BONWICK'S GEOGRAPHY.

According to promise, we now subjoin a few extracts from this interesting and valuable work:—

GEOLOGY OF VICTORIA.

The agricultural qualities of the country greatly alter according to the relative position with the Great Dividing Range and the Alps. The land between the Murray and the mountains is as indifferent as that between that range and the sea is good. Generally speaking, the soil near the hills is poor and heavily timbered. The sandstone plains on the north side have few trees, and little grass and water. The limestone region to the north-west, and along the western boundary, is very scrubby and barren. The basaltic plains to the south and south-west, and the basalt or ironstone localities of Kyneton, Kilmore, Bacchus Marsh, &c., are productive and valuable. On the other hand, slate and granite districts are inferior. Little good land is found near the gold-fields.

The county of Bourke has good farms in Pentridge, Somerton, Keilor, Heidelberg, &c. East and south-east of Melbourne the soil is sandy, and to the north and west of a fertile clay. Mornington county is either swampy or sandy; Evelyn, rocky and thickly timbered; Dalhousie, mountainous and indifferent, excepting near Woodend, Kyneton, and the Goulburn; Talbot, also hilly and poor, excepting on the Trappean Loddon Plains, and the banks of rivers. Ripon is a rocky county; Hampden has large and excellent grazing plains; Dundas is rocky and poor to the east, flat and poor to the west and north, but fertile to the south. Normanby has good soil to the north, south, and east, but is sandy and poor to the west,—it is remarkably productive on the Wannon and Grange Burn. Villiers is swampy to the west and north, but fertile to the east and south — the banks of the Hopkins are very fine. Heytesbury and Polwarth, the Cape Otway country, are little known and lightly esteemed; there are barren, scrubby, sandstone ranges, with occasional belts of grass-tree swampy flats; the Stony Rises are north-east of those counties.

The scientific surveyor, Mr. Skene, gives the following account of the physical geography of Grenville county:—Open plains, 1018 square miles; and timbered country, 452. He describes the grazing lands as comprised in 1202 square miles, the agricultural in 84, and the barren ranges 184. The same gentleman speaks of Grant county containing 1277 of timbered country, and 423 open plains. Of these, again, he regards 984 as grazing land, 618 agricultural, and 103 barren. The Ovens district is mountainous and barren in one part, and flat and swampy in the other. Good land is known on the Broken River and Devil's River. Gipps Land is a favorite portion. Shut in between the sea and the Alps, accessible in all weathers for all vessels, by the port of Welshpool, it is a province of itself. The north, west, and east are rocky and timbered. Along the coast the land is flat, liable to floods, and scrubby, but occasionally very rich. Between that region and the hills is a belt of magnificent country, well supplied with running streams, and having a delicious

belt of magnificent country, well supplied with running streams, and having a delicious climate. It is less favorable in soil about Welshpool and Tarraville than about Alberton. Wilson's Promontory is hilly, but splendidly timbered. Western Port is swampy, scrubby, and sandy. In Victoria the proportion of agricultural land is greater than in any of the Australian colonies.

The geology of Victoria is of a varied and interesting character. The Australian Alps are principally of granite, though there are great masses of slate, quartz, porphyry, &c. The Gibbo Range contains much quartz, with some argentiferous lead ore. The Buffalo and Fullers Ranges are of granite. The Ovens district is chiefly granitic, with auriferous slate and quartz. The sands of those mountain rivers are rich in oxide of tin as well as gold. The Indi River, or source of the Murray, abounds in quartz and gold. The Omeo plains are basalt, surrounded by auriferous alluvial deposits. The Mitta River dashes over romantic-looking basaltic rocks, which sometimes assume the appearance of frozen cascades, in three, five, and six-sided cylindrical prisms The natives never ascended high mountains, from a fear of yellow smoke and boiling chasms. Gipps Land is of crystalline rock to the north, and recent tertiary, or Murray fossiliferous limestone, along the sea shore. The flats are of similar limestone. Wilson's Promontory and the neighboring islands are of granite. Between the Promontory and Liptrap is slate, succeeded by blue fossiliferous limestone, near a deposit of iron sand. The Cape is of serpentine.

