

# JOE MACINNIS...

SDM INTERVIEW

CANADA'S FOREMOST DIVING SCIENTIST

**Dr. Joe MacInnis, president of Undersea Research, Ltd., Toronto, Canada, is one of the finest doctors in the world specializing in the physiological effects of diving. He is also an explorer, filmmaker, author, adventurer and innovator. He has literally been the catalyst to the implementation of Canada's manned underwater programs. He designed and conducted the installation of the Sublimnos habitat in Tobermory Bay, where scientists could descend to experiment with Sublimnos as a base of operations. That was Canada's first underwater habitat. Recently, MacInnis designed a spherical plexiglass underwater station which he dubbed Sub-Igloo and placed beneath the ice in Canada's Resolute Bay, 78 miles from the North Pole and 600 miles north of the Arctic Circle. There, in a frigid environment where winter temperatures averaged 45 degrees below zero, MacInnis and his team made underwater excursions to study Arctic marine life. The expedition was documented by the National Film Board of Canada and by National Geographic Magazine. MacInnis has made four expeditions to the Arctic site—in summer, fall, winter and spring—so that the differences between seasons could be monitored. On the last trip, Joe MacInnis became the first man to dive beneath the North Pole.**

*MacInnis is a world-recognized authority on hyperbaric medicine. He has served as medical consultant to several of Edwin Link's saturation diving projects, notably one in which divers locked out of the Deep Diver at 700 feet. He was also medical consultant to the U.S. Navy Sealab III project. In addition, he has written a book of poetry called Underwater Images in 1971, and recently his book Underwater Man was published by McClelland and Stewart, Ltd., Canada and by Dodd, Mead and Company in the U.S. This book is a high-voltage series of underwater experiments and expeditions in which he has played very important roles, but largely it is an*

*expression of his poetic love for the sea. And not to be overlooked is the fact that Joe MacInnis has sparked Canada's interest in her 150,000 mile coastline and continental shelf.*

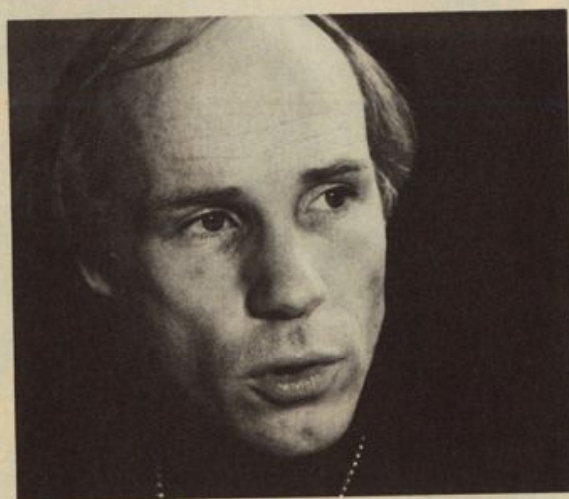
*Although Joe's outlook on his work and the environment in which he works is deeply serious, he is a free-spirited fun-lover, and his friends know him well for his light-hearted antics and sense of humor. When we interviewed him he supplied us with great doses of both fun and seriousness. He talked freely about his involvement with his work, with the sea, and how he began. By the time we were finished we had a detailed knowledge not only of his own philosophy, but of the difficulties and problems that all ocean scientists face. We were impressed with the great strides that have been made in the past decade by these brothers under the sea.*

**SDM:** Were you first into medicine or diving?

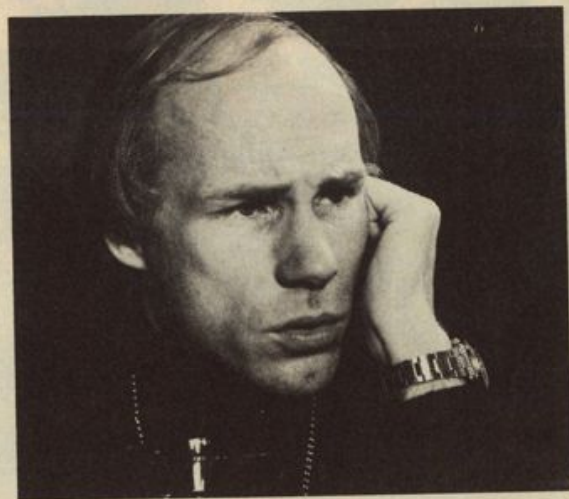
**JM:** I was into the water first. I grew up in Ontario, a place with a quarter of a million lakes, and you can't go a mile without falling into the water. Each summer we'd go to the lakes, summer camp or something, and I fell in love with aquatics. I had this psychic alliance with water and a real love for it. I am a strong believer that kids are natural explorers, and it was then very normal for me to look at water and wonder what the hell was on the other side. Then the face mask. It suddenly became a new window.

