FERDINAND HOCHSTETTER IN NEW ZEALAND

Les Kermode

[This contribution was presented orally (and illustrated with 80 colour slides) as the Historical Studies Group Plenary Talk at the 1990 Geological Society Conference in Napier. Normally an article of this length would be published as two parts in consecutive issues of the Group Newsletter. However, in view of Hochstetter's importance as the "founding father" of New Zealand geology, plus the fact that some previously unpublished information is also included, it has been decided to print the full article in this issue.]

Fig.1. Portrait of Ferdinand von Hochstetter (1829-1884) taken in Vienna.
Photographer: Julius Leth. Archive: Alexander Turnbull Library, Wellington, N.Z. (F94412½).

"Through a combination of lucky circumstances it fell to my lot to provide a scientific foundation to the geography and geology of New Zealand." With these thoughts Ferdinand Hochstetter reflected on his inimitable achievements of 1859.

Christian Gottlieb Ferdinand Hochstetter was born in Esslingen near Stuttgart, in southern Germany, on 30 April 1829. He was the son of a clergyman and was educated at a local school and a church seminary. Ferdinand, like his father, was keen on natural sciences, especially geology, so as soon as he had finished the clergymen's course he transferred to Tübingen University where he presented his Ph.D. dissertation on calcite crystals. After graduation Hochstetter made a study tour which included the small, young volcanoes of the Eifel district in the Rhine valley, and eventually reached Vienna where the cultural variety and scientific opporunities of that city were a tremendous stimulus to him. The following year, at the age of 24, he joined the Austrian Geological Survey. Almost immediately his outstanding capabilities were recognised and he was sent to produce a geological map of the district surrounding mineral springs in Bohemia. In a few years he compiled and published a large map and eight other geological reports.

During the 1850s the young Austrian emperor Franz Joseph and his brother Archduke Ferdinand Maximilian were enraptured by the numerous discoveries of the natural sciences. Because the archduke was also Commander-in-chief of the Austrian Navy, he was able to plan a spectacular enterprise. A naval training ship - the sailing frigate *Novara* - would voyage around the world to show the flag, to establish trade, and, by carrying scientists on board, would achieve some exciting exploration. The prodigious output of scientific publications by the young Hochstetter led to his selection as geologist for this scientific extravaganza, and he was asked by the Austrian government to write popular newspaper reports of the expedition.

Ferdinand Hochstetter was of slight build, had a delicate constitution, and suffered throughout his life from bronchitis. In temperament he was quiet, serious, unselfish, courteous, tactful, and very industrious.

Fig.2. Portrait of Ferdinand Hochstetter, taken in Auckland, 1859.
Photographer: Bruno Hamel. Archive: Auckland Museum (C2679).

Fig.3. Commercial Bay, Auckland, 1859. Part of panorama from Britomart Point.
Photographer: Bruno Hamel. Archive: Auckland Museum (C21530).

Novara sailed from Trieste on Hochstetter's 28th birthday, and during the voyage visited the volcanic areas of St Paul Island, southern Indian Ocean, and Java, Indonesia. Eventually, late in December 1858, after 20 months at sea, *Novara* cautiously made her way towards Auckland. The weather cleared to reveal Rangitoto Island as a perfect, model volcano. Closer to the mainland Hochstetter felt that Auckland did not correspond with the expectations and mental images that he had made of New Zealand. The Governor (Colonel T.G. Browne) welcomed the expedition and requested the leader (Commodore B. von Wüllerstorf-Urbair) to allow the geologist to visit and report on the newly discovered coal deposits south of the town. Julius Haast, who had arrived from Germany on the previous day, was elated to meet Hochstetter and so many fellow countrymen. Haast had also studied geology, but did not graduate. Although of very different temperaments, the two kindred spirits quickly got down to planning natural history explorations.

When the Christmas festivities were over, all the scientists from *Novara* journeyed by wagon to Drury with artist-surveyor Charles Heaphy, medical missionary Arthur Purchas, and Julius Haast. While the geologists examined coal deposits, the other scientists were busy examining plant and animal life. Later, the whole party struggled through dense bush, over hills, and then travelled by canoe down Waikato River to Tuakau. They returned by way of Drury Hotel. The expenses (£93) for the geological investigation were submitted to the Provincial Government.

