

REPORT ON THE GEM AND IRON DEPOSITS OF
MR. GRESSON, NORTH-EASTERN TASMANIA.

LOCATION AND ACCESS.

These deposits occur in the north-eastern corner of Tasmania, five miles to the north of Herrick, the terminus of the North-eastern Railway from Launceston. The gem-wash is found along the Spottiswood Creek, a small tributary of Trout Creek, one of the headwater streams of the Little Boobyalla River. The iron deposits occur between the Little Boobyalla River and Walpole Creek and half a mile north-west of the gem-wash.

The most convenient means of access to the area is the Boobyalla Road from Herrick Railway station. This road passes half a mile east of the gem-wash at a distance of five miles from Herrick. No connection occurs between the road and the deposits, although a long bridge has been constructed over the Little Boobyalla River. The Boobyalla road is a poor one, but is sufficiently passable for motor cars for the five miles. This road continues to the small township and port of Boobyalla, 12 miles to the north.

The area can also be reached by a cart track, five miles in length, from south Mount Cameron, a township on the Herrick to Gladstone road, four miles to the east.

TOPOGRAPHY.

The topography of the district is generally of low relief, but is broken in places by residual mountains rising abruptly above the surrounding country. The comparatively flat and level parts have elevations varying from 250 feet to 600 feet above sea-level.

Mt. Cameron, in close proximity to the district, rises abruptly to elevations up to 1800 feet above sea-level. Mt. Horror, 8 miles to the south-west has an elevation of 2000 feet above the sea, while to the south-east, the Blue Tier rises to similar altitudes.

The drainage is to the north where it flows into Bass Strait. The area in the vicinity of the above deposits is drained by the headwaters of the Little Boobyalla River such as Walpole Creek, Trout Creek, and the main stream of the Little Boobyalla River. The Little Boobyalla River joins the Boobyalla River which flows three miles to the west of the area. The Ringarooma River flows in a general northerly direction, four miles east of the area. These two main streams enter the same estuary which forms the port of Boobyalla and is connected with Ringarooma Bay.

GEOLOGY.

Cambro-Ordovician.

Although not exposed within the area examined the oldest rocks in the north-eastern district

are the slates and sandstones of the Cambro-Ordovician system. The nearest outcrop of these rocks is along the northern flanks of Mt. Cameron where they junction with the granite and have been metamorphosed by it. They also outcrop to the west of the district in the vicinity of Mara and Mt. Horror. No fossils have been found in these rocks and they are referred to the Cambro-Ordovician system on general lithological and structural grounds.

Devonian.

The greater part of the district is occupied by granite. On the northern flanks of Mt. Cameron and other localities in north-eastern Tasmania this granite is observed to be intrusive into the Cambro-Ordovician slates and sandstones. It is not found intrusive into the Permo-Carboniferous rocks and its age, therefore, lies between the above limits. In correlation with other granite bodies in Tasmania which are intrusive into Silurian strata, it is regarded as being of Devonian age. The granite is a normal type consisting of quartz, felspar, and biotite. In hand-specimens the felspar is white and appears to be chiefly plagioclase. The rock is a coarse-grained, holocrystalline type generally even in grain but sometimes containing large felspar crystals. These large felspar crystals invariably contain numerous small flakes of biotite.

In the vicinity of Spottsweed Creek, a dyke of aplite occurs intrusive into the granite. Numerous pieces of the rock occur on the surface, and it has been exposed in a small excavation on the south side of the creek. The width and strike could not be determined, but the latter has a general north and south bearing. The rock is a fine-grained variety consisting mainly of quartz and felspar. A small amount of muscovite and a dark mineral occurring in small grains are also present. The latter is difficult of determination in hand-specimens, but appears to hornblende or tourmaline. A few small crystals of zircon are also visible.

Another dyke probably occurs to the west as the wash upstream from this dyke contains numerous pebbles of decomposed aplite.

Tertiary

To the west of Trout Creek, the granite is overlain by rocks which on disintegration yield a very sandy soil. In places this sandy soil contains numerous pieces and boulders of quartz grit and sandstone cemented with oxides of iron. Near the summits of hills in the vicinity of the 80 acre Reward Claim held by Mr. A.E.W. Greason, these ferruginous sandstones and grits outcrop plentifully and in places they pass into almost pure ironstone (oxides of iron). These strata have a thickness of 130 to 150 feet where measured. The summits of the low hills formed by these rocks have altitudes of 560 feet above sea-level, and are generally flat-topped. Similar hills occur to the north-west across the valley of Walpole Creek, and also to the west, and are probably composed of the same formation. The strata are horizontally bedded and are regarded as Tertiary strata of probably marine origin.

