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DEPARTMENT OF NATIONAL DEVELOPMENT.

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RECORDS.

MOUNT GARNET ALLUVIAL TIN PROSPECTS, NORTHERN QUEENSLAND

by

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SUMMARY

A study of the data obtained from regional geological mapping of the Atherton Four Mile Sheet area in Northern Queensland has resulted in a new concept of the geomorphological control of alluvial tin deposits in this region. The most promising prospect has an area of 6 square miles, and is situated between Smith's and Return Creeks, a few miles south of Mount Garnet, and downstream from the present tin dredges of Ravenshoe Tin and Tableland Tin Companies. (Plate 2). Testing of two prospects in this area is recommended.

INTRODUCTION

The purpose of this report is to record some alluvial tin prospects in the Mount Garnet area in North Queensland, which warrant further examination and testing.

The prospects have been recognised as a result of regional geological mapping of the Atherton Sheet areas in North Queensland which was carried out by the Bureau of Mineral Resources and the Geological Survey of Queensland in 1959.

The alluvial tin prospects have been indicated by the realization during the regional geological mapping, that:

(i) The Permian - Triassic Elizabeth Creek Granite is the most important tin-bearing granite in the area; the Permian - Triassic Herbert River Granite contains lesser amounts of tin;

(ii) Most of the alluvial tin was concentrated in stream channels before the extrusion of the Cainozoic basalt, which cover a large part of the area.

In the Lower Tertiary, and before the eruption of the basalts, the watershed was farther east than it is today (Griffith Taylor, 1911). The headwaters of many of the streams now draining east formerly belonged to westerly draining streams. This diversion and capture has been effected by:

(a) recent faulting and/or

(b) damming and diversion by basalt flows, and/or

(c) burial of former streams by basalt flows.

MOUNT GARNET AREA

Over the last 20 years most of the tin produced from the Atherton 4-mile Sheet area has been won by dredging Return, Smith's, and Battle Creeks, and by hydraulicking Nettle Creek. These creeks are tributaries of the Herbert River, and the prospecting carried out so far has been based on the premise that the courses of these streams have always been essentially what they are to-day.

Plate 1, illustrates the probable evolution of the stream system in the area and shows that while the premise may be valid for Return and Battle Creeks, it is invalid for Smith's Creek. The different stages are:

Stage 1: This shows the stream pattern as it may have been in the Lower Tertiary. The watershed was farther east, and south than it is to-day, and the main stream was the west-flowing Tate River.

Stage 2: In (?) Miocene time basaltic volcanoes erupted about 25 miles to the south-west of the area. The distal portions of some of the flows coursed down the valley of the ancestral Rudd - Gunnawarra Creek.

Stage 3: The twin streams, Rudd and Gunnawarra Creeks, incised valleys along the flanks of the basalt flow.

Stage 4: Slight faulting or down-warping along an east-trending line severed the southern tributaries of the ancestral Tate River, and reversed the drainage in these tributaries. Rudd, Gunnawarra and Sunday Creeks were diverted and joined the south-trending main stream via "boat hook bends" (Taylor, 1911). Probably about this time these streams became part of the head-water system of the Herbert River.

Stage 5: Another basalt flow from the southern volcanoes coursed down the eastern side of the earlier flow and was diverted down the new valley of Rudd and Gunnawarra Creeks. Probably about this time a basalt flow from volcanoes on the Atherton Tableland coursed down the headwaters of the ancestral Tate River and terminated a few miles south of Mount Garnet.

Stage 6: Slight faulting or upwarping along a line trending about 010° truncated the ancestral Tate River about 4 miles west of Smith's Creek. The ancestral Tate River headwaters were diverted, at what is now the mouth of Return Creek, into the headwaters of the Herbert River. Smith's Creek was forced to drain south-east to the former Rudd-Gunnawarra Creek valley.

The reconstruction of the evolution of this stream pattern is based partly on field work, and partly on air photo-interpretation.

Examination of the airphotos showed a depression trending south-west from the end of the basalt flow in Return Creek (marked "X" in Plate 2). The depression bifurcates about 4 miles south-west of "X", one branch trends west to Smith's Creek and cannot be traced beyond it. The other branch trends south towards Smith's Creek and no attempt has been made to trace it further.

Field work has verified the photo-interpretation.

It is assumed that the depression marks the site of a pre-basalt drainage system: that it is part of the ancestral Tate River. There are two possible explanations for the depressions west of the point of bifurcation:

(a) the west-trending depression marks the course of the lower part of the ancestral Smith's Creek, and the south-trending depression is the main ancestral Tate River.