The Auckland Provincial Council was so impressed with the Drury coal report that they wanted Hochstetter to remain and continue his geological explorations. He was most reluctant to accept the proposal, until he was assured that New Zealand would pay all his expenses back to Austria. After 17 days in Auckland *Novara* sailed for Tahiti.

Hochstetter remained, and, accompanied by Haast, Heaphy, and Purchas, examined most of Auckland's volcanic cones and craters. Hochstetter recognised that the explosion craters were similar to those he had visited in the Eifel district, and that each of the scoria cones had been built in a very short period of time. He also concluded that the white, silty deposits of the Manukau lowlands were pumice silt and dust all the way from Taupo Volcanic Zone.

Later in January, Hochstetter sailed down Manukau Harbour and was most impressed with the kauri forest of Waitakere Ranges. The party crossed Manukau Entrance and sailed by derelict boat to Waiuku, then walked over the sand dunes, which Hochstetter saw to be the raw material for a future iron industry, and followed the coast to the Port Waikato mission station. The Maori porters were amused that Hochstetter collected so many worthless stones that were, in reality, important fossil shells (Mesozoic and Tertiary) and some exciting fossil ferns (Mesozoic). The distant peak of Mount Egmont was seen clearly through the unpolluted atmosphere. Back in Auckland, based at Clermont House (Princes Street), Hochstetter was busy throughout February arranging rock and fossil collections, draughting maps, and completing sketches.

Twenty years earlier, the volcanoes of the Bay of Islands district had been visited by the American geologist James Dana, and a few years later the volcanic features of the Taupo district had been briefly described by another German, Ernst Dieffenbach. Therefore, Hochstetter resolved to make a two-month journey into the heart of the island to the active volcanoes, and the hot lakes that were often described, but never scientifically investigated. All the best of equipment was needed for this long expedition on foot through sparsely populated districts, and for camping in the open every night. The party consisted of 22 people; Hochstetter, Haast, Captain Drummond Hay (as quartermaster-interpreter), Bruno Hamel (photographer), Augustus Koch (artist-observer-curator), three assistants, and 15 Maori porters, most of whom were of noble birth.

The expedition left Auckland on 7 March and, by way of Drury, again reached Waikato River where everything was loaded into canoes. Here Hochstetter discovered that the map he had bought was little better than a blank sheet of paper. Day after day the explorers paddled, visiting the exposed coal seams near Huntly, the mission school at Taupiri, and then up Waipa River. After nine days by canoe Hochstetter walked on ahead to climb Kakepuku hill, and was able to see Ruapehu from the mission house. The party stumbled onward through poorly tracked forest, over the hills to Raglan Harbour, then travelled south, inland of Karioi, to the mission station at Aotea Harbour. Later, many shell fossils (Mesozoic) were collected from the shores of Kawhia Harbour and shipped to Auckland. A burial cave in the limestone cliffs at Rakaunui was visited. Usually the Maori people were suspicious of all English visitors as potential land-grabbers, but Hochstetter's Austrian scientific party was given every assistance.

