covered with the distinctive dwarf eucalypt from which the name is derived, but now with extensive wheat fields and sheep paddocks and with water for stock and domestic purposes supplied through winding channels from storages outside the region. The Wimmera, with red-brown soils and tall eucalypts, with a denser pattern of farms and market towns, has the highest yielding wheatfields in Australia and a considerable sheep and cattle population as well. The Western District, with lush pastures on its well-watered volcanic plains, has both a long tradition of the growing of fine wools on sheep stations dating back to the early days of the pastoral expansion and a much more recent development of intensive dairying. The north-east has irrigated citrus and stonefruit orchards,

market gardens and pastures on the plains of the middle Murray and its tributaries, which give way to cattle stations upstream where the valleys run back into the rugged slopes of the Australian Alps. Gippsland spells dairying and fodder-crop growing, timber extraction in the tall forests of the hills, off-shore and coastal fishing, and the industrial enterprises based on the power derived from the Morwell-Yallourn brown-coal deposits in the Latrobe Valley. The Port Phillip Bay region holds Melbourne, the financial and administrative hub of the State and a fast growing port, metropolitan market and industrial centre, while on the eastern shore commuters' and holiday homes stretch through the Mornington Peninsula to the ocean shores. On the west, secondary industry is extending through Williamstown and Altona to Geelong.

### Area

Victoria is situated at the south-eastern extremity of the Australian continent, of which it occupies about a thirty-fourth part, and contains about 87,884 square miles, or 56,245,760 acres.

Victoria 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. The total length of this boundary, following the windings of the River Murray from the South Australian border along the Victorian bank to the Indi River, thence by the Indi or River Murray to Forest Hill and thence by the straight line from Forest Hill to Cape Howe, is 1,175 miles. The length of the River Murray forming part of the boundary is 997 miles, of the Indi or River Murray, 68 miles, and of the straight line from Forest Hill to Cape Howe, 110 miles. On the west it is bounded by South Australia; on the south and south-east its shores are washed by the Southern Ocean, Bass Strait, and the Pacific Ocean. It lies approximately between the 34th and 39th parallels of south latitude and the 141st and 150th meridians of east longitude. Its greatest length from east to west is about 493 miles, its greatest breadth about 290 miles, and its extent of coast-line 980 miles, including the length around Port Phillip Bay 164 miles, Western Port 90 miles, and Corner Inlet 50 miles. Great Britain, inclusive of the Isle of Man and the Channel Islands, contains 89,041 square miles, and is therefore slightly larger than Victoria.

The most southerly point of Wilson's Promontory, in latitude 39 deg. 8 min. S., longitude 146 deg. 22½ min. E., is the southernmost point of Victoria and likewise of the Australian continent; the northernmost point is 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 westerly boundary 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 280 miles.

The following table shows the area of Victoria in relation to that of Australia:—

## AREA OF AUSTRALIAN STATES

State or Territory	Area	Per cent. of Total Area
	sq. miles	
Western Australia .. .. .	975,920	32·85
Queensland .. .. .	667,000	22·45
Northern Territory .. .. .	523,620	17·62
South Australia .. .. .	380,070	12·79
New South Wales .. .. .	309,433	10·42
<b>Victoria</b> .. .. .	<b>87,884</b>	<b>2·96</b>
Tasmania .. .. .	26,215	0·88
Australian Capital Territory .. .. .	939	0·03
Australia (Total) .. .. .	2,971,081	100·00

**Mountains and Hills**

The highest mountain in Victoria is Mount Bogong, situated in the county of the same name, 6,516 feet above sea-level; the next highest peaks are Mount Feathertop, 6,307 feet; Mount Nelson, 6,170 feet; Mount Fainter, 6,160 feet; Mount Hotham, 6,101 feet; Mount McKay, 6,030 feet; and Mount Cope, 6,026 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, although, according to a list which was published in the Year Book for 1915–16, there are numerous peaks between 4,000 and 6,000 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. Although, during the winter, the peaks and higher plateaux are covered with snow, it is not perpetual and disappears during the spring.

**Coastline**

The Victorian coastline stretches some 682 miles from the South Australian border to the New South Wales border. Small stations of whalers and sealers were operating along the coast, mainly at Westernport, Portland, and Wilson's Promontory long before the advent of Henty and Batman.

The coastline is now well served with lighthouses, though in the early days it proved hazardous to navigation and no fewer than six ships were wrecked at Port Fairy before 1850. Port Phillip Bay is a safe harbour for shipping and the cities of Geelong and Williamstown afford excellent facilities. The Bay was the first place where settlement was made, at Sorrento in 1803, by a party under Lieutenant-Colonel Collins. In January 1804 the settlement was abandoned.

Wilson's Promontory is the most southerly part of the State of Victoria; it was rounded by Lieutenant Grant in the *Lady Nelson* in 1801. The original entrance to Lakes Entrance was, owing to silting, closed in 1889 and a new entrance opened 1½ miles to the west.

When Lieutenant Grant called at an island in Western Port in 1801, he named it Churchill Island (after an English Government official, who supplied a small amount of seed). Wheat was planted and when Lieutenant Murray in the *Lady Nelson* visited the island some months later, the wheat was growing vigorously, being six feet high. It was the first wheat planted in Victoria.

The main features of the coastline are as follows:—

Nelson to Cape Bridge-water	Sandy beach backed by dunes.
Cape Bridgewater to West End of Portland Bay	Cliffs of basalt tuff dune limestone and miocene limestone.
Portland Bay to Port Fairy	Sandy beach backed by dunes with low cliffs of basalt and dune limestone near Port Fairy.
Port Fairy to Warrnambool	Beach dunes and dune limestone.
Warrnambool to Childers Cove	Cliffs of dune limestone.
Childers Cove to Point Ronald	Bold cliffs of tertiary limestone.
Point Ronald to Cape Volney	Cliffs of lower tertiary sandstone and dune limestone.
Cape Volney to Castle Cove	Bold cliffs of mesozoic sandstone.
Castle Cove to Point Flinders	Bold cliffs of dune limestone.
Point Flinders to North of Lorne (Eastern View)	Cliffs of mesozoic sandstone.
Eastern View to Torquay	Cliffs of tertiary sandstone and limestone interspersed with bays and sandy beaches.
Torquay to Cape Schanck	Sandy beach backed by dunes with intermittent low cliffs of dune limestone.
Cape Schanck to Nobbies	Bold cliffs of basalt.
South Coast of Phillip Island	Sandy beaches backed by dunes with granite at Pyramid Rock and Cape Woolamai.
Cape Woolamai to Anderson's Inlet	Cliffs of mesozoic sandstone.
Anderson's Inlet to Cape Liptrap	Sandy beach backed by dunes with low cliffs of dune limestone at south end.
Cape Liptrap Promontory	Cliffs of lower palaeozoic sediments and diabase.
Waratah Bay as far East as Tongue Point	Sandy beach backed by dunes.
Tongue Point to Mount Hunter	Granite headlands interspersed with bays with sandy beaches backed by dunes.



- Mount Hunter to Conran Sandy beach backed by dunes with lagoons behind dunes.
- Cape Conran (Granite) to Cape Howe Granite headlands with beaches between them and some local cliffs of metamorphosed lower palaeozoic sediments at Cape Everard, Little Ram Head and near Mallacoota.

The area of Port Phillip Bay is 762 square miles and the coast-line of the bay stretches for some 132 miles.

**Rivers**

The Main Dividing Range may be regarded as dividing the river basins or catchments in Victoria into two main groups. Of the rivers draining the northern basins, the Loddon is the westernmost river that normally reaches the Murray. Except for the internal drainage basin of Lake Corangamite, the rivers south of the Divide flow into the sea.

If we also divide the State into an eastern and western area by a line joining Melbourne and Echuca we have four areas conveniently termed the north-east, north-west, south-east and south-west. Streams in these four areas whose flows average more than about 100,000 ac. ft. per annum are tabulated below, using this figure as a unit:—

**VICTORIA—MAIN RIVERS**

Area	River	Station	Mean Annual Flow
			100,000 ac. ft.
North-east ..	Goulburn	Murchison ..	23
	Murray ..	Jingellic ..	18 *
	Mitta ..	Tallangatta ..	11
	Ovens ..	Wangaratta ..	11
	Kiewa ..	Kiewa ..	5
	Broken ..	Benalla ..	2
		Sub-Total ..	— 70
North-west ..	Campaspe ..	Rochester ..	2
	Loddon ..	Laanecoorie ..	2
	Wimmera	Horsham ..	1
		Sub-Total ..	— 5
South-east ..	Snowy ..	Orbost ..	18 *
	Yarra ..	Warrandyte ..	9
	Latrobe ..	Rosedale ..	7
	Mitchell ..	Bairnsdale ..	6
	Macalister	Glenmaggie ..	4
	Thomson ..	Heyfield ..	3
	Tambo ..	Bruthen ..	2
	Bunyip ..	Bunyip ..	1
		Sub-Total ..	— 50
South-west ..	Glenelg ..	Dartmoor ..	6
	Barwon ..	Geelong ..	2
	Hopkins ..	Allansford ..	2
		Sub-Total ..	— 10
		Other Rivers	135
			35 (Estimate)
		Total ..	170

\* Includes flow from New South Wales.

For more detailed information concerning stream flows, reference should be made to "River Gaugings", normally published at six-year intervals by the State Rivers and Water Supply Commission.

The total flow in the State, is about 17,000,000 ac. ft. per annum including about a 1,000,000 ac. ft. from New South Wales. Although the northern streams contribute about the same flow as those in the south, the flow in the eastern part of the State is about six times that in the west. Differences in average stream flow in the four sectors are primarily a reflection of mean annual rainfall. All streams exhibit pronounced seasonal variation, but the greater rainfall and higher incidence of summer rains in the east give those streams a more regular flow during the year than those in the west.

In addition to seasonal variation, streams are subject to large variations in annual flows. In very wet years, such as in 1870, the total stream flow would be about three times the mean flow, whereas in drought years, such as in 1914, the flow would only be about a quarter of the average. Although this variability may appear high, it is relatively mild compared with streams in other parts of Australia, excluding Tasmania.

By far the major use for water in Victoria is for irrigation in rural areas (see pages 458-461). Storages with a capacity of about 6,000,000 ac. ft., i.e. about one-third of the mean annual flow, enable a million acres of land, nearly all in northern Victoria, to be irrigated annually. The use of water for urban areas is, by comparison, small.

The amount of water used by urban populations in Victoria is only about 10 per cent. of that used for irrigation—or about equal to that lost by evaporation from storages built for irrigation.

### **Lakes**

For lakes to form, there must be suitable physiographic features and sufficient water supply to offset evaporation and seepage losses. Although the water supply in the western part of the state is comparatively poor, the majority of Victorian lakes occur in the west because of suitable physiography which is attributable to volcanic activity. Some extinct volcanoes carry crater lakes, and on the volcanic plains numerous lakes have been formed, the largest being Lake Corangamite. Lakes on the plains are relatively shallow, their depth and hence volume varying considerably with climatic trends in rainfall.

