REVIEW IN REVIEW

The able bodied writer. For a sea-going text to accompany Roy Nicholls' "sea-going faces" (page 12) we called on a main eminently suited for the job: staff writer Michael Pengelly, who has a happy combination of writing background (newspapers, Canadian Press, The United Church Observer) and an incurable love of the sea.

An English-born Canadian educated in Fort William and Port Hope, Ont., young Pengelly hung around the docks for hours at a time. He learned to recognize ships the way some kids grow to know their favorite hockey players; became famous for his iterations of a boastful whistler; soon was even able to mime the sounds of ships themselves. One day in school, in a moment of over-exuberance, he issued the "Woop-woop-woop" call of a certain fighting ship. The teacher immediately scolded another boy for barking in class.

"Sir," cried Pengelly with honesty, and a measure of professional pride, "that wasn't Ned, it was me! And it wasn't a dog. It was a destroyer!"

He gave up cub reporting on a weekly newspaper to join the Navy when he reached enlistment age (17) but the Japanese inconsiderately surrendered before Mike completed training. His first postwar job provided his only sea-time to date: three days on a snow dredging Port Hope harbor.

Pengelly returned to his other love, the printed word, but waterfronts are still his favorite habitat. He assures us, though, that he hasn't talked to a destroyer for years.

Blend well before serving. The blend of gasoline that the service station dealer puts into your tank is a mixture of hundreds of components. For illustrations to go with the gasoline research story (pages 2-6), we, therefore, prepared our own carefully-controlled blend.

When photographer Roy Nicholls toured Imperial's Sarnia research lab to tell its story in pictures, he discovered it would be impracticable, if not impossible, to photograph every step in the making of gasoline. His solution: semi-abstract pictures of such operations as engine tests, distillation tests, measuring vapor pressure and so on. His camera moved in close on flasks of swirling fluids, on mazes of glass tubing; on a micro-syringe with a drop of gasoline at its tip and a chemist's eye in the background.

Printed and projected on a screen, however, these pictures seemed to over-simplify Imperial's complex highly-technical research. Nicholls began to build better abstractions, in the darkroom, superimposing one color slide over another, with an artist's feel for design and impression. The result: Nicholls own photographic "blend" of gasoline.

Speaking of gasoline, Prof. E. A. Allatt, formerly of the engineering department, now professor emeritus, University of Toronto, charts one of our references to the Pogge carburetor (The Miracle Carburetor and other fables, April). He did not, as was implied, quarrel with the principles of the carburetor (pre-heating or vaporizing gasoline before it enters the cylinder) but did, and still does, refute the claims made on its behalf.

IMPERIAL OIL REVIEW

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EDITOR: ALBERT COLLINS

Meet the stuff in your tank

In Imperial's fuels research laboratories at Sarnia a few weeks ago, we happened upon a cupboard stacked with dozens of small labeled bottles. They contained some of the ingredients of motor gasoline.

"Suppose we put all the parts of gasoline in separate bottles, for a picture?" we asked a chemist.

"Impossible!" he said. "There'd be hundreds of bottles; I don't know exactly how many. I doubt anyone's ever counted all the components of gasoline."

Which killed a photo idea, but gave us a new slant on the complex stuff that goes into everyone's gas tank.

Most of us, if we think about gasoline at all, regard it as pretty commonplace. Rarely do we stop to visualize modern life without it: no more automobile travel for commuting, shopping, holidaying or school; no more trucks to haul farm produce or fetch implement repairs; no more tractors or combines to till the land or harvest the crops.

The trouble is that we never get to know gasoline, the way we know most of the other products in our lives. We rarely see it or touch it, unless the attendant spills it on the tarmac. We smell it, but it doesn't smell as good as a pine forest, a sizzling steak or Chanel No. 5.

We seldom admit to its effectiveness. We say, "Boy, this car has a lot of pep!" but rarely relate that extra surge of power to the improved fuel that research has given us. Our only tangible contact with gasoline is the bill.

The "gasoline primer" on the following seven pages is an effort to introduce you to the stuff in your gas tank: what it is, how it got that way, what you're getting for your money. It might help us remember, during the next pause at the pumps, that this "ordinary" liquid flowing into the tank is as much a high-precision tool as the car itself.
Elixir

by the gallon by Hunter Elliott

The crimson fluid in the photo-mosaic at right is, next to water, the most-used liquid in our daily lives. Last year Canadians used 3.5 billion gallons (compared to 850 billion gallons of water, 1.8 billion gallons of milk, and one-quarter billion gallons of beer). For most of us, modern life without it—in terms of how we get to work and how we spend our leisure time—would be unthinkable. Yet few of us think about or even see automobile gasoline.

Common though it is, unromantic though it seems, gasoline is incredibly complex stuff. It is not just a liquid, but many liquids and gases, all drawn together into a kind of rare elixir that brings life to today's demanding auto engines. Imperial alone has spent $55 millions on equipment to make better gasolines in the last 10 years. Yet ounce for ounce it costs less than a soft drink or distilled water. Transforming it from crude oil to the fluid that powers your tank requires an army of specialists, from oil-drillers to PhDs.

Fifty years ago the gasoline that ran the first primitive car really was what a good many people think it still is: a liquid distilled from crude oil, not much more difficult to produce than orange juice or buttermilk. Since then, gasoline has changed in composition and structure much more than the motor car. It is a highly-tailored mixture of literally hundreds of components, squeezed and cracked from crude by such processes as distillation, polymerization, catalytic cracking, catalytic reforming and alkylation. A roll call of its components would bring forth such exotic names as isobutylene, butane, isopentane, pentylene-1, hexane, benzene, cyclohexane, heptane, iso-octane, toluene, nonane—you could go on and on. Gasoline is composed of blends of these hydrocarbons and thousands more. Therein lies the answer to the question: are all gasolines the same? Just as there's a difference in cooking, there's a difference in the skill with which the various refiners blend their products.

Quite aside from the quality difference, there are different blends for different situations. There is one for cold weather quick-starting (accenting such volatile ingredients as butane, which boils at about the freezing temperature of water). There's a summer blend, with less volatility, to prevent vapor lock in the fuel lines. And there are blends for different altitudes and geographic areas.

Even a blend of thousands of hydrocarbons is not adequate for the demands of modern motors. So, certain non-petroleum materials are added. Imperial gasolines include an anti-stall additive, an anti-oxidant (prevents gummy residue from forming during long storage), an additive to prevent fuel-line freezing...
A gasoline primer (gasoline itself won't freeze but a gas tank when cooling may ‘breathe in’ moist air) and minute quantities of tetraethyl lead. Lead helps gasoline to resist knocking, or put another way, improves gasoline power. When engines demand more work than the fuel can deliver, the engine complains with an audible “knock.” Knock is annoying and, in time, can damage the motor. Each gasoline has a given ability to resist knock and produce a given amount of power, measured in terms of “octane rating.”