Their relation to the Tertiary basalt flows is not known but examination of the country to the west would decide this question.

Pleistocene.

Numerous shallow shafts have been sunk in the area between Trout Creek and Little Boobyalla River, and it is stated that tin-bearing gravels were passed through in them. These gravels are older than those forming along the present stream and are regarded as being of Pleistocene age.

Recent.

River gravels, sands & alluvium are forming along the present streams.

ECONOMIC GEOLOGY.

Tin.

The Recent sands and gravels along Spottiswood Creek have been shown to contain abundant cassiterite by washing them for gems, and in prospecting dishes. The other streams probably also contain cassiterite in the gravels along their courses. The ground between the Trout Creek and Little Boobyalla River has been tested by means of numerous shafts and potholes and is stated to be tin-bearing. The wide open flat between the Little Boobyalla River and the bend in the Boobyalla road has been bored for tin, but with what result is not known.

These latter deposits were not examined during the present investigation. With regard to the wash along Spottiswood Creek, it is very narrow in extent and the quantity available for treatment would therefore be very limited. The average width would be 10 to 20 yards, but the material which it would be profitable to treat would be restricted to a few yards on either side of the creek. The wash would only be tin-bearing where it flows over granite and hence profitable wash would not be found to the west of the Tertiary boundary.

The cassiterite in all these alluvial deposits has been derived from the Devonian granite. No lodes are known in the district and the ore in the alluvial has resulted from the disintegration, of smaller narrow tin-bearing quartz veins, greisen veins and such like contained in the granite. The aplite dyke appeared to contain cassiterite but a grab sample which was assayed in the Mines Department Laboratory, Launceston, yielded only 0.05 per cent of tin.

The old workings carried out over 35 years ago along the Spottiswood Creek appear to have had for their object the location of a tin lode. A shaft on the north bank was sunk in solid granite. A small cut on the south bank, east of the shaft exposed the aplite. Numerous trenches and shallow shafts on the south bank opposite and to the south-west of the shaft were cut in the recent wash or the soft decomposed granite "bottom". A short adit was driven westerly from one of the trenches and carried the decomposed granite in the sides and face with the wash in the back. Nothing resembling a vein or lode was visible in the decomposed granite.

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Gems.

Several years ago, Mr. A.E.W. Gresson in prospecting for tin in some old surface workings on the south side of Spottiswood Creek found a number of gemstones in the wash. These included sapphires corundum, zircon, topaz, pleonaste and tourmaline. They were found in association with coarse gravels containing large waterworn pebbles of quartz. The wash in the vicinity also contains abundant cassiterite.

The wash consists of coarse and fine gravels, and sands formed along the course of Spottiswood Creek. On the north side of the creek the granite comes to the surface within a few yards of the stream bed. On the south side the granite is not visible within 10 to 15 yards from the creek bed. The wash, however, does not extend this far but gives place to surface detritus and decomposed granite. The width of the wash is, therefore, not large and may be taken as 5 to 10 yards. With regard to the length it may be taken that cassiterite and gems will occur along the creek between the junction of the Tertiary strata and the granite and its entry into Trout Creek. This distance is approximately 150 yards.

With regard to the origin of the gems the greater part of these as well as the cassiterite, have been derived from the granite. Topaz and tourmaline occur in the small greisen, pegmatite and similar veins in the granite. Zircon is present as crystals distributed throughout the granite. The origin of the corundum (including sapphires & emery) and pleonaste is not so certain but they either occurred as crystals distributed throughout the granite or in the meta-morphosed Cambro-Ordovician rocks which formerly overlaid the granite. The same minerals occur in small quantities in the tin-bearing gravel throughout north-eastern Tasmania and it is probable that they have all been derived from the granite.

The waters of the Spottiswood Creek flowing over the granite have concentrated these gem stones and tin ore in the sands and gravels along its course. It is also possible that a previous concentration may have occurred in the basal beds of the Tertiary system. These beds are regarded as being of marine origin and no large concentration can be anticipated. A small amount of work where these beds overlie the granite would be the best method of determining this point. If such a concentration has occurred the Spottiswood Creek is reconcentrating these gems as well as those from the granite.

It is stated that the gems are found more particularly in the coarser gravels especially in pot-holes in the granite bottom. The total depth of wash is 6 to 8 feet. The upper portions are finer and are sands and grits rather than gravels, and it would probably be found preferable not to treat such parts. It would be advisable to test these sands before deciding to reject them.

