

BIOCHEMISTRY

Animals Share Heredities

By combining bits of DNA molecules of different animals, scientists are able to study the genetic relationship between the various vertebrate animals—By Barbara Tufty

► A NEW METHOD of “matching” pieces of key hereditary molecules of DNA (deoxyribonucleic acid) from different animals is being used by biologists to show the relationship among such vertebrates as men, monkeys, rats, rabbits, fish and cattle.

Men and mice, for instance, share from 20% to 25% of their hereditary characteristics, reported Drs. B. H. Hoyer of the National Institute of Allergy and Infectious Diseases, now at the Carnegie Institution in Washington, D. C., and Brian J. McCarthy and Ellis T. Bolton, staff members of the Institution.

Men and salmon share about five percent of the characteristics, they said.

The basic principle of this new method of determining relationships among earth's creatures is to allow fragments of the DNA molecule from one animal to attach themselves to homologous or similar sections of DNA from another animal.

The DNA molecule present in each living organism contains coded hereditary information that is passed on from generation to generation. The large molecule is formed of two long strands, twisted around each other like a double strand of beads.

In detail, the “matching” method consists of the following steps:

1. The two twisted strands of the DNA molecule in the cells of an animal are separated by heating. To keep the individual

strands separate, the hot solution is then quickly cooled.

2. The two strands are then entrapped separately in jelly-like agar. When the agar cools, the strands are mechanically broken into small bits.

3. Strands of DNA from another animal are made radioactive in order to label and track them, and are broken into short fragments by mechanical shearing. These pieces are then heated to separate the strands and are quickly cooled to keep them from recombining into the typical twisted double strands.

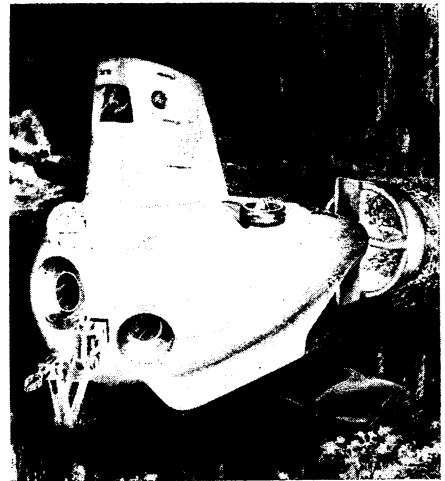
4. These short strands of radioactively labeled DNA are then allowed to diffuse through the agar containing the long single strands of DNA from the first animal.

The mixed DNAs are then “incubated” for several hours at normal temperatures. During this period, bits of the short radioactive strands combine with portions of the longer strands where a sequence of similar genes permits such recombination.

5. The amount of recombination is then analyzed to determine the degree of relationship between the two animals under observation.

This procedure, described in *Science*, 144: 959, 1964, is an important step in determining the degree and nature of the relationship between vertebrate animals.

• *Science News Letter*, 85:365 June 6, 1964



Litton Industries

ALVIN—This two-man oceanographic submarine developed by the applied science division of Litton Industries, Minneapolis, is named *Alvin* after Allyn C. Vine, physical oceanographer at Woods Hole Oceanographic Institution, Massachusetts, who initiated the basic planning for the vehicle. Capable of maneuvering at depths down to 6,000 feet, the 13-ton vehicle is to be used for the study of biology, geology and physical oceanography.

Nature Note

Trap-door Spiders

► THERE IS A scurry of eight tiny feet, and a door is slammed shut in your face.

The trap-door spider is a member of the tarantula group. They dig themselves burrows which they secure against intruders by a carefully fitted silk door.

The spider that is called *Bothriocyrtum californicum* is slightly more than an inch long.

Its jaws are equipped with large spines that are used like rake prongs for digging. With them it scrapes away bits of earth which it rolls up into balls and carries away from its tunnel.

The eight-footed trapper then waterproofs the walls with saliva and earth, and finally applies a silken lining to the nest. By continuing the silk from the lining onto the inside of the door, the spider makes a firm hinge.

The spider conceals the tiny door by planting moss or pebbles on it. Each spider is a solitary individual and rarely leaves the tunnel voluntarily. It can grasp the inside of the door and hold it tightly shut against intruders. At the proper time, the tunnel becomes a mating chamber and a nursery for the young.

The hungry spider sits with the door ajar, and snatches any insects that wander too near.

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ICHTHYOLOGY

Oxygen Lack Kills Fish

► ABSENCE OF OXYGEN in water can cause deaths of millions of tons of fish, even though there is plenty of natural fish food and no man-made poisons.

Fish need oxygen just as man and beasts need it, only they get the precious life-giving gas from the water. Fish breathe in this water with dissolved oxygen through their gills. A sudden lack of dissolved oxygen in the water is as deadly to fish as sudden lack of oxygen in the air is for human beings.

Winds and currents can stir up vast layers of ocean water in such a way that suddenly fish are without the proper amount of oxygen, reported Dr. John Ryther, biological oceanographer at Woods Hole Oceanographic Institution, Woods Hole, Mass., and director of the U. S. program in biology for the International Indian Ocean Expedition now in progress.

Dr. Ryther recently returned from a research cruise in the Arabian Sea, near a spot where a Russian merchant ship in 1957 reported passing through millions of tons of dead fish floating in an area 125 miles wide and about 600 miles long.

Deaths of massive numbers of fish can

be caused by several factors, Dr. Ryther said. The action of wind and sea currents can move vast layers of undersurface water which is rich in inorganic nutrients but poor in dissolved oxygen.

As these nutrient layers rise to the ocean surface near the sunlight, minute sea creatures called plankton begin to feed upon the nutrients and use the sunlight to produce organic matter through the process of photosynthesis.

The growth of plankton attracts larger animals and fish into the area. At the same time, organic matter is slowly dying and sinking beneath the surface. Here it decomposes and uses up the rest of the already scarce oxygen.

When this anoxic water is driven by winds and current to the ocean surface, billions of fish are trapped in an oxygenless environment and are asphyxiated.

Scientists from 28 nations are working from shore stations and research vessels in an effort to analyze 28 million square miles of Indian Ocean, an area as large as Asia and Africa combined.

• *Science News Letter*, 85:365 June 6, 1964