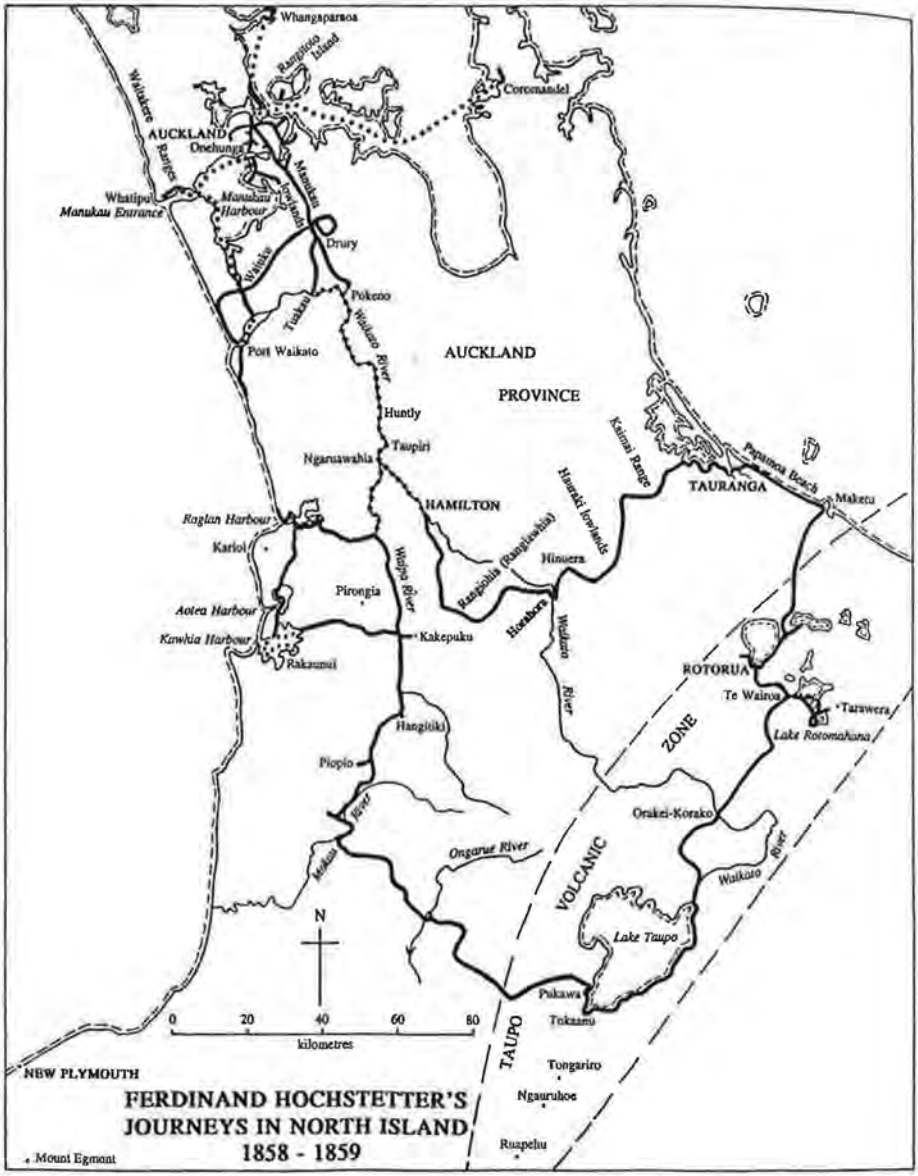


Fig.4. Map of Hochstetter's North Island journeys December 1858 - June 1859.

Fig.5. Limestone cliffs (detail) at Rakaunui, Kawhia Harbour. Compare with the engraving published in *Geologie von Neu-Seeland*, p.46.
Photographer: Bruno Hamel. Archive: Auckland Museum (C2655).

The party tramped over the forested slopes of Pirongia mountain and returned to Waipa River for a couple of days rest before undertaking two arduous weeks in untracked forest. The photographer, with his cumbersome equipment, headed direct to Rotorua. Hochstetter visited a limestone cave at Hangatiki to search for bones of the extinct, wingless moa. Then the explorers (a party of 18) moved on through dense forest, weaving their way around limestone hollows which reminded the Austrian of the karst landscape in his homeland near Trieste. They glimpsed Ngauruhoe from Piopio hill, then descended into Mokau valley where Hochstetter did not see very much of geological interest, but kept himself busy observing the plant and animal life, and filling in details on that inadequate map he had bought, for this was country that even Maori travellers avoided. A steep climb, pushing through dense undergrowth in heavy rain, led them over another range of hills to a well-earned rest by Ongarue River. From the top of a nearby hill they were rewarded with an excellent panorama. Unfortunately Ruapehu was capped with cloud, but with the aid of a telescope Hochstetter made detailed sketches of the crater of Ngauruhoe. Numerous kiwi roamed the forest and Hochstetter collected specimens to enable him to co-author a scientific paper about them. Cathedral-like forest of rimu and totara, with an understorey of tree ferns, was common travel for the explorers.

