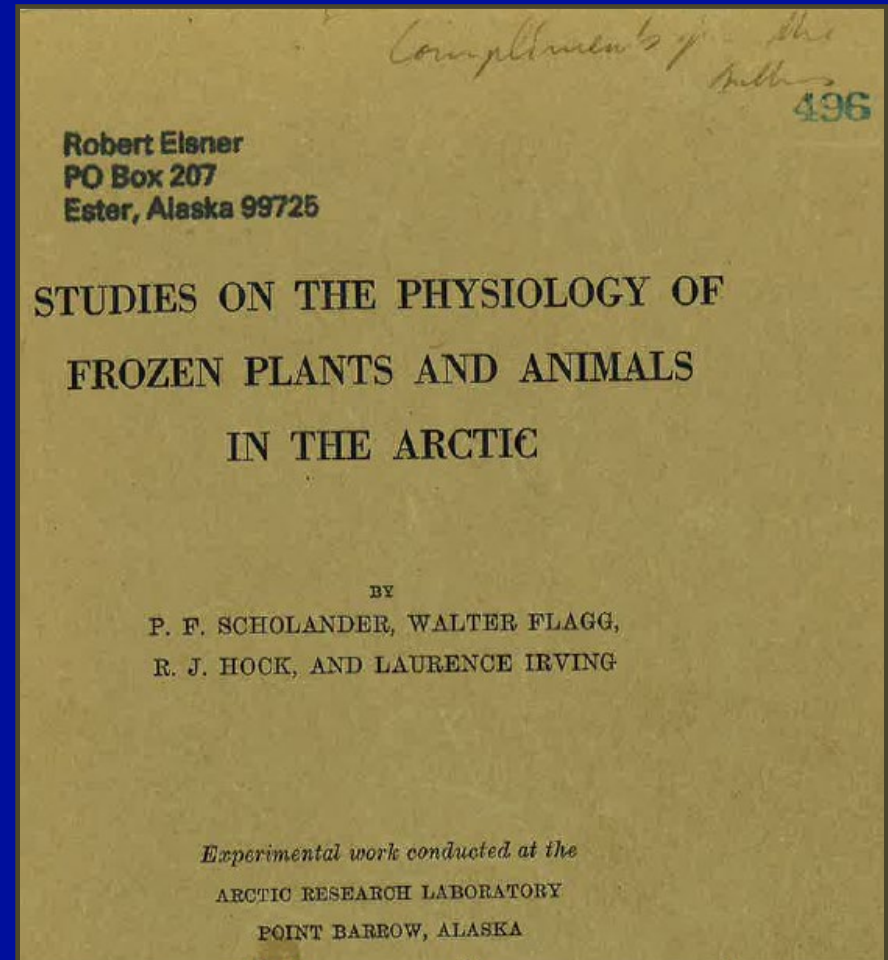
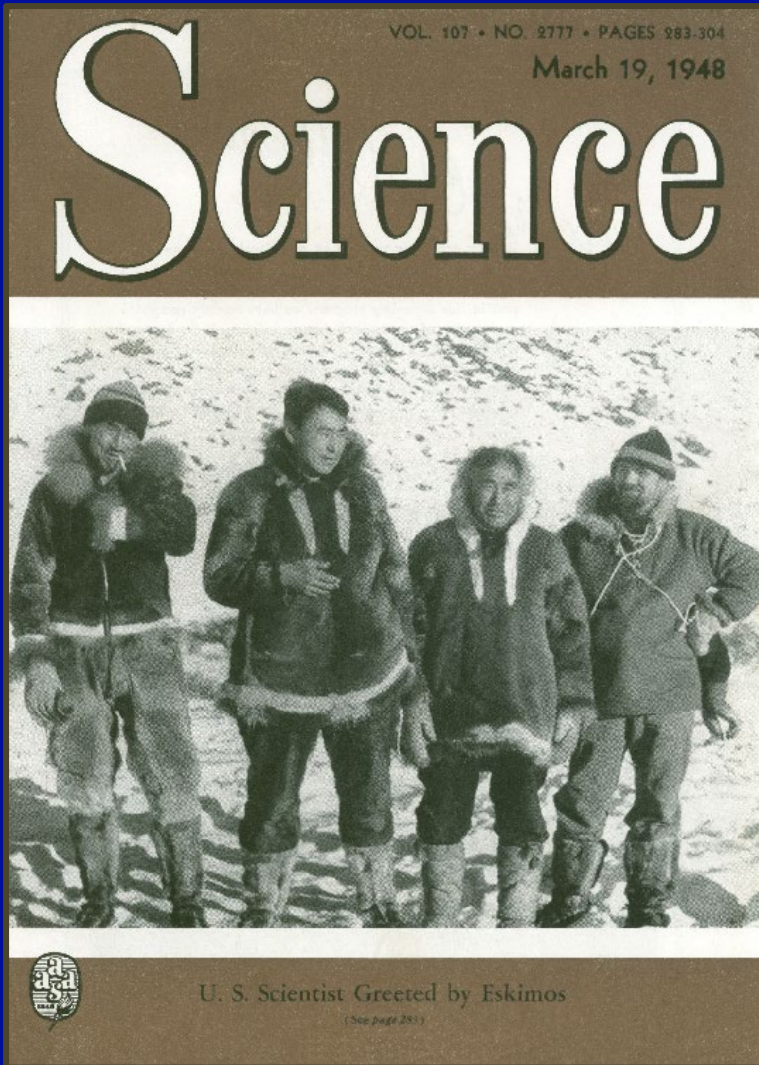


