

exchanges from kindred societies, magazines and papers, maps, plans and photographs, have been considerably extended, and it will be necessary to provide another book-case for the accommodation of this now very valuable collection.

FINANCES.

The audited statement of the Treasurer which will be submitted to you in detail at the annual meeting, shows our finances to be in an exceedingly satisfactory condition the cash balance on hand at 31st. January, the end of our financial year, amounting to \$1,632.49. As showing the growth of the Institute the following comparative statement of our receipts and disbursements will be of interest :—

| | Receipts. | Disbursements. |
|-----------|------------|----------------|
| 1898..... | \$2,674.67 | \$2,454.85 |
| 1899..... | 3,421.10 | 3,156.05 |
| 1900..... | 3,601.50 | 3,455.76 |
| 1901..... | 4,076.50 | 3,749.71 |
| 1902 .. | 6,330.89 | 5,655.80 |

Submitted on behalf of the Council.

CHARLES FERGIE,
President.

B. T. A. BELL,
Secretary.

Notes on the Gold Ores of Western Ontario.

By MR. CHARLES BRENT, Rat Portage.

The gold fields of Western Ontario are situated on what is regarded by geologists as the oldest portion of the earth's crust now exposed.

The formations are entirely Archean and are two in number viz. the Laurentian and the Huronian, the latter being subdivided into the Couchiching and Keewatin series. The term Laurentian is used by Canadian geologists to designate in a petrographical and structural sense the crystalline generally acidic granitic or gneissoid rocks underlying the Huronian.

The Huronian of Western Ontario in its lower series the Couchiching consists wholly of sedimentary shallow water deposits of clay and clayey sands now almost wholly converted into grey and brown gneisses and mica schists but in places being merely consolidated into sandstones showing little or no alteration.

The upper or Keewatin series is largely composed of eruptives and their products with important sedimentary deposits now occurring as conglomerates, quartzites grits, breccias, graywackes slates and limestones.

The lower Archean occurs in large isolated areas, more or less surrounded by the schists of the upper Archean the latter forming a rough net work around the Laurentian areas.

The Huronian series dip away at high angles in every direction from the Central Laurentian bosses forming synclinals between the granite areas and now showing sections by which the geological history of the region has been worked out.

The whole mass of the Western Huronian series was once floating on a viscous granitic magma which under the varying weights of the Huronian strata or from some deep seated internal force swelled up into great bubble-like domes allowing the floating strata to sink into the spaces between. As the domes pushed upward the surface strata were stretched, fissured, sheared and contorted according to their position with regard to the rising masses which by friction with the colder strata had their outer cooling surfaces drawn into a sort of rough parallelism with the shear planes of the outside rocks thus forming the gneissoid margins which almost invariably surround the granitic masses. At the same time the margins of the granite masses were affected by the contact with the basic schists becoming themselves more basic and darker in color. *Felsitic* dykes were at the same time injected into the fissures

of the Huronian formed by the stretching and fracturing of the colder rocks.

It must be supposed that these granitic magmas though possessing fluidity were only hydrothermally fused since all along the edges of the contact angular fragments and slabs of basic Huronian rock, readily fusible at the melting point of granite, at a dry heat; are found floated off into the granite with their edges not even rounded by the heat. Later bosses of finer grained granites break through both Laurentian and Huronian areas and throw out felsitic dykes into each formation. A still later eruption of very fluid felsitic matter which may have been formed by a sort of a liquation process from some of the older eruptions must be assumed to account for some of the fine grained felsitic dykes which occur occasionally along the lines of contact of the older formations and penetrate fissures of almost capillary fineness in these rocks.

From the great magnitude of these domes of granite and from the steep dip of their synclinal gneissoid margins which correspond to the dip of the Huronian formations lying on their sides, it may be inferred that these Archean mountains were comparable in height to the greatest elevations of the present day. Lawson estimates the thickness of the Huronian rocks at 50,000 ft. and it is thus probable that the summit of these oldest of earth's mountains rose many miles above the present level.

Dynamic disturbances of post Archean times have apparently been rare in this district and are confined to the injection of a few *diorite* dykes and the fissuring and faulting of the rocks in the immediate vicinity of these. It must not be assumed from this statement that there has been no movement in the rocks during post Archean times. The clastic character of the quartz in most of the ore deposits and the shattered pyrites, often of different ages, constantly occurring in the veins show that movements have taken place which however are probably rather of secular than of dynamic character.

By the process of denudation which culminated during the glacial epoch, these great elevations have been reduced to an approximately level plane lying about 1200 feet above sea level which presents at the present day a most interesting section through the base of this group of ancient mountains. This plane is diversified by numerous basins scooped out of the softer rocks, which are now occupied by the complicated lake system of the district.

It may be noticed that the chains of lakes conform generally to the strike of the Huronian rocks which is approximately that of the direction of the glacial flow.

Post glacial changes have been very slight over the entire region as is evidenced everywhere by the freshness of the glacial strata and by the existence all over the district of brightly polished surfaces of rock which are just as smooth today as they were when the retreating ice sheet left them bare to the sky. This brief review of the geological history of the district will serve to make plain many peculiarities of the ore deposits and ores of this oldest of all the Gold fields.

The disturbances of the Archean period alone are responsible for the general geological arrangements we find at the present day and also for the folding, shearing and formation of the fissures which by subsequent circulation of hot and cold waters have been filled with the quartz and other minerals which form the ore deposits of Western Ontario.

The levelling of the Archean mountains which took place through the long ages preceding the glacial epoch was completed during that period and the whole mass of decomposed material swept away to the south and west to be distributed over half a continent, leaving only the solid unaltered bases of the mountain group.

This sweeping away of the debris of ages has rendered the ore deposits of Western Ontario unique in many respects among which may be noted the following :—