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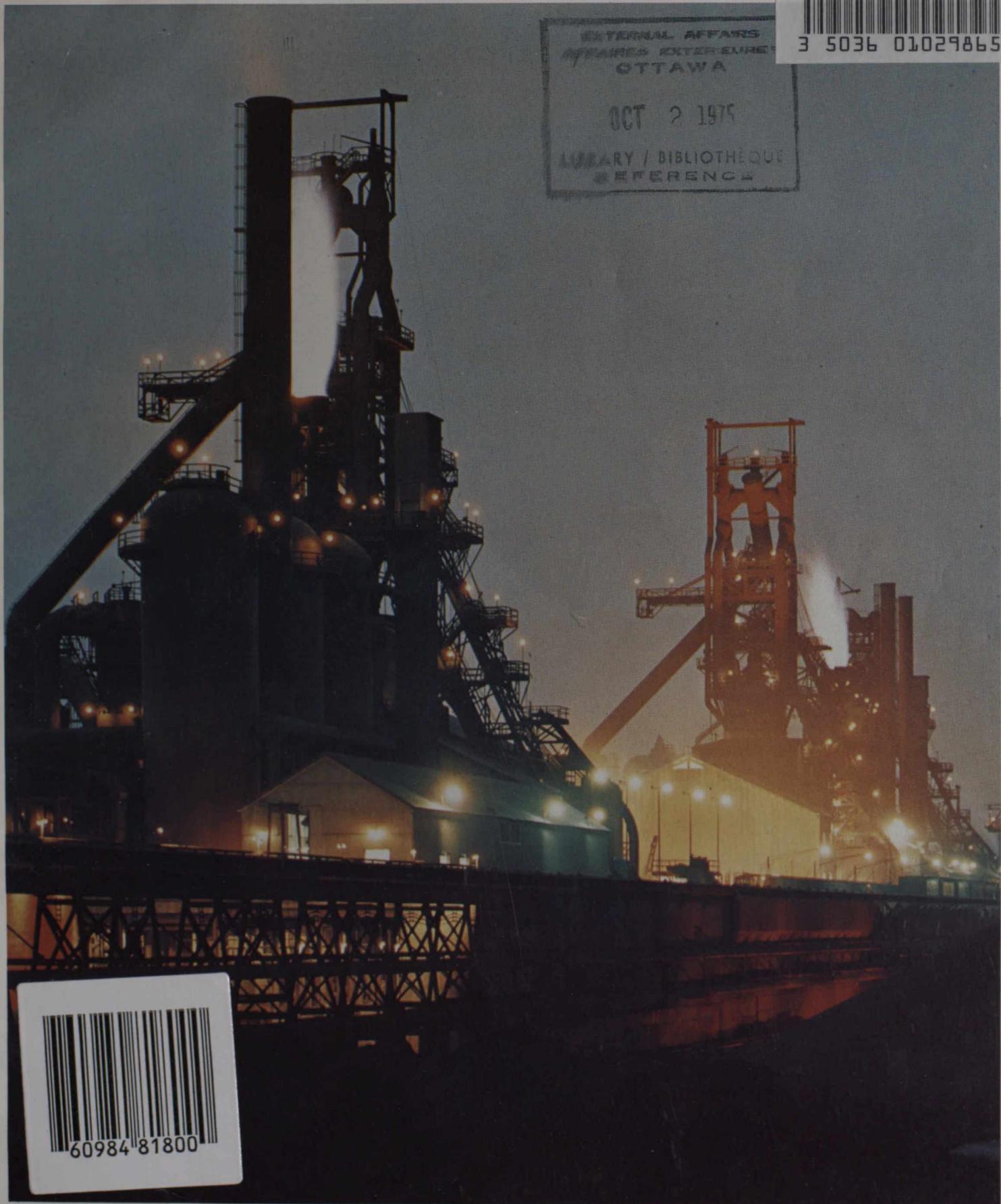


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Cover illustration shows a night view of blast furnaces in operation at Dofasco's steel-making complex in Hamilton, Ontario where the pictures on pages 3 and 5 were also taken.

Canada Today



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Industry:

Steel thrives on new technologies

By J. M. Greene

By international standards, the Canadian steel industry is small, ranking twelfth in the world and producing approximately 1.9 per cent of the total world output. However, it has an above-average growth rate of 7 per cent per annum, compared with the world average of just over 6 per cent. Capacity figures estimated for this year are 16.9 million short tons; by 1980, if the present growth rate is maintained, it should be 24 million short tons.

The Canadian industry has been in the forefront in some of the newest steelmaking technologies. It operates at 90 per cent capacity, which is high by international standards, and is competitive in price when competing on an equal basis.

It has come a long way in a short time. In the 1940s, it was almost non-existent: peak annual production amounted to about one million tons. From then on, demand at home and abroad encouraged rapid growth. Large iron ore mines were opened up. Smelting and milling were developed using a variety of new techniques and the list of products obtained from steel ingots grew steadily.

In the sixties development became explosive. Production capacity more than tripled between 1962 and 1972, with technical advances in almost every stage of operation. The industry has also formed an efficient system for marketing and distribution, which in a country as widely-spread as Canada is a considerable feat.

To describe the Canadian steel industry as stretching from coast to coast is a slight exaggeration, but in a broad sense true. From east to west, there is Newfoundland Steel at St. John's and the Sydney Steel Corporation (Sysco) on Cape Breton Island, owned by the Nova Scotia Government. On the west coast is Western Canada Steel (Cominco), based in British Columbia. With a few exceptions, steel companies in Canada have tended to locate themselves close to markets.

Ontario and Quebec

Other integrated mills and a majority of the smaller steelmaking firms are concentrated in Ontario and Quebec. The Steel Company of Canada (Stelco), Dominion Foundries and Steel (Dofasco) and the Algoma Steel corporation are the three integrated mills in Ontario, accounting for about 80 per cent of Canadian steel production.

The newest integrated steelmaker in

Canada is Sidebec-Dosco, based at Contrecoeur, Quebec, an up-to-date plant fitted with new electric furnaces and a Midland-Rose pelletised iron-ore reduction system.

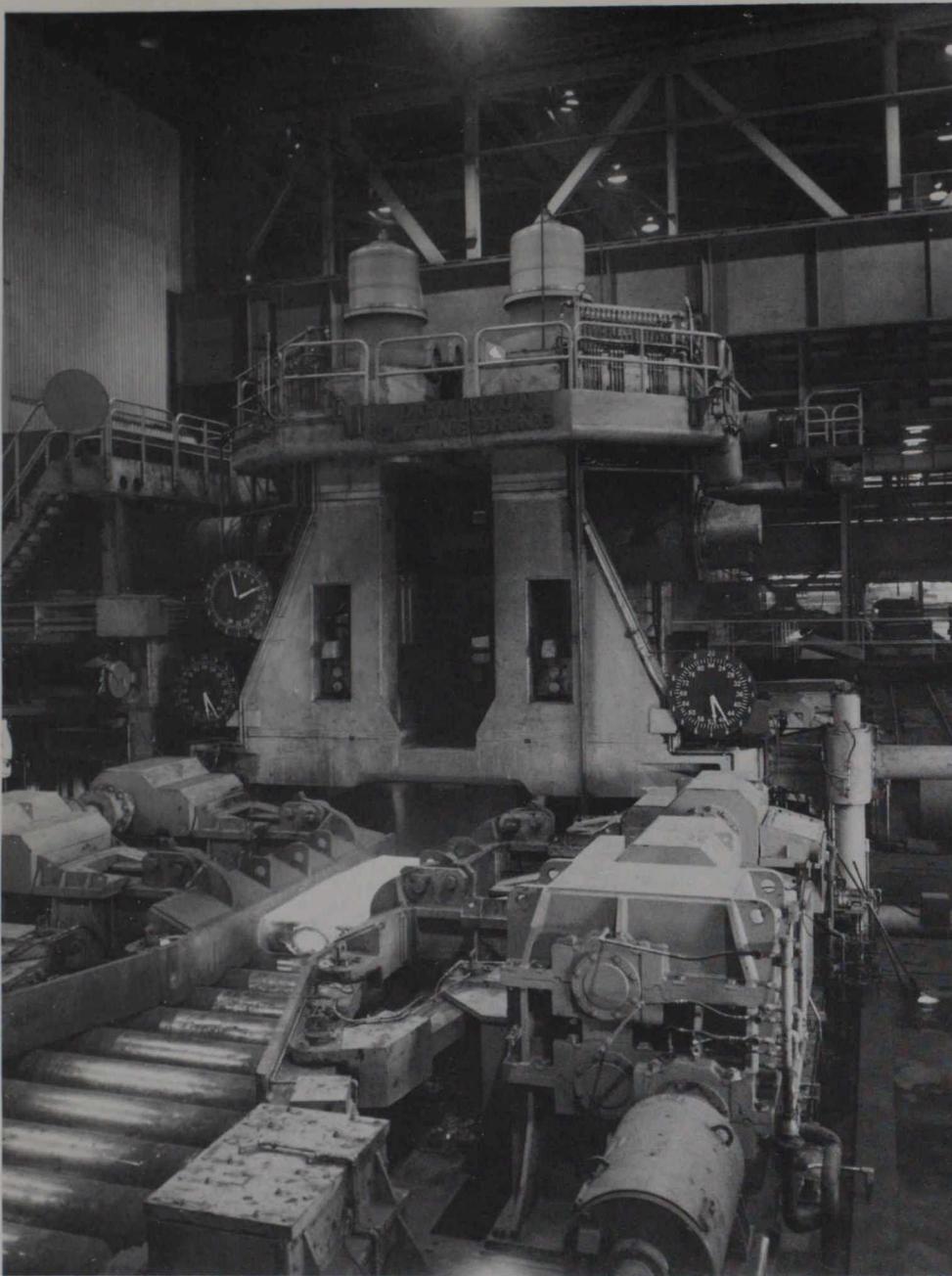
In addition to the six integrated companies, there are a number of small steelmakers using electric arc furnaces and cold-scrap charges. Rounding out the industry there are several manufacturers with only a variety of rolling mills for furnishing operations and one speciality producer, Atlas Steels, of Welland, Ontario.

