

Ice Crystal Photography — Norway Station, 1960

By V. von BRUNN

A 1911 model Swift polarizing microscope was kindly lent to the first South African National Antarctic Expedition (based at Norway Station, 70°30'S, 2°32'W) by the University of Cape Town for the purpose of studying rock specimens. As an instrument for the examination of ice crystals at sub-zero temperatures this microscope served its purpose very well and it was also used in the photography of these crystals for which a 35mm camera was fitted with a special home made microscope attachment.

It was found, however, that microphotography under these conditions demanded much patience in order to obtain reasonable results. Furthermore, it meant that valuable 35mm film was being used, some of which was being wasted on experimental work. Development of the film and subsequent enlargement of the negatives took some time. A less complicated method of ice crystal photography had therefore to be sought.

Encouraged by the results obtained by Dr. V. Schytt at Maudheim (Norwegian-British-Swedish Antarctic Expedition, 1949-52) who had constructed an instrument for the photography of ice, it was decided to build a photomicrographic apparatus, based on the principles of a photographic enlarger. This simple "contraption", as it became known at the Station, was constructed of empty biscuit tins, disused packing cases, broken window panes, etc. A sketch of the apparatus is shown in Fig. 1.

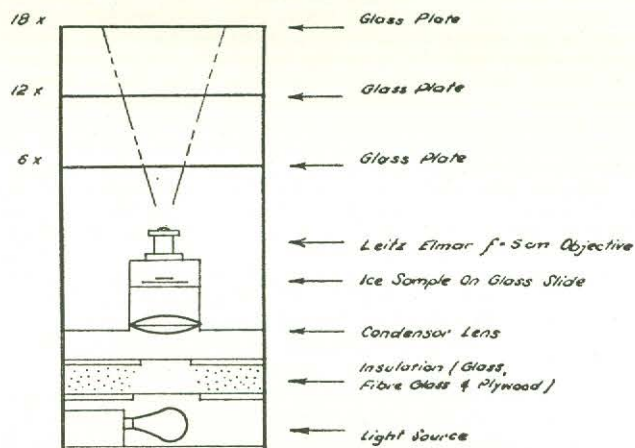


Fig. 1: Photomicrographic Apparatus.

An ice crystal, mounted on a glass slide, was illuminated from below and its image was projected upwards on to a sheet of photographic enlarging paper. The light-source consisted of a 100-watt bulb which was separated from the ice crystal by insulation material. The condenser lens was taken from a magnifying glass while the main objective belonged to a Leica camera. A glass plate (a broken windscreen from a snow tractor) on which the photographic paper was placed, could be inserted at either of the three enlargement levels (depending on the size and shape of the individual crystal specimen) shown in Fig. 1. An exposure of approximately two seconds was required for every photograph. The prints were developed immediately after exposure and revealed a remarkably clear and well-defined enlarged (negative) images of the ice crystals. Apart from photography, the "contraption" could also be used for detailed tracings from the image of the crystal projected on to transparent paper placed on the glass plate, or for the measurement of grain-size of firm granules.

The advantage of this photomicrographic apparatus lay in its simplicity and the fact that it saved much time and photographic material. A disadvantage of having paper prints instead of film negatives of the crystals is that these cannot be readily reproduced when required unless they have been re-photographed. Closeup photographs of the prints show all the detail, but are never quite as satisfactory as the original copy. Once a 35mm film negative has been taken, the picture of the crystal can be considerably enlarged. The chief advantage of the microscope over the photomicrographic apparatus, is that its enlargement factor is much greater which makes it possible to photograph minor details of individual crystals.

In the photography of ice crystals a number of difficulties are encountered, some of which may be mentioned here. Much patience is required in the handling of the usually minute and brittle ice crystals at temperatures well below freezing point. Due to the friability of the crystals it is often necessary to work bare-handed which, after a time, can become rather unpleasant. A further difficulty is rime which easily develops on the lenses or on glass plate surfaces when accidentally breathed upon, or by body moisture given off by the face or hands. Sublimation very rapidly reduces the size of the crystal and destroys much of its most delicate external pattern. The ice cave laboratory which was dug into the firn wall at the far end of the ice corridor at S.A.N.A.E. Base in 1960, proved too "warm" (average temperature approximately -12°C) which resulted in a comparatively high degree of sublimation of the crystals under examination.

The study of crystalline ice is nothing new and much work has been done by the Japanese, particularly by Prof. U. Nakaya. There are, however, so many different and interesting forms which

