# medical sciences

## Attacking snail fever

Schistosomiasis continues to be the world's greatest unconquered parasitic disease, afflicting some 100 million persons in South America, Africa and Asia. The subtropical schistosome worms enter their victims' skin while they bathe in rivers. The worms attack various body organs. Symptoms can eventually prove severe or fatal.

Because the schistosome worms depend on an intermediate host—freshwater snails—for their survival, copper sulfate has been used with some success in killing off the snails and their eggs. But inorganic copper has serious environmental effects. It kills aquatic plants and some fish. So Thomas C. Cheng and his biology team at Lehigh University are trying to come up with a copper compound that would kill the snails specifically.

Unfortunately no one knows how copper kills the snails. One of the theories being tested is that copper is taken up by the snails' blood cells through a biological process called phagocytosis. If this turns out to be the case, Cheng says copper could then be hooked up to a molecule such as ferritin, which is readily phagocytized by the snails. The other theory under test is that copper permeates the snails' surfaces by osmosis. In this event, Cheng says, copper could be hooked to a lipophylic organic molecule.

## Fetal detection of respiratory syndrome

Amniocentesis, or the withdrawal of amniotic fluid from the womb, is finding rapidly expanding clinical use in the diagnosis of fetuses' health (SN: 7/17/71, p. 44). One of the more recent and practical, for preventive medicine, is the successful use of amniotic fluid analysis to determine the potential risk to a neonate of developing respiratory distress syndrome.

What S. G. Bhagwanani and his obstetrics research team at the Welsh National School of Medicine, Cardiff, did was to devise a simple chemical method for estimating the total lipid, phospholipid and lecithin content of amniotic fluid. They assayed amniotic fluid samples from 156 women at different stages of pregnancy. They found that the lecithin levels were the critical ones: if below 3.5 milligrams per 100 milliliter, a newborn will have a good chance of getting respiratory distress syndrome. Twelve of thirteen infants who scored below 3.5 mg in the test developed the syndrome. The Welsh researchers' work is reported in the Jan. 22 LANCET.

## Pigmentation and sunburn

Certain cells with the pigment melanin are destroyed more by ultraviolet radiation than cells without melanin. This finding, reported in the Feb. 2 NATURE NEW BIOLOGY, is paradoxical. Melanin has always been thought of as a protective skin agent.

One possible explanation for the discrepancy, suggests one of the co-authors, Gerald Mandell of the University of Virginia Medical College, is that irradiation rupture of a cell's lysosomes may be enhanced by the presence of melanin. But why, if melanin can make sunburn worse, do dark-skinned persons not sunburn? His group's theory, Mandell says, is that black-skinned persons have enough melanin to completely block sunlight; others have too little melanin, so their cells behave poorly. The other authors are B. E. Johnson of Scotland, and Farrington Daniels Jr. of Cornell University Medical College.

# physical sciences

## Black holes and the laws of physics

One of the difficulties involved in studying what goes on in black holes, assuming any exist, is that black holes have few or no ways to communicate with the universe around them. Their gravitational fields are supposed to be too strong to permit radiation or particles to escape.

Theorists had thought, however, that black holes could exert forces on bodies near them. Recent theoretical work narrows even that expectation. During the last year several theorists have suggested that black holes cannot interact with the world by the weak nuclear force. In the Feb. 14 PHYSICAL REVIEW LETTERS Jacob D. Bekenstein of Princeton University comes to the same conclusion with regard to the strong nuclear force.

This means that black holes transcend two important physical laws: conservation of baryons and conservation of leptons. Baryons (including protons and neutrons) are the particles subject to the strong force, leptons those (including electrons) subject to the weak force. The laws say that whatever may be the changes of identity in the reactions among particles, the net number of baryons and the net number of leptons stay the same. These ideas of immutable baryonness and leptonness are fundamental to the current understanding of particle physics. But if these theories are correct, there is no way to check whether the laws are upheld or violated inside a black hole.

## The question of neutrino stability

Physicists have generally assumed that the neutrino is a stable particle, not subject to spontaneous radioactive decay. But the negative results of one current experiment, the failure to find an expected flux of neutrinos produced in the sun (SN: 9/25/71, p. 210), lead at least three physicists to suggest that neutrinos may not be stable.

The suggestion is made in the Jan. 31 PHYSICAL REVIEW LETTERS by John N. Bahcall of the Institute for Advanced Study at Princeton, N.J., Nicola Cabibbo of the University of Rome and Amos Yahil of the University of Tel Aviv.

Current experimental evidence, they say, cannot even show whether neutrinos last as long as 500 seconds (their sun-to-earth travel time) and so there is room for a suggestion of instability. The decay reactions suggested by the three physicists involve decay of a given neutrino into another kind of neutrino and one or more other particles. In some cases, they say, the neutrino produced by the decay could be detected in experiments.

## Again no quarks in the cosmic rays

It is now more than two years since Brian McCusker of the University of Sydney reported that he thought he had found some quarks in the cosmic rays (SN: 9/13/69, p. 198). Attempts at independent confirmation of the finding have been made without success.

The latest nondetection is reported in the Jan. 31 PHYSICAL REVIEW LETTERS by a group from the Technical University of Aachen in West Germany, including A. Böhm and seven others. They searched in cosmic-ray air showers with energies between $10^{13}$ and $10^{15}$ electron-volts and found none. They set a limit on the quark detection rate of one quark per 10 billion seconds per square centimeter of detector per sterradian of sky.