The companies are distributed unevenly among the provinces with the highest concentration in the highly industrialised province of Ontario. Most of the big organisations are situated there. Quebec, which contains about 25 per cent of Canada's population, accounts for only 12 per cent of its steel consumption. Generally speaking, the industry is geared and tailored to the needs of local markets. This is true to some extent even of the three giants — Stelco, Algoma and Dofasco — though they also look further afield and sell their products throughout Canada.

Plants across Canada

Stelco is the largest steel producer and its production line covers the widest range. Except for rails and structurals it covers almost the remainder of the spectrum. It has 19 manufacturing plants across the country. Its western plants are major suppliers of Western Canada's steel needs and export to several foreign countries. In Burlington, Ontario, it has recently opened a remarkable research centre — a steel works in miniature with pilot steelmaking and rolling facilities and advanced equipment for physical, chemical and metallurgical experimental analysis.

The second-largest producer is Algoma, the only Canadian manufacturer of wide flange beams, rolling beams up to 24 inches in depth. In 10 years Algoma has spent more than \$300m. in capital expenditures, primarily for new rolling and processing facilities and on projects to control air and water pollution. Their computer-controlled 166-inch plate mill makes the widest range of steel plate products in Canada. Customer orders, scheduling, order tracking and production control are all computer based. Being the most Western of the "Big Three", Algoma exports a larger percentage of its production to the United States than Stelco or the third giant, Dofasco.



Dofasco's production line, concentrated on a 793-acre site in the industrial centre of Hamilton, is primarily limited to flat-rolled items and castings. Its carbon, alloy and steel castings — up to 25,000 lb. — include railroad-car products, steel valve-castings and components for mining equipment. Among Dofasco's customers for hot-rolled and cold-rolled items are producers of consumer goods such as cars, agricultural machinery, construction, containers, other machinery and tools, appliances and utensils, and railway cars. National Steel Car, which makes railroad cars, is a wholly-owned subsidiary.

Dofasco has invested \$334m. in expanding its facilities over a 10-year period. Production is by the L-Oxygen steelmaking process which they introduced to North America in 1954. Their products are exported to many countries and sold throughout Canada.

Raw material in plenty

Canada's steel industry is based on an almost unlimited supply of raw material.

Although less than one-third of the country has been surveyed geologically, known iron ore reserves are evaluated at around 36 billion tons. Potential reserves are estimated at about 89 billion tons, giving a known and potential total of 125 billion tons.

Exports of ore

Current iron ore production is approaching a total 70 million tons. Much of Canada's ore is exported, mostly as high grade concentrates and pelletised products. Production more than doubled between 1962 and 1972 and is expected to reach about 20 million tons annually by 1980. Anticipating growing demand from established markets and new customers, the iron and steel producers spent more than \$1 billion over that same 10-year period on modernising, expanding and establishing new plant facilities. Expansion is expected to be even greater over the current decade ending in 1982.

There is a certain amount of foreign investment in Canadian steel. Two of the

companies are entirely foreign-owned. The Atlas Steel Company at Welland, beside the Welland canal section of the St. Lawrence Seaway, is owned by Rio Algom, part of Britain's Rio Tinto Group. Atlas converts selected steel scrap and alloying elements into speciality steels, fashioning them into a wide range of mill shapes and sizes. Its continuous casting machine — introduced at Welland in 1953 — was the first of its kind in North America. A newer plant at Tracy, Quebec, produces stainless steel sheet and strip. Atlas are constantly researching towards new products, a recent result being their scruff and scratch-resistant steel sheet and strip.

The Crucible Steel Division of Colt Industries (Canada) is entirely owned by the parent company, Colt Industries, in the United States. The British Steel Corporation owns 51 per cent shares of Slater Steel and a 25 per cent interest in the Interprovincial Steel and Pipe Corporation (Ipsico), a relatively young company founded in 1956 which has been the first in the world to supply the X-70 grade large diameter pipe. Use of this new pipe makes significant savings in creating pipelines and is of particular interest for design and applications in Arctic conditions.

Mannesmann of Germany holds 25 per cent of Algoma's shares and has three executives on the company's board of directors.

Flat-rolled expansion

Recent investment within the industry has concentrated mainly on expanding its capacity in flat-rolled products. Geographically, it is concentrated mainly in Ontario, Quebec and Nova Scotia, though provincial authorities across Canada have been making considerable efforts to encourage the establishment of a basic steel industry in particular provinces.

The large primary-steel companies have been increasing investment in the secondary sector. Considerable investment has been directed toward rationalisation and pollution control. The iron and steel foundries in particular are investing heavily in equipment to abate pollution. The steel-fabricating plants tend to concentrate investment in modernising their equipment, this being their main weapon in the price-fighting battle.

Technologically, the largest benefit over recent years has been from the use of basic-oxygen furnaces. By the end of 1971, these accounted for 43.3 per cent of Canada's steelmaking capacity. The advantage of this method is an enormous saving on the batch time: the tap-to-tap time is between 45 minutes and one hour, against six to eight hours for most open-hearth methods. The lower capital costs as well as the saving in time and labour cost can result in an ultimate saving of between \$2 and \$10 to the ton, depending on the efficiency of the open-hearth that is replaced.

Two other major technological advances — the increased use of continuous casting

and the introduction of direct-reduction steelmaking — hold promise for the future, when modern facilities are likely to be introduced at an even higher rate.

The largest domestic consumer of steel in Canada is the construction industry, accounting for an estimated 20-30 per cent of domestic consumption. Two years ago, shipments to the automotive and aircraft industries amounted to 11 per cent — but this is now declining since the car industry accounted for over 90 per cent of the total. Pipes and tubes, on the other hand, provide a market full of promise, particularly with regard to large-diameter pipe that is used in constructing pipelines to oil and natural gas discoveries in the North Sea. A growth rate of 7 to 8 per cent from pipe demand seems feasible.

The remaining 45 per cent of demand is accounted for by 13 other categories

including wire and wire products, natural resource industries, appliances, containers, railway vehicles and tracks, and agricultural equipment.

The growth of the domestic market is likely to continue supplying a large part of the industry's strength, alongside opportunities for exports. There is, however, an important change to be reckoned with. While most steel-rolled products are now manufactured domestically, imports are increasingly price-competitive. Consequently, to displace or even resist the growth of imports is much more difficult now than it was in the fifties and sixties. In this competition domestic producers have one great advantage: because of the size of Canada and the high costs of transportation relative to the value of steel, foreign producers have to reckon with competing on a regional as opposed to a national basis.

Export markets

Exports of Canadian steel have meanwhile been gradually increasing. The ratio of exports to domestic shipments rose from 4 to 14 per cent through the 20 years ending in 1973. The largest consumer is the United States, accounting for an average of 66.3 per cent of exports between 1968 and 1973. Since an estimated 33 per cent of this total went to the automobile industry in America, which is vulnerable like the rest of the world's motor industry to the demand slack on cars, a change in this figure over the current year is not unlikely. A distant second after the United States is Latin America. Small amounts of steel are also exported to Europe and South-east Asia. ♦

They're standing up to economic pressure

By Jenny Pearson

The Canadian steel industry, rapidly built up and modernised over the past decade to meet the demands of the country's industrial expansion, has been holding up well in the context of the international economic situation. In spite of warnings from steel magnates that threatened strikes and declining demand in certain sectors of the economy could rock, if not upset, the apple cart, the industry as a whole stands remarkably firm compared with Britain's steel industry, where production cuts have lately been a problem.

Last year the industry in Canada maintained its upward progress with increases in overall production (to 15 million tons) and employment. Profits reached record levels — though as J. Peter Gordon, president of the Toronto-based Steel Company of Canada, commented, comparison of 1974 figures with those of previous years "must take into account the serious distortions caused by inflation."

In 1975, the upward tempo of economic activity in Canada has levelled off in response to the recession in the international economy. There have been declines in some steel consuming sectors of the economy, notably in the motor appliance and construction industries. Demand has softened and the general outlook for steel is expected to reflect this uncertainty in the economy.

But it is anticipated that heavy steel plate will continue to be in short supply. For most other steel products, the supply situation is expected to ease somewhat during 1975.

But the steel foundry industry should be relatively unaffected by present economic trends and will probably remain buoyant during 1975, according to recent Ottawa estimates.

Reactions to economic uncertainty have varied from one steel company to another — for Canadian steel is still largely in the hands of private enterprise, with the exception of certain companies controlled or partly controlled by provincial governments. The huge Dominion Foundries and Steel Company (Dofasco), having announced last year a plan to increase annual steel ingot production to a capacity of more than six million tons, began work in February on a new \$103 million steel-making plant in Hamilton, Ontario — just the first stage in a giant development programme. That's fairly solid optimism.

Cautious optimism

The Algoma Steel Corporation, of Sault Ste. Marie, Ontario, expressed a more cautious optimism in their annual report published in March. David Holbrook, their chairman, noted that in spite of predictions of a decline in domestic steel use, Algoma's backlog of orders at the end of last year stood at a record high. Steel intended for the weakening automotive market had been diverted to other uses.