Of the minerals found in the wash those which are likely to have a value as gem stones are zircon, topaz and sapphires, the pleonaste, emery and corundum being useless for this purpose. There is only a small demand for zircons and topaz and it is only the finest stones that have any appreciable value. The sapphires represent

the most valuable product likely to be obtained from the wash, and the number and quality of these will determine the value of the deposit. A number of these have been found but have been sent away as samples and are not available for examination. The few remaining are either very dark or partly-coloured.

During the examination of the gem-wash two samples of the wash were treated. The first was taken partly from the east-west trench where the gems were discovered, and from a north-south trench west of the other. The material from the east-west trench was taken from the bottom of the wash, several feet from the site of the original discovery, while that from the north-south trench consisted of fine wash from above the soft granite bottom. This sample amounted to one quarter to one half a cubic yard. The second sample was taken from the east-west trench and consisted mainly of coarse gravels from pot-holes in the granite bottom. This sample amounted to approximately a quarter of a cubic yard.

These samples were treated separately as follows:- The material was tipped into the head of a wooden box approximately 12 feet long 2 feet wide and 1 foot deep, which had a slight grade from the head to the tail. Boards sliding in guides fitted at the tail end enabled water to be retained in the box. Water was admitted to the box and the material was then "puddled" by turning it over with a long-handled shovel work being commenced at the tail end of the box. By these means, the clay, fine sand, etc. are washed away and the coarse sand, pebbles, gems, etc. retained at the head of the box in a clean condition. The cleaned material was then treated, a small quantity at a time, on a sieve suspended by ropes so that it could be easily and rapidly shaken to and fro. This sieve contained 12 meshes per inch which is smaller than that used (about $\frac{1}{4}$ inch) on the Anakie Fields, Queensland. The sieve, with its charge of wash, was shaken to and fro while water was poured on the material to further cleanse it. By this means the finer sand, etc. was also separated. The remaining material was then inspected and any gemstones picked out by eye.

On being treated as above the first sample yielded approximately 20 pieces of pleonaste, 10 small zircons and a number of pieces of emery. The second sample yielded about 40 pieces of pleonaste, 20 pieces of zircon, several pieces of emery and 2 pieces of bluish corundum. No topaz or sapphires was obtained. The material on the sieve consisted of water-worn pebbles of quartz, angular pieces of quartz and felspar and worn pebbles of partly decomposed aplite.

Although these tests of one-half to three quarters of a cubic yard of wash yielded no sapphires the test is not absolutely conclusive. Softer minerals such as cassiterite tend to wear and become distributed throughout the wash in small pieces but the harder gemstones remain in larger pieces which become erratically distributed throughout the wash. Such large pieces are only liable to be moved by fast-running water as in times of flood and it is for this reason that they are generally associated with the coarser gravels.

As to the yield of sapphire to be expected in a payable wash the following figures quoted from the Queensland Government Mining Journal, March 15, 1905 will give some idea.

"It is difficult, if not impossible to give some average figures as to the yield of the wash, it varying not only in the one locality but often within one claim.

Ordinary ground may be taken as yielding only $\frac{1}{2}$ oz. of "crystal" per load, with runs of 4oz. per load. At Policeman Creek the yield is from 1 to 6oz. averaging $1\frac{1}{2}$ oz.

At Retreat Creek the average yield of the deep ground to the load is 2oz. (4oz. according to same, but probably inferior stones), that the shallow ground having been $1\frac{1}{2}$ oz. or less.

The proportion of "crystal" (clear, glassy stones suitable for cutting) to "corundum" and "schneid" (the former opaque and the latter flawed, and both unsuitable for cutting) may be put at two to one.

These figures do not refer to the "wash" in the ground, but as prepared (hand-picked and sieved) for the troughs, 6 or 8 cubic yards of ground having to be broken down and thrown back or raised to yield ore load of screened ground. This, when water is plentiful fills three puddling troughs, but just now, owing to the water famine, it is further reduced to fill only two troughs".

Iron

Oxides of iron occur plentifully in association with the Tertiary strata which occur in the western part of the area. These strata consist of sandstones and grits the cementing material of which is one or other of the oxides of iron. The oxides of iron are very abundant in some specimens and the rock becomes a ferruginous sandstone or grit.

Specimens of almost pure haematite and limonite occur and it is these materials which would form any valuable iron-deposits in the district, and the mode of occurrence of such is therefore of primary importance.

Mr. Gresson holds an 80 acre reward claim as the discoverer of these iron-deposits. This lease embraces the summit and flanks of Halfway Hill and portion of another hill to the south-east.

Mr. Gresson has sunk a number of shallow shafts and cut numerous trenches on and around Half-way Hill. This work has been performed with the dual object of obtaining material suitable for the manufacture of paint and also for the production of metallic iron.