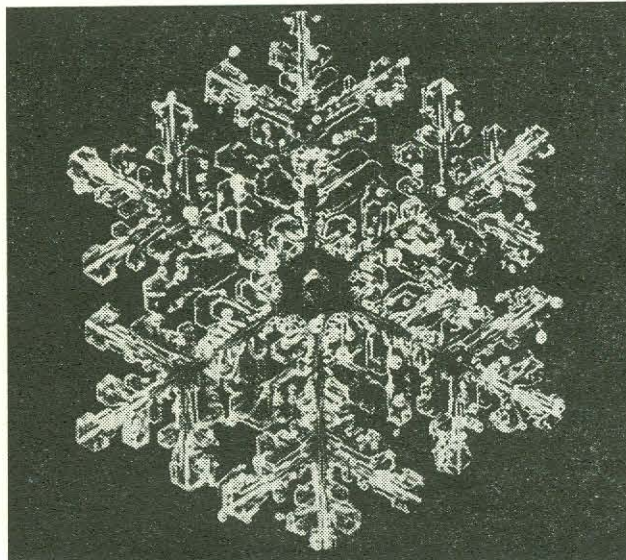
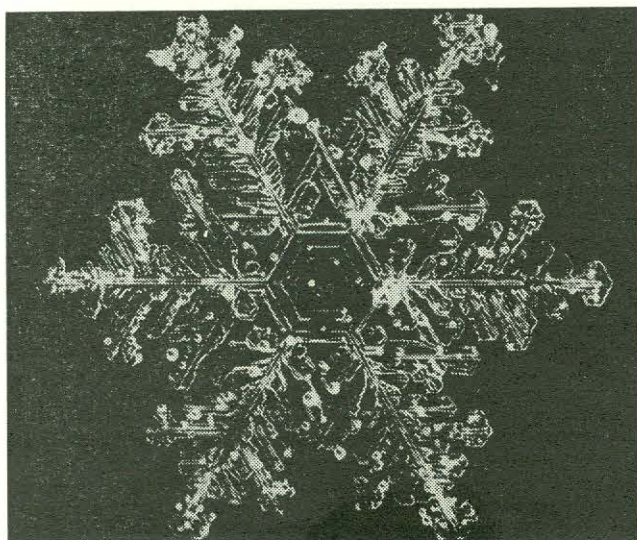


Fig. 2: Typical star-shaped snow crystals with diameters of $5\frac{1}{2}$ mm. each, photographed with the apparatus described above.

could be studied in greater detail. In the short time spent on ice crystals at S.A.N.A.E. Base during the course of 1960, various types were encountered and photographed. These included hydrometeorites (stellar/star crystals, trigonal crystals, prisms, bullets, composite bullets, capped columns, needles, plates, etc.), drift snow, firn (granular snow), condensation and hoar frost crystals. Experiments carried out on the possibility of "preserving" the numerous ice crystal forms by photographic means, were purely

experimental and not much time was available for modifying the primitive but effective "contraption".

Apart from building up a labelled collection of photomicrographs of ice crystals for the meteorological office at SANAE, a systematic and routine study of ice crystals together with the associated meteorological conditions, could certainly be an asset to the South African research programme in the Antarctic.

NEWS FROM SANAE AND THE ISLANDS

SANAE, 28th September, 1965:

Everybody is fervently active here at present. For those concerned with the forthcoming field expedition this is understandable, but for the others it is possibly the appointment of the 1966 team which has brought the realization home that our term is rapidly approaching its end.

Although September is supposed to be a spring month it brought several weeks of bitter cold. At times the temperature remained consistently below minus 40°C. Brilliant mirages of the buktas and icebergs as well as of columns of sea mist were regular features of the sunny days. Auroral displays were particularly frequent and were seen to extend north of our zenith.

The expedition to the mountains at the beginning of September was postponed and the geological, geophysical and field surveys will all be combined into one expedition due to depart early in October. The two Muskegs and one dog sledge team will participate. One Muskeg will return to base after completing the Dassiokop-Marsteinen tellurometer survey. The sledge party will provisionally consist of Wolfgang Pollak and Zac Ezekowitz. The support and depot-laying Muskeg party will consist of leader Sewes van Wyk, Wilfred Hodson and Nico Smit. The survey Muskeg party will be surveyor Johnny Strydom supported by Dries Steyn. With half the team away on field programmes for various periods the chaps at the Base will really have their hands full to maintain the "home" programmes.

SANAE, 12e Oktober, 1965:

Hier by die basis moet sewe man nou veertien se plekke volstaan en bowendien het Moeder Natuur dinge ongemaklik gemaak deur kwaai sneustorms en winde te stuur wat tot oor die 100 knope gestoot het. Die kerele wat berge-toe vertrek het, het eers alles terdê omgekrap en toe met groot gebrul en gemaal van sneeu weggejaag. Wolfgang en Zac het stil-stil oor die horison verdwyn met die hondspan nadat hulle so byna die dinamietstelsie omgery het. Die trekkers het aanvanklik na verskillende punte vertrek vir die tellurometertrajekte. Alles het voor die wind verloop tensypte van die traagheid van die tellurometers om reg warm te word.

Arme ou Pottie dra nog steeds 13 instelle van 6 koppies koffie in die oggend rond om daarmee ook die leë beddens wakker te maak. Hy kla net vreeslik oor sy kliënte wat die dorp verlaat het sonder om eers hulle rekenings te vereffen. Danie meen dat kook- en skiewiebeurte mekaar nou te snel opvolg. Krugerdag is op tradisionele wyse met rooiwyn en skyfskiel gevier. Jan Dok met sy kontaklense was die enigste wat die skyf op 100 treë kon sien en tref.