After 14 more days in the bush, the travellers welcomed the sight of the mission station at Pukawa, near Tokaanu. Hochstetter unwisely used the first fine day to examine hot springs, and the next day when he was taken into the pa to be welcomed, he was given a most ungracious reception by a stern, gloomy man wrapped in a dirty, woollen blanket and sitting in front of an unsightly, unadorned hut - it was the great Te Heuheu, and his sense of protocol had been offended. After repeated apologies from the geologist a feast was prepared, and, for the occasion, the renowned and mighty chief dressed himself in an elegant, black suit.

The explorers were not permitted to visit the Tongariro volcanoes, because 20 years earlier, a botanist, John Bidwell, had made an unauthorised ascent of Ngauruhoe. So, without achieving the main objective of their journey, the party left with an invitation to return, except for Captain Hay, who, as agent of the English governor, was no longer welcome. They trekked past the enormous white cliffs of pumice on the eastern shore of Lake Taupo and down the Waikato River trail to Orakei-Korako thermal area. As Hochstetter crossed the scrubby, tussock-covered plain (that today is planted in pine forest) he believed he could see a relationship between volcanoes, hot springs, and fault lines, similar to what he had found in Bohemia.

After another eight days in the scrub and bush, the Te Wairoa mission station was indeed a welcome sight, but scientific examination of the hot lakes and springs was not to be frustrated by rest and relaxation. Hochstetter kept himself busy exploring, sketching, sampling, and photographing. He camped on an island in the middle of old Lake Rotomahana, but did not realise that within 28 years the whole landscape and 153 people would be wiped out by the Tarawera eruption. The map he drew of Lake Rotomahana proved invaluable when geological investigations were made into the devastated district. The hardworking Hochstetter enjoyed the comfort of the mission house to celebrate his 30th birthday, and then spent another six days in Rotorua visiting boiling mud-pools, geysers, and cold springs.

The party (together with other travellers) tramped down to the mission station at Maketu on the coast, and along Papamoa Beach to Tauranga (Te Papa mission station). Here Hochstetter was asked to mediate in a protracted and armed feud which embroiled some local Maori families. The route onward was up and over the forested Kaimai Range, across the confusing swampy Hauraki lowlands, past the bluffs of Hinuera stone, and over Waikato River by means of a log bridge near Horahora.

Hochstetter and Haast spent a night at Otawhao mission station near Rangiohia (Rangiawhia), then the party reassembled at a nondescript settlement (now called Hamilton) and once again used canoes for transport to Ngaruawahia. After an audience with the Maori king, Potatau, they continued down Waikato River by canoe to Pokeno and arrived back in Auckland on 24 May. This amazing journey had taken 78 days.

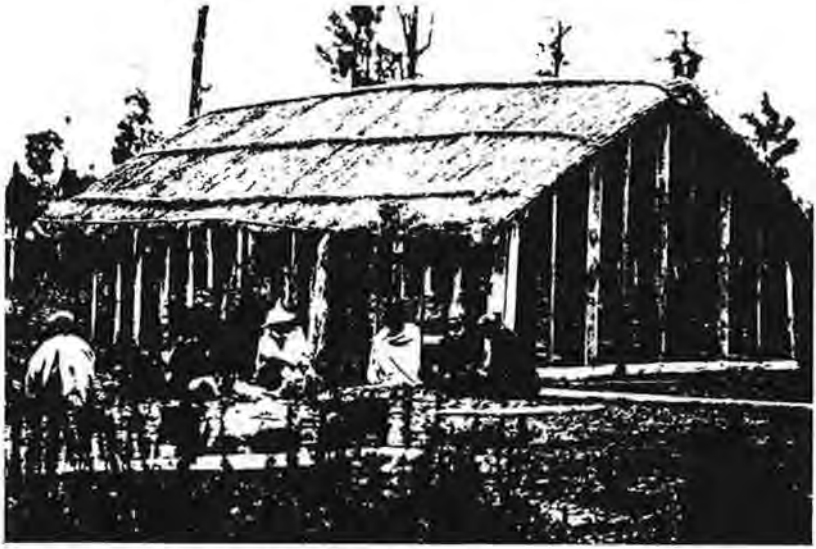


Fig.6. Reception by Takerai of Hochstetter's exploring party near Waipa River.
The visitor on the left (wearing hat) is probably Hochstetter.
Photographer: Bruno Hamel. Archive: Auckland Museum (C2654).