# How Bloodworms in Barrow (1947) Began Climate Change Analysis



**75<sup>th</sup> ANNIVERSARY OF THE NAVAL ARCTIC RESEARCH LABORATORY**  
**Celebrating the Past – Planning for the Future**  
Todd Sformo, NSB-Dept. Wildlife Management, Utqiagvik, Alaska

# NPR-A, PET 4, and the Beginning of Arctic Research Lab (ARL, NARL)

- President Harding 1923
- President Roosevelt 1943:  
"To appraise oil possibilities"

Commercially viable

Summer '43 Simon Panniaq, Wien

Cape Simpson Base

Barrow Base

- > 500 Naval Personnel &

- 125 Local Personnel

- Closes 8 July 1953

- 1944-1953: \$47,615,000.00



CHOW-LINE AT THE MESS HALL

# PET 4 and Arctic Research Lab (ARL): Early Facts

- 1947, Extracurricular support for non-oil activities
- LORAN and ARL
- ARL --two 40 by 100-foot warehouses and a 20- by 56-foot Quonset hut. . . Later the Quonset hut was converted to an animal house . . . ”
- estimated \$50,000 . . . to provide for the support and maintenance of ARL (*Exploration of NPR No.4, 1944-53*)
- First Director Laurence Irving ONR: “From the beginning ARL was conceived a national facility” (Reed 1971).





6 August 1947 — Dr. Laurence Irving, First ARL Director

## Importance of Traditional Ecological Knowledge

“The sharp observation of our Eskimo assistants has been invaluable. Combined with their keen observation, their accurate memory and ability to report observations literally is making available to us gradually the careful results of **their** serious study of this region (Reed and Ronhovde, 1971).”

Irving, L. and **S. Paneak**. **1952**. On the weight and nutritional state of birds at the arctic terminus of migration. Proc. 3rd Ak. Sci. Conf. p.212.

Irving, L. and **S. Paneak**. **1954**. Biological reconnaissance along the Ahlasuruk River west of Howard Pass, Brooks Range, Alaska, with notes on the avifauna. J. Wash. Acad. Sci. 44(7):201-211.

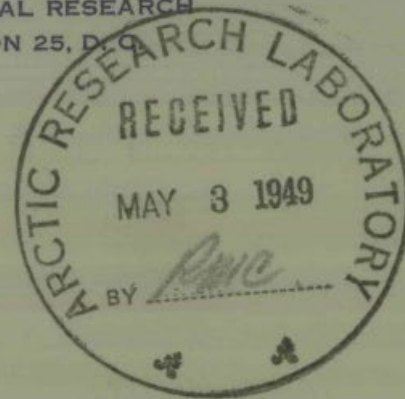
Irving, L., G. C. West, L. J. Peyton and **S. Paneak**. **1967**. Migration of Willow Ptarmigan (*Lagopus lagopus*) in Arctic Alaska. Arctic. 20(2):77-85.

--Cited from Simon Paneak Memorial Museum

First group of scientists under Irving—Expeditionary Physiology



DEPARTMENT OF THE NAVY  
OFFICE OF NAVAL RESEARCH  
WASHINGTON 25, D. C.



