

WILD AND WONDERFUL

The Skaergaard layered gabbro is probably the most studied of all igneous intrusions and has greatly influenced thinking on many aspects of igneous processes. The intrusion is on the East coast of Greenland, a little North of the Arctic circle at 68°10' N, to the east of the entrance to the large fjord of Kangerdlugssuaq. It came to prominence with a 1939 memoir by Lawrence Wager and Alex Deer, which caused something of a sensation at the time. At Skaergaard, igneous layering is spectacularly developed, with features that Wager and Deer interpreted as due to vigorous convection currents in a magma chamber that had been allowed to cool without disturbance and in which something akin to recognised sedimentary processes operated (Fig. 1). Wager later became a professor at Oxford University. Alex Deer became a professor at the University of Manchester and then the University of Cambridge, where he was Vice-Chancellor from 1971 to 1973. He is the 'D' in the 'DHZ'¹ (along with Howie and Zussman) that so many of us use.



FIGURE 1 A photograph of layering similar to that described by Wager and Deer (1939, Plate 8, Fig. 1, which had the caption "Gravity differentiated layers separated by layers of average rock..."). The dark parts of layers are concentrations of olivine and clinopyroxene, the pale parts are mainly plagioclase. PHOTO: IAN PARSONS (1990)

FIGURE 2 was taken at the 'base house' on Skaergaard in 1953 and shows Lawrence Wager leaning against the window, Alex Deer smoking his pipe and Malcolm Brown sitting in the foreground. Malcolm went on to become a professor at Durham University and later Director of the British Geological Survey. Other members of the party were Dougie Weedon, sitting further back in the photo, Geoff Nichols, Charlie Hughes and myself. My boots appear at the far left. This was the return of Wager and Deer to East Greenland to continue their work on the now-famous intrusion, work that had begun in 1930 when Wager was a member of the British Arctic Air-Route Expedition that explored this then largely unknown coastline (see *Elements* 2007, v3n4, p295). The base house, erected in 1935, was in remarkably good condition in 1953, having been temporarily used as a radio station towards the end of World War II. It provided very comfortable accommodation while working nearby and a welcome refuge on return from the more frequent distant journeys. Unfortunately, it was later burnt down while being used by Greenlanders. The 1953 party was a combination of Oxford and Manchester university personnel and had the objective of deciphering Skaergaard. The Oxford group also studied the Kangerdlugssuaq syenite, while the Manchester group examined the Kap Edward Holm intrusion, both intrusions being on the far side of Kangerdlugssuaq.



FIGURE 2 Left to right: Alex Deer, Dougie Weedon, Malcolm Brown and Lawrence Wager at the Skaergaard base house in 1953. PHOTO: PETER BROWN (1953)

Wager's ideas on organising an expedition were essentially to make it as simple as possible. He had a deep distrust of anything mechanical. When asked if a radio would be taken to communicate with the outside world during our months of isolation (the whole trip took three months) his reply was that if we took one it would break, and then when people did not hear from us they would want to rescue us and we would NOT want to be rescued (health and safety take note!). He also believed that you ought to be able to survive for a week on what you happened to find at the bottom of your rucksack. This philosophy was evident in the composition of the expedition food boxes: the ration per day, per man, was, in ounces (an ounce veing 28.35 g): pemmican 5.5, margarine 4.5, ships biscuits 4.5, porridge oats 2.5, milk powder 2.0, sugar 3.5, chocolate 3.0, potato flour 1.5, dehydrated vegetables 0.5, tea 0.25 (total 27.75 ounces of food). I remember being hungry and a lot thinner by the time I arrived back home. This is in great contrast to present-day lightweight ration boxes. On later trips to Greenland we always managed to eat with more sophistication, if not more effect. Some of the pemmican taken in 1953 was left over from 1935, though it did not come, I believe, from the bottom of Wagers' rucksack! The '35 brand proved to be much more appetising (if that is the right word to use about pemmican) than the later version. Being young and with a sweet tooth, I always ate my daily chocolate bar after the breakfast porridge and then had the evening torment of lying in my sleeping bag while listening to Deer laboriously sucking his. Deer also had a supply of dried onions that he liked to mix with his pemmican, to the distress of the rest of the party. At the end of the trip we were on our last ration box and the fjord was freezing over.