Fig.7. Detail from the "Geological Formation of the Auckland District" by Ferdinand Hochstetter. This large map is thought to have been compiled (possibly by Charles Heaphy, or under his supervision) for Hochstetter's lecture in June 1859. Archive: Auckland Museum (C25904).

Once again it was time to arrange rock and fossil collections, draw maps, complete sketches, and study the results from the camera. Bruno Hamel the photographer was paid off (£35). In June, Hochstetter gave a public lecture on "the geology of the Auckland Province". It was published in the government gazettes, as a newspaper supplement, and later in book form. His coloured geological maps were printed three years later in Germany. The final expenses account that was submitted to the Auckland Provincial Government included: fare to Trieste £165, accommodation in Auckland £130:12:6, Hay's salary at £25 per month, a tent £4:5:0, Maori porters' wages £336:12:6, and so on.

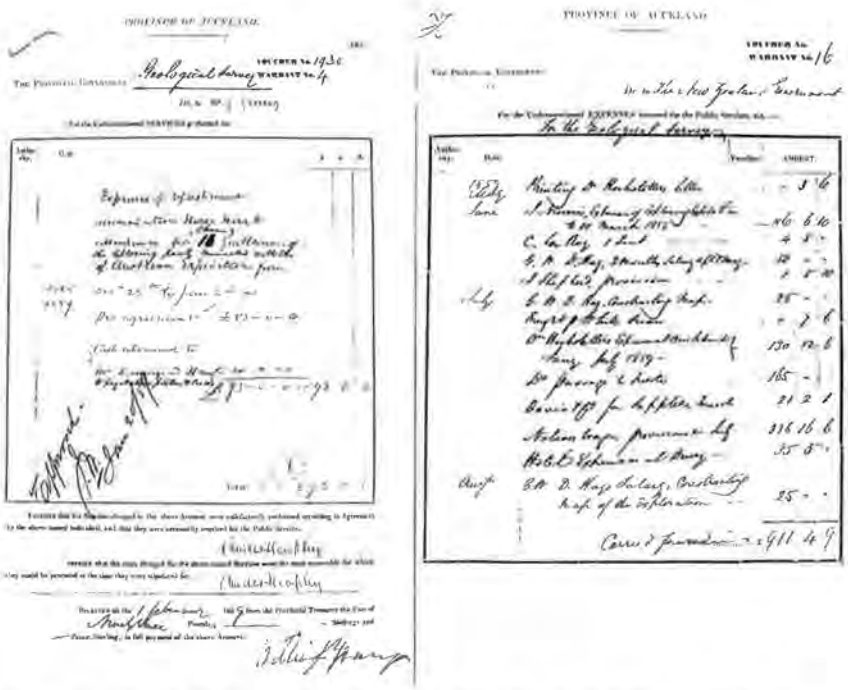


Fig.8. Expenses Vouchers authorised by the Auckland Provincial Government for the Novara-Expedition, and for Hochstetter's explorations around the province. Archive: Auckland Museum (MS18, C25905, C25906).

The settlers of Nelson were very keen for their mineral-rich province to be explored and evaluated by Hochstetter and Haast. So, late in July, the two geologists sailed from Onehunga on board the steamer *Lord Ashley* and called at New Plymouth, where they had a magnificent view of Mount Egmont, then a stormy journey took them to Wellington for one day, before continuing to Nelson.

