Fertile faster, if herd under the roar

Breeding season seems to bring out the most vociferous behavior in many male animals, with their loud mating noises of various kinds. Clamorous contests of bellows or whistles often precede battles between males competing for female attention. A few studies have shown that this vocal display may go beyond challenging a male competitor to a fight: In several bird species, for example, those females serenaded by lusty male songs ovulate earlier. Apparently the strident red deer of New Zealand and Great Britain have the same biological effect on their females, according to a study by Cambridge University's Karen McComb.

Reported in the Dec. 17 NATURE, the study "provides the first evidence that male vocalizations can affect the timing of ovulation in female mammals," says McComb. It was already known that stags "holding" harems of females during the breeding season roar an average of twice per minute, even in the absence of threatening males. To test the hypothesis that roaring can advance the ovulation dates in female red deer, McComb studied a herd kept on a New Zealand farm. Female deer were divided into three groups: one exposed to roaring recordings, one that included a male that was vasectomized to prevent impregnation of the female, and a third isolated from both males and roaring. A potential fourth group, that of females exposed to a surgically silenced male, was not included for humanitarian reasons, says McComb. After two weeks of "treatment," females in each group were further subdivided and bred with one of three stags, to minimize any effects on fertility by individual breeding males.

Conception dates – indicative of ovulation timing – were determined by the dates on which calves were born. Calving among red deer occurs an average of 233 days after conception. McComb found that, as expected, females exposed to vasectomized males had the earliest ovulation dates. (Other animal studies had shown that male behavior and male pheromones affect ovulation.) But those exposed to recorded roars also became fertile earlier – a phenomenon that enhances calf survival, says McComb, since calves born later in the season have a higher mortality rate. Stag roaring also increases the probability that the most vocal males will mate with a greater number of fertile females before a competitor replaces them.

Internal drug factories in mammals?

Why there are receptor sites for the poppy-derived drug morphine in the mammalian brain has been a mystery since their discovery more than a decade ago. But scientists may now be able to add the drug and others like it to the list of opioid, or opium-like, substances made within the body itself.

Already included on that list of endogenous "drugs" are the so-called endorphins, which act like morphine but have a very different chemical structure. Charles J. Weitz, Kym F. Faull and Avram Goldstein at Stanford University say they have found precursors to morphine in rats, an indication that the body is actually producing the chemical instead of absorbing it from an outside source. The authors say the results are "the first direct demonstration" of morphine synthesis in animal tissue.

After extracting morphine and codeine from cow brain and adrenal tissues in 1986, the Stanford researchers began looking for intermediate substances known to be part of the reactions that poppies use to produce morphine. They report in the Dec. 17 NATURE that rat livers can convert one key morphine precursor to another both *in vivo* and *in vitro*. This synthetic step, however, was not detectable in other tissues. Weitz and his coauthors caution that although the data suggest that morphine and codeine found in mammalian tissues are endogenous, scientists will have to determine whether the entire synthetic pathways for the drugs exist in animals.

Cancer inhibitor identified in burgers

Vegetarians like to remind their carnivorous comrades that meat-eating may be dangerous to their health, as research has shown traces of mutagens and carcinogens in cooked meat. But the humble hamburger may yet make a comeback, especially if recent research is borne out. Michael W. Pariza, a researcher at the University of Wisconsin in Madison and the director of the university's Food Research Institute, has isolated and identified a cancer inhibitor in fried hamburger.

In research published in part in the December *Carcinogenesis*, the compound proved effective in preventing skin and stomach cancers in mice when given in concentrations equivalent to that found in eight hamburgers per day. The research was funded by the National Cancer Institute, the U.S. Department of Agriculture, McDonalds Corp., the American Meat Institute and the Wisconsin Milk Marketing Board. It builds upon Pariza's previous finding of an unidentified cancer inhibitor in beef (SN: 12/22&29/84, p.390).

Despite the findings, Pariza doesn't recommend eating eight burgers per day. Most foods probably have both cancer-promoting and cancer-inhibiting components in them, he says. "There's got to be at least ten million things in a hamburger after you've fried it. How they interact is the important thing."

The newfound inhibitor, a conjugated form of linoleic acid, appears in meat as the result of a chemical reaction between fats and proteins during the cooking process. In contrast to the protective powers of an eight-burger helping, Pariza says, one would have to eat 80,000 charcoal-broiled hamburgers to get a dangerous dose of one of the better known carcinogens in cooked meat, benzo[a]pyrene.

Nevertheless, he says, "We're not seeing hamburgers as a magic bullet" against cancer. "There really are no anti-cancer foods. The best advice still is to eat a well-balanced diet in moderation."

New artificial cornea shows promise

The first vision-restoring transplant of a new, soft plastic cornea on a human patient was reported last month. The artificial cornea is designed to replace the normally transparent tissue that covers the front of the eye following corneal injury or disease. Its developers say that the clear plastic disc holds promise for many of the thousands of people for whom live corneal transplants are inappropriate or unavailable.

More than 28,000 corneal transplants were performed in the United States in 1986 – more than all other organ transplants combined. But because of a shortage of donated corneas, another 5,000 patients remain on waiting lists each year, spurring interest in the development of plastic replacements.

The new artificial cornea, developed by Delmar Caldwell and Jean Jacob-LaBarre at the Tulane University Medical School in New Orleans, shows signs of having overcome many of the difficulties that have plagued previous, less elastic corneal prostheses. Hard plastic corneas are often expelled from the eye because of the tremendous shearing pressure exerted on them by the eyelids during blinking. The new device is flexible and made of two kinds of plastic; the center area is smooth and transparent, while the surrounding opaque "skirt" is designed to accommodate new cell growth from surrounding eye tissue. It features radial spokes that are stitched into the eye to help hold it in place.

The first human recipient to have his vision restored with the plastic cornea is "doing great," says Caldwell, who performed the surgery Dec. 9. He says that because the device requires no outside source of moisture, it may prove especially useful in patients who, due to severe injury or burns, cannot produce tears. And if future trials are successful, he says, the device "could very easily replace corneal transplants altogether."