Finally, gasoline (which in its natural state looks like water) gets an identifying dye: orange for regular Etho, red for Etho Extra.

The actual preparation and “blending” of all these ingredients in commercial quantities is done in the refinery, primarily, and more or less automatically. Once the basic blends have evolved, making gasoline might seem as simple as baking with a cake mix. But, of course, it isn’t. Maintaining and improving quality in the face of changing engine needs is an endless and exacting task.

At Imperial’s Sarnia laboratories, 14 graduate chemists and 14 technicians (with help from a dozen other experts) devote themselves full-time to this task on gasoline and other fuels. Their coordinator is John Tiedge, a tall ex-British Columbian with thinning hair, an M.Sc. in chemical engineering and a penchant for motor boats. Tiedge has been with Imperial 16 years. Like all senior men in the research department, he believes in giving his men a free hand. There is no “policing” of the scientist but this means that the scientist must be a rather special kind of man. University education is, of course, mandatory. The 14 working with Tiedge hold a total of 25 degrees (including five Ph.Ds.) from 15 Canadian and foreign universities. But a university education per se is not enough.

“...we want creative people who will come up with new ideas for new products and new processes,” says John Tiedge. “And to be creative in research, a man must have a good brain, a good education, and be willing to use them. In addition to long term exploratory research, he must not lose sight of problems of the moment.”

The “problem of the moment” may be anything from the special fuel for outboard motors to a need for a higher octane gasoline in the car of five years hence.

Every man in the fuels group has, of course, a working knowledge of the internal combustion engine (a surprising number of average motorists don’t). He must know that a four-cycle engine operates on air and a small amount of gasoline vapor drawn into the cylinders on the down-stroke of the piston, compressed on the up-stroke. A spark ignites the gasoline, which heats the compressed air, causing increased pressure and providing force for the downward powerstroke of the piston. A subsequent exhaust-stroke removes the burned gases from the cylinder.

It follows that the fuels men pay close attention to the air-fuel ratio and the compression ratio of engines, for these have a direct relationship to the power you can get from gasoline. But they know, too, that the piston engine is an inefficient device, even when in good running condition. About 78 per cent of a gasoline's potential energy is lost as heat in exhaust gases; as heat lost to the cooling system; lubricating oil or by natural radiation; and as energy consumed by car accessories or in overcoming engine and gear friction.

This leaves 22 per cent to move your car and overcome air resistance and friction between tires and the road—if the motor is properly tuned. The fact that gasoline gives as much traveling power as it does, is largely due to groups like Tiedge’s, and part of their success depends on their skill at crystal-ball gazing.

What kind of engine will you drive next year or in 1965? Senior research chemist Charles Rupar, in charge of the gasoline quality section in the Sarnia laboratories, asks himself that question every day. Rupar, who graduated from the University of Western Ontario 20 years ago, is six-foot-tall, bald, a high enthusiast—in short, he displays none of the nervous symptoms you might expect from a man who has to second-guess public taste. Once a year, sometimes oftener, Rupar predicts for management the kinds of engines you’ll drive in the years ahead. Easy? Consider the recent shout-face in the motor industry. About six years ago, six-cylinder motors seemed to be out of vogue. Sales of high-powered cars were soaring. Motor manufacturers accordingly upped the compression ratios to give the public the high-powered cars it seemed to want.

Greater compression means more power, but the octane rating—that is, the mentioned measurement of ‘knock’ and power—rose accordingly. Since compression ratios appeared to be going up indefinitely, gasoline makers emptied through their teats into the octane race. One refinery had to spend $10 mil-

lion to raise the octane one point. Today, as Charlie Rupar’s carefully plotted graphs show, the trend is reversed. Sales of six-cylinder, foreign and compact cars are soaring. The high-powered cars are on the down curve. The octane race has leveled off.
Rupar's graphs, based on sales trends, are just part of his "intelligence" operations. He and his staff also test motors and read all published data on new developments in the automotive industry. It's essential that he keep in touch with both current thinking and future trends.

Back at Sassia, gasoline prices are constantly under test. Some go into a row of engines that are stubbed in small laboratory rooms, like thoroughbreds waiting for a race. A flick of a switch on the control panel outside the room sends a motor roaring into a "suburban cycle," with all the stops, sitting and gear changes of urban traffic, or a "turnpike cycle." Some are ordinary engines; some are not.

Here, one day, I watched a test engine with 72,000 miles on the odometer, "driving a turnpike" at 70 miles per hour. It had a compression ratio of 12:1, higher than anything on the commercial market today.

Rupar also runs outdoor tests on various makes of cars. Over the years he's found that almost two cars of the same make and model show wide differences in octane needs. Some of these differences develop in use; some are built into the car from the assembly line.

This doesn't mean that car manufacturers are getting sloppy. In the auto industry a tolerence of plus or minus 0.001 inch is considered "rough" work. But there are fractional differences in various parts. Usually the.plus and minuses cancel out. But when they all happen to stack up in the same direction on a given car, it can make a substantive difference in octane requirements. Ignition timing may be off. Cooling temperatures, spark advance and combustion chamber deposits all have an effect on octane requirements.

"Because of these differences, no refiner could afford to produce gasoline to satisfy the exact requirements of every car," says Rupar. "But we can and do produce blends to satisfy over 99 percent of the total car population."

While Rupar portrays engines of the present and future, others in Tiedje's group are working on additives, blends and processing methods. Here, fuel trickles through tinfoil-wrapped glassware, chilled with dry ice; an experiment on de-icing additives. There, a blue fluid swirls in a beaker; it's a test for sulphur content (sulphur compounds tend to corrode metal in the fuel system). Here, a white-coated chemist with a micro-syringe—looking for all the world like a doctor who gives you your polio shot—inserts a drop of gasoline into a highly sensitive electronic machine called the mass spectrometer. The spectrometer will separate the gasoline into its many components, and report back in terms of graphs and tables of numbers.

There are many more such machines in the fuel lab now—nest, grey, impersonal-looking machines with names like "capillary chromatograph" and "infrared spectrophotometer", that speedily spew forth facts which, five years ago, would have called for tedious work by men with test tubes and notebook.

Yet the scientist has not been displaced. The human element is still more important than ever; it takes skill and knowledge to analyze problems, "program" the machines, and interpret the data. The researcher, inside his lab, still speaks a mysterious language. One morning I saw a chemist testing for sulphur (as it turned out) and asked what it was all about. He eagerly began to explain. Ten minutes and one very long equation later, we parted, vaguely unsatisfied.

