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**AURIFEROUS DRIFTS OF THE SOUTH ESK
VALLEY :**

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THE AURIFEROUS DRIFTS OF THE SOUTH ESK VALLEY, IN THE NEIGHBOURHOOD OF FINGAL, TASMANIA.

In endeavouring to arrive at an estimate of the extent and probable productiveness of the deep lead drifts of the South Esk Valley, the first enquiry, naturally, should be directed to the character of those rocks in the locality which either themselves contain gold, or which, by their abrasion, have contributed to the auriferous contents of the drifts. A geological aspect of the upper water-shed of the South Esk may be obtained from the subjoined sectional diagram (No. 1), the rocks present being, in stratigraphical order, as follows.

(Reference to Diagram No. 1.)

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| <ol style="list-style-type: none"> 1. <i>Alluvial</i>: recent fluvial accumulations. 2. <i>Upper Pliocene</i>: terrace-drifts of water-worn fragments of palæozoic rocks. 3. <i>Newer Volcanic</i>: dolerite, anamesite, tufa, and ashbeds, first observable at Avoca, and extending thence to and west of Corners. 4. <i>Middle Pliocene</i>: deep-lead drifts. 5. <i>Greenstone</i> (probably mesozoic): diabase, consisting of plagioclastic felspar, augite (in part chlorite), and magnetite, with orthoclase, hornblende, titanite iron, and quartz as accessory minerals. 6. <i>Dyas</i>: sandstone, shale, coal-seams, and fossiliferous | <p>limestone. The latter is rich in productus, spirifer, and cyclostomata, amongst which crisia and numerous forms of fenestellidæ.</p> <ol style="list-style-type: none"> 7. <i>Lower Silurian</i>: sandstone and clayslate, in places (e.g., at Mangana) altered to quartzite and hornfels. These rocks are traversed by auriferous quartz veins, and in the neighbourhood of granite (e.g., at Story's Creek) also by tin-bearing quartz veins. 8. <i>Granitoid Rocks</i>: ternary granite, eurite, greisen, aplite, felspar, porphyry, and stanniferous quartz veins. |
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To the gold miner the occurrence of greenstone, permian (dyas), and granitoid rocks is of no practical importance.

Upper Pliocene.—The upper pliocene drift is most extensively developed on the left side of the Esk Valley, between Fingal and Ormley, where it crops out in terraces rising up to 50 feet above the river flat. It is composed of well-worn gravel and shingle of permian sandstone and limestone, and boulders of greenstone, with but little quartz. Being chiefly derived from other than silurian rocks, it is not likely to contain gold in sufficient quantities to pay even for sluicing.

Volcanic.—The newer volcanic rocks are of interest both to the miner and the geologist: to the miner, because he will have to sink through them to reach the lead on its lower course west of Avoca; to the geologist, because he recognises in their presence the main cause for the covering up of the old drainage channel, as well as for other changes in the physical geography of the district. My examination of the country in the neighbourhood of Avoca was too hurried to enable me to form an opinion whether the lava emanated from defined points of eruption (craters), or from dykes. The probability, however, is that the upper (eastern) margin of the lava flow at or near the site of the present village of Avoca, stemmed the current of the old river to a height of several hundred feet, causing the channel along its entire upward course to be silted up by drift accumulations (newer pliocene). Where the modern water-course has scooped its bed out of these younger drifts, it is confined within the banks of the old lead valley; while further down, to the west, in skirting (because unable to break through) the denser volcanic rocks, it is conducted into an independent water-shed. The distance between the ancient and modern river channels increases as they flow westward. A few miles west from Stony Creek this divergence cannot be less than three miles. There are no present means of estimating the total thickness of the volcanic rocks in this locality. At the railway station at Corners a shaft, sunk for the purpose of a well, exposes a depth of 90 feet of scoriæ and tufa; no water was met with. (See Diagram No. 2.)

The lithological character of the lava is essentially that of a dolerite, while, as far as I have observed, the true basalt is wanting. On the geological map published by the Government the term "basalt" is apparently used in a collective sense, so as to embrace all tertiary volcanic rocks. This explanation cannot, however, apply to several patches of "basalt" shown on the map, one extending for six miles or more along the right bank of the South Esk from the Break-o'-Day River towards Black Boy; another some two miles south-west of Fingal, and, again, between Ormley and Avoca. The rock at these places protrudes in isolated, generally much water-worn, blocks from the sandy clay flats bordering the river, and consists of a laminated diabase, rather more siliceous and less ferruginous than that of the Fingal Tier, owing, probably, to a more advanced state of disintegration and transmutation. I am inclined to think that its occurrence here is not one *in situ*, but that of huge boulders embedded in other loose detritus, derived from the denudation of a once unbroken mass of greenstone, of which Ben Lomond and the Fingal Tier are mere outlying vestiges.