From Anderson's Inlet, past Cape Patterson, to Bass River, of Western Port, is a coarse, rotten, soft limestone and conglomerate, with fossil wood. This is the formation with which the Western Port coal is associated. There are four sites of this mineral in Victoria, namely—Barrabool Hills, near Geelong; Deep Creek, of Bacchus Marsh; Cape Otway country, and Western Port. The Barrabool is a small basin, from which little coal has yet been obtained. The seams are thin. The rocks are fine-grained sandstone, and a blue claystone. Though surrounded by basalt, no dykes are seen in the field. A bituminous shale or slate, covered with basalt, was found three miles from Bacchus Marsh. North of Cape Otway, and between it and Port Phillip Bay, are many coal localities. At Apollo Bay is a jet. Many seams of lignite are observed near Loutit Bay, in a silicious sandstone. This formation is much disturbed by trappean dykes. The Western Port coal measures extend along the south-eastern side, round by Cape Patterson, to the Tarwin River. These are constantly interrupted by basaltic veins. As elsewhere, the coal, which is highly bituminous, rests on slate, and immediately beneath the tertiary series. One pit sunk in 1840 gave the following results:—Blue clay 3 feet, yellowstone 11, clay 10, coal 3, clay 9, coal 3, rottenstone 6, coal 5. Near Cape Patterson is a seam 6 feet thick, of first-rate mineral. The Queen's seam, 4 feet, is below high-water mark. Some doubt exists as to the permanent thickness and extent of these veins. In 1840 the coal was discovered twelve miles from any loading-place in the Bay; a fossil tree, twenty feet long, was observed there. Fifteen years ago a company sought to work this mine. Occasionally there are seen, over the coal, in the soft sandstone silicious balls a foot in diameter.

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The north side of Western Port is of quartz and quartzose sandstones. Much blue clay is near the Great Swamp. The east side of the port is of recent sandstone, with intrusive greenstone, and the western coast of dark, hard basalt and quartz; the basalt contains fine calkspar crystals. French, or Inner Island, of Western Port, has trappean basalt to the north; sandstone, conglomerate, and coal to the east; basalt to the south; tertiary sandstone to the west. Phillip Island or Grant has recent sandstone on the north; basalt to the south and west; and pink granite to the south-east. Cape Wollomai is a granite of green mica and red felspar. Flint pebbles are washed up on the southern shores of the Port. Arrongonite, quartz pebbles, and red ochre are found at Nobby Point, Phillip Island. Cape Schank country contains slate, porphyry, calcareous spar, and basalt. On the basalt is a concretionary or root limestone, which is doubtless produced by the percolation of rain water with the lime from shells, among the sandy shore. There are good specimens of mammilated hæmatite of iron. A granite of white felspar and yellow mica occasionally shows itself.

The Peninsula from Cape Schank to Point Nepean of Port Phillip exhibits a series of sand hills, with a rough, earthy, fossiliferous recent limestone. The lime occurs in occasional lumps in the sand, which are extracted for burning. The sandy cliffs have thin bands of this recent limestone. This limestone of the Port Phillip Heads is similar to that of the Murray, containing the fossils of the Nautilus, Turritella, Erata, Cypræ, &c., with coral and fossil wood. A good freestone is wrought at Point Nepean. South-east of Port Phillip Bay is the granitic Arthur's Seat. A bed of tertiary clay divides this from Mount Martha, which consists of slate, granite, and basalt. A ferruginous sandstone cliff near Mount Martha, 200 feet high, is of mottled sands, with bands of pebbles. There is also a good building stone of quartz grit conglomerate. Near Martha is a basin of tertiary blue clay, containing fossils of the Murex, Turretella, Terebratula, Patella, Nautilus, and Coral. Greenstone dykes are in the neighborhood. Basalt and blue clay divide Martha from Mount Eliza. Carrum Swamp is north of Eliza. North of the swamp are the recent formations of Brighton, St. Kilda, and Prahran, consisting of fossiliferous and horizontal sandstone beds, coarse quartz grit, clays, and a fine conglomerate of building stone. The underlying slate sometimes crops out. At St. Kilda is a white sandstone, with white mica in the joints. The titaniferous iron sand of Brighton contains 70 per cent. of pure metal. Sandridge is of very recent formation. Between it and Melbourne is an upheaved estuary of sand and clays, resting on red tertiary sandstone.