Nor is gasoline being displaced as a fuel. The piston engine will be with us in the foreseeable future, and at least one executive in the automotive industry predicts that gasoline engines will still drive your car 20 years hence. It would be a much improved engine, he says, which means it would demand even more in gasoline quality.

Which is why there will always be fuels research men. John Tiedje, who like most scientists would rather work at his job than talk about it, nevertheless summed it up rather eloquently one day—and, in a sense, spoke for all scientists.

"You have to keep looking for better ways to do a thing," he said, "if somebody tells you 'It can't be done', you must not accept it. You must never stop asking why . . . ."

A gasoline primer

**WHAT GOES INTO THE PRICE TAG?**

Under normal circumstances three things add up to the price you pay for gasoline at a service station. The first is the price at which the oil company sells the gasoline to the dealer, the second is the dealer's mark-up, and the third is the tax collected for the provincial government.

Companies like Imperial Oil sell their gasoline to service stations at a wholesale or "tank wagon" price. The dealer adds a mark-up to the tank wagon price to cover his operating expenses and to give him a profit. The road tax is set by the provincial government (see box).

Under any circumstances, competition is the controlling factor in establishing prices. Both the oil company's price to the dealer and the dealer's mark-up are established by competitive forces. There is competition in all phases of the oil industry's operations. To begin with, the supply of oil products compete with suppliers of other forms of energy for the customer's dollar. Diesel oil, for example, competes with coal and natural gas.

Within the industry, oil fields throughout the world compete with each other for the business of refineries in 56 countries around the world. Western Canadian crude oil competes with oil fields in the Middle East and Venezuela for markets on the Pacific coast. World-wide competition is the reason western Canadian crude cannot compete in the Montreal market; crude oil from other countries can supply Montreal's refineries at a lower price.

Here, then, is the first and main cost in producing gasoline—the cost of crude oil.

Manufacturing—the turning of crude oil into motor fuel and other products—is the next cost factor. The refiner puts
The Tax You Pay

Road taxes referred to in this article are imposed by the provincial government, and are not included in the price you pay for gasoline at the pump. Here's how they vary in the 10 provinces in 1971:

Ont., Que., Man., B.C., N.B., N.S., P.E.I., N.L. $1.00 $1.00 $1.00 $1.00 $1.00 $1.00 $1.00 $1.00

Relatively speaking, it costs less than two cents a litre. While the cost of living has increased by 24 percent in the last 10 years, the average tank wage price which the provincial Department of Finance has gone down.

It is the only way the price can be reduced and the price at the pump falls in the last 10 years. It is the only way the price at the pump falls.

The same principle applies to the dealer's mark-up. Nowhere is competition more evident than in the more than 30,000 service stations throughout Canada. A dealer cannot set a mark-up that will make his products more expensive than those of his nearest competitor. If he did, his customers would be taking their business to other stations. This means that the price at the pump is fixed by the same forces as those that govern the price of gasoline to the consumer.

A gaso line primer

This is the gas that is bought by private brand dealers. The private brand dealer normally sells his gasoline at prices slightly below those of the national brands. Because the public will not pay as much for products of lower quality, he relies on large volume sales to make up for the lower profit per gallon, and therefore can operate profitably only where there is a good deal of traffic, usually in cities.

When there is a great deal of spare re- fine capacity, competition between refiners becomes more intense. The private brand dealers can purchase his gaso line supplies at well below tank wagon price. This puts him in a position to cut his retail prices to attract new customers and further increase his volume of business. Therefore, the two competitors usually can come only from neighboring branded dealers, the branded dealers must turn cut their prices to stay in business.

In a dense urban market where stations are fairly close together, this price cutting leads to price wars.

Gaso line is unlike most of the products we use, so the results of price cutting are not generally the same in all markets. The price of a product can be reduced by cutting its price. For instance, people would buy more of those cut price items than before, but they would not buy more of a product by that same percentage. Therefore, prices begin to come down at the short term. Finally, the price cuts stop at some point, and the price is again increased as the customers become aware that the price cuts were not likely to increase business for long.

In addition to severe price cutting, the other factor that is a basic cause of price wars is excessive dealer mark-ups. If dealers are matched in mark-ups, too high, it is an invitation to price cutting. If dealers have different mark-ups, the price cuts are likely to be slow to come, and the customers are likely to take advantage of these price cuts.

Many factors can contribute to the start of a gasoline price war, but the basic cause is that there are too much gasoline and too many dealers.

How do price wars start?

Richard R. McColl, assistant comptroller for the past five years, has become deeply involved with particular responsibility for planning the company's accounting policies and future organization. His former position was held now by W. Kenneth Tannier who has been regional assistant comptroller for the producing offices in Calgary for the past three years.

A native Montrealer, Mr. McCollan has an academic accounting experience with an accounting firm and Royl- line Oil Co. (a former Imperial subsidiary) before joining the company in 1948. He had been chief accountant in the producing offices in Calgary for two years and assistant comptroller of the tax department in Toronto for three years before he was appointed assistant comptroller. Fred W. Holley has been trained man-ager of building management.

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Letter to a small daughter
by Robert Collins

W hat a day this has been for you! It began at six o’clock when you woke me to say that it was the day. Never have I seen you so well-brushed or so well-behaved as this morning at breakfast. In the shop on Yonge Street your excitement kept spilling over into little one-legged hops, until finally we bought your first bike—a two-wheeler, free-engine red, the kind you’ve been wanting for more than a year. And later in the schoolyard where you made your first shaky ride, I was as proud as you were.

But now that you’re asleep, with fresh bandages on your knees, I’m a little frightened. Partly just because you are growing up. Partly because now you are even more vulnerable to the world around you.

Our neighborhood has the usual TV’s and late-model cars—but no sidewalks. It has speed zones and caution signs—which motorists ignore. Last year in Canada more than 1,000 children were killed and injured in cycling accidents. Not many, compared to the car accident toll. But I don’t think of them as cycling “statistics.” They were all small people like you.

After all, you are only seven. (But nearly eight. I know.) Some safety experts say you shouldn’t own a bicycle until you are nine or ten. But every other seven-year-old in our block has one, as you’ve reminded me every day for a year. Better that you should have one too, and that I should try to make riding it as safe as possible for you.

Which is why I am writing this letter. You will not really understand it, but then I am really talking over your head, the way grownups do, to other parents and to motorists.

