Promiscuity: A bitter pill for swallows

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Male bank swallow pursues his mate into burrow, protecting her from other males.

With the number of divorces, separations and unmarried couples seeming on the increase, sociologists and anthropologists are examining more closely the question "How natural is monogamy?" Shortly before her death, the late Margaret Mead suggested that traditional family structure might metamorphose, out of the failure of monogamy, into a more communal arrangement where children would be raised by several "mothers" and "fathers"

One way to approach the question is to study the extent of monogamy among animals, where such structures are rooted basically in survival and instinct. Bank swallows, for instance, have been observed to mate not only for the duration of the egg-laying period, but well beyond the time necessary simply to ensure reproduction of offspring. "At first glance, bank swallows seem the classic example of a monogamous, monomorphic bird species," say Michael D. Beecher and Inger Mornestam Beecher of the University of Washington department of psychology.

But first glances, and what the Beechers say may be misinterpretations in previous studies, can be deceiving. "In the course of a long-term study of the bank swallow, *Riparia riparia,* we have discovered that males of this species appear to routinely and actively pursue a mixed reproductive strategy (MRS)," the researchers report in the Sept. 21 SCIENCE. MRS means that in addition to pursuing monogamous family life — complete with secure homes burrowed into sandbanks — male bank swallows "routinely seek promiscuous copulations with other females, both before and after pair-bonding" with their mates.

Following more than 2,000 observation hours from 1970 through 1977, the Beechers color-marked and banded 20 to 30 individual swallows within a colony and studied their interactions. They first observed that for about one week after "pair formation," the male bank swallow pursues his mate on every flight from the burrow. The flights — as many as 100 per day — are used to collect nesting materials or to gather food. These "spectacular," "acrobatic" pursuit flights were previously thought to be part of the mating process.

But the Beechers say they represent "the male attempting to protect his mate from insemination by other males." They report they have identified in more than 100 cases that one or more additional males pursue the female when she ventures from the nest for the express purpose of "promiscuous copulation." This conclusion, they say, is based on the observation that already-mated males are frequently chasers, and "since males never have more than one mate ... the activity is not part of mate acquisition."

And some of the chase scenes are worthy of Hollywood. In-flight confrontations between the chasing and guarding male sometimes involve "a vigorous face-to-face fight," the researchers report. Or, the guarding male may attempt to persuade his mate to get back to the burrow by either subtly bumping her or more emphatically knocking her to the ground or fighting and then heading back to the burrow.

In addition, chasing males seem to pursue only females in the fertile period — as evidenced by their chasing mated birds or those who are alone but are heavier in flight (an indication she may be carrying fertilized eggs). In other situations, swallows have been seen copulating with dead birds and even group-"raping" a lone, heavy-flying female.

"To the best of our knowledge this is the first documentation of an MRS as a persistent aspect of social behavior of a nonhuman vertebrate species," say the researchers. The behavior is "so prominent," they say, "that closer investigation of the natural history of other monogamous species living under the appropriate conditions may reveal that MRS is indeed a relatively common pattern." □

More on cosmic background anomaly

It's beginning to seem as if we really are going somewhere. The traditional picture of the expanding universe has space expanding like a dough with too much yeast in it. The galaxies ride along with this expansion like raisins in the dough. Now it is beginning to appear that our raisin at least is moving through the dough as well. Such an impression comes from a few recent studies of classes of distant galaxies and of the cosmic background radio radiation. The latest cosmic background study that can be read to support this possibility is reported in the Sept. 15 ASTROPHYSICAL JOURNAL LETTERS by Edward S. Cheng, Peter R. Saulson and David T. Wilkinson of Princeton University and Brian E. Corey of Massachusetts Institute of Technology.

