

It will be unnecessary for me to say anything on the relative modes of dressing the herring, as practiced here where they are frequently spoiled, and in Holland, where the very superior mode of treatment gives them a delicious flavour. This has been fully explained by T. F. Knight, Esq., in his valuable pamphlet. One remark, however, I may venture with reference to the barrels in which our Nova Scotia herrings are too frequently packed. They are not only defective in material, but faulty in size, for many of them are too large, so that the fish working loose, become softened and spoil in long voyages to warm climates.

A good system of inspection of both fish and packages, is a great desideratum in this Province. A Chief Inspector, thoroughly competent to teach our fishermen the best and most improved systems of catching and curing fish, would prove a very valuable officer, if possessed of zeal and tact. His salary should be paid out of the public revenue, and not by the fishermen, who would also be expected to pay the deputy inspectors. I am very glad to see that Mr. Knight's pamphlet strongly recommends the encouragement of Fishing Societies by the Government, in the same way as Agricultural Societies, and for similar ends, viz.: the improvement of implements and modes of labour. By such wise and generous means as these shall a great branch of industry be fostered, which shall not only add vastly to the material wealth and naval importance of this country, but will impart a tinge of manliness, hardihood, and enterprise, which will ennoble its national character for all time.

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ART. IX. THE GEOLOGY OF GAY'S RIVER GOLD FIELD.  
BY REV. D. HONEYMAN, D. C. L., F. G. S.

(Read Dec. 3, 1866.)

THIS peculiarly interesting Gold Field is situate on either side of the old Gay's river road, and about four miles from Gay's river and Stewiacke river, or intermediate between those two rivers. Approaching it from the west, my attention was first specially attracted by an outcrop of lower carboniferous limestone, containing the fossils characteristic of this horizon. This occurs on the roadside. Advancing, I observed argillite strata



crossing the road in numerous outcrops, shewing that we had passed from the lower carboniferous into the horizon of our gold fields. At a short distance to the left of the road, gold diggings are observed.

Passing onward we still meet with outcrops of argillite, and other diggings appear nearer the road and on the same side of it, and then on the right side; and at a little distance from the road there is a brook with a saw-mill, where other diggings are to be seen. Farther on we still find an outcrop of argillite, and then we evidently pass again into the lower carboniferous, as I observed, about two miles distance from the last argillite outcrop, plaster pits on either side of the road, and succeeding these at some distance, an outcrop of sandstone. We have thus on this road a geological section, showing a lower silurian centre, succeeded on either side by lower carboniferous rocks. My attention was chiefly directed to the first of the diggings referred to. In the examination of these I received valuable aid from Mr. Gay, to whom I am indebted for much of the information which I am now to communicate. On examining the excavations made, I found an extension of the argillite, which I have referred to as outcropping on the road, unconformably overlaid by a thick stratum of conglomerate of undoubted lower carboniferous age, and the latter in turn overlaid by a thick accumulation of drift material. The argillite underlying the conglomerate exactly resembles the slates of many of our productive gold fields, being of a greenish hue and greasy touch. It is inclined at the usual high angle. The conglomerate reposes on the edges of argillite, appearing to dip slightly in a direction opposite to the dip of the former strata. This conglomerate is of variable coarseness, and a slight examination of its composition is sufficient to show that this locality was, so to speak, an "Ovens" in the lower carboniferous era,—that it was a beach on which the shingle of the period accumulated, derived from the argillites, quartzites, quartz, and granites of the lower silurian period,—that the shingle was cemented by the ferruginous constituents of the same rock, decomposed by the chemical action of the salts of this ancient sea. The conglomerate is composed of slate, quartzites, quartz, mica, felspar



(?) and oxide of iron and gold. The pieces of slate imbedded in this conglomerate are often large and angular; the quartzite and quartz sometimes occur in boulders; the mica is grey and glistening; the oxide of iron gives to the mass a rusty hue, which is now and then varied by the lustre of the precious metal.

In illustration of the cementing process to which I have already referred, I may observe that a modern example may be seen at Sydney Mines, Cape Breton. In 1861, when examining the section of carboniferous rocks on the shore, my attention was attracted to a conglomerate on the beach, at the mouth of a level belonging to one of the mines. The water flowing from this level is highly ferruginous; it flows into the gravel which is also washed by the sea, and a cementation of the gravel and sand is the result, and the conglomerate referred to is being formed. I would now direct attention to the position of the gold. It is found in the argillite, according to Mr. Gay's statement, and in the drift, and it is found in the conglomerate, as the specimens before us strikingly indicate. When it occurs in the argillite it is embedded in debris inserted in former openings of the strata in the line of strike, or at right angles to it; the debris in the latter being generally the more productive. Auriferous quartz leads have not yet been found in the slate, although there can be little doubt that the gold has been derived from such a source.

The gold found here is generally connected with the conglomerate. This conglomerate is said to be in some places about thirty feet in thickness, but while it is considered that gold may be found throughout the mass, it is found occurring chiefly at the bottom of the conglomerate, or where it rests on the argillite. This is easily accounted for: when the original gravel was washed by the sea, the superior density of the gold would cause it to settle at and towards the bottom. In specimen 1, the gold appears on the edges of the argillite upon which the conglomerate has rested. In 2, 3, it is on the smooth side of the conglomerate, which was originally in contact with the argillite; and in 4, it was also near the argillite. I was informed that gold is also found in the drift. This is not at all unlikely,



as this is mainly derived from the underlying and associated rocks.

