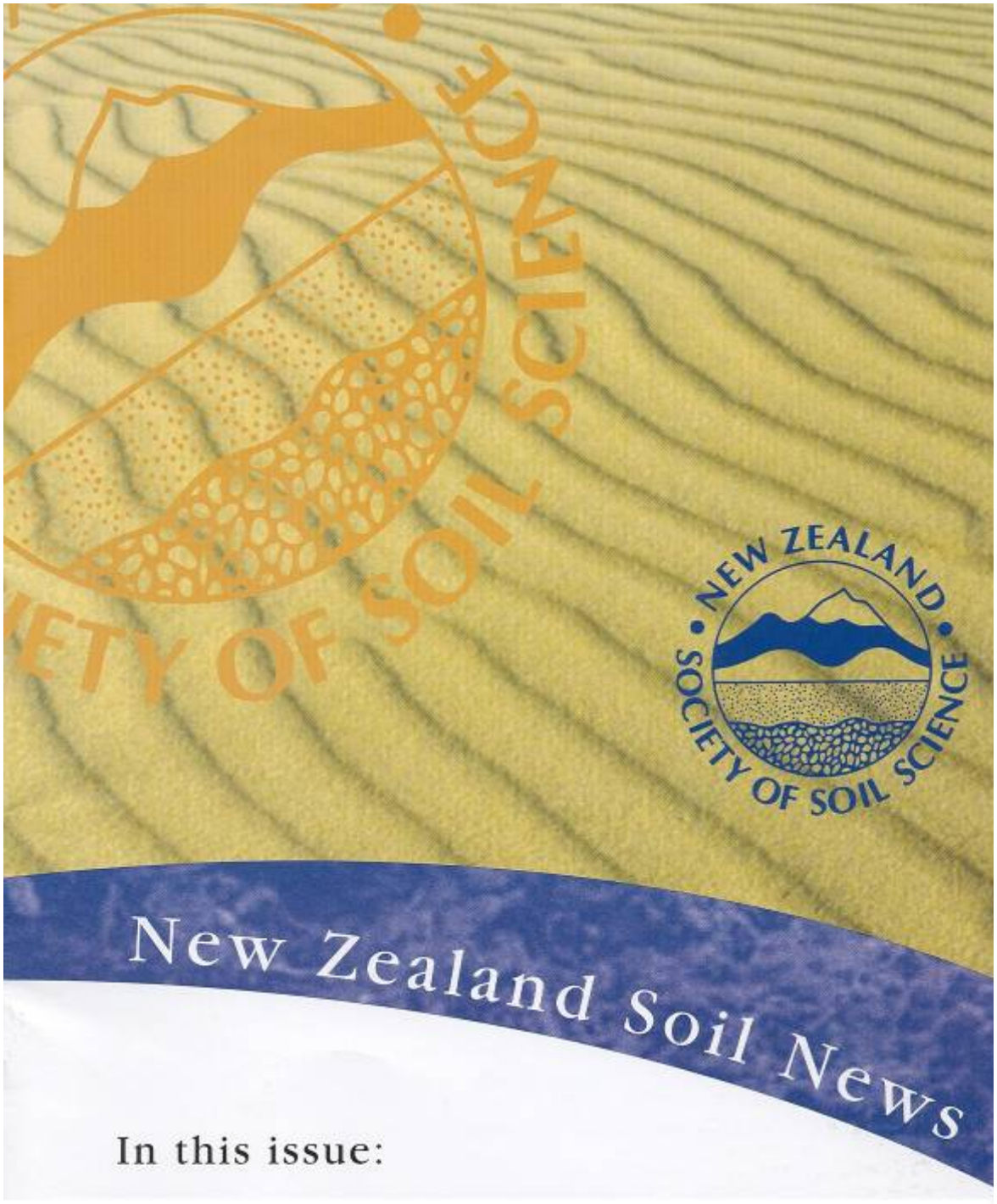

- **Obituary – Peter Stephens**
- **New NZSSS Fellow – Des Ross**
- **Report on 'Active tephra in Kyushu 2010'**
- **Soil Bureau Antarctic Expedition 1959-60**

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Soil Bureau Antarctic Expedition 1959-60

Graeme Claridge

It is now 50 years since Soil Bureau first began its involvement with Antarctic soils. This was commemorated last year when a function was held at Waikato University when John McCraw and I discussed our experiences. This account is a combination of both our addresses and covers more our personal experiences rather than the detailed science and emphasises the differences between Antarctic work then and now

