

Drs. Schmidt-Nielsen, Prange and Hackel (l. to r.) successfully developed ways of maintaining sandrats in the lab. Duke University

RESEARCH ANIMALS

# Diabetic sandrats

The disease in animals mimics the condition in human beings

by D. G. Robinson Jr.

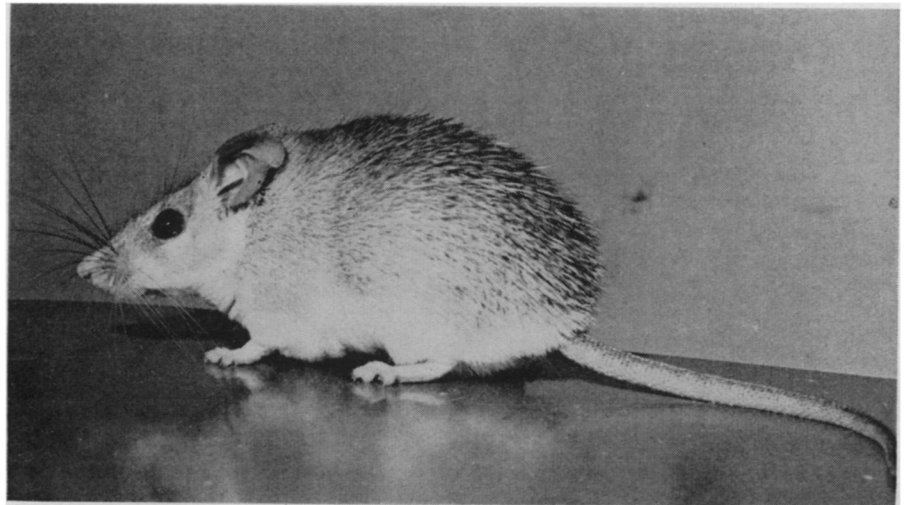
Diabetes is a heredity-linked disease that affects four million persons in the United States.

It is also a hereditary trait in some mutant mice and certain strains of Chinese hamsters; the animals are born with the disease. Nevertheless, the problem of finding a satisfactory laboratory animal analogue to the disease in people is a serious one.

"Although it is desirable to study a naturally occurring condition, it may also be worthwhile to induce the disease to determine the mechanisms involved," says Samuel M. Poiley, a veteran worker in laboratory animal genetics and production at the National Institutes of Health.

Thus many researchers now are showing interest in the fat sandrat, *Psamomys obesus*, which under certain conditions develops diabetes mellitus resembling the human condition.

Until recently sandrats were very difficult to rear in captivity. But Duke University researchers Henry D. Prange, Knut Schmidt-Nielsen, and D. B. Hackel have developed techniques



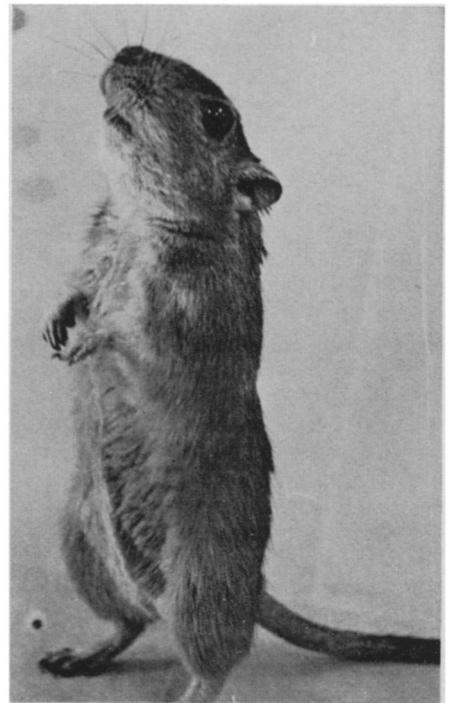
Dr. Strasser

The spiny mouse becomes a new candidate for diabetes research.

for successfully maintaining this species as a laboratory animal. This success followed several years of discouraging results in solving problems of animal housing, diet, breeding and health.

Sandrats belong to the same rodent subfamily as Mongolian gerbils, and inhabit North Africa and the Middle East. They subsist on succulent plants having high salt content, and drink almost no water. During earlier studies of this species' unique water metabolism, Drs. Schmidt-Nielsen and Hackel noted a series of perplexing symptoms in captive sandrats. The evidence—obesity, cataracts, high blood sugar, ketone bodies and sugar in the urine, and degeneration of pancreatic activity—finally led to a diagnosis of diabetes.

Wild sandrats are not diabetic, nor are captive sandrats when fed a natural diet. But those animals given a standard laboratory pelleted food usually develop diabetes. Once this was discovered, zoologist Prange and co-workers experimented until they found a practical diet which enabled them to raise diabetes-free animals. The basic diet is beet



Dr. Prange

Sandrat: diabetes with diet change.



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## . . . sandrats



Poiley: Induced disease helpful.

leaves and spinach, supplemented with the pelleted food. To induce diabetes, it is necessary only to reduce the amount of vegetables and increase the pelleted food. "Diabetes can be induced at any life stage and compared with non-diabetic control and animals," the investigators say.

**Scientists don't** know what causes the sandrat's spontaneous diabetes mellitus, but they speculate that an excessive intake of calories and/or carbohydrates is responsible.

At Hoechst AG in Frankfurt, Germany, similar success in colonizing sandrats is reported by Dr. Hans Strasser, who confirms that diabetes can be produced when increased amounts of pelleted diets are offered. He is also breeding two varieties of spiny mice for medical research. One subspecies, *Acomys cahirinus dimidiatus*, has been used before in diabetes investigations, and he is conducting studies to determine whether the syndrome can be established in the other subspecies, *Acomys cahirinus cahirinus*.

**Spiny mice**, also known as porcupine mice, are bristle-haired rodents from Africa and Asia; in captivity they thrive on seeds, vegetables, meat and ample drinking water. They are bred in the laboratory much like sandrats, with one notable exception: An experienced or compatible female is caged with a pregnant female to function as an animal midwife.

"The attention of the midwife seems to improve the survival rate of the newborn," according to Dr. Strasser. Because the young are relatively large and precocious at birth, the second female can assist by cutting umbilical cords and licking fetal membranes.

The availability of sandrats and spiny mice suggests that they will be valuable for studying many interrelated factors involved in diabetes. Since the susceptibility to diabetes is a genetic trait, researchers hope to be able to establish stable inbred strains of these species to increase their potential as experimental animals. ◇

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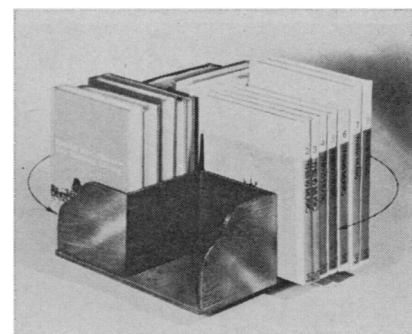
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