

# ZOOLOGY

## DDE: Egg shell shutdown

Ray Bradbury, Phillip Dick and Olaf Stapleton, together brainstorming a fictional ecosystem, would be hard pressed to create one with the imagination of earth's own. The chain of environmental events that leads from, for example, the spraying of DDT to the thinning of egg shells, is a testament to nature's creative irony. Following up such ecological upsets, scientists try to retrace the chain reactions. A report appears in the Jan. 15 NATURE.

It is known that DDT breaks down to DDE in the food chain and acts in some way to prevent certain birds from building strong egg shells. David S. Miller and William B. Kinter of the Mount Desert Island Biological Laboratory in Maine and David B. Peakall of the Canadian Wildlife Service studied the effects of DDE on the egg shell glands of white Pekin ducks.

They found, both in the test tube and in live ducks, that low levels of DDE inhibit certain enzymes that are probably involved in the transport of calcium from the blood to the shell gland membrane. The mitochondria in this membrane take part in calcium transport, and it is an enzyme called calcium ATPase, associated with the mitochondria, that is inactivated by DDE. Although the chain of molecular events in the shell gland is not yet clear, this report is the first link between a biochemical mechanism and shell thinning, Miller says.

## The quirks of quokka pouch hunting

Newborn marsupial "joey's," as travelers on an odd evolutionary sidestreet, have to make an important journey before they are half-developed. Blind, hairless and tiny at birth, they must crawl from the mother's cloaca, up her abdomen, into her pouch and find the mammary glands which will sustain them until physical development is completed. How they find the pouch opening in the expansive jungle of hair and skin has been open to speculation. But now, the quokka is turning speculation into explanation.

The quokka is a small marsupial that lives in swampy thickets in Western Australia. A team of researchers from the University of Western Australia and Monash University, headed by J.R. Cannon, tested newborn quokkas as they crawled toward their mother's pouches. Their purpose, they explain in the Jan. 1 & 8 NATURE, was to test between two theories; one, that the joey uses a keen sense of smell to locate the pouch, and two, that the joey is negatively geotropic (crawls upward, instinctively) and more or less tumbles into the pouch by accident.

They observed five births in March of 1974 and 1975. During one, they placed a newborn joey on the pouch rim. It climbed up, not down and in. They turned the mother upside down, and the joey turned and climbed upwards. They put it back near the cloaca and it climbed upwards again and fell into the pouch. The newborn quokka, they conclude from these and other tests, has a "righting reflex" and is indeed directed by gravity rather than sense of smell.

## Take that—(cough!)—you dirty rat

One need only stand at night on the black soil plains of central Australia to appreciate the vocal repertoire of the long-haired rats that congregate there. So says zoologist R.J. Begg of Monash University in the AUSTRALIAN JOURNAL OF ZOOLOGY (23:4). But he did more than just appreciate their "language." He studied it in detail and reports that, during fighting, they make five distinct sounds; squeals, squeaks, hisses, coughs and teeth chattering. The first two, he says, are defensive, the last two offensive. Hissing show disturbance. But the sounds, he says, don't appear to affect the opponent.

# BIOMEDICINE

## Fetus's vulnerability to foreign chemicals

The blood-brain barrier consists of tiny blood vessels that generally protect central nervous system neurons from harmful substances in the bloodstream. A team of London scientists has now found that the barrier is not as well developed in the fetus as in the adult and suggests that such incomplete development might be the cause of brain damage in some unborn children.

M. Adinolfi and his team of pediatric researchers at Guy's Hospital Medical School examined the cerebrospinal fluid of 14 human fetuses for various proteins, then compared the levels of proteins in their fluid to those in adult fluid. They found a much higher concentration of the proteins in the fetal fluid, suggesting that the fetus's blood-brain barrier is not as fully developed as the adult's.

Then they explored levels of the same proteins in the cerebrospinal fluid of newborn rats and adult rats to determine whether the blood-brain barrier becomes more developed shortly after birth. They found that it does. For instance, more of the proteins could be found in the cerebrospinal fluid of one- and four-day-old rats than in the fluid of seven-day-old and adult rats.

These results, the investigators conclude in the Jan. 15 NATURE, "suggest that, in abnormal maternal states, the permeability of the fetal blood-cerebrospinal fluid barrier to hormones and antibodies against antigens of the nervous system may have an important role in the production of long-lasting damage to the developing brain and to the unfolding of behavior."

## Isolating precursors to tRNA

Before it departs the mammalian cell nucleus to direct the manufacture of proteins in the cell cytoplasm, messenger RNA undergoes a drastic reduction in size (SN: 3/23/74, p.197). Similarly, transfer RNA, which helps convert amino acids into a protein per mRNA's specifications, is also formed from larger precursor molecules. This situation applies in both mammalian and bacterial cells. However the transient nature of these precursors has made their isolation difficult.

Now Gabriel Vögeli and co-workers at Yale University have isolated two bacterial tRNA precursors. They used the technique of affinity chromatography based on complex formation between the precursors and end-product tRNA having complementary nucleotides. Nucleotides are the chemical building blocks in tRNA. In addition, both of the tRNA precursors were found to contain additional nucleotides beyond the five prime (right) ends of the mature tRNA.

This method, they report in the December PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES, can be used to isolate other tRNA precursors, both from bacteria and mammals.

## Protecting fire fighters from CO

Some 10,000 fire fighters are overcome by carbon monoxide and other toxic gases each year. Desperately needed is a device fire fighters can quickly use to ensure that the CO in their blood is not approaching a toxic level. Such a device has now been developed by Richard D. Stewart and colleagues at the Medical College of Wisconsin, the Milwaukee County Medical Complex and the Milwaukee Fire Department.

With this technique, a fire fighter exhales into a portable electrochemical cell. The cell registers whether the CO in his blood is approaching a critical level. Analysis takes only one-and-a-half minutes. According to a report in the Jan. 26 JOURNAL OF THE AMERICAN MEDICAL ASSOCIATION, 170 fire fighters in Milwaukee were trained to use the technique and enthusiastically endorse it.