Proof that photographers are born, not made, can be found in the careers of the three photographers whose work appears in this issue. Barry Ranford, Ian MacEachen and John de Visser all started out to be something else and became photographers by chance; Ranford through an interest in birds, and de Visser and MacEachen when they got their hands on camera and found they would rather make pictures than do what they had been doing.

De Visser was a banker—or at least, he worked in a bank—before becoming a full-time freelance photographer in 1961. By that time he had been taking pictures for seven years and had already seen them published in such magazines as Maclean’s. Over the past nine years he has made every major Canadian magazine except the Imperial Oil Review. His pictures have appeared in many of the picture books that have been published in the last three or four years, but his first all-de Visser book was This Rock Within The Sea, with a text by Farley Mowat, a book about Newfoundland published in 1968. He and Mowat are collaborating on another book to be published next fall, about Siberia and the Russian Arctic.

The other photographer-by-accident is Ian MacEachen, whose pictures of the ski patrol appear on pages four to nine. MacEachen is a native of Glace Bay, N.S., and he worked as a television cameraman in Saint John before taking up the still camera. As a television cameraman he learned to compose his pictures as he was shooting them, and this habit stayed with him when he switched to the still camera. As a result, MacEachen’s pictures are hard to crop—that is, to cut into different shapes to conform to a magazine layout. Most of his subjects are people, and his pictures usually make a comment on some aspect of society.

Barry Ranford’s pictures, on the other hand, don’t ever make a conscious social point, and are hardly ever of people. Ranford is a bird enthusiast (“don’t say ‘bird-watcher’—you always get snickers”) who uses a camera to capture birds. He’s an editorial designer who studied commercial art. Ranford has been taking bird pictures for four years and in that time he has amassed about 3,000 slides showing close to 150 species of birds. His aim is to photograph all of Canada’s bird species—there are between four and five hundred of them—in detailed close-up. The pictures of the tundra that appear on pages 12 to 17 are some that he shot in 1968 while waiting for birds to come to their nests and be photographed.

Wrong!

Last December, the Review stated that an act of the Parliament of Canada of 1967 declared lacrosse Canada’s national sport. Apparently it didn’t for not even the diligent researchers of The Canadian Press could find the act when they searched for it a few years ago, and we are indebted to Fraser MacDougall, chief of CP’s Ottawa bureau, for enlightening us.

Wrong II

CONTENTS

Imperial technicians are measuring the push of Arctic ice page 28 WINTER’S WORST by Louis Richard

Oil companies could hardly exist today without satellites page 18 THE IMPERIAL FLEET by Albert Martin

If skiing leaves you black and blue, look for this yellow cross on a rusty-red jacket

page 4 THE SKI PATROL by Vicki Innes

Its tiny plants literally live on ice

page 12 TUNDRA by Rachel Kilsdonk

Solving mysteries for puzzled users of Imperial’s oils

page 24 OIL SLEUTH by H. Stanley Fillmore

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BY VICKI INNES
photos by Ian MacEachern

If you break a leg skiing this is the view you'll get—if you're lucky. It means the Ski Patrol has found you and the worst is over.

It happens countless times each winter. A skier falls on the hill and another skier, wearing a rusty red jacket with a yellow cross on a blue circle on the back, zooms to see if help is needed.

It often is Kip Fleming of Owen Sound is one of thousands of skiers who have gratefully accepted that offer from a Canadian Ski Patrol System member. Fleming, 50, fell while skiing at a central Ontario ski club last winter and he was in severe pain when Fay Kerr made her routine offer of assistance. His symptoms suggested a serious back injury and Fay quickly summoned other patrol members. Working very carefully because of the risk of paralyzing the patrollers placed Fleming on a back board and pulled on his head and feet to keep his back straight during both the ride down a hill on a caterpillar tractor and the 30-minute drive to hospital. Fleming had broken his back in two places but, thanks to the efficient first aid he received, he was not paralyzed. In fact, he has now recovered and even planned to ski again this winter.

Fleming's accident was far more serious than most, but ski patrol members are prepared to handle the whole gamut of cuts and bruises, sprains, strains and fractures that are a part of skiing. And when they're not giving first aid, members of this national organization are trying to prevent accidents: preaching safety to ski clubs and other groups, warning skiers who endanger others on the hill, marking dangerous spots and trails, and "sweeping" trails at the end of the day to make sure no skiers are left stranded on the hill.

In fact, it would be hard to imagine skiing without the patrollers. They are so much a part of it that they're usually taken for granted—at least by skiers who've never had an accident. Members patrol 180 odd public and private ski areas in the country—65 per cent of the total—and the familiar, red-jacketed figure is rarely more than 10 minutes away.

It's a lucky thing for skiers, too, with the current boom in skiing. The CSF estimates there are between 500,000 and 750,000 of them in Canada; Quebec alone has about 200,000. So many skiers travel north from Toronto to ski areas...
that Highway 400 is becoming almost as crowded in winter as it is on summer weekends when city dwellers swarm to their cottages. The number of ski hills is growing apace. The patrol’s Central (Ontario) Zone covers about 25 areas now, compared with a handful in 1940. And the number of accidents is up, too.

The ski patrol expects 12,500 people to hurt themselves this winter in the areas it patrols. To help the victims, it will have 3,000 ski patrolers on duty in every province—three times the number of patrolers in 1962.