I wish we lived in one of the communities that have bicycle safety clubs. Police forces, parent teacher organizations or safety leagues usually run them. Particularly, I wish we lived in Edmonton where the Pedal Pushers club makes it fun to ride a bike safely. They put thousands of grades one to six children through a five-lesson course every year. The fathers get into it as instructors, using excellent manuals provided by the clubs. As a Pedal Pusher, you’d get free and expert bike inspection from certain local dealers, a safety bookmark each time you completed a lesson, and a “skilled rider” certificate for your wallet upon graduation. On graduation day you’d decorate your bike and parade along the main street with a police escort, finishing off with hot dogs and soft drinks.

We have no such club here (although there’s no reason why we parents couldn’t start one). So I shall get all the necessary information from the nearest safety league and teach you myself.

We’ll spend many evenings practicing your balance, and the safety rules, in the schoolyard, until you’re ready to solo. You already know about traffic lights and stop streets; now you must learn how to use them. You’ll learn how to signal your turns with the left arm the way motorists do; how to stop and check for traffic before coming out of a lane, driveway or from between parked cars; and never to carry an extra passenger. These are the most-neglected rules; failure to observe them accounts for 81 percent of cycling accidents.

You’ll learn, too, always to ride on the right side of the road, always single file, always a safe distance behind automobiles. You must never hitch rides on cars or trucks, or do stunt-riding in the street. What a lot of “don’ts,” you’ll say! But bicycle riding, like everything else, is more complicated than when I was a kid.

Today I adjusted the bike to fit you, according to this formula: heel able to reach the pedal at lowest point, with leg, thigh and heel forming a straight line. For a while, too, I contract to keep your bike in good repair. In seven or eight years you’ll either be too sophisticated to ride, or have some hony youth, with large feet, acne and slicked-down hair, willingly pumping up the tires. Until then I’ll help you keep tire pressures up, parts oiled, bell working, and brakes, handle bars and handle grips snug.

You won’t be riding at night but if you were I’d put silver Scotchlite on the handle bars and front forks, a headlamp with a 500-foot range on front, and a reflector and red Scotchlite on the rear fender.

All of these are the things a safety club would do, yet even they seem pretty inadequate for someone as important as you. When I have attended to them I can only hope that drivers of cars remember that you are just a small girl. I hope they remember that you do not have the protective armor of a car around you. I hope they realize that you will sometimes wobble and sometimes forget the rules. For, if one should strike you, no matter who is at fault, I know that he would never forget it.

Nor would I.
...Men of far-away places who give the Seaway its soul...

by Michael Pengelley

From every sea-going nation in the world they come: from the busy channel ports of Holland and France, from the Baltic Sea and the Black Sea, from the warm Mediterranean and the steamy mist of Tokyo bay—the wind-blown men of the sea bring their many-flagged ships up the broad long river into the heart of the New World.

Their faces are etched with days of wind and sun, or pinched in the deep-lined concentration of endless solitude. These are the men of far-away places who give the Seaway its soul.

In the vaulting shadows of Chicago’s skyline, at the honking dockside of a dozen other Great Lakes ports, the drama goes on: the winches whine and the ocean ships unload their exotic cargoes of tweeds and woolens from Britain, imported wines from France, cheese from Stockholm, sugar from the Indies, linen from Ireland and tinned delicacies from Japan.

In its third year of operation, the St. Lawrence Seaway, a fantastic 2,000-mile water highway into the industrial hub of the continent, has become virtually a North American institution.

Families spend their Sundays driving to sightseeing spots along the seaway’s canals to watch the foreign ships go by: (On the Welland Canal, "shipwatching" brings as many as 10,000 people on a weekend. There’s talk of founding a 200-acre national historic site there, with viewing stands near the locks.) In the big cities, they trundle down to dockside to see the ships unloaded, or catch sight of a group of sailors shuffling up for a night’s entertainment.

In all, over 3,500 ships carrying over 20 million tons of cargo pushed their painting way through the seaway’s 110 miles of concrete canals and locks last year. Over a thousand were ocean vessels which dropped off more than seven million tons of foreign goods at lake ports from Kingston to Duluth.

On return trips to the sea, they carried away some 6 million tons of U.S. and Canadian raw and finished materials to ports around the
globe; wheat from Fort William for Europe; polyethylene from Sarnia and scrap iron from Toronto—bound for Japan; heavy U.S. machinery from Chicago, headed for Brazil; steel from Hamilton for use overseas; detergent alkylate from Imperial's Sarnia refinery for customers in South America.

Despite all its activity, there have been rumblings that the seaway is already on the downgrade. A business magazine concluded earlier this year that ocean vessels are fast losing favor on the seaway. The reasons: a sharp contraction in world trade, the threat of strikes by longshoremen, inadequate docking facilities on the lakes, and increasing competition from the barge carriers.

In 1960 the Lake Ontario-St. Lawrence river section of the seaway was supposed to handle 20 million tons of ocean and lake shipping, according to predictions made in 1957. It handled only 20 million tons. Cargo through the Welland Canal section was supposed to hit 45 million tons last year; it didn't match 30 million.

Meanwhile, rail and trucking competition along the seaway route is said to be tightening. And the 30-year amortization period (the period in which the seaway is supposed to pay for itself on the basis of predicted tonnages) will either have to be extended or current tolls boosted. The latter would further discourage traffic on the Lakes.

On the other hand, Captain E. C. Hopkins of the port of Toronto tells the seaway "an unequalled success so far as we're concerned." Toronto's deep sea business has leaped from around one-quarter million tons per year to more than one-third of a million. Other ports have felt the same boost. Hamilton last year increased its overseas tonnage by 150 percent.

And the gateway to it all, Montreal—a great inland port before the seaway and now the world's greatest—reports soaring tonnage figures and millions of dollars worth of waterway improvements.

In addition, several Japanese shipping lines made a joint announcement earlier this year that they planned assigning more ships to the St. Lawrence seaway run. Even passenger traffic is new getting a break. The Canadian line, a Dutch shipping firm, has already begun a regular trans-Atlantic run through the seaway. Another three ships to the service, each capable of carrying some 150 passengers as well as freight, will begin service this season and from Toronto and Chicago; tourist-bound passengers can embark at Chicago and Sarnia.

Several officials attending the American Association of Port Authorities' conventions last year asserted, furthermore, that original tonnage targets predicted four years ago will still be met in 10 to 15 years: 50 million tons a year for the St. Lawrence section of the seaway, 60 million tons in all.

