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Kidney Function Research at Montana State University

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Aplodontia rufa, a "living fossil" that went to work as a laboratory animal at Montana State University last year, has brought scientists one step closer to a better understanding of kidney functions, it was announced this week by the scientific team that has the little animal under study.

Nine months ago, Dr. E. W. Pfeiffer, MSU zoologist, Dr. Harold A. Braun of the Western Montana Clinic and Klaus I. Dolph, MSU graduate student in zoology, took up the investigation for one principal reason -- Aplodontia rufa's system doesn't store water very well and he needs vast quantities of fresh water to stay alive. With support provided by the Montana Heart Association and the Western Montana Clinic Foundation, the team went to work to find out why.

At the heart of the research was the job of adding proof or disproof to the so called "counter current" theory of kidney function. This theory, advanced by German scientists, says that kidneys with a small central core and thick outer "bark" or cortex, don't concentrate urine very well. On the other hand, kidneys with a large core and thin cortex do. To human beings, the importance of the theory lies in the fact that if too much water is lost, shock or other disturbances from insufficient blood volume may result. If the kidneys retain more water than they should, dropsy or edema may occur.

Aplodontia rufa and premature babies have kidneys with a small inner core and thick cortex. For them, water conservation is a problem.

In order to check on theory, the research team decided to find out if A. rufa could be made to do a better job of conserving water. To do this, they gave the little animal injections of an interesting pituitary hormone. This is a hormone

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that has been found to be very active in cases of congestive heart failure, and doctors think it may contribute to water retention by people who have this disease.

As a control to check their observations, and also for the sake of compiling more evidence, the team ran the same kind of experiments on a group of rabbits at the same time.

Result: They know that Aplodontia rufa conserves water better when given the hormone. But even with the hormone, he doesn't conserve as well as rabbits. Comparing findings of other researchers, he doesn't do nearly so well as dogs, rats, mice, hamsters and human beings.

Dolph correlated the information gained in the MSU project with findings of many other researchers and the evidence dovetails neatly with the erstwhile controversial "counter-current" theory of water handling.

Having helped erect what seems to be a fairly sturdy signpost, Aplodontia rufa is not going into retirement. As is usual in scientific investigations, he raised enough interesting questions to warrant other research programs. There is no way to attach service chevrons to a little creature whose name sounds like apples-on-the-roof, but the MSU team wishes that there were. Aplodontia rufa is a tough little soldier -- otherwise he would have passed into oblivion in the age of fossils. But he hasn't won the battle completely. Once widely distributed, the only place he lives today is the Pacific Northwest, where natives know him as the mountain beaver.

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