Melbourne stands on a slate formation, which is often violently and curiously contorted. An auriferous gravel in one part and clays in another form in the upper stratum. Gypsum is abundantly found in the adjoining swamp, which is conjectured by Mr. Blandowski to have been once the crater of a volcano, filled up with recent deposits. On the north, west, and east sides of Melbourne is the dark basaltic rock, or bluestone of colonists. Though this covers Richmond and Collingwood Flats, the slate floor re-appears on Richmond and Collingwood Hills. The same trappean basalt extends southwestward along the Bay shore, across the Saltwater River to Williamstown, and so onward toward Geelong, forming large treeless plains. It is thought there were two irruptions of basalt, according to Mr. Smyth, between which is a quartz gravel bed, on the road from Melbourne to Flemington. The latter place is on a tertiary ferruginous rock, containing Turretella, Tynolites, &c. There is also basalt, soapstone, and valuable hæmatite of iron. A recent sandstone reposes on old basalt at the Saltwater River, and upon that is another volcanic coating. Crossing the Yarra from Collingwood Flat we leave the basalt, and tread upon the slate of Boroondara. In most parts of that beautiful and hilly district the slate is covered with thick beds of gravel, which is sometimes of rounded masses of quartz; at other times of shot-like particles, cemented by pressure into a sandstone; but it is in many parts covered with clay and sand. The basalt and slate are in like manner divided by the Darebin Creek. The slate of Boroondara, by the Yarra, has the meridianal direction, and is intersected by quartz veins, as well as accompanied by parallel bands of quartz, as on the diggings. Without doubt the gravel is auriferous.

The river Yarra Yarra runs through a slate and granite at first, and then through the slate and quartz of barren Yerring and Warrandyte. In the slate of Upper Yarra are found the Tribolite, Echinus, Crustacea, &c. The auriferous rocks become more manifest on Anderson's Creek. A band of calcareous breccia there contains coralline zoophyta. Mr. Aitchesou discovered a remarkable coralline vein, fifteen inches wide, Upper Yarra, between layers of hard blue inclined slate, abounding in microscopic fossils. There are minute Encrinites and moss corals. The formation is of the lowest Silurian. This appearance in an auriferous locality is very curious. Mr. Selwyn speaks of a cave of crystalline limestone, eight miles from the Yarra, leaning against basalt, which has elsewhere, by contact, converted sandstone into quartz.

The Diamond, Darebin, and Plenty rivers rise among crystalline mountains, but flow chiefly through basaltic plains. The Yan Yean Reservoir, for supplying Melbourne with water, is fed from the Upper Plenty streams. At Broadmeadows the slate appears under the trap. The sandstone of Moonee Ponds contains the fossils of the Encrinite, Orthis, Lingula, Tribolite, Orthoceras, &c. Basalt covers the Keilor Plains, forming columnar cliffs one hundred feet high, beside the creek. Tertiary gravel is presented between the basalt and slate at Keilor.

Geelong is surrounded by a field of basalt, which covers a marine limestone, forming cliffs by the Bay side. Mr. Orlebar noticed a freshwater limestone in its vicinity, and speaks of a basalt conglomerate, cemented by lime containing fossil shells. A yellow and a white sandstone occur near the town. Portarlington, at the entrance of Geelong harbor, is on a magnesian limestone, which, with some interruption, extends up to the granite Station Peak, and averages, according to Mr. Skene, half a mile in width. Brisbane Range, the source of Little River, is of slate, skirting Station Peak. Boulders

Range, the source of Little River, is of slate, skirting Station Peak. Boulders of trap strew the limestone shore at the mouth of the Barwon. The Werribee rises in a basaltic country, falling over a trap rock of fifty feet. It receives the Lerderberg coming through a slate defile, 700 feet deep, over very thick slate debris. The Moorabool flows through the Derrimut basalt and slate country. In Derrimut district is a low limestone ridge. The Moorabool branch, Lal Lal, has a fall over basalt columns, 112 feet high. The Leigh separates the basalt western country from the slate one. Slate prevails from the trap at Sunbury, on Macedon river, to the trap Mount Blackwood. Mercer's Hill, by the Leigh, is of quartz and slate, near basalt, containing copper, lead, and gold. The Anaki Hills are volcanic: an imperfect crater may be seen. Mount Moriac is of basalt; and Coloite, at the entrance of Lake Connewarre, of recent limestone. Mr. Skene thus sums up the geology of Grant county:—Auriferous schists, 54 square miles; slate, 220; granite, 32; lime, 19; sandstone, 35; basalt 1340.