The degree of richness of the conglomerate described is likely soon to be thoroughly tested, as a crushing mill, in course of erection in the locality, is expected soon to be in operation.

These observations conclusively show that the great upheaval of the granite, quartzite, argillite and auriferous quartz, was an event prior to the formation of even the lowest member of our carboniferous system. This fact is established by the evidence of composition of the lower carboniferous conglomerate, and its unconformability with the underlying argillite. Now the geological age of the former is established by the fossiliferous limestone of the section. What, may be asked, is the geological age of the argillite? Does it belong to the age immediately preceding the lower carboniferous, or is there here a break in succession? We are accustomed ever since Dr. Dawson wrote his classical work, *Acadia Geology*, to style the argillite in question, and its associate quartzite, as lower silurian. Is this incontrovertibly the age of these sedimentary strata? Comparative lithology has hitherto been the only method of determination available, and Dr. Dawson has certainly very ingeniously applied the method. On examining Prof. Ramsay's admirable catalogue of the rocks of Great Britain, in the Museum of Practical Geology, Jermyn St., London, and comparing our own with the descriptions there given, I have for some time arrived at the conclusion that as far as mineral structure is concerned, our rocks in question, may either be devonian or lower silurian. If, however, Prof. Jukes has succeeded in his recent attempt to demonstrate that the so called devonian rocks of England, which have given the term to geology, are after all silurian, Dr. Dawson's comparison may be considered as legitimate and conclusive. I would adduce another argument in confirmation of the opinion that the formation in question is lower silurian. Being persuaded of the correctness of the opinion expressed, I took occasion in the month of February, 1861, when advocating the establishment of a geological survey of the Province, before a Committee of the House of Assembly, to quote from Murchison's *Siluria*, the confidently expressed opinion, that the metamorphic lower



silurian was the formation in which gold was chiefly found in workable quantities—assuming that this was the geological character of the Nova Scotia rocks under consideration. I argued from the discovery of gold at Tangier, that a proper examination might prove these rocks to be extensively auriferous. The discovery of gold the second time at another locality in Tangier; the numerous discoveries made in rapid succession of auriferous deposits in other localities; and the productiveness of these gold fields, shew that the inference was a legitimate one. These results corresponding so strikingly with Sir Roderick Murchison's observations, may therefore be adopted as a *vice versa* argument in establishing the age of the geological formation in question.

The aid of palæontology is much desiderated for the purpose of a conclusive decision of the question. A few years ago I met with a piece of dark shale containing a reticulated organism, which, at the time, I considered as derived from the dark slates which had been quarried in the region. I submitted the specimen to a distinguished naturalist, Prof. Wyville Thomson, of Belfast, and it was considered to be a leaf, imbedded in black carboniferous shale. As the specimen was not found *in situ*, I am persuaded that this opinion is correct.

Another desideratum is regularity of succession. After a lengthened and extensive investigation, I have not found these rocks overlaid conformably with rocks of a more recent period. When in contact, or nearly so, it is invariably with carboniferous strata unconformable in position,—yet another is relative *inter-position*. I give an example in explanation. It is an example already referred to in my paper on the Geology of Antigonish County. In Lochaber we find devonian strata, metalliferous, &c., to a certain extent metamorphic, owing to the influence of trap-eruption. As far as I have yet examined them, they are destitute of fossils, and isolated would be of doubtful age. These rocks, however, are found perfectly conformable, with strata containing organisms equivalent to D of Arisaig, *i. e.*, equivalent to the Lower Helderberg, United States, or to the Upper Ludlow of England, and also they are succeeded by lower carboniferous sandstone and limestone. I therefore con-



sider that I am warranted in assigning to these strata a devonian age. Our auriferous quartzites and argillites over-lie the granite of uncertain age, and, as I have already observed in the Gay's River Gold Field, the argillite is overlaid unconformably with the lower carboniferous conglomerate. So that the age of argillite, &c., cannot be determined by interposition.

The stratified rocks of our gold fields have marked peculiarities, by which they are easily distinguishable from the stratified rocks of the interior of whatever age; and no one can hesitate on leaving the one and entering upon the other—in maintaining that the formations are altogether different. I have already at considerable length, directed attention to these formations as they exist in Antigonish county, and I consider that an insertion of the Arisaig silurian series and the Lochaber division is sufficient to fill up the breach in succession between the lower silurian argillite and the lower carboniferous conglomerate.

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ART. X. THE COAL TRADE OF THE NEW DOMINION. BY  
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the Nova Scotia Coal-Owners' Association.*

ON glancing at the map of the world, the eye rests on three points as peculiarly adapted to be the great centres of commercial and maritime activity. The first is situated on the eastern, and the second on the western shores of the Atlantic, and the third is to be found on the Pacific coast of America. All of them lying sufficiently far from the tropics to be the homes of a healthy and industrious race, form portions of the British Empire. England, placed between the German ocean and the Atlantic, seems to guard the highway of commerce from the North of Europe with the rest of the world. Nova Scotia, standing far out into the ocean, looks like some vast pier which nature has raised up to intercept the trade of the New and of the Old World, while Vancouver's Island more nearly recalls to us, by its climate and its insular position, the geographical features of the mother country. Yet valuable as a favourable position is to enable a country to lead the van of commerce, there are other scarcely less important elements of national