IN REPLY REFER TO  
EXOS:ONR:412:yr

APR 29 1949

8194

Dr. Laurence Irving,  
Scientific Director,  
Arctic Research Laboratory,  
Box 1310,  
Fairbanks, Alaska

Dear Larry:

The following is a list of research projects and personnel  
now at Point Barrow and contemplated for the summer of 1949:

Swarthmore College

Expeditionary Physiology

Dr. Laurence Irving,  
Dr. Harald Erikson  
John Andrews  
Eringer Stewart  
Dr. Per F. Scholander  
Dr. Norman Abrahamsen  
Robert Stapleton  
Robert Clason

Lieutenant, WW I, American Expeditionary Force  
Respond to broad range of conflicts and crises  
Across full range of operations

**Influence of WWs and Cold  
War on NARL Compative  
Physiology**

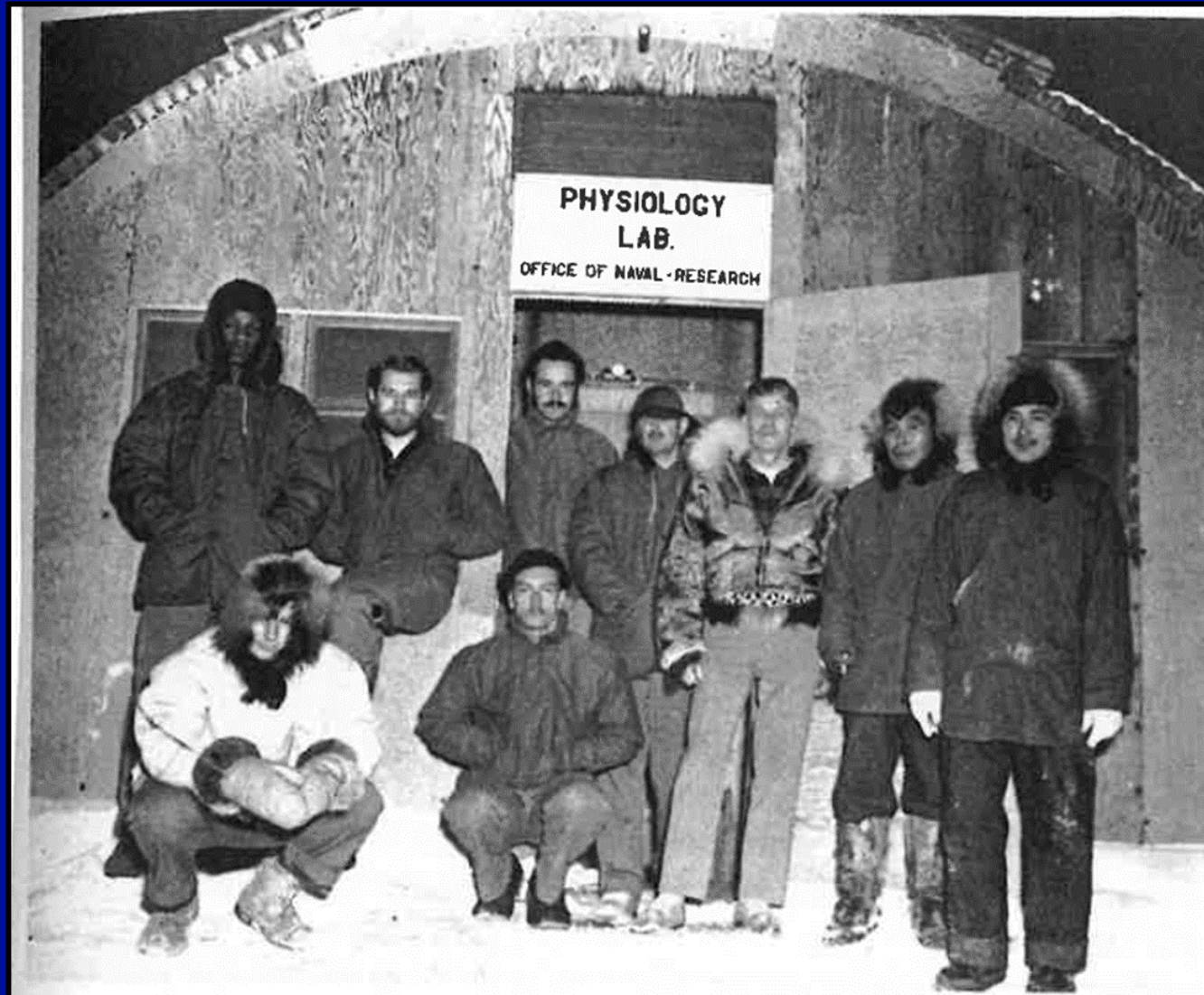
Johns Hopkins University

Ecological Study of Marine Fauna at  
Point Barrow

G. E. MacGinitie  
Mrs. Nettie MacGinitie  
Rodgers D. Hamilton  
Mr. Feder

## Expeditionary Physiology Group

Might the  
assistants be  
Joseph Ahgeak  
and  
Clay Kaigelak?