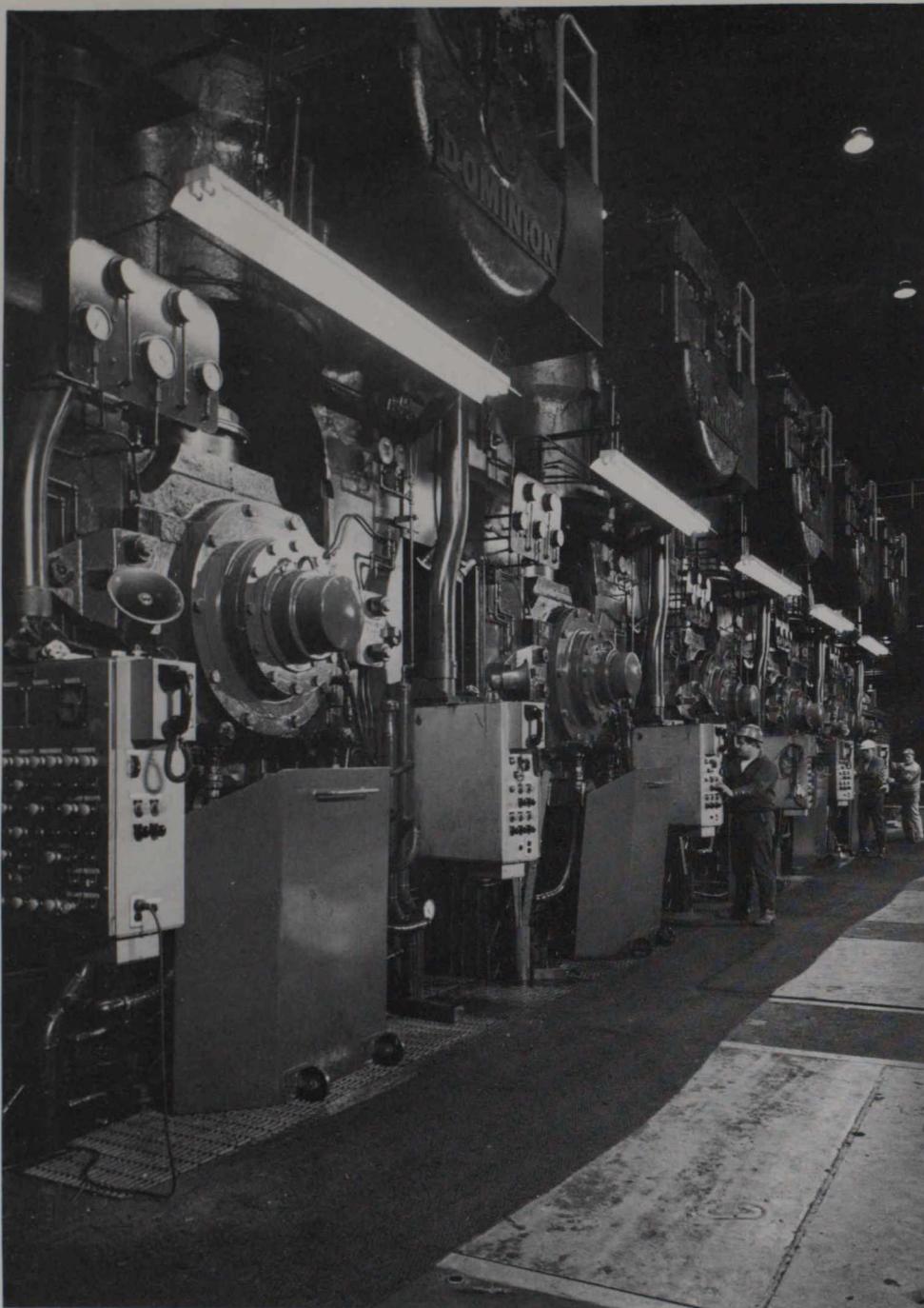
Mr. Holbrook said the domestic steel industry was in an enviable position with

its up-to-date equipment, energy supplies and personnel. He concluded: "There does not appear to be any need to revise forecasts of continued long-term growth."

Algoma's steel production last year actually cost them less than in 1973. "Increases in product prices, high steel product shipments and economies achieved in operations from the new... basic oxygen steelmaking plant and from greater tonnages of continually cast steel more than compensated for the sharp rise in prices paid for services and commodities."

Canada's big steel companies have in fact been modernising very actively over the past decade, which is a big factor in keeping their product competitive. Imported rolled steel plays a large part in the industry as a whole — last year Canada imported a record 3.2 million tons — but in spite of a lowering of prices on imported steel (the result of softening demand on the world steel market), Algoma sailed into the new year confident that Canadian prices would stay below those of imported products and that steel imports over the whole of this year would drop.

Another major steel company to sound the clarion of optimism early in the year was the Steel Company of Canada (Stelco), which is based in Toronto and processes about 40 per cent of all steel made in Canada. Its annual report was confident that Canadian demand for steel would continue firm overall, despite the weakening demand in some domestic sectors. An expected replacement of imports by



domestic shipments coupled with a strong demand for capital goods should, said the report, keep the market for Stelco's products firm.

Last year was "outstanding" for Stelco, too, with profits and sales at record levels. Demand kept the Stelco plants working at full tilt and almost without exception the allocation of their products was maintained throughout the year.

New plants were brought into operation at Contrecoeur, Quebec, and Edmonton, Alberta, bringing Stelco's raw steel capacity up to about six million tons a year — and it is still expanding, showing confidence that Canada, although forced to import raw steel in order to meet all its needs, will be able to go on producing its own steel at a price which can compete with imports.

There is, however, no denying that the policy of confidence adopted by these steel companies is tempered by an uneasy awareness that the wind could change. It is significant that they feel it necessary to

reassure everybody that nothing is wrong, where two years back they would simply have been glowing with optimism and talking about expansion towards a bigger, brighter future.

There are several imponderables at work which have to be kept in view. First, the industry's ability to weather the demand slack in such key users as the automobile and appliance industries and to redirect tonnages into stronger areas. Second, although price differentials between imported and domestic supplies still favour Canadian producers, price-cutting by foreign producers is expected to get more intense. Third, a strike-free settlement of new labour contract negotiations by Stelco and Algoma earlier this year could lead to a reduction in demand over the third quarter of the year, as users who built up their stocks as a hedge against a possible summer strike work off their inventories. Fourth, although the rate of production and raw material cost increases is expected to moderate in 1975, major

steel producers are expected to offset wage and fringe benefits in new labour contracts by raising prices.

A Toronto steel analyst has summed up the situation in a statement that "While the steel industry may not be as robust as it was a year ago, there are other areas in the economy doing a lot worse."

Most analysts believe the domestic industry's position will not be severely undermined by low-priced imports — indeed, Canadian manufacturing companies who had to buy high-priced imported steel last year have been eagerly establishing good relations with domestic mills.

But the analysts and the steelmakers themselves are more cautious about demand, wondering how it will hold up in the second half of the year.

David Holbrook of Algoma, addressing their annual shareholders' meeting in May, said that steel production in the early part of 1975 was less than one per cent higher than a year ago — "and we don't see any more than nominal growth over last year, especially as a number of key economic indicators continue to fall."

Fuel set-back

J. Peter Gordon of Algoma has been taking a more hopeful view, believing that the domestic market could well regain its firmness towards the end of the year. F. H. Sherman of Dofasco has commented that a forecast "turnaround" of the economy in late 1975 would improve demand for steel products in the consumer market.

Hopes for lower-priced steel products resulting from modernisation and streamlining of production have taken an unfortunate knock from an offsetting rise in the price of coal, gas and fuel oil — energy components which are the core of steelmaking. Algoma noted that in the first quarter of this year costs were 84 per cent higher than they had been a year earlier, while oil and natural gas costs were more than 70 per cent higher. Inflation has also caused a heavy increase in the cost of new steel plant equipment.

Nevertheless, at the time of writing the domestic market does seem to be holding up. The only noticeably "weak" product is cold-rolled steel, which is used in the automobile and household appliance industries — though the steel intended for cars can, as Algoma has shown, be diverted to other uses. Demand for cold-rolled steel could stiffen again with an increase in house construction, which would in turn boost the demand for appliances.

Demand is strong for heavy steel plate, structural steel, rails and hot-rolled sheet and strip: rails, in particular, are in great demand. Machinery and heavy equipment manufacturing, industrial projects, power plants, refineries and other energy-related programmes are also keeping up a solid demand for domestic steel. ♦

Archaeology :

Indians lived here 5,000 years ago

Archaeological research in the Bonavista Bay area, Newfoundland, has unearthed evidence of Indian settlements dating back 5,000 years. Work has been under-way for three years and Paul Carignon, curator of the Newfoundland Museum, says that hundreds of artefacts have been discovered near Terra Nova National Park, on the northeast coast of Newfoundland.

Research has uncovered evidence of three groups of Indian inhabitants in the area. The earliest are called the Maritime Archaic, because they lived mainly on coastal food sources. They were the first known people to inhabit Newfoundland and groups appear to have migrated into Bonavista Bay by 3,000 B.C.

These Indians are best known for their large cemeteries in the Bonavista Bay area, each cemetery containing large numbers of graves with accompanying grave offerings. The recovered artefacts are all made of stone because the bone and wooden tools used by these Indians did not last in the ground.

Mr. Carrington said they had found spears and knives made of chipped stone, which were used for hunting and butchering seals, whales and other sea mammals. "The knives were of various shapes and undoubtedly some were hafted into bone and wood handles, much like today's steel knives." Ground stone axes attest to

various woodworking activities, including frames for tent structures, firewood and perhaps dugout canoes and carvings. While no cooking or storage vessels were found, this could be because these were made of perishable materials.

Charcoal from cooking fires has been chemically analysed by the radiocarbon method and so far the earliest date obtained is 2,950 B.C. — although Mr. Carignon expects to obtain dates several hundred years earlier. The culture of these Indians went on for centuries in the Bonavista Bay area.

Meanwhile, an entirely different people—the Dorset Eskimo—began to migrate out of the Eastern Arctic and down the Labrador coast. The date of their appearance in Newfoundland is thought to be around 300 to 400 AD. They spread quickly across the coastal areas.

It is not known whether the two groups lived together peacefully or battled. A major Dorset community, dated to 300 AD, has been found on Bonavista Bay. The Dorsets brought a completely new set of tools and hunting equipment with them, a product of their life in the Arctic. They used new styles of point, bone tools and knives to hunt the same animals as the Maritime Arctic. Their stone lamps and cooking vessels were generally rectangular and made of soapstone.

"The appearance of these unique and fascinating people is as much a mystery as their ultimate disappearance," Mr. Carignon commented. After 600 to 700 AD, archaeologists are unable to find any trace of the Dorsets, whose migration to Newfoundland makes the province "the most southern extension for any known Eskimo group in North America."

