NEW ZEALAND ANTARCTIC RESEARCH PROGRAMME.

REPORT ON NORTHERN FIELD PARTY GEOLOGICAL EXPEDITION 1967-68.

PARTY (1) Initially the suggestion was for two, four men parties working for approximately ten weeks. This was eventually cut to one, 6 man party to work between the Evans Nève in the South and Frolov Ridge in the North. The Eastern boundary being the Lillie Glacier and the Marazumi Range in the West. The following made up the party:

D. G.	MASSAM	- Leader
M.	SHEEHAN	- Deputy Leader
J.	DOW	- Senior Geologist
V.	NEALL	- Geologist
G. C	CHAMPNESS	- Field Assistant
J.	GLASGOW	- Field Assistant

M. Sheehan's knowledge of the area, having been on the previous Rennick Glacier trip, was of great help especially when working in the broken Rennick Glacier area. Due to the large areato be worked the trip was once again to be mainly reconnoitre.

PREPARATIONS AT SCOTT BASE: (2) Three of the party, Massam, Sheehan and Champness flew into Scott Base on the 21st October to prepare the equipment which would be necessary for the trip. One could not help but feel that three weeks was far too long to fill in satisfactorily as it was not until November 11th that we finally got into the field. We had prepared a fuel and food dump to be put in on the Reccy flight on November 6th, this was finally put in on the 9th on the fourth attempt, into the Leap Year Glacier. Members on the Reccy flight Massam, Dow (who with Neall had arrived on the 4th November) and Sheehan. The sixth member Glasgow arrived on the 8th November. Due to Ed. Hillary's party we were forced to take two dog sledges and relash another manhauler before we had enough sledges.

MOVEMENT INTO THE FIELD: (3) November 11th saw the complete party aboard a C 130 Hercules of the U.S. Navy, heading for the Evans Nève at the head of the Rennick Glacier. This was a combined Reccy and put in flight. Weather was perfectly clear over the Lower Rennick, Explorers Range, and Marazumi so a good view of the area was obtained though we were unable to be put down East of the Freyberg Mountains on the Evans Nève due to cloud so eventually were put down between the East and West Quartzite Ranges at Lat. 72°4 ' S Long 165° 7 ' E.

FIELD WORK: (4) 11th November to 21st November:

Whole party of six moved from Quartzite Ranges Northwards to Leitch Massif. two man parties made side trips to both East and West Quartzite Ranges, "Neale Massif" and Leitch Massif. We were visited at the Leitch Massif by Skua Gull. Temperature at this stage very cold - 15°F - 32°F.

22nd - 26th November (5): Proceeded North across the Black Glacier to the mouth of the Leap Year Glacier then up the Leap Year to our Fuel and Food Depot. Very soft snow made the going extremely difficult. Once again 2 man parties made side trips to either side of Leap Year and across the Black to the King Range. Side trips were made from the depot across the ExplorersRange to Sledges Glacier and via the Champness Glacier to the Lillie Glacier.

27th November - 20th December (6): This was the most difficult area we were to cover, from depot we travelled West down an unnamed Glacier to the Sledges, following this to the Rennick. We depoted two 44 gal. drums of fuel off Mt. Soza and continued North to Frolov Ridge. Warm temperatures at this stage forced night travel. This area is very broken and only two outcrops were visited between the Carryer Glacier and Frolov Ridge. The same as visited in 1963-64. From Frolov Ridge we returned to Mt. Soza then headed West to the Marazumi Range. We camped four miles to the East of the Range visiting Littel Rocks enroute. Had our first major breakdown of a toboggan when a wooden track runner collapsed fracturing the chassis and wrenching the holding bolts straight through the metal. Temporary repairs were made and we tried to conserve the use of it except for actual sledging. 2 men parties made extensive trips down the Eastern side of the Range and a 5,500 Ft. granite peak North of Berg Peak was climbed. (Wilson Snow Petrels were seen here). Surface of the Rennick Glacier is very difficult for travel, hard sastrugi and Blue ice knocked the toboggan about very much. We returned to Mt. Soza, collected food and fuel dump and headed back towards the Leap Year Depot. Side trips up the Carryer were made but heavy crevassing and ice falls restricted the areas visited. The lower Sledgers Glacier was not visited as heavy crevassing did not warrant the risk. One toboggan at this stage sheered off a driving gear and had to be towed back to depot on sledge. We arranged for a replacement, also another manhauling sledge to replace one we had broken prior to this to come in on the re-supply. We arrived back at the Leap Year Depot on December 20th to receive our re-supply which was due on the 21st.