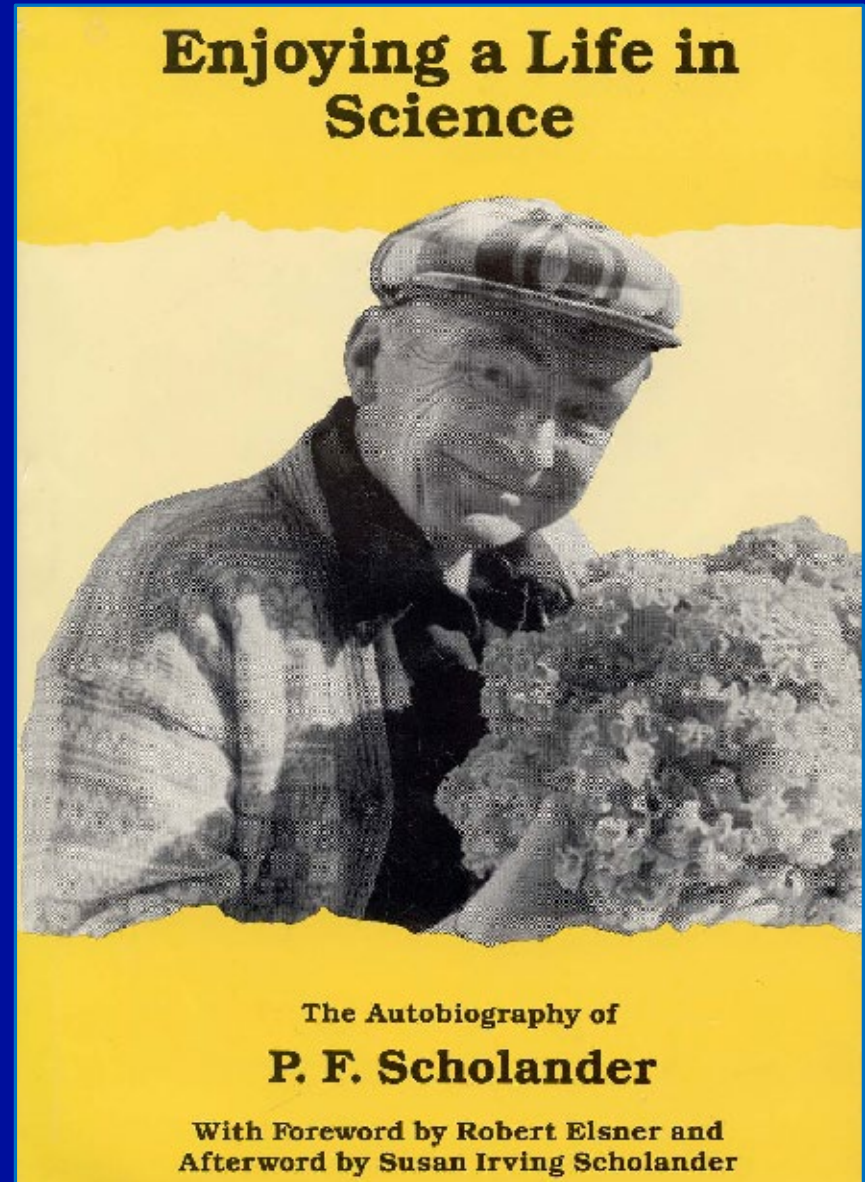
*First team of the Physiology Lab at the Arctic Research Laboratory Point Barrow, Alaska. Standing: Walter Flagg, Bob Stapleton, Ray Hock, Pete Scholander, Larry Irving, and two Eskimo assistants. Sitting: Reidar Wennesland and Larry's son, Larry Irving.*



# Per “Pete” Scholander

Over his career he studied:

- M.D. and Ph.D.
- Diving physiology of seals
- Swim bladders in fishes
- Metabolism-insects, dogs, lichens
- Water movement up redwoods
- Sap pressure in plants
- Supercooling in fishes
- . . . .





to find suitable personnel, which is extremely difficult at this time. However, the station is an extremely attractive one, and it will give us a chance to show what physiology can do in the operational part of the Air Forces. The physiological research is, of course, well and successfully established in the Materiel and Training Commands, but it is difficult to get it into the operational commands.

