

run along the sharp anticlinal axes into which these rocks have been folded. Although a great deal may be expected of the deep deposits of the old rivers which have not yet been worked, the future of the gold mining industry in Quebec must as elsewhere lie in the working of the solid veinstone.

The section surveyed this season in Nova Scotia lies westward of that surveyed in 1889 and 1890, and extends along the sea shore from Peter's lake to Halifax harbor, and northerly to the Shubenacadie and St. Andrew's rivers, covering an area of 305 square miles in Halifax County and 70 square miles in Colchester County. Besides this, Mr. Eaton surveyed 130 miles of roads in Hants County to be used as tie-lines in next year's contemplated work.

The greater part of the region is occupied by the auriferous Lower Cambrian rocks cut by the western end of the belt of granite examined last year, which extends to within two miles east of Waverley, and also by a small granite mass three miles north of Waverley. In the northern portion, the gold-bearing rocks are overlain by the Lower Carboniferous formation along the valleys of the Shubenacadie, Gay's and St. Andrew's rivers and a few of their tributaries.

Two or three beds of dolomitic limestone from six inches to four feet thick were found at various places at the bottom of the upper graphitic ferruginous slate group, between layers of greenish talcose slate. These beds may contain fossils, but search made for them has so far proved unsuccessful.

The anticlinal axes were minutely examined and traced, as in former years, on account of their close relation to the auriferous belts. Within the region examined, the geological structure of the gold district of Lawrencetown, Montague, Waverley and Oldham, was carefully studied. Lawrencetown has been little worked. The yield of the three other districts has been as follows:—

DISTRICTS.	Yield for 1890.	Total Yield from 1882 to 1891.
Montague	2,263	32,581
Oldham	2,775	41,242
Waverley	403	53,874
Total in Nova Scotia.....	24,358	506,675

Special attention was given to the gold district of Oldham, it being a typical district, worked to a great extent and exposing to great advantage the quartz leads, all of which were prospected by means of surface trenches on account of the small thickness of the drift. A detailed geological map of this district, on a scale of 500 feet to one inch, with sections, was compiled on the ground. It shows the elliptical structure of the anticlinal fold, with all the known quartz veins, both interbedded and transverse; and also the numerous faults affecting them, and proves clearly that the richness of a lead depends altogether on its position and relation to the structure of the elliptical dome of the fold to which it owes its origin. In this work I am specially indebted to Mr. J. E. Hardman, B. Sc., M. E., manager of gold-mining properties in Oldham and Waverley, for much valuable information which his great experience in gold-mining enabled him to give.

Auriferous leads have also been prospected at Elmsdale, South East Passage, and other places along anticlinal axes; and traces of antimony ore are reported to have been found at Wyse's Corner.

Some facts, which have an important bearing upon the question of deep mining, may here be introduced, in view of the great interest taken at present by the mining community in the subject. From a study of the districts east of Halifax, and especially of that of Oldham, it is plain that whenever an interbedded lead is followed some distance on the surface or to great depths, its relation to the axis of the anticlinal, and consequently to the stratigraphy of the fold, is constantly changing, and its size and workable value must consequently be affected; so that it is improbable that a lead found rich and of good size on the surface can be followed profitably to great depths. The limit of depth may vary from a few feet to 400 or 800 feet according to the structure of the anticlinal fold, the position of the lead and the extent to which it has been denuded. The problem of deep mining seems thus to depend on the location of a zone of rocks containing the parts of the leads which are of sufficient richness, because they keep the same relative position to the axis of the anticlinal. In most of the districts the zone of rich leads has the anticlinal axis for its centre, and it is probably the centre of the auriferous zone to a depth practically unlimited. Such is the case in the eastern part of the province, at Seal Harbor, Isaac's Harbor, Goldenville, Harrigan Cove, Salmon River, Fifteen Mile Stream, Killag, Mooseland, Moose River, Caribou, Gold River, Lawrencetown, Waverley and Oldham. In the few other districts where the auriferous zone is worked only on the north or south side of the anticlinal, the zone would for the same reason be parallel to the axis of the anticlinal to an inaccessible depth, as in Isaac's Harbor, Wine Harbor, Beaver Dam, Tangier and Lako Catcha.