There were several reasons why this expedition came about when it did. Firstly, in order to justify maintaining New Zealand's Scott Base, built originally for the Transantarctic expedition and the International Geophysical Year, suitable projects were being looked for, as well as the continued geological and mapping of the Ross Dependency. Secondly, there was some interest being shown by the international science community in soils/surficial geology of Antarctica, and thirdly, Norman Taylor wanted to blow New Zealand's trumpet by claiming that the N Z Soil Bureau had carried out soil surveys from the equator to the pole. In New Zealand the 1:250000 soil maps of both islands had finally appeared, Charlie Wright and others had visited and produced soil maps of most of the islands to he north, Fiji, Samoa, the Cooks etc, but there was a large gap to the south, the Ross Dependency, that could be filled. NHT wanted to be able to present a map to the meeting of the International Soil Science Society, meeting in Madison in 1962, with all the appropriate bits filled in

The instigators of the expedition, Norman Taylor and J K Dixon, standing in front of the North Island soil map in the map room of 54 Molesworth Street

Map prepared for NH Taylor in 1960 for Soil Science Conference in Madison, Wisconsin, showing NZ soil survey reach from the equator to the poles. The map was presented at the conference with accompanying maps of the various areas from Taylor Valley in Antarctica to Samoa near the equator. The map was salvaged from the ruins of Soil Bureau in 1989.

The island pedologist, Charlie Wright, was not interested. As the son of one of Scott's men he had enough of these old Antarctic explorers standing with their backsides to the fire, talking of the good old days, so he specialised in tropical environments. In the end John McCraw was told to go to Antarctica and I was told to accompany him. We were told to seek for evidence of any soil processes currently operating in Antarctica and to produce a small-scale map of the Ross dependency. At the same time we were told to look for any traces of buried soils or other evidence of changes in climate, to study past and present chemical and physical weathering, to investigate the relationship of the permafrost table to topography and to investigate the organic cycle under polar conditions. At the same time, as much geological and botanical information was to be gathered. These objectives came straight out of the directive given to us.

There was some preliminary information available. In 1916 Jensen reported on some soil material from Cape Royds collected by members of Shackleton's expedition and showed that there was some evidence of chemical weathering. Much later, during the construction of Scott Base, Arthur Helm collected a tin of soil from the building site which Blakemore and Swindale analysed. The material had a pH of 8.5 and had a clay fraction consisting mainly of dioctahedral mica (Blakemore, L C and Swindale, L D 1958: Chemistry and clay mineralogy of a soil from Antarctica. Nature **182**:47-48) .

I spent a lot of time in the next few months reading all I could find on the Antarctic, the accounts of Scott's expedition, the detailed and very wordy reports by Priestley, Griffith Taylor and Debenham and others who, after a very short time in the field had seemingly worked out most of the secrets of the arid landscape we were to visit. Details of where we were to go and what we were going to do were very vague and a lot of it was left to be worked out once we were down south. We collected what seemed to be a vast amount of stuff, most of which would in later years be issued at Scott Base, and collected clothing from Antarctic Division's office and store in Vivian Street. The store did not have a pair of Anson boots to give me but let me have an experimental pair that were double lined and fitted me quite well. I have them still and wore them on most of my subsequent trips to Antarctica. I have had them resoled twice, so now they are on their third sole, but otherwise are more fit for Antarctic duty than I am. They also did not have any woollen mitts but issued us with a number of pairs of fingered gloves that did not seem to be suitable to me. At that time of year the sports shops did not have any stocks of ordinary woollen mitts so I dug out an old pair that were just about worn out, and later on had to darn them every night after a days work.

We eventually went south, initially to Christchurch and then on to McMurdo on 21stOctober, 1959. In those days the passenger aircraft was an old Superconstellation, a four-engined propeller driven aircraft designed for the Atlantic traffic. We were lucky in that we only boomeranged once and I recall the cheer that the passengers, mostly US Navy, gave as we landed back in Christchurch after about 10 hours in the air so that they could have another night with the girls.

Superconstellation at Christchurch airport ready to depart

The next day, after a 14-hour flight, we reached Scott Base. The transport from Willie Field to McMurdo Station was a canvas-covered sledge pulled by a D8 bulldozer, so that added another hour to the journey.