Lakes also occur in the north-west plains, some of which are intermittently replenished by effluents from rivers. Another type of lake is that which occurs along the coast by sand bars forming across the mouth of a stream. The Gippsland Lakes constitute the main lake system of this type.

Although lakes are often described as "salt or fresh" such a classification is misleading in shallow lakes as salinity varies inversely with the volume of water in the lake. Certain Victorian lakes are so shallow that salt is deposited in the summer when evaporation is high and in some cases, such as Lake Tyrell, it is harvested.

### **State Aerial Survey**

After the Survey Co-ordination Act was passed in 1940, the Central Plan Office was set up to co-ordinate the surveys of the State, to record permanent marks, test surveyors' tapes and direct the work of the photographic laboratory. During the financial year 1958-59 more than 30,000 aerial photographs and photo-maps were printed and approximately 160,000 plans and field notes were copied.

In 1944, the State Aerial Survey Branch was inaugurated. The Department then became responsible not only for cadastral surveys but also for aerial photography and the mapping of the State. The Aerial Survey Branch consists of a geodetic survey section, equipped with the latest electronic measuring instruments and a photogrammetric section, employing British and Continental photogrammetric plotting machines. Aerial photography is carried out under contract by a commercial aerial survey company.

Aerial photographs and photo-maps may now be obtained for any part of the State. The work, however, is continuous due to rapid changes taking place in many areas. Mapping is divided into two categories: base mapping and standard topographic mapping.

Base mapping is at present the major task, as this type of map is urgently required for engineering and town-planning purposes. These maps show all cadastral boundaries, street and road names, drainage and contours at either 5 or 10 feet intervals. Priority has been given to the outer Metropolitan Area where a programme of work has been undertaken conjointly with the Melbourne and Metropolitan Board of Works for the preparation of approximately 170 base maps at a scale of 400 feet to 1 inch. Forty-one of these maps have already been published. A similar series of maps is now in course of preparation for the Shires of Flinders and Mornington, and for the whole of the Latrobe Valley. Maps to special specifications are also prepared. The proposed site for the new Melbourne jet aerodrome has been mapped, contours were plotted at 2-ft. intervals and all details shown with the actual height of objects such as buildings, poles, trees, &c.

Standard topographic maps are published at a scale of 2 inches to 1 mile and are for more general use. More than 100 sheets of this series have been compiled and 48 sheets published.

The work of the Cadastral Survey Branch has also increased with priority given to surveys for the Soldier Settlement and Housing Commissions. The normal work of the Branch includes the inspections of Crown lands and boundary surveys of selection purchase leases, improvement purchase leases, reservations and areas of Crown lands which are to be sold.

During the financial year 1958-59, 1,660 inspections of Crown land were made, 460 areas of Crown land and 120 Soldier Settlement holdings containing 54,000 acres were surveyed, and 110 surveys were effected for the Housing Commission.

**List of Available Printed Maps***Topographical Maps*

Map	Scale
Based on International Grid Sheets .. .. .	1 inch = 1 mile (1 : 63,360)
(Partial Coverage of Victoria) .. .. .	1 inch = 40 chains (1 : 31,680)
Dandenong Ranges Project .. .. .	1 inch = 10 chains (1 : 7,920)
Melbourne and Metropolitan Base Map Project ..	1 inch = 400 feet (1 : 4,800)
Mornington Peninsula Project .. .. .	1 inch = 400 feet (1 : 4,800)

The above plans show roads, contours, rivers and other physical features.

Map	Scale
County Plans Showing Crown Subdivisions without Dimensions	1 inch = 2 miles (1 : 126,720)
Cadastral Plans Showing Crown Subdivisions without Dimensions .. .. .	1 inch = 1 mile (1 : 63,360)
Township and Parish Plans Showing Details of Crown Subdivisions .. .. .	Varying
Street Map—Melbourne and Suburbs (2 sheets) .. ..	1 inch = 40 chains (1 : 31,680)
Street Map—Melbourne and Suburbs (9 sheets) .. ..	1 inch = 20 chains (1 : 15,840)

The plans shown as County, Cadastral, Township and Parish Plans give all the original Crown information about the alienation of Crown lands and form the basis for the description, indexing and registration of land titles.

*Physical Geography***Physical Divisions***Introduction*

This article should be read in conjunction with the articles on geographical features, area, climate and geology.

The chief physical divisions of Victoria are shown on the map (Fig. 1). Each of these divisions has certain physical features which distinguish it from the others, as a result of the influence of elevation,

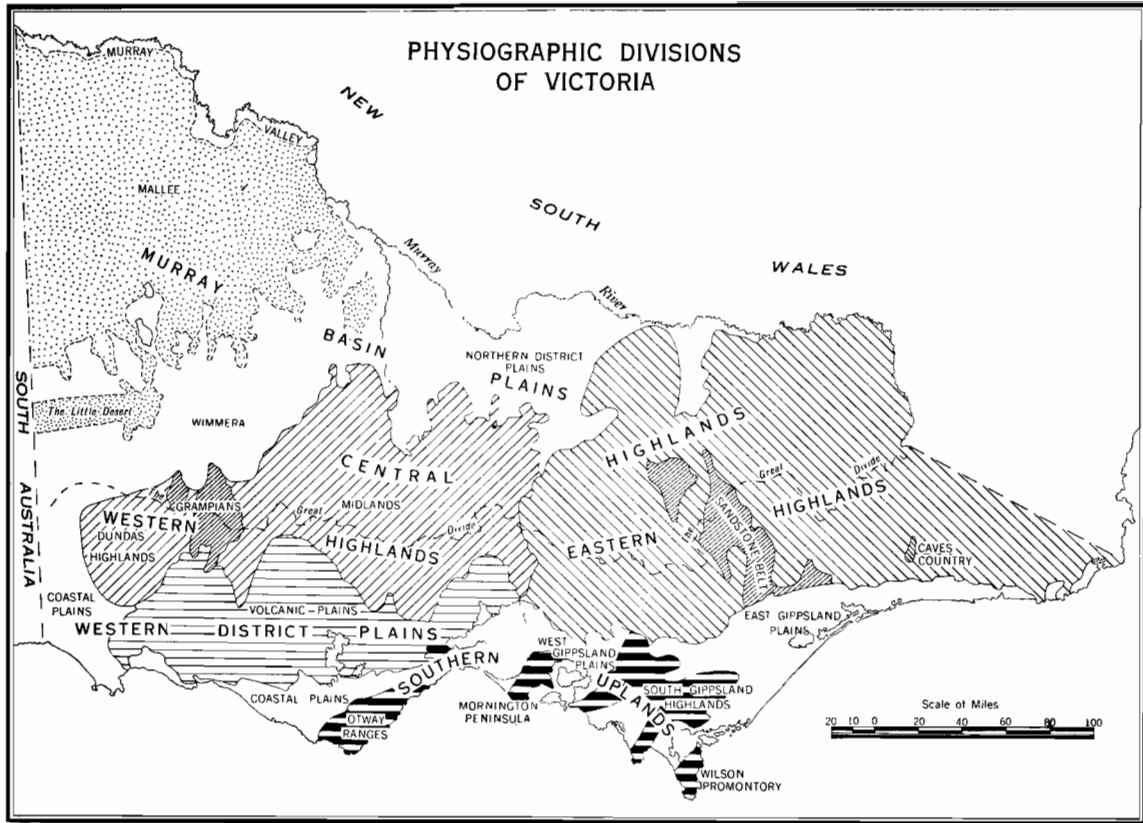


Fig. 1.

geological structure, climate and soils, as is recognized in popular terms such as Mallee, Wimmera, Western District and so on. The following is a table of these divisions:—

1. *Murray Basin Plains:*

- (a) The Mallee
- (b) The Murray Valley
- (c) The Wimmera
- (d) The Northern District Plains

2. *Central Highlands:*

A. The Eastern Highlands, within which—

- (a) the Sandstone Belt and
- (b) the Caves Country may be distinguished from the remainder

B. The Western Highlands:

- (a) The Midlands
- (b) The Grampians
- (c) The Dundas Highlands

3. *Western District Plains:*

- (a) The Volcanic Plains
- (b) The Coastal Plains

4. *Gippsland Plains:*

- (a) The East Gippsland Plains
- (b) The West Gippsland Plains

5. *Southern Uplands:*

- (a) The Otway Ranges
- (b) The Barabool Hills
- (c) The Mornington Peninsula
- (d) The South Gippsland Highlands
- (e) Wilson's Promontory

*Murray Basin Plains*

These plains include the Mallee, the Wimmera, the Northern District Plains and the Murray Valley itself. The most noticeable distinguishing features of the Mallee are the soils, vegetation and topography. It is not a perfect plain, but exhibits broad low ridges and depressions which appear to be due to folding and faulting of the rocks. Sand ridges trending due east and west are an indication of a former more arid climate, but they are now fixed by vegetation. When cleared, the sand distributes itself irregularly without forming new ridges. There is evidence of a succession of former wet and dry

periods in the Mallee, but at the present time all the streams that enter it lose so much water by evaporation and percolation that they fail to reach the Murray and terminate in shallow lakes, many of which are salt. The Murray Valley itself is cut into the higher Mallee land and is subject to periodical flooding by the river.

The Northern District Plains are formed from the combined flood plains of rivers flowing to the Murray, with an average gradient of between 3 and 5 feet to the mile, the surface being almost perfectly flat except where small residual hills of granite rise above the alluvium as at Pyramid Hill.

The Wimmera lies between the Western Highlands and the Mallee and is also composed mainly of river plains except to the north of the Glenelg where old abandoned river channels contain a succession of small lakes. Most of the lakes of the Murray Basin Plains have crescentic loam ridges (lunettes) on their eastern shores.

### *Central Highlands*

The Central Highlands form the backbone of Victoria, tapering from a broad and high mountainous belt in the east until they disappear beyond the Dundas Highlands near the South Australian border. They were formed by up-warping and faulting. The Eastern Highlands differ from the Western in their greater average elevation, with peaks such as Bogong, Feathertop and Hotham rising above 6,000 feet, while the Western Highlands are generally lower, the peaks reaching above 3,000 feet, and the valleys being broader. Also in the Eastern Highlands patches of older volcanic rocks occur, whereas in the Western the volcanic rocks belong mainly to the Newer Volcanic Series. Several well-known volcanic mountains are still preserved, Mounts Buninyong and Warrenheip near Ballarat being examples.

Because of the great variety of geological formations in the Central Highlands and the effects of elevation and deep dissection by streams, the features of the country are very varied and there are many striking mountains and gorges. The severe winter climate, with heavy snow on the higher land, is also a special feature of the Eastern Highlands. Included in the area are several high plains such as those near Bogong and the Snowy Plains. Caves are well known in the limestone around Buchan.

In the Western Highlands, the Grampians, with their striking serrate ridges of sandstone, may be compared with the belt of sandstones stretching from Mansfield to Briagolong in the east.

The Dundas Highlands are a dome which has been dissected by the Glenelg and its tributaries, the rocks being capped by ancient laterite soils which form tablelands with scarps at their edges.