21st December - 5th January, 1968 (7): Re-supply due on the 21st for various reasons delayed till the 24th December. Left on the 26th for the head of the Graveson Glacier. We felt for the first time we were an exploration party as this area was being visited for the first time. Once again we struck very soft snow conditions. From this point on weather deteriorated very much until the average became one by up day in three. We crossed a high pass from the Graveson Glacier into the nêve at the head of the Carryer Glacier, we named this the "Edlin Nêve". Side trips down the Carryer were undertaken though confined because of crevassing. Two days of heavy snow in the Edlin Nêve curtailed any further work in this area though one side trip North towards Mt. Sturm was made and two 8,000' peaks climbed. Fossils were found on the slopes of one of these Peaks. We returned the same way with 2 men side trips visiting outcrops East and West of the Graveson Glacier. On the 5th January returned to Depot.

January 6th - 20th (8) This was the last stage of the trip from the Leap Year Glacier to the Freyberg Mountain and Gallipoli Heights. We did our longest straight haul from the depot to Galatos Peak in the Salamander range covering 36 miles. Struck good sledging conditions for the first time in three weeks. A visit to Galatos Peak then across the Canham to the Northern side. 2 men parties made side trips up a number of unnamed side Glaciers then we crossed to the Southern side of the Canham and Takrouna Bluff (a day was spent here). Crevassing again became a problem so travel slowed considerably. We travelled up the Canham nineteen miles, a visit by 2 men parties to the Granite in this area was made then we crossed to the Eastern side just North of Mt. Apolotok. We had hoped to be able to make this our pick-up area but found it too rough for a suitable strip.

In poor conditions we crossed the Canham again to a point five miles North of Gallipoli Heights 72° 23' S long 163° 57' E. Drifting snow and winds made this part of the trip very unpleasant. Continuous wind blew off the Evans Nêve and sledging was made most difficult by the large sastrugi and very hard snow. Visits were made to Gallipoli heights and outcrops North of this. We got our second blizzard during this period which continued for some 50 hours. Our proposed climb of Mt. Apolotok had to be abandoned due to the severity of the weather; our pick-up site was in the Canham Glacier some 21 miles south of Takrouna Bluff. The Upper Canham was found to be unsuitable due to the bad surface conditions.

(9) Mention should be made about the capabilities of the Field Assistants. Without them only a very small part of the Geological programme would have been accomplished. I feel very strongly that on this sort of trip it is imperative that Geologists have Alpine experience. It places too much responsibility on the Field Assistants and at times endangers them needlessly, especially when working in 2 man parties. It does seem at times that Geological recommendations are inclined to gloss over the difficulties involved in travelling through some of the areas. (This is no reflection on the work done by Geologists Dow and Neall.)

Health of Party (10): This in all respects was good apart from an occurrence of monoxide poisoning during the one and only blizzard we had. It might be added that the burning of two primus' in one tent is not to be recommended.

FIELD LOGISTICS.

Mileage covered, towing sledges	700 miles.
Total mileage covered - approximately	1,300 miles per toboggan.
Fuel	440 gallons.
Kerosene	30 gallons.
Oil	6 "
Travel days	20
Geological days	27
Lie-up days (including 3 waiting resupply	23.
Camp sites (separate)	21

RADIO COMMUNICATION (11): We carried two 557 radios which proved very efficient and good reception and scheds were had most of the time. Apart from a few black-out periods we received Scott Base on the Main at Strength 5. The Commander proved inadequate and was sent out on the re-supply The problem of the 557 still seems to stem around the weight of the unit.