(b) the west-trending depression marks the course of the ancestral Tate River, and the south-trending depression marks the course of a former north-trending tributary of the ancestral Tate River.

If the stream diversion and capture have taken place in this manner, there are two areas which warrant prospecting for alluvial cassiterite. These have been hachured on Plate 2, and labelled Prospect 1 and Prospect 2. The prospects have an aggregate area of about 6 square miles. If they prove to be economically stanniferous there will be the additional prize of easy access to the unworked section of Return Creek, previously abandoned because of leasing difficulties.

PROSPECT 1-LOWER SMITH'S CREEK

Tableland Tin Company is dredging the valley occupied by this stream and is at present working about 1½ miles upstream from the Hann Highway. The company has prospected within the confines of the present valley, to a point several miles south of the highway. They found that about a mile south of the road the cassiterite concentration decreased sharply, and attributed this decrease to distance from the source. But it may well be due to the present stream being superimposed over only the headwater part of the older stream, and a divergence in the two channels at this point. (see Plate 2).

PROSPECT 2 - THE ANCESTRAL TATE RIVER

The ancestral Tate River valley between Return Creek and Smith's Creek offers the possibility of a substantial yardage of stanniferous gravels.

The main tributaries of the ancestral Tate River (Plate 2) were:-

Wild River. The upper reaches yielded a lot of tin from basalt-capped deep leads. The lower reaches have not been explored because of thick basalt and an abundance of water.

Battle Creek, is dredged by Ravenshoe Tin Company.

Nettle Creek, was hydraulicked by Broken Hill Proprietary Ltd., during World War II; it will be dredged by the Ravenshoe Tin Company when Battle Creek has been worked-out.

Return Creek, was dredged by Tableland Tin Company. An intractable land-holder is reputed to have forced the abandonment of dredging in this stream about 1½ miles west of Mount Garnet.

Millstream is not known to be stanniferous. The valley is partly filled with basalt, but it drains an area of Elizabeth Creek Granite and could contain stanniferous gravels beneath the basalt.

Blunder Creek is unlikely to prove stanniferous.

Big Dinner Creek does not contain cassiterite.

From this it can be seen that the majority of the tributaries were stanniferous and it is possible that there was not over-much dilution in the ancestral Tate River.

The most favourable part of the ancestral Tate River valley for prospecting is the section between Smith's and Return Creek. This section lies down stream from the mouth of the ancestral Return Creek, and on the air photographs it appears to be free of basalt. Should this section prove payable then the next section east, (down to the mouth of Return Creek) could be examined. This section on the air photos appears to be basalt-capped and would probably be more difficult to prospect. It is unlikely that the remainder of ancestral Tate River valley (from the mouth of Return Creek upstream to the Wild River/Millstream junction) could be worked, so there is no point in attempting to prospect it.

Tableland Tin Company's dredge is digging in Smith's Creek to a depth of 60 feet. Test-drilling in this area has indicated stanniferous gravels down to a depth of about 120 feet. The ancestral Smith's Creek is assumed to have drained into the ancestral Tate River; and if this assumption is correct the depth of stream sediments in the ancestral Tate River Valley will probably be at least 120 feet.

Mullaburra Creek now crosses the ancestral Tate River valley, almost at right angles, but its valley is not deeply incised and it is unlikely that it would have cut stanniferous horizons in the old stream sediments.

CONCLUSIONS

The concentration of tin in alluvial deposits in the Mount Garnet area is essentially morphological. In the Mount Garnet area there is abundant evidence of tilting of the land surface and subsequent river capture, and other changes in the drainage pattern. The effect of such movement has been to mask the old stream channels so that only in those places where the recent superimposed drainage has cut down through an old channel has alluvial tin been exposed.

Apart from the specific recommendation included in this report, future investigation of the Mount Garnet region should include plotting known deposits and source areas against geomorphological features in an attempt to delineate areas of alluvial tin concentration in the ancestral drainage pattern.