The final group of natives were the Beothuck Indians. Artefacts from their camps include notched arrowheads, small scrapers used for processing skins and triangularly shaped knives. Like the other two groups, these Indians were coastal oriented. It is not known whether they were descended from the Early Maritime Archaic. Mr. Carignon says: "It is possible that Archaic Indians survived through the Dorset period and with the demise of the Eskimos re-emerged to be known in historic times as Beothuck Indians."

Researchers of a Beothuck burial ground in Bonavista Bay have found red ochre, carved beads, pendants, shell beads, iron nails, remains of a sword and several clay pipes. The pipes, identified as French in origin, date back to 1580 — which makes them the earliest-known pipes yet found in North America. It seems they were obtained from early French fishermen — which is the first indication there has been of contact between these two peoples in Newfoundland.

The Bonavista Bay research was supported by the Museum and the Archaeological Survey of Canada. Artefacts become the property of the museum and go on display once examined and catalogued. Major archaeological research has only been going on for 10 years in Newfoundland and, according to Mr. Carignon, it is "one of the three hottest archaeological areas in Canada." ♦

Rock structure rivals pre-European geometry

Geometry was known and used in Canada at least a century before European man arrived on the North American continent, archaeological theory suggests.

This is deduced from a gigantic rock structure, involving stairways, paths and low walls, found near North Bay in the central Canadian province of Ontario. Built more than 500 years ago, the structure has an elaborate configuration of paths leading up a granite slope. A mound of rocks shaped like a serpent flanks the structure, which covers an area 160 by 165 feet.

Mr. Allen Tyyska, an Ontario government archaeologist, recently told a meeting that wall and path lengths range from six, 12, 24 to 48 feet — a geometric

progression of 1 : 2 : 4 : 8. All walls are six or 12 feet long, said Mr. Tyyska. Corridors and stairways are 24 feet and the serpent-like figure measures 48 feet.

Geometric order and precision are also suggested by two small figures chiselled into the rocky face beside the corridors. One forms an isosceles triangle whose angles all are multiples of 18 degrees. The other calls to mind a human-like figure poised to leap. Mr. Tyyska said the figure has angles all in multiples of 18 degrees.

The archaeologist said blueprints of the rock structure suggested that architects had deliberately used geometric progressions in laying out the entire structure. Studying the blueprints, he found that lines drawn at 18-degree intervals or arcs

coincided with focal points on the structure — the serpent's tail, neck, nose and so on. Indeed, he said, every major point of the structure coincided with the arcs or with triangles and circles geometrically produced by the arcs.

Anticipating objections to his theory, he agreed it might seem surprising to find manifestations of geometrical practice in the prehistoric Canadian shield.

"I suppose many of us are inclined to suspect that the mathematics here described are the projections of a 20th-century mind," he said. "However, I think reflection will confirm the logical necessity that deliberate geometrical thought preceded the building of this structure." ♦

Drop-outs and stop-outs decline

Canadian students are showing a new interest in university education — and the jobs it may help them to get. Enrolments are up some three per cent across the country, with science, engineering and business courses enjoying increased popularity.

The trend leaves educators hopeful they may have seen the last of the “drop-outs and stop-outs” who caused a fall in enrolments over the past few years. The term “stop-out” is applied to high school graduates who decide to take temporary jobs or travel, often in Britain and western Europe, before settling down to higher education.

The emphasis is strong on job-oriented courses, officials say. A. M. Kristjanson, spokesman for an organisation of universities and colleges, says the national pattern shows a strong interest in vocational subjects.

Study for jobs

“Students are tending to concentrate on courses they feel will lead to a job,” he said.

This has resulted in greater interest in science, professional and business curricula. Federal government officials estimate that more than 500,000 students enrolled in degree programmes in 1974-75, and predict undergraduate enrolment will continue to increase at the rate of nearly five per cent a year until 1977.

Nearly all of Canada's 68 degree-conferring institutions reported a higher incoming rate of students, with the three largest Canadian provinces, Ontario, Quebec and British Columbia, leading the way. British Columbia, a province with a high proportion of younger people and generous student bursaries — recently increased by nearly 50 per cent — sets the pace for Canada in student enrolment, official figures show. The rate of increase in British Columbia is estimated at between five and six per cent compared with three per cent nationally.

Record set

One Canadian university — McMaster in Hamilton, Ontario — set a record for first-year enrolment in 1974-75. Science and engineering courses proved especially popular.

While most officials agree that the emphasis appears strong on vocational courses, there are some schools, such as

York University in Toronto, where enrolment in science programmes is down. The pattern varies somewhat from university to university, officials say. Educators predict the mini-boom in enrolments will probably increase until the early 1980s. Lower birthrates in the early 1960s may cause a tapering off about then.

Farmers dig for gas

Farmers in a rural Ontario community, cut off by the local gas company, are digging gas wells of their own in their backyards.

Once a common practice, the new well-digging spree was spurred by a decision of the local gas company to discontinue service to rural customers in the Fisherville area, about 25 miles south of Hamilton.

When Fred Snider, a farmer, heard from the gas company that his supply was going to be shut off, he said “Like heck!” He joined up with his son and a neighbour to buy an old gas drilling machine and they began drilling under a pasture in their spare time. They have already brought one gas well into production in the younger Snider's backyard and have plans for at least two more.

Ron Snider, the son, says that the well has the potential to produce about 10,000 cubic feet of gas a day. On the coldest day, he reckons that about 1,000 cubic feet is required to heat the house. The drill rig they use is an antique unit, originally a hand-made copy of an old Union Gas drill.

Harold Meadows, a retired farmer living several miles away, has two wells producing gas — one dates back to 1926 — and is now having a third drilled. He proudly declares, “When you have your own gas well, then you don't have to be dictated to by anybody.”

The decision by the gas company to discontinue supplies to some 950 rural residents was made after 24 miles of pipe became corroded. They decided that it would be too expensive to replace. The Ontario Energy Board gave permission for the service to be discontinued but ordered the company to compensate gas-users who had to switch to other energy forms.

The company brought in natural gas from outside the area since most of their local wells were sold or abandoned. Art Newton, a geologist working with Union Gas, says that although chances of drilling a well successfully in this area are good, the costs may outweigh the benefits. Nor can drillers be sure of hitting gas on every attempt.

The drilling and plugging of private wells is carefully supervised by the provincial government's Petroleum Resources Section and cannot lawfully be done without a permit.

Free bus rides

They're giving free bus rides in one Canadian city — to help ease traffic problems. The free transit system, believed to be unique on the North American continent, is operating in Winnipeg, capital of the western Canadian province of Manitoba.

Twelve buses from the city's regular service operate a shuttle system in the centre of Winnipeg, covering main streets in downtown business and shopping districts. The idea is to encourage commuters to leave their cars at home. An average of some 15,000 passengers weekly used the system — known as DASH or Downtown Area Shuttle — in its first weeks.

The experiment is jointly financed by the city and the provincial government. Buses operate at five-minute intervals Monday to Friday. The idea has won enthusiastic passenger approval.

Scott's letters

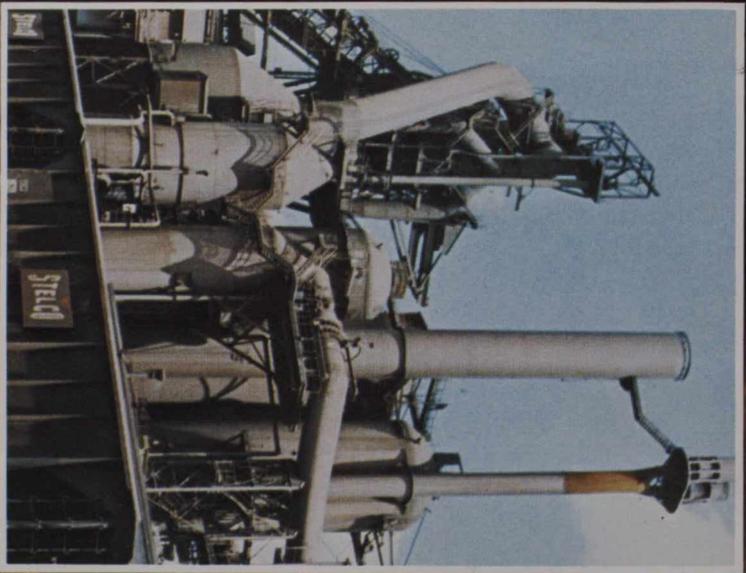
Researchers at the University of Guelph Ontario, have found 44 letters written by Sir Walter Scott in a paper bag among 14,000 items of eighteenth and nineteenth century documents and manuscripts, recently acquired in Edinburgh.

Professor Stanford Reid, head of the university's history department, enthusiastically describes the collection as the world's leading one of Jacobite material. Recently he declared: “I believe Scottish students will have to come to Guelph in the future if they wish to make a thorough study of their own history.”