The cosmic background radiation is a radio flux that was generated by processes operating in the earliest moments of the universe. Since then that flux has pervaded space, expanding with the universe, always present everywhere in it. That at least is the theory, and it used to seem borne out by observations. The radiation does seem to have the spectrum of a blackbody or perfect thermal radiator, as the universe as a whole ought to have. The temperature it represents comes out to about 3° Kelvin, appropriate to the age of the universe. Observers from earth find it in every direction they look, certainly a presumption of all-pervasiveness.

There is at least one hitch to this, the growing evidence for a temperature anomaly, especially from work by George Smoot, M. V. Gorenstein and Richard Muller (SN: 7/16/77, p. 44). The observations of Cheng, Saulson, Wilkinson and Corey were made by balloons that flew from Palestine, Tex., in May 1975 and in August 1978. The first carried a radiometer that received 19.0-gigahertz waves; the second had radiometers at 24.8 gigahertz and 31.4 gigahertz. The balloon flight to 27 kilometers up was chosen to minimize problems with atmospheric absorption of the radiation.

According to the observers the best reduction of the data shows a "dipole," that is, a forward-and-backward anomaly, in which the temperature is slightly higher in one direction than in others. The excess is 3 millidegrees Kelvin, and lies toward right ascension 12.3° and declination −1°. The standard interpretation of a dipole anomaly is that the earth and whatever the earth is attached to is moving through the background at some velocity.

Cheng, Saulson, Wilkinson and Corey point out that although their result is consistent with other measurements of the cosmic blackbody, all of these taken to-

gether are inconsistent with results of observations of distant galaxies. These examined the redshifts of the galaxies to determine trends that could be interpreted as a velocity of our galaxy toward some preferred direction or other. For the velocity of the local group of galaxies, the observations of distant galaxies give either 450 kilometers per second toward galactic longitude 160° and latitude −10° or 310 kilometers per second toward longitude 180° and latitude +50°, depending on the sample of galaxies used. The present microwave background work gives 540 kilometers per second toward longitude 280° and latitude +30°.

In a well-behaved universe, as cosmologists have conceived it, our local group's velocity with respect to these two frames of reference should be the same. Scientists are striving to reconcile the discrepancies, but Wilkinson and collaborators suggest that other alternatives be considered. One of them is that the cosmic blackbody has an intrinsic "dipole moment". "Suppose part of what we're seeing is due to a built-in primordial dipole moment, and not motion," Wilkinson says. He has no physical picture of what process in the early universe might have made the blackbody thus anisotropic, but physicists should keep it in mind as a possible explanation of the "sharp disagreement" between the two kinds of velocity measurement. Another possible explanation is that there are random motions at velocities around 500 kilometers per second by large-scale gangs of galaxies (gangs around 100 megaparsecs across). In that view the galaxies used by the galaxy measurers (principally Vera Rubin and Kent Ford) are going somewhere, we're going somewhere, and what is being measured is the sum or difference velocity. □

Snail darter vs. dam: 'Pork barrelers' win

Admitting that he was bowing to political pressures — which he presumably felt could weaken his bid for reelection — President Jimmy Carter signed into law a $10.8 billion public-works appropriation bill last week. In so doing, he removed the last obstacle standing in the way of completing the $145 million Tellico Dam project in Tennessee, famed for its role in the threatened extinction of the snail darter.

The continuing saga of the fish versus the dam has played before audiences large and small, from the Supreme Court (SN: 6/24/78, p. 403) and the Cabinet-level Endangered Species Committee (SN: 1/27/79, p. 55) to local affected homeowners. It has also figured prominently in both the threatened demise (SN: 10/7/78, p. 247) and later revision of endangered-species law. But this newest chapter introduces a specter that environmental lobbyists had hoped to elude — a complete and uncompromising exemption from all federal laws so that a "pork barrel" project might survive unabated.

The Tellico Dam has been the subject of intense and heated controversy since its inception around 1963. Supporters of the project have claimed that the recreational value of the dam reservoir, new construction jobs and the economic growth that would follow development of it's reservoir's scenic shoreline would aid economically depressed East Tennessee. And TVA, for whom the dam is being built, expects to save $2.7 million annually in electrical generating costs by diverting base-load capacity from coal and nuclear power plants to Tellico's somewhat less costly hydropower.