**SDM:** Can you describe your first experience?

**JM:** I was a competitive swimmer at a time when it is important, as a kid, to have a goal—13, 14, 15. I decided, naively, that I wanted to become an Olympic swimmer. I went to Florida to a college swim clinic. At the end of it someone said, 'Hey, let's go diving!' I dove off Ft. Lauderdale's second reef and it was one of the most exciting days I've ever had in my life. I was completely entranced with the rhythms and colors.



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*"I think working with Chris Lambertsen was the most exciting intellectual experience I've ever had..."*

Text by Hillary Hauser-Photography by Jack McKenney

That kind of watershed event plays a critical role in our lives. I think probably less so when you get older, but when you are young and tabula rasa, those magnificent imprints are really strong, as this was on me. It was a rather shallow dive, but still full of all the glories of color, fish and life. I knew then, and I was still in high school, that somehow I had to work in the sea, that the sea had all the ingredients for me: exploration, discovery, self-discovery, artistry, creativity.

**SDM:** And how did the medicine come in?

**JM:** I went through medical school, not with the idea that I wanted to become the classic savior doctor, but that medicine offered the best insight, the best telescope, into what was to me the most fascinating element of the planet—man. This incredible creature with all his fears, joys, delights, euphorias and sadnesses. Medicine was in fact a road map. As I went through college I kept hearing the names of Cousteau, Link and Bond, especially toward the end of my medical years—in the early 60's—and I thought if I could just work with any of them I could combine medicine, the sea, and man, and they would all fuse into a very tight radius. Glory of glories, it came to pass.

**SDM:** So, from the beginning you wanted to join these things into some sort of a career?

**JM:** Somehow I knew my destiny was tied to the sea, just exactly how I didn't know. There was no university degree in diving medicine. I knew I would probably have to go out of Canada because nothing was happening there. Everyone said, 'Hey, there is no way—a doctor in the sea—what are you going to do, operate on porpoises? Eye transplants on sharks?' There was nothing to justify man and sea, so it meant creating one's own curricula. The only way to do that was to go to the ultimate university—the ocean.

**SDM:** What was your first practical experience?

**JM:** In 1963 I graduated and I wasn't really sure what was going to happen. So I went to the Underwater Society of America's meeting in Philadelphia. George Bond was there and he was just getting ready for *Sealab I*. I went up to Bond and said, 'Look, I just graduated from medical school and I'm just starting my internship and I really desperately want to work in the ocean with man, as a physician.' He looked at me and said, 'Son, we just can't do it. As much as I'd like to have you come with us, it's a Navy program and you are a civilian and you're from Canada, so it just isn't going to work.' I realized I didn't know a thing but figured I'd better get my humble shoes on and work like hell. I knew that it was going to cost me money but I thought if I could hang in there with enthusiasm for about five years, ten years, whatever, I could make it. There was no one else, no other physician, who wanted to work full time at this thing like I did.

**SDM:** How did you become involved with Ed Link?

**JM:** It was hard. I couldn't bring anything to him except a lot of enthusiasm and a little bit of experience and I now know how small it was. I pursued him for three or four months. Every couple of days I'd phone or write or wire. He was involved in the review of the *Thresher* tragedy and he was virtually inaccessible. There was no way I could get close to this man. I finally decided I had to resolve this thing, so I phoned him and said, 'Look, I'm going to be in Washington tomorrow and I must see you for just 15 minutes. I want to come and work for you and I know you're terribly busy, but would you talk to me for 15 minutes?' He said that he would see me at 9 o'clock the next day. It was then four in the afternoon. The simplest thing would have been to take an airplane, but there wasn't one. Toronto to Washington was a distance, and so I drove all night. At about 6:30 a.m. I was passing through Gettysburg and hit a deer. It wiped out my radiator, the front of the car, and I was standing in the road with deer all over the windshield. I was going to meet with Ed Link in one hour and all around me was nothing but graveyard and fog. It was ominous. So, I pushed

the deer off the road and shoved the car in a ditch and walked back to Gettysburg and rented a car at 9:00. I phoned Ed Link and said, 'Mr. Link, you are not going to believe this, but I'm going to be a little late and here's why...' He laughed and I saw him at 10:30. When I saw him I let fly five years of ambition. I guess we hit it off. I think he could feel the intensity; I was terribly excited. At that time he was looking for a guy who could support his deep dive series, Man-in-Sea, phase II.