Lower Silurian.—Although no fossils have, I believe, been hitherto found in the older palæozoic clay-slates and sandstones of the South Esk valley, these rocks bear lithologically and in their mode of occurrence so much resemblance to the graptolite beds at the Cabbage Tree Hills, north-west of Launceston, that there is no reason to doubt their lower silurian age.

The strata can be well examined in the road cuttings from four to five miles south-west of Fingal. Highly contorted and faulted, they present a normal strike of N. 38° W., with a cleavage dipping 70° to 80°, now with, and again transverse to, their underlay. The few quartz veins visible are rarely "bedded," but run generally parallel with the cleavage plane. (See Diagram No. 3.)

At Mangana the rocks appear in various stages of metamorphism; the sandstone becomes more and more indurated, till it approaches the character of quartzite; the slates pass into felsite schist. Some of the numerous quartz veins in this locality have been worked with advantage.

At Black Boy, where quartz reefing has been conducted for many years, and at depths exceeding 600 feet, the character of the country is more like that of a Victorian gold-field than any of the other localities I have visited. The dark-coloured slates, studded with cubical pyrites, the graphitic casings, the nature of the quartz veins, as well as that of the veinstone, remind one of the Garibaldi Reef, Blackwood. I was informed that the principal lode worked by the Black Boy Company is from one to four feet in thickness, and yielded at no time less than an ounce of gold to the ton. The reason why a mine of such extraordinary richness in the past is allowed to lie idle was stated to be the abnormal amount of pyrites present in the veinstone. What little prospecting there is done outside of the mine just referred to has been carried on in the desultory style usual on mining fields where individual labour has not yet been replaced by the co-operative system. Still the results obtained justify the opinion that systematic mine-work can be carried on with profit. There is a large number of untried quartz veins on the hills at Black Boy, and the gullies springing from these ranges all yield coarse gold of high standard. The best means of testing the character of the lodes in this locality, suggested by the favourable topographical features, is, perhaps, the driving of a low-level adit, starting from the Esk valley and running in a south-westerly direction transversely to the strike of the rocks.

The upper water-shed of the South Esk and Dan's Rivulet is, in part, bound by spurs from Mount Victoria, the lower slopes of which are known to be intersected by numerous quartz veins. I have not visited the spot, but specimens shown me as having been recently obtained from there are exceedingly rich in gold.

Middle Pliocene (deep-lead) Drifts.—Deposits of alluvial gold have been traced from shallow levels, in the neighbourhood of auriferous lodes, trending towards the deep ground under the Esk Flat in many places, notably at the Mangana Creek, the Black Boy diggings, and several gullies near Hazlemere, all falling in on the west side of the valley. The doubtful point in connection with deep-lead mining in this locality, therefore, is, not whether gold will be found in the deep drifts, but in what manner it has been distributed. For instance, as, in addition to the main channel, there is assuredly a system of tributary leads, it must be left to actual mine-work to ascertain whether these branches may not be, in parts, richer than the main trunk.

The site of the prospecting operations at Tullochgorum appears to be well chosen, as it commands the main lead as well as the Mangana lead, and probably other subsidiary channels. The subjoined section (No. 4) across the Esk valley at Tullochgorum is constructed from the following particulars:—The silurian rocks (sandstones predominating) crop out on the edge of the alluvial flat, about 200 yards north of the river. Taking this outcrop as a starting point, and going in a south-easterly direction across the main valley, we come, at a distance of 330 yards, to No. 9 bore, which bottomed at 102 feet; at 363 yards No. 8 bore struck wash at 106 feet, bottoming at 111 feet; at 418 yards No. 7 bore reached the bed-rock at 125 feet, after going through 5 feet of wash; at 450 yards a prospecting shaft was (1874) sunk to a depth of 70 feet, not bottomed, but meeting with a heavy influx of water; at 470 yards No. 10 bore bottomed at 110½ feet, having encountered five

feet of wash; at 506 yards the new engine shaft is now being sunk; at 616 yards No. 1 bore bottomed at 118 feet; at 704 yards No. 4 bore bottomed at 176 feet; at 726 yards No. 5 bore bottomed at 211 feet; at 755 yards No. 6 bore bottomed at 199 feet,—the last three bores terminating on bare sandstone; at 792 No. 2 bore struck greenstone at 202 feet 6 inches,—it was continued, at my suggestion, to a depth of 23 feet, still working in greenstone; at 957 yards No. 3 bore struck greenstone at 180 feet 6 inches. At a total distance of 1480 yards we arrive at the opposite side of the valley, where the bank is made up of well-worn detritus of diabase, limestone, upper palæozoic sandstone, and a little quartz.