Meanwhile, an experts argue and shipping companies cast envious eyes on the French canals, their tough, mean men of the sea with their strange tongues and many royalties shuffles and fees that must be paid to board the sky. They grumble up traffic-clogged lower streets of Great Lakes cities to dance at a Ukrainian hall; ante a bus to Niagara Falls; press on to Toronto's Yonge Street, farm up to buildings that seem to touch the sky; doggedly walk with a strange language and strange currency in city shops, to buy a toy for a child in a hard fare away.

The sun never seems to set. The sea goes on. Because of them the cities of inland North America will never again be the same.
The day is not far off when traffic in a dozen large Canadian cities could come to a complete standstill in one last, great traffic jam. The total length of cars, buses and trucks will simply outstrip the total length of city streets.

No one can accurately forecast the date. But already about 90 percent (3.6 million) of Canada’s passenger cars are concentrated on 10,000 miles of city and suburban roads (including multiple lanes) in or near a dozen big cities. This is at the rate of one automobile for every 14.7 feet—an impossibility if all cars were out at once, assuming the average car is 16.5 feet long.

Serious as this situation is, it’s apt to be twice as bad within 20 years. From 1950 to 1960 Canadian motor vehicle registrations doubled; by 1980 there may be more than 11 million, or 37,500 miles of vehicles. The majority will probably continue to be concentrated on city and suburban roads and streets.

Even if traffic somehow still continues to move, the cost— in terms of time lost in traffic jams—will be staggering. Already, in the U.S., it is estimated in billions of dollars.

Some planners and officials, aware of the impending chaos, have suggested banning all cars from the downtown area. Already cities such as Ottawa have introduced the “shopping mall,” where traffic is barred from a portion of one downtown artery. Malls are successful as far as they go but automobiles still converge on the downtown area. To ban cars from the entire downtown would call for an elaborate, costly system of public transportation (overhead or underground railways, perhaps) and would pose many other problems. For instance, should delivery vehicles, doctors and other “special” drivers be allowed in? Where do you draw the line?

Most of the other proposed solutions are based on the idea that the fixed element—the streets and highways—should be remodeled, while the mobile element—the motor vehicles—remain unchanged.

Elaborate expressways, tunnels and underpasses are on the drawing boards—and very often stay there, because of the vast expense involved. In Montreal, for instance, the cost of a tunnel under Mount Royal—just one part of a master program which calls for expressways, bridges and an eight-mile subway—is estimated at $60 million. In Toronto planners estimate that the taxpayer must fork out nearly $2 billion over the next 20 years to keep traffic moving. Vancouver needs $500 million by 1980.

Even if the money can be raised most of the proposed elevated highways and tunnels are designed to help through traffic. It seems unlikely they will solve the basic problem of making ordinary city streets available for the use of more cars.

Because of large buildings at the sidewalk edge, few streets in the heart of the city can be widened. One exception, Toronto’s Avenue Road, was widened recently. But the cost of adding two lanes on a section of less than one mile was reported to be $3,300,000.

Perhaps the answer lies in a revolutionary new concept in cars.

At no time to my knowledge has there been a conscious effort to design cars for the express purpose of easing traffic problems. Small European cars and the American compacts have helped to a certain extent—as anyone who has ever parked his big car at a meter next to a baby vehicle can testify.

But the main reasons for the small European cars were production and fuel economy. They won popularity in America through their lower prices, ease of parking, operating economy and, in some cases, better finish. The American

This is a citycar

So far it is merely an idea, but automatic writer Alex Jordan sees it as a possible solution to our ever-increasing traffic jams

Imperial Oil Review, August 1964
compacts were introduced mainly to meet European competition.

The "Cars of the Future" displayed by North American manufacturers remain long and low. They have little "air resistance"—but they take up a lot of space, and this "traffic resistance" is the problem.

To keep traffic moving—and this would not be incompatible with any downtown traffic bumm that might eventually come—my suggestion is that car designers might adopt a new concept: trafficability. The measure of trafficability could be simply the ratio between the number of cubic feet of useful inside space and the total length of the car. The more useful space per foot of length, the more efficient the vehicle.

The length of the current North American models could be reduced by one-third without changing the inside dimensions, producing trafficability ratings higher than that of small imports.

But to achieve really effective trafficability, automobile design could split into at least two branches: general purpose, or highway cars similar to the existing types; and special high density traffic vehicles, or "citycars," specifically designed for city traffic, just as a racing car is designed for pure speed, or a motor scooter for pure fuel economy. It may seem like a pipe dream now, but let's become automobile designers for a moment and see if we can guess a future trend.

The citycar would be about 12 feet long, but it would not be another midget model or bear any resemblance to imported light-weight models, excellent as they are for their own purposes. Its inside dimensions would be about the same as those of any current North American sedan, permitting comfortable three abreast seating. This could be achieved by making the car as wide as its current models, increasing height, placing the engine under the floor in the rear, and eliminating trunk space. The engine could be a flat six (cylinders mounted horizontally instead of vertically or in a "V") already in use in some imports and compacts, or even a conventional six altered to permit horizontal installation.

Despite the increased height, the under-floor position of the engine and transmission would keep the center of gravity low. To further lower the center of gravity, the top section of the body could be made of light plastics reinforced with steel hoops for safety.

Absence of trunk space would cause no particular inconvenience, as most trips within the city are made without heavy luggage. Lockers for small luggage could be provided under the floor, in the space occupied by the drive shaft in conventional North American models.

The increased height and reduced length would give the citycar a short and dumpy appearance dominated by curves, as compared with the long, low, sleek horizontal line of current models.

Citycar would have exactly the same smooth surge of power, would ride as comfortably and have the same solid feeling as cars nearly twice its length. Engine power would be in the neighborhood of 100 brake horsepower. Wheelbase would be only slightly reduced. There would be no attempt to scale down the size of every component, or to pare weight beyond what is required by sound engineering practice. Wheels and tires would be of standard size, preferably 14 inches.

Aside from its reduced length, the citycar could incorporate other special features, such as a very small turning circle, rubber-faced bumpers all around, a transmission geared for city use, easily replaceable body panels, fume eliminating muffler and power steering for parking.

It would also have safety features, such as head rests, hydraulically mounted bumpers and a flexible, though unbreakable, steering wheel.

No difficult engineering problems need be involved in the production of such a car, as it would use mostly components already on the market. The major obstacle is purely psychological—a matter of overcoming resistance to a very radical change in styling, and convincing people that an easy-to-park, easy-to-handle car does not have to be somewhat cramped.

There could be many variations ranging from economy citycayrs to high-priced, high-powered luxury models. There is no need to standardize completely the car's chassis design or styling, providing it conforms to the requirements of high density traffic operation.

But with traffic conditions growing steadily worse, taxation reform to speed up the introduction of vehicles favoring a lower traffic flow might be desirable.