**SDM:** What happened?

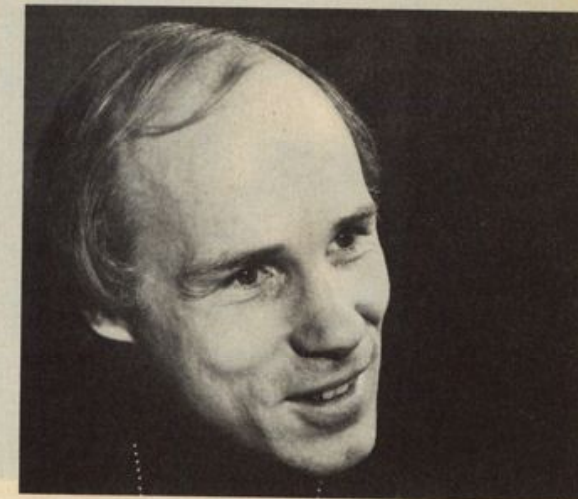
**JM:** Link said to me, 'There is one thing you must do. I'll put you on a Link Foundation Fellowship and I want you to go to work for Chris Lambertsen. He is the best in the world. I want you to spend some time in his laboratory and get some training and have him introduce you into diving medicine as we know it.' I think working with Chris Lambertsen was the most exciting intellectual experience I've ever had. He is truly a giant among men.

**SDM:** What did you do with Lambertsen?

**JM:** He put me under a fellow by the name of James Dickson. I started to work on preparing the systems for the deep dive, getting the analyzers ready and talking to Jim to find out what the problems were. We did some mice experiments which ended up in a series of dives to 4000 feet, which for mice in 1965 was pretty exciting. The two of them, Lambertsen and Dickson, guided me and showed me some of the hurdles, and they were at that time just starting to get ready with their new 1200 ft. facility. It was very exciting because it was my first introduction into real diving research.

**SDM:** What was your first practical experience at sea?

**JM:** In March of 1964 I loaded up my car and headed down from Washington to Key West, to go back to Link who was then getting ready to go out and do the first initial tests for Man-in-Sea phase II—432 feet for 49 hours. We made mistakes, but we were blessed with good fortune. I can now look back at those mistakes where we could have very easily lost a life. In naivety or ignorance we did things we thought were right but were in fact wrong. One of them occurred in 1967. We dove on the Grand Banks with *Deep Diver* to locate and recover a plow used to bury ASW cables. We made several dives. It was only after we came back that we found that the T-1 steel in the submarine was really not certified for those cold temperatures.



*"In July of 1973 the Federal government announced a national ocean policy. It was really rewarding to be one of the architects, even though mine was a small role."*

I don't know what could have happened but perhaps the hull could have failed and all hell broken loose. Nobody's ever going to do that again.

Another case occurred in 1964, during the original Link dive. We filled the deck chamber with far more oxygen than we now consider safe and we had ignition sources that we wouldn't tolerate now. We could have had a fire. You can see these things when you look back. Maybe we were in too much of a hurry in those days, but at that time the whole thrust was to get to the continental shelf — go deep, get there fast, and stay long. I think we were pushing ourselves. But these were exhilarating years — years that will never be repeated. There was a euphoria that paralleled the space program — money was accessible because science was in good stead, and everyone had big dreams of the ocean being the cornucopia of tomorrow's world. Leading the rush, following the *Thresher* disaster and accelerated by the H-bomb recovery off Spain, was underwater man. We had a period of about five years that will just never be repeated, where we had access to money, and the best of people. We were able to solve the problems as fast as they came up. That's when we made the giant strides. Now they take much more money and effort.