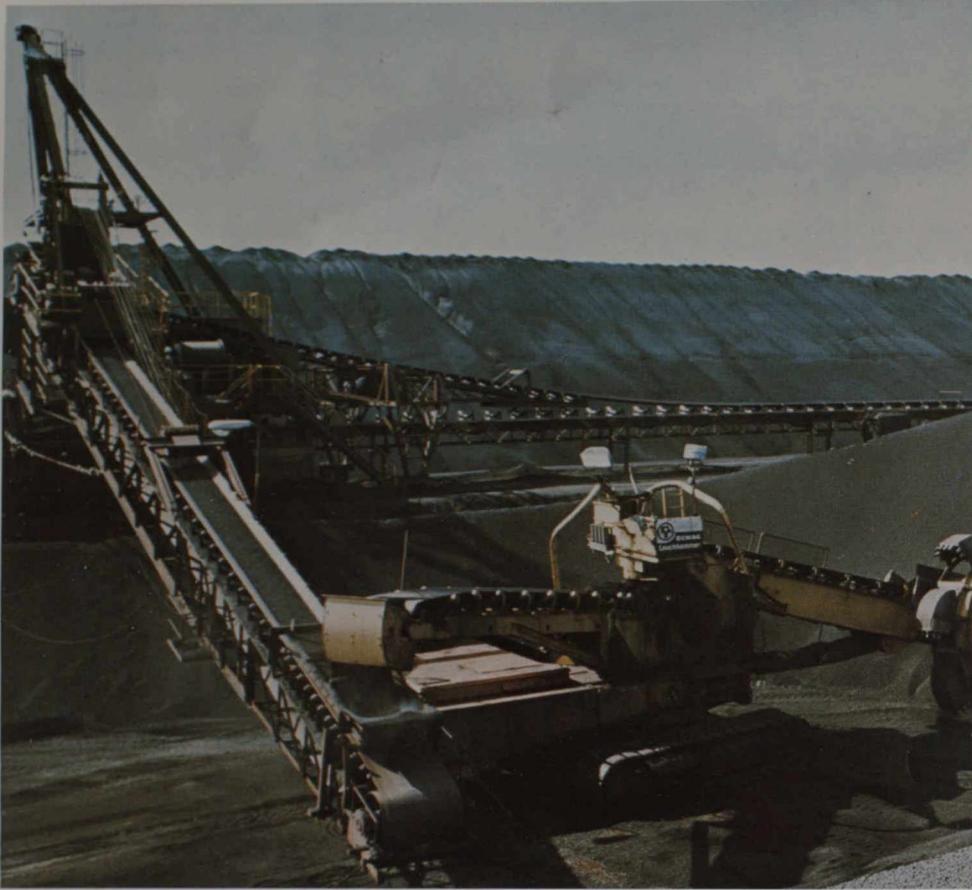
The collection also contains letters written by Byron and Robert Burns, written to or collected by the Aberdeen hardware merchant John Even, a patron of the arts.

Guelph University has a strong link with Scotland, being founded by a Scot, John Galt. Professor Reid's own ancestors came from Scotland in 1826 and he proudly declares: “We probably have more people studying Scottish history here than they have in Scotland.”

Out of the earth and through the mills steel emerges

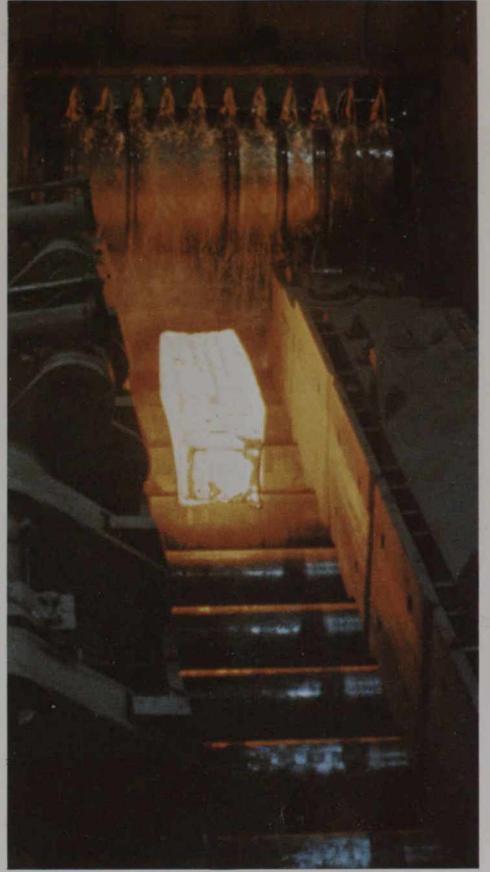


*Open hearth furnace in operation and (inset) exterior of a blast furnace,
Steel Company of Canada.*



Above: Open-pit iron ore mining at Sept-Iles, Quebec.

White-hot steel passing through the rolling mill.



Below: Teeming on the oxygen melt shop floor. The average weight of ingots poured during this operation is 10 tons.



Medicine

Scientific accident helps patients to breathe

People who need to breathe oxygen because of respiratory diseases have been helped by an accidental discovery by scientists at the University of Calgary five years ago.

The scientists, Dr. Robert A. Ritter and his assistant David G. Turnbull, were working on a chemical process with commercial applications when they stumbled upon a new and simple method of producing near-pure oxygen from ordinary air. This has now been adapted for use by patients in the home, providing an alternative to the conventional use of bottled oxygen.

The health department of the Alberta Government helped Dr. Ritter and his partner through a grant and loans to set up a commercial company which now markets a machine to do this job. The department itself has bought 30 of these machines and has been lending them out for use at home on a trial basis for patients suffering from such diseases as chronic bronchitis, emphysema, asthma, bronchiectosis and cystic fibrosis.

One patient using the Reox 2500 unit, as the first Ritter model is called, is Irene Kettner, 45, a Calgary housewife who was previously hooked to an oxygen bottle, spent a lot of time in hospital and was unable to do much exercise or work. She suffers from a heart condition complicated by the loss of one lung—and she is full of praise for the new machine. "It gives me mobility which I didn't have with the oxygen bottle. It's easy to operate, safer to use and much cheaper. It takes away the depression I had with the oxygen bottle."

The average cost of operating a Reox 1500 is \$6 a month, compared with over \$200 for bottled oxygen. The savings in hospital bills are even bigger: about \$100 per patient-day in Alberta. Other advantages are elimination of the possibility of bottled oxygen exploding and security of supply, as all it needs is household electricity current and air.

10-ton capacity

Dr. Ritter says it is economically viable to produce Reox systems with a capacity of up to 10 tons of oxygen a day. Above that capacity conventional methods are preferable.

His firm has had inquiries from hospitals and nursing homes about using Reox systems as a central source of oxygen. The process also promises wide applications in other fields such as cutting and welding, on ships and aeroplanes, chemical manufacturing and "whenever there is a need for a small quantity of oxygen."

It can also be applied to the separation of other gases and liquids. Dr. Ritter is seriously looking into the possibility of using the process to produce helium from natural gas.

Helium, a rare gaseous element which is lighter than air and does not burn, is irreplaceable because once it is lost it escapes to the upper atmosphere. Dr. Ritter estimates that about \$25m. worth of helium is being lost in natural gas production in Alberta annually.

The patent for the process is held by

the firm of Ritter Engineering, set up last summer when Dr. Ritter and Mr. Turnbull left the university to devote full time to commercial development of their discovery.

This was made while they were studying the process of absorption chromatography as a possible method of producing polystyrene, a common plastic used in the manufacture of a wide variety of products. The process uses the ability of certain molecules to attract and hold other molecules; they decided by chance to test it on air before trying it on ethyl benzene, the raw material from which styrene was to be extracted. After a few tests they discovered they had found something they weren't looking for—an easy way to produce an almost pure oxygen.

They developed an absorbant or molecular sieve to hold nitrogen, which constitutes 78 per cent of atmospheric air, while permitting oxygen to pass through. The absorbant, consisting of aluminium silicate and calcium cations, is capable of producing oxygen of up to 95 per cent purity. To provide a continuous flow of oxygen, two sieves are used in each separator unit, with one producing oxygen while the other, under the influence of a vacuum, cleans itself of nitrogen. The sieves alternate their functions at two-minute intervals.

Dr. Ritter reckons that with the exception of precision metal-cutting, which requires 100 per cent pure oxygen, the oxygen produced by the separation process can replace bottled oxygen in almost all medical, commercial and industrial applications. ♦

Schools wage cut-price war on trash foods

Seven school boards on the island of Montreal have adopted a novel form of warfare against the trash foods that are ruining children's teeth throughout the civilised world. While banning trash foods from their school cafeterias, they have at the same time slashed prices for wholesome dishes with a subsidised food programme to discourage children from taking their custom elsewhere.

Candy and soft drinks are no longer available from vending machines; instead, the cafeterias offer milk and fruit. As a result, just over 30 per cent of students now buy the nutritionally balanced hot plate (for less than 50 cents), and 90 per cent of both elementary and secondary pupils buy one or more of the single items on sale (price from 5 to 15 cents) such as fresh fruit, side salad, yoghurt or cheese. Milk is the most popular drink.

Miss Nicole Saint-Jean-Demers, chief dietician of the Montreal Catholic School Commission, helped devise the programme, which evolved from a successful food subsidy system innovated by the Catholic Commission in 1973. She says prices have been cut only on items which were not automatically popular.

Her own board is the largest participant with 59 schools. An eighth board is expected

to follow suit in the autumn. Miss Demers is now working on a nutrition programme to educate parents.

Junk foods banned from the cafeterias include any food made mostly of sugar such as candy, pastries rich in sugar and fat, biscuits or cookies with more sugar than dough, carbonated or soft drinks, peanuts, chewing gum, potato chips and deep fried foods, fish and chips, and doughnuts.

Favourites such as hamburgers, hot dogs, pizza, smoked meat and submarine sandwiches are permitted, but only as alternatives and only two or three times in a six-week period. Ice cream, milk and chocolate are allowed. Many parents have inquired why and in reply Miss Demers quoted the Order of Dentists research which, she said, proved that foods leaving particles in the teeth contribute most to tooth decay. Therefore ice cream and chocolate, which melt quickly in the mouth, are allowed while peanuts are banned.

At first children mourned the disappearance of sugar-laden foods, but after five months most of the schools seemed to have accepted it. Miss Demers says that "only the teachers are asking for soft drinks now!" The principal of one school participating in the programme says that children have been given permission by their parents to go out to "junk food stores around the corner" for lunch. He commented; "Now what we need is a good, strong nutritional education programme for parents."

This is just what Miss Demers is working on with the Catholic Board. Three other school boards are also looking into ways of enlightening parents.

Movement helps to mend bones

Methods of treating broken bones in human beings may be revolutionised by Canadian experiments with rabbits which cast doubt on century-old theories that rest hastens healing. Studies at Toronto's Hospital for Sick Children point to the need for motion rather than rest.

The experiments showed that damaged knee joints of rabbits did not heal properly when the rabbits were totally immobilised. But when the limbs were kept in motion, healing was much more rapid.