### *Western District Plains*

Many of the surface features of the Western District Plains are a result of volcanic activity, very large areas being covered with basalt flows of the Newer Volcanic Series above which prominent mountains

rise, many of them with a central crater lake. Some of the youngest flows preserve original surface irregularities practically unmodified by erosion, thus forming the regions known as "Stony Rises".

The coastal plains of the Western District are for the most part sandy, the soils being derived from Tertiary and Pleistocene sedimentary deposits, which in places attain a thickness of some 5,000 feet, and yield considerable quantities of artesian water.

### *Gippsland Plains*

Continuing the east-west belt of plains on the eastern side of the drowned area represented by Port Phillip Bay and Western Port Bay are the Gippsland Plains. These are underlain by marine and non-marine Tertiary and Pleistocene sedimentary deposits, including the thick seams of brown coal of the Latrobe Valley. A notable feature is the Ninety Mile Beach and the lakes and swamps that lie on its landward side. This beach is an off-shore bar on which aeolian sand ridges have accumulated.

### *Southern Uplands*

Lying to the south of the plains above mentioned is a group of uplifted blocks for which faulting is mainly responsible, these constituting the Southern Uplands. The Otway Ranges and the South Gippsland Highlands are composed of fresh-water Mesozoic and Tertiary sediments with older Volcanic basalts in South Gippsland, and the Mornington Peninsula is an upraised fault block of complex geology, including granites. The Sorrento Peninsula is entirely composed of Pleistocene calcareous dune ridges which have been responsible for practically blocking the entrance to Port Phillip Bay.

## **Land Surface of Victoria**

### *General*

The surface features of Victoria were brought into existence as a result of the sum total of all geological events that have affected the region over many millions of years in the past. The understanding of the physical features of the State cannot therefore be divorced from a study of its geological history. This applies not only to the various rock masses of granite, basalt, schist, sandstone, limestone and so on which are to be found in the different regions of the State and which have characteristic topography, soils and vegetation, but also to remnants of ancient erosional or depositional surfaces that are preserved in many of the landscapes.

### *Mesozoic Peneplain*

Many of the regions of hard rocks such as granite and Devonian dacite in Victoria have plateau summits which are relics of an ancient peneplain, once thought to be Cretaceous, but now recognized as older and perhaps Jurassic in age. During the Jurassic period this old land surface was deformed by down-warps in which non-marine beds were deposited and by up-warps which began to outline the Central Highlands



of the State. The presence of marine Cretaceous rocks discovered in bores in western Victoria indicates that an ancient Bass Strait was already in existence at this time. In the Central Highlands, which were not then as high as they are today, streams cut broad valleys in which gold-bearing gravels were deposited in places during the early Tertiary period, and in the lower lands thick deposits of brown coal, clay and sand were laid down. The older volcanic basalt flows were extruded during Eocene and Oligocene times and renewed earth movements led to the sea invading southern and western Victoria and the Mallee. At its maximum advance the sea reached nearly as far as Broken Hill in New South Wales in a large embayment known as the Murray Gulf, but after the Miocene period it retreated and Victoria gradually assumed its present configuration. The uplift that accompanied the retreat of the sea caused deep erosion in the highlands and deposition of sands, gravels and clays in the low-lying plains. The newer volcanic lava flows and tuffs were extruded after the sea had retreated from western Victoria and it is worth noting that in Port Phillip Bay we have an area which is still a marine transgression over the land. The submergence of Port Phillip and Western Port Bays was partly due to down-faulting and partly to the rise of sea level that occurred all over the world when the ice masses of the great ice age (Pleistocene) melted. This rise of sea level also cut off Tasmania from the mainland.

The various movements which have affected Victoria have not completely ceased, as is shown by the occurrence of earthquakes, some of which have been of moderate severity.

Not only has the State been affected by these various changes of elevation and advances and retreats of sea level, but the climate has changed also. In the later and middle Tertiary period it appears to have been much wetter and warmer, becoming drier in the Pliocene and wetter again during parts of the Pleistocene period. Even in geologically recent times there has been at least one period of aridity during which the sand ridges of the Mallee and of the sand belt between Brighton and Mordialloc were blown up.

The final influence on the surface of Victoria has been man himself by the clearing of forests, irrigation, drainage, the sowing of pastures and orchards, the cutting of roads and the building of dams. Accelerated soil erosion has been one of the serious effects of man's activity, but fortunately we are able to control this by various means, although continual effort is required. Similar effects of man's activities are to be seen along the coast where the building of breakwaters and groins, while often beneficial in some places, has also had adverse effects in causing unwanted erosion or the deposition of sand.

### Further References

E. S. Hills, *The Physiography of Victoria*, Fourth Edition, Whitcombe and Tombs, Melbourne, 1959.

*Resources Surveys—Preliminary Reports* : Published by the Central Planning Authority, Premier's Department, Melbourne.

*Geology***Introduction**

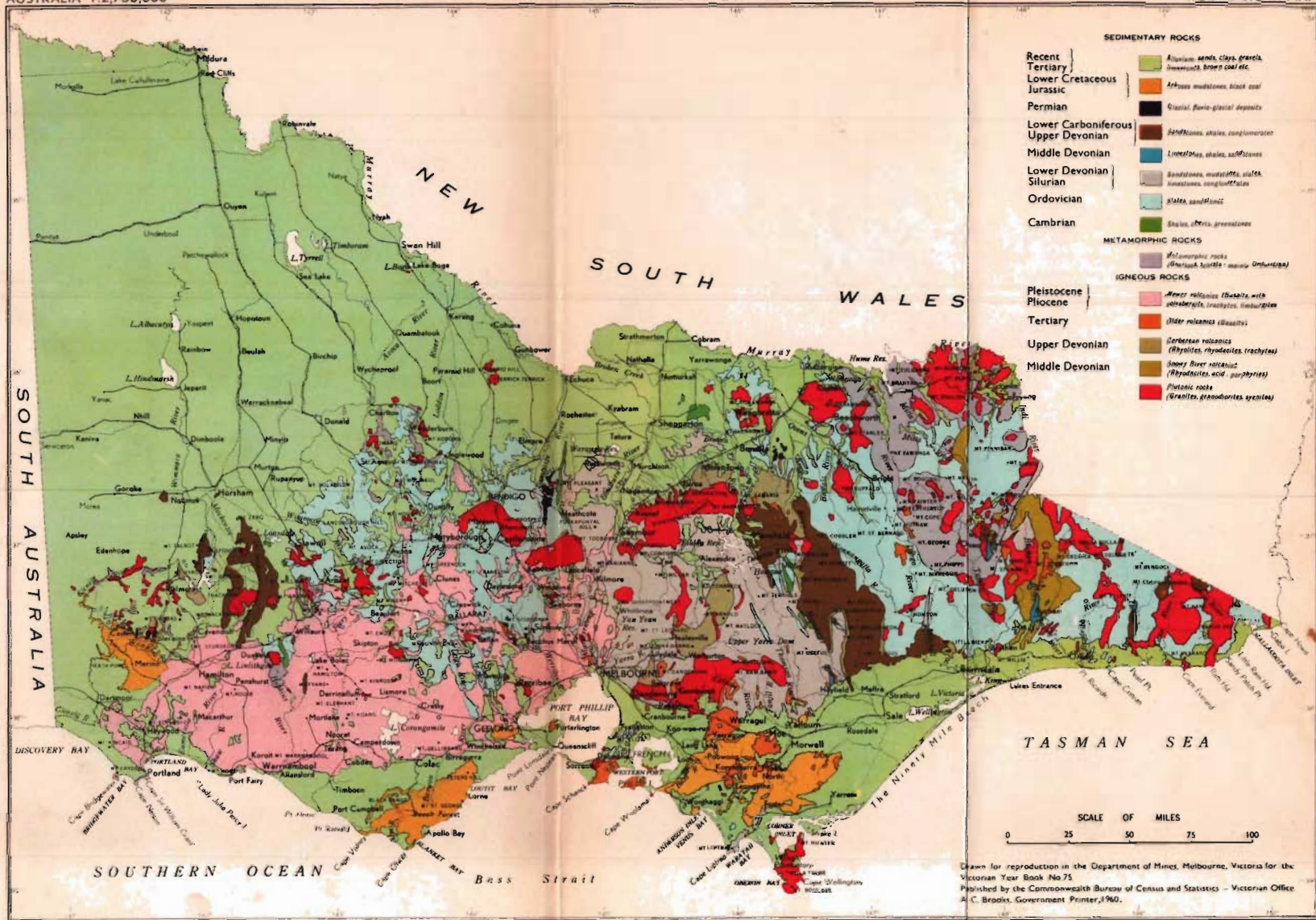
The following two sections deal with the geological structure and the geology of Victoria respectively. A brief summary of contents will indicate the information covered in the article:—

1. Geological Structure of Victoria
2. Geology—
  - (a) *Palaeozoic Rocks*—
    - Cambrian
    - Ordovician
    - Silurian—Lower Devonian—
      - (i) Silurian
      - (ii) Lower Devonian
    - Middle Devonian
    - Upper Devonian—Lower Carboniferous
    - Permian
    - Palaeozoic Igneous Activity
    - Economic Products
  - (b) *Mesozoic Rocks*—
    - Triassic
    - Jurassic
    - Cretaceous
  - (c) *Cainozoic Rocks*—
    - Tertiary
    - Quaternary
    - Economic Resources

**Geological Structure of Victoria**

Three major belts of folding and thrust faulting are recognized in Victoria—the Stavely, Heathcote and Wellington belts. These have roughly meridional trends and all are characterized by inliers of Cambrian thrust over Ordovician, Silurian and Lower Devonian, and in one case Upper Devonian rocks. Structurally, Victoria is roughly symmetrical about the median–Heathcote line. Between this and the Stavely line to the west is a series of brachy anticlinoria and brachy synclinoria which are sharply folded and thrust faulted. Further west are the Grampians consisting mostly of Upper Devonian–Lower Carboniferous rocks in broad structures with well-defined scarp and dip slopes.

On the western side and surrounding the Wellington belt of Cambrian rocks is the matching area of Upper Carboniferous and Lower Carboniferous rocks forming the Wellington Highlands. West of the Grampians and outcropping where the thin cover of Tertiary and lateritic soils have been eroded is an area of schists, gneisses and more Cambrian greenstones together with some unaltered rocks similar to the Ordovician. East of the Wellington Highlands are Ordovician and Silurian rocks with narrow belts of Middle Devonian limestone overlying the widespread Snowy River Volcanics.



The geological history of this belt extending as far east as the boundary of New South Wales is different from that of east central Victoria. Unconformities reveal evidences of three Palaeozoic epochs of folding in eastern Victoria—the Benambran, Bowning and Tabberabberan. All the structural trends in the Palaeozoic rocks are approximately north and south but sometimes NE or NW. The Upper Palaeozoic (Permian) are represented by the glaciogene beds which are not known to be folded but are preserved in small down-faulted areas.

