

## NOTES ON THE GEOLOGICAL STRUCTURE OF THE NORTH-EAST COAST OF TASMANIA.

DEAR SIR,—I forward a few notes on the Geological structure of the North East Coast, they are briefer than I had intended, as in consequence of my having been so fully occupied with my visit to the Fingal district, I have been unable to attend to other matters,—I regret that I cannot as yet lay before the Society my completed Geological map of the district, this I hope to do at the next meeting, and in the meanwhile shall confine myself to a few points which do not necessitate illustration.

At several meetings of the Society attention has been directed to the controversy maintained among Geologists as to the age of Australian coal,—and it will doubtless be within the recollection of the members that I expressed my opinion as to the coal in Tasmania belonging to two distinct periods, assigning a later date to the age of Fingal, and Douglas River coal than to that of the Mersey,—a subordinate point in the argument, was the relative age of the Coal and the Greenstone,—and on this point I expressed an opinion different from that of other Geologists.

My own impression being that the Coal formation was of anterior origin to the Greenstone, and had been penetrated by the latter, subsequent to its formation,—this opinion was supported by the faulted nature of the formation, its general disturbance near the Greenstone, and the mode of occurrence of the latter in several instances in small isolated masses on the very summit of some of the loftier ranges of the upper Palæozoic formation, the other view was that the Greenstone was the older rock, and had formed a bold and rugged Coast outline, jutting out into points and promontories affording protection to bays and estuaries, within which the coal had been accumulated.

I am glad now to be able to furnish evidence corroborative of my own view, and enclose a sketch of a Coast Section exhibited near the mouth of the Tomahawk River, upon the North East Coast. In this interesting locality we find in close proximity no less than four formations, viz., Granite, Greenstone,—an old Palæozoic formation, and what I take to be Carboniferous or later Palæozoic Sandstones.

The granite is of a kind very common upon the coast—porphyritic in structure, and exhibiting large and distinct crystals of pink and white felspar.

It is traversed by porphyry elvans. Near the junction with the Greenstone these belong to two periods, in the sketch appended, the direction of one of the elvans is from S. 55 W.,

to N. 55 E., and where visible upon the beach it is broken by a succession of faults. One of these faults is caused by elvan No. 2,—which is from 6 to 8 feet in width, and consists of a very intimate mixture of Quartz, Felspar, and Mica—weathering perfectly smooth, and traversed by three strings of Cherty Quartz, the direction is N. 30 W. Elvan No. 1 is about three feet in width at the one end, gradually diminishing, and breaking up with a number of strings at the other.

The Greenstone is of a coarsely crystalline structure similar to that so widely distributed over the Colony,—I have but little doubt, therefore, that it is identical in point of age, as well as in general characters, with the Greenstone forming the elevated tiers at Fingal and Mount Nicholas,—the older Palæozoic rocks likewise bear internal testimony, from their structure and composition, as well as from their strike, cleavage, &c., as to their age,—the only question remaining, and in this case the important question is as to the age of the associated Sandstone,—which I shall, therefore, consider in more detail. These Sandstones occupy the shore for the distance of some few hundred yards, and they are separated from the older Palæozoic formation and the Granite, by a kind of fault running in the direction 10 N. of W., and S. of E.—they lie to the northward of the fault, and upon the Tomahawk Point, a little beyond the opening of the river, they may be traced as far as Tomahawk Island, but only along the beach,—they have but a slight inclination, and form a sort of pavement on the beach, they are friable and coarse, buff colored, speckled with brown, presenting the variegated appearance so characteristic of the sandstones forming so large a portion of the coal measures at Fingal and Killymoon,—some traces of vegetable impressions remain, and to a small extent carbonized wood. In fact, in general aspect they so closely resemble the coal measures of other parts of the colony, that I think no person, after a careful comparison, would feel inclined to doubt their identity. It is also a remarkable fact that upon the beach adjoining, and upon the headland on the west of Tomahawk Point, fragments of coal are constantly thrown up, I myself discovered many, all within the span of a few hundred yards, and satisfied myself that they could not have resulted there from any accidental occurrence.