The Cape Otway country comprises the counties of Heytesbury and Polwarth, south-west of Geelong. It is a district of rough, scrubby, sandstone ranges, containing silicified trees, and presenting on the eastern sea-coast considerable traces of coal, extending from Addis Bay to Airey's Inlet. Large blocks of magnetic iron are gathered on the beach. Greenstone occurs at the Cape. Ten miles west of the Cape are stalactitic limestone caves. Similar caves are northward, near the Stony Rises. On the coast are horizontal beds of sandstone and limestone, with recent marine fossils. The cliffs near the Gellibrand are 200 feet high in the neighborhood of the celebrated fossil clay cliff. From the shore northward to Mount Leura are deep deposits of marly clay and loam. Limestone stalactites may be seen at Apollo Bay.

Westward of Geelong the country is principally basaltic. Gellibrand, Hesse, and Warrion, in Grenville, are volcanic cones. The plains are often covered with small pebbles of glossy ironstone, and fragments of porous ferruginous sandstone. According to Mr. Skene, the surface of Grenville county shows 39 square miles of auriferous rock, 18 of granite, 375 of slate, and 1087 of basalt. The wonderful basalt and porphyr Stony Rises are scattered over many miles to the southward and south-westward of Lake Coranganite, and between the Emu and Hopkins, being partly in Heytesbury and partly in Hampden counties, surrounded by a basalt country. Mount Powdon rises in the middle 500 feet. Some imagine they observe a large crater. There are many volcanic cones around Leura. Lake Curremberte, 150 feet deep, is doubtless an extinct volcano. The limestone formation appears at Mortlake, surrounded by basalt. Granite obtrudes west of trappean Timboon. A beach of lava is spoken of near Lake Colae. The neighborhood of Warrnambool is limestone: north of it the barren sandstone is seen. Ridges of basalt pierce through the western recent limestone, as on the Shaw and round Portland Bay. There is a limestone cave at Bridgewater, fifty feet deep, ornamented with droll but artistic sketches of aborigines, native animals, &c. The stalactitic caves of the Glenelg are very beautiful; the limestone there contains the Pecten, Echinus, Ostrea, Formanifera and coral.

This recent limestone extends northward to the Murray, along the boundary, and for four hundred miles along the stream. A sandstone floor connects the limestone region with the mountainous parts. Several granite hills rise from the plain—as Hope and Pyramid; the rock of Mount Hope is a white felspar and black mica.

The Dividing Range is between the Murray limestone and sandstone country and the basaltic southern plains. The rocks are crystalline. The basis is slate, but the alternations of granite, quartz, and basalt are frequent and extensive. The trap is found on both sides of the range. It is abundant on the sources of the Yarra; forms the country between Kilmore and Lancefield; covers part of the Macedon ranges; appears in many volcanic cones north of Ballaarat; and connects the granite Mount Misery with the Pyrenees. Slate is prominent in the Dandenong and Plenty hills, though often pierced by granite. It forms the countless rises of Black Forest and the Kilmore ranges, and is the prevailing rock of all auriferous districts, at a very inclined angle. Fossils are frequently met with in these ancient schistose formations. Passing over the auriferous rocks of the eastern Pyrenees, we have a short interval of granite, when the slate and quartz are presented in great force around the amphitheatre, the centre of which, however, is of trap and granite. Further to the west is the giant Cole, followed by the golden rocks of the Avoca. The granite head of Ararat rises from the slaty country at the source of the Wimmera.