Met die temperatuur wat nou uiteindelik begin styg kla die tradisionele klaagpotte dat Antarktika vir hulle nou te warm begin word—die temperatuur het een dag tot minus 3°C gestyg!

SANAE, 29th October, 1965:

October started with the worst snowstorm of the year and the maximum gusts could not be recorded. But snow petrels showed up after the storm—a sure sign of warmer weather. While the Republic experienced unseasonal cold weather a "heat wave" hit SANAE and the temperature soared to minus 3°C!

After many unforeseen delays the field expedition is making slow but steady progress. Only three days after departure Sewes returned with Wilfred who was suffering from acute appendicitis, but he has recovered since. Johan replaced Wilfred but the Muskeg had to return to base on two more occasions.

Johnny and Dries have been very successful with the tellurometer survey and they will return to Base early next month. Zac and Wolfgang report that the dogs are behaving excellently despite the short time that was available for training them. Every day an amusing account of the days events in the field is received from Smittie.

Meanwhile the indoor explorers have been very busy keeping programmes going at Base. Willie, assisted by Pottie, is trying to get Bernadine roadworthy again. The fresh air has bitten Ray to

such an extent that he now spends most of his time outside erecting a new antenna system which he hopes will greatly improve communications. Danie is preparing another cosmic ray balloon instrument for a flight early in November. Derek had everybody up in arms when he ran his noisy ionosonde once every minute to cover the ionospheric effects produced by the comet as it approached the sun. Hennie no longer needs a torch to take the midnight "met" readings.

The number of engagements announced from down here this year has now increased to four. We extend our heartiest congratulations to Nico Smit and Johan Joubert and the lucky girls Cecilia and Gerda.

MARION, 2e November 1965:

Hier op Marion is ons vas oortuig dat Oktober wel die mooiste maand is want ons het seker die lekkerste sonskyn suid van die 45e breedtegraad geniet. As die sonnetjie dan so lekker skyn is daar ook sommer 'n groter lus om bedrywig te raak. Kameras kom tevoorskyn en die basis word dan ook sommer eenzaam as die mense in alle rigtings verdwyn om hulle fotografiese kuns te gaan beoefen. Ander weer verkies om tuis te bly en so 'n bietjie gemmerbier te maak. Wat egter verbasend is, is om te sien watter verskillende bestanddele in daardie bierkannetjie beland. Na 'n week word die prop voor die bek van die kan verwyder. Eddie was die ongelukkige persoon wat deur die halfduim straal bier getref is, maar Grietjie, die pappegaai, het ook nie ongesonde daarvan afgekem nie selfs al het sy die straal probeer ontwyk deur bo van haar dwarsbalk af te tuimel. Grietjie wou eers niks van die tuisgemaakte brousel weet nie maar na 'n paar dae se vere skoonmaak het sy 'n liefhebber van die gemmerbier geword.

Die weerkundige personeel het 'n tydskromme om dop te hou vir die waarneming van liggewende wolke. Ongelukkig is die kritieke punt nou so by 2.30 vm. en is daar besluit dat die "kurwe" nou nie juis een van die interessantstes is om dop te hou nie.

Die klein see-olifantjies lyk nou al soos trommeltjies en die koeie begin reeds geleidelik terugkeer seewaarts. Met die koms van die rokkopper pikkewyne begin ons ook al voel dat die einde nou in sig is wat betref ons verblyf hier, want as die broeikringloop voltooi is sal ons ook huiswaarts keer.

MARION, 27th November, 1965:

Apart from a few snowfalls we had exceptionally fine weather during November. The biologists welcomed the good weather as it was possible for them to do fieldwork most of the time.

GOUGH, 21e Oktober 1965:

As daar ooit eendag 'n toeristeverkeer na Gough mag ontstaan dan sal een van die advertensiespreuke seker so lees: "As u Gough-eiland op sy beste wil sien, kom dan in Oktober". Die plantegroei is al die skakerings van groen en die varings en struie staan kniediep sover as wat die oog kan sien.

Ons het so byna 'n droogte gehad toe dit vir 8 dae nie 'n druppel gereën het nie, want al die riviertjies en bergstrome dreineer vinnig na die see. Ons hoenderboerdery het die afgelope paar maande mooi gevorder. Die battery met ongeveer 30 hennelower gemiddeld twee dosyn eiers per dag. Verskeie hennelower die battery het begin broeis raak en twee dae gelede het die eerste kuikens dan ook verskyn.

Die belangrikste gebeurtenis hierdie tyd van die jaar is die aankoms van die Tristania. Vier dae gelede het hulle ons skielik laat weet dat hulle van Tristan vertrek en die volgende dag 10 vm. hier sou arriveer. Ons was egter skaars klaar met ontbyt die oggend toe die skeepshoring hier vlak by ons blaas en die radio-operateur so ewe droeg vra: "Did we give you a fright?" Die weer was egter so sleg dat hulle nie kon affaai nie en ons moes maar tevrede wees om 'n paar dae te wag.

Ons laaste 6 maande op die eiland het nou aangebreek en indien dit netso vinnig sal verbygaan as die eerste 6 dan is ons sommer een van die dae terug in die Republiek.