During the next two months the nature of Hochstetter's work was more as a mining consultant than as a geological explorer, for he travelled around at the wish of prominent settlers who hoped to profit from the mineral industries of gold, copper, and coal. Although his investigations and journeys lacked an overall scientific plan, he thought that every step was attended with new results.

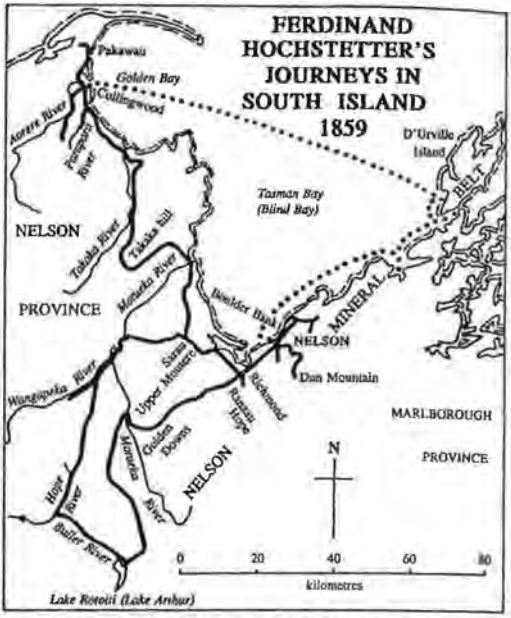


Fig.9. Map of Hochstetter's South Island journeys, August - September 1859.

After visiting a small coal mine in the rugged hills south of Nelson, the geologists were taken by the coastal steamer *Tasmanian Maid* to D'Urville Island to examine the colourful deposits of copper minerals, then the ship sailed overnight across Tasman (Blind) Bay and Golden Bay to Collingwood.

Two years previously gold had been discovered in the Aorere and Parapara valleys and men of all ages, and every occupation, were laboriously shovelling the river gravels in wet, dangerous conditions. Some of these miners had also visited small limestone caves nearby to fossick for moa bones, to satisfy the overseas demand for skeletons of the giant, wingless birds. The two geologists had not found any deposits of moa bones during their North Island journeys, so, as well as giving geological advice to the gold-diggers, they excavated some complete bird skeletons from the caves.

Hochstetter went around the bay to Pakawau where a small mine, in the forest to the west, produced good quality coal from very thin seams. He returned along the coast to rejoin Haast and to inspect an abandoned coal mine in Takaka valley. Travel through the open beech forest was very different from their struggles with the dense undergrowth of the North Island bush. The geologists crossed over the treacherously sharp marble outcrops of Takaka hill, descended into Motueka valley, and later were nostalgically delighted to find two small German settlements, at Upper Moutere (Sarau) and Hope (Ranzau).

While Hochstetter was based in Nelson (Trafalgar Hotel) he visited the long Boulder Bank that sheltered the harbour so magnificently, and he collected some important fossil shells (Mesozoic) from near Richmond. Some of the short Nelson field trips were provided with delicious lunches, such as cold chicken pie with champagne, which contrasted starkly with the North Island bush meals of crackers, boiled potatoes, pork, and a mug of sweet, black tea. A walk through beautiful bush started a two-day visit to barren Dun Mountain and the nearby copper mines. Here Hochstetter gathered samples which enabled him to describe and name a new rock "dunite".

While Haast made a quick reconnaissance of Marlborough, Hochstetter made a final exploring excursion for two weeks up Motueka and Wangapeka valleys. He crossed into Hope valley and tramped up the tussocky Buller River flats to Lake Rotoiti (Lake Arthur) where he identified the southern end of the Nelson mineral belt, and enjoyed a distant winter view (more than 200 km) along the Southern Alps. His return route was down Motueka valley to Golden Downs where for the last time he camped in the open using a triplefold blanket sack.

At the end of September Hochstetter gave a public lecture on "the geology of Nelson Province". It was published in the government gazettes and as a supplement to a local newspaper. His coloured geological map was later printed in Germany. Early in October, Hochstetter sailed by the steamer *Prince Alfred* for Sydney. He then visited the Victorian goldfields and sailed by the steamer *Benares* (via Mauritius and Suez) to eventually reach Austria early in January 1860. Julius Haast remained in New Zealand to continue geological investigations in Nelson and Canterbury Provinces.

