BIOLOGY

At last, a sachet for insect scent

Talk of using the sex scent as a means of insect control has been in the air for years (SN: 1/15/77, p. 37). But practical problems of distributing the relatively expensive chemicals in precise, uniform quantities have kept the technique from getting off the ground. Now the Albany International Corp. announces they have received Environmental Protection Agency approval for a system of distributing the sex pheromone of pink bollworms, and that chemical is already wafting through cotton fields in southern California, Arizona and northern Mexico.

Packaging the chemical in short plastic fibers is the technique that has made pheromone insect control practical, the company says. Tubes 1.5 centimeters long, with an inside diameter of 200 microns, are distributed by plane or tractor, about 1 fiber per square yard. A sticky substance on the fibers fastens them to plants. Pheromone flows to the ends of the tubes by capillary action and gradually evaporates. Applications of fiber-packaged pheromone (called Glossyplure H.F.) last 10 to 21 days.

The applied pheromone acts as a birth control device; it reduces the chances of the moths' finding each other. The males normally locate mates by a scent the females emit, so become confused when the sex smell permeates the air. To decrease crop damage 80 to 90 percent, the pheromone must be applied throughout the cotton-growing season.

Although pheromones are more expensive to produce than toxic pesticides, the overall cost of the new insect control method should be less. One pound of active ingredient is 900 times as effective as a pound of pesticide and must be applied only half as often, the developers claim. The fibers, made of an acetal resin, are photodegradable and the EPA found the system had no ill effects on wildlife, soil and water. Researchers are now testing other pheromones-hollow fiber systems to control fruit tree pests, spruce budworm and elm bark beetles.

Glowing by land, as by sea

Bacteria provide the light for many luminous deep-sea fish (SN: 2/18/78, p. 106), but reports of luminescent bacteria on land have been rare and unverified. However, George O. Poinar Jr. and Gerard M. Thomas a few months ago discovered a new strain of landborne bacteria, which are clearly luminescent.

The University of California scientists were studying a species of worm that infects insects. When they took a container of wax moth larvae into their Berkeley darkroom to be photographed, they noticed dead larvae glowing in the dark. They now explain that the bacteria live symbiotically inside the worm, a nematode. The worm enters an insect and releases bacteria, which kill the insect and cause the cadaver to light up. Young nematodes develop inside the dead insect, gather up the bacteria and move on to new victims. The glowing cadaver may attract other insects to be attacked by the nematode-bacteria teams.

Bacteria recruited as solar batteries

Salt-pumping purple bacteria (SN: 2/25/78, p. 119) can be used to generate electricity directly from sunlight, according to Lester Packer of the Lawrence Berkeley Laboratory at the University of California. In his experiments, packets of bacterial pigment in a solution with mercury electrodes, produce small amounts of electricity, enough to light a tiny bulb for 90 minutes. Besides generating electricity, Packer proposes the purple pigment might be useful for desalinating seawater or concentrating chemicals from lakes, oceans and sewage. Packer's research indicates that in the purple membrane an "electrical wire-like structure" conducts protons, which pool at two amino acids, tryrosine and tryptophan, used in the energy reaction.

PHYSICAL SCIENCES

Let there be light

For a new telescope the ceremony of first light, in which the instrument is opened to the sky for the first time, is rather like the launching of a ship. The superstructure remains to be fitted —that is, the observing instruments remain to be installed—but this is when they see whether she floats.

Of course if the designers know what they're doing, there should be no question. Still the ceremony of first light for the Multiple Mirror Telescope, which took place on May 15, is more significant than for most telescopes. The MMT, a joint project of the Harvard-Smithsonian Center for Astrophysics and the University of Arizona, is the world's first attempt to make several mirrors (six) act like one (SN: 11/12/77, p. 318). Many regard it as the prototype of future large telescopes. So far two mirrors have been opened to the sky. By the end of summer it should be known how well the six work together.

The karma of nuclear fusion

It is not certain whether it was the 20 arms or the purpose, power from thermonuclear fusion, but the world's largest laser fusion experiment is called Shiva (SN: 7/31/76, p. 74). It delivers the energy from 20 laser beams to a small pellet of fuel with the intention of inducing thermonuclear fusions in the pellet. Shiva, which is located at the Lawrence Livermore Laboratory in California, just had its first full power shot.

On May 18 at 10:58 p.m., local time, the 20 arms delivered 26 trillion watts of optical power to a target the size of a grain of sand. The shot, which lasted 95 trillionths of a second, produced 7.5 billion fusion reactions in the target, a record number by a factor of about 3 but still a long way from the ultimate goal of getting more energy out of the target than the lasers put into it.

Later on, Shiva is expected to make a significant step toward that goal, what people in the field call "significant thermonuclear burn" or the production from the target of several percent of the energy put in by the lasers. Break-even is the hope for future systems, such as the Nova laser now being developed.

And now a runaway black hole?

There are a number of radio nebulas in the sky, clouds of gas that emit radio waves, presumably as a result of excitation by young stars or stellar objects embedded in them. But if astronomers assume that this model applies to the radio nebula called W3(OH), a cloud of hydroxyl in the constellation Cassiopeia, they will find it falls short.

W3(OH) has a number of peculiar features: The energy for the observed emission demands an unusually dense concentration of stellar matter as its source, and the radio-emitting gas has a "peculiar velocity" of more than 10 kilometers per second with respect to the surrounding medium. The quote is from V. A. Hughes and M. R. Viner of Queen's University in Kingston, Ontario, in the May 15 ASTROPHYSICAL JOURNAL LETTERS.

A consideration of information derivable from the spectrum of W3(OH) leads Hughes and Viner to propose that in this case the energizing factor is not the usual young star, but a compact object, that is, possibly a black hole or a neutron star, those being the compact objects of highest interest to astrophysicists these days. Furthermore, the peculiar velocity in particular suggests a runaway, an object that has been given a kick by a supernova explosion and is moving across the sky with an unusually high velocity.

Assuming that W3(OH) is not unique, Hughes and Viner suggest where to look for others. A general search of dark, dense hydrogen clouds seems indicated with especial concentration on regions in Ophiuchus and Corona Australis.