Having said thus much upon the age of the Sandstone and the Greenstone, I would call your attention to sketch No. 2, which represents the relations of the two as actually exhibited upon the coast, the overhanging masses of Greenstone and underlying bed of Sandstone passing underneath the Greenstone at an angle of a few degrees, altered at the point of

contact, and for the distance of a few feet from it into a ferruginous sandstone, which has evidently been subjected to great heat. There can be no question, therefore, as to the relative-age of these two rocks, and the only point open to doubt is as to that of the Sandstones, which I myself believe, and have endeavored to point out my reason for believing, to be the equivalent of the Fingal formation, and it may be remarked that even should this not be the case, and the rock be of later date than that which I have assigned to it—and I think no one after examination would credit it with an earlier age—the point which I have submitted would be the more certainly proved,—for the Greenstone, if of later date than this, would necessarily be the same with the Coal formation, which would, upon this supposition, be of older formation than the one described.

Another point of interest upon the coast is the existence, in the neighborhood of Cape Portland, of a limited area of the Fenestella bearing beds of the upper Palæozoic formation, these occur near the head of Musclee Roe Bay—in a creek running from between some Greenstone Hills and traversing the sandy flats round the head of the bay—the country in this direction is so depressed and covered by drifts, that but little evidence of its internal structure can be obtained, and it is, therefore, interesting to find in this locality and in this position, a formation, which is not represented in any way in the higher ground in the neighborhood, and in fact is not met with in any direction for many many miles,—this, as well as the little outliers of the coal formation at Cape Portland, represent the last traces of the upper Palæozoic formation upon the Coast, but still are sufficient evidence of their having been as widely distributed at as late date over that portion as they are generally over the centre and south of the island. I believe that their entire destruction resulted from their having been subjected to the influences of marine action during a longer period, and possibly in consequence of a different rate of depression and elevation to that extended to other parts of the colony.

The attention of the Society has been directed at various periods to the tertiary deposits flanking the shores of this island—perhaps in no district could they be studied more effectually, or with greater advantage, than in the one to which my present remarks apply.

The low sandy wastes, commencing near George Town, and alternately expanding and contracting in width as they extend round the coast, attain their maximum development in the North Eastern point of the island. In fact an area of about 200 square miles, lying south of Cape Portland, appears

to have been almost and totally submerged during the period when these Tertiary deposits were formed. The coast line then consisted of Mount Cameron, Bayleny Hill, and the other highlands intervening between these and the Blue Tier, the few elevated ridges such as the Ringarooma Tier, the Long Marsh Tier, and other highlands scattered sparingly throughout the district, were thus probably but little elevated above the level of the sea,—they are all capped with Basalt or Greenstone, and probably are indebted to that fact for their immunity from destruction. A feature common to all sandy coast lines is strikingly shown, at various points along the beach between the mouth of the Ringarooma and Cape Portland, viz., the progress of a sort of wave or avalanche of sand, from the line of sand hills upon the beach across the flat low land behind it. They are often of no considerable width, but simply progress forward, steadily, invariably, covering over, and burying everything which lies in their course, one of these drifts nearly embraced the dwelling house at Cape Portland, by good fortune it passed a little on one side, and the house was thus preserved from destruction, which would otherwise have been inevitable in the course of a few years. With this fact so prominently brought under one's notice upon the beach, and with regard to existing sand dunes, it is interesting to find its counterpart upon the hills, and with regard to those of a Tertiary period, this is the case along the flanks of the Ringarooma Tier, where the practised eye will recognize the presence of long ridges of drifted sand overlying and concealing the mass of rock constituting the hill below, and evidently referable to the cause alluded to.

I am at present engaged upon a manuscript map of all the North East part of the Colony, which I hope to be able to submit to the Society at the next meeting. This will embrace all the rich basaltic land lying in the vicinity of the Ringarooma, and a large extent of country previously unvisited. I shall reserve my remarks upon the general Geology of the district till that occasion, and trust that these few will not be unacceptable to the Society.

I am,

Yours very truly,

CHARLES GOULD.

J. W. Agnew, Esq., M.D.,  
Hon. Secretary to the  
Royal Society.