Novara-Expedition had spent 28 months making explorations around the world and returned to Austria four months ahead of Hochstetter. The huge volume of material collected was then studied, but, despite many scientists becoming involved, it was 17 years before the 7-volume Novara project (K. Scherzer, chief editor) was finally completed. Immediately after his return to Vienna, Hochstetter visited London for several months to compare his findings with material held at the British Museum. While he was there he also discovered that his map of the Auckland volcanoes had been plagiarised and published by Charles Heaphy.

The geological volume on New Zealand (*Geologie von Neu-Seeland, 1864)* was completed within four years by Hochstetter himself. However, his most important work was *Neu-Seeland (1863),* written at the same time in an enthusiastic, narrative style and copiously illustrated. The English edition *(New Zealand, 1867)* was revised and many chapters were rewritten, but the author was then embarrassed by the New Zealand Government's long delay in paying its share of the publication costs. Another important work was the *Topographic-Geologic Atlas of New Zealand, 1863* (English and German editions) co-authored with August Petermann. Hochstetter published a further 21 reports about New Zealand.

Dr Ferdinand Hochstetter was undoubtedly the best-known scientist of Novara-Expedition. His patron, biographers, and admirers were enthusiastic. He was honoured by numerous scientific societies throughout Europe, and a personal royal title (von) was bestowed on him. On his return to Vienna Hochstetter was appointed Professor of Mineralogy and Geology at the Imperial Polytechnical Institute and was chosen to be geology tutor to the Austrian crown prince. His inaugural lecture as vice-chancellor of the technical university was on "geology and railway construction", and from it he is credited with originating the term "engineering geology".

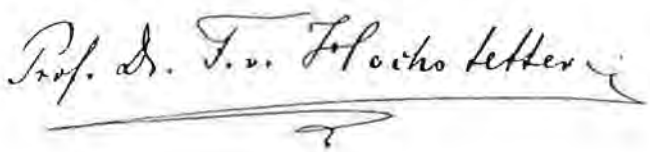
In 1861 Ferdinand Hochstetter married Georgiana Bengough, an Englishwoman, and they raised a family of eight children.

Honours never ceased; nor did the numerous new duties that this untiring scientist undertook. Despite his extra committees and prestigious lectures, Hochstetter was appointed to establish the new Imperial Natural History Museum in Vienna. Exchange exhibits were arranged, especially with Julius Haast who had continued to be involved in geology and exploration in New Zealand and was at that time establishing Canterbury Museum in Christchurch, where the employment of Andreas Reischek (as taxidermist), was recommended to Haast through Hochstetter.

Hochstetter's lifelong throat ailment eventually forced him to relinquish his teaching activities. However, although suffering from worsening diabetes, he continued his museum work for another three years until a minor foot injury caused a rapid deterioration in his health. On 18 July 1884, Ferdinand von Hochstetter died in Vienna, at the age of 55 years.

Hochstetter was a great scientist with a wide, comprehensive approach. He loved the interaction between major fields of study, as is so well demonstrated in his museum activities and in his outstanding volume *Neu-Seeland*. He was not a head-in-the-clouds scholar, but followed up his research with well-illustrated, popular presentations of the technical results. He did not shrink from the strain and discomfort of geological field work, nor from the fatigue of world-wide travel by land or sea. Nevertheless, he was at ease and confident in the presence of royalty. His talent for organisation brought many challenges to promote research, initiate congresses, and establish exhibitions, the most famous of which was the natural history museum in Vienna.

New Zealand scientists and geographers have also honoured Hochstetter by giving his name to a unique, native frog (*Leiopelma hochstetteri*); a large, carnivorous, native, land snail (*Paryphanta (Powelliphanta) hochstetteri*); a small lake (42°27'S, 171°40'E) and a nearby mountain (42°31'S, 172°01'E); a second, higher mountain (43°30'S, 170°20'E); and a steep glacial icefall (43°36'S, 170°11'E).



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