Being introduced to marvellous exposures of spectacular Skaergaard layering by the men themselves is a special memory. I could see those currents descending to sweep across the intrusion floor while depositing their gravity-stratified layers (Fig. 1). Years later, I accompanied Alexander R. McBirney on his first visit to Skaergaard, where he did so much to stimulate ideas on igneous processes. Standing on some particularly fine examples of the layering featured by Wager, I was rather thrown by Mac's comment of "You don't believe that do you?" Of course I believed it! When, as an ignorant postgraduate student, Wager was good enough to explain it to you, then you did not presume to think otherwise. It was not allowed. There may be many differing origins for igneous layering, like Parsons' upside-down Klokken peculiarity, but, for those Skaergaard layers, Wager was right – wasn't he?

For work on the Kap Edward Holm intrusion, Deer, Nichols and myself made the 20-mile crossing of Kangerdlugssuaq fjord in a 15 ft boat with a dubious engine which was said to be capable of operating off a variety of fuels, but which was something of an unknown item on any of them. I count those ice-bound (Fig. 3) hazardous journeys as the most perilous adventures I have ever been involved in. To this day, I am unable to

1 Deer WA, Howie RA, Zussman J (2013) *An Introduction to the Rock-Forming Minerals*, 3rd edition. Mineralogical Society, UK



FIGURE 3 Looking towards the open sea from near the base house. The vertical cliff behind the mist is Kap Hammer, and the jagged skyline is entirely Palaeocene basalt flows. PHOTO: IAN PARSONS (1990)

decide whether Deer was an immaculate boatman or just unconcerned, or both. For some of our glacier travel we used a man-hauled sledge for moving gear. This was, in retrospect, a ridiculously heavy contraption but was used to get to camps high on the huge glaciers that we needed to traverse. The prospect of the heavy-weight sledge with its three attendants disappearing down one of the numerous very large crevasses was a constant source of enlivenment.

One memorable day saw Deer and myself leave camp to cross a large snowfield in order to reach rocks that he had seen on a 1935 winter dog-sledge journey. It was late in the day when we finally got to our objective, only to find that it was guarded by a very large bergschrund. Fortunately, a short descent enabled a bridge to be reached, but, having got there, our only collecting hammer was dropped and could be dimly seen stuck on an icy knob about fifty feet down. Later, there was some discussion about who had dropped the hammer, but I know who it was! With the hammer recovered, we collected our hard-won samples and the long return was made back to a very welcome camp. Deer's experience and determination were essential to achieving our objectives on these, at times, arduous days on Kap Edward Holm.

Despite his mountaineering background and his experience on Everest – without oxygen he reached 28,200 feet (8595 m) in 1933 – Wager strongly discouraged any activity not directly relevant to the geological program. He regarded any suggestion of taking in the odd summit, just because it was there, as highly frivolous. Not an unreasonable point of view, considering the time, effort and expense involved in getting to East Greenland in 1953. That was a time, not long after the war, when the area was hardly visited. Now the Blossville coast is much frequented, and adverts for adventure trips can be found in glossy magazines. There is gold in some of the rocks on Gabbro Mountain, and the region has been overrun by helicoptering geologists of all nationalities. In 1953, wild-life around Kangerdlugssuaq was completely undisturbed. Nothing, apart from sealing activity in offshore waters, had significantly disturbed the area for many years. Bird life in the fjord was prolific, seals were abundant and other rare animals, such as the narwhal, were present. Now, however, bears, which travel south in the winter months, have become targets for hunters as they make their way back north and have to cross fjords such as Kangerdlugssuaq. Visits in later years have shown a scene greatly changed by human activities and hunting. Wager would not recognise his 1930s exploration paradise.

