

## Amphibian Athenas: A heady delivery

According to Greek mythology, Athena sprang full grown from Zeus' forehead. Exact analogy it's not, but some Australian zoologists have discovered that the young of an Australian frog emerge partly grown from the mother's mouth. Most frogs hatch into tadpoles, unaided by the mother, after the eggs are fertilized and deposited. The eggs of these frogs, however, are swallowed by the mother and hatch and develop to the juvenile stage (tail has disappeared) inside her stomach before the mother ejects them through her mouth.

Michael J. Tyler of the South Australian Museum in North Terrace and two colleagues report the discovery in the Dec. 6 *SCIENCE*. The stream-dwelling frog species *Rheobatrachus silus* was just reported for the first time in 1973. Tyler's team was studying an adult specimen with "an unusually large girth" when it began ejecting little frogs. Anatomical study revealed a large, thin-walled abdomen containing yolk reserves, an indication that the eggs contain enough nourishment for the entire development period.

The team assumes that all gastric secretions and digestion stops and that this inhibition may be controlled by reproductive hormones. The animal's so called "gastric brooding" is unique, they state, and indicates possible "gaps in the current knowledge about vertebrates."

## A new communication signal

When scouting ants locate food supplies they hurry back to their colonies and recruit nest mates to the food source. Methods of recruitment vary for different species. Thought to be one of the most primitive methods is the so-called tandem running behavior—recruiting one mate at a time with the follower keeping in constant antennal contact with the leader ant. While analyzing tandem running in the *Leptothorax acervorum*, biologists M. Möglich and U. Maschwitz of the University of Frankfurt and B. Hölldobler of Harvard University discovered another signal in ant communication. They term it "tandem calling," and it initiates tandem running.

When a successful forager returns to its colony, it first regurgitates food to several nest mates, raises its gaster (the enlarged part of the abdomen) and extrudes a droplet of liquid from its poisonous sting gland. This calling behavior attracts a nest mate, who touches the caller, and tandem running begins. Whenever contact is interrupted the leader immediately stops and resumes its calling position.

The discovery of chemical tandem calling throws light on ants' chemical communication techniques in general, the researchers state in the Dec. 13 *SCIENCE*. Chemical mass recruitment, another form of ant communication, may have evolved from tandem calling, they state.

## Prodding the citrus stubborn disease

California citrus growers lose millions of dollars annually because of stubborn disease. This disease deforms and stunts citrus trees and can drastically reduce the production of those golden globs from the West. The disease is called "stubborn" because it responds poorly to treatment. But some plant pathologists at the University of California at Riverside may have found the key to controlling the costly problem. A team headed by George H. Kaloostian and George N. Oldfield have identified a vector of the disease—a leafhopper called *Scaphytopius nitridus*. Identifying the insect and learning how it transmits the disease will help scientists learn to control it, they state.

## General relativity and radio waves

Electromagnetic waves that pass near a massive body should be deviated from a straight path by the gravitational field of the body according to Einstein's theory of general relativity. This prediction was confirmed for starlight passing near the sun at the eclipse of 1919 and has been rechecked at many subsequent eclipses. The possibility of checking the effect with radio waves from celestial sources has arisen in the last few years because of improvements in the techniques for determining the positions of radio sources. In the Dec. 30 *PHYSICAL REVIEW LETTERS*, C. C. Counselman III of the Massachusetts Institute of Technology and seven others from MIT, the Goddard Space Flight Center and the Haystack Observatory report that the observation has been successfully done for the first time.

The technique used two antennas at the Haystack Observatory in Massachusetts and two at the National Radio Astronomy Observatory in Green Bank, W. Va. The operation involved simultaneous observation of the sources 3C279 and 3C273B at a time when the sun was about to pass in front of 3C279. The result gives an amount of deviation equal to 99 percent of the Einsteinian prediction with an uncertainty of three percentage points.

## Infrared interferometer

The value of interferometry, combining signals from a celestial body received at two separated telescopes, is that it gives much higher resolution of positions and details of the sources than a single telescope can. In the Dec. 30 *PHYSICAL REVIEW LETTERS* M. A. Johnson, A. L. Betz and C. H. Townes of the University of California at Berkeley report that an interferometer for infrared operating at a wavelength of 10 microns has been successfully tested in observation of an astronomical body.

The shorter the waves, the smaller the interferometer can be. The telescopes in a radio interferometer can be anything from meters to thousands of kilometers apart; in the infrared case 5.5 meters are all that is required. The infrared telescopes use heterodyne techniques of detection, combining the infrared signal with laser light to convert it to a radio frequency that the recording equipment can handle. The test was run on infrared emanations from the planet Mercury. Four thousand seconds of continuous observation show that the optical path difference through the atmosphere and the two telescopes—the crucial factor in producing reliable interference effects—is remarkably stable.

## Collapsing molecular clouds

The nature and long-term behavior of the clouds of molecules found in interstellar space is one of the most fashionable topics in astrophysics today. In *ASTROPHYSICAL JOURNAL LETTERS* (Vol. 194, p. L103) three observers from the University of Texas at Austin, Robert B. Loren, William L. Peters and Paul A. Vanden Bout, suggest that three clouds, those surrounding the stars R CrA and LkH-alpha 198 and one in the reflection nebulosity association Mon R2, may be collapsing.

The evidence comes from an observed systematic variation in the width of an emission line of carbon monoxide according to the location of the emitting molecules in the cloud. The three observers are dubious that this can be explained except by collapse, and if it is, the velocity of collapse is inversely proportional to some power of the distance from the center of the collapse.