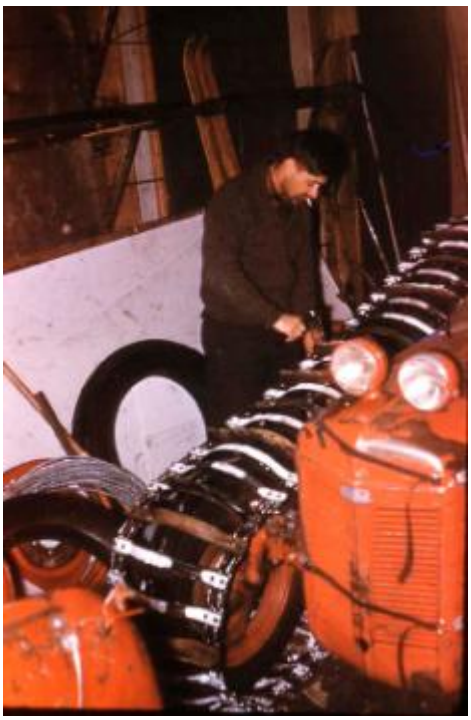
Tucker Snocat pulling canvas-covered sledge, the main method of transport to Williams Field in 1959

Scott Base in October 1959. John and I were quartered in the Jamesway hut on the right of the picture

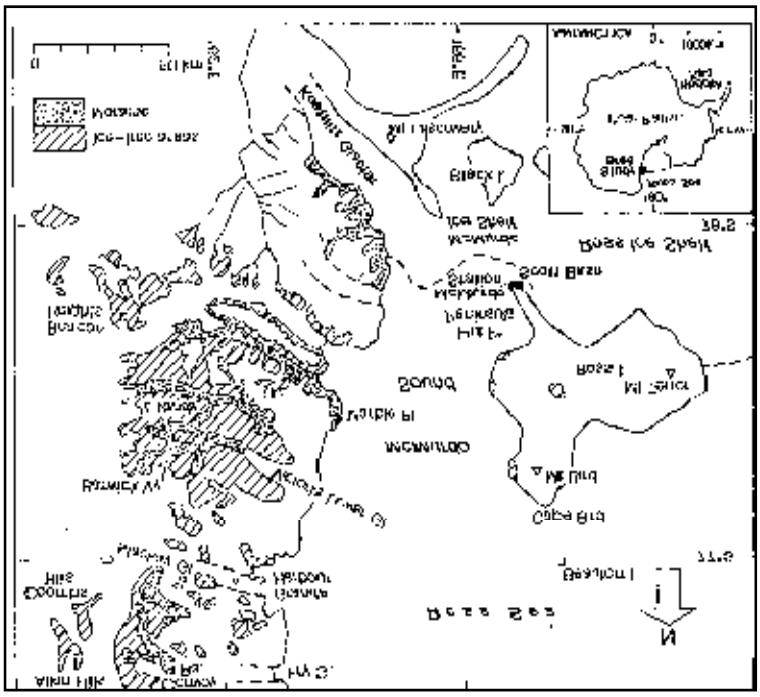
Our programme now seemed to take shape: a trip to Cape Royds by tractor, then by the same means to the Taylor Valley where we would spend a month. First we had to overhaul a couple of Ferguson tractors which had been dragged into the garage, a canvas structure where Q Hut is now situated. We were told to pick out tents from the beaver crate, which was by the flagpole and patch the best of them. So we spent the next week or so repairing the tractors, then in the sledge room sewing patches on a couple of tents.

We were shown the store of field ration boxes and were later told the story of their contents. These ration boxes had been supplied to the Transantarctic expedition and their contents were based on the British experience in working on the Antarctic Peninsula. The rations were slightly modified from that used by Scott, and about half-filled the standard sledging ration box. The mainstay was pemmican and porridge, with lots of sugar and a few trimmings, all done up in square tins. We later found out that Hillary had taken one look at their contents, declared them unfit for men to eat and had Otago University develop a much more suitable ration which was used by the New Zealand TAE parties. This left the rejected rations to be supplied to unsuspecting field parties such as ourselves.

Before leaving for Cape Royds I was called into the medical room by Merv Rodgers, the science technician at the base, who doubled as medical officer, having had a couple of days experience in the casualty room at Wellington Hospital. He pointed out that I had not had the second tetanus injection I needed and proceeded to give me the jab there and then, and then he gave me another vial and told me I was to do the same to Rowley Taylor, NHT's son who was up at Cape Royds counting penguins. I later did so in the not very sterile environment of Shackleton’s old hut and he seemed to survive it.



John busy repairing the tracks of a Fergusson tractor, preparing it for our journeys



Map of the McMurdo Sound area

We left for Cape Royds eventually: a convoy of two tractors dragging a sledge each, a bit of overkill. We sat on the back of one of the sledges showered with snow from the tracks of the tractor and getting progressively colder and colder, despite the down suits we were wearing.

Passenger's view from the sledge, en route to Cape Royds, everybody getting showered with snow

From time to time we would try to warm up by running alongside the sledge. We eventually reached Cape Royds and managed to find a route to get the tractors very close to Shackleton's old hut and moved in, joining the penguin party who were living in the hut. We slept on the hut floor, which was cold, probably colder that outside, but lacking experience we did not realise how much warmer a polar tent could be. We tried to warm the hut up by making fire in the coal range, burning scraps of wood scattered around outside the hut, but all this did was to melt the snow packed in the rafters which proceeded to fall on us as we sat around the stove.