**SDM:** Would you say that the 432 ft. dive, the Lindberg/Stenuit dive, was your first big project?

**JM:** Yes, it was the first big smasher. That was my graduation into the serious game.

**SDM:** What did you actually do on that dive?

**JM:** My role was medical life-support. The dive itself was the deepest, longest dive ever. That was the first real demonstration that man could saturate deep within the sea and could go to 400 ft. plus. By coincidence we just happened to rest the station on the edge of the average depth of the continental shelf — 432 feet. This demonstrated that man had the physiological resources to live for short periods of time at the deep edges of the continental shelf. We knew that if he could do it for two days, then he could probably do it for 20 days. It was a very pivotal experience because it brought together a lot of different technologies. It fused deep diving engineering, physiology and operations together for the very first time. It also spawned a lot of commercial diving companies. Link was then able to go to Union Carbide and say, 'Look what man can do. Let's start a company, an ocean systems company.' For a while, Ocean Systems was the largest diving company in the



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world and certainly the most advanced from a research point of view. Then others strode strongly on the scene, such as Comex and Oceaneering.

**SDM:** What did Ocean Systems start out to do?

**JM:** We had the most incredible 24-36 month period, where we had the research dollars that we needed, the expertise that we needed, and we started simulation dives. We did several hundred dives in that period, including 48 hours at 650 feet. We began the first really deep oxygen-helium dives when the other guys had no idea what was going on past 200 feet in terms of saturation diving.

**SDM:** What was your role with Ocean Systems?

**JM:** From 1965-1968 I worked as medical director. I also worked for Link and did anything that had to do with *Deep Diver* — it was deep and exciting stuff.

**SDM:** There must have been a feeling of tremendous accomplishment to be the first to penetrate such depths. Why do you think the U.S. Navy, with so much more money than Link, or even Cousteau at the time, failed to go as deep as Link?

**JM:** There are several reasons. First of all, the Navy has a set of safety criteria that it must satisfy before it dives. Commercial divers can dive under situations that other divers are not allowed to because of certification standards. It wasn't that the Navy had so much money. The real money was in the oil-gas industry. This was a real driving force and still is today as far as underwater man is concerned. As for Cousteau, he shifted into the entertainment and awareness business. In 1965 he did his last major scientific operation in the water. He was moving up into film at the same time he was doing some land-based research, but eventually he disappeared from the deep diving arena. The Navy decided to go the *Sealab* route. By 1968-1969 other companies like Comex and Oceaneering were starting to thunder. Ocean Systems was quietly dissolving. Link got out, and they let all kinds of very good people go. Innovators were not listened to, money was turned off.

**SDM:** Was it at this point that you began to turn your efforts toward Canada's underwater program?

**JM:** In 1970 I was asked to come to Ottawa to help the Canadian government look at its undersea activities, and at the whole ocean game: marine science, ocean industry, shipbuilding, law of the sea. For the past four years I have been involved in that. In July of 1973 the Federal government announced a national ocean policy. It was really rewarding to be one of the architects, even though mine was a small role.

**SDM:** And how did you actually get Ottawa interested in your diving projects?

**JM:** I thought that Canada should do something, maybe modest, but something. This is how *Sublimnos* was born. I decided that we could have a spartan station by getting a few nickels and dimes together, open it up to everybody for use in scientific work. But mainly *Sublimnos* would be a catalyst to other, bigger, things.

**SDM:** Did the Canadian government support *Sublimnos*? Who put up the financial backing for this project?

**JM:** I knew I couldn't do it through my consulting company, so I put together a foundation. Got some lawyers, did a tax number, and went through all the strife. The foundation is a center for underwater research and education. The first significant funds came from the National Geographic Society.

**SDM:** How did *Sublimnos* lead to the Arctic expeditions?

**JM:** *Sublimnos* was just the first step. We learned during that first winter that the Great Lakes were very similar to the Arctic in terms of ice and other conditions. So I thought, 'Why not go to the big arena of the future?' In 1970 I took my first Arctic expedition, four guys. We stayed 12 days, and made 30 dives.

**SDM:** What was the purpose of that expedition?

**JM:** Well, it was a kind of reconnaissance. All I wanted to do was look at the Arctic, look at the problems of operation, equipment, and human performance. We also did brief biological and geological surveys and tried to clarify the value of divers for that sort of operation.

