

BIOLOGY

# Germ Free Monkey

## Infant Simian, Most Remarkable in the World, Romps In Her Small Cage, Untroubled By Even Harmless Germs

By DR. FRANK THONE

See Front Cover

**A** BABY monkey romps in a rather small cage in the bacteriology laboratory at the University of Notre Dame, and peeps through a round window at one end with big, wondering eyes.

In her way, this infant simian is the most remarkable little monkey in the world. There is not, and never has been, a germ of any sort in her active little body. Germ-free she came into the world, and thanks to most elaborate scientific precautions, germ-free she remains.

Scientists will watch her career with keenest interest. Normally all animals, from worms to whales, live and die with their insides swarming with bacteria and other one-celled plant and animal life. That goes for the human animal, too. We seldom stop to think of it (as well, perhaps, that we don't), but everyone of us is a perambulating combination zoo and botanic garden. So normal is it for animals to be inhabited by germs (usually harmless varieties) that it has even been contended that these micro-populations are necessary to life.

### Elaborate Technique

Prof. James A. Reyniers, director of the bacteriology laboratories at Notre Dame, wasn't so sure about that. Being of an intensely inventive turn of mind, he built some elaborate mechanisms wherein it was possible to bring animals into the world untainted by any germs,

and keep them germ-free afterwards.

He started out modestly, with small animals, down near the lower end of evolution's ladder: mice, rats, guinea pigs, rabbits, chickens. Long, patient experimentation proved that germ-free life was possible to animals. Through years of practice, his technique was made as nearly unerring as is humanly possible.

Finally he was ready to try his method on a larger and more difficult animal, zoologically much closer to the human stock. Most convenient and easiest to obtain, of all the monkey tribe, is the rhesus monkey, familiar to everyone as the hand-organ virtuoso's constant companion. Rhesus monkeys are imported in large numbers from India, for research purposes. So Prof. Reyniers bought a number of monkeys of this species.

### Caesarian Birth

He selected a young female, pregnant with her first offspring. After elaborate skin cleansing and sterilization, he performed a caesarian operation—duplicate in miniature of the procedure in thousands of difficult human childbirth cases.

There was one decided difference, however. The operation was not performed in a typical hospital theater, but in a sterile closed chamber, so arranged that the scientists themselves were outside it, reaching in to do their work with their arms encased in long rubber gloves.

Babies of all mammalian species are normally free from germs during their entire prenatal existence within the womb. They get their first germs with their first milk, with their first breath. Delivered by caesarian operation and kept in a closed chamber, with germ-free food, germ-free water and germ-free air, they should remain germ-free themselves so long as the seal against the outer world remains unbroken.

That is what Prof. Reyniers did for his guinea pigs and other small animals, and that is what he has done for the little germ-free monkey. All supplies are sterilized and introduced through germ-

excluding air locks. Air is filtered free of all micro-life. When the little monkey is to be weighed or fed, hands are thrust into the long gloves gasketed into the sides of the solid-sided cylinder that is her rearing cage. This is the nearest she comes to contact with the outside world.

The mother monkey, incidentally, recovered nicely from her operation and has been restored to the laboratory's monkey colony. Prof. Reyniers hopes that she will eventually provide him with another germ-free infant.

The little monkey, meanwhile, has become quite a favorite with the laboratory staff. They have named her "Yehudi II," quite disregarding her sex.

Little Yehudi II receives a diet very similar to that given to human babies. Her formula consists of canned milk, water and dextri-maltose every two hours. This is supplemented with Pabulum once daily, and the necessary vitamins. Daily she gains weight between a fifth and a quarter of an ounce.

"At present," Prof. Reyniers reports, "she is fast becoming a laboratory worry, since her curiosity is so acute that she gets into all sorts of unpredictable adventures. We have found it necessary to hide all feeding equipment, and since the space in the cage is rather limited, I am wondering how long we can keep her out of mischief. She has a most provoking habit of unscrewing anything that she can turn with her little fingers.

### Favorite Perch on Balance

"She roams wobbly-legged all over the cage, and several days ago she got herself tangled in one of the gloves and nearly smothered. Her favorite perch is on the balance, which gives her a gentle up-and-down ride. Several weeks ago she cut her biting teeth, and she exhibits dislikes for certain foods, such as spinach."