Group around the stove in Shackleton's hut at Cape Royds, trying to get warm

We dug a few holes in the surrounding till and in the guano saturated material of the rookery, getting our first glimpse of what Antarctic soils could be like.

After a couple of days, we moved across to Cape Evans and set up camp on the beach in front of the hut.

Camped in front of the hut at Cape Evans

We spent a few hours digging out the snow, which filled the hut, or at least that part of the hut nearest the doorway. The hut had remained more or less snowtight since it was abandoned by Shackleton's Ross Sea Party, leaving the remains of their lunch on the table, when they sighted the ship that had been sent to rescue them. The first visitors, in 1948, were able to photograph the remains of the lunch but could not open the door because of a layer of ice several inches thick on the floor. Later visitors had to cut the door to gain entry, thus leaving cracks for snow to enter, so that by the time we arrived,

the hut appeared full of snow. We helped to dig out some of this snow and then wandered over the ice-free area of Cape Evans which had been well and truly worked over by Scott's party. Nevertheless it was still full of interest to us. At one site we dug a series of holes across a shallow gully to measure depth to ice-cement, which we thought should have some relevance to our studies. I came across that line of holes when I was able to return to Cape Evans in 1987. They were still obvious and looked likely to remain visible for many years to come.

We found well-developed debris cones, looking like small volcanic cones, but formed from debris falling into holes in a glacier, which are left as heaps with a striking cone shape after the glacier has ablated away, also introducing the concept that glaciers in the area had receded. Some small rounded mounds that we investigated turned out to consist of rock fragments that had fretted out from a central kenyte boulder core.

John investigating permafrost at Cape Evans. The line of holes we dug across this small gully were still visible in1987

Back at Scott Base, at the invitation of Professor Bob Clark of Victoria University, John was able to take part in a couple of flights over the dry valley area as far north as the Mackay Glacier and as far south as the head of the Koettlitz Glacier, covering most of the ice free areas in the McMurdo Sound region. A valuable series of photographs was obtained on these flights which added to our understanding of the area and the landscape

In order to get some indication of the soil pattern further north, we arranged a flight to Hallett Station, which was about 800 km up the coast. We flew up in a US Navy R4D (DC3), the cabin of which was half filled by a large rubber fuel tank, needed when these aircraft were flown down from New Zealand. After we became airborne the crew found that the tank was leaking along a seam and smoking was prohibited while the crewman worked over the tank with a spanner. Eventually the leak was stopped or at least minimised and after a while the passengers were allowed to smoke at the rear of the aircraft, in order to satisfy the avid smokers amongst the navy personnel. The cabin of a DC3 is not all that large.

John trying to describe a hole in a penguin rookery, strongly resented by the penguins

We had five hours on the ground, enough to dig a couple of holes in the penguin rookery, although strongly resented by the penguins, but apart from that the visit passed without incident apart from nearly missing the flight back to McMurdo

We then packed up the sledges again for our trip to the Taylor Valley. Suggestions that we might supplement our rations were not well received by the cook, but we did manage to grab a case of tinned fruit in passing his stores, which helped. After our experiences on the Royds trip we thought we could do better in the way of shelter during the journey across the sound. We located a large packing case, which we turned into a small hut, 3 feet square by 6 feet, which we fitted with a door and two windows made out of plastic bags. The idea was that we would use this as a cabin on the journey across the sound and then as a cookhouse when we established our camp in the Taylor Valley. On the journey across, we found that temperatures had increased and we were able to spend the journey sitting on top of the box admiring the view. It took us two days to reach the Taylor Valley, with stops at the Dailey Island and Cape Chocolate.

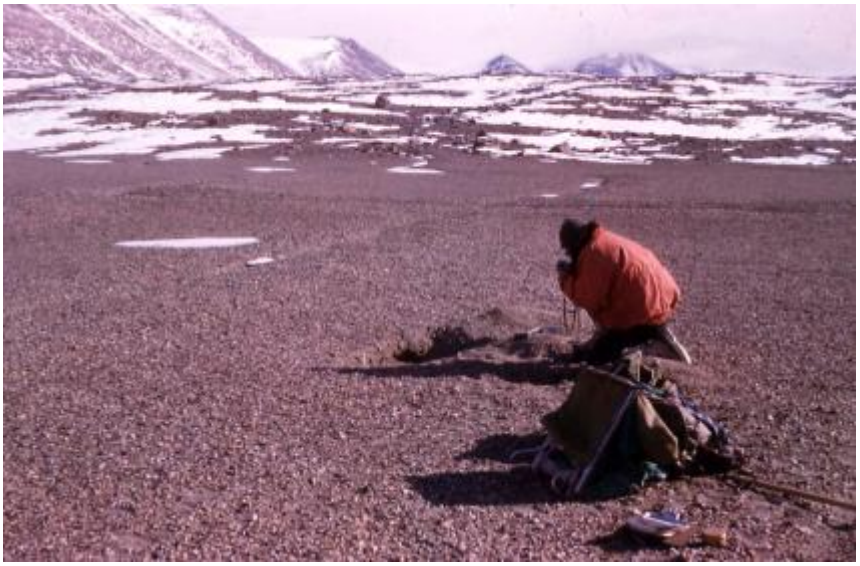
Tractor repairs at Cape Chocolate. The brake drum on the right side had disintegrated.