The Ski Patrol’s interest in providing first aid doesn’t stop at skiing. It has provided patrolers for water skiing competitions and car races. And patrol members will leave their area to help snowmobile riders even though patrolers are usually more interested in skiing than in snowmobilers. Mark Labow of Montreal, CSPS president, says his organization would gladly give snowmobilers first aid if asked. In fact, patrol members are ready with their offer of help wherever they see it is needed. Patrolers with cars usually keep their first aid kits in them to help car accidents.

This is the type of off-duty dedication shown by Marcel Grandmaitre one foggy Septembrol morning in 1968. The 27-year-old patroler, who now lives in Metropolitan Montreal, was waiting at a railway crossing in Oakville, Ont., on his way to catch a plane when the oncoming passenger train went off the rails. Grandmaitre ran to the locomotive and found the engineer pinned down with his right arm almost completely severed below the shoulder. Grandmaitre and another man got the engineer from the train. At the engineer’s request, Grandmaitre held the hand of the almost-severed limb and the engineer, reasured, responded as if he could actually feel the contact. A doctor said later that this simple act helped avoid severe shock until the engineer reached hospital. Grandmaitre handled the accident coolly but he confessed, when he telephoned later to get another plane flight, he dialed the wrong number five times.

Patrollers like Grandmaitre—who won last year’s award for the most outstanding first aid act of 1968—and Fay Kerr have been well trained for such demanding work. Each fall the new recruits, 18 years or older, sit down once a week for an average of nine weeks—the length of the course varies with the area—to study a thick training manual prepared by the Canadian Ski Patrol System with the help of the Red Cross and St. John Ambulance manuals and the ski patrol’s own medical advisory board. The students learn not only first aid procedures for every conceivable type of skiing mishap, but what to do in such non-skiing emergencies as snake bites, toothaches, radiation burns and childbirth. In parts of western Canada, avalanche studies supplement the training. Students also learn through simulations of accidents, using faked blood and bits of plastic resembling broken bones. The simulations are so good that they upset a few students who decide not to be first aiders after all.

Recruits finish with written and practical exams, in which they must get 85 per cent to pass. In the practical tests, students act out their moves in a given situation describing what they would do to help, say, an old woman who had fallen in a shopping plaza and broken her leg. They’d get marks for remembering that magazines make good splints when there’s nothing better.

Of course, they have to be able to ski, and as soon as snow falls they can be tested. Championship form is not required. “We need a safe skier who can ski in all terrains, in all conditions, under complete control,” explained Bruce Smith, an Ontario Central Zone executive officer. “If you’re bringing a 250-pound man down a steep slope on a toboggan, you’ve simply got to be in control.” Recruits learn on the slopes how to handle the seven-foot fiberglass toboggan.

Then they’re ready to work. A patroler is on duty all day Saturday and Sunday, three weekends out of four, at his assigned area. The fourth weekend he has off or he may patrol another ski area. Their job doesn’t allow long chats by the fire in the ski chalet either because their schedule makes sure that a patroler is on each hill all the time; working in pairs, one patroler member goes up the hill on a lift while another is coming down. Breaks for lunch or coffee are short.

The schedule leaves little time to enjoy the scenery, which can be spectacular. It ranges from the grandeur of the Rockies through the bushed beauty of Quebec ski trails after a fresh snow to the uniqueness of Montmorency’s Magnetic Hill, the newest ski hill in New Brunswick. The ski patroler’s work is much the same in all these areas although there are regional differences. In New Brunswick, for example, the snow tends to be
is still a ski patroller member at 58, used to put injured skiers on a toboggan and take them several miles to the building used by skiers. There was no first aid unless a person with medical training like Dr. Firth happened to be in the area. Skiers swooshed among trees along the trails and it was fairly common for them to bang into a tree—a type of accident that rarely happens on the cleared hills of today’s skiing.

There is another hazard now. Dr. C.F. Douglas Ackman of Montreal who is in charge of the ski patrol's medical statistics says cuts are more common today because skis have sharp steel edges. Bindings are designed to release in a fall—if something has to give when you fall, better the bindings than the leg bone. This is the theory, but many skiers ignore it by keeping the bindings too tight to release in a bad fall; 60 per cent of the girls in the ski patrol's last accident survey had bindings that failed to release. The CSPS urges that bindings be checked at the start of the day and periodically after that. Its members are quick to contradict anyone who talks about "safety bindings" because they feel the term gives a false sense of security.

Patrol members have 20 other safety tips that they like to give out as a form of preventive condition, a set of common-sense rules that every skier should know but often forgets: Get in shape with pre-season exercises; climb the hill once in a while to lumber up and to keep warm on cold days (at the side of the hill, please); yell out on which side you intend to pass a downhill skier, who has the right of way don’t go down the expert trail if you’re a novice; never ski out of control; never ski alone and never ski when you’re tired.

Enough people forget or ignore these rules to keep the ski patrol very busy. Accidents have been increasing, despite improvements in equipment and all the ski patrol's efforts. Some enthusiasts insist you're as likely to get hurt crossing the street as skiing down a hill, and for every skier who knows a man who broke his leg, an arm, four ribs and crushed his vertebrae skiing down a gentle slope, there’s another who can recall the one who walked away after flipping head over heels in the air. But Dr. Ackman maintains skiing is a dangerous sport and that any other statement is disconcert. But, he adds, "people who ski like to live dangerously."

A look at the statistics confirms it. Roughly one out of every four skiers in a group of about 4,000 sampled by the CSPS had had an accident—a sprain, broken limb or twisted knee—and one out of 20 had broken a leg. These statistics come from the sixth annual accident survey made by the ski patrol with the help of a computer. The survey, which is being used as a model for a similar one being set up by the National Ski Patrol System in the United States, includes an analysis of another 3,500 skiers who had accidents last winter. Half of them were in the 10 to 20-year-old age group although only 40 per cent of skiers are in this age group.