The new methods were discussed at a clinical research society in Toronto by Dr. Robert Salter, surgeon-in-chief at the Hospital for Sick Children. He said sustained motion appears to stimulate certain fledgling cells in bone marrow. Further study was needed before such methods could be used with human casualties, Dr. Salter said. But the principle of motion rather than rest appeared feasible providing broken parts were set with metal screws.

Crime

Project proves value of supervised bail

The controversial Bail Reform Act brought in by the Canadian Government in 1972 has been praised or blamed for a variety of problems in different cities.

In Toronto, for example, it has been criticised by police as providing new opportunities for bail abuse and absconding, and for allowing potentially dangerous persons to roam loose when they should be locked up. One Ontario police chief said recently career criminals account for over two-thirds of all criminal activities in Canada, and the Act allowed these criminals to "be at liberty to prey on society."

But from Vancouver comes word of a pilot project for bail supervision that seems to be turning the legislation to good effect.

The Act took the somewhat radical step of reversing the traditional onus for bail from the accused to the accuser. Except in cases of murder charges, the prosecution now must show the courts why an accused person should be held in custody instead of being at liberty until a trial is held. If the police cannot convince the court that the accused is either dangerous to society or not likely to appear for his trial, the right to remain free on bail or personal recognizance is automatic. Previously, the accused had to convince the court that he was worthy of bail.

Now a pilot project in Vancouver has shown that the legislation can be made to work at a considerable saving to the taxpayer. The answer, it appears, is to supervise people who are remanded on bail in such a way that they find supervision helpful rather than intrusive.

During the first six months the scheme was in operation, the failure-to-appear rate for persons released on bail — varying between 30 and 45 per cent before its introduction — was brought down to nine per cent for those persons the courts assigned to the bail supervision project.

Hank Matthias, a former probation officer who helped to conceive the project, says: "We're making the Bail Reform Act work. Not only is our failure rate only nine per cent, but of the first 130 persons assigned to us who have completed their court process, only two committed subsequent offences while out on bail."

Why does it work? Al Radcliffe, Mr. Matthias' partner in setting up the project, says they can give no "objective" answer; but they do get "good vibes" from their clients. "My own feeling is that it's the personal interest we take in them that makes the difference. They just come

in and talk to us and we try to help them see their own problems and learn to handle them responsibly — but we don't lay the heavies on them."

With many of their clients, old hands at bail-skipping, it may be the first time anyone in the court custodial establishment has taken time to listen to them.

"We've had lots of clients come back after their cases to thank us," Mr. Radcliffe said, "and we have several who still drop in to say hello when they're in the neighbourhood."

The team say that the nicest part of their success is the saving in social cost of their bail-violations. But there is secondary saving in cost to the taxpayer: it costs about \$28 a month to supervise a person on bail as compared with \$25 a day to keep the same person in custody. The cost of supervision is met jointly by the federal Justice Department, the provincial Corrections Branch and the provincial Justice Development Centre.

Results like probation

The project was set up in 1973 by the Corrections Branch because of concern about remand facilities and procedures. They asked Mr. Matthias, a social worker by training, and Mr. Radcliffe, formerly an officer in a custodial remand centre, to see what they could do.

Mr. Matthias explained: "The pre-trial situation has always been an in-or-out thing — either you were behind bars or totally free on the street — and what we've tried to do is provide a third thing, free but supervised."

How does this differ from probation?

Mr. Matthias says that where the probation officer has to come up with a plan for the parolee and enforce it, "the people we're working with are only accused, not convicted, so there is less of a casework attitude for us. We don't view ourselves as the guiding direction in their lives. We're interested in tying them back into the community — putting them in touch with other agencies and employers who can give them direction. The end product may be the same as in probation but the process is qualitatively different."

What do the supervisors do?

First, they hang around the courts listening to individual cases and telling the judge how they might be able to help the

person before the bench. "The judges shake their heads at us when we offer to take on some cases, but they assign them to us anyway — and shake their heads again when the person actually appears on trial."

Once the person is assigned, the supervisor's first job is to explain the court process. Terry Egan, the third member of the supervisory group, said: "Even if a person has been through the court process before, he often doesn't understand it. We explain that when they have to appear next it isn't for trial, but setting a trial date; and how to get legal aid. We tell them how to get things out of the property room and what a guilty plea means. Since most of them have nowhere to stay, we arrange with the social agencies for accommodation and temporary financial support."

Because of a shortage of judges and courtroom space, most Vancouver courts have to assign trial dates a long time ahead. In April they were being assigned for August. "That's a long time to wait — especially if you've got nothing to do," Mr. Egan said, "so we have some job counsellors who are tremendously good at coming up with positions for these people and, if there's an emotional or family problem involved in the offence, we get them in contact with the community health teams for individual or family counselling."

Initially, most of those under supervision report once a week, but if things are going well check-ins may be as infrequent as once every six weeks.

At first the team feared they would only be assigned people who would normally get bail anyway rather than those the

courts tend to keep in custody. But this has not been the case; they have handled the full gamut from shop-lifting to non-capital murder — and the three people assigned to them accused of non-capital murder all showed up on time for their trials.

At the time of talking, 60 per cent of the males and 72 per cent of the females to have passed through their care had previously served jail terms. About 42 per cent had drug and alcohol problems. The current caseload was about 200 persons, between 50 and 60 to each supervisor, though it was hoped to drop the number to about 40 per supervisor. The team expected to handle about 800 persons — two to three new cases a day — in their pilot year. The province's remand population is now at a fairly constant 375. ♦

Solicitor-General answers demands for harsher punishments

The crime and punishment debate ebbs and flows in Canada, as in Britain and elsewhere, according to events that tug at emotions as the moon pulls at the tides. Fundamentally the debate is always the same — between those who favour harsher punishments as a cure for violent crimes and those who believe violence only begets more violence, whether it is legal action by the state or illegal action by individuals.

As the tide for harsher punishments rose recently in Canada, the Solicitor-General, Mr. Warren Allmand, produced a lengthy statement, well backed by statistics, intended to oppose this view. The statement left no doubt that the present Canadian Government is wary, if not sceptical, of the belief that severe punishment is an effective deterrent to crimes of violence. The two main points in it were that capital punishment is not the solution to murder and that there had not been — contrary to some well-publicised views prevailing at that time — any disproportionate increase in the number of violent crimes in the country. Police, as in Britain, take a less liberal view of the issue. This was illustrated by a recent recommendation of Ontario police chiefs calling for mandatory capital punishment for premeditated murder.

There has not been a hanging in Canada since 1962. Capital punishment has been abolished there since 1967 except for murderers of policemen and prison guards.

The Allmand statement acknowledges that "horrible murders" committed recently in Canada had led some people to believe that homicides and other violent crimes were "on a rapid and uncontrolled increase." Another fear was that any rise

in crime is largely due to a decrease in the use of severe punitive measures against criminals. However, it urged: "Let us look at the facts. Existing data indicate that there has been no disproportionate increase in the number of violent crimes. The proportion of violent offences to all Criminal Code offences has remained relatively constant at around 10 per cent per annum over the period 1966 - 73."

As for the "especially strong concern" over crimes of violence against law enforcement agents, it said — there had been no significant increase in such crimes. The number of police murders annually fluctuated from two to five between 1964 and 1973, rising to six in 1974.

"There is obviously no trend of increasing police murder in the past decade or so and it is too early to conclude that any trend is beginning," the statement argued.

From 1960 to 1974, the most murders — 11 — took place in 1962 when capital punishment was still in force in Canada. Some recent tragic and sensational crimes in Canada had resulted in misconceptions and led to a belief that capital punishment could solve the problem. There was a feeling in some quarters that murders with police officers as victims were increasing due to lack of a strong deterrent.

"It is evident that capital punishment may satisfy the strong sense of moral and emotional outrage that many of us experience when a murder is committed, and there is no doubt that the threat a particular individual has posed to society is terminated absolutely" by execution, the statement said. But there were other crucial issues, including morality.

Personally, the Solicitor-General said he believed it was wrong to take the life of another person except as a last resort in self-defence.

Statistical evidence cast doubt on the effectiveness of capital punishment. "We now know that most types of violent crime are not deliberate or rationally planned," Contributing factors could include a history of quarrels between friends or families; the use of alcohol or drugs; access to firearms, emotional instability or derangement. "Given the sudden, unplanned nature of most homicides, it appears unlikely that most individuals who commit murder take into account the existence or non-existence of capital punishment before carrying it out."

Another factor was the existence of a class of people, who might be called adventurers, for whom the danger of death had little deterrent effect. These included mercenaries, auto racers, parachute jumpers and citizens who volunteered to fight in Indochina. Similarly some criminals knew the risks they were taking but the danger of on-the-spot punishment did not seem to deter.

The more he had studied the problem, Mr. Allmand said, the more "I have become convinced that capital punishment is not the solution to murder." Examination of statistics and research in Europe, Canada and the United States indicated that capital punishment did not effectively lower the murder rate. Lowest murder rates were found in countries and states where capital punishment had been abandoned, such as Sweden, Minnesota, Wisconsin, Rhode Island and Maine. ♦

Agriculture :

Science may increase protein content of crops

A scientist working for the National Research Council of Canada has recently recorded a breakthrough in investigation of the process which produces protein in vegetables. This could lead to ways of artificially increasing the protein content of legumes such as peas and beans. It is also possible that it could enable scientists one day to introduce protein into non-legumes such as wheat, though the NRC emphasise that this is a long-range possibility.

The breakthrough recorded by Dr. J. J. Child at the NRC's Prairie Regional Laboratories at Saskatoon involved the cultivation of the nitrogen fixing bacteria "rhizobia" alongside, but separated from, the cells of various plants they normally inhabit. Up to now the bacteria have never been known to carry out this process, essential to the production of protein, except within the plant cells. Scientists have been trying to induce them to do so for about 80 years.

Dr. Child grew rhizobia alongside various plants and observed that they carried out their nitrogen fixing even though separated from the plants. This indicates that whatever it is in the plant cells that enables the bacteria to do this work, it is a substance that can pass outside the cell walls and diffuse across the space separating the cells from the bacteria.