Our reform could first shift some of the tax load from gasoline to licences, then make that tax progressive in proportion to the length of the car. A tax based on length, rather than weight or horsepower, would be more equitable—since what we are actually paying for is the right to use the public roads.

Such steps may appear extreme but they are far milder than banning cars, or restricting their use to certain hours in the central area of the city.

At the same time highway, tunnel and bridge tolls and parking charges in and near metropolitan areas could favor shorter cars. As city cars increase in number, parking garages and lots could provide special lanes.

Citycar might be well-suited to the taxi business. Long cars, with protruding trunks and fins, being used in crowded streets for transporting mostly one person at a time are obvious space wasters. A special taxi citycar could be designed, with additional luggage space on the roof. There could even be extra short citycar taxis, seating only two passengers—side by side with the driver, with partition.

The introduction of citycar taxis would immediately increase cab-rank space by 50 percent. Furthermore, the adoption of citycayrs as taxis would provide the incentive to manufacturers to produce citycars in large quantity.

The London taxis aside from their antiquated styling come fairly close to the citycar concept. They are 15 feet long, carry six passengers and have an extremely small turning circle.

A determined public policy favoring high traffic efficiency cars is the one solution of the traffic problem which would cost nothing. Other solutions, costing billions, have in the past—though their adoption for the use of low traffic efficiency cars does not make economic or technical sense. No one would expect millions of long cars to be scrapped overnight. Yet we cannot wait too long. It would be far better to institute reforms while the traffic is still moving.

Alex Jordan was born in France, attended London's College of Aeronautical and Automobile Engineering, and has contributed semi-technical articles to several North American automotive magazines.

More ideas for tomorrow's motoring

by Michael Jacob

Whether or not you ever drive a citycar, vast changes are coming in family motoring. They'll come gradually, as have all automotive changes over the years. You won't wake up one morning to find an entirely different kind of automobile on the market. Nor is it likely that the auto as we know it will soon be replaced by that most romantic of recent developments, the air car.

The air car, which travels four feet above ground or water on compressed air, has piqued the interest of some U.S. and British companies and branch-es of the armed forces. However, it kicks up a blizzard of dust, tends to stall over hills, loses altitude wherever the surface is not reasonably flat and, on roads with steep camber, tends to slide to the curb like an ordinary car on a patch of ice. Even when these mechanical bugs are ironed out, say some experts, the air car will probably be used for public rather than private transportation.

However, researchers are seriously thinking about or working on less exotic new aspects of automobile travel. Some are near at hand; some are very much in the distance.

Motors aren't heading for an immediate or wholesale change. Imperial Oil forets experts (who consult regularly with automobile manufacturers) believe the piston engine will be with us for at least five more years. (Even if new type engines were then introduced, existing cars with piston engines would be with us for another five years.) A Ford executive in the U.S. predicts that cars 20 years hence will still be powered with a gas engine (albeit a lighter and much improved one).

A successor to the present type of automobile engine could be the fuel cell, which converts chemical energy
into electrical energy. The president of the American Gas Association said recently that such an engine—noiseless, fumeless and operating on electrical energy derived from natural gas—is a "definite possibility." Imperial Oil director C. E. Carson adds that the fuel cell is the most promising of all new power plant concepts being explored and compared to a conventional heat engine, may yield more than double the amount of energy from a given amount of fuel. Another possibility is the rotating combustion engine. A current experimental model produces 100 hp, is only 16 inches long and has one long central rotor which, from the end view, looks somewhat like a triangle with curved sides. For each complete revolution of the rotor within its cylindrical housing, three complete cycles of compression, ignition power and exhaust occur. It has no pistons; only one redesigned type of spark plug; a liquid cooling system; and a carburetor. Some foreign cars will have it next year.

Other possibilities are the gas turbine engine, electric cars with solar-charged batteries, thermoelectrics (producing electricity by the combustion of fuel), and the free piston engine (operating on the diesel principle with no spark plug and, at most, two pistons). Anton Braun and Prof. James S. Campbell of Kingston, Ontario, completed tests last May on one model which they claim is "a world technological first" because of its advanced design. It couples the principles of a diesel engine and gas turbine so gas is produced to feed the turbine. The engine, or gasifier, has no crankshaft, connecting rods, bearings, camshafts, valve mechanisms or flywheel. Campbell says it's cheaper to make than a diesel, costs less to operate, is lighter in weight and will burn almost any fuel. Tires are getting better. As yet there is no sign of a tire that will last the life of a car. However, the industry is developing new types of cord, and experimenting with such materials as dacron and glass. More new tires will provide a softer ride, following the lead of Atlas Bucron tires. With the trend to smaller cars, and with increases in cord strength, two-ply tires are a possibility. Colored tires are not yet practical because of the differences in color-fading between tires and car finishes.

A temporary flat-tire replacement for use in getting to a service station is in the research stage. The best experimental model to date has a thin casing on a very narrow rim and wheel. It collapses to one-inch thickness for easy storage.

Researchers are also working on a year round tire that has "anti-skid" material embedded in its tread, can be mounted on all four wheels, rides like a conventional tire during the summer but in winter provides effective traction in snow up to six inches deep or on ice. Brakas are getting safer. Linings of specially processed metal may replace the present fibrous lining. Both drum and shoes, being of metal, will expand at the same rate under heat, eliminating brake "fade" during emergency stops. Disk-type brakes, already on some foreign sports cars, may soon go on passenger cars. Drums and pads are designed as opposing disks (there are no brake bands) giving a more effective grip with no brake "fade."

Mufflers will be more durable and efficient. In the near future, a new catalytic-type will completely burn away, or neutralize, harmful exhaust gases. Mufflers and tail pipes will be coated with a ceramic or glass for longer life.

Bodies will have new rust preventives and salt resistant undercoatings. Paints and enamels, incorporating petroleum-derived salis and enamels, will be more durable. New greases will make possible permanent chassis and suspension lubrication at the factory. New permanent bond adhesives may reduce the need for welding, riveting and drilling, and reduce the cost of parts. We'll see more development work on plastic bodies.

Highways may become automatic. A General Motors executive says no-hands driving may be in effect by 1980, with cars responding to electronic signals, possibly from cables buried in the highway. Before that we'll see asphalt binders that will contribute to crack-free roads, and chemically-modified asphalt pavement that will bear several times the present loads. A new family of thermoplastics will make colored road surfaces practical for the first time. Interlocking highways and clervolasts may be paved in different colors to define routes. Colors may also indicate speed zones— or even to reduce eye fatigue and influence the driver's mood.