You will be interested to know that the reason for my selection was that we had always regarded problems of respiration from the point of view and by the methods of comparative physiology. The Air Surgeon very kindly and, I believe, wisely suggested that the physiology of human aviators was, after all, only another form of comparative physiology, in which the human environment changed rather than the organisms. It was this view which attracted me, and I know that you will be interested in it as an example of the penetration of the influence of the outlook of biologists into practical affairs.

I hope to see you sometime soon in Washington.

With best wishes

- Irving Letter, Air Force Proving Grounds
- Comparative (expeditionary) Physiology

Concerns?



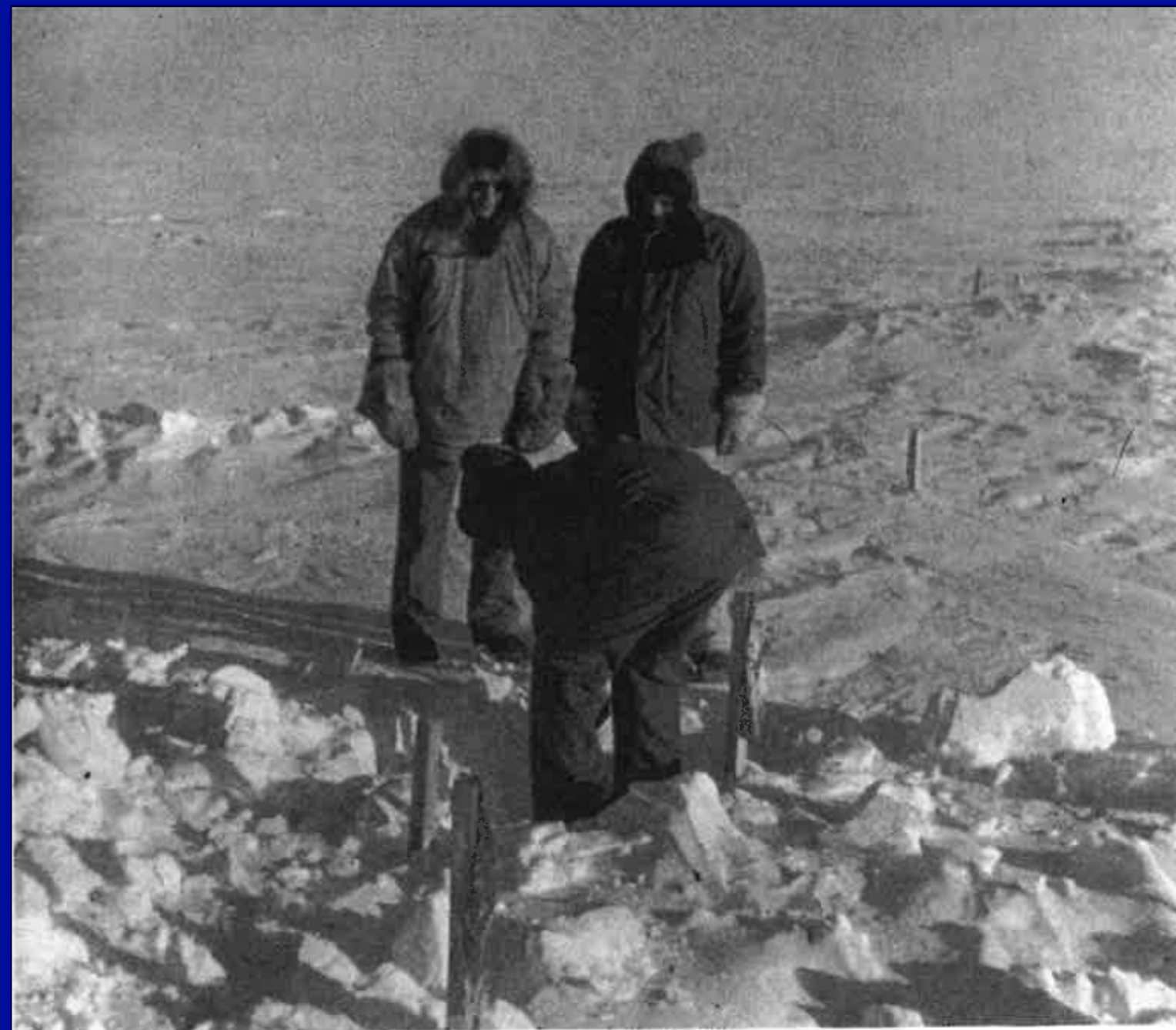
June 25, 1942

President Frank Aydelotte  
- The Institute for Advanced Study  
Princeton, New Jersey

