

The search for oil continues

The following is from Research McGill, published by McGill University, Montreal.

Professor Eric Mountjoy, of McGill's Department of Geological Sciences, has spent much of the last 17 years studying and mapping ancient carbonate reefs and other rocks in and adjacent to the Rocky Mountains, looking for deposits of oil and gas.

Reefs are formed by organisms such as corals, brachypods, algae or mollusks, which secrete calcareous shells or skeletons. These accumulate and form either sand (such as the white sand of the Caribbean beaches) or massive structures called reefs.

The reefs Mountjoy is studying were formed in ancient seas, in shallow marine waters similar to the modern Caribbean. In fact, some of his research has been carried out in the Caribbean area, in order to use information on the nature of modern reefs as a basis of comparison for studying ancient reefs. From the formation and subsequent modification of modern reefs, he can deduce much about older ones in the Rockies.

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Alberta oil boom

About two-thirds of the oil in the province of Alberta comes from carbonate rocks, half of it from ancient carbonate reefs. One such reef led to an oil boom in 1947 when it was discovered in the Leduc oil-fields. This discovery stimulated the development of more than 40 oil-fields, which, 20 years later, produced over 325 million barrels annually.

The type of material which collects in the reservoir rocks is determined by... what happens after the reef sediment is deposited. Normally, sea-water is trapped in the sediment when it is formed. As more and more sediment is deposited on top of it, the sea-water is gradually squeezed out of some sediment, especially that which is muddy and clay-rich. If this water contains much organic matter, and if the temperature and pressure are right, petroleum may be expelled with it. If there are porous reservoir rocks nearby, they may collect and trap the petroleum, forming a petroleum pool.

The more a geologist knows about the history of an area, the better he will be able to infer (1) where permeable rocks occur and (2) whether organic matter

(such as petroleum) is likely to have been preserved. This second question is particularly important because petroleum is very easily moved and destroyed. As rocks tilt and erode, petroleum can escape to the surface, where it is destroyed by bacteria. Though it occasionally forms oil-sands or tar-pits, once petroleum reaches the air, it is usually destroyed. Because petroleum is lighter than water it tends to migrate upwards and therefore is found in larger amounts in younger rocks.

Initially, explains Professor Mountjoy, the petroleum industry was not too concerned about porosity and permeability in carbonate reefs, as it seemed that most reefs were porous and permeable, and most of those were oil-bearing. But, because further exploration has shown this to be untrue, some of Mountjoy's research has been directed at the question of why some reefs are porous and others are not.

The size of the pore spaces is important, too. The smaller the pore spaces and their interconnections, the greater the extent to which surface tension and other factors limit the amount of oil which can be recovered. In some cases, only 10 per cent of the trapped oil can be recovered, and in others as much as 60 per cent. Naturally, the petroleum industry wants to know how much oil can be recovered from any particular pool.

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The value of studying reefs in the Rocky Mountains, Mountjoy explains, is not that they contain oil. The rocks in [one] formation have been so tilted, eroded and structurally disturbed as to be no longer suitable as traps for petroleum. "If there ever was petroleum there," he says, "it has long since gone. What is important are the rocks of the immediately adjacent foothills and plains. These areas contain similar reef-bearing strata, buried at depths of 15,000 feet or more, that are relatively undisturbed. Normally, one would drill for samples of the rock to tell what kind of formations are there, but at this depth it's expensive to drill. So instead, from data in the front ranges we have extrapolated information about the eastern foothills and plains."

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Public awareness essential

While he is working to help industry exploit petroleum and other non-renewable resources, Mountjoy emphasizes that

they are just that — non-renewable. Canadians are fast using up their energy resources and have made no truly efficient long-range plans for alternative sources of energy. The public, he insists, must be kept more aware of the energy situation, and must take an active part along with the Government in planning for the future. The public must also be made to realize that it is important to level off and eventually decrease our consumption of petroleum within the next five to ten years.

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that reason we must redouble our efforts and our commitment to peaceful means....

Middle East

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Canada remains committed to the framework for peace embodied in United Nations Resolutions 242 and 338. Our support for Israel's right to exist as defined by those resolutions is firm and unequivocal. We deplore and will continue to do so, all efforts within this Assembly and elsewhere, to attribute patently false motives to Israel or to diminish its status and rights within the United Nations or as a legitimate member of the world community.

Canada believes all countries in the region need and have a right to expect more than just another cease-fire or merely a formal end to belligerency. If this kind of peace is to be achieved, the crucial issues of territory must be solved. The only truly secure borders — those which are freely recognized by the parties on either side of them — must be determined, by negotiations, within the framework of Resolution 242. Until then, we believe that nothing should be done unilaterally or illegally to change or predetermine the status of any part of the occupied territories. We regret that such actions are still being taken without regard to their effect on the prospects for peace. It is also clear that any resolution of territorial issues, if it is indeed to bring about the lasting peace that all desire, must provide a just, humanitarian and political solution for the Palestinian Arab people by which they can live in peace without threatening the security of any country in the region. Any solution for the Palestinian Arabs must, of course, include their clear and unequivocal