The survey also found that you're more likely to have an accident if you're a beginner (good skiers have a very low accident rate), if you haven't had lessons and if you're a girl. Another thing about beginners: 63 per cent of the accident victims in this group were girls. 'I don’t think many girls can ski,' Dr. Ackman says. 'That's a disgrace. They should take lessons.' But women suffer less serious accidents; men are more likely to have fractures and women to have sprains. Snow conditions and carelessness together accounted for about one quarter of the mishaps.

Ski patrol members feel they can’t shock people out of these accidents so they’re taking a more subtle approach. It’s the Yeti campaign, started two winters ago by Ontario’s Central Zone to illustrate all the unsafe things that skiers do. The central character is the Yeti, a giant beast, a drinking buddy of Tibet’s abominable monster. The CSPS ‘discovered’ it after studying its mask, which happened to resemble the ‘bath-tub’ left when a skier tumbles. The patrol identified seven basic types of Yeti-example: the Yeti Potamus who ‘raises his accident chances 40 per cent by not getting into shape before the ski season’ and invited the public to identify others. Many people did and many hundreds more wrote to get a ‘Look out for Yeti’ poster after an article on the campaign appeared in a U.S. ski magazine; the first printing of 1,000 posters quickly ran out. This winter, Yeti posters will be seen in a number of other provinces spreading the ski patrol’s message of safety.
Thirty years ago, if ski equipment was not too expertly done, you got it at the ski slopes. That was Eaton's 1959 catalogue price for a pair of wood skis and harness, leather boots and poles. The least expensive set listed in the Christmas 1969 catalogue comes to 450—and that's a bargain. You can pay as much as $250 for skis alone, and another $240 for boots.

Whatever the cost, skis and boots come in a greater variety today than ever before. Skis, for example, may all look the same to the untrained eye but they actually come in different shapes, depending on their function: cross-country skis are very narrow, long and light; slalom skis are shorter and narrower than the more flexible ski intended for the straight runs or long turns of downhill skiing. Skis are made of metal or fiberglass—or both—as well as wood. Skis are the most durable and some skiers claim they are better in deep powder snow than fiberglass skis, which excelled on hard surfaces.

But with so many variables, it's difficult to generalize. Many ski makers use both materials to get the best qualities of each; one ski has top and bottom aluminum sheets to spread and absorb the stresses and protect the fiberglass-epoxy sheet in the middle that provides strength and flexibility. Wood is often used as a core surrounded by the newer plastics and metals; one all-fiberglass Canadian ski has a hollow core.

Like skis, boots contain increasing amounts of various plastics, most of which can be derived from oil. Boot-makers are using synthetics because there just isn't enough leather to keep up with the demand for boots and because of the special qualities of plastic materials. Plastics can be injection-molded to make boots with one-piece soles and uppers—and no seams where water can enter. There are other revolutionary new boots including one with a rigid, molded fiberglass shell that opens at the top of the foot like a suitcase with the hinge along the middle of the sole; inside is a removable soft leather boot that doubles as an after-ski boot.

The rigidity of plastic is both a strength and a weakness in ski boots: it provides the needed stiffness around the ankle but unlike leather does not mold itself to the shape of the foot. To overcome this drawback, the maker of one molded plastic boot is using a semi-liquid plastic, similar to Silly Putty, that molds itself in five minutes to the shape of the foot and then reshapes itself if there is any change in the clothing, for example. The material, located inside the inner vinyl lining, does away with the often painful period of breaking in a new ski boot.

Plastics are making a great impact in other areas of skiing, too. Shutterproof plastic sunglasses are nothing new but some now have a special plastic coating that keeps them fog-free and self-cleaning; fogged glasses are an annoying and sometimes dangerous problem for skiers. The new materials also promise to allow year-round skiing—researchers are experimenting with the use of various synthetics to make ski slope surfaces that won't melt in the summer sun.
TUNDRA

Its hardy plants can take the worst of the polar winter, but can they withstand the attacks of man?

by Rachel Kildonk

You couldn’t find a better word for it if you tried...tundra. It evokes vast distances of infinite loneliness and frigid, singing winds, mystery and alien beauty, the tenuous fragility of communities of plants, animals and insects.

But the tundra is not a silent, empty wasteland; it's an exciting world of unexpected beauty, one of this planet's last remaining wilderness reserves, the most promising source of oil, iron, copper, asbestos, nickel and sulfur in Canada's mineral-rich history, and something of an enigma.

To begin with, there’s no definite line where it starts up north. It merges with the stunted trees and swamps of the taiga and northern evergreen forest, running northwest from the southern shores of Hudson Bay to the Mackenzie delta. It sprawls across the top of the continent covering nearly a third of Canada's 3,851,809 square miles from the western mountain ranges, across the rich, fuel-bearing rocks of the interior plains—the so-called Barren Lands—over the glacier-worn plateaus of the Canadian shield and the undulating plains of the Hudson Bay lowlands, through northern Quebec and Labrador to the Atlantic. It clings thinly to the rocks of the Arctic lowlands until its persistent lichens and mosses finally give up their struggle to clothe lands buried all year by thick polar ice.

