

Astronomy

Dietrick E. Thomsen reports from Vancouver at the meeting of the American Astronomical Society and Canadian Astronomical Society

Protoplanetary disks are common

Evidence for planetary systems around stars other than the sun continues to accumulate. Most recently, Bruce Campbell and co-workers report evidence that several stars may be accompanied by planet-sized objects (SN: 6/27/87, p.405), and Stephen E. Strom of the University of Massachusetts at Amherst reports evidence that may neatly complement that finding: Protoplanetary disks, the material out of which planets may form, seem to be fairly common accompaniments of young stars.

Strom worked with Susan Edwards of the University of Massachusetts and Immo Appenzeller of the University of Heidelberg, West Germany, to determine that 20 young stars in the Taurus molecular cloud have such disks. From this they deduced that about 15 percent of young stars should be accompanied by protoplanetary disks at their formation.

Present telescopes cannot resolve the disks. The observing technique used spectroscopy of the stars' outflowing stellar winds to detect the presence of disks of dust. Stars, including our sun, give off gas — stellar wind — that flows away from them in all directions. As terrestrial observers view this wind, they should see equal amounts coming toward them and going away from them — unless a disk of preplanetary dust is present. The disk cuts off some of the wind from the observers' sight, and they see an unbalanced distribution of velocities. Of the 20 stars surveyed, "every single object gave evidence only for approaching gas," Strom says.

There is a surprise here for the accepted theory of planet formation. From the ages of these stars it appears that some of these disks last as long as 3 million years. Theory, Strom says, would have predicted that planets would finish forming in a tenth of that time.

Creationism in Ontario

Some scientists, and maybe ordinary pedestrians too, may believe that religiously motivated interference in the teaching of science is a feature of life in the American South, the so-called Bible Belt. That is where the famous court cases have come from (Tennessee, Arkansas, Louisiana). "It doesn't happen only in the deep south," says John R. Percy of the University of Toronto. He was surprised to find such attitudes politically powerful in Ontario as he worked with the provincial Ministry of Education on a revision of the school science curriculum.

In fact, astronomy almost got left out of the Ontario science curriculum, Percy says, until some Ontario astronomers noticed and objected. Such an omission had actually happened in the United States, Kenneth Brecher of Boston University pointed out in a talk that followed Percy's. According to Brecher, astronomy was the most widely taught science in U.S. high schools in the late 19th century. But around the turn of the century an influential committee of educators, formed to recommend revisions of the science curriculum, didn't include a single astronomer, and so astronomy got left out. Brecher is now working on a nationwide project to reemphasize astronomy in U.S. schools.

Recently in Ontario, astronomy was also threatened, but was saved by the efforts of a number of astronomers. However, as they worked with the Education Ministry to prepare a curriculum, the astronomers were surprised and dismayed by some of the changes in the material requested by ministry officials. In a unit on the solar system, officials wanted them to avoid the scare word "evolution." It was relatively easy, Percy says, to replace "evolution" with "development" or some similar word. Requests to omit the age of the sun or to present the theory of supernovas as if it were very uncertain, he says, were more troubling.

Biology

Cracks in the egg theory

There is, scientists say, a perfect size for an egg: not necessarily that of the grade AA beauties of the local store, but the size that represents a stable balance between the best prospects for offspring survival and the amount of energy the mother must invest in making and caring for her eggs. The "optimal egg size theory" — nested in the natural-selection concept of evolution — predicts that within an individual species producing more than one egg at a time, individuals can alter their reproductive output by changing the number of eggs produced, but not the average egg size.

Some freshwater turtles, however, apparently have a different idea, say Justin D. Congdon and J. Whitfield Gibbons of the Savannah River Ecology Laboratory in Aiken, S.C. They report in the JUNE PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES (Vol.84, No.12) that, unlike lizard species previously studied, the turtles produce variable egg sizes more attuned to the size of the mother. By taking X-rays of captured pregnant turtles, the scientists found that average egg size increased as the body size of adult female turtles increased, reflecting parallel increases in the size of the pelvic opening.

Why two of the smaller turtle species studied have not achieved the "optimum" in egg size is unknown, say Congdon and Gibbons. No relationship between maternal and egg sizes was observed in a larger freshwater turtle species included in the study. Perhaps, the scientists suggest, the structures surrounding, and therefore influencing, the pelvic opening are so important to mobility and other nonreproductive behavior that expansion of the opening to allow larger eggs has not had priority in terms of evolutionary changes for some species.

No more alligator tears?

Having pulled itself back from the brink of extinction, the American alligator is no longer officially considered an endangered species, U.S. Fish and Wildlife Service officials announced recently. The animal — after 20 years of protection under the Endangered Species Act — is now listed as "threatened by similarity of appearance," based on its resemblance to the still-endangered American crocodile. The reclassification allows alligator hunting under regulations that protect the crocodile while ensuring that alligators will remain plentiful. Estimates of the number of alligators in the United States are incomplete, according to the federal agency. But statewide studies indicate at least a 10-fold increase in Alabama and South Carolina since the mid-1970s, a reptilian abundance that has led to alligator harvesting in some areas.

While the alligator has disappeared from the "help needed" list, other creatures have not been so fortunate. Since the beginning of 1987, 37 additional species have joined the ranks, making a total of 449 endangered species in the United States. While presence on the endangered list may help, it is no guarantee of recovery. Last month, the world's last dusky seaside sparrow died in Florida, despite years of effort by wildlife specialists.

Genes on the (laser) firing line

Like a nail puncturing a tire, lasers apparently make tiny, self-sealing holes in cell membranes through which genetic material can enter, say scientists at the University of California at Irvine. In the "laser-mediated gene transfer" technique, cells are irradiated with an yttrium-aluminum garnet laser beam while suspended in a liquid containing foreign DNA. According to an article in the JUNE PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES (Vol.84, No.12), the DNA is successfully incorporated into the genetic machinery of host cells. The authors suggest that the method may circumvent problems in standard DNA transfer techniques.