

cold. Lieut.-Col. Wienecke confirmed General Devers's emphasis on the survival factor, but the exercise confirmed the practicability of small-scale operations being carried out over snow-covered regions in conditions of extreme cold by ordinary troops, rather than by highly trained specialised units.

Exercise "Snowdrop" has not only considerably influenced American strategic concepts, but has also given valuable experience in problems of supply, clothing, shelter, equipment and subsistence. It was observed that bulky stores must be rapidly flown in to provide adequate protection against the cold, and that casualties will mount rapidly. Clothing at present in use is cumbersome and heavy and, since fur is not available in sufficient quantity, special fibre-glass clothing must be developed to provide warmth without weight. Ski and snowshoe bindings must also be simplified. Finally, the preparation of frozen tinned food and drinking water are problems complicated by warfare conditions, as a fire may draw unwelcome attention. The effect of snow and ice on weapon efficiency, and difficulties created by the freezing of oil are also being studied.

RATIONS OF THE SOVIET NORTH POLAR DRIFT, 1937-38

[Based on information in *Pitanie Papanintsev na dreyfuyushchey l'dine* [*The food of Papanin and his companions on the drifting ice*] by M. F. Belyakov. Moscow, Gostorgizdat [State Trade Publishing House], 1939.]

The food provided for the four members of the Soviet North Polar Drift Expedition of 1937-38 was the subject of careful consideration and research by the Institute of Public Nutrition Engineers at Moscow. Every effort was made to improve on the rations of previous expeditions with regard to nutritional value, ease of preparation and taste.

	Grammes (oz.)	Calories
Fresh butter	100 (3)	813
White bread rusks with meat	225 (8)	785
Lard	100 (3)	681
Powdered meat and preserved meat	161 (6)	498
Chocolate	100 (3)	492
Sugar	100 (3)	409
Condensed milk	100 (3)	318
Rye bread rusks	75 (2)	335
Powdered egg	40 (1)	206
All other items	573 (21)	1713
Total	1574 (53)	6250

It should be borne in mind that the object was not to prepare sledging rations. The party proposed to remain throughout on the same drifting icefloe, only moving away if it became impossible to stay on the original floe. Also the food was designed, not for a comparatively short sledging journey, but for a drift of up to 22 months. The only factor demanding lightness in weight was the limitation imposed by air transport of men and stores to the expedition's starting-point at the North Pole. On the other hand, the rations could not be similar to those appropriate for an expedition wintering at a base-hut. There

was going to be plenty of energy expended in heavy manual labour—for instance, when winding in over 4000 m. of cable after sounding—and it was going to be very cold. This, together with the fact that these fairly light and compact rations were designed to be cooked on primus stoves, makes it clear that a parallel could be drawn between these rations and those suitable, say, for an ice cap station supplied by aircraft.

It was decided to allow 6250 calories a day for each man. As far as the principal items are concerned, this was made up as shown above. Unfortunately, insufficient information is available to compute the protein:fat:carbohydrate ratio in the above list.

About half the food taken was dehydrated. This was the first occasion on which dehydrated foodstuffs had been used on a Soviet arctic expedition. All the rations, with the exception of some fresh meat and fish acquired just before leaving, together with a few odd items, were packed into airtight cases. Each case contained four men's rations for 5 days and weighed about 44 kg. (97 lb.). There was considerable variety in the choice of foods available for any given meal. A typical menu for one day—at least five menus with small differences could be used in rotation—was as follows:

Breakfast: coffee, pressed caviare, plain omelette, rusks with meat.

Midday lunch: tea with jam, lard, rusks with meat.

Main meal: bacon and "borsch" (soup with meat and vegetables), meat outlets with peas, fruit compote.

Supper: rissole with potatoes, rice pudding, chocolate.

It must be admitted that polar exploration is about the last thing with which one associates caviare, even in Russia; and in fact the members of the expedition reached satiety in this respect. After 3 months of enormous portions, not one of them could face any more caviare for the rest of the drift. The same was true of some other items also—even chocolate. But in general this assortment of food does not seem so choice to a Russian as it might to an Englishman. The quantities, moreover, proved excessive. It was found that 4500 to 5000 calories a day was all that could be managed out of the 6250 allowed.

The cooking was done on two primus stoves. The chief difficulty was to obtain water with which to cook the dehydrated food. Once the water was ready it only took about 5 min. to prepare the food; but it sometimes took 3 hr. to find and melt snow for water.

On the whole the food seems to have been a great success. It was well fitted to the requirements of the expedition, and the four men not only remained healthy but put on weight during the 9 months drift. It is quite clear, however, that although there was some very welcome variety, the total weight of the rations would be a big disadvantage in most circumstances; the quantity per man per day generally allowed on expeditions for long journeys away from the base is about half that taken on this expedition. If a reduction, however, were made to 4500 calories it seems likely that some features of the rations might commend themselves to less highly specialised expeditions.

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