By analysing the materials found in this space, scientists may now be able to isolate for the first time the plant substance the bacteria use. And because the process also worked when the bacteria were cultured with non-legumes such as wheat, the substance is now known to be present even in plants which cannot obtain nitrogen from the air.

The NRC say that Dr. Child's experiments open up a new field of research. When the plant component needed for nitrogen fixing has been identified, scientists will be able to start searching for ways to make the nitrogen-fixing process more efficient.

The Prairie Regional Laboratories have been working on the nitrogen fixing process for more than five years. As often happens, their finding was published simultaneously with similar results from Australia — though the NRC claim that Dr. Child was about four months ahead of the Australians. ♦

Blacksmiths go to college

With the returning popularity of horses, particularly farm horses, across Canada, an old trade has been crying out for new recruits. Where have all the blacksmiths gone? So Algonquin College in eastern Ontario has come forward with a typically modern answer to the problem: a college course for blacksmiths.

Ten students enrolled for the first twenty-week course earlier this year, working five days a week in a barn at Equidae Stables, twelve miles south of Ottawa. Among them was one woman student, Daphne Lane, 24, who succeeded after some difficulty in persuading the federal Manpower Department that a woman could and should enter this traditionally male trade. Perhaps they'll re-jig the old blacksmith song in her honour:

"My true love I hear,
Her anvil is ringing
Her voice it is singing . . ."

The course is essentially practical. Before they progress to shoeing live horses, the students practise on hooves severed at the fetlock, which serve them as cadavers do medical students. Dan Dunwoodie, a blacksmith with twelve years' experience, teaches the anatomy and physiology of horses, drawing particular attention to hoof defects. He also teaches them how to deal with balky horses.

His pupils learn to "roll a shoe from bar stock," a technique that was being practised by blacksmiths a century and more ago. They make their own tools with hammer and welding torch.

With a recent survey showing ten thousand horses in the Ottawa valley and around a million across Canada, graduates should have no employment problems. Mr. Dunwoodie says: "At the moment about fifteen blacksmiths are working in the area and they're always overbooked."

A difference in the trade today is that where people used to bring their horses to a static forge, nowadays it is more usual to make house calls. Mr. Dunwoodie expects his students to set up mobile units. "It's often easier to go to the customer than have the customer come to you." ♦

New McIntosh apple grows scab-free

There's an apple orchard in Ottawa where Sir Isaac Newton might well have missed his chance to discover the law of gravity. Instead of the big, red apple which struck him so forcefully on that historic occasion, the chances are that sitting under a tree in this orchard, he would be hit by a specimen too small and shrivelled to make the point.

The orchard on Agriculture Canada's Central Experimental Farm has not been sprayed with the usual fungicide against scab disease since it was established ten years ago. Many of the trees are McIntosh, a variety which normally produces juicy red apples popular in the supermarkets — but which without spray suffer from scab, resulting in shrivelled apples covered with ugly marks and sparse growth.

Among the diseased trees, however, are some healthy ones whose branches are weighed down with fine apples. They have not been sprayed, either, but belong to a new variety named Macfree which is resistant to the disease.

These trees are the product of years of research by Dr. L. P. S. Spangelo at the research station in Ottawa, work which is now being carried on at research stations in St. Jean, Quebec and Smithfield, Ontario. The new variety is a McIntosh type and is considered to have proven itself in Ottawa — indeed, small quantities were made available to the nursery trade earlier this year. As it becomes more generally available it should lead to immense savings of time and money for commercial producers. ♦

Blacksmith invents bale-handling machine

A new machine which solves the awkward problem of handling round hay bales has been invented and marketed by an enterprising inventor in Killarney, Manitoba.

Bob Shaw, a former blacksmith and mink rancher, learned about the need for such a machine when he was repairing a round-baler — an efficient machine which produces huge bales, fifteen hundred pounds in weight and almost six feet in diameter. Farmers were in difficulties over loading them and transporting them back to the farm yard for cattle feeding.

With his co-worker Ken Vandenberg, Mr. Shaw tried out several ideas before settling on the one he has marketed. It is hydraulically operated and can pick up three bales in less than five minutes. To produce it, he had the backing of five friends putting up C\$30,000 in collateral, the local bank adding a C\$60,000 loan and a team of government experts providing counselling assistance.

When the finished bale carrier was unveiled, the manufacturer of the round baler immediately ordered 60 of the implements for distribution throughout the Canadian Prairies and northern United States. Mr. Shaw's firm, registered as B and K Industries, is situated on his farm in two buildings. About six men, all welders and metal cutters, are employed producing three of the carriers a day. ♦

Continued from page 16

The northland night may be long, but not too long or lonely when the trail has been hard. "For then the body is very weary . . . moccasins are removed and four or five pairs of woollen socks are hung to dry. Maybe you sit near the stove for a while and smoke, but the fire burns low and it grows cold in the tent.

"The night's allowance of half a candle burns out. A thin layer of ice forms over some tea left from supper. You wrap yourself in three heavy blankets, pull a fur cap over your ears and move your swaddled feet to find the warmth of the dog's body. It is six o'clock and dark. Then you are asleep."

Other passages recount portages with birchbark canoes and watching Indians trade the winter's harvest of furs at a Hudson's Bay Company trading post. Rich pelts go for gaudy ribbons, coloured thread or patent medicines, prompting the author to brood on the "great tragedy" of the nomadic Indians whose trails run

from the post like silver threads. "They live and die," wrote Mr. Schoonover. "A little bleached cross marks their grave, and a friendly Indian hangs upon it a rosary and a few leaves." Later, he reflects, the furs will be seen in Canada's big cities of a winter's evening, all "plucked and groomed and fashioned for the season of social struggle."

Famous illustrator

Writer, lecturer, artist and photographer, the author studied under renowned teacher Howard Pyle at the Drexel Institute in Philadelphia. He flourished during what is recalled as the "Golden Age of Illustration" and is remembered particularly for the illustrations he created for such books as Jack London's "White Fang" and John Buchan's "The House of the Four Winds."

Other prominent writers whose works he illustrated included Rex Beach ("Where Northern Lights Come Down"), W. A. Fraser ("The Blood Lilies"), and Sir Gilbert Parker ("Northern Lights").

Some 800 of his Canadian photographic studies survive, their clarity of definition remarkable. His son Cortlandt, book collector and English instructor, helped prepare the present edition. The publishers say they chose stories, paintings and photographs to "portray the spirit of the Canadian wilderness and its native people with truth and validity." They add: "The continuous struggle with the elements, the pride and integrity of the people who called the North their home, the stark physical beauty of the wilderness can all be found in this uniquely visual and literary documentation." There is no argument with this claim.

Cricket gains favour

For all but a minority, cricket in Canada has long been viewed as a harmless eccentricity — amusing, perhaps, but not in the same league, old chap, as baseball or ice hockey.

Now it's gradually becoming more popular, with some 5,000 people playing the game in seven of Canada's 10 provinces.

In the next decade, the Canadian Cricket Association looks for further advances as national and provincial squads compete against sides from Ireland, Bermuda, Denmark, Holland, Scotland and other countries.

Interest was enhanced by the visit in May of the Australian Test cricket team. The Australians played Canadian teams in Vancouver on May 21 - 22 and in Toronto on May 24 - 25.

From July 21 - 28 in The Hague, a Canadian team was to take part for the first time in an international junior tournament. All Canadian players are under 21. England was to have two teams in the tournament, Ireland, Denmark and Holland one each.

British Columbia has long been a flourishing area for cricket. Seven schools play organised cricket and there are senior-level leagues in Vancouver and Victoria. Cricket also does well in the province of Ontario with 40 teams competing in the Toronto area. Generally, the sport lacks major crowd appeal so funds must be raised from cricket enthusiasts to bring visiting teams to Canada.

Save the whooping crane

Canada's whooping cranes have unwittingly joined the jet set in a desperate battle for survival of the species that is being fought by the Canadian Wildlife Service and the United States Bureau of Sport Fisheries and Wildlife.

While the few remaining in the wild whoop on oblivious, nests in Wood Buffalo National Park, on the Northwest Territories boundary with Alberta, were gently raided in May of this year and 13 eggs removed, first by helicopter to Fort Smith and thence by a Canadian Armed Forces jet to the Patuxent Wildlife Research Centre at Laurel, Maryland.

There the eggs were placed in an incubator, with the idea that the young birds hatched out of them should join a captive flock, now numbering 17 birds, kept at Patuxent. It is hoped that this flock will in due course produce young which can be returned to the wild.

The scheme has been instituted because it is feared that the tiny wild flock may be too vulnerable to survive unaided; just one violent storm or serious disease could wipe them all out. It is felt to be valid because although two eggs are usually laid in each nest, few families arrive at the wintering grounds in Aransas, Texas, with more than one chick. Studies by CWS show that the number of young reaching the south annually averages only about one fourth of the number of eggs laid by the wild birds. Therefore it was concluded that removal of one of the two eggs in each clutch for hatching in captivity could be done with little chance of harming productivity in the wild flock.

The programme began in 1967, when six eggs were picked up; 10 were taken in 1968 and another 10 in 1969. Since then there has been only one pick-up; 11 eggs in 1971. The practice has been renewed this year because of the low survival rate of fledglings in the wild. Only one of the two young that flew south last fall survived the winter, lowering the total number of whooping cranes in the world to 48.

Conservation

The handsome Arctic hare, white in winter and grey in summer, is also getting careful attention from conservationists. Driven dangerously close to extinction in its native Newfoundland by centuries of hunting and by imported competitors, it is now being reintroduced there through an experiment by the Newfoundland Wildlife Service.

Six years ago the Wildlife Service discovered a small population of Arctic hares in the southern area of the Long Range Mountains, which run like a spine inland from Newfoundland's west coast. Four were captured and set loose on Brunette Island, an uninhabited island in Fortune Bay off the south coast of Newfoundland. Last autumn biologists counted one thousand of the animals on Brunette.

Jim Inder, a wildlife biologist involved in the scheme, said that the establishment of a "reservoir" population of Arctic hares was a necessary prerequisite to introducing them elsewhere. Although the general location of various colonies was known, capturing them in the western mountains would have been difficult.