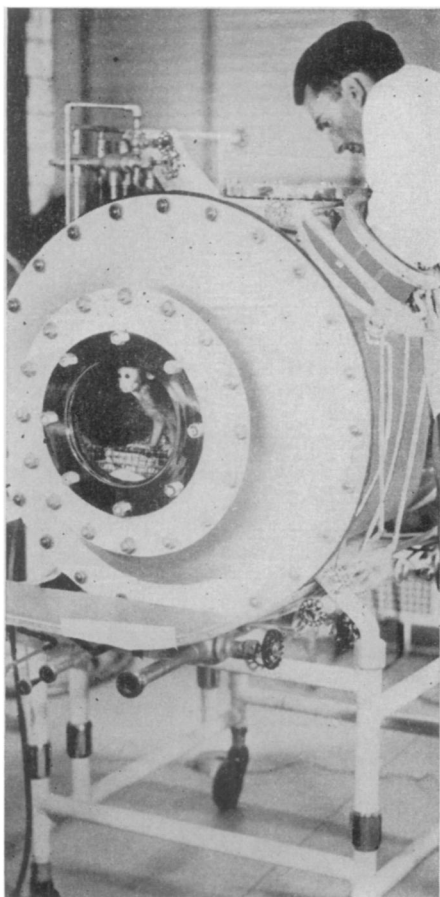
Prof. Reyniers also states his reasons for undertaking to raise a germ-free monkey baby: "The first reason for this experiment with the monkey is its resemblance to the human. Since our studies are concerned with the relationship of bacterial flora to the development of animals, and since we have perfected our techniques and experiments on rats, mice, rabbits, guinea pigs and chickens,

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GERM-FREE CAGE

Little Yehudi II peeps from her sanitary surroundings as the attendant waits on her from outside. How she is fed without contact with a germ-ridden world is shown in the illustration on the front cover of this week's Science News Letter.

the monkey is the logical next step. Since there is very little literature on monkeys, we want to raise this monkey for experience and records for future use in the laboratories.

"We also expect to extend our experiments to the dog, as a representative carnivorous animal."

*Science News Letter, October 18, 1941*

India is to have two museums for exhibits of scientific and industrial research, at Calcutta and Delhi.

As far back as 1934, says one economist, Germany began shifting *food habits*, gradually decreasing consumption of bread, meats, fats, milk, and fruit and increasing other food such as potatoes, with a view to meeting wartime food problems.

## METALLURGY

## Steel Famine Even In Defense Seen for the Next Few Years

**This Year's Production of 90,000,000 Tons Will Be 8,000,000 Short; Shortage Next Year 27,000,000 Tons**

A SHORTAGE of steel even for defense needs in 1941 and for the next few years is foreseen by Dr. Matthew A. Hunter, professor of metallurgy at Rensselaer Polytechnic Institute in Troy.

Even our scrap iron bin is practically empty, he declared. For years we sent large quantities of our scrap iron to a belligerent eastern nation. Now we have reason to regret this action.

This year, he continued, speaking on the General Electric Science Forum, the steel industry will produce about 90,000,000 tons of steel. But this is 8,000,000 tons short of our requirements.

Next year the shortage will be 27,000,000 tons.

By the construction of new plants, the steel industry expects to increase its capacity by 10,000,000 tons. But this still leaves a shortage of 17,000,000 tons which can only be made up by civilian conservation.

Already the Office of Production Management has indicated that a 50% cut in automobile manufacture in 1942 will be necessary in order to save some 4,500,000 tons for defense. Further restrictions will be necessary but cannot entirely make up the deficiency.

However, the situation is not altogether hopeless, Dr. Hunter thinks. He points out that some 14,000,000 tons of aluminum utensils have been contributed by American householders. He believes that every American household could contribute 20 pounds of scrap iron. They can do with fewer refrigerators, washing machines, ranges, and other articles containing iron.

Also there are untapped sources of scrap iron. He pointed to the automobile graveyards that dot the countryside. Iron fences, grills, and other useless structures can be removed. There is no substitute for steel, he said.

*Science News Letter, October 18, 1941*

## CHEMISTRY

## Mottled Enamel of Teeth Prevented by Water Treatment

FLUORIDES, cause of the disfiguring "mottled enamel" of teeth, can be removed from the drinking water by two simple methods designed for use in homes or small institutions having their own water supplies. The methods were devised and patented (numbers 2,207,725 and 2,257,111) by Dr. Elias Elvove, chemist of the U. S. Public Health Service, who assigned his patent rights to the United States Government.

How many American children have the ugly, irremovable brown spots on their teeth, result of drinking water and eating food cooked in water containing fluorides during the tooth calcification ages, is not definitely known. The condition, also called "black tooth," according to one estimate, afflicts 5,000,000 people in 31 states.

Community water supplies can be freed of fluorides by a relatively cheap method now commercially available.

The latest method for individual home

### Benjamin Franklin's Experiments

EDITED BY I. BERNARD COHEN

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