From the extensive water-shed drained by the deep lead, it is only reasonable to expect a much greater depth of wash than has been proved to exist in any of the bores, and it is, therefore, all but certain that none of these bores (the correctness of the data given by the workmen being admitted) have, as yet, struck the deepest ground, even if the results obtained by No. 5 bore, bottomed at 211 feet, and No. 2 bore, sunk to 236 feet, did not argue in the same direction. With regard to Nos. 2 and 3 bores, discontinued while working greenstone, I have already expressed an opinion that the diabase rocks in this position are, probably, derivative deposits, *i.e.*, loose shingle and boulders overlying other and deeper-seated drifts. The possibility, nay, the probability, therefore, exists that deep ground will be found between bores Nos. 2 and 3, or even further to the south. It is, also, not improbable that a smaller run of deep ground lies between bore No. 9 and the western bank of the valley, in proximity to the river.

The shaft now being sunk is intended to test the character of the drift between Nos. 10 and 8 bores. Although the deepest ground will, probably, not be found in this position, it is, as already observed, a doubtful point of importance to ascertain if gold is most plentifully distributed in the side valleys and shallower tributaries or in the deeper main channels.

Apart from the company's individual concern, the progress of the trial workings now carried on at Tullochgorum is fraught with the greatest possible public interest; for the disclosure of the existence of a payable auriferous gutter in this position is merely the precursor of deep-lead mining that will probably extend from the Black Boy to Corners,—a distance of upwards of 60 miles.

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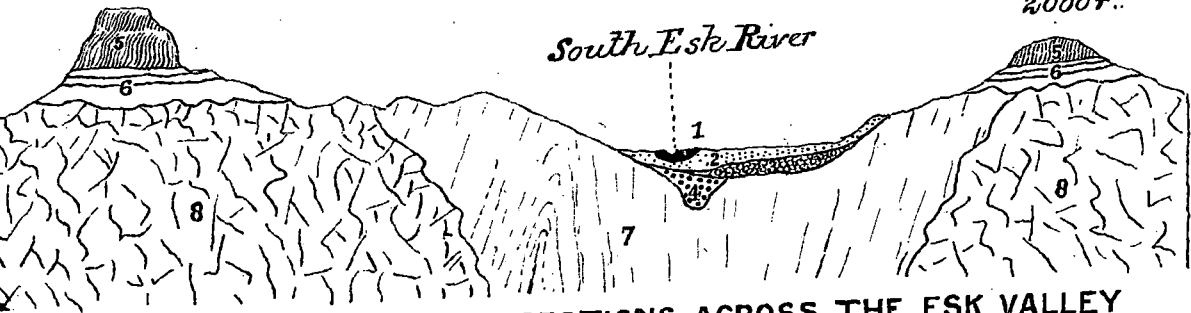
Ballarat, 1st March, 1883.

Ber. Lombard
5000 f^t

NO.1

Fingal Tier
2000 f^t

South Esk River

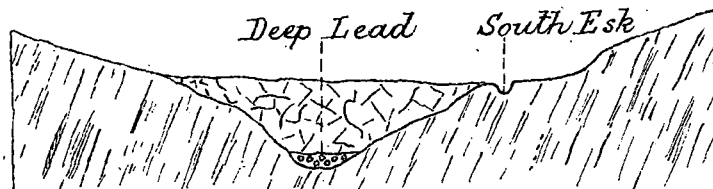


SKETCH SECTIONS ACROSS THE ESK VALLEY

NO.2

Deep Lead

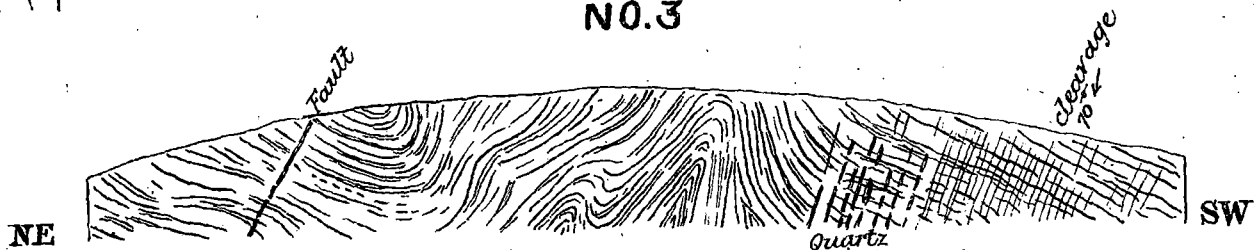
South Esk



SKETCH SECTION NEAR STONY CREEK

(LOOKING WEST)

NO.3



ROAD CUTTING IN SILURIAN SHALES AND SANDSTONE

4 1/2 MILES S.W. OF FINGAL

NO.4

SECTION OF THE SOUTH ESK VALLEY AT TULLOCHGORUM

Horizontal scale four chains } to an inch.
Vertical scale one hundred feet }