Over this one-and-a-half-million square miles, various kinds of tundra adapt to varying soil depths and types: there’s alpine tundra above the tree line on high plateaus; shrub tundra, mingling with the wind-torn black spruce on the edge of the taiga; sedge tundra as you go farther north and, finally, moss and lichens merging with the ice cap.

Much about these rolling, treeless plains continues to baffle science, particularly the permafrost and the peculiar...
cycles of plants and other forms of life the tundra supports. When its diminutive, slow-growing plants are trampled upon they may never grow back again. The mass of dainty mosses, strange lichens, tiny sedges, heaths and dwarf shrubs shelter an amazing array of annual and perennial flowers. They glow and blossom during the short summer—hundreds of square miles of bright yellow arctic poppies, purple saxifrage and crocus, the pale primrose and dryas, masses of yellow amica, pink lousewort, golden cross, spires of sweet wintergreen, the dainty white bells of the heater.

And among these flowers thrives a population of bees, tiny flies, midges, minute parasitic wasps, big and little spiders, butterflies and a host of fragile moths. Many of these creatures have not yet been described or classified.

According to Robin Leech, a graduate student at the University of Alberta and a spider expert: (he’s writing his doctoral thesis on tundra spiders and spent last summer collecting 21,000 of them for a federal department of agriculture research program) “There are at least 150 different species of spiders, of which we know almost nothing, living on the tundra.

Walking over the tundra in the summertime is like walking on a feather bed. From the air it looks like an endless green meadow splashed with acres of vivid blossoms, spotted with blue, green and gray lakes and dark brown masses of muskeg. Here and there it’s lumpy with rocks of all sizes, and etched with ridges of eskers composed of glacial sand and gravel. The horizon seems to go on forever, particularly in winter when all you can see is a land of whiteness merging into the frigid gray of the frost-laden sky.

The climate of the tundra is classified as ‘subarctic,’ and has average annual temperatures ranging from 25 degrees Fahrenheit in the south to 15 degrees in the north. Winnipeg, for comparison, with a ‘continental moist’ climate has an average annual temperature of 35 degrees Fahrenheit, only 10 degrees warmer than the warmest part of the tundra. But tundra temperatures swing through extreme variations with sudden, deadly 60–below blizzards that whine back and forth throughout the Arctic during the long eight months of winter. The summers are short and dry. Precipitation is so light—only about nine inches a year—that the region has been called a ‘polar desert.’

Nevertheless, the tundra has been capable throughout history of supporting vast populations of animals, birds and plants as well as people. It supported muskoxen by the thousand and large numbers of caribou—up to five million, according to some reports. Arctic foxes and the huge white wolves of the tundra used to live in great numbers in the white wilderness, their barking and howling cutting through the silence.

The abundance of lemmings in the tundra persists to this day. At the height of a population cycle these small, mouse-like rodents swarm so thickly in places that you can’t move without stepping on some area’s great numbers of tawny ground-squirrels scurrying among the rocks, defining the climate by digging tunnels in the eskers of sand or gravel.

Labrador tea grows in a flower-covered clump a foot high

Ducks, geese, swans, loons and other waterfowl use the lakes, muskegs, streams and ponds of the tundra for safe nesting in spring. Ptarmigans, a type of grouse, croak hoarsely from behind the boulders. The great snow owls that flapp across the southern prairies in winter were bred on the grassy flats of the tundra, and many of our hawks share the opalescent tundra skies with dainty songbirds, loons, geese, hunting sandpipers, and a host of others.

But, marvellous as the tundra and its inhabitants are, it is literally the surface of a phenomenon even more mysterious—the underlying permafrost, which it insulates in a permanent deep freeze and which it needs if it is to live at all.

The trouble is nobody knows much yet about the permafrost and its peculiar behavior. Permafrost is a paradox, since it is neither permanent, nor frost,” says Dr. W. O. Pruitt of the University of Manitoba, an expert on the Arctic. “It is usually defined as a ‘substratum’ that has existed below freezing for at least two cycles of the season. It may be peat, loam, sand, gravel or even bedrock.” There is still no agreement as to the age and length of existence of permafrost.

The mystery will not last much longer, for the icy grip that has held the resources of the North is slowly yielding them to men’s needs, and experience in the tundra is gradually providing the knowledge needed to work there. For example, tracked and wheeled vehicles may travel over the tundra in Alaska only in winter when the ground is frozen and snow cover protects the plants. Such restrictions were placed in the wake of ugly erosion scars unwittingly created by the bulldozing of plant cover in sensitive areas as long ago as the 1940s.

But not all mistakes on the tundra lead inevitably to the same result. Where less than half the permafrost is ice, erosion has been known to halt itself as soil from the melt gradually builds up to a thickness that will support new vegetation.

This type of information is very scarce, though. Biologists and soil scientists know a lot about the tundra, but their work has dealt with it in its natural state, undisturbed and healthy. “Knowledge of damaged tundras and their capacity for self-healing is woefully sparse,” Robert Weeden, of the Alaska department of game and fish reported last year.

Responsible oil and mining companies entering the Arctic are aware that the tundra presents problems and have whatever information is available about it. Research programs are underway in many universities, in government and in industry to fill in the gaps in our knowledge of tundra.

Alex Hemstock, a muskog and tundra expert who is Arctic coordinator for Imperial Oil’s western producing region, told the Alberta Science Institute at Fairbanks last fall that “the promise of petroleum development gives hope for great changes in the Arctic. It is the responsibility of each of us connected with that development to see that the changes are for the betterment of mankind generally, and particularly for those indigenous to the North.”