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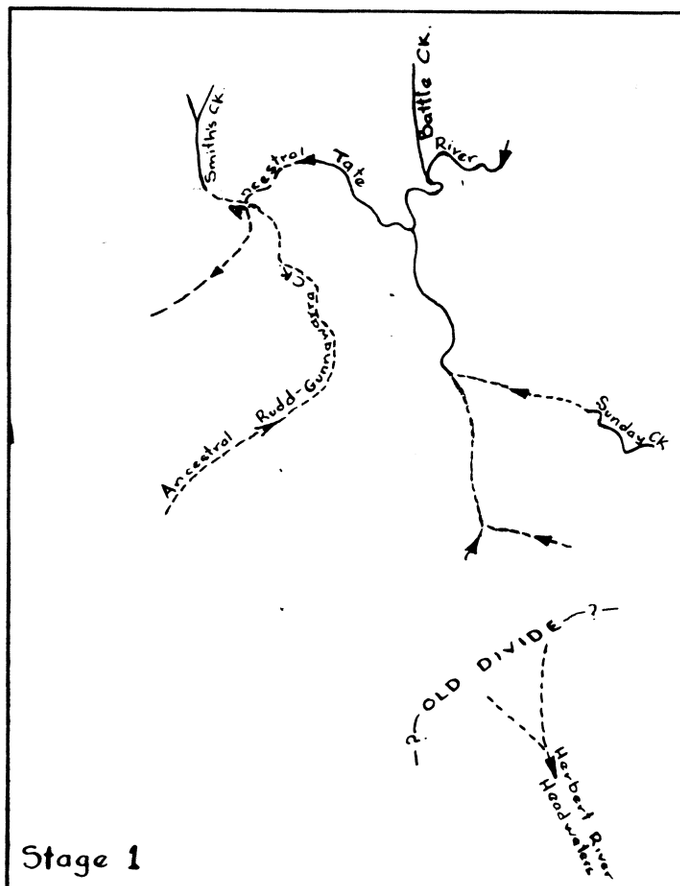
TAYLOR, T.G., 1911 - Physiography of Eastern Australia. Comm.Bur.Met.Bull. 8

WHITE, D.A., 1961 - Geological history of the Cairns-Townsville Hinterland, North Queensland. Bur.Min.Resour. Aust. Rep. 59 (in press) and Rec. 1961/68 (unpubl.)

A



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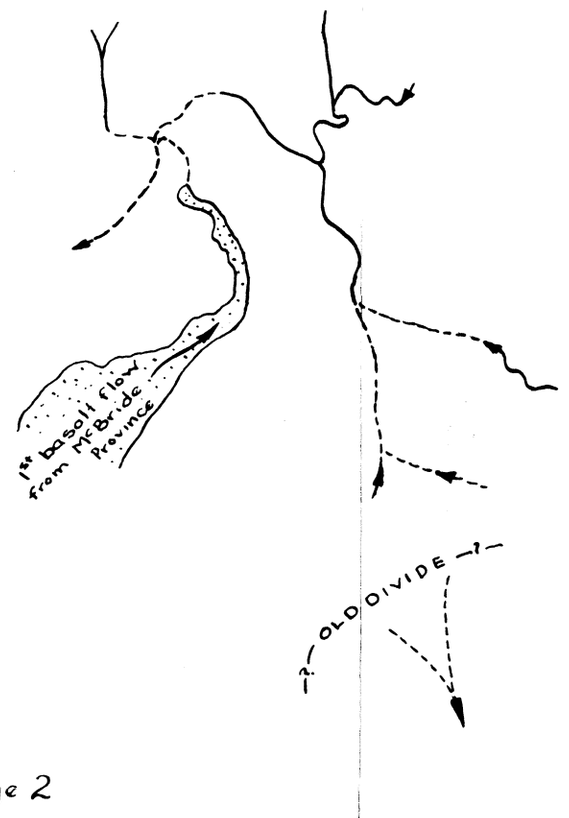

