

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.

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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

SEX 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

the fluid in which the two sexes are growing."

A study of the habits of the organisms over a period of three months showed that the normal sex reaction will not take place at certain times in the life history, notably during the first week following conjugation, during endomixis, and whenever the animal is overfed.

Dr. Sonneborn found that in cases of reproduction by division, sex is invariably inherited from the parent; while in cases in which conjugation or endo-

mixis has intervened, inheritance is determined strictly according to the Mendelian laws which govern inheritance of sex in man. Thus, the examination of several thousands of individuals has shown that the distribution of the sexes is purely a matter of chance.

As in the case of most other organisms, Dr. Sonneborn reports, "it is evident that the method of inheritance indicates that sex determination is unclear."

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be strata of different density, which change the speed of sound. In mountainous country, there will be confusing echoes.

With all these factors, and others besides, to shift the sound hither and yon, a sound-detector is doing well enough if it can give the widest kind of a blunderbuss location for the oncoming plane. It is then up to the searchlights to spot it, the rangefinders to estimate height and distance, and the gunlayers to get the cross-hairs of their sights on it.

Then, with all the skill they can muster, and a dab of cannonceers' luck to help out, they may score a hit. Othello's occupation is far from gone, in the A.A. artillery, at least.

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PHYSICS

# Mythical Gun That Aims Itself Seems Impossible to Silence

THAT ever-booming perennial, the gun that aims itself, has been getting into the papers again. The experts who know all about artillery because they can make a newspaper typewriter work (admittedly no mean feat!) tell us that somewhere on the deck will be a listening device, that will catch the distant sound of the approaching bomber's motors, even though the plane is hidden in night or fog. With no more than this to go on, the marvelous robot machinery of the guns will swing them around until their muzzles point squarely at the unseen foe. Boom! (or Bang!, if you prefer), and the enemy nosedives for Davy Jones's Locker.

It avails Navy ordnance men nothing to deny, even with curses and almost with tears, that such a device exists. They are only given credit for discretion and zeal in guarding the secrets of our nation's defenses. The whole legend of the gun that aims itself is a beautiful example of how a naive will-to-believe

can make even the most improbable legend puncture-proof.

An elementary knowledge of the physics of sound will show how difficult it is to get even an approximate idea of where a thing is merely by the noise it makes.

Sound, as everybody knows, consists of rapidly moving compression waves in air. When air moves, it dislocates and distorts the sound. We have all had experience with that, when we try to shout something to a companion on the other side of a field when a strong wind is blowing. The wind carries away our voices, we say. That is even scientifically correct.

The giant grotesque ear-trumpet-like things used by the Army to listen for approaching planes increase the range of the ear as field-glasses aid the eye. But they can be fooled. There may be two, three, or more quite independent winds blowing in the upper air, between them and the object of their search. There may

PHYSICS

## Accelerated Weathering Tests Building Materials

ACCELERATED aging tests that include changes in temperature, humidity and light are part of the program of research which the National Bureau of Standards is applying to fibrous building materials like insulating and wall boards for both exterior and interior uses and sheathing papers. Part of the fund given to the Bureau for a general study of building material relative to low-cost housing projects, is financing the research.

The effects of serious artificial weather changes will be studied to see how they create distortion, expansion and contraction, cause mold growth, vary the moisture resistance and decrease the strength of the materials. Two research scientists have been added to the staff for this project which should supply information that will permit the house builder to make an intelligent choice between different types of materials and determine whether he can profitably substitute some of them for more expensive materials.

*Science News Letter, August 21, 1937*

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