

MICROPHOTOGRAPHY

# Microfilms Hailed as New Way To Duplicate Books, Pictures

**New Technique Makes Library Stores More Accessible; Permits Distribution of Unpublished Manuscripts**

By WATSON DAVIS

**A** NEW way of duplicating records, manuscripts, books and illustrations is being developed and scientists predict that it is destined to play a large part in the scholarly research of the future.

It consists of making miniature photographs on film and then reading them by use of a machine that enlarges them to more than original size on a translucent screen.

"Microfilms," these small photographs of documents and books are called. Soon, it is predicted, this word will be as common as "book" or "journal" in library, educational and scientific circles.

These microfilms are made on ordinary motion picture film. A hundred feet of microfilm, small enough to slip into the vestpocket, will hold 1,600 pages of a book or manuscript, or more than the contents of five ordinary fat books.

Science Service, the institution for the popularization of science, has inaugurated and sponsored this development with the cooperation of the Chemical Foundation, the U. S. Naval Medical School, the U. S. Department of Agriculture Library, the U. S. Bureau of the Census, the Library of Congress, the Works Progress Administration and other agencies.

This new technique is called "microphotography," not to be confused with "photomicrography," which is the making of large photographs of very small objects through a microscope.

## Need Special Apparatus

While it has many problems in common with ordinary photography, with so-called candid cameras, motion picture apparatus, etc., microphotography requires special apparatus. Design and construction of required cameras and reading machines has been accomplished under the direction of Dr. R. H. Draeger, a U. S. Navy surgeon, detailed to cooperate in this project for making scientific litera-

ture more accessible at low expense.

Science Service and its cooperating agencies have demonstrated that microfilms are practically useful in two important fields:

## Two Fields

1. Making material in libraries more accessible by allowing the librarian in effect to loan the book and keep it on the shelves, too.

2. Publishing voluminous, technical, or highly illustrated manuscripts, theses, and other material that now languish in laboratories and studies because no journal has funds or space to publish them.

As a demonstration and practical service the "bibliofilm service" has been

operated in the Library of the U. S. Department of Agriculture for the past two and one-half years. During that time hundreds of thousands of pages of material have been microfilmed for research workers, at the cost of about a cent a page. This bibliofilm service has been acclaimed by research men and women in all corners of the globe who are thus enabled to use the facilities of this important library hitherto inaccessible to them.

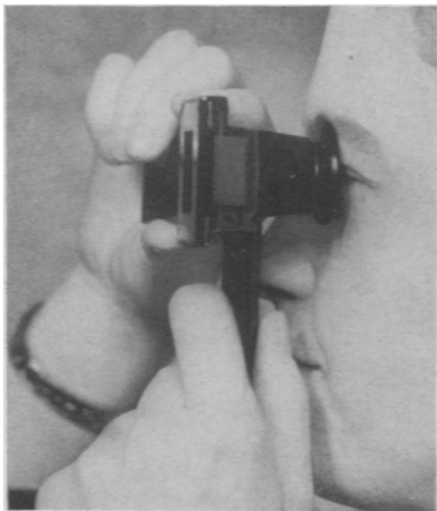
## Leading Journals Aid

The editors of more than 25 leading scientific journals are cooperating with Science Service in an auxiliary publication service made possible by microfilm. Articles, tables of data, illustrations and other material that can not be published are deposited with Science Service, where a document number is assigned and a price is set for which a microfilm copy can be furnished. The journal then publishes a short version of the scientific paper together with an announcement of the availability of the microfilm. Readers who need it then order it sent them. In this way important but specialized material can be made perpetually accessible without burdening li-



## READING THE FILM

*The tiny images on microfilm are enlarged with optical apparatus to make them easily read. This reading machine can be placed on a desk like a typewriter and projects the images on a translucent screen so that they are larger than the original size of the type.*



#### HANDY VIEWER

*For film inspection or for use when traveling is this small sized viewing device.*

braries and individuals with material that they may never need.

A reading machine that stands conveniently on the desk and can be loaded in a few seconds with thousands of pages of microfilm has been perfected. In the future those engaged in scholarly research will think of a microfilm reading machine as they do of a typewriter, and studies, libraries and laboratories will be equipped with them as commonly as with typewriters.

Records of all sorts, as well as scholarly materials, will be condensed and preserved by microfilming. An ordinary letter-sized sheet of  $8\frac{1}{2}$  by 11 inches shrinks to three-quarters by one inch upon a microfilm. This is only  $1/125$  of the original area.