He emphasized the very delicate balance of tundra ecology. “The life of plants and animals is in a precarious position when even slight changes occur. This is of particular concern to the petroleum industry, since even slight changes in the environment might trigger a chain reaction.”

Imperial Oil’s practice is to move over the tundra only in winter when the frozen ground and the snow cover protect surface vegetation. The people who operate machinery are instructed in practices that will not disturb the tundra. Bulldozers are used to clear trails of snow, but operators are expressly forbidden to scrape the plant cover off the underlying permafrost. The company is also investigating methods of improving the treads on tracked vehicles to eliminate damage to tundra by reducing the number of metal protrusions. “It’s a practical project,” says Alex Hemstock, “and I’m sure it will succeed.”

Imperial Oil and other companies have been experimenting with the restoration of damaged areas. In test plots at Inuvik and Tuktoyaktuk, reflective material and insulation have been tested to encourage recovery of slow-growing plants. Plots seeded with crested wheat grass and canary seed sown successfully, although on one plot birds ate most of the canary seed, and rodents ate the grass. ‘These experiments and observations, along with other
Tucked among the mosses, lichens, shrubs and plants of this section of tundra is the nest of a tree sparrow

The most basic of the work is aimed at understanding the heat balance associated with man-made structures on or in permafrost," Alex Hemstock points out, "and in finding methods to prevent deterioration of permafrost."

Isolation of structures from permafrost on piles is a well-known practice. At Iqaluit the hotels, all the government buildings, two huge residential schools, the hospital, fifty or so small business establishments and most of the houses, except those of the Indians and Eskimos, are built on piles. To build on permafrost, a steam heater thaw is a hole in the ground about 18 or 20 feet deep. Then piles are sunk into the resulting mush which soon refreezes and holds the building solid and level. The base of the building must be left three or four feet above the ground so the heat from its floor won't melt the permafrost.

At Iqaluit, and in an increasing number of planned Arctic towns, the buildings are heated from a central station where diesel motors pump hot water under pressure to all the buildings in town. There are more than 18 miles of hot water pipes in Iqaluit, but the water loses only 20 degrees from the time it leaves until it returns to the pump house.

In the construction of roads, airfields and other "fill" structures on permafrost the important factor is the retention of the permafrost in its original frozen state and the least possible damage to permafrost in bulldozing the required fill. Permafrost will also have to be protected in the terrain surrounding producing oil fields, gathering terminals, and living compounds in the tundra for hard economic reasons, says Imperial’s Gerry Rempel—"if it isn’t the buildings will subside as the permafrost melts and the land will turn into a bog that no vehicle can negotiate effectively. The necessity of finding ways to preserve the permafrost for such commercial reasons will lead to techniques that can protect it in other situations as well.

The urgency of developing this environment carefully was emphasized last fall at a tundra conference at the University of Alberta. The meeting was convened by Dr. W. A. Fuller, a zoologist at the university, who invited more than 150 Arctic experts from Russia, Sweden, Denmark, Scotland, England, the United States and Canada. The climate, flowers, animals, people, fish and insects of the Arctic were discussed in detail and the conference resolved to speed up research into all aspects of the Arctic environment.

A joint study is expected to get under way next spring sponsored by the International Biological Program, the Canada Department of Indian Affairs and Northern Development, the International Union for the Conservation of Nature, the National Research Council and several Canadian universities.

"What we are trying to do," Dr. Fuller says, "is learn enough fast enough to be able to use the resources of the North without destroying the country in the process."
It was late Sunday night in Peace River, Alta., when Wally Homershaw got the call. Could be fly immediately to Zama Lake to take an injured man to hospital?

An hour later Homershaw, fellow pilot Don Magnuson, and a Peace River doctor were on their way to Zama Lake, a tiny drilling camp with an unlit airstrip 150 air miles away. They landed at 1:30 a.m. aided by two trucks shining their headlights down the strip and a third marking the far end with its parking lights. Rick Madsen was lifted aboard on a stretcher and flown to a hospital in Edmonton.

The emergency flight occurred just over a year ago in late 1968. Today, Madsen is back at work for the company as a derrick man at a producing oil field near Edmonton and the two pilots are back making regular trips between remote drilling camps and the communities in the northwest.

Homersham and Magnuson are two of the 17 pilots employed by Imperial Oil—all former RCAF or bush pilots with an average age of 43 and average flying time of 12,000 hours.

A large amount of Imperial’s flying takes place in the west, and the greater part of western flying—about 70 per cent of it—is usually between Calgary in the south and the Mackenzie delta. Since Imperial’s discovery of oil at Atkinson Point last January, these percentages have risen even higher. The planes range throughout northwestern Canada.
Canada, linking the cities with oil sites. In some cases, the link is vital. Some distant communities such as Inuvik, on the Mackenzie delta 100 miles from the Beaufort Sea, have commercial air service. But for exploration sites in the Arctic or producing fields at Rainbow Lake, the company’s three twin-engine Otters are the only link with civilization. These sturdy little planes, all bought within the past 12 months, replace three older planes: a Caribou, a single-engine Otter and a Piper Aztec. The Otters, made by de Havilland just outside metro Toronto are STOL craft (for short-take-off-and-landing); they can land almost anywhere—on wheels or skis in the winter and on floats in the summer—carrying loads of up to 3,000 pounds, excluding fuel. An Otter can land on a 2,000-foot runway prepared beside a drilling rig.

Two of these planes are based at Inuvik and used mainly for drilling and seismic operations in the Northwest Territories and the third is at Peace River to serve the Rainbow Lake and Zama Lake oilfields and Edmonton.

