

DOCUMENTATION

# Unpublished Manuscript To Be Accessible to Scholars

## Microfilm Seen as an Aid to International Exchange Of Scientific Information; Rare Books Can Be Filmed

ANY BOOK in the world, any unpublished manuscript in the world, and eventually complete lists of all scientific and other literature, can be made available to any research worker in the world, at low cost and in form for his own permanent possession. This is practicable through the use of microfilm, declared Watson Davis, president of the American Documentation Institute and director of Science Service, at the World Congress of Universal Documentation. Mr. Davis is chairman of the American delegation to this meeting.

Microfilms are copies of book pages, manuscript sheets, illustrations, etc., as separate "frames" on a continuous strip of film the size of standard movie film or smaller. A complete copy of a large book made in this way can be carried in the corner of a pocket, and mailed anywhere in the world for a few cents. They can be read with the aid of small hand-size lens-holders, or more easily through the use of special projection machines about the size of standard typewriters.

### Library In Small Space

Thus a scholar can have a permanent library covering his whole subject and comprising the rarest works in the world, even though he does all his work in a single small room.

Auxiliary publication of long works, and other specialized material too expensive to print for the limited circulation they would receive, is also possible through microfilm. Mr. Davis pointed out some of its advantages:

"It will supplement other forms of publication and make accessible material of all sorts that can not now be printed because of economic factors. It will make available valuable research data that now go unrecorded. It will make available out-of-print and rare books. It is adapted to the publication of photographs and other illustrations. Auxiliary publication service (which might be named Docufilm Service) should be auxiliary to established channels of scholarly publication and it should aid and

not hinder journals. Editors of journals and institutions should act as intermediaries between the authors of papers and the 'Docufilm Service.'

"This idea has been given an experimental demonstration in America in connection principally with scientific papers. There a journal editor can publish as much or as little of a technical paper as he wishes. In the case of a very specialized paper it may be only an abstract or summary. He appends to the notice or article a note saying that the full article with diagrams, pictures, etc., can be obtained by remitting a certain price and specifying the document number under which this full article has been deposited at the central agency operating the auxiliary publication service. Orders are sent by readers directly to this central agency, which is the American Documentation Institute at Washington, D. C. Microfilms of the document are made only if and when ordered.

"In this way the document is perpetually 'in print' but no extensive, space-consuming stocks need be stored, only the document itself and the microfilm negative from which positives are made for distribution. The operation of the plan is simple and uncomplicated and editors may use it when, how and if they find it helpful. No financial participation or guarantees on the part of the editor or author are required.

"It is believed that this or analogous techniques can be adopted in other countries, preferably with central agencies serving those countries. If this is done there can be effective exchange of negatives between 'Docufilm centers'."

### For News Files

Newspaper files, that now take up costly space by the cubic yard in newspaper offices and public libraries, can be squeezed down until a single filing case will hold the issues of many years, through the use of microfilm.

The proposal to save space, and at the same time make the records safe against the inevitable crumbling of wood-pulp

print paper, was put forth by Mr. Davis, speaking before the World Congress. Mr. Davis said, in part:

"The volume of the daily production of newspapers of the world is stupendous. In one sense, the daily newspaper is a very ephemeral product. Nothing is staler than yesterday's issue. In another sense, the daily newspaper is a fundamental historical document. Often no other written record is closer to an event. Each issue is a complex installment of the world's continued story, which is never finished.

"The mere physical volume of files of newspapers prevents them from being maintained and stored as they should be. Only a fraction of the newspapers of America, for example, are filed in the libraries of the cities in which they are issued. The wood-pulp paper on which they are printed is perishable and some of it disintegrates after two or three decades.

"Here is a major job for microfilm. Only through the medium of microfilming does there seem to be any hope of preserving the daily newspaper record of the world.

"Happily for all documentation, and especially for newspaper preservation, research has shown that microfilm that is cellulose acetate, or 'safety' film, is chemically more stable than good rag record paper, which means it should last at least 100 to 200 years. Thus, microfilming is an act of preservation."

*Science News Letter, August 21, 1937*

GEOLOGY

## Arctic Canada Had Gold Rush in 16th Century

GOLD rushes renewing themselves in the Arctic, scientists flying to the Pole and announcing that they intend to stay there for a year, give timely point to an old story revived by a new scientific publication of the Field Museum of Natural History, Chicago, written by Sharat K. Roy, curator of geology.

It is about the first stuff pertaining to be gold ore brought back from the American Arctic. It launched the first gold rush and the first gold mining boom. It cost many nifty men their lives, and many "suckers" their money. And now, after more than three centuries, Mr. Roy finds out that the "gold" was not even fools' gold or pyrites, but brassy yellow mica, veined in some black rocks.

In 1576, Capt. Martin Frobisher, after a successful career in piracy (broadly

winked at by his honored sovereign, Queen Elizabeth), set out from England with two small vessels to find a route around the northern end of North America. It was the first of many efforts to navigate the famed Northwest Passage.

