Giant Gene in Action

See Front Cover

➤ "GENES IN ACTION" is the title of a large new model, seen on the front cover, to be shown in Chicago at the American Medical Association Convention from June 26 to 30.

Dr. A. G. Macleod, project coordinator for the Upjohn Company, said that the main part of the exhibit represents a small segment of a giant chromosome from the cell of a fruit fly magnified 289,400 times. It shows a single gene in the process of "puffing" as it actively produces RNA, or ribonucleic acid.

Many persons will be wandering together through the chromosome world depicted in the model, which contains the latest information about its complex processes. The "puffing" is shown by 180 convoluted aluminum tubes swirling upward to a height of 18 feet, while flashing signals from 1,350 miniature lights help to make clear what happens when genes are in action.

Each gene is a tiny part of one of the chromosomes packed together in the nucleus of one cell. It consists of a segment of DNA, or deoxyribonucleic acid, which carries the genetic code determining the nature of the cell and of the human, animal or plant of which it is a part.

DNA never leaves the cell nucleus, but it transmits its genetic information by synthesizing messenger RNA, which takes the information to the ribosomes, or protein factories located in the cell's gelatinous outer region called the cytoplasm.

DNA and RNA in the exhibit are differentiated by strands of colored vinyl wound about tubes—DNA in blue and RNA in red.

The model shows that both DNA and RNA are essentially long strings of chemical entities called bases. The sequence in which the bases are joined is different for each creature and determines every biochemical reaction that makes the bacterium, plant, frog or man.

Auxiliary exhibits show how RNA and DNA relationships work in such areas as normal protein synthesis, the effect of antibiotics and hormonal actions. One unit for example, demonstrates how streptomycin causes bacteria to misread the code written into messenger RNA and produce useless protein.

Consultations with specialists including Dr. Hewson Swift of the University of Chicago, Dr. Joseph C. Gall of Yale University and Dr. Geoffrey Zubay of Columbia University aided in detailing the model, Dr. Macleod said.

(Cover photograph by Ezra Stoller.)

• *Science News, 89:436 June 4, 1966*

EPIDEMIOLOGY

TB Outbreaks Reported in Navy

➤ SIX OUTBREAKS of tuberculosis since 1959 have occurred on U.S. Navy ships in spite of pre-enlistment screening by X-ray and tuberculin tests.

One of the most recent scares was on the carrier USS Wasp last December when it was standing by as the prime recovery ship for the Gemini 7 astronauts. Four ill crewmen, suspected of having TB, were flown to the mainland for examination. In all, 21 crew members were admitted to the U.S. Navy Hospital in St. Albans, N.Y., for study, Capt. Donald C. Kent, chief of medicine, told the annual meeting of the National Tuberculosis Association and its medical section, the American Thoracic Society in San Francisco.

Only three had active TB, but the other 18 had become infected with the TB germ, a tuberculin skin test showed. However, an intensive investigation showed no evidence of clinical tuberculosis among these men.

A person with active TB in a closed group such as occupies a Navy ship can spray the air with tubercle bacilli on droplet nuclei, Dr. Kent explained. A closed community such as this has not built up immunity by prior exposure, true of an increasing proportion of the United States population today.

Although the vaccination of Navy personnel with BCG has been suggested by some observers, Dr. Kent believes this is not necessary or even advisable. Such vaccination would mean loss of the tuberculin test as an indicator of infection because vaccinated persons become tuberculin positive.

Early detection is a key point in the Navy's TB control program, Dr. Kent emphasized. As soon as the disease is diagnosed in any crew member the commanding officer of the station or ship from which the patient came is notified. All contacts are given a chest X-ray and, if not previously tuberculin positive, are tuberculin tested.

At three-month intervals for a follow-up period of 12 months, positive tuberculin reactors are again X-rayed and the tuberculin test is repeated on negative reactors. Contacts whose findings are suspicious are admitted to a Navy hospital for further study.

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