Checking the weather at Department of Transport office at Inuvik.

The three usually take over where the big Fairchild Hiller F-27—a twin-engine turbo-prop—drops passengers off from Calgary or Edmonton. The plane can carry 8,000 pounds, excluding fuel, two and a half times an Otter’s capacity.

The Otters and the F-27 are used only rarely for emergencies like the one at Zama Lake in 1958 although, jokes one employee, ‘three weeks in Inuvik and every flight out becomes a mercy flight.’

Most trips are routine. Typical is the F-27’s flight one Saturday last December to Inuvik. The plane left Calgary at seven that morning with its crew of three and two passengers. Seventeen more—are among them two pilots, a geologist, three surveyors, a core handler and a refinery superintendent got on at Edmonton. The plane also carried 4,500 pounds in freight: radars, batteries, stove pipe, film, hoses and other equipment, but no food—most groceries are bought through the Hudson’s Bay store at Inuvik. At Fort Nelson, B.C., the plane stopped for fuel and at Norman Wells the refinery man got off.

At Inuvik the passengers got off and
the plane took on 32 new passengers, most of them members of scientific party number 23 and all of them carrying suitcases that Wally Love of Imperial’s producing department in Edmonton always thinks of as being ‘as big as refrigerators’. The plane took off at 2:30 p.m. just as the sun was setting. After a short stop at Peace River to drop off seven car skiers, the plane got back to Edmonton at 8:53 p.m.—13½ hours later and 2,600 miles from Cal-gary. The only unusual thing about the flight, said Hugh Carlyle, superintendent of western operations for air trans- port, and one of the two pilots on the flight, was the fact that it didn’t return to Calgary because it was fogged in.

If most flights are routine, they are not dull. The excitement of flying over uninhabited country in single-engine planes may have been eliminated when the company sold the last of these planes in July, 1965, but there are still the ‘whitewalls’ that newcomers find so dis-orienting. This peculiarity of northern flying occurs north of the tree line in winter where there is virtually nothing below but snow—no hills, no trees, no roads, no buildings. When the sky is white, too, it’s hard to tell where sky ends and ground begins. It’s an eerie sensation, but the pilots are used to it and when they encounter it they auto-matically switch from visual to instru-ment flying as they do when they go into a cloud.

Winter flying in the Arctic has other hazards, too, and the greatest among them is the cold. When the temperature drops to 50 below zero all flying halts. No one is certain how materials behave in that numbing cold, particularly in the stresses of take-off and landing, so the planes simply stay on the ground. When it gets that cold, the survival of passengers who withstand a forced landing is questionable. Such tempera-tures are not common, fortunately—-they may occur on five or six days during a winter and it seldom stays that cold for more than two or three days at a time.

Summer flying is an entirely dif-ferent matter—long hours of daylight as opposed to the dark of the Arctic winter night, and temperatures that can be very pleasant. There are difficulties, of course, such as the anxiety of landing on unfamiliar lakes to service a geo-logical party, and coping with the chop, tide or fog on open stretches of the Beaufort Sea. After every occasion land-ing, the planes must be hosed off to avert corrosion from salt water. But such problems are minor beside those of the Arctic winter when most of the flying is done.

This winter, for the first time, Imperial aircraft had their own hangar at Inuvik, big enough to take two twin Otters at once. The hangar has cut maintenance time drastically, because the planes can be serviced inside at com-fortable temperatures. Before the han-gar was built, service personnel had to work outside under canvas tents thrown over the engines, heated by gas-fired heaters and lighted by electric extension lamps. Now the work can be done indoors in comfort. The hangars also cut in half the time required to warm up a plane before the day’s flying. As Imperial’s air transport manager H. O. Gooding says: ‘It’s the difference between operating at 40 below and 50 above.’

It may seem like a lot of trouble to go to, but the advantages of having your own plane are real and tangible. For example, an Imperial refinery has a breakdown and needs equipment from Sarnia, a company plane can take it there far faster than a commercial aircraft. The producing department in Edmonton has another advantage in mind when it flies in delicate seismic equipment from Houston, Tex. Several years ago, an electronic device trucked from Houston to Calgary was shaken loose from its crate and required a month’s work to put back into working order. Now such equipment is flown, uncrated but tied securely, in the F-27 and it arrives intact.

There is a long way from 1921 when Imperial purchased its first aircraft—two monoplanes—to become one of the first Canadian companies using planes com-mercially. The two 185-horsepower Ger-man Junkers were bought to lift men and equipment to remote areas of the country; when oil was discovered at Norman Wells in 1920 it used to take six weeks to make the 2,000-mile trip down the Mackenzie River from the end of the railroad line at Peace River to reach the well site. On the flight from Peace River to Fort Simpson and back, the planes were forced down three times by the weather and smashed two pro-pellers and a tail skid. Still, the flight was considered a great success: the re-turn flight took only six hours.

Imperial Oil wasn’t the only company to take up the air in these days. Two Quebec pulp and paper companies used war surplus aircraft in 1920 and mining companies were using planes in the 1930s. The use of company-owned aircraft has grown steadily since then. Canadian Aviation magazine reported last year that there were more than 1,300 business planes, including 44 jets, registered in Canada.