On the second day, we had a breakdown, when the brake drum of one of the tractors disintegrating, making steering difficult. We called for assistance on the radio, but Scott Base was definitely not interested in helping us, or even talking to us. By listening to the messages we gathered that a snocat had been lost down a crevasse with death and injury resulting. We had to find our own way out of trouble, so eventually put everything back together, minus the broken bits and continued on our way, with one tractor only able to turn left, so our onward path consisted of a series of circles.

We eventually reached New Harbour and set up camp just inland of the beach, and farewelled our tractors and drivers. We setup our tent on what looked to be a level surface just above a dry streambed. We gave no thought to this except that it looked to be stable. The hut served its purpose: we cooked in it, John wrote up his notes and checked his samples in it and the sample bags slowly filled the gap between our tent and the hut. The hut was still standing in 1972, when we revisited the Taylor Valley and was unchanged except that the woodwork was showing signs of erosion from sandblasting. It may have been removed subsequently.

John and I wandered around the lower part of the valley, trying to sort out what was going on but I fear, not getting much further than Priestly and the others reached after a few days there in 1912. We argued about what we saw: What puzzled me was the topography: a tangled arrangements of mounds with a relief of about 100 metres around the coast of the bay in which we camped and then further inland sloping down again to a more or less level plain with a lake. There was a valley leading inland from our camp, which was clearly an old stream bed, which at its highest point turned at right angles and headed south. At this point low saddle led to a similar valley running downwards to the plain occupied by the lake. I could make no sense of this at first, nor of the very fine material that underlay a stony pavement carrying some very large boulders, the occasional finely bedded and slightly cemented layers that stood out in places or the ice layers that were exposed in the valley of a quite large stream on the north side of the valley. It is only now that the pattern makes sense to me as the story of the ice advances into the valley during the last glacial maximum, the lake which occupied the valley at one time and the complex history of previous ice advances into the valley becomes known.

We also puzzled about the strange pattern of rocks in the material which we recognised as tills of some sort, some containing much kenyte, a rock which we had become familiar with at Cape Royds, and some containing much more granitic material. We recognised that these must have been brought by ice moving inland but how when and why were not immediately apparent to us



One of our many holes in the landscape. Lower Taylor Valley

We found working out of our camp at the mouth of the valley a little restrictive as we needed to go further afield, which meant inland so we packed up a few days food, a small tent and other gear and set up a camp on the shores of what we now know as Lake Fryxell.

The Americans who had set up a camp near here a few years before, investigating a possible site for an airfield. We found traces of their camp, and the rubbish left behind, and poking around found that they had buried a whole lot of cans of food, probably to avoid having to take it out. We investigated and found that the tins all khaki-coloured were unlabelled contained either a very palatable pork and beans stew, or contained a rather tasteless cake. They made a change from our pemmican and tinned peaches diet, but it was always a lottery opening the cans.

On the smooth ice of the lake we laid out a baseline for surveying the valley, there being no reasonable maps of the valley at that time, carefully measured the length of the line with a tape measure, and took a round of angles to prominent points from either end. By taking similar rounds of angles from other points in the valley we hoped to be able to construct a map and tie in the air photos that I had prepared by copying rolls of air photos taken by the navy a couple of years earlier. This sketch map was used as the base for the soil map of the valley, which John later produced. The finished map has a distinct curve in it, which does not appear in later maps of the valley, and I think we did not allow for magnetic variation over the relatively short length of the valley.

John and I enjoying a well-earned cup of tea after a day's work.
Note the sample bags piling up representing work for me later

After spending a few days working out of our camp by Lake Fryxell we felt the need to go further inland. We announced to Scott Base that we were going up the valley and would be out of communication for a week Scott Base did not like this but there was nothing they could do about it. We switched off the radio and left, We established our camp in the gut below the Suess Glacier and were able to look at the country to the west, as far as the Taylor Glacier.