The Mesozoic and Tertiary rocks which outcrop to the south of the State have a general east to west disposition. The Mesozoic rocks are much faulted and similar faults affect the Tertiary beds resulting in warped monoclines. The Mesozoic beds occur in three main localities, the westerly one near Casterton, the Otway Ranges in south central Victoria, and the large area in south Gippsland.

The Tertiary rocks are down-warped and occupy the Murray Plains, swing southerly round the Dundas Tableland and form a deep basin extending from Portland as far easterly as Birregurra. This basin has an east and west trend and deepens westerly. In eastern Gippsland a similar depression pitches easterly and occupies the Latrobe Valley area swinging round the eastern extremity of the Balook Dome.

A smaller depression occurs in the Port Phillip area south of Melbourne.

### Palaeozoic Rocks

#### *Cambrian*

Of the three main Cambrian belts the best known is the central one running from west of Romsey and north to Colbinabbin through Heathcote. It is interrupted centrally by the intrusive Cobaw granite massif.

It is a narrow belt up to 2½ miles wide. The eastern boundary is a high angle reverse fault system made up of the Mt. William, McIvor and Mt. Ida Faults. These faults in the south near Romsey bring the Cambrian against Middle Ordovician to Lower Silurian on the east while in the Heathcote area the Cambrian abuts against Upper Silurian to Lower Devonian, in this case with a throw of some 45,000 feet. The western boundary north of the Cobaw massif is also a faulted junction but in the south there is a conformable passage from Cambrian to Ordovician. Stratigraphic units recognized north and south of the Cobaw granite are:—

Stratum	Lancefield Area	Heathcote-Knowsley East Area
? Middle-Upper Cambrian ..	Goldie Shales ..	Goldie Shales
Middle Cambrian .. ..	Mt. William Group	Knowsley East Formation
Lower-? Middle Cambrian ..		Heathcote Greenstones

The Heathcote Greenstones are altered basic to intermediate lavas, pyroclastics, minor intrusives and lenticular bedded cherts containing *Protospongia* sp. and radiolaria.

The greenstones belong to the spilite-keratophyre association. During the alteration these rocks and feldspars were albitized, pyroxene largely converted to actinolite chlorite and/or talc, and secondary minerals introduced. Most of the basic rocks are undoubtedly lava flows but some of the more acid types are most probably dykes or sills. In the Heathcote area there are two small masses of granite in part albitized, which outcrop within the greenstones.

In two areas younger Cambrian rocks outcrop. In the south the lavas, &c., pass up into interbedded cherts and black shales. Some of the black shales near Monegetta contain the rich dendroid fauna listed below:—

Archaeolafoea  
Mastigograptus  
Protohalecium  
Sphenoecium  
Cactograptus  
“Acanthograptus”  
“Thallograptus”  
Acrotreta antipodum

The overlying unfossiliferous Goldie Shales are some 2,000 feet thick and are followed apparently conformably by the Ordovician.

In the Parish of Knowsley East, 6 miles north of Heathcote, the greenstones are followed conformably by the Knowsley East Formation. They contain two principal Trilobite bearing horizons as well as the dendroid Fauna similar to that listed above.

The “Dinesus Band” contains the following trilobites:—

Peronopsis  
Dinesus ida  
Kootenia fergusoni  
“Amphoton”

The “Amphoton Band” contains:—

Peronopsis cf. normata  
Dinesus  
Solenoparia  
Nepea narinosa  
Dorypyge  
“Amphoton”  
Fuchouia

#### *Mt. Stavely—Mt. Drummond Belt*

These are isolated occurrences oriented in a general northerly direction and outcropping from beneath Quaternary rocks. The largest exposure is the Mt. Stavely where a belt 2 miles wide consists of interbedded basic lavas and cherts.

West of the Grampians several outcrops of basic rocks near Casterton and Dergholm are believed to be Cambrian in age.

The probably northern continuation of one of these western Victorian belts is to be found in the diabases struck at Dimboola No. 1 bore at 370 feet, Wail M1 bore at 590 feet, and in Gerang Gerung at 658 feet.

#### *Barkly and Jamieson Rivers and Mt. Wellington Belts*

Cambrian rocks outcrop along two sub-parallel belts trending in a north-westerly direction. The eastern one can be traced from near Mt. Wellington through to the Jamieson and Howqua Rivers. The western belt outcrops on the western side of the Barkly River and is truncated by cross-faulting. One of the best known of the inliers is that of the Dolodrook River where the Mt. Wellington greenstones include lavas, tuffs and conglomerates which are followed conformably by the Garvey Gully tuffs which contain the lenticular Dolodrook limestone.

The fauna from these includes the forms:—

Hypagnostus  
 Ptychagnostus australiensis  
 Pseudagnostus vastulus  
 Pseudagnostus  
 Phoidagnostus  
 Blountia  
 Bynumia  
 Crepicephalus etheridgei  
 Corynexochus  
 Eugonocare  
 Thielaspis (n.gen.) thielei  
 Thielaspis minima

Approximately on the northern extension of these greenstones are the outcrops near Tatong and Dookie.

The narrow strip of greenstones running in a north-easterly direction on the western shore of Waratah Bay is faulted against another faulted strip of limestone which contains a Tremadocian trilobite fauna.

#### *Ordovician*

The Ordovician is about 16,000 feet thick composed of thin bedded slates and sandstones with innumerable graded beds that belong to the graptolitic facies. The subdivisions are based on the appearance and disappearance of some of these graptolitic faunas. At Waratah Bay a thin limestone belt is of Tremadocian age and contains the following trilobites:—

Leioestegium  
 Kainella  
 Protopliomerops  
 Geragnostus

In the Upper Ordovician alternating grits and shales occur. The main subdivisions are as follows:—

Silurian				
Upper Ordovician	Bolindian ..	} Zones with Dicranograptus	} Zones with Dicellograptus	
	Eastonian ..			
	Gisbornian			
Middle Ordovician	Darriwillian	Zones with Diplograpti		
Lower Ordovician	Yapeenian ..	} Zone with Cardiograptus Zone with Oncograptus Zones with Diplograpti Zones of Isograptus	} Zones with Diplograpti	
	Castlemainian			
	Chewtonian			Zones with Didymog. protobifidus
	Bendigonian			} Zone of T. fruticosus Zone of T. approximatus
	Lancefieldian	Zone with Bryograptus Zone with Staurograptus		

The beds are strongly folded and cleaved and the major structures are complex brachy-anticlinoria and brachy-synclinoria with marked pitch variation, while strike faults, chiefly high-angle reverse faults are numerous. In Eastern Central Victoria, however, the Upper Ordovician rocks occur mainly in arcuate anticlinal structures. In the Tabberabbera region a belt of Upper Ordovician strikes north-westerly and although a great deal of Eastern Victoria is shown on all maps as being of Upper Ordovician age it is becoming more evident that much is more akin lithologically to Silurian and Lower Devonian sediments. Between Ensay and Wodonga in the north there is a broad zone where the rocks have been metamorphosed to phyllites and schists with granite intrusions.

The Mt. William-Heathcote axis is important not only structurally, but it separates areas to the east with Silurian rocks (and Lower Devonian) from those of Ordovician age (mostly Lower Ordovician) to the west. It also divides the State into two parts, each with a fundamentally different structural pattern. To the east typical anticlinoria develop and are ranged as parallel arcuate belts while to the west brachy domes and troughs give the impression of structural isolation.

The graptolite bearing rocks in this Western part are confined to the area as far west approximately as Ballarat and to a line running northerly to Wedderburn. Some of the better known of the complicated domes are the Bendigo Dome which is thrust by the Whitelaw Fault over the Strathfieldsaye Trough to the east, to be succeeded still further east by the Axedale Dome, the Tooleen Trough, and the Heathcote-Colbinabbin axial line. The Maldon Dome further to the west is flanked to the southwest by the Werona Trough and again it is overthrust over the Muckleford Trough by the Muckleford Fault. This in turn is succeeded by the Blackwood-Trentham Dome. Between this dome and the Lauriston-Taradale Dome is the Expedition Pass Trough. Still farther south and east is

the Pyrite Dome with Lower Ordovician rocks surrounded by Middle Ordovician and then comes the Riddel Trough farther to the east in which Upper Ordovician rocks outcrop. The Djerriwarrh Fault separates the latter structures.

#### *Silurian-Lower Devonian*

East of the Mt. William-Heathcote axis are structures in which increasingly younger rocks occur ranging in age from Lower Silurian east of Romsey to Lower Devonian north of Heathcote in the Mt. Ida Synclinorium. Rocks of this younger age are repeated in the "Lilydale Synclinal" structure which is flanked to the east by the Mt. Easton Anticlinorium. Lying between this structure and the Mt. Wellington belt is the Walhalla Synclinorium, in which 10,000 feet of beds of supposedly Lower Devonian age overlie the Silurian.

#### *Silurian*

There appears to be a lithological change of the Silurian rocks going eastwards where there is a horizon marked by conglomerates, grits and limestone lenses which are approximately the base of the Lower Devonian. The graptolite-shelly fossil assemblages of East Central Victoria are replaced by a horizon characterized by graptolite-plant remains. The various divisions of the Silurian are difficult to map except in a general way and no mappable horizons have been found between the following division:—

Yeringian ..	..	Lower Devonian +
Tanjilian ..	..	Upper Ludlow
Melbournian ..	..	Lower Ludlow
Eildonian ..	..	Wenlock
Keilorian ..	..	Llandovery

Westwards of the Heathcote Axis the rocks are older than Silurian and the Upper Ordovician is known to occur only in the Riddel Trough. In the Mornington Peninsula a nearly complete sequence of Ordovician rocks marks the Mornington Anticlinorium.

The Silurian rocks are as a whole unfossiliferous and lithologically similar and the sequence extends upwards beyond the range of graptolites, which when present can be used as "marker beds" and so help in working out the stratigraphy and the structure.

In the Keilorian the graptolites are the only forms available for correlation except for one horizon of shelly fossils. The lower beds are marked by the biserial forms *Diplograptus* and *Climacograptus* while *Akidograptus* has also been recorded. Higher in the sequence are the various coiled forms such as *Monograptus turriculatus*, *M. convolutus*, as well as *Rastrites*, *M. crispus* and *Stomatograptus australis*. The most widespread zone is that of *M. exiguus*. In the higher beds are some shelly fossils such as:—

#### *Lower Silurian—*

<i>Thomastus thomastus</i>
<i>Leangella ino</i>
<i>Tyrothyris tiro</i>
<i>Velibeyrichia epona</i>
<i>Gillatia trinacria</i>



The Middle Silurian—"Yarravian" as a rule is very unfossiliferous yet *Monograptus vomerinus* has been found with plant remains and *M. priodon* persists from the Keilorian. In the higher beds *M. testis* has been found. Although *Cyrtograpti* have been found in New South Wales and are the most characteristic form at this horizon in other parts of the world, they have not as yet been found in Victoria.