Flying for both business and personal reasons has become so extensive that Imperial has just introduced a new idea in service for business and private aircraft. Instead of sitting around in the uncomfortable chairs of drafty hangars, passengers and crew landing at Mont-real’s Dorval International Airport can go to a new building called Aviat. There, planes are overhauled and fueled, and pilots can get information on flight planning and weather forecasts; they can also use the recreation facilities, showers and a ‘quiet room’. For passen-gers there is a lounge and refreshments, and a conference room for businessmen who want to fly to Montreal, hold a meeting and fly out again.

Piper Aztec, based in Edmonton, takes off from Peace River, Alta.

Getting prepared for a flight to the north, the F-27 is hauled from its hangar in Calgary.
The biggest petroleum research establishment in Canada is Imperial Oil’s research department in Sarnia. Research is big in Sarnia: Imperial also operates a refinery and a chemical plant there, but one of every eight employees is a researcher. Products and processes that are used around the world have come out of these laboratories. They contain equipment that can spectrographically identify the presence of iron, copper or other elements foreign to finished petroleum products; can fingerprint changes in chemical composition by infrared analysis; or even show it’s sugar that’s clogging your fuel pump.

Sugar? In your fuel pump? Quite.

On the top floor of one of the research buildings at Sarnia is Imperial’s Customer Service Laboratory, but everybody just calls it the used oil lab. It is there that Mark Stratychnik and his three assistants can investigate just such bizarre problems for Imperial’s customers. That one began with a letter that said: ‘Dear Imperial Oil, I have been an Esso user for 20 years. In all that time I have not filled my tank more than 10 times with another company’s product. After 12,000 miles of driving, my new car broke down and the dealer had to replace the fuel pump. I am sending you the fuel pump and hope you can tell me if the gasoline is the problem.’

When the fuel pump arrived, the lab’s technicians tested the gummy material. It took them two days to identify it as sugar, and in a short, almost cryptic note, the lab reported its findings.

Well sure, the deposit was sugar. But how did it get into the customer’s fuel system?

‘We can only speculate of course,’ answered Stratychnik.
Then, like every good detective from Sherlock Holmes to Joe Friday, he began to build his case. ‘Look at the man’s letter; it’s a printed, personal letterhead with a fashionable North Toronto apartment house address. Rents in that building would include indoor parking. It’s my guess that some other tenant in the building has a grudge against our customer and poured a cup of sugar in his tank—probably late one night. If I were the gentleman, I’d get a gasoline filler cap with a lock.’

Another inquiry came from an Ontario man who put his inboard power boat into the water one 24th of May weekend. Before launching he asked the marina operator to drain the crankcase and re-fill it with new oil. After 10 hours of cruising, his engine began to spatter erratically. The sportsman checked his crankcase and found the oil suspicious-looking. He sent a sample to Stratchuk’s lab, suggesting that the marina operator hadn’t drained the crankcase at all, but had merely topped it.

‘We ran some tests on the oil,’ Stratchuk says. ‘The oil was not abnormally dirty but showed an unusually high fuel dilution—gasoline mixed in with the crankcase oil. This may happen in a gasoline engine with either a maladjusted or malfunctioning choke, worn or stuck rings, fouled plugs or a cracked fuel pump diaphragm. Gasoline escapes from the cylinders and dilutes the oil in the crankcase. In this instance the dilution was far greater than normal after 10 hours of use.’

The boatman was advised to check his engine before accusing the marina of topping up the oil.

Coplaintants like these represent less than one per cent of the samples analyzed by Stratchuk and his three technicians. Most of their work is for large industrial customers such as the railways, steel manufacturers, steamship lines and mining companies. When new oil products are developed for such users they are put through every laboratory test that Sarnia’s research people can contrive. Major products go through field trials as well. But even after all this testing, Imperial researchers are still not satisfied there will be no problems. So they follow actual performance through tests made by the used oil lab over the course of several years. The tests are considered preventive maintenance—they give researchers a chance to anticipate problems and head them off before damage occurs.

Preventive maintenance is a wise precaution that helps get the best service from today’s sophisticated oil blends, which contain additives to reduce wear and to clean the engine as they lubricate.

The duties of this lab check diesel lubricating oil samples from, say, mining company locomotives after various periods of use. From their analyses they advise on a suitable oil—change interval. That’s preventive maintenance.

Another function of Stratchuk’s lab is solving customer problems—problems like those of the man with sugar in his gas tank but on a grander, costlier, commercial scale. For example, early this year a large fertilizer manufacturer complained that the oil filters on one of his compressors were getting plugged. The used oil from the compressor was tested and shown to be in good condition. The material plugging the filters was isolated and a chemical analysis that included an infrared scan—a chemical fingerprint—showed the material was urea. This material is foreign to low oil and lube oil additives, but is a common fertilizer ingredient. Armed with this fact Imperial’s marketers were able to help the customer trace the origin of the contamination.

Finally Stratchuk and his crew are salesmen—though not one of the four has ever taken a customer to lunch or earned a sales commission.

‘We provide technical and laboratory service for Imperial’s marketing division,’ Stratchuk explains. ‘For instance when a salesman is trying to swing a big customer to Imperial from a competitor, we’ll work with him to discover the customer’s particular needs, then call in our product development research chemists and other technical specialists in the field involved. With their help we develop or suggest Imperial products to do the job.’ Stratchuk has ready access to and often uses the expertise of Imperial’s research men. He also alerts them to product quality deficiencies that may show up in his investigations.

In any one year the detectives of this lab analyze some 2,500 individual samples of oil, grease, sludge and damaged machine parts such as bearings, valves, and the like. The tests are not cheap: the average cost is $30. And the work is not leisurely; the small lab is alive with the hiss of Bunson burners, the hum of whirring centrifuges and the gested bubbling of a distillation apparatus.