Camp beside the Suess Glacier, looking to the west

On one very long day we climbed up high on the north wall of the valley somewhere west of the Rhone Glacier: I am still not sure where we went as we were in cloud most of the time. I could not reconcile the site of our highest soil pit with the topography I encountered in a later visit to the Taylor Valley. A highlight of that day was when we approached Lake Bonney we came across an large box containing food abandoned by a USGS party the year before The chocolate it contained was very much appreciated, as it was in short supply in our rations.

The Taylor Glacier from the gap between the two lobes of Lake Bonney

As we passed throughout the gut between the East and West lobes of Lake Bonney we could not fail to notice the discrepancy between the description given by Scott in his account of his visit to the area in 1902, which indicated that the lake level had risen. Other people noticed the same thing and published on it some years later.

A rock glacier similar to fossil periglacial features

It was not easy to produce any sort of a soil map, especially as we had no base map to work from, apart from our own pace and compass survey. We were able to produce a map of sorts, based on topography and parent material, especially the different rock types in the tills, which we now know to be the consequence of ice movement around Ross Island and into the Taylor Valley during the last glacial maximum when ice filled the lower part of the valley up to a well-defined limit on the hills bordering the valley We also studied periglacial features related to solifluction, such as terraces and mounds, sorted and unsorted nets, stone stripes, etc, many of which John had seen as subfossil features in the Central Otago landscape but were seen here in action, as it were.

Lunch by the Taylor Glacier in the course of a very long day. Note the red discharge from the glacier, now known as Blood Falls, probably caused by discharge of an anoxic brine containing ferrous iron from a subglacial lake. When the brine is exposed to air the iron immediately oxididses, precipitating iron oxides

One feature that aroused much discussion amongst us was the rounded shapes of Hjorth Hill and Mt Coleman, which we looked at from our hut site. (Hjorth was the original maker of the primus stove, while Coleman made the American gasoline stoves). I thought that the rounded shape might have been a result of glaciation but John thought otherwise, When we climbed up to reach similar country we found that the surface was covered with large blocks of rock broken out of the country rock, here part of the metamorphic basement, laced with dykes of darker rock, which showed up in the felsenmeer as dyke shadows), indicating that there was little or no glacially deposited material on these surfaces.

I now consider that the smooth and rounded appearance of the uplands is a consequence of long-continued weathering in a very cold climate, with all but the larger rock fragment produced by weathering blown away, the surfaces have never been covered by glacial ice, and may be amongst the oldest part of the landscape, possibly having been exposed to weathering for up to 15 million years. So John was right in his initial judgement and I was wrong.

Dyke shadows in rolling uplands. These are formed by the intrusion of dark-coloured rocks into the lighter coloured country rock. They are slightly harder than the surrounding rocks and stand out as low walls

When we returned to the base camp after a week away we found that the thaw had begun and what had been a level and dry plain was now covered with flowing water only a few inches from our tent door. Eventually our time in the Taylor Valley was up and we considered how we might come home. Our

original plan was to take what gear, samples etc that we could not abandon and sledge round to Marble Point where there was an airstrip. However by the end of December the sea ice was starting to thaw and there was a considerable moat between the land and the ice, making our journey somewhat difficult. A few weeks earlier, Bob Nichols, an American geologist from Tufts College in Boston had dropped in by helicopter and spent a couple of days with us. He had with him a team of graduate students who pulled his sledge and were grilled by him each evening on the geological features they had seen each day. One of these was George Denton, who is now an authority on glacial events in Antarctica and I suppose one of our competitors in this field. We therefore knew that helicopters could reach us and carry the load of our samples and gear. After much discussion Scott Base agreed to as McMurdo for help and we were evacuated to Scott Base, leaving our little hut all alone in New Harbour

Camp at the end of the season with water flowing close to the tent

Sikorsky helicopter to the rescue

A deserted campsite

Otter aircraft on the Marble Point airstrip. No wheeled aircraft have used this strip since 1959. It is now used as a helicopter refuelling depot

John in Dodge truck , Marble Point

Our next and final journey was to Marble Point where we spent 3 or 4 days, looking at soils and geology. At that time Marble Point was envisaged as a site for an airstrip on land capable of handling large intercontinental planes such as the Connie. After a couple of year's work all that could be seen for the effort was a rough strip that an Otter, a small single-engined plane that could carry 5 or 6 people could use. The flight across in an Otter did not fill me with confidence. A pilot and a mechanic were in the front seats, and I could see that every time after the pilot had set one of the controls, the mechanic would reach across and adjust it slightly. The airstrip at Marble Point was marked by the tail of a crashed Otter at either end. The landing was rough as in the centre of the runway there was a bump, which threw the plane back up into the air for a few seconds.