#### Safety Film Used

Because non-inflammable cellulose acetate or "safety" film is used in making microfilm, copying upon it is actually an act of preservation. The National Bureau of Standards has concluded that microfilms will last as long as good rag paper, which means at the least one to two hundred years.

One valuable use for microfilm is for copying newspapers, rare documents, archives and other material that will otherwise soon be lost to civilization. The Library of Congress was a pioneer in using the microfilm method for copying historical documents in Europe, the originals of which may be endangered or destroyed as in Spain. Some newspapers are now having microfilms made of their daily issues as a method of preservation for libraries. Newsprint

only 20 years old is disintegrating badly in some cases.

As a result of Science Service's pioneering in applying microfilms to scholarly material, scientific and scholarly organizations are organizing a Documentation Institute to continue and broaden the work that has been done.

It is not considered likely that microfilms will ever replace ordinary books, magazines or newspapers produced in large editions. The economy and usefulness of microfilm lie in making available a small number of copies of material of limited appeal or in reducing the bulk of voluminous works.

Not content with the possibilities already demonstrated, it is planned to apply microfilm in the future to the problem of making a giant index of all scientific literature. Heretofore scientists have not dared to contemplate such an undertaking because of the millions of cards that would need to be classified and filed, to say nothing of the cost of printing. If an "electric eye" were perfected to select from the rolls of microfilm the references a scientist might desire, then the building and use of such a great guide to the world's knowledge might be contemplated.

#### Smaller Still

The present microfilm, condensed as it is, is not considered the ultimate. With better photographic emulsions, which may already be in the making in laboratories, it should be possible to make the photographic images still smaller. If the microfilm images can be made a quarter-inch high instead of one inch, that is, if the reduction ratio can be made 44 instead of 11, then upon a film the size of the familiar three by five inch card used universally in libraries, there could be placed 240 pages.

What does this mean? The libraries of the future may be placed in the space of their present card catalogs.

*Science News Letter, March 20, 1937*

#### ANTHROPOLOGY

### Jungle Life Blamed for Ancient Man's Flat Head

**J**UNGLE life was to blame for prehistoric people in Java having ape-like flatness of head, 25,000 years ago.

This is the theory of Dr. G. H. R. von Koenigswald, who has arrived from Bandoeng, Java, bringing with him eleven casts of the skulls of men, women, and children of this strange-looking ancient race. Their heads became flat at the back, he believes, because they developed tremendous neck muscles in their athletic struggles to weave their way through thick Javanese jungles.

#### Solo Man

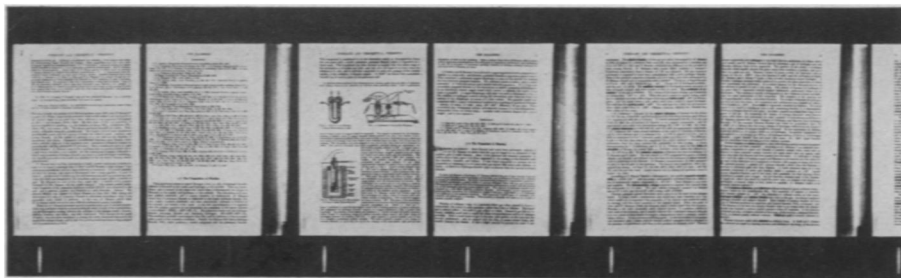
This early human type has been discovered in Java, and named Solo Man, after the Javanese river where the bones came to light. Dr. von Koenigswald places Solo Man on man's family tree as a branch of the Neandertal stock, which flourished widely on earth, mainly 60,000 or more years ago.

Dr. von Koenigswald journeyed here to attend the International Symposium on Early Man, held at the Academy of Natural Sciences of Philadelphia, March 17 to 20.

Among the eleven casts of this old human type exhibited at the symposium, Solo Woman can be recognized by a lighter skull and smaller brain than that of Solo Man. This is a sex difference among living races, no less than those 25,000 years old.

Solo men and women were probably cannibals, says Dr. von Koenigswald. Prehistoric peoples who thus ate their fellows did so mainly for magical benefits, as, for example, the belief that devouring the brain of an enemy would thereby enable the eater to acquire the dead man's power and strength.

*Science News Letter, March 20, 1937*



#### ON MICROFILM

*This is the actual size of the microfilm which reproduces six pages of a book. Drawings and other illustrations, as well as the text, are copied faithfully.*