TRANSPORTATION: The toboggans once again proved their versatility and apart from a period in the "Edlin Nève" where we had to abandon any further travel due to a fresh fall of snow on a surface already soft they handled conditions very well. I feel that the working unit of 5 miles a gal. could well be changed to 9 miles, a far more realistic number. Minor repairs were made on the trips, mainly annoying things, i.e. Throttle linkages which proved most inadequate and ended up by being wired in place

Repairs Made:
1 Ski replaced.
1 Clutch replaced
2 drive belts
1 Track runner temporarily repaired
2 Carburettors replaced
1 Fuel pump
2 Throttle cables
12 Throttle linkages replaced
1 pivot bush replaced.

The perspex windscreens again proved inadequate and I feel a heavier material would be much better.

One toboggan had to be replaced on re-supply due to sheering of a drive gear which could not be repaired in the field. I feel it is essential that someone with mechanical knowledge should accompany these parties.

Sledges: On the main, the manhaulers proved extremely good and apart from one runner breaking we had very little trouble with them. The main problem seems to be that no spares are available at Scott Base for repairing them, especially runners.

RECOMMENDED PLACE NAMES.

NEALE MASSIF - BLACK NÈVE
Between Salamander and West Quartzite Ranges 72° 0'S-72°-7

MT. STIRLING - Range East of Leap Year Glacier.
Pos. Lat. 71° 32' 30' S Long. 164° 03' E

MT. IAN SMITH - Range East of Leap Year Glacier.
Pos. Lat. 71° 31' S 164° 00' E

CHAMPNESS GLACIER - Flows East from Leap Year Glacier into Lillie Glacier.
Lat. 71° 29' S Long 163° 55' E

EDLIN NÈVE - Head of Carryer Glacier in Explorers Range.

MT. DOW - Explorers Range
Lat. 71° 06' 25 S Long 163° 06' E.

MT. GLASGOW - Explorers Range
Lat 71° 08' S Long 162° 54' E

MT. WILLIAM WEBB - Explorers Range
Lat. 71° 11' S Long 162° 75' E

McCLIN GLACIER - Flows East into Graveson Glacier from Edlin Nève
(Explorers Range).

CORONET PEAK
2185 M. - Range East of Leap Year Glacier.
Lat 71° 38' 30S 164° 21' E.

EL PULGAR - Pk. Marazumi Range.
Lat. Long.

GIBRALTAR
West Quartzite Range
Lat. Long

CARAMELLO

NUNATAK

COPPERSTAIN RIDGE

DESOLATION RIDGE

LOCKHART PEAK.

PRELIMINARY REPORT ON THE 1967-68 RENNICK GLACIER GEOLOGICAL SURVEY EXPEDITION, NORTHERN VICTORIA LAND, ANTARCTICA.

The Rennick Glacier Geological Survey expedition was provided with a number of specific geological problems to examine during the 1967-68 summer field season. As outlined in the geologists' directive they included examination of the geological relationships between:

(1) The shallow water sediments of the Bowers Group and the greywackes and argillites of the Robertson Bay Group.

(2) Robertson Bay Group rocks and biotite grade Rennick schist originally assigned to the basement complex by the 1963-64 geologists working in the same area.

(3) Bowers Group rocks and Beacon Group sandstones and arkoses.

(4) Two types of granite bodies and their relationship, if any, to the quartz porphyries and rhyolites at Gallipoli Heights.

(5) The observation of present day weathering processes inland from the coast.

Roughly 6,000 square miles were covered during the 70 days spent in the field with the following breakdown of activities:

Geology	27 days
Travel	20 days
Lie up	23 days

From a geological point of view the trip was a very successful one. Its success was due in no small way to the interest shown by the filed men and to the efficient and enthusiastic way in which they handled the logistics side of the expedition.