The bold Black Range is the great north-eastern spur of the Dividing Chain. With grey granite at the foot, and much kaolin or decomposed felspar, the black and the smoky quartz is a striking feature. Black tourmaline is plentiful, as well as phonolite, or clinkstone, of which the native axes were made. The north side of Macedon range is granite; slate, quartz, porphyry, syenite, clinkstone, iron ore, also are observed. To the west of it are many singular basaltic piles, twenty feet high, composed of stones, says Mr. Blandowski, convex at the base, concave at the top; this place was the favorite resort of the aborigines At the foot of Mount Macedon appears an extinct volcano, with trappean veins. Mount Diogenes, or Dryden's Monument, near Macedon, has been well described by Mr. Blandowski. A perpendicular wall of dolerite rises before it; and at the foot of it are vast numbers of basaltic pyramidal columns, from fifteen to twenty feet in diameter, and from thirty to one hundred feet high, containing many hollow concretions filled with a fine soft earth. In 1846, in the marsh by Mount Macedon, in a black soil and yellow clay, were found animal marsupial fossils, like those of Wellington Cave in New South Wales; the kangaroos were larger than any now existing.

The Grampian Hills are of a silurian slaty sandstone. Phonolite is found on Mount Williams; crystallised sandstone on Abrupt; micaceous sandstone on Zero; ferruginous quartzose sandstone on Sturgeon; quartzose conglomerate on Mitre Rock; and quartzoze sandstone on Arapiles or Choorite. Between Sturgeon and Mount Eckersley the country is basalt. The source of the river Loddon is among volcanic cones; it then flows for many miles through an auriferous country, until it reaches the plains. The Loddon Plains, be-

miles through an auriferous country, until it reaches the plains. The Loddon Plains, between Castlemaine and Maryborough, are covered with basalt; the golden gravel, doubtless, lies between this and the slate. Trappean basalt is the prevailing formation along the Greenock and Deep creeks of the Loddon. At Carlsbrook the slate is on the western side of the Deep Creek, and the basalt on the eastern. The Upper Avoca has the quartz and slate on both sides for fifty miles. The Campaspe has a long course through basalt. At its junction with Piper's Creek there are basaltic columns 250 feet high. Granite is the rock of Piper's Creek. The Coliban, likewise, runs in a trap district till it approaches Mount Alexander, when the banks are of granite. Slate is at its junction with Myrtle Creek, Mount Franklyn, of Jim Crow Creek, is of basalt, near limestone.

Taking the Melbourne road to Bendigo, the traveller journeys over basalt to the granite banks of the Deep Creek, twenty miles distant. Trap follows this, succeeded by quartzose sandstone, and that again by trap, to Gisborne. The Black Forest is slatiform. Excepting where slate and quartz occasionally appear, the basalt prevails from Woodend to Tarradale, where the auriferous rocks present themselves. Near Carlsrhue the basalt is north, west and south; the slate and quartz east; and granular quartz north-east. Granite is beheld south and east of Kyneton, the basalt region; but through this trap the slate and quartz often are observed.

Malmesbury is basalt. Granite extends from Stratford Lodge, on the Coliban, to the slate of Elphinstone. With the exception of the trap on the Exe, the district between Bendigo and M'Ivor is a slate one. Between Kyneton and Kilmore is the mountain Lancefield district of basalt on slate, bounded by granite to the north; the township of Springfield has slate and quartz to the westward.

The Sydney road leads through a basalt country for twenty miles. Soon after the slate ranges begin. Kilmore, over the Dividing Range, is on basalt. At Ferguson's, Broadford, is a fine-grained quartzose sandstone, and a quartz conglomerate. Roofing slate lies between that and Seymour. Slate commences, also, two miles north of Kilmore. Basalt intrudes a few miles south of Seymour, and granite for six miles north, succeeded by slate. Avenal and Longwood are upon granite; the same rock extends from Violet Town to Benalla, on the Broken River. Dark limestone is quarried at the latter township. Twelve miles north of that river the slate and quartz are seen. Flats then extend to Spring Creek, of the Ovens district, where the granite recommences. Between Kilmore and M'Ivor is the granite country of Mollison's Creek and Pyaleng, with its huge boulders. This rock is exchanged for quartz and slate at the "Pick and Shovel," ten miles south of Heathcote, on M'Ivor. On Mr. Pohlman's station westward is some meerschaum clay in a silicious rock. At M'Ivor, in addition to gold deposits, very rich sulphuret of antimony is obtained. In the contorted slate rock of Mount Ida, M'Ivor Creek, the following fossils are found:—Trilobites, Orthocerites, Crinoids, Zoophyta, Mollusca, &c.

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