On the eastern and south-eastern ends of the hill the workings have revealed a soft reddish clayey material, which represents a fine-grained sandy clay stained with red oxide of iron. This contains a few concretions of harder oxides of iron, and the upper layer near the surface is generally nearly pure limonite. This soft red material was mistaken for red oxide, and thought to be of value for paint-making.

As the summit of the hill is approached the ferruginous sandstones and grits become more prominent, and the massive, and apparently pure, limonite is also abundant. This massive limonite appears to be more prominent near the surface and underlying this are iron-stained grits or soft

earth material stained with limonite. Similar conditions also occur on Thomas' end of No. 1 ridge to the south of Half-way Hill. At this locality limonite and haematite occupy a 12 inch layer near the surface and overlie grits or sandstones stained various shades of yellow, brown and red.

It would appear therefore that the Tertiary strata consist of iron-stained grits sandstones and much finer-grained sandy and clayey ferruginous and almost pure limonite and haematite also occur. This concentration has been brought about by the action of circulating waters and evaporation. The rain-water which falls on the surface descends and traverses the rocks and dissolves small amounts of oxides of iron. In times of little or no rainfall some of this water is drawn to the surface and on evaporation leaves behind its content of oxides of iron. In this way pure oxides of iron are deposited but often include sand and soil at the surface and the resulting formation is impure.

Small amounts of limonite and haematite have been obtained in these deposits and used in the preparation of corresponding amounts of paints. Brown shades were obtained from limonite occurring on Half-way Hill and red shades from haematite on Thomas' end and other parts of No. 1 Ridge. Small quantities of these materials could be obtained from the surface concentrations with sufficient purity to enable them to be used without treatment. The greater portion of the materials would however require treatment with water in order to separate the iron minerals from the sand. Under these conditions the materials could not compete commercially with those from other resources which do not require this treatment.

Near the eastern end of the summit of Half-way Hill, three shallow shafts were sunk 40 feet apart. Two bags of material were obtained from each of these and forwarded to Castlemaine, Victoria, where the ore was smelted. It is stated that the result was the production of a white cast iron. The ore consisted of honeycombed limonite with which was associated softer bands containing quartz sand. A grab sample of typical ore was assayed in the Mines Department Laboratory, Launceston, with the following results:-

		Per cent
Silica	(Si O ₂)	18.60
Ferric Oxide	(Fe ₂ O ₃)	57.48
Ferrous Oxide	(Fe O)	1.54
Alumina	(Al ₂ O ₃)	11.58
Lime	(Ca O)	Nil
Magnesia	(Mg O)	0.28
Phosphate	(P ₂ O ₅)	Nil
Ignition Loss		10.88

This analysis shows the ore to be rather low in iron (about 40 per cent) and high in the impurities silica and alumina. These impurities are present in the ore as sand and clay and would need to be removed to render the ore suitable for smelting. While this separation could be easily effected, the practice is not carried out at the present time.

Only those ores of sufficient purity not to require preliminary treatment are in general use in iron smelting. Impure ores can be used by mixing with purer ores but this involves the possession of deposits of pure ores.

Gems.

The Recent alluvial sands and gravels along Spottiswood Creek have been found to contain cassiterite and gemstones. Of the latter the only ones likely to make the wash a valuable one, are the sapphires of which a number have been obtained. Although the test carried out during the examination did not yield any sapphires, this is not definitely conclusive owing to the erratic occurrences of large gemstones in alluvial deposits. In view of the comparatively small amount of wash available, the only work justifiable is the testing of a larger quantity of wash (say 5 to 10 cubic yards). Should the result prove unpayable, no further work should be undertaken on the wash.

A small amount of surface work might be undertaken to expose the basal beds of the Tertiary system. This could be performed on either side or at the head of Spottiswood Creek where the Tertiary beds overlie the granite. It is possible that a concentration of gems may have occurred in the beds. If the basal beds are of the nature of gravels a quantity of the material might then be tested.

Iron.

The tertiary strata in the vicinity of Half-way Hill consist of sandy clays, sandstones and grits more or less stained and cemented with oxides of iron. Bands of nearly pure limonite are present in these rocks, and a superficial concentration of limonite and hematite from solutions has occurred at the surface. This surface accumulation represents the largest and purest body of the oxides so far revealed by the workings. It does not occur continuously at the surface, and is often rendered impure by inclusions of surface sand and clay. Small quantities of limonite and haematite have been subjected to a water treatment and used in the preparation of paint.

No quantity of materials which could be used without treatment has yet been exposed, and until such has taken place it cannot be considered that a reserve of paint material exists.