Opponents have countered, focusing on the natural, historical and cultural value of the river and its valley. For example, the dam reservoir will inundate some 5,600 acres of agricultural land and most of 280 archaeological sites — chronicling a history of human habitation dating back 10,000 years — that had been nominated to the national Register of Historic Places, in addition to seven sites already in the register. It will also partially flood a national landmark.

What's more, certain fish- and wildlife-habitat losses which will occur with the dam-reservoir development "are not fully accounted for in the TVA's comparisons of measured recreational benefits," according to a January 1979 cost-benefit analysis of the dam project by the staff of the new Endangered Species Committee.

In fact, when the Cabinet-level Endangered Species Committee held its first meeting, last January, its seven members voted unanimously against the dam on the grounds that finishing the already 90-percent-completed project was economically unjustifiable, irrespective of the snail-darter issue. At best there was a $.4 million annual net benefit for the dam over the originally free-flowing river, the new Endangered Species Committee's staff found. And Cecil Andrus, who chaired the committee, said his calculations showed a possible $.6 million annual net benefit for the river over the dam. Both calculations were arrived at before consideration of the acknowledged but largely unmeasurable value (in dollars) of the archaeological sites and wildlife regions that would be lost due to the project.

But no sooner had the committee decision been tendered than Tennessee Senator Howard Baker vowed he would abolish the panel. Ironically, it was his bill that only months earlier had established this panel and empowered it to waive endangered-species law. In the end, Baker and other disgruntled members of Congress just wrote a blanket exemption for the Tellico Dam from all federal regulations — including Occupational Safety and Health Administration laws and workmen's compensation — and attached it as a rider to the public-works bill.

President Carter said he signed the bill "with regret" to avoid a "divisive veto battle" that might divert congressional attention — and undoubtedly support — from more pressing issues.

And what about the fish? Some 2,000 transplanted snail darters appear to be thriving in another Tennessee river. □

Heart death decline examined

During the past few years, deaths from heart disease have fallen off dramatically in the United States, regardless of age, sex or race (SN: 11/11/78, p. 328). Between 1968 and 1976, for instance, the decline was 20.7 percent. Michael P. Stern, a physician with the University of Texas Health Science Center in San Antonio, has examined all the scientific studies published on heart disease that might illuminate which factors contributed to the decline in heart disease deaths between 1968 and 1976.

As he reports in the November ANNALS OF INTERNAL MEDICINE, the fall could be largely attributed to changes in lifestyles — eating less cholesterol and animal fats and smoking fewer cigarettes — and also to improved medical care for heart attack victims, especially in the form of coronary care units.

A number of studies, Stern explains, convinced him that a decrease in a high cholesterol-high animal fat diet (implicated in the past as a coronary artery disease risk factor) has been a major contributor to the decline in heart attack deaths between 1968 and 1976. Estimates prepared annually by the U.S. Department of Agriculture show that the consumption of animal fats, which contain cholesterol and are largely saturated, has declined between 1909 and 1973. Concommitantly, consumption of polyunsaturated, cholesterol-free vegetable fat has tripled. Thus, these dietary changes may have led to a gradual decline in the average blood cholesterol concentration in the United States, particularly since the early 1960s (SN: 7/23/77, p. 58). And two Scandinavian studies demonstrated that the protective effects of the lower cholesterol levels occur quickly.

Another significant contributor to the lowered heart disease mortality between 1968 and 1976, Stern continues, is a decline in cigarette smoking — a well-documented heart disease risk factor. The Framingham Study showed that between 1950 and 1968 cigarette smokers declined from 61 percent to 37 percent among men and from 40 percent to 31 percent among women. The National Clearinghouse for Smoking and Health found that the percentage of male cigarette smokers declined from 53 to 37 percent between 1964 and 1975, and that a modest decline in the percentage of