Peter Brown, University of St. Andrews
petbrown@btinternet.com

Wager LR, Deer WA (1939) Geological investigations in East Greenland. Part III: The petrology of the Skaergaard intrusion, Kangerdlugssuaq, East Greenland. Meddelelser om Grønland 105: 1-323

TENURE-TRACK FACULTY POSITION IN MANTLE PROCESSES

The Department of Geological Sciences seeks an outstanding scientist to lead a vibrant research program in the broadly defined area of Mantle Processes. Specific areas of interest include (but are not limited to) the composition, structure, and evolution of our planet over varying length and time scales. We are particularly interested in those who seek to make connections between deep and shallow processes (examples include how the dynamically flowing and recirculating mantle interacts with its crust, hydrosphere, and atmosphere). Research approaches should encompass some combination of field, laboratory, and modeling. The appointment will preferably be at the junior level (Assistant or untenured Associate Professor), but applications from scientists at all career levels will be considered. The successful applicant will be expected to develop a world-class independent program of research, interface where appropriate with existing programs in the Geological Sciences and in the School of Earth, Energy, and Environmental Sciences, and teach at the undergraduate and graduate level.

Applications should include a cover letter, curriculum vita, a statement of research and teaching interests, three recently-published representative papers, and the names and email addresses of three individuals from whom the search committee can request letters of reference. Please apply at: <https://academicjobsonline.org/ajo/jobs/6199>

Review of applications will commence October 31, 2015. The position will remain open until filled. Questions can be directed to: Lauren Nelson at lnelson@stanford.edu

Stanford University is an equal opportunity employer and is committed to increasing the diversity of its faculty. It welcomes nominations of and applications from women, members of minority groups, protected veterans and individuals with disabilities, as well as from others who would bring additional dimensions to the university's research and teaching missions.

Stanford
SCHOOL OF EARTH, ENERGY
& ENVIRONMENTAL SCIENCES
Geological Sciences

DEPARTMENT OF EARTH SCIENCES (Geochemistry)

ASSISTANT OR ASSOCIATE PROFESSOR

(Application Closing Date: November 30, 2015 or until the position is filled)

The Department of Earth Sciences at Carleton University invites applications from qualified candidates for a preliminary (tenure-track) appointment in geochemistry at the rank of Assistant or Associate Professor beginning on July 1, 2016.

Applicants must have a Ph.D. in Earth Sciences, have demonstrated excellence in teaching, and possess a strong commitment to research and scholarship, as reflected in publications. The successful candidate will have the ability to develop an externally-funded, high quality research program; will be committed to effective teaching at the undergraduate and graduate level; and will contribute effectively to the academic life of the Department. Proficiency in English is a requirement.

The Department is particularly interested in candidates with demonstrated expertise, experience and research interests in the field of isotope and/or elemental geochemistry, who are able to teach core courses in geochemistry. Preference will be given to candidates who have expertise with instruments such as a thermal ionization mass spectrometer (TIMS) and/or laser ablation inductively coupled plasma mass spectrometer (LA-ICPMS), and who also are engaged in the development of new techniques and innovative application of isotopic systems.

Information about the undergraduate programs of the Department of Earth Sciences and the link to the extended job advertisement may be found at www.earthsci.carleton.ca. The Departments of Earth Sciences and Geography, at both Carleton University and the University of Ottawa, form the Ottawa-Carleton Geoscience Centre, a collaborative research and graduate institution with a wide range of research facilities.

Please send your application by email in one single PDF document to the attention of: Chair, Department of Earth Sciences, Carleton University, 1125 Colonel By Drive, Ottawa, Ontario, K1S 5B6 c/o Mrs. Sheila Thayer (Sheila.Thayer@carleton.ca). Applications should include curriculum vitae, a cover letter, a teaching dossier including teaching experience, a statement outlining current and future research interests, and the names and addresses (including e-mail addresses) of three referees. The deadline for applications November 30, 2015. Applications will be accepted until the position is filled.

Please indicate in your application if you are a Canadian citizen or permanent resident of Canada.

Carleton University is strongly committed to fostering diversity within its community as a source of excellence, cultural enrichment, and social strength. We welcome those who would contribute to the further diversification of our University including, but not limited to: women; visible minorities; First Nations, Inuit and Métis peoples; persons with disabilities; and persons of any sexual orientation or gender identity and expressions.

All qualified candidates are encouraged to apply. Canadians and permanent residents will be given priority. All positions are subject to budgetary approval.

