

medical sciences

IUD's: Worth their weight in copper

The efficacy of intrauterine devices has been greatly increased by incorporating copper into their structure. Dissolved ions, in fact, appear to be the actual contraceptive agent, since some 25 percent of a copper wire placed in a human uterus disappears within a year, and metals of low solubility, such as silver, are not very effective contraceptively.

The possibility that copper released by IUD's might produce toxic effects in women who wear them has been explored by Tati Okereke and his obstetrics-gynecology team at Albert Einstein College of Medicine in the Bronx, N.Y. Investigators inserted radioactively labeled copper wire into the uteri of rats and measured the concentration of the isotope in various organs over a period of time. As they report in the July 28 *SCIENCE*, some of the copper dissolved and was absorbed by the blood and several organs.

The authors doubt whether comparable absorption in women would produce the serious nerve and blood upsets experienced by persons with Wilson's disease, a rare genetic condition whereby the body absorbs too much copper. They suggest, however, that pathologists start examining biopsy tissue from IUD wearers for its copper content.

Flu doesn't always hit and run

Flu has long been considered by virologists to be of brief duration. The optimal period for isolating the virus from the upper respiratory tract has been during the first 48 hours of the disease, and viral antigen has not been detected in cells more than eight days after infection.

In the July 21 *NATURE*, though, P. J. Wilkinson and R. Borland, pathologists at the University of Cambridge, England, report evidence that the influenza virus can persistently infect human lung cells. Infectious virus was released from the cell cultures up to seven weeks after initial infection. After five days of incubation, the cells appeared to be reinfected, possibly because of the normal turnover of DNA in the cells.

Whether the virus lingers this long in human lungs in the real life situation remains to be determined, the authors admit.

Where steroids do their thing

How hormones act on target tissue interests many investigators. Some hormones, such as protein ones, give evidence of acting outside the cell, on its membrane. Other hormones, such as the steroids, are known to pass through the membrane and act inside the cell.

In the July *PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES*, a team of biochemists and biophysicists at the University of California in San Francisco, headed by John D. Baxter, have found that glucocorticoids, steroids that act on a number of tissues, penetrate the cell membrane, then bind to specific receptor proteins in the cell cytoplasm. The steroid-protein complexes formed there move into the cell nucleus, where they appear to bind to DNA. Because glucocorticoids have been found, by other researchers, to accumulate active messenger RNA, the authors conclude that the hormone protein complex modifies gene transcription—not by depressing certain genes, but by adding new regulatory elements to DNA.

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natural sciences

Copper-tolerant grass

The principle of natural selection is that only the hardest species can survive in inhospitable environments, and man creates some of the most inhospitable.

Soils near metal refineries in Lancashire, England, are highly contaminated with copper. To study the effects of this pollution on evolution of the plant population, Lin Wu and A. D. Bradshaw of the University of Liverpool measured the copper tolerance of grass from four areas near the refining area and two uncontaminated areas. They suspended the grass in a solution of copper sulphate. They report in the July 21 *NATURE* that grass from uncontaminated areas had low copper tolerance. Grass from the boundary of the contaminated area was more tolerant and grass from highly contaminated areas showed the highest tolerance. Uncontaminated and boundary areas had several species of grass; only one highly tolerant species was found in the contaminated area.

To see if the tolerance is hereditary, the botanists measured growth of seeds from the same six sites in toxic soil from the refinery area. Seeds from contaminated areas grew largest. The researchers conclude that natural selection for copper tolerance can occur easily.

The birds and the bees

Flower reproduction often depends on pollination by bees or hummingbirds. In areas where the weather is often cloudy or rainy, though, bird-pollinated plants seem to have the advantage.

Robert W. Cruden of the University of Iowa studied the fecundity of bird- and bee-pollinated plants in areas with different weather, or flight, conditions. Fecundity of a plant species was defined as the percentage of pollination times the percentage of seed set (the proportion of ovules that develop into seeds). He reports in the June 30 *SCIENCE* that where flight conditions are good, birds and bees are equally effective pollinators. But in the areas with poor flight conditions, flowers dependent on birds for pollination have higher fecundity because birds remain active in bad weather.

Cruden's results explain why, in a recent study in Mexico, plants pollinated by birds were found to be more numerous at elevations above 2,300 meters, where flight conditions tend to be poor, than they are at lower altitudes.

Mussels under stress

Stress experienced by an adult mussel can affect the later development of its larvae. B. L. Bayne of the University of Leicester in England subjected adult mussels to temperature and nutritive stress and observed the growth of the larvae that developed from gametes produced by the stressed adults.

Mussel embryos develop in three stages. During stages one and three there is rapid development of new organs but little increase in size. There is also greater reliance on stored food reserves than in stage two. During stage two there is minimal development of organs but considerable growth. The larva usually doubles in size during this period. Bayne reports that stress on the adult affected stages one and three, causing the larva's organs to develop abnormally, but had little effect on stage-two growth.

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