Characteristic shelly fossils are:—

*Late Middle Silurian*—

*Atrypoidea australis*  
*Mucophyllum liliiforme*  
*Favosites allani*  
*Mazaphyllum cowombatense*

*Melbournian*—The shelly fossil—graptolite horizon of north central Victoria is a different facies from eastern Victoria, where the *Monograptus uncinatus* and plant fossils occur. Among the shelly fossils are:—

*Melbournian*—

*Chonetes melbournensis*  
*Otarion spryi*  
*Raphiophorus jikaensis*

The chief graptolites are:—

*Monograptus bohemicus*  
 „ *colonus* et var.  
 „ *chimaera*  
 „ *dubius*  
 „ *nilssoni*  
 „ *roemeri*  
 „ *varians*

In eastern Victoria following the *M. uncinatus*—*Baragwanathia*—*Yarravia* assemblage is the *Tanjilian* with abundant plant remains as well as:—

*Paneka gippslandica*  
*Styliolina fissurella*  
*Novakia matlockiensis*

*Lower Devonian*

Younger rocks follow the Upper Silurian conformably in the Mt. Ida Synclinorium where the sandy, shelly facies persists. In the Lilydale Synclinorium the shelly fossil and mudstone type of sedimentation becomes important. In the Walhalla Synclinorium about 15,000 feet of sediments lie above the basal conglomerates, grits and limestones of the Walhalla beds. Two other horizons of grits which in places are conglomeratic occur in the Walhalla beds, i.e. the Waterloo Gully Grits and the O'Keef Gully grits. The youngest beds in the Synclinorium are the Centennial Beds in which the following plants have been identified:—

*Sporogonites chapmani*  
*Zosterophyllum australianum*  
*Hostimella* sp.  
*Pachytheca*

Among the shelly fossils characteristic of the Lower Devonian are:—

Cyrtinopsis cooperi  
Maoristrophia  
Lepostrophia affinalata  
Pleurodictyum megastoma

On the Mitchell and Wentworth Rivers a complex sequence of Lower and Middle Devonian sediments, the Wentworth Group was folded into a north and south synclinal structure—the Tabberabbera Synclinorium, which has been traced northerly for about 25 miles. This transgresses the fold axes of the Ordovician sediments showing clearly that the Ordovician was strongly folded prior to the sedimentation of the Lower Devonian rocks. Near the headwaters of the Indi and Buchan Rivers, Middle and Upper Silurian sediments, the Cowombat Group, is overlain with marked angular conformity by the Snowy River Volcanics (Lower Devonian or Upper Silurian).

Lithologically and structurally it has not been possible to separate the Lower Devonian from the Silurian in most of Victoria.

#### *Middle Devonian*

These rocks are entirely confined to Eastern Victoria and outcrop around Buchan, Bindi, near Tabberabbera and in much smaller areas at Limestone Creek and Stony Creek. At the base of the Buchan beds is a series of volcanic rocks—the Snowy River Volcanics 700 to 1,000 feet thick. They include breccias, conglomerates, fine-grained and calcereous tuffaceous shales with interbedded felsitic lavas, as well as flows, dykes, and necks of andesitic or basaltic nature. Higher in the succession are several hundred feet of dark blue or grey marine limestones both bedded and reef varieties occupying a denuded synclinorium. The underlying Snowy River Volcanics crop out at the boundary of the Middle Devonian rocks and form rugged and barren hills whereas the limestone country with its red soils and grassy slopes forms undulating country where sinkholes, caves and underground drainage are common physiographic features.

Similar in nature are the beds at Bindi. There is a strongly folded series of blue limestones also occurring in a synclinal structure with a meridional strike, which has been traced for a distance of 25 miles in length, but the width is exceedingly narrow.

Some characteristic fossils of the Middle Devonian are:—

Breviphyllum recessum  
Acanthophyllum aequiseptatum  
Chonetes australis  
Kirkbyina fragum  
Sulcella australis

#### *Upper Devonian and Lower Carboniferous*

These rest unconformably on all the older rocks and are themselves only broadly folded and so have low dips except near structural edges. Apparently there is a passage in the main area from the Upper Devonian into the Lower Carboniferous. The fossiliferous Upper Devonian rocks occur in thin bands but are of wide geographical

extent. In the Blue Hills near Taggerty thin basal conglomerates pass up into red and buff coloured tuffaceous sandstone and shales striking just east of north and dipping east 30° to 40°.

The fishes *Dipterus microsoma*, *Bothriolepis gippslandiensis* and *Phyllolepis* occur and prove an Upper Devonian age. The Upper Devonian beds crop out at the edge of the Lower Carboniferous series and are associated with porphyritic lavas. Similar fish remains accompanied by some plants occur at Freestone Creek, and farther east at Iguana Creek, plant remains bearing *Archaeopteris howitti*, *Sphenopteris iguanaensis* and *Cordaites australis*.

The Upper Devonian rocks with the absence of marine fossils and the presence of land plants are of continental origin. In many other localities in Eastern Victoria thick acid lava flows underly the Lower Carboniferous. These acid lavas are generally linked together as Upper Devonian series and others considered to be of the same age are those of the Warburton–Healesville district and the Dandenong and Macedon Ranges. The most complete sequence of igneous rocks of Upper Devonian age are those near Eildon in the Cerberean Ranges where a Lower Acid Series is followed by Basic Lavas and then by the Toscanite series and these in turn by the Upper Acid Series which include Nevadite and Rhyodacite.

The Carboniferous rocks succeed the Upper Devonian in two main belts, namely, the Grampians in the west and the Wellington Highlands in the east. In both these areas arenaceous rocks predominate and in the Grampians region occur massive, thick crossbedded quartzose sandstones, grits, thin sandy flags and shales of white to reddish-brown colour overlying thick rhyolites. The softer chocolate micaceous sandstones and shales are confined to the valleys.

The sediments are intruded by hornblende porphyrites, granodiorites and granites, and are gently folded and tilted. Folding is probably Epi-Lower Carboniferous to Middle Carboniferous in age. The dip is predominantly to the west excepting in the vicinity of faults and in the Wartook syncline, Dundas Range and Willaura–Wickcliff area. Steep dips occur near marginal faults, e.g., along the north-eastern edge of the Ranges near Hall's Gap.

The sediments are mainly freshwater and unfossiliferous but small shells of *Lingula borungensis* (Chapman) and ostracods sp., and fragmental shark scales and spines can be found in the Wannon River and Fyan's Creek valleys. Some fragmentary plant remains (*Equisetales*) have been found in the Chimney Pot Gap, Victoria Range.

The rocks unconformably overly Cambrian and Ordovician sedimentary and igneous rocks, e.g., in Frenchman's Creek near Balmoral and in the Willaura–Wickcliff syncline north-east of Mt. Stavelly. In the Black Ranges the sandstones are faulted against Cambrian greenstones and cherts.

The Grampian Ranges are essentially strike ridges of massive quartzose sandstones, with the intervening valleys eroded in soft thin beds of red siltstones and sandstones, e.g., the valleys of the Wannon River and Fyans Creek. The rounded hills at the northern end of the Victoria Valley have been eroded in the granitic rocks.

The rhyolites include fragments of trachyte near Cavendish and it is presumed that trachytes outcropping on the southern edge of the Dundas Tableland are of Upper Devonian age.

In Eastern Victoria, yellow, brown and red coarse-grained sandstone and conglomerates occur. They are broadly folded but the dips are not high except in disturbed zones especially on the margins. At Bridge Creek north of Mansfield the following fish remains occur:—

Acanthodii—Gyracanthides murrayi, Acanthodes australis;  
 Eupleurogmus cresswelli;  
 Rhizodontidae—Strepsodus decipiens;  
 Palaeoniscidae—Elonichthys sweeti, E.gibbus;  
 Dipnoi—Ctenodus breviceps.

These indicate a Carboniferous age and are generally considered to be low in the sequence as they follow the Upper Devonian beds without angular unconformity. Plant remains include *Lepidodendron* sp. which is common, and in addition an Ophiuroid occurs—*Aganasta* gregarious.

#### *Permian Glacial Beds*

There are many discrete occurrences of glacial sediments which are probably remnants of former much more widespread deposits, which have been preserved in downfaulted blocks. They fall into three distinct belts bounded by major north-south trending faults. The beds as a rule are generally flat lying or only gently tilted except at Bacchus Marsh where they have an over-all dip of about 25° to the south-south-west. Open anticlinal folds have been observed in this area as well. The deposits are apparently entirely the product of land-ice glaciation composed of a thick series of tillites, fluvio-glacial conglomerates, sandstones, siltstones and mudstones as well as laminated shales of lacustrine origin. Pebbles and boulders of a great variety of rock types, some faceted, polished and striated, are present. It has not yet been possible to trace all the erratics to definite source areas.

There is some evidence of sheet glaciation as shown by the glacial pavements. These striations and grooves trend generally to the south-west or north-east. Although the sub-glaciation topography is not completely known the ice has overridden elevated as well as low-lying parts of the pre-glaciation land surface.

The glaciated surfaces with traces of stoss-and-lee topography occur over a distance of about 15 miles measured across the direction of ice flow and indicates that Victoria in those times was subjected to the action of thick sheet ice.

In the valley of the Korkuperrimul Creek near Bacchus Marsh over 2,000 feet of glacial beds have been measured and twelve distinct tillite horizons and eight of glacial mudstones interbedded with bands of fluvio-glacial and lacustrine origin have been recognized. Glacial sediments occur in the valleys of the Chetwynd and Glenelg rivers, and the Koroite Creek in western Victoria.

In the Werribee Gorge area stratified sandstone and freestone also occur. Similar sandstones outcrop in the Mt. Ida Creek area near Heathcote. Apart from surface exposures glacial deposits have been met with in bores, for example at Netherby and at Oxley.

*Age Evidence—Fossils*

Plant bearing sandstones of two horizons may indicate interglacial beds. The Gangamopteris sandstones contain many leaves of this form. Plant fragments have been found in the basal tillites near the contact with the Ordovician sediments near Bacchus Marsh. Spores also have been described from Coimadai and these have been compared with ones obtained from several horizons in the Indian Talchir Boulder Beds. The glacial beds overlie Ordovician slates and acid intrusive rocks and contain blocks with Silurian and Lower Devonian fossils as well as the Lower Carboniferous sandstones and mudstones of the Grampians. At Bald Hill near Bacchus Marsh the glacial deposits are succeeded without angular conformity by about 400 feet of beds which contain a *Thinnfeldia* flora which are generally taken to be indicative of a Triassic age.

*Palaeozoic Igneous Activity*

No granitic rocks in Victoria are younger than the Palaeozoic. The Cambrian greenstones have already been described but the age of some of our granite and granodiorite batholiths cannot always be determined. In central Victoria the granodiorites invade rocks of Lower Devonian age; some of the granites and porphyries intrude the Upper Devonian–Lower Carboniferous rocks in the Grampians; a hornblende adamellite near Mansfield intrudes rocks of similar age. The Lamprophyre dykes and the Woods Point dyke swarm were intruded after the folding of the Lower Devonian but before the deposition of the Upper Devonian sediments and volcanics. The Marysville igneous complex is a series of intersecting cauldron subsidences with granodiorite–porphyrite ring dykes, with Volcanic Cauldrons up to 14 miles in diameter.

