

sinking along the archipelago slope, with water of Atlantic origin having a temperature of $+0.50^{\circ}\text{C}$, a resulting mixture with a temperature of $+0.35^{\circ}\text{C}$ at 400 meters would consist of nearly 94 percent Atlantic water and only about 6 percent locally formed water.

This would seem to make Giletti and Kulp's point (iv), that "a new source of the deeper water of the Arctic Ocean was found to be in the Canadian archipelago," sound a bit pretentious, especially as it is based on a single tritium measurement the results of which, as Barnes and Coachman point out, tend

to support the more generally accepted theory nearly as strongly as they suggest the Giletti and Kulp conclusion.

WILLIAM G. METCALF
*Woods Hole Oceanographic Institution,
Woods Hole, Massachusetts*

We wish to thank W. G. Metcalf for his comments on our report "Tritium tracer in Arctic problems" and our subsequent exchange of letters with Barnes and Coachman. The point under discussion is our interpretation of the high value of tritium concentration found in a sample of Arctic Ocean

water at a depth of 400 meters. In our explanation of this value we suggested that the supply of tritium occurred by the sinking of local surface water (normally richer in tritium) to this depth. We drew the analogy with other localities where sinking takes place as a result of freezing surface conditions. It would appear from Metcalf's calculation that only about 6 percent of the sea water in our 400-meter sample could have been derived from the surface as a result of such freezing.

In the generally accepted view of Arctic Ocean circulation the water at this depth is derived by the sinking under the arctic surface water of more highly saline water from the Atlantic. This water would then circulate cyclonically, traveling past Siberia before reaching our sample location north of Canada. If this were so, a very rapid rate of circulation would be required, and the net effect would be a generally high tritium content for all the deep water partaking of this pattern. As we pointed out in our reply to Barnes and Coachman, improbably high natural tritium production rates are required to maintain this concentration.

Metcalf suggests that the tritium data actually do "as Barnes and Coachman point out, tend to support the more generally accepted theory nearly as strongly as they suggest the Giletti and Kulp conclusion." On the contrary, there is a major contradiction between the tritium data and the expected tritium concentration. If the major cyclonic-flow pattern is excluded from this area, however, then all the data can be made to fit without the need for fresh supplies from the arctic surface. In this case, the Atlantic-derived water must flow in a fairly direct line to the sample location.

A possible solution to the problem may therefore be a more sharply defined version of the generally accepted theory. Should subsequent measurements support these original tritium observations, the theory may have to incorporate direct flow of Atlantic-derived water to the region north of Ellesmere Island. Further, if cyclonic flow exists over most of the Arctic Ocean, it must bypass the sample area.

Finally, we wish to stress the point that tritium can be used as a tracer to derive information on mixing rates in the Arctic Ocean. The present limited amount of data is as yet insufficient for drawing firm conclusions.

BRUNO J. GILETTI
J. LAURENCE KULP

*Lamont Geological Observatory,
Torrey Cliffs, Palisades, New York*

Note

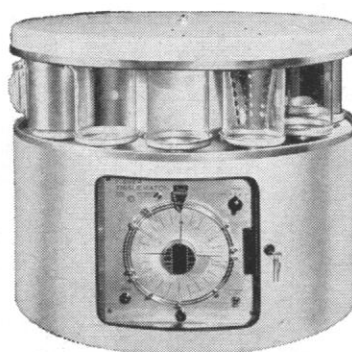
This letter is the Lamont Geological Observatory Contribution No. 386.

The new, automatic instrument

FISHER TISSUEMATON

*for fixing, dehydrating and
impregnating tissue specimens*

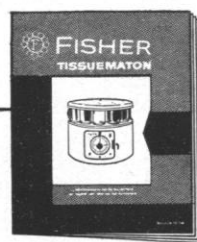
- Automatic operation takes guesswork and tedium out of tissue preparation
- Unmatched program flexibility
- Reduced processing time speeds examination and diagnosis
- Tissue processed gently, reproducibly, time after time



The Fisher Tissuematon automatically produces properly prepared tissue ready for embedding and sectioning. It replaces hand operation and guesswork with precisely timed baths of fixing, dehydrating and impregnating media in the proper sequences for as long or short a time as required. Specimens are processed without supervision, without damage, without loss and without artifacts caused by improper techniques.

TISSUEMATON FEATURES:

- No set-up time, nothing to punch or perforate
- Dial quickly set for predetermined automatic time cycle
- Foolproof controls and cutoff switches
- Quick service and parts from 7 key plants



FACTS & SPECIFICATIONS ARE YOURS FOR THE ASKING

This 8-page booklet gives the full story of the Fisher Tissuematon and how it can help you prepare better tissue specimens easier and in less time. Ask for your copy

Write: 139 Fisher Bldg.
Pittsburgh 19, Pa.