Since 1973, two lots of hares have been brought over from Brunette Island and set free — thirty-six in the centre of the Avalon Peninsula some fifty miles south of St. John's and thirty-five on the south coast of Burin Peninsula. The hares were tagged and several of them have since been reported killed, but the colonies have bred and numerous sightings have been reported to the Wildlife Service.

The hares were once plentiful across Newfoundland and provided an alternative flavour to the winter diet of the Beothuk Indians, which became extinct in the first part of the nineteenth century. ♦

Economic Digest

Cost of living

Higher prices for food, especially meat, pushed the Canadian consumer price index up by 1.5 per cent in June, to an annual rate of 11.2 per cent, Statistics Canada reported at mid-July. This was the sharpest increase in the index since it rose 1.7 per cent in May 1974; it raised the annual rate from 7 per cent maintained during the preceding three months.

Statistics Canada predicted that the rise would continue into July; the June figures did not fully reflect a 10-cent-a-gallon increase in the excise tax on petrol introduced in the latest Canadian budget, June 23. That tax measure by itself would add half a percentage point to the index when July figures were in, Statistics Canada estimated.

Altogether food prices accounted for 60 per cent of the June index increase, rising to an annual rate of 19.5 per cent seasonally-adjusted from 4.8 per cent in May. It was the fastest rate for any month so far this year, but still below the increases for each of the final three months of 1974. The Food Prices Review Board predicted that food prices would continue to rise later in the year.

All other items covered by the index, however, showed an increase of only eight-tenths of 1 per cent, about the same rate of increase as during each of the previous six months. Next to food, the cost of housing, owned or rented, contributed the most to the index increase. The result brought the index to 184 from its base level of 100 in 1961 and 166.70 a year earlier.

Nuclear energy

The latest estimate from Canadian government authorities is that more than 40 new nuclear reactors will be built in Canada during the next 10 years. This will require capital outlays of C\$7 billion, including C\$5 billion for machinery and equipment; an additional C\$1 billion is expected to be required for the building of heavy-water plants. Heavy-water is an essential ingredient in the Canadian-developed CANDU reactor which is expected to dominate this expansion of nuclear power production in the country.

This raises the certain prospect of considerable expansion of the Canadian nuclear industry. Currently there are about 60 Canadian firms producing the major components for nuclear reactors made in Canada. They employ some 25,000 workers. This skilled work force is expected to expand by at least 3,500 during the next four years. The anticipated demand will be for machinists, welders who can use precision welding techniques, quality-control personnel and technicians capable of working with exotic materials to extremely close tolerances.

The information was drawn from a speech to the 15th annual international conference of the Canadian Nuclear Association by J. P. Reny, director, machinery branch, Canada Department of Industry, Trade and Commerce. "Eventually," he predicted, "the economic benefits of the CANDU programme could extend to 1,000 or more companies."

Unemployment

The unemployment rate in Canada remained relatively stable during June, Statistics Canada reported at mid-July. The rate for younger job-seekers rose, but the overall rate was 7.2 per cent of the work force, up from 7.1 per cent in May. Across the country the rate fluctuated over a considerable range of ups and downs. The province of Nova Scotia showed the best improvement where unemployment fell to 7.3 per cent from 10.2. At the other end of the country, British Columbia had the sharpest rise in unemployment, to 8.3 per cent from 7.7.

The rate for those 24 years old or younger rose to 12.6 per cent from 12.5, but for the 25-and-older group remained unchanged at 5.2 per cent.

Foreign lenders

Removal of the withholding tax, ranging from 15 to 25 per cent, on interest paid to nonresident holders of medium and long term Canadian corporate borrowings is reported to have aroused fresh interest in the Canadian lending scene among European as well as American financiers.

In the budget of June 23, the tax exemption was offered on interest paid by a corporation resident in Canada to an unrelated (arm's length) lender on bonds, debentures or other debt obligations having a fixed term to maturity of not less than five years. It applies to debt issued after the budget date and before 1979. A similar exemption was applied earlier this year to interest on borrowings abroad by government at any of the three levels in Canada — federal, provincial and local.

Both these moves supplement the withdrawal in February 1975 of foreign borrowing guidelines. Since 1970 they had requested Canadian borrowers to exhaust Canadian sources before floating issues outside the country.

British bankers

The Financial Post, published weekly in Toronto, reported that one British banking team arrived there shortly before the budget was presented, in anticipation of the withholding tax change. These early birds represented the City investment banking firm of S. G. Warburg & Co. and its French associate, Banque de Paris et des Pays-Bas (*Parisbas*). Members of the team are frequent visitors to Canada, but Warburg executive director Peter Darling was reported to have told the FP that removal of the withholding tax was the main reason for this visit. He and his companions spent several days chatting up chief executives of large Canadian firms in Toronto and Montreal for possible new lending business. Their main interest was believed to be in firms with net worth of C\$100 million or more.

From New York, meanwhile, came word that United States investment bankers intend to be competing for a piece of the Canadian corporate bond financing anticipated during the next few years — an action that could range to the C\$1 billion area as new natural gas pipelines, nuclear reactors and other large energy projects are capitalised from foreign sources.

Motor-car sales

Canadians, brought up on the economic maxim that when the United States economy coughs Canada comes down with pneumonia, are pleased but puzzled by the almost record-breaking motor-car sales in their country this year, while in the U.S. the auto market is in its worst slump in history. U.S. motor-car sales at mid-year were down nearly 20 per cent from a year earlier. But Canada's motor-car market was booming and may come close this year to matching record-breaking sales in 1974. Analysts offer a variety of explanations. A frequent one is the world oil crisis created a year ago by the sudden increase in prices. Rich in their own oil and gas resources, Canadians enjoyed lower petrol prices than the U.S., at least initially; there were no filling stations closed, no lineups at the pumps, no threats of rationing as in the U.S. Another reason given in a recent analysis by Joseph Dupuis, business editor of *The Canadian Press* news agency, is a more stable employment scene in Canada than the U.S. recently, so that more consumer purchasing power stayed in circulation.

Unemployment has risen in Canada as inflation did but not so fast or high as in America. While the Canadian unemployment rate reached 7.2 per cent of the labour force, the U.S. rate rose to 9.2 per cent. A Ford of Canada executive also pointed to "an almost unbelievable 20 per cent" increase in personal income levels for the average Canadian worker as a major stimulus to the Canadian economy. A General Motors of Canada Ltd. executive put it this way: "Per capita disposable income in the U.S. has declined . . . while it has been increasing in Canada." ♦

The Arts:

Illustrator found magic in a frozen wilderness

By Alan Harvey

A pan of melted lard, a few chunks of fat pork, and a pailful of boiled tea — thick, black and scalding hot.

Hardly the fare to galvanise a gourmet, but travellers in Canada's frozen northland find it hits the spot. "I don't think I should like such food at home, but it's very appetising after a hard morning of breaking trail."

So wrote American-born illustrator and author Frank E. Schoonover (1877-1972), whose paintings and writings testify to a love of the Canadian north which lasted all his life.

A vivid impression of that lifelong passion comes freshly off the pages of "The Edge of the Wilderness — A Portrait of the Canadian North," published on March 6 by Eyre Methuen Ltd. (£12.50).

This is a handsomely printed book comprising 85 paintings and illustrations by Frank Schoonover, along with stories and records resulting from several extended visits to Northern Canada in the early years of the century. Some were previously published in magazines such as Scribner's and Harper's.

The book, as the publishers claim, is an accurate record of early 20th-century Canada and "an insight into the last frontier of the North American continent — the wilderness of the Canadian North." If one sentence emerges as a heart-cry from this tribute to the bleak, awesome majesty of the Last Frontier, it comes in Mr. Schoonover's frequent references to the bone-chilling climatic conditions that give the north its favourite adjective "frozen."

"What a cold, cold, bitter cold country this is!" writes the author. He speaks with awe of the boundless white northern wilderness, of pure white rabbits glimpsed frozen to the hardness of stone, of a "weariness that enters into the very marrow of your bones."

Mr. Schoonover made two main journeys, the first a 1,200-mile winter expedition by snowshoe and dogsled in the Hudson Bay and James Bay areas in Northern Quebec accompanied by Indian guide Xavier Gill and a half-breed, the second by canoe and portage to the same general area in 1911. He is thought to have been the first illustrator to take his own sketching tent through the bush by dog train, defying the "unbelievable severity" of conditions, including raging snowstorms and temperatures frequently more than 40 below zero. Everywhere he went, he took photographs on roll film and sketched



"The trapper" by Frank E. Schoonover, 1927, oil, 24 by 30 inches, now in the Stuart Kingston Galleries, Rehoboth Beach, Delaware.

endlessly, fascinated by snowy wastes now vivid pink in the setting sun, now deep purple shadows.

A sample passage gives an idea of the difficulties in painfully breaking trail: "I unfasten my axe and fall to work with the guides. No one may stand idle. The clothing, damp from the terrible work of the morning, soon freezes on one's back . . . it is bitter work in the biting cold to unfasten the strings that hold the loads, but no one thinks of complaining."

Hard work in the clear cold air is a marvellous appetiser, and the travellers crowd eagerly round the frying pan, taking a "gillette" of flour, water and baking soda browned in the pan and spreading it with lard or using it to pick up tidbits of fat pork. Thick cups of black tea, bitter

and scalding, accompany the treat, acting "like a tonic on the tired body." That is dinner cooked in the northern wilderness, says Mr. Schoonover, and "we grew strong and lusty upon such faring."

And it is a tribute to the spirit of sharing in the north that on an Indian campsite, the replete traveller may find hanging on a post a few bear-skulls, possibly containing a pinch of tobacco in the nostril sockets, thoughtfully left behind for any trapper who chances by without a pipeful.

Night falls early. You stop walking before three in the afternoon and make camp, packing the snow and spreading it deep with green boughs. It is now quite dark, and a "furious little red fire is blazing in the little sheet-iron stove, and the terrible cold is forgotten in its comfort."

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