In eastern Victoria three major periods of folding are present, and are accompanied by igneous intrusions. The Berridale granite is part of the Bowring Orogeny and it has intruded the Cowombat Group (Middle to Upper Silurian) and is overlain by Snowy River Volcanics (Lower–Middle Devonian).

The Angusvale Diorite at Tabberabbera intruded Middle Devonian sediments but it is overlain by Upper Devonian sediments, so can be correlated with the Tabberabberan Orogeny.

The discordant granitic batholiths with hornfelsic aureoles are younger than the concordant ones in the schistose belts.

*Palaeozoic Economic Products*

Victoria is essentially a gold province which has yielded over 73,000,000 ounces of gold. This gold occurs mostly in a free-milling state except in the eastern parts where the ores are pyritic. The Victorian gold reefs can be divided into two main classes:—

- (a) those connected with the folding and associated faulting, e.g., Bendigo, Castlemaine, Ballarat;
- (b) those associated with dykes that intruded the folded beds, e.g., A1 Mine at Gaffneys Creek, Morning Star at Woods Point and Long Tunnel at Walhalla.

At present there are only four producing gold mines in the State.

In some cases the gold is associated with antimony as at Costerfield and Coimadaí.

Galena rich in silver has been mined near Buchan, Mount Deddick, Wombat Creek, &c.

Copper has been mined near Walhalla and active mining is now taking place at Accommodation Creek near Deddick. At the copper mine chalcopyrite and pentlandite occur together with palladium and platinum.

Over 8,000,000 tons of iron ore (haematite) occur between Buchan and Nowa Nowa.

In the Cambrian steatite, chromite, magnesite has been mined.

The Palaeozoic limestones and dolomites, e.g., at Buchan are the main reserves for high-grade ore.

Weathered Palaeozoic granites are the source of kaolin and the rocks for clays which are used for brick and tile manufacture. They are also used for slates and building stone.

### Mesozoic Rocks

#### *Triassic*

These are confined to one limited outcrop of sandstone on the south of Bald Hill near Bacchus Marsh with a thickness of about 400 feet. They contain a Triassic flora near the top and overlie, apparently conformably, the Permian Gangamopteris sandstones of the Bald Hill Lower Quarry. *Schizoneura*, *Thinnfeldia* and *Antholithus* occur. In the Quarry Reserve further south are sandstones, freestones and conglomerates with a large number of plant remnants including *Phyllothea*, *Schizoneura*, *Coniopteris*, *Thinnfeldia*, *Ptilophyllum*, *Ginkgoites*, *Baiera*, *Phoenicopsis*, &c.

There is another small area of this age near Newstead.

#### *Jurassic*

The Jurassic was a lacustrine period and in Victoria the main outcrops are in three areas but it is not known whether these originally formed a single basin of deposition. The most westerly outcrop is the Merino area and the next outcrop forms the Otway Ranges. A probable north-easterly continuation of this area includes the deposits known from shallow depths in the Bellarine Peninsula, and on to the beach north of Mornington, on the eastern side of Port Phillip Bay, and the Barabool Hills near Geelong are also of this age.

The most easterly and most extensive outcrop is in south Gippsland and includes the hilly country formed by the Bass, Hoddle and Strezlecki Ranges.

The rocks consist of blue-grey felspathic sandstone, mudstone, sandy shales, lenticles of conglomerate and thick conglomerates near the base. The sandstones often show false bedding and consist of igneous materials, for example, quartz, orthoclase and plagioclase feldspar in fairly fresh condition as well as biotite partly altered to chlorite. Recent discoveries in the Otways points out that some of the materials are of tuffaceous origin.

The underground mining operations in Gippsland show that the rocks are much faulted and that the faults are of quite considerable throw. The Jurassic rocks yield rich soils and were originally heavily forested.

There is a remarkable similarity of structure between the Otways and the South Gippsland Highlands, which consist of two major structures, the Narracan and Balook lobes.

They are all dome-like uplifts elongated on south-west–north-east axes. The dips are generally low except close to major structures which take the form of fault-folds and often are along normal faults. The south-east dipping limbs are steep to vertical and the north-west limbs less steep.

Several recent workers using microfloral and microplanktonic evidence maintain that a great deal of our Jurassic is really Cretaceous in age and can be referred to the Albian and Aptian zones. On the other hand macroscopic plant material has been compared many times with macrofloras from other parts of the world and the conclusion reached that they are Jurassic.

Fossil plants are found in abundance throughout the Jurassic rocks of Victoria but up to the present no zoning has been possible by the use of these fossils. Among the more important fossils the following may be mentioned:—

Taeniopteris  
 Nilssoniasp.  
 Ginkgo  
 Araucarites  
 Brachyphyllum  
 Cladophlebis  
 Sphenopteris

The freshwater bivalve *Unio* has also been found in places. Among the few vertebrate remains are those of *Ceratodus* from Cape Paterson, a scale of *Ceratodus* from Kirrak, *Psilichthys* from Carapook and *Leptolepis* from Casterton. A reptilian fragment allied to *Megalosaurus* was found at Cape Paterson.

### *Cretaceous*

Dicotyledonous leaves occur in association with leaves of exclusively Mesozoic plants in the Runnymede Formation at Killara Bluff near Casterton. This flora indicates a Cretaceous age for the beds. It occurs at the top of the lacustrine–mesozoic sediments of the Merino Group and is unconformably overlain by marine sediments of the Baghallah Formation which are early Tertiary. The association of plants is:—

*Phyllopteroides lanceolata*  
*Sphenopteris* cf. *S. burrumensis*  
 ?*Czekanowskia*  
*Phoenicopsis elongatus*  
*Araucarites cutchensis*  
 Angiosperm

which indicate a Lower Cretaceous age.

Recently sediments containing marine shelly fossils including ammonites of Cretaceous age have been found in deep bores at Port Fairy and Port Campbell.

At Port Campbell and Port Fairy the following Cretaceous foraminifera have been found:—

Globigerina cretacea  
 Marsonella oxonya  
 Eoguttulina  
 Haplophragmoides cf. chapmani  
 Ammobacculites  
 Pseudoglandulina  
 Globulina

Associated with these are fragments of Ammonites, the gasteropod *Merelina*, *Eriptycha*, fish scales and bones, and coiled annilid tubes.

### Cainozoic Rocks

#### Tertiary

Rapid changes of facies and discontinuous outcrops have given rise to several interpretations of the Tertiary sequence but three types of sediments are apparently widespread:—

1. Non-marine, when fluvatile gravels, lacustrine sediments, brown coals, siltstones and clays were deposited.
2. A marine anaerobic environment in which carbonaceous and pyritic sands and clays were deposited. Pollen and spores are abundant with the only other common fossil *Cyclamina* sp.
3. A normal marine sedimentation both calcareous and non-calcareous. Marine transgression reached a maximum in Balcombian times.
4. A return to non-marine sediments in younger Tertiary times.

The sequence is divided into stages and some differences of opinion still exist as to the limits and successions that are represented. One of these is summarized in the following table:—

According to Dr. O. P. Singleton	Probable Age
Werrikooian .. .. .	Upper Pliocene
Kalimnan .. .. .	Lower Pliocene
Cheltenhamian .. .. .	Upper Miocene
Bairnsdalian .. .. .	Miocene
Balcombian .. .. .	Lower Miocene
	? Burdigalian
Batesfordian .. .. .	Lower Miocene
	? Aquitainian
Janjukian .. .. .	Oligocene—
	? Lower Miocene
“Johannian” .. .. .	Upper Eocene—?
	Oligocene
Undifferentiated	
“Wangerripien” .. .. .	Palaeocene to/or
	Lower Eocene

Detailed successions have been based on regional work and no attempt is made here to follow these details.



*Quaternary*

Pleistocene and recent deposits and events are important as to the climates of the immediate past and to the origin of soils and subsoils. Of importance are the ways erosion and deposition have affected the present-day land forms.

Buried artefacts and the Keilor skull ail point to the antiquity of the aboriginal rocks about 10,000 years ago.

Another artefact near Terang is beneath tuff which here overlies the coastal aeolianites.

The relative movements of land and sea are difficult to unravel and the raised sea beaches near Altona are due to sudden emergence, although the shore platforms around our coastline do not point to recent earth movements.

The main rock types are:—

Dune limestone and sands of Pleistocene age forming ridges up to 300 feet high parallel to and immediately behind the coastline;

Outwash sands and river gravels;

Newer basalts; and

Sediments in lake and swamp fillings behind many of the basaltic bars.

*Economic Resources*

The Cainozoic is important economically.

The basalts, both new and older, are used in the extractive industries, for road making and concrete aggregates.

Sands in the metropolitan area are used for many purposes—in concrete, hotmix plants, foundries, &c., and for the production of glass.

Limestones are for the manufacture of cement, e.g., at Geelong and Merrimans Creek in Gippsland, and for agricultural lime. At Coimadai dolomite is mined.

Many of the Pleistocene to Recent clays are used for tile and brick manufacture.

Bauxites developed from the older basalts are mined in south Gippsland and gypsum in the north-west of the State.

The most important are the brown coals. Proved reserves are 24,000 million tons and about 12 million tons are produced yearly. Chief areas are in Gippsland and the latest discoveries are at Anglesea.

*Climate***Climatic Conditions in Victoria***General*

The State of Victoria experiences a wide range of climatic conditions ranging from the hot summer of the Mallee to the winter blizzards of the snow-covered alps, and the relatively dry wheat belt to the wet eastern elevated areas from which many of Victoria's permanent streams spring.

### *Temperatures*

February is the hottest month of the year and January only slightly cooler. Average maximum temperatures are under 75° F. along the coast and over elevated areas forming the Central Divide and north-east highlands. Apart from these latter areas there is a steady increase towards the north, until, in the extreme north, an average of 90° F. is reached. Values decrease steadily with height, being under 70° F. in alpine areas above 3,000 feet and as low as 60° F. in the very highest localities.

Conditions of extreme summer heat may be experienced throughout the State except over the alpine area. Most inland places have recorded maxima over 110° F. with an all-time extreme for the State of 123·5° F. at Mildura on 6th January, 1906. Usually such days are the culmination of a period during which temperatures gradually rise and relief comes sharply in the form of a cool change with rapid temperature drops of about 30° F. at times. However, such relief does not always arrive so soon and periods of two or three days or even longer have been experienced when the maximum temperature exceeds 100° F. On rare occasions extreme heat may continue for as long as a week with little alleviation.

Temperatures fall rapidly during the autumn months and then more slowly with the onset of winter. Average maximum temperatures are lowest in July; the distribution during this month again shows the lowest values at elevated places, but a significant feature is that, apart from this orographically induced area, there is practically no variation across the State. Day temperatures along the coast average about 55° F. in July; much the same value is recorded over the wheat belt and only a few degrees higher in the far north-west under conditions of few clouds and relatively high winter sunshine. The alps experience blizzard conditions every season with minimum temperatures 10° to 20° F. less than at lowland stations.