The atmosphere is relaxed, although Stratchuk is a perfectionist. He runs the customer service lab with casual thoroughness. His records are exact; his cross-reference filing system a model. His daily logbook keeps track of the oil samples and damaged engine parts that arrive in the lab; each arrival is identified with a code that indicates whether the specimen was fuel or lubricating oil and whether it came from an individual customer or a company. It also tells Stratchuk in which of several dozen bound volumes he will later find the complete record of the specimen from the original query through all the lab test reports to the final answer.

Since his graduation in 1956 from the University of Saskatchewan, Stratchuk has worked for one employer only, Imperial. His office, a glassed-off corner of the lab with partitions that fall a full three feet short of the ceiling, affords him no privacy, which doesn’t seem to bother him at all. A visitor begins to suspect that Stratchuk has his telephone rigged with a timing device to ring automatically every 45 seconds.

Recently, Stratchuk took up a hobby: name collecting. He collects one name only—his own. In six months he has collected it in 21 misspellings, all attached to used oil samples coming into the lab. ‘One arrived with my name spelled with a capital L,’ he reported.

Baffling for a detective.
Winter's icy grip

Just how strong is it? Imperial engineers are measuring it this winter in the polar sea

Locked in Arctic ice, a pair of devices to measure ice strength await tests to be conducted by Imperial technicians.

The Arctic seems a strange place for nutcrackers, even giant ones. But there they are, four of them, locked in the ice of a harbor off Kugmallit Bay near Tuktoyaktuk, NWT. Their job: to teach oilmen more about ice.

This brand new kind of nutcracker was specifically designed by Imperial Oil engineers to measure the force exerted by moving ice on fixed structures—such as drilling platforms. The device consists of two vertical cylinders 16 feet long and 30 inches in diameter, joined at the bottom by a hinge. It looks just like a nutcracker—and that's how it got the name. But it works the opposite way. Instead of the legs pressing together to crush the ice, hydraulic jacks on top of the legs push them open against the ice until it fractures. The load and movement of the legs up to the point the ice breaks will be measured.

This is the kind of information oil companies will need to build drilling platforms strong enough to withstand Arctic ice, which may cover billions of barrels of oil reserves. More than a quarter—200,000 square miles—of North America's 750,000 square miles...
moving ice. Like toffee, which breaks more easily under a sharp blow than by gradual bending, slow-moving ice can ‘creep’ around an object, crushing under the pressure, but not breaking.

Ice in the protected harbor near Tuktoyaktuk moves very little but the nutcrackers can simulate the movement of both polar ice and shore-fast ice by moving its legs apart, possibly at two different speeds. Two engineers and a technician from Imperial’s producing department in Calgary will travel north to conduct these tests at various times this winter, until March. Working from a control hut near the nutcrackers, the men will also classify the ice by measuring the salt content, temperature and strength of small samples.

The nutcracker idea arose from a study of the feasibility of measuring ice forces by driving piles containing instruments into the sea bed. But the analysis showed it would be hard to get the equipment in place by this winter, for one thing, and the piles would have had to be very large. If, for example, they were in water 18 feet deep with ice about five feet thick, the wall thickness of the piles would have to be two inches—an inch thicker than that of the nutcrackers. And they would have to be driven at least 60 feet into the sea bed—and possibly 200 feet, depending on its composition.

The production research lab came up with another idea: Why not push something through the ice and measure the load—deflection characteristics up to the point the ice fails?

Various tube shapes were considered, and once the nutcracker design was accepted, the producing department lost no time. The nutcrackers were built by National Tank Ltd. in Calgary for Imperial and completed by mid-August, just two months after the idea was approved. The 35-ton package was taken by truck north to Hay River and then by barge to Tuktoyaktuk. The nutcrackers floated on pontoons in 25 feet of water a quarter mile from land until the legs were frozen into place. This winter, Imperial Oil engineers and technicians began the tests to measure the strength of the Arctic ice.

Frozen phrases
Shugas and nilas are words you have to be prepared for if you’re going to drill for oil in the Canadian Arctic, which has a vocabulary all its own. A shuga is an accumulation of small, spongy, ice lumps and a nilas is a thin, elastic crust of floating ice that bends with the waves. Bummocks—ice pieces that project down from the ice canopy—can be seen from a submarine, and calving occurs when a mass of ice breaks away from a glacier or an iceberg. That’s just the beginning. Ice can also be hostile or friendly, brash or rotten, stranded or pancake, fast or fractured. When you know the words, you can head north.

Count 3 and pull
Supertankers can do many things, but stopping on a dime isn’t one of them. In a trial run the 110,000 deadweight ton Imperial Otawa required 1.71 miles to make an emergency stop from 17 knots; it could take as much as 10 miles to glide to a stop. A Japanese ship-building company thinks faster stops may be possible using eight underwater nylon parachutes on a 200,000-ton tanker. Tests indicate the chutes may reduce the stopping distance by 25 per cent.

Ice eraser
Fertilizer is finding a new use that has nothing to do with growing plants.

The fertilizer, urea, is being used to keep runways at Canadian airports free of ice. It works both to prevent ice forming and to soften existing ice so that it can be plowed away. The chemical, which is effective down to 11 degrees Fahrenheit, does not corrode metals used in a plane or jet intakes as the salt used on city streets corrodes cars. A bonus of urea is that it stimulates the growth of grass along runways. A converted fertilizer spreader designed by a Burlington, Ont. firm spreads the pellets of urea.