Some of the limonite from Half-way Hill has been smelted and it is stated that a white cast iron resulted. The analysis shows the ore to be somewhat impure and also low in iron content. Small quantities of purer ore occur, but large amounts of such are necessary in order to make the deposit one of economical importance for iron smelting purposes.

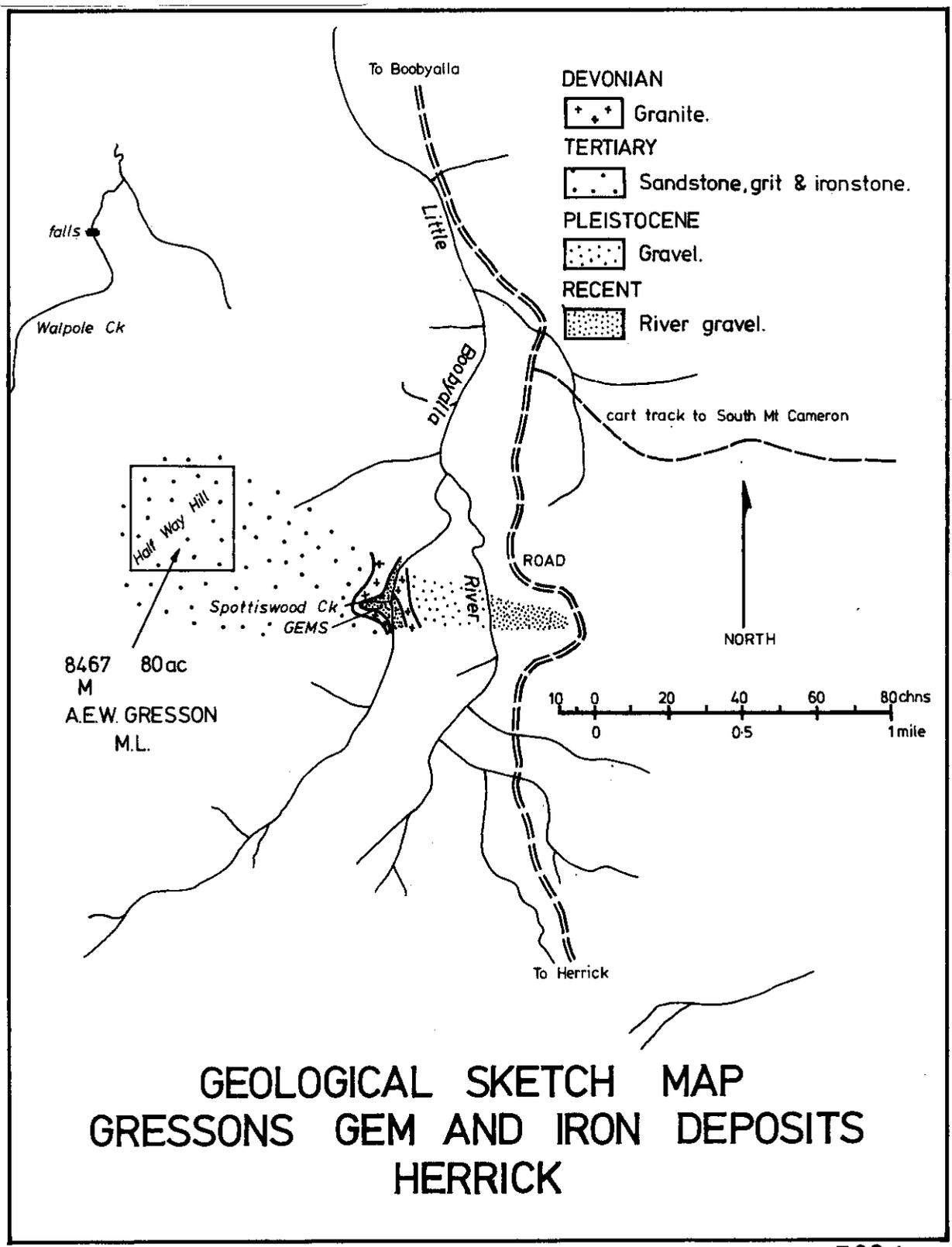
Any further work should be devoted to sinking deeper shafts or bore-holes from the hill summits to ascertain the nature of the strata below the superficial concentrations, and whether they contain bodies of purer oxides of iron. It is not anticipated that such will occur but this can only be decided by the above procedure.

(Sgnd). P.B. NYE.

Hobart,
29th. Feb. 1924.

GOV'T. GEOLOGIST.

5 cm



**GEOLOGICAL SKETCH MAP
 GRESSONS GEM AND IRON DEPOSITS
 HERRICK**