I would, therefore, strongly recommend that deep perpendicular shafts be sunk on the anticlinals, and that cross-cuts be driven on both sides at various depths to test leads which do not crop out to the surface, many of which would probably prove very rich as they would be cut in their most favorable stratigraphical position and could easily be worked by means of levels and overhead stowing from the cross-cuts and the one perpendicular shaft. This system might be adopted with advantage at the North Star property of Isaac's Harbour, at Goldville, where on both sides of the anticlinal have been worked from 500 to 600 feet deep and abandoned, but the middle of the auriferous zone has never been tried; at Fifteen Mile Stream, in the vicinity of the Serpent lead; at Moose River, where Mr. D. Touquoy has his main shaft; at Waverley, on the east and west side; and at Oldham, west of the Black brook. No such systematic workings have, however, yet been undertaken in Nova Scotia, that I know of, except in Oldham, where Mr. J. E. Hardman began last summer to sink a perpendicular shaft

on the anticlinal dome. The result of his undertaking is awaited with great interest.

The pay streak of the leads in different districts is also a subject of great importance to miners; but, unfortunately, the data necessary to draw conclusions are very meagre, as in most of the mines, especially in old workings, no systematic records of the yield of different parts of the leads have been kept. I hope, however, to be able to throw some light on the subject from the notes I have gathered this summer.

The materials of economic importance met with in the Lower Carboniferous comprise chiefly unexhaustible and valuable deposits of limestone and gypsum. One belt of fine grey limestone at Gay's River corner carries a good percentage of argentiferous galena; it runs east and west, rests unconformably upon the lower quartzite group, was worked some years ago where the south-west branch of Gay's river crosses it, and also prospected last summer at Carroll's corner, where some mining areas were taken up.

The gold district of Gay's river was re opened last spring by the Colo Stream Gold Mining Company, who put up an extensive 50 stamps steam mill and other large buildings. They sank a shaft, immediately north of Daniel McDonald's old works, which gave the following section of the Lower Carboniferous:—

	Feet.
Surface drift	20
Conglomerate containing gypsum, non-auriferous...	35
Coarse sandstone	2
Auriferous, irregular conglomerate	8

(To be continued.)

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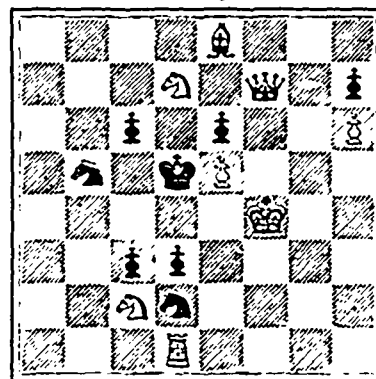
CHESS.

PROBLEM No. 115.

By P. A. Larsen.

Nationaltidende.

Black 8 pieces.



White 8 pieces.

White mates in two moves.

GAME No. 116.

Edinburgh Tournament.

A stylish finish.

Zukertort Opening.

White.	Black.
Mr. Gilchrist.	Mr. Barriar.
1 Kt to B3	P to Q4
2 P to Q4	B to Kt5
3 P to K3	P to K3
4 B to K2	Kt to Q2
5 P to QKt3	KKt to B3
6 B to Kt2	B to K2
7 QKt to Q2	Castles
8 Castles	R to Ksq
9 P to B4	Kt to Bsq
10 R to Bsq	Kt to Kt3
11 P to KR3	B takes Kt
12 Kt takes B	P to B3
13 B to Q3	QR to Bsq
14 B to Kt sq	Kt to K5
15 Kt to Q2	P to KB4
16 Kt takes Kt	QP takes Kt
17 P to B4	P takes P on pas
18 P takes P	B to B3
19 Q to K2	P to B4
20 QR to Qsq	Q to K2
21 B to R3	P to Kt3
22 P takes P	P takes P
23 R to Q2	B to B6
24 R to Q3	Q to Kt4 ch
25 K to R2	Q to B3
26 P to B4	RR to Qsq
Inviting 27 R takes R and 28 B takes P in order to reply 28 R to Q7.	
27 KR to Qsq	R takes R

23 R takes R Kt to R5
29 B to B2 P to K4!

The design is to give up the Bishop, imprison White's Rook at B3, fix a pawn at King's 5th to support a check of the Kt and then with Q, R and Kt force a mate or something equivalent.

30 R takes B P to K5

31 B to Kt2

The Queen would be forked by a check of the Kt if she defended the Rook.

Kt to B6 ch

32 K to Rsq Q to R5

33 K to Kt2 R to B3

34 K to Bsq R to Kt3

35 Q to B2 R to Kt8 ch

36 K to K2

If the Q takes R, Q to K8 mates likewise.

R to K8 ch

37 Q takes R Q takes Q mate

The conclusion is truly artistic.

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