**SDM:** You've said that you felt the Arctic was the underwater arena of the future. How so?

**JM:** Resources. In many ways it's like the rest of the ocean was 20 years ago. When you descend through the Arctic interface and down through the water column to the bottom, you can make a check list: oil and gas, pipelines, subsea production platforms, pollution, baseline studies and the hundred-plus jobs that commercial divers do. They are eventually going to do them all in the Arctic — dock repair, salvage, tying in a completion system, whatever. My feeling was to get man up there on a non-urgent basis before a crisis arrived so that we could get some idea of what the problems were. It's terrible to go up there for the first time to do a job and at the same time solve all the problems of operation, support, setting up camp, equipment, vehicles, logistics, etc.

**SDM:** You have made several expeditions to the Arctic. Did these differ in objectives?

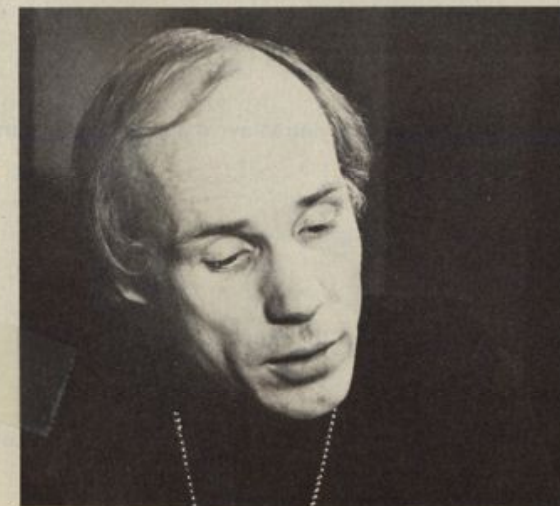
**JM:** On the first expedition I found that we could do it without a lot of expense, so I decided on a series of four expeditions, each of which would be in a different season of the year. This would give us insight into operating during summer, winter, spring and fall. Each expedition would grow larger in complexity, in people, in number of dives, and in objectives. We started with four guys, did something like 30 dives and stayed about a week. On the last trip, we went for about two months and had about 50 guys who made almost 300 dives.

**SDM:** How did the whole concept of *Sub-Igloo* come to be?

**JM:** *Sub-Igloo* was an offshoot of *Sublimnos*. There is the same kind of sensation you get from both of them. You go into *Sublimnos* and stick your head up into that dome at the very top of the station and look around. Since we get about 90% of our information from our vision, I thought, 'Why not make a manned station a virtual eyeball in the sea? Why not make it as transparent as possible?' From this thinking was born the whole idea of *Sub-Igloo*, a relatively low-cost, highly portable, diver-buildable, transparent sphere.

**SDM:** Now that you have completed your four expeditions to the Arctic what are some of the future plans for *Sub-Igloo*?

**JM:** In April, 1975, we were invited to participate in another program, Project Score, with Harbor Branch, Florida, NOAA, and the Perry Foundation. Bob Wicklund, the project manager of *HydroLab*, was the author. We saturated four teams of divers for five days each in *HydroLab*, using the *Sea Link* as a trans-



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porting vehicle. *Sub-Igloo* was placed at 90 feet off the Bahamas.

**SDM:** What do you think about the future of the ocean industry?

**JM:** The ocean industry will, as usual, follow in the wake of oil and gas exploration and ASW systems. I'm a little depressed about the immediate future of marine science in this country. Look at NOAA. What the hell is NOAA going to do? There isn't any money.

**SDM:** Does this include Canada, too?

**JM:** I'm talking about the world. We are going to have to do things in a modest way for a while. The whole world picture doesn't seem too optimistic. I think this population-resource pressure is going to get much worse. Everywhere I go — New York, Washington — anybody who has an ear to things says it's not good. It may get a hell of a lot worse before it gets better. Things don't sound good for marine science.