Dear Mr. Aydelotte:

Enders and I were pleased with your note recognizing the good work which Dr. Flynn and Biological Abstracts are doing. It was also kind of you to refer some credit in that direction to us, and, whether correct or not, we are glad to be associated with the work in Biological Abstracts. Dr. Flynn has a broad view of the production of scientific work in biology, and he can see and estimate the tendency of scientific activity in this country and in the other countries as well. The facts which he has, as well as his opinions, should be of considerable value in forecasting the future. I doubt whether so accurate a view of an important basis for our culture is available in the mind of any other person.

Our experience with the comparative physiology of respiration made us turn rather seriously a year and a half ago toward the practical problems of aviators and divers. Dr. Scholander has developed some particularly ingenious devices and procedures for comparative studies which seemed to apply to many of the practical problems which would come up. With this in mind, we started toward the practical application of these procedures, controlling them meanwhile in various purely scientific studies. The results have been quite successful, and we have been able to advise a number of military, naval and other laboratories. The practical part of the work has now grown so that we are swamped with requests to send our equipment to other laboratories. Financing the work has been a difficult procedure, and just now it is touch and go as to whether I can get through. Whatever the outcome, I am glad to have had a chance for service that was worth taking. I have just sent an application to Dr. Richards for funds to carry on the work, and I have good hope for its considerate reception.



- Aug 1947 flagged a pond
- Jan 1948 cut Ice blocks
- Examined trapped insects to see if respire?

“Could respiratory gases get through ice?”

*Clearing the snow samples previously marked by flags, Barrow,*

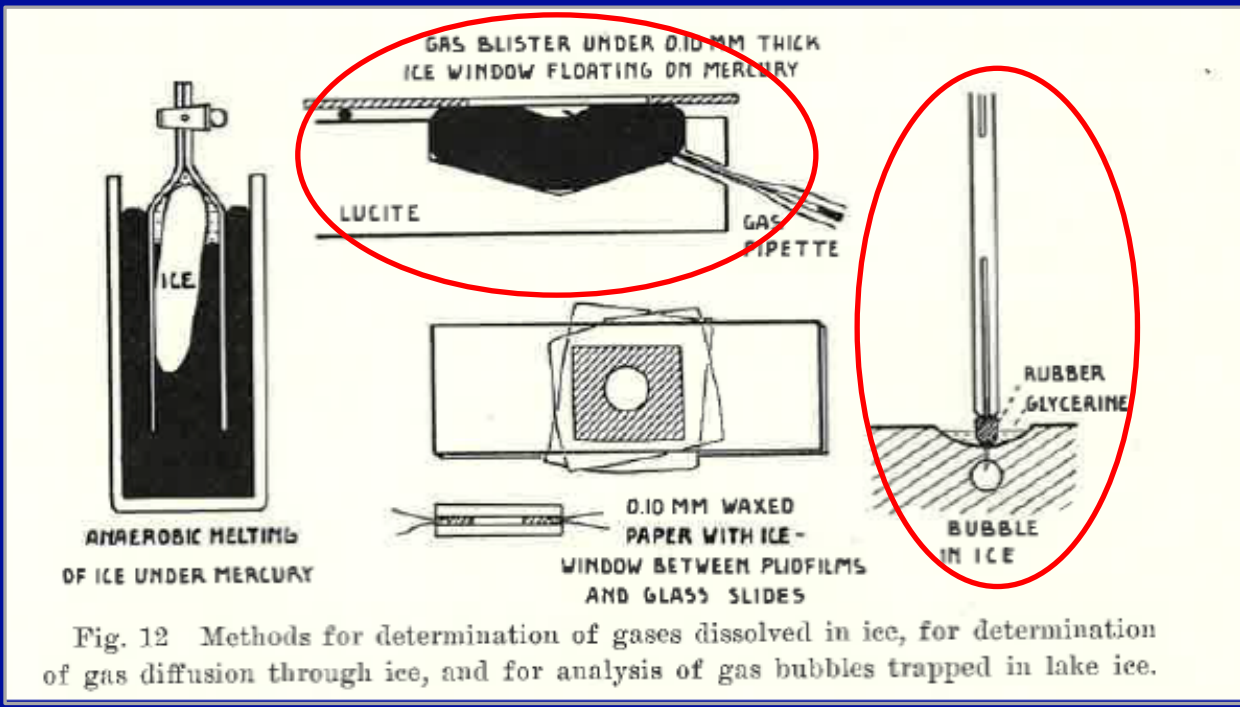
Results (1953 paper):