The Marble Point camp was dead and abandoned, the explanation given to us was that there had been an outbreak of food poisoning, which had killed several men, but the rumour was that these men had broached a drum of methyl alcohol, with fatal consequences.

While we were at Marble Point a helicopter arrived to pick a large marble slab which had been selected to be used as a foundation stone for a building in Christchurch. It was duly loaded into the helo, but proved to be too heavy, the helo failed to get airborne and search had to be made for a smaller boulder. The camp was equipped with several trucks and two enormous D9 bulldozers which I believe were later driven with great care across the ice to McMurdo. A few years ago there were still a couple of vehicles abandoned at the ice edge.

Eventually we returned to Scott Base and packed up ready to return to New Zealand by ship. John spent a lot of time poring over his notebooks and air photos and working on the map we were sent down to produce. Once the samples had been packed I had little to do and was able to spend some time with Eric Wedgewood, who had been the winter cook and spent the summer looking after the spare dogs not required for the southern party who were working in the Nimrod Glacier area. Earlier, I had been fortunate to witness the departure of the southern party- two dog teams pulling heavily loaded sledges heading south along what is now the read to Williams Field, followed by the snocat party, two ex-TAE snocats and their sledges Of course, only one snocat returned the other being lost down a crevasse, as I have said earlier, killing Tom Couzens and leaving Jim Lowery without his legs.

Our samples and other gear being loaded onto the Glacier. Not all of it was official cargo

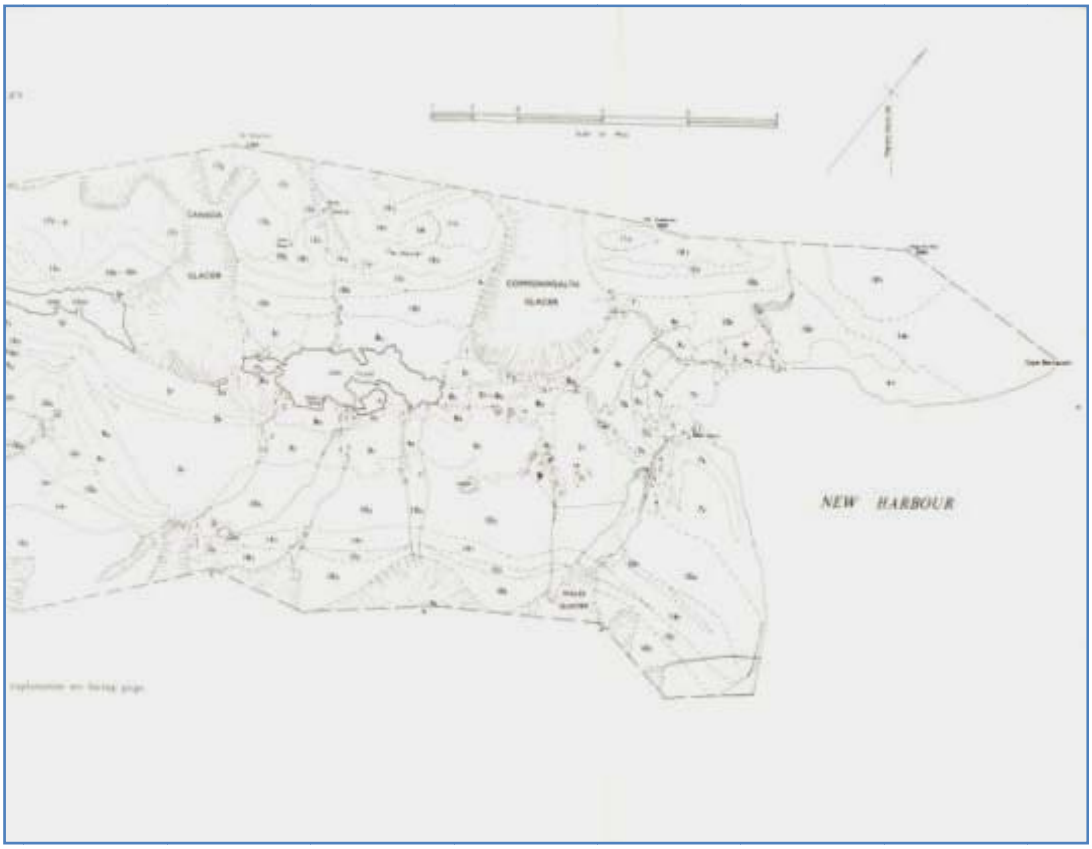
Several Scott Base personnel as well as ourselves were to return on the Glacier, the largest icebreaker then in service, armed with two guns on the foredeck. What with our samples and the various pieces of equipment, official and unofficial, that the base mechanic was shipping back, we had quite a load of cargo.