This season's geology expedition tackled all the above problems and it is considered that the area was covered in sufficient detail to enable reliable conclusions on most of the above problems to be made after examination of samples and evaluation of field data has been completed.

(1) Several good sections through rocks of the Bowers Group were examined between the Quartzite Ranges and the Carryer Glacier but descriptions of Bowers Group rocks north of the Carryer Glaciers in the Explorers Range were severely restricted as access to the exposed rock by a ground party was impossible due to heavy crevassing in the tributary glaciers and the generally rugged nature of the terrain. It is considered that further work in this part of the Bowers Mountain would be impracticable without helicopter support

The contact between the Robertson Bay Group and the Bowers Group was traced for 90 miles mostly between close limits and although the contact itself was never found exposed, it can be interpreted either as a conformable or a fault contact. The latter is preferred. Field relationships indicate that the Bowers Group is younger than the Robertson Bay Group.

Detailed mapping within the Bowers Group will allow subdivision of these rocks into at least three major formations one of these being the previously recognised Camp Ridge Quartzite. A huge thickness of conglomerates in excess of 20,000 feet thick, of varying lithologies was also mapped near the base of the exposed Bowers Group sequence. Several facies variations along the strike were also mapped but these will be dealt with in some detail in a more comprehensive report at present in preparation.

In addition a good collection of Archaeocyathid corals, of probable Cambrian age, was obtained from a reef-like limestone body near the top of the exposed Bowers Group sequence.

Bowers Group rocks have been folded into a broad synclinal fold and faulted against Rennick Schist and Beacon Group to the west.

(2) Two similar granite plutons (one in the Marezumi Range, the other in the Freyberg Mountains) and their relationships to the biotite schists which they intrude were also examined. The biotite schist can probably be correlated with the Rennick Schist but the nature of the relationship of this schist to the Bowers or Robertson Bay Groups will have to await a more detailed laboratory analysis. The results of the latter investigation will be submitted in a more detailed report.

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(3) Several outcrops of Beacon Group sandstones and Ferrar Group dolerites were also examined and a good macrofloral collection wasobtained from carbonaceous sandstones at Takrouna Bluff in the lower Canham Glacier. Perfectly preserved leaves and stems were obtained and several species appear to be represented.

It can also be shown conclusively that the Beacon sandstones and the Camp Ridge Quartzite of the Bowers Group are separated by a considerable interval in time. The Quartzites are stratigraphically older than the Cambrian archaeocyathid limestone and the Beacon sandstones in Northern Victoria Land have a mid Mesozoic age. Strong structural discordancy between these two rock types was also found on the west side of Leitch Massif where non-folded gently west dipping Beacon sediments are in probable fault contact with folded steeply dipping Camp Ridge Quartzite.

(4) The coarse grained quartz porphyries and rhyolites at Gallipoli Heights occur adjacent to a large granite pluton in the Freyberg Range but no direct contacts were found exposed. A fault contact is considered to be most likely but a genetic relationship between the acid volcanics and the granite pluton is strongly suggested despite the more recent faulting.

(5) A number of processes contribute towards present day weathering phenomena. Of these,salt weathering is probably the most effective especially on crystalline rocks. A number of types of salts were collected for analysis. In addition, wind abrasion, frost heaving and running water were observed to have minor effects on slope erosion. The glaciers themselves do not appear to be actively eroding.

Detailed meteorological observations were made daily and frequently twice daily, the information being radioed back to Scott Base on normal radio schedules. The meteorological data was passed on from Scott Base to the McMurdo meteorological office. A detailed analysis of meteorological data will be submitted to R.D.R.C., when completed.

A limited number of biological observations were also made. These include reports of bird sightings and descriptions of mosses and lichens and will be summarised in due course.

Approximately 170 rock samples were also collected including large samples of igneous and metasedimentary rocks for potassium-argon age determinations.

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