Tolerate freezing (and refreezing)

By -15C (5F), 90% body water is frozen



Can oxygen and CO<sub>2</sub> travel through ice?



Measuring gas bubbles trapped in ice and introducing known gas concentrations under ice

Fig. 12 Methods for determination of gases dissolved in ice, for determination of gas diffusion through ice, and for analysis of gas bubbles trapped in lake ice.



GAS BLISTER UNDER 0.10 MM THICK  
ICE WINDOW FLOATING ON MERCURY

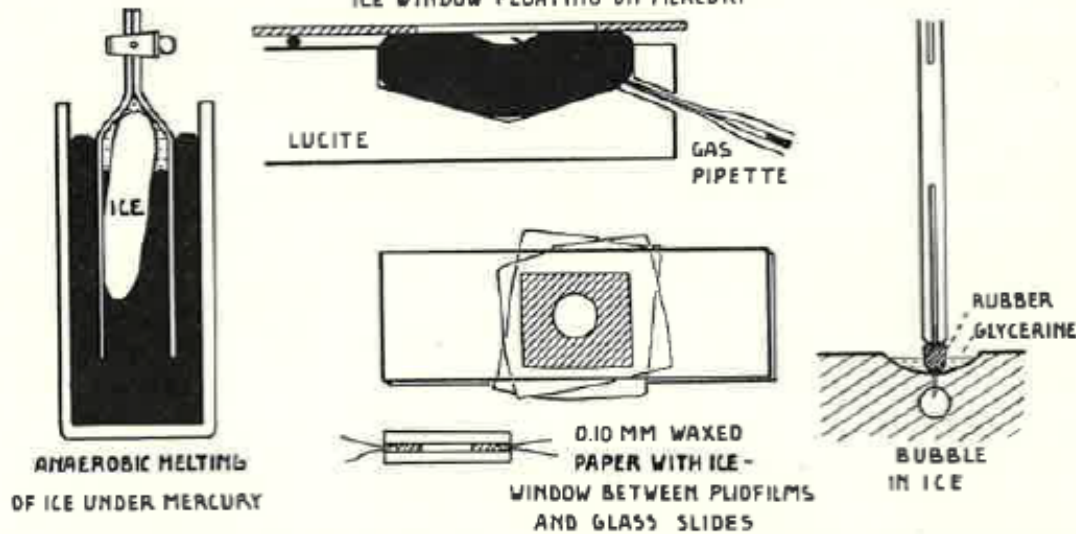
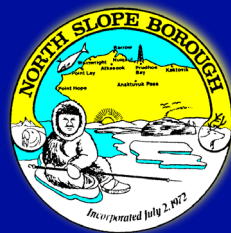


Fig. 12 Methods for determination of gases dissolved in ice, for determination of gas diffusion through ice, and for analysis of gas bubbles trapped in lake ice.

Rate of diffusion  
40,000x to 70,000x slower

“... struck us immediately that these data [and method could be a] means of ascertaining the composition of ancient atmospheres” in glaciers.

- NARL Legacy — birthplace of gas analysis in ice cores
- 1947- present ice core gas analysis is routine method  
> 2,000 research papers
- NARL Legacy — We owe a huge scientific debt to collaborative work of Ahgeak, Kaigelak, and Scholander
- NARL Legacy — continues with the NSB-Dept. Wildlife Management Subsistence and Science staff, gaining direction on questions to ask based on Traditional Ecological Knowledge to help ensure the rich Iñupiaq traditions (subsistence) continue