FISHER SCIENTIFIC

America's Largest Manufacturer-Distributor of Laboratory Appliances & Reagent Chemicals

IN THE U.S.A.

Boston
Buffalo
Charleston, W. Va.

Chicago

Cleveland
Detroit
New York

Philadelphia

Pittsburgh
St. Louis
Washington

IN CANADA

Edmonton
Montreal
Toronto

8 AU

A resolving power better than 15 AU

is guaranteed for the Electron-Microscope

ELMISKOP I

designed for normal routine work and for special research problems in science and industry.

Special features:

Beam voltages 40, 60, 80 and 100 kv.

Direct magnification continuously variable from 200 to 160,000 times.

Fine-focus condenser for transmission of smallest specimen regions down to a diameter of 3 microns.

Adjustable magnetic stigmators in condenser and objective.

Transmission microscopy (bright- and dark-field, stereoscopic and selected area micrographs).

Diffraction (normal transmission diffraction with and without lenses, high-resolving diffraction, reflection diffraction for conducting specimens, simultaneous diffraction, selected area diffraction).

Universal diffraction unit with heating device (optional).

Object cooling stage (optional).

For work in the industrial field and medical research the simplified design

ELMISKOP II is of increasing importance:

Resolving power better than 25 AU.

Beam voltages 40, 50 and 60 kv.

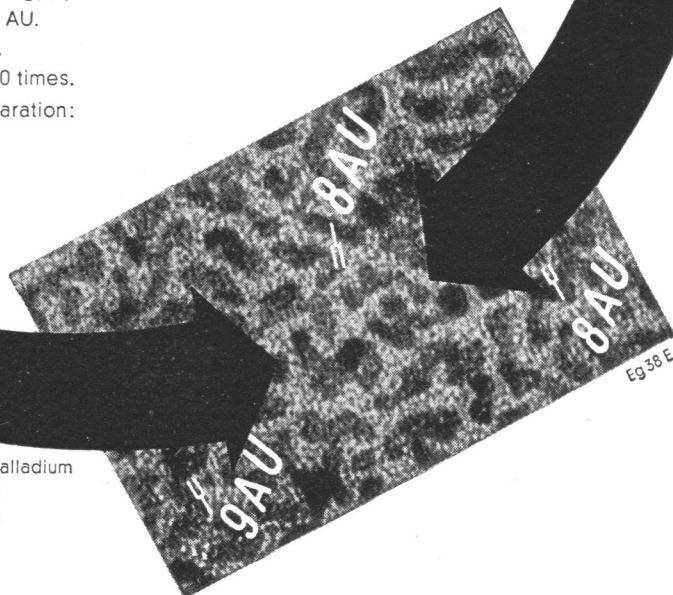
Direct magnification up to 30,000 times.

Accessories for specimen preparation:

Vacuum Evaporating Unit

11-kc Emulsifier

Resolution test with evaporated palladium
direct magnification 100,000 times
total magnification 1,000,000 times



SIEMENS & HALSKE AKTIENGESSELLSCHAFT
BERLIN • MÜNCHEN

SIEMENS NEW YORK INC.
350, FIFTH AVENUE • NEW YORK 1, N.Y. • TELEPHONE: LONGACRE 4-7674

THE AHEARN & SOPER CO. LTD.
OTTAWA (CANADA) • P.O. BOX 715 • TELEPHONE: C 34 068



NEW!

AO Spencer Automatic Knife Sharpener
*provides excellent edge
 and bevel... saves you time and money*

This complete, automatic knife sharpener gives you on-the-spot facilities for honing and polishing knives to the same high quality edge and bevel you get with a new AO Spencer Microtome knife.

The same resharpening methods used at the AO factory developed and proven over the years, have been adapted and built right into this instrument. Yet it's remarkably compact, it weighs less than 20 pounds and requires no more bench space than your AO Spencer "820" Microtome. And it's a perfect companion instrument for your "820"... you always have sharp knives available to assure the optimum sectioning results the Microtome is designed to produce.

Plus—you save time and money by ending the

delay and expense of outside servicing and tedious, time consuming hand honing and stropping. You can reduce expensive knife inventory to a minimum.

Operation is completely automatic. You simply place knife in holder, apply abrasive powder, set automatic timer and flip on switch. Knife holder will accommodate any knife up to and including 185 mm.

Ask your AO Sales Representative to show you how AO's New Automatic Microtome Knife Sharpener can reduce your laboratory expense... reduce your costly knife inventory... and assure you a sufficient stock of sharp knives on-hand, at all times.

A demonstration costs you nothing. Use the handy coupon for complete information.

American Optical
 **Company**

INSTRUMENT DIVISION, BUFFALO 15, NEW YORK

Dept. X-1

- ☐ Please send full information on the New AO Spencer Microtome Knife Sharpener.
☐ Please arrange a demonstration of the New AO Spencer Microtome Knife Sharpener.

Name

Address

City Zone State