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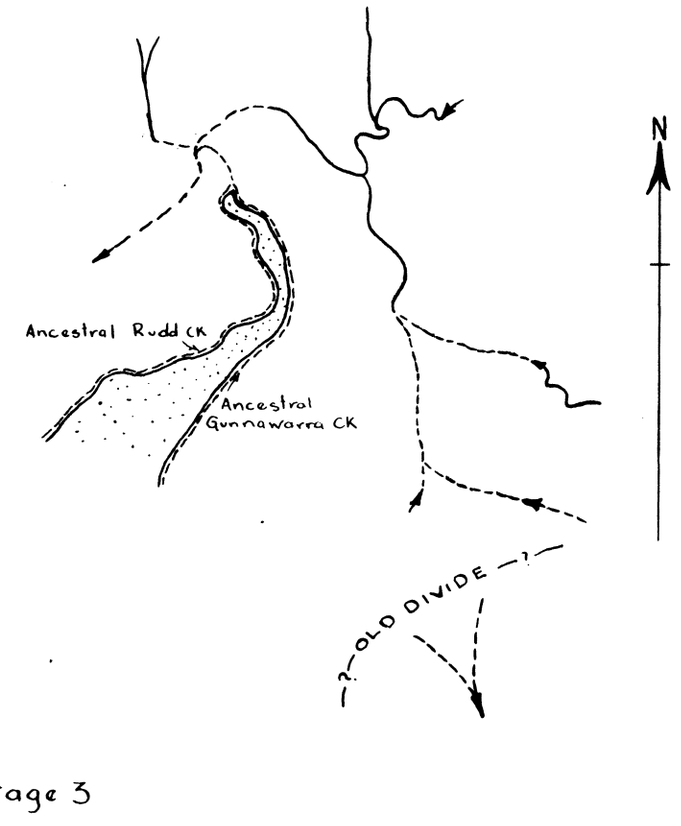
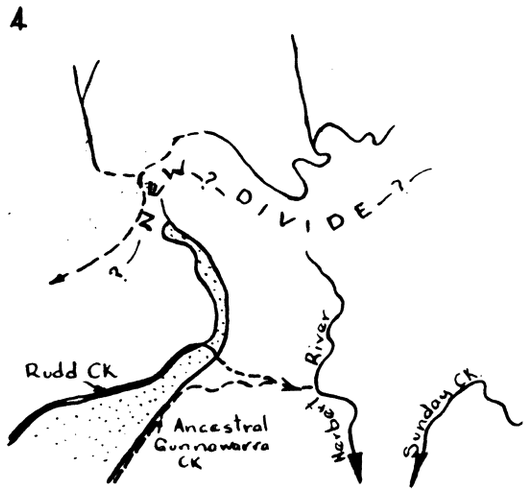


Stage 3

Stage 4



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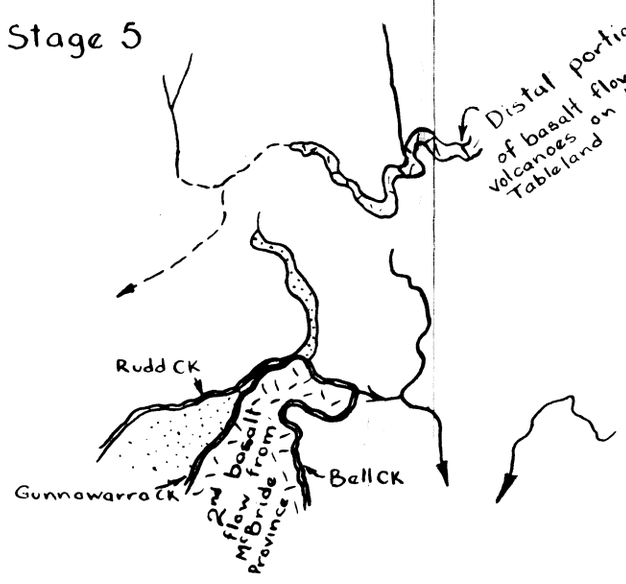