Women will still be standard accessories in cars, and cars will be designed accordingly. We'll see more lighted vanity-mirrors on sun visors, fancy carpets in the trunks, four sets of seat covers (one per season) and special shelves for purses.

Drivers thus can expect more color and comfort in the future as well as economy of operation.

BY AL RUOKIN AS TOLD TO GORDON WESLEY/The Beaver whirled away southward over the ice-covered Arctic Ocean, and left us in emptiness. George de Mille and I stood silently sizing up our surroundings. To our knowledge, we were the only persons on the 70-by-140 mile Somerset Island. A sea of undulating rock stretched north to the horizon where it met a few menacing clouds. A cool wind—it was 30 above—whipped at the cuffs of my Arctic jacket. Seldom have I felt so alone. It was something like landing on the moon and knowing that human help is utterly beyond reach.

It was 10 a.m., June 20, 1960—the beginning of our Arctic summer. George and I had just landed, 1,200 miles from the North Pole, on a geological expedition for Imperial Oil that was to take us 600 miles nearer the Pole. Our assignment: to try to learn something of the oil potential of the high Arctic.

In the weeks that followed, as we roamed about the uninhabited and rock-bound islands on the top of the world, we learned other things too. Many men have "gone north" and discovered, as we did, that the high Arctic is not all white wasteland; that it has a variety
of terrain, wild life and even plants. But relatively few white men have camped out on the islands for an entire summer as we did. And while we don’t pretend to be experts on the subject we did learn that physical preparedness isn’t enough. Northern living calls for mental preparedness, too—a clear understanding of the Arctic’s isolation, and the ability to cope with it.

George and I felt we were well-prepared on both counts. Our equipment was good. We’d worked off and on for nearly a year reading Arctic data and laying plans. Emotionally, we’re a balanced team. George, the senior partner, is meticulous and careful—a good brake for my occasional over-enthusiasm. Together we’ve been on many a trip in search of oil clues and few men get along as well under rough conditions.

But for all of our preparedness, I was taken aback that first morning by the apparent hardness of the land. There was no shelter higher than a six-inch rock, no vegetation thicker than the sparse, spindly ground-hugging Arctic willow, no kindling for a fire. In spite of our lengthy preparations I felt strangely vulnerable.

Those preparations had begun August 1959, when drawings of aviation gasoline were shipped by tanker from Montreal to Resolute on Cornwallis Island. Soon after this we were making maps from aerial photographs, ordering camping gear, clothing and food. We studied books, pamphlets and geological reports. By May 1960, we were ready.

We chose Piper Cub aircraft, rather than helicopters. They have longer cruising range, more speed, and are cheaper to operate.

We took lightweight Egyptian cotton tents specially reinforced to stand up to the high winds. Our sleeping bags were down-filled and we each carried a felt underpad, for insulation, and air mattress. We needed them too; a few inches below the surface the ground is permanently frozen. Our food was non-perishable—dehydrated fruits and potatoes, hardtack, rice, canned meats, canned butter, oatmeal, flour, tea, coffee, dried milk, sugar and chocolate.

We moved food, some camping equipment and gasoline to our campsites in advance, so that whenever we arrived supplies were ready. We were going to visit 11 islands—Prince of Wales, Prescott, Somerset, Cornwallis, Devon, Bathurst, Ellesmere, Cornwall, Amund Ringnes, Efjot Ringnes, and Axel Heiberg—with base camps on seven of these.

We always landed under emergency conditions

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**We looked for a place to stop for lunch**

**Imperial Oil does not hold exploration acreage there, but it’s part of the company’s long-term program to work toward keeping information on the geology of any new possible oil-bearing areas where we might become interested.**

Party 65, as we were called, was a five-man team. There was Art Nieboer, a blind 13-year-old radio operator of Dutch birth, who doubled as cook and after considerable experimentation did wonders with our limited variety of food. The pilots were Ken McLennan, the older, and likelier young Mike St. Arnaud, who grew a black "Paul Bunyan" beard.

But that first week on Somerset Island, George and I were making a preliminary reconnaissance solo. We set up camp and the next day began to map the geology. We walked a loop, six hours out, six hours back. We made our way slowly along the seashore, glacing at the frozen ocean, not talking much. Soon, we looked for a place to stop for lunch. Edless broken rocks surrounded us. There was no shelter. We piled a few rocks into a windbreak. It was uncomfortably cold. We made some hot tea on our portable gas stove to cheer us up. But sitting on the almost-permanently frozen rock was not much better than standing.

After lunch we went farther afield. Every now and then we came across small hummocks of moss, studded to high points by grass and lichens. Their nourishment came from bird droppings.

Later that afternoon I came across a strange, mossy, domed-shaped hummock. I swung at it with my geologist’s hammer—and cut clean through the top of a humus skull. The bone had provided nutrients for the moss growth. We saw other human and many animal bones thereafter. In the Arctic, the dead can be buried because of permafrost and rock; foraging animals or the elements scatter bones from their rock-cruming graves. The bleakness andloneliness of that first day taught us our first lesson in Arctic living. An accident in bush country can be serious; an accident in the Arctic can be fatal. Just suppose, I thought, that we fall into one of the icy streams that bubble through the rocks around us? How would we dry ourselves without perishing in the endless dump, bitter wind?

Fortunately, we were never put to the test. But in the days that followed we had a few close scares with the planes. On busy days we landed and took off as many as 17 times—each time under what normal air lines would call emergency conditions. It’s a tribute to St. Arnaud and McLennan that we had no serious crack-ups. The ground was rarely flat and frequently strewn with boulders. Inflated to only four pounds’ pressure, our overpriced low pressure balloon tires absorbed much of the shock of landing on rough ground (and supported the aircraft on soft ground or snow).

The Arctic wind was our constant enemy. It averaged 13 miles per hour but sometimes exceeded 40. Once a gust tossed us up during a landing and we tore off a wing tip. The wear and tear on the aircraft was soon visible and we ended up with several large patches in the fabric bodies—improved by the pilots on the spot. Sometimes a ghostly mist rolled in abruptly off the sea, engulfing most of the island. We lost 13 days of the 70 because of this and other weather hazards.

A typical day started early, with a searching look at the sky. If there was no fog, we hurried through breakfast, oatmeal or hardtack biscuits, coffee. Then we took off, following our plan outlined the evening before. Nieboer had a map of our proposed route; he would radio Resolute if we were long overdue. Before each camp move, we reloaded Resolute, too, and the few other geological and scientific parties in the Arctic. During the summer we met some of those parties. We just slipped anywhere from five to 100 miles, landed and mapped the types of rock. The pilots were our anchor, always on the lookout, often for hours, while George and I walked and chipped away at rocks.