## References

- Alley, Richard B. "Reliability of ice-core science: historical insights." *Journal of Glaciology* 56, no. 200 (2010): 1095-1103.
- Brewster K. 1997. Native contributions to arctic science at Barrow, Alaska. *Arctic* 50:277–288.  
Irving, Laurence Papers. Archives, Alaska and Polar Regions Collection, University of Alaska Fairbanks. Box 7.
- Irving, L., and Paneak, S. 1954. Biological reconnaissance along the Ahlasuruk River east of Howard Pass, Brooks Range, Alaska. *Journal of the Washington Academy of Sciences* 44(7): 201–211.
- Reed, J.C., and Ronhovde, A.G. 1971. Arctic laboratory—A history (1947–1966) of the Naval Arctic Research Laboratory at Point Barrow, Alaska. Washington, D.C.: Arctic Institute of North America.
- Reed, John C. *Exploration of Naval Petroleum Reserve No. 4 and adjacent areas, northern Alaska, 1944-53; Part 1, History of the exploration*. No. 301. 1958.
- Scholander, Per Fredrik. *Enjoying a life in science: The Autobiography of PF Scholander*. University of Alaska Press, 1990.
- Fifty more years below zero: tributes and meditations for the Naval Arctic Research Laboratory's first half century at Barrow, Alaska*. ED: David W. Norton, Arctic Institute of North America. 2001.
- Letters from Alaska and Polar Regions Collections & Archives University of Alaska Fairbanks*

“The increasing interest in the Arctic . . .”

VOL. 107 • NO. 2777 • PAGES 983-304

March 19, 1948

# Science



U. S. Scientist Greeted by Eskimos

(See page 28.)



“Per F. Scholander, of the Department of Zoology, Swarthmore College, a member of the Point Barrow research team, is shown on this week's cover (extreme right) with three Chandler Lake natives . . .”

6/20/2014 James Nageak identified for me the three individuals (from left to right):  
Frank Rulland  
Simon Panniaq  
Jesse Aguk



Arctic Research Laboratory

Point Barrow, Alaska

6 April 1948

Dr. M. C. Shelesnyak  
Medical Sciences Division  
Office of Naval Research  
Washington 25, D. C.

Dear Shelly,

The report of the executive committee appears to give a good statement of the functions of the Board, ARL and SDARL. I recommend that it be the basis for discussion of operation and organization at the next meeting of ARLAB.

I hope that directions will soon develop for completion of #250, so that I may bring to the meeting of ARLAB a definite prospect of our proposed activities this year.

I also hope that the papers are in process for designation of Giddings, so that he may accompany me to the meeting.

The weather here is now beautiful, temperatures near freezing, much bright sun, and enough daily snow to keep the surface fresh. Scholander has initiated some interesting experiments upon the amount of ice formed in animal and plant tissues at low temperatures. Using the specific gravity method he obtains reliable and sensitive indications free from the objections of the awkward calorimetric method. He and Ray Hock are now at Bethel to obtain the blackfish, Dallia, which is alleged to withstand solid freezing. If that is so, it will be very interesting material for whole and tissue studies.

The warm weather handicaps the completion of low temperature studies, but we are obtaining a 600 cu. ft. refrigerator from the camp

“Everything is progressing well in our research, but the new lab is not progressing . . .”

Here is the research I want to highlight

June 25, 1942

President Frank Aydelotte  
- The Institute for Advanced Study  
Princeton, New Jersey

Dear Mr. Aydelotte:

Elders and I were pleased with your note recognizing the good work which Dr. Flynn and Biological Abstracts are doing. It was also kind of you to refer some credit in that direction to us, and, whether correct or not, we are glad to be associated with the work in Biological Abstracts. Dr. Flynn has a broad view of the production of scientific work in biology, and he can see and estimate the tendency of scientific activity in this country and in the other countries as well. The facts which he has, as well as his opinions, should be of considerable value in forecasting the future. I doubt whether so accurate a view of an important basis for our culture is available in the mind of any other person.

Our experience with the comparative physiology of respiration made us turn rather seriously a year and a half ago toward the practical problems of aviators and divers. Dr. Scholander has developed some particularly ingenious devices and procedures for comparative studies which seemed to apply to many of the practical problems which would come up. With this in mind, we started toward the practical application of these procedures, controlling them meanwhile in various purely scientific studies. The results have been quite successful, and we have been able to advise a number of military, naval and other laboratories. The practical part of the work has now grown so that we are swamped with requests to send our equipment to other laboratories. Financing the work has been a difficult procedure, and just now it is touch and go as to whether I can get through. Whatever the outcome, I am glad to have had a chance for service that was worth taking. I have just sent an application to Dr. Richards for funds to carry on the work, and I have good hope for its considerate reception.