Night temperatures, as gauged by the average minimum temperature, are, like the maximum, highest in February. Values are below 50° F. over the elevated areas, but otherwise the range is chiefly 55° F. to 60° F. The highest night temperatures are recorded in the far north and along the coast. In mid-winter average July minima exceed 40° F. along the coast and at two or three places in the far north. The coldest point of the State is the north-east alpine section, where temperatures frequently fall below freezing point. Although three or four stations have been set up at different times in this area, none has a very long or satisfactory record. The lowest temperature on record so far is 9° F. at Hotham Heights (station height 5,776 feet) at an exposed location near a mountain top. The extreme minimum for Australia is minus 8° F. at Charlotte Pass (station at 6,035 feet), a high valley near Mt. Kosciusko in New South Wales, and it is reasonable to expect that similar locations in Victoria would experience sub-zero temperatures (i.e., below 0° F.) although none has been recorded due to lack of observing stations.

With the exception of the exposed coast, all parts of Victoria may experience frost, but frequencies are highest and occurrences usually more severe in elevated areas and valleys conducive to the pooling of cold air. All inland stations have recorded extreme screen temperatures less than 30° F., whilst at a large number of stations extremes stand at 25° F. or less. Thus, frost may be expected each year over practically the whole of the State, but the bulk of the occurrences is restricted to the winter season. Spring frosts, however, may constitute a serious hazard to agriculture and in some years a late frost may result in serious crop damage. Periods of frost over Victoria longer than three or four days are most unusual.

### *Rainfall*

Rainfall exhibits a wide variation across the State and, although most markedly seasonal, most parts receive a slight maximum in the winter or spring months. The relatively dry summer season is a period of evaporation, which greatly reduces the effectiveness of the rainfall. Average annual totals range between 10 inches in the driest parts of the Mallee and over 60 inches in parts of the north-eastern highlands. An annual total exceeding 140 inches has been reported from Falls Creek in the north-east; however, with the sparse population and inaccessibility of the highland localities, it is not practicable to obtain a representative set of observations from this area. Most areas south of the Divide receive an annual rainfall above 25 inches, but above 40 inches over the Central Highlands, Otway Ranges and south Gippsland. Wheat-belt totals are chiefly between 12 and 20 inches. With the exception of Gippsland, 60 to 65 per cent. of the rain falls during the period May to October. This proportion decreases towards the east, until over Gippsland the distribution is fairly uniform with a warm season maximum in the far east.

All parts of the State have, on rare occasions, been subjected to intense falls and monthly totals exceeding three times the average have been recorded. Monthly totals exceeding 10 inches have been recorded on rare occasions at most places on and south of the Divide, the chief exception being over the lowlands extending from Melbourne to the central Western District. Occurrences of intense falls are more frequent, but still unusual, over the north-east and east Gippsland and isolated parts such as the Otways. The event has with few exceptions never been recorded over the north-west of the State. The highest monthly total ever recorded in the State was a fall of 35·09 inches at Tanybryn in June, 1952.

### *Floods*

Floods have occurred in all districts, but they are more frequent in the wetter parts of the State, such as the north-east and Gippsland. However, although a rarer event over the north-west lowlands, they may result from less intense rainfall and continue longer owing to the poor drainage in this section of the State. In many instances the frequency of flooding is increased by valley contours and damage is often greater because of the higher density of adjacent property and crops.

### *Snow*

Snow in Victoria is confined usually to the Great Dividing Range, which at intervals during the winter and early spring months may be covered to a considerable extent, especially over the more elevated eastern section. Falls elsewhere are usually light and infrequent. Snow has been recorded in all districts except the Mallee, Wimmera, north and lower north. The heaviest falls in Victoria are confined to sparsely populated areas and hence general community disorganization is kept to a minimum. Snow has been recorded in all months on the higher alps, but main falls occur during the winter.

### *Winds*

The predominant wind stream over Victoria is of a general westerly origin, although it may arrive over the State from the north-west or south-west. There are wide variations from this general description, however, and many northerlies and southerlies are experienced. The latter is the prevailing direction from November to February with a moderate percentage of northerlies often associated with high temperatures. Easterly winds are least frequent over Victoria, but under special conditions can be associated with some of the worst weather experienced over the State. Wind varies from day to night, from season to season and from place to place.

Examples of the diurnal variation are the sea breeze, which brings relief on many hot days along the coastline and the valley or katabatic breeze, which brings cold air down valleys during the night. The latter is well developed in many hilly areas of Victoria; being the result of differential cooling after sunset, it springs up during the night, often suddenly, and continues after sunrise until the land surfaces are sufficiently heated again. The sensitive equipment required to measure extreme wind gusts has been installed at only about five or six places in the State and to date the highest value recorded is just slightly over 90 miles per hour. There is no doubt, however, that stronger gusts have been experienced over the State, although not in the vicinity of a recording anemometer. A number of tornadic squalls have been experienced and, from the severe local damage, engineers have estimated wind strengths over 100 miles per hour. It is considered that any place in Victoria could feasibly experience at some time a local gust of 100 miles per hour or more.

### *Droughts*

There have been numerous dry spells over the State, most of them of little consequence, but many long enough to be classified as a drought. The latter was recognized as an agricultural hazard in Victoria from the middle of the previous century when population was extending into drier areas of the State. There have been less than ten significant drought periods during the last 50 years. The State of Victoria is situated on the northern fringe of the belt of prevailing westerly winds which, by and large, results in fairly uniform and reliable rainfall throughout the year. Victoria has a rather equable climate. Although severe droughts, devastating floods, scorching bushfires and severe storms are experienced from time to time, compared with other places in Australia and elsewhere over the world, the climate of Victoria is well behaved.

### Meteorological Records

Particulars about climate and weather conditions have been furnished by the Commonwealth Bureau of Meteorology, and are given in the following tables. In the first are shown the rainfall for each district and for the whole State for each of the years 1901, 1910, 1920, and 1930 to 1959, together with the average rainfall covering a period of 30 years:—

#### VICTORIA—RAINFALL IN DISTRICTS (Inches)

Year Ended 31st December—	Districts								Whole State
	Mallee	Wimmera	Northern	North-Central	North-Eastern	Western	Central	Gippsland	
1901 ..	9·39	16·61	13·58	24·78	28·08	27·90	28·98	33·66	22·05
1910 ..	15·96	22·36	20·13	29·13	31·10	32·45	28·28	30·80	25·96
1920 ..	14·93	16·04	20·15	28·37	34·42	25·99	31·38	33·37	25·43
1930 ..	15·32	20·94	19·68	30·59	32·49	29·43	30·85	33·66	25·76
1931 ..	14·86	19·25	21·77	31·20	43·18	28·79	32·88	32·65	26·97
1932 ..	14·96	18·90	20·60	29·63	34·33	31·85	32·91	34·19	26·34
1933 ..	14·13	20·96	20·25	31·09	32·09	26·87	27·56	30·65	24·47
1934 ..	13·21	16·64	21·01	28·57	42·81	29·20	35·60	43·39	27·60
1935 ..	10·84	17·71	19·53	29·14	35·86	30·49	34·23	42·53	26·63
1936 ..	14·39	19·41	19·50	28·47	35·52	26·91	30·24	36·38	25·63
1937 ..	12·69	17·19	13·70	20·08	26·25	26·39	25·20	28·33	21·02
1938 ..	6·30	11·39	8·66	15·62	20·49	22·63	20·47	26·39	16·28
1939 ..	15·32	20·33	27·72	37·83	53·05	32·94	38·10	38·16	31·37
1940 ..	6·82	11·26	9·67	17·13	21·21	21·51	22·81	26·94	16·73
1941 ..	12·23	20·14	17·31	25·39	30·41	29·73	31·53	33·13	24·29
1942 ..	14·31	22·04	19·66	31·91	38·28	30·54	29·68	31·59	26·28
1943 ..	8·25	13·48	10·98	20·22	26·76	25·86	22·46	30·05	19·44
1944 ..	6·59	10·46	9·24	17·10	20·72	24·30	23·97	27·54	17·09
1945 ..	9·63	15·20	14·84	21·72	29·97	25·21	22·25	28·60	20·50
1946 ..	14·07	22·07	17·76	29·86	39·85	40·20	33·04	41·19	29·37
1947 ..	15·16	22·71	20·35	32·93	40·91	33·80	33·00	36·10	28·46
1948 ..	11·29	19·15	16·46	24·82	31·98	28·37	25·93	34·37	23·61
1949 ..	11·80	16·67	20·45	31·35	33·72	26·91	32·62	36·72	25·05
1950 ..	17·57	20·04	23·67	31·63	35·03	24·01	30·82	36·65	26·52
1951 ..	12·09	19·61	20·26	31·87	37·45	33·32	34·71	41·78	27·91
1952 ..	15·22	21·87	21·86	35·56	46·24	39·30	40·66	48·71	32·75
1953 ..	12·27	19·62	16·81	28·69	35·57	30·40	30·75	35·29	25·38
1954 ..	13·41	17·68	21·22	29·88	35·58	25·92	30·93	34·02	25·02
1955 ..	17·68	22·44	26·00	35·99	49·05	32·40	34·12	33·86	30·24
1956 ..	20·85	24·31	31·45	41·17	55·59	34·02	34·29	44·25	34·69
1957 ..	9·67	14·87	13·55	23·01	27·32	26·82	24·85	31·98	21·03
1958 ..	15·45	17·65	21·40	31·57	37·78	29·05	28·99	35·42	26·35
1959 ..	9·97	15·16	16·56	26·09	27·69	24·46	26·53	33·63	21·70
Averages*	12·49	17·52	18·09	28·16	34·81	27·59	28·89	33·47	24·30

\* Averages for a standard 30 years' period 1911-1940.

The heaviest rainfall in the State occurs in the Eastern Highlands (from the Yarra watershed to the Upper Murray), in the Cape Otway Forest in the Western District, and in the South Gippsland, Latrobe and Thomson Basin sections of the Gippsland District. The lightest rainfall is in the Mallee District, the northern portion of which receives on the average from 10 to 12 inches only per year.

The means of the climatic elements for the seasons in Melbourne deduced from all available official records are given in the following table:—

### MELBOURNE—MEANS OF CLIMATIC ELEMENTS

Meteorological Elements	Spring	Summer	Autumn	Winter
Mean Pressure of Air (Inches) .. .. .	29·971	29·920	30·075	30·076
Monthly Range of Pressure of Air (Inches)	0·889	0·763	0·816	0·973
Mean Temperature of Air in Shade (° Fahr.)	57·7	66·7	59·4	50·1
Mean Daily Range of Temperature of Air in Shade (° Fahr.) .. .. .	18·7	21·1	17·4	14·0
Mean Relative Humidity (Saturation = 100)	64	59	69	74
Mean Rainfall in Inches .. .. .	7·36	6·10	6·58	5·86
Mean Number of Days of Rain .. .. .	40	25	34	44
Mean Amount of Spontaneous Evaporation in Inches .. .. .	10·23	17·33	8·09	3·79
Mean Daily Amount of Cloudiness (Scale 0 to 8)* .. .. .	4·8	4·2	4·7	5·1
Mean Number of Days of Fog .. .. .	1	1	6	12

\* Scale : 0=clear, 8=overcast

In the following statement are shown the yearly means of the climatic elements in Melbourne for each year 1956 to 1959 together with averages and number of years of record for each element. The extremes between which the yearly mean values of such elements have oscillated in the latter periods are also included.