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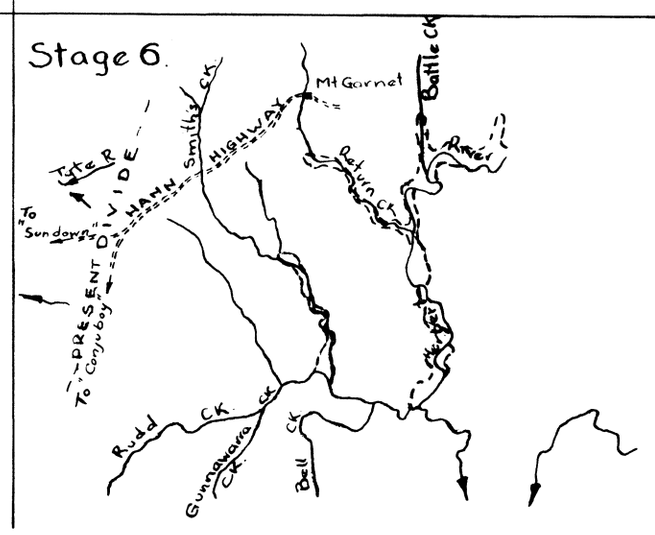
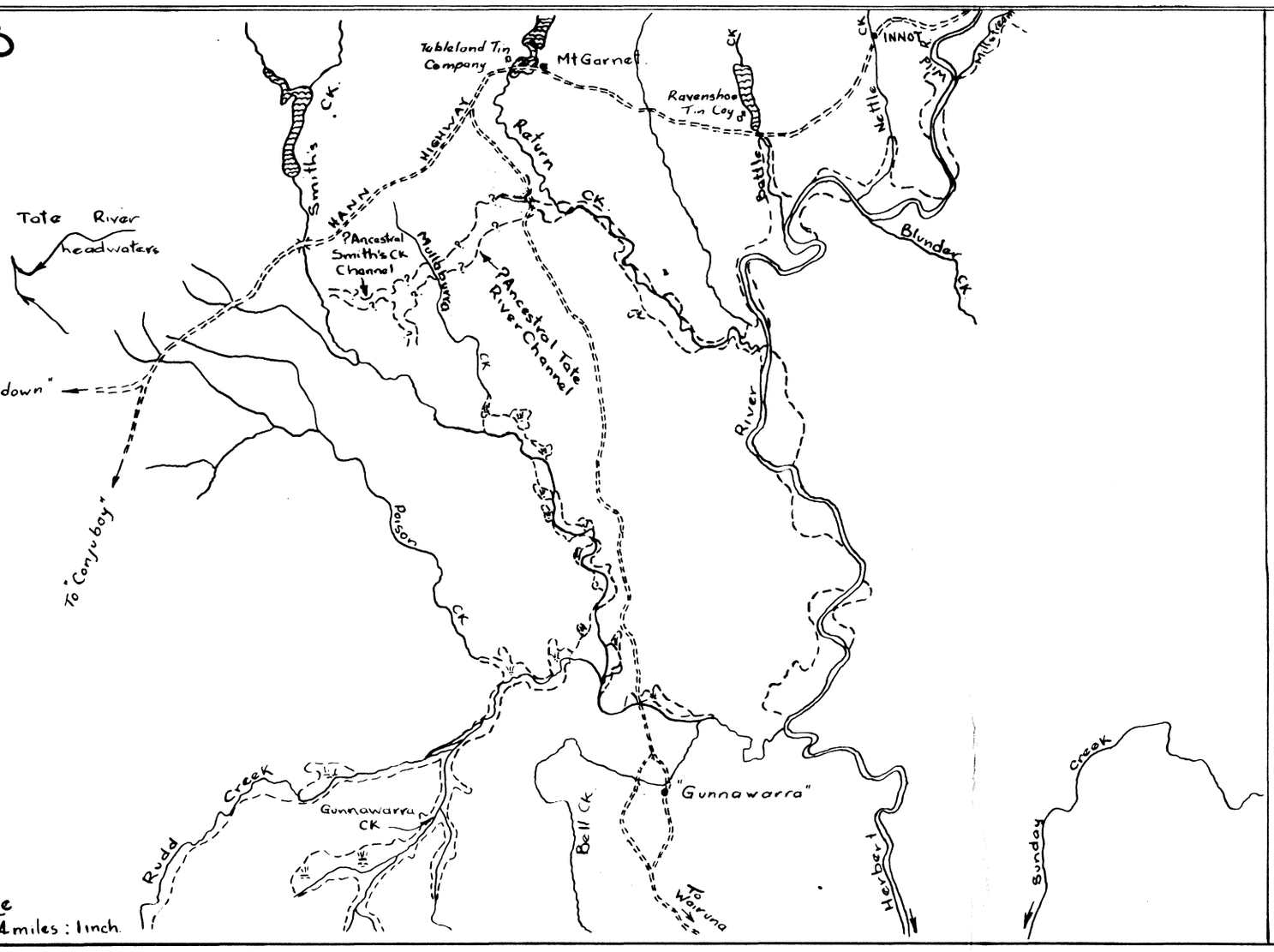


Scale 10 miles : 1 inch

B



Scale
4 miles : 1 inch

Stream diversion and capture in the south-east corner of the Atherton 4-mile Sheet.

Part B. Is a map of the area south and east of Mt Garnet where geological evidence suggests stream diversion and capture has taken place during Cainozoic time

Part A. Sketches 1 – 6 illustrate probable stages in the evolution of the drainage pattern in this area. For explanation see text, page .

LEGEND

- Known stream channels
- Postulated stream channels (arrows indicate direction of flow).
- Areas dredged for tin
- Cainozoic basalt
- Road

JGB April '61

PLATE 2.

ALLUVIAL TIN PROSPECTS

MOUNT GARNET AREA NORTH QUEENSLAND.

Scale

1 0 1 2 3 Miles

PROSPECT AREA "A"

Further possible alluvial tin deposits south-west of Mt.Garnet , between Return and Smith's Creeks .

Prospect No. 1 is possible former channel of Smith's Creek

Prospect No. 2 is possible former channel of ancestral Tate River

- Dredged area (to September 1959)
- Basalt (?) Basalt(from air photos)
- o Proposed percussion drill hole.
- —2200'— Contour line (from 1 Mile Military Map).

True North 6.5° Magnetic North

Bureau of Mineral Resources, Geology and Geophysics. Canberra, A.C.T. May, 1961.

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