Captain Frobisher did not discover the hoped-for route to Cathay, but he did get well up into the Arctic and made noteworthy explorations among the islands between Canada and Greenland.

Upon his return, the wife of one of his sailors put a coal-like piece of rock her husband had brought with him on the fire, to see if it would burn. It refused to burn, but oozed out a few globules of yellow stuff that looked like gold.

That started it. Cautious reports of reputable goldsmiths, that there was no gold in the rock, were ignored when one adventurous alchemist declared that he really had found gold in it. Frobisher's principal financial backer, one Michael Lock, organized a stock company. The queen herself subscribed for one-fourth of the shares.

### Import "Ore"

The cargo brought back from a second voyage, 200 tons of the "ore," was kept securely under lock and key in the dungeons of Bristol Castle. A third voyage, with a whole fleet of ships, brought back 1,300 tons of the "ore." But by then the bubble had burst; the stuff was known to be worthless. Michael Lock was ruined, bankrupt, jailed. Frobisher was acquitted by the queen, afterwards proving his worth in the Armada battle, when with one small ship he whipped four vastly bigger Spanish galleons. He finally died of a wound received in later fighting against the Spaniards.

Remains of Frobisher's diggings are still to be seen on Countess of Warwick Island, with the ruins of a stone house he had erected there on his last voyage. Specimens of the 1,300 tons of "ore" dumped as worthless in Dartford have also been recovered in recent diggings. Petrographic examination shows the "gold" to consist merely of veins of brassy-colored mica.

*Science News Letter, August 21, 1937*

A water sleigh designed by Soviet scientists for use in the Arctic is equipped with a 100 horsepower motor, steered by an air rudder, and run on skis, and can be used over water, ice floes, or snow.

BIOLOGY

# Sex Found in One-Celled Animal Considered Sexless

## Paramecium Found to Pair and Mate and Inherit Sex By Mendelian Laws in Same Way as Does Man

**S**EX has been discovered in Paramecium.

For decades, this one-celled animal has been the classical example of sexless mating. Dr. Tracy M. Sonneborn, associate in zoology at the Johns Hopkins University, has reported this discovery, (*Proceedings of the National Academy of Sciences*). A new approach to the study of the origin and nature of sex has been made.

Occasional mating in such minute unicellular animal organisms has been observed for many years, but there was no indication of sexual difference until the experiments of Dr. Sonneborn.

Two of the five races of Paramecium explained by Dr. Sonneborn have shown sex differences, and have exhibited a mating process fundamentally the same as that known in higher life.

The actual presence of individuals of opposite sex, under favorable conditions, has apparently been found to be the only requirement for inducing an instantaneous sexual reaction. Dr. Sonneborn reports, too, that sex is inherited and determined in much the same way as that of man and of higher life in general, and is similarly governed by the Mendelian laws of heredity.

Placing the study of the genetics of unicellular animals on a "quantitative and predictable" plane for the first time, Dr. Sonneborn estimated that his discovery, which brings with it perfect control of mating and a consequent certainty of rapidly acquiring a knowledge of the genetics of Paramecium, "should lead rapidly into a systematic, coherent body of knowledge in close touch with the rest of genetic science."

The discovery will open wide the field for the study of heredity in unicellular animals, which comprise a large portion of the animal kingdom.

In the Paramecium, a small oval-shaped animal, approximately one two-hundred-fiftieth of an inch in length and about one-third as wide, often found in stagnant waters, reproduction is known to take place by a simple division of the parent body. Occasional conjugation oc-

curs in the temporary union of two individual cells. In the process, complicated divisions of the central portions, or nuclei, of the Paramecia occur, there is an exchange of nuclear particles, and the Paramecia separate again.

Despite the resemblance to true sexual reproduction, biologists long held conjugation to be an example of sexless mating.

Dr. Sonneborn's discovery of two distinct sexes each of which will conjugate only with members of the opposite sex, followed in the course of his study of endomixis, a process similar to conjugation, but lacking fertilization.

He found that after this process, "in certain cases the numerous descendants of a single individual that has undergone endomixis will not conjugate together, but they will under the same conditions conjugate with descendants of certain other exendomictic individuals. Following this clue, the entire stock was found divisible into two sex classes."

The original work was done with a "Race S" of Paramecium, found in a pond at Cold Spring Harbor, Long Island.

Dr. Sonneborn found that cultures derived directly from certain individuals would, on mixture, immediately form clusters, growing large enough to include all the individuals, and finally disintegrating into normally conjugated pairs. Pairing off a group of such cultures into all possible combinations, Dr. Sonneborn was able to divide them into two sexually different groups, the same in all visible aspects. The clusters produced by combining cultures of the sexes persist about one hour.

"Within the clusters readjustments of position occur slowly," Dr. Sonneborn reports, "until pairs achieve the position appropriate for conjugation. In this position, nearly all the oral side of the body is in contact with the mate . . . Each properly oriented pair is automatically released from the cluster."

"Cluster formation and pairing are seemingly not due," his report continues, "to the action of certain substances in