### MELBOURNE—YEARLY MEANS AND EXTREMES OF CLIMATIC ELEMENTS

Meteorological Elements	1956	1957	1958	1959
Atmospheric Pressure (Inches)—				
Mean .. .. .	29·915	30·018	30·015	30·080
Highest .. .. .	30·490	30·650	30·522	30·669
Lowest .. .. .	29·233	29·452	29·451	29·233
Range .. .. .	1·257	1·198	1·071	1·436
Temperature of Air in Shade (°F.)—				
Mean .. .. .	58·6	58·7	58·3	59·5
Mean Daily Maximum .. .. .	67·0	68·1	66·6	68·4
Mean Daily Minimum .. .. .	50·3	49·4	49·8	50·7
Absolute Maximum .. .. .	101·0	103·0	101·7	109·0
Absolute Minimum .. .. .	31·3	30·8	32·3	29·5
Mean Daily Range .. .. .	16·7	18·6	16·7	18·4
Absolute Annual Range .. .. .	69·7	72·2	69·4	79·5
Terrestrial Radiation Mean Minima (°F.)	47·8	46·0	46·8	47·5
Rainfall (Inches) .. .. .	30·96	20·86	26·98	25·84
Number of Wet Days .. .. .	188	146	156	131
Year's Amount of Free Evaporation (Inches) .. .. .	35·59	41·40	38·75	38·43
Percentage of Humidity (Saturation = 100) .. .. .	69	62	66	65
Cloudiness (Scale 0 to 8)* .. .. .	5·0	3·7	4·8	4·6
Number of Days of Fog .. .. .	13	18	21	24

\* Scale : 0=clear, 8=overcast

An estimate of the areas of the State, subject to different degrees of average annual rainfall is contained in the following statement:—

**VICTORIA—DISTRIBUTION OF AVERAGE ANNUAL  
RAINFALL**

Rainfall							Area
inches							square miles
Under 10	..	..	..	..	..	..	Nil
10 to 15	..	..	..	..	..	..	19,686
15 to 20	..	..	..	..	..	..	13,358
20 to 25	..	..	..	..	..	..	15,731
25 to 30	..	..	..	..	..	..	15,819
30 to 40	..	..	..	..	..	..	14,150
Over 40	..	..	..	..	..	..	9,140

**Climate of Melbourne**

*Temperatures*

The proximity of Port Phillip Bay bears a direct influence on the local climate of the metropolis. The hottest months in Melbourne are normally January and February when the average is just over 78°F. Inland, Watsonia has an average of 81° whilst along the Bay, Black Rock, subject to any sea breeze, has an average of 77°F. This difference does not persist throughout the year, however, and in July average maxima at most stations are within 1°F. of one another at approximately 55°F. The hottest day on record in Melbourne was 13th January, 1939, when the temperature reached 114·1°F. which is the second highest temperature ever recorded in an Australian Capital City. In Melbourne the average number of days per year with maxima over 100°F. is about four, but there have been years with up to twelve and also a few years with no occurrences. The average annual number of days over 90° F. is just on nineteen.

Nights are coldest at places a considerable distance from the sea, where a good open exposure is available. The lowest temperature ever recorded in the city was 27° F. on 21st July, 1869, and likewise the highest minimum ever recorded was 87° F. on 1st February, 1902.

In Melbourne the average overnight temperature remains above 70°F. on only about two nights per year and this frequency is the same for nights on which the air temperature falls below 32°F. Minima

below 30°F. have been experienced during the months May to August, whilst even as late as October extremes have been down to 32°F. During the summer, minima have never been below 40°F.

Wide variations in the frequencies of occurrences of low air temperatures are noted across the Metropolitan Area. For example, there are approximately ten annual occurrences of 36° F. or under around the bayside, but frequencies increase to over twenty in outer suburbs and probably to over 30 per year in the more frost susceptible areas. The average frost free period is about 200 days in the outer northern and eastern suburbs, gradually increasing to over 250 days towards the city, and approaches 300 days along parts of the bayside.

### *Rainfall*

The range of rainfall from month to month in the city is quite small. The annual average is 25·89 inches on 156 days. From January to August monthly averages are within a few points of 2 inches; then a rise occurs to a maximum of 2·7 inches in October. Rainfall is relatively steady during the winter months when the extreme range is from  $\frac{1}{2}$  to 5 inches, but variability increases towards the warmer months. In the latter period totals range between practically zero and over 7 $\frac{1}{2}$  inches. The number of wet days, defined as days on which a point or more of rain falls, exhibits marked seasonal variation ranging between a minimum of eight per month in January and a maximum of seventeen in August. This is in spite of approximately the same total rainfall during each month and indicates the higher intensity of the summer rains. The relatively high number of wet days in winter gives a superficial impression of a wet winter in Melbourne which is not borne out by an examination of total rainfall.

The highest number of wet days ever recorded in any one month was 27 in August. On the other hand, there has been only one rainless month in April, 1923, in the history of the Melbourne records. On occasions, each month from January to May has recorded three wet days or less. The longest wet spell ever recorded was sixteen days and the longest dry spell 40 days. Over 4 inches of rain have been recorded in 24 hours on several occasions, but these have been restricted to the warmer months, September to March. No fall above 2 inches in 24 hours has ever been recorded in the cooler months. Fogs occur on four or five mornings per month in May, June and July and average 21 days for the year. The highest number ever recorded in a month was twenty in June 1937.

### *Cloud*

Cloudiness varies between a minimum in the summer months and a maximum in the winter, but the range, like the rainfall, is not great compared with many other parts of Australia. The number of clear days or nearly clear days is two to three on the average each month



from May to August, but increases to a maximum of six to seven in January and February. The total number for the year averages 98. The high winter cloudiness and shorter days have a depressing effect on sunshine in winter, and average daily totals of three to four hours during this period are the lowest of all capital cities. There is a steady rise towards the warmer months as the days become longer and cloudiness decreases. An average of nearly eight hours per day is received in January; however, the decreasing length of the day is again apparent in February, since the sunshine is then less in spite of a fractional decrease in cloudiness. The total possible monthly sunshine hours at Melbourne range between 465 hours in December and 289 in June under cloudless conditions. The average monthly hours, expressed as a percentage of the possible, range between 55 per cent. in January and February, and 34 per cent. in June.

### *Wind*

Wind exhibits a wide degree of variation both diurnally, such as results from a sea breeze, and as a result of the incidence of storms. The speed is usually lowest during the night and early hours of the morning just prior to sunrise, but increases during the day especially when strong surface heating induces turbulence into the wind stream and usually reaches a maximum during the afternoon. The greatest mean wind speed at Melbourne for a 24-hour period was 22·8 m.p.h., whilst means exceeding 20 m.p.h. are on record for each winter month. These are mean values: the wind is never steady. Continual oscillations take place with lulls during which the speed may drop to or near zero, and strong surges, which may contain an extreme gust lasting for a period of a few seconds only, up to or even over 60 m.p.h. At Melbourne gusts exceeding 60 m.p.h. have been registered during every month with a few near or over 70 m.p.h. and an extreme of 74 m.p.h. on 18th February, 1951. At both Essendon and Aspendale, wind gusts have been measured to 90 m.p.h.

### *Storms*

There have been occurrences of thunderstorms in all months, but the frequency is greatest during November to February. The greatest number of days on which thunderstorms were recorded during the year was 25 in both 1928 and 1932. Hailstorms have occurred in every month of the year: the most probable time of occurrence is from August to November. The highest number of days on which hailstorms were reported in a year was seventeen in 1923 and the greatest number in a month occurred in November of that year when seven hailstorms were recorded.

Snow has occasionally fallen in the city and suburbs; the heaviest snow storm on record occurred on 31st August, 1849. Streets and housetops were covered with several inches of snow, reported to be one foot deep at places. When thawing set in, floods in Elizabeth and Swanston streets stopped traffic causing accidents—some of them fatal. One report of the event states that the terrified state of the aborigines suggested they had never seen snow before.

### **Victorian Weather Summary for 1959**

#### *General*

Rainfall during the year was mostly below normal over the State. The only district to register above the yearly average was East Gippsland. Isolated places in the Western District also received rainfall above normal. Comparatively dry months were January and April to July inclusive. November, August and December were close to normal, the rest being above.

Generally speaking, temperatures during the year were higher than normal. January and November both ranged from 2° F. to 6° F. above the normal, whilst both October and December were comparatively cool.

#### *Noteworthy Events of the Meteorological Year*

##### *Heat Wave*

From 9th to 20th January, there was a continued registration of maxima above normal in all districts; the majority of stations recorded temperatures in excess of 100° F. from the 15th to 19th. The highest temperature was 114.3° F. at Nhill.

A number of people collapsed and the excessive heat was regarded as a contributory cause of the deaths of many people, particularly elderly persons and young children. Suburban and country railway lines buckled and services were disrupted. Tons of fruit were spoiled, and several bush and grass fires broke out over the countryside.

##### *Storms*

On 6th and 13th February, thunder and wind storms ravaged the State. The greater damage occurred on the 13th when many houses were damaged, trees uprooted, and telephone and power lines were twisted into a tangled mess over wide areas.

On the 13th June an estimated 70 m.p.h. tornadic squall swept over eastern suburbs of Melbourne and several houses were damaged. In June severe frosts in the northern Mallee damaged pea crops valued over £100,000.

Extensive flooding occurred in East Gippsland on 22nd July inundating a 56-mile section of the Princes Highway.

*Storm of the Year*

This occurred on 5th August, causing widespread damage over the State and resulting in one death. Rail and tram services were disrupted and many properties were damaged.

Damaged power lines resulted in many blackouts and interrupted radio and television services. Telegraphic services were disrupted and over 400 country towns were still isolated from these services on the afternoon of the 6th. Very rough seas eroded the eastern side of the bay, and small craft, piers and breakwaters were damaged, while shipping services were disrupted. Wind gusts reached 64 m.p.h. at Melbourne and were reported as over 80 m.p.h. at Geelong.

In September, a storm which affected Victoria from 18th to 20th resulted in heavy rain over the State. Most streams from Melbourne to East Gippsland were flooded. The worst affected areas were on the Yarra Basin. Some rail services were disrupted. In Melbourne on the 20th gusts exceeded 50 m.p.h. Melbourne Harbour was closed for some time and many vessels in Bass Strait were forced to shelter. Buildings were damaged, telephone services seriously affected, and some power failures occurred. Blizzards raged in alpine areas.

In November a spell of warm to hot and humid weather occurred from the 20th to 29th with temperatures above 100° F. at most stations in the north from 21st to 23rd. Mean maxima and minima for the month were highest for November at many stations since 1914.