**SDM:** How will the MacInnis Foundation operate?

**JM:** One of the things about our foundation is that it is in fact almost a ghost. It is operated almost entirely by volunteers for brief periods of time to solve specific problems. The problems are focused on during the expeditions. The volunteers get the adventure, the experience, and they either do it for free, or they get their institutions to support them while they participate in the expeditions. We have operated and done all of these expeditions for less than \$75,000. The things that have been done by the foundation in the Arctic have mainly been done on the thrust of excited volunteers. For example, *Sub-Igloo* was entirely donated by Alcan Canada Products Ltd., by Chemacryl Plastics Ltd., by Dow Corning, and by King Plastics Ltd. Yes, we had a little cash flow, but it was nickels and dimes compared to the real cost. The companies involved all donated their time, and the people who actually came on the expeditions came because they really wanted the opportunity for work and adventure.

**SDM:** There must be an advantage to functioning like this — perhaps there is an esprit de corps that doesn't exist in other, better-funded, situations.

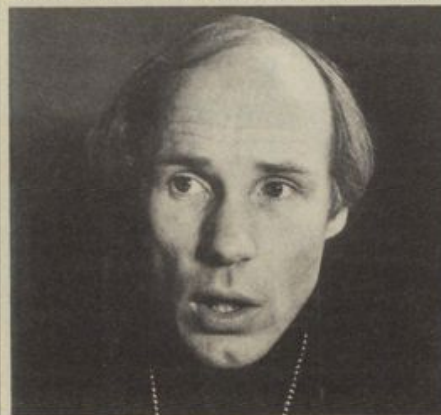
**JM:** There is a special magic in operating this way. First of all, if you have a lot of money sometimes you can waste it and just spread it around. This is what governments are doing. If you don't have any money, but just a dream, somehow the whole thing becomes more precious. The returns for the people in-

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volved were experience and adventure. For example, Ernie Brooks II came, paid his own way, and got pictures and an insight into a part of the planet and some people



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he had never known before. He made an enormous psychic contribution to Arctic IV. It was a great exchange.

**SDM:** Was it during the spring expedition that you made your dive under the North Pole?

**JM:** It was April 28.

**SDM:** What was your feeling?

**JM:** It was the first scientific dive made under the North Pole. There may have been a nuclear submarine in earlier years that slipped a diver out to look at a propeller, but ours were the first dives under the North Pole as far as I know. This was definitely the highlight of all the diving I've ever done — a crescendo. It started as a dream in 1969. In 1970 I stood on a runway at a place called Alert on the very northern part of Canada. I looked up north and I saw 450 miles of ice and I said to myself that someday I was going to take a team of divers up there. I had no idea how or who or what, but I thought, 'We are going to do it.' The problems we had going to the North Pole — they were incredible, a fantastic story in planning and logistics.

**SDM:** How did you get up there?

**JM:** The Canadian Department of Natural Defense flew us in an aircraft from Resolute Bay to Thule to Alert. It was part of a search and rescue rehearsal. And then in a helicopter 450 miles to the Pole. When we landed at the Pole, seven para-rescue men parachuted out of one of the airplanes — some carrying Canadian flags and champagne. Some rehearsal! I was so moved by it all that I cried. We made our camp and spent three days. The armed forces came back to pick us up three days later.

**SDM:** The North Pole, as you say, was your crescendo, something rather hard to top. Where to from here?

**JM:** My mission this year is a book, called

*Underwater Canada.* It is a task in which I am going to tell the Canadian people that our oceans are very important and that we can no longer take them for granted. Fortunately the marine scientific community in Canada, although small and sometimes scattered, is very strong. Its greatest contribution will come in the area of polar work, simply because Canada is a place dominated by ice and cold. If you start rolling the Canadian figures off the tongue it includes numbers like three major oceans and inland lakes and rivers that cover almost 300,000 square miles. Also 1/7th of the world's surface area is within Canadian borders. We are the water country, in a sense. But we are surrounded by water that is frozen for most of the year, and it presents a unique problem.

**SDM:** And do you think that Canada will come in with financial support, considering the successes of your past expeditions?

**JM:** No, and this may sound strange, but I never go for big dollar support. I don't believe that one should ask for this kind of support. I don't believe that one should go to Washington or Ottawa with a big tin cup in their hands. I think that if you have a viable idea with national implications the first thing to do is see if it will stand on its own merit. We went to industry and we went to institutions and that's where we got the money. As I said before, we didn't need or want much. In fact, we haven't had any government money for any of the Arctic expeditions except the last one. But we got a lot of other support in terms of aircraft and equipment. I don't believe in the welfare state. I believe in the laissez-faire state. Man must be productive if he is to remain free. >