Waves breaking over the bow of the Glacier. Note the guns

Once the ship was loaded, it set off and spent a couple of days charging up and down the channel from the ice edge to McMurdo to clear out any ice that would interfere with the cargo ships that were expected. This lasted until both propellers had broken blades. As we sailed north the ships engineer spent most of his time standing on the stern of the ship as it bounced up and sown with out of balance propellers. While we in McMurdo Sound the ship's helicopters were carrying out training flights to Marble Point and back and the pilot's cabins were filing up with all sorts of loot. We arrived in Lyttleton after a rather rough trip.

Eventually the samples arrived in Wellington and I was left with the problem of what to do with them. As is usual, I spent much more time working on the material in the laboratory than was spent in the field collecting them. Eventually I worked out a scheme for dealing with them; soluble salts, salt chemistry, particle size, clay minerals, which essentially I have followed for all the subsequent samples I have collected. What I was able to show was: I confirmed that some chemical weathering processes were operating, the soils contained considerable amounts of soluble salts, largely sodium chloride but a much higher proportion of sulphate than would be the case if the salts were totally derived from sea water. The clay mineral assemblages also contained considerable amounts of smectite especially in the soils containing marble fragments, indicating that there was authigenic clay mineral formation.

As a consequence of this work and subsequent laboratory studies we managed to publish five articles on the results of our work. including John's detailed map of the deposits in the lower part of the Taylor Valley, which was the first detailed map of surface features, based on differences in topography and parent materials rather than a true soil map.



A portion of the "soil" map we produced as a consequence of our investigations

What was most intriguing was that in samples supplied to us from other parties, was that there seemed to be much more chemical weathering and clay mineral formation elsewhere in the Antarctic and that the Taylor Valley was not representative of the whole area. This led me to propose further work elsewhere in the Ross Dependency, aiming for a north south gradient and an altitudinal gradient running east west across the Transantarctic Mountains. Over the next thirty years or so I managed to achieve this aim, resulting in the work by Iain Campbell and myself, summarised in a book we published in 1987, although work carried on. We introduced Megan Balks to our team, especially in

our work on the effect of human activity on the Antarctic soil environment and soil moisture studies, but all that is another and continuing story. A soil map of the Ross Sea region of Antarctica has finally been published by Malcolm McLeod and others, fifty years after John and I started work on it.

At least, when Norman Taylor presented his map at the Madison conference, he had some facts behind him to back it up

Publications resulting from this expedition

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McCraw, J D, 1967: Soils of Taylor Dry Valley, Victoria Land, Antarctica, with notes on soils from other localities in Victoria Land. New Zealand Journal of Geology and Geophysics 10: 498-539

Claridge, G G C `1961: Seal tracks in the Taylor Dry Valley. Nature 190: 559.

Claridge, G G C 1965: The clay mineralogy and chemistry of some soils from the Ross Dependency, Antarctica. New Zealand Journal of Geology and Geophysics 8: 186-220

News from correspondents

AgResearch Invermay

At Invermay we are currently recovering from a 'big wet' from which we received a quarter of our annual rainfall (180 mm) over 7 days and 6 nights. The plague of locusts did not eventuate though. During this time our field staff and post grad students were kept very busy with some intensive field sampling. Some of our remote field sites were particularly difficult to service due to an extensive number of road closures throughout the Otago region. In the middle of this **Ross Monaghan** and **Rich McDowell** had to make a return journey to Cromwell to act as keynote speakers at an Otago Regional Council forum on water quality.

Congratulations to **Richard McDowell** who has recently been appointed an Adjunct Professor at Lincoln University. Richard has played an active role in the supervision of Lincoln PhD students based at Invermay. **Gina Lucci** and **Fiona Curran-Cournane** are now both completing their theses write ups and Richard has two new PhD students arriving at Invermay in late June. Richard and Gina recently hosted **Dave Nash** from the Victorian DPI to catch up on all issues P related and plan future collaborative research.

Ciel de Klein and **Selai Letica** and a busy technical team now have all the research aspects of their NOMR trial established at the Telford Rural Polytechnic dairy demonstration farm near Balclutha. This programme focuses on different aspects of DCD research with a grazing, mowing and nitrous oxide gas loss trials. May was an important month for this work with a large team involved with the collection of cow urine to be applied with and without DCD.

With the early onset of a wet winter in Dunedin, a number of the Invermay team are eagerly awaiting some warm weather at the upcoming world congress of soil science in Brisbane this August. Travelling to this event from Invermay are **Tony van der Weerden, Dave Houlbrooke, Rich McDowell, Fiona Curran-Cournane and Gina Lucci.** We hope to catch-up with other NZSSS members there too.