We were making a rapid geological reconnaissance from south to north on a line that took us across all the major geological "provinces" of the archipelago. The Arctic, in its way, is as varied and interesting to the eye as any other part of the land. There are rolling hills. There are mud flats and desert-type moraines—as strange as those in Arizona. To the north and east many mountains, up to 10,000 feet. And there are great bare flat stretches of limestone and gravel. Sometimes we walked on special aprons held down our tents. Yet even in its bleakest corners this land is always changing. During the glacial period, ice depressed the area much as 700 feet. Some of it is rebounding from the sea, at the rate of four inches per century. At one point on Devon Island we saw beaches 100 feet above sea level. We found a whale skeleton, 140 feet above sea level and a half-mile from the present shore. Elsewhere we had polynized and carbonized trees in the rock and sand.

We often came back late from our day’s work. Time meant little to us. It was light 24 hours of the day, which played havoc with regular eating and sleeping schedules. Sometimes we found ourselves eating supper where breakfast should have been.

We were too busy to become bored, except the time we were "weathered in" for six consecutive days; in such times each person can do little but sit with his own thoughts. By the time supper was
over and reports were written we hadn’t
time or energy for recreation—although
even after walking all day, George and
I sometimes took walks in the perpetual
daylight. We talked, about the country,
the oil business, the next move; maybe
monitored our radio and heard a pilot
on a trans-Polar flight far above; then
hit the sack. The wind rattled and
snapped our tent. It sounded like vio-
ently boiling water and, eventually, it
grazed on our nerves.

One day we took off in the Piper Cub
from a fjord on Axel Heiberg Island.
We skidded the top of a huge
iceshelf as we passed over the fjord.
Seconds later the iceberg began to
shatter from the vibrations of our en-
gine. A large chunk weighing hundreds
of tons rolled off; the whole “berg”
topped upside down. This caused fur-
ther vibration and the iceberg broke
again. In a few minutes, it destroyed
itself.

We didn’t hear the “explosion” but
Nieboer, who was quietly reading in
camp, heard the first bang and came
running in alarm. He told us later, “I
thought you’d crashed!” In some ways,
that summer was harder on Art than on
the rest of us, for he was left alone for
hours on end, without continuous work
to occupy his mind.

In a way, none was almost welcome.
The Arctic for the most part is strangely
silent. This doesn’t mean that you are
alone. In the south, we saw seals by
the hundreds, lying on the ice near their
blow holes. We saw Eider ducks, Snow
and Brant geese. We saw more than 100
walruses and we walked among flocks of
gulls without frightening them.

The archeologist is a game preserver,
and rightly so. Indiscriminate hunting
would decimate the wild life. Creatures
in this part of the Arctic have rarely
seen man and usually do not regard him
as an enemy. He is just a curious object
to be investigated. Wesels followed us,
making no attempt to hide. If we stood
still the white Penny’s caribou would
come within a few hundred feet and
stare. We found Arctic fox kits which
snuggled fearlessly in my arms.

We caught lemmings and the little
red foxes were soon running a wheel
Nieboer made with a coffee can and wire
axle. We took four back to Calgary.
They were terrified of children and two
died almost immediately. Another lived
for months, only to fall victim eventually
to the food of civilization.

Only once on the trip did we meet an
unfriendly animal—a shaggy 100-pound
muskox, looking like a walking hay-
stack. He came as near as he could—30
feet away—pawed the snow and tried
to charge us off his property. Fortu-
nately, we were on a snowbank that over-
hung a cliff and the muskox knew it
wouldn’t bear his weight. We retreated
down the cliff, leaving him mothing.

Most animal life we found was on
those parts of the islands which will
support mosses, dwarf grasses and
flowering plants (Arctic poppy, sax-
frage and Arctic cotton). We even saw
dandelions in bloom. The largest plants,
the Arctic willow, is not a tree, but a
creeper. The limestone, sands and most
shakes have little growth; there is simply
no nutrition in them. Moisture is
scarce too. Annual precipitation (half
rain, half snow) is in a mere three to five
inches and the average temperature dur-
ing our stay was in the mid-30’s.

The plants that do grow, mature rap-
idly. An entry in George’s diary mid-
June—“poppies beginning to grow.
July—poppies in full bloom.
August—grasses and flowers are
ripening rapidly; the summer is nearly
over. Lemmings are storing hay in large
quantities.”

This fleeting summer supports few in-
sects. Mosquitoes are no problem; in
fact, it was worth noting in the diary one
day that we saw “two butterflies, some
small spiders, one mosquito and num-
berous non-biting little flies.” Elsewhere
we saw caterpillars and bumblebees.

The perpetual Arctic chill has pre-
served the several Eskimo camps we
encountered: stones of dwellings, whale
and other animal bones and scattered
human skeletal remains. Present sites,
archeological data indicates that these
are several centuries old. We learned to
recognize the campsites from far away
by the stones arranged in circles, the
bones, and the plant growth.

There were other discoveries, too. On
Grinnell Peninsula, part of Devon Is-
land, we wandered upon carvings made
by the British explorer Sir Edward Belcher,
more than a century ago. They contain-
ed notes, of academic interest, which
have been turned over to the National
Museum in Ottawa.

At the request of the RCMP in Res-
olute we also looked for soapstone; the
Resolute Eskimos wanted to carve but
had none. We sent back a substitute: 30
pounds of anhydrite, a common rock,
buff, transchent and easily carved.
The Eskimos were delighted and started
to work with it immediately.

Naturally, our main concern was: is
there oil in the high Arctic? Chipping
away at rocks for geological information,
covering thousands of square miles in a
relatively short period (about 500 miles
each, on foot) cannot give a complete
picture of the geography. But we were
able to report that this area in general jus-
tifies further exploration. It contains one
of the deepest sedimentary basins in the
world—with structures comparable in
size to those of the Middle East. In some
places the sediment may even be 40,000
feet thick. But drilling, the only sure test
for oil, has yet to come, and develop-
ment of the oil, if any, will depend on a
great many factors.

We flew home when our tour ended,
happy to rejoice our families; happy to
return to such luxuries as hot baths,
the hospitable climate and a change of
food. A day or so after we got back, my
wife and I went out for a lobster dinner,
without hardtack biscuits.

Perhaps we’ll be sent back to the Arct-
ic some day. Certainly many other ex-
peditions will go in. And certainly they
will find, as we did, that a man in the far
north needs more than mere physical
resources. He must have a stable per-
sonality and he must be ready to change
and adapt himself to this strange land.
For, in our time at least, I doubt that the
north itself will change.

Arctic fox snuggled fearlessly in my arms.