BIOLOGY

Alcoholism and the poison cycle

Ethanol, the alcohol in beverages, is toxic to the human body. Researchers are now finding, however, that a metabolic product formed by the oxidation of ethanol in the liver may be even more harmful. Studies reported in the past five years have linked high levels of the metabolite, acetaldehyde, to physiological dependence, and to brain, heart and liver damage in alcoholics.

Earlier this year, Mark A. Korsten, Charles S. Lieber and colleagues at the Bronx Veterans Administration Hospital and the Mount Sinai School of Medicine reported that alcoholics have significantly higher levels of acetaldehyde in their blood than nonalcoholics after the same consumption of ethanol. Working with laboratory animals, Lieber, Rolf Teschke and Yasushi Hasumura now report (SCIENCE, Aug. 29) what may be the mechanism that leads to higher acetaldehyde levels.

The results of a series of experiments have lead the team to postulate the following mechanism: When alcohol is consumed, the two systems in the liver that oxidize the ethanol produce initially high levels of acetaldehyde. After chronic consumption, these high levels of the toxic metabolite injure the liver mitochondria, the normal site for acetaldehyde breakdown. The impaired ability of the mitochondria to break down the poison results in even higher blood levels of it, further liver injury, greater damage to the heart and brain and stronger addiction.

The team's next step, Lieber says, will be to determine whether some persons are genetically predisposed to these higher acetaldehyde levels and therefore to alcoholism.

Solving its own energy crisis

If one wanted to visit a sun-tracking parabolic solar collector, he almost certainly would *not* go to Canada's frozen Northwest Territory and look for small flowers. But this is just what Peter G. Kevan did. And he found his solar collectors.

Kevan is a biologist at the Memorial University of Newfoundland at St. John's. He discovered three years ago an interesting adaptation in arctic flowers that started him thinking. The adaptation is heliotropism, a sun-tracking mechanism that keeps a plant continually facing the sun. He and others wondered if the bowl-shaped flowers of some of arctic plants also act as solar heat collectors . . . and this is exactly what he found.

Reporting in the Aug. 29 SCIENCE, Kevan describes clever experiments on two common arctic flowers. He mounted tiny thermocouples on the petals and in the thoracic cavities of insects that bask in the sun-tracking flowers. He found that the bowl shapes focus the sun's heat on the reproductive apparatus (including the insects) at the center of the flower. This speeds up metabolism, and thus the reproductive cycle, which must complete itself in six short weeks. Kevan calls this "flower power."

Odd little mold with anti-yeast potential

Everything about *Physarum gyrosum* is slightly odd. It is an acellular slime mold—an undifferentiated mass of protoplasm that creeps around on rotting logs like an amoeba, but sends out reproductive spores like a plant. It's body engulfs and feeds on bacteria and yeasts in rotting forest debris, probably killing them with an antibiotic of unknown structure.

Pennsylvania State University biochemists M. Frank Mallette and Richard Taylor are harvesting the antibiotic from the unorthodox mold with the hope of developing new, more effective anti-yeast agents. Their latest step is a liquid growth medium that contains dead yeast cells and bacteria. The mold spews oily, yellow antibiotic material into the medium, and the team can now collect 10 times more of it to study than before.

TECHNOLOGY

The videodisks are coming

After a decade of research, and more than $200 million dollars expenditure, the electronics industry is about ready to market what it hopes will be the hottest new item since color TV—the videodisk. A survey of competing systems is presented in the Sept. 15 BUSINESS WEEK and the August IEEE SPECTRUM.

Designed for the home market, to make movies, sports events and educational programs available in disk form for reproduction on existing color TV sets, three new systems are racing to reach consumers first. Since only one system is likely to survive, the stakes are running high for the industrial consortiums involved.

First to market, in Germany, is the TED system developed jointly by Telefunken and Decca. The system uses mechanical contact of a diamond "skid" that detects bumps along a groove in a thin, flexible disk. Each disk plays only 10 minutes, however, and the system is seen as a possible adjunct to existing media (with disks possibly inserted into magazines).

RCA's SelectaVision, which next year will probably be first to reach the American market, is also a mechanical contact system. A sapphire stylus rides along a groove divided into slots of varying width and separation. A metal contact on the sapphire is used to detect changes of electrical capacitance between slots. Disks wear out after a few hundred plays.

A few months later, the completely optical system made by Philips, MCA and Magnavox should be coming on-line. With more sophisticated electronics, greater flexibility, but more technological hurdles to overcome, this system uses a laser beam focused through a microscope lens to reflect off tiny pits.

The first systems will probably market for $400 to $800, with a two-hour feature movie costing $12 to $15 on half-hour disks. Whether people will be willing to pay that much to be able to play old movies a hundred times remains to be seen.

Two dark-horse candidates may shake the field before anybody recoups the R&D expenditures. The i/o Metrics Corp. of Sunnyvale, Calif., is experimenting with much less expensive disks manufactured photographically and not requiring a laser for playback. Also, Sony hopes to be able to pack enough information onto magnetic surfaces to make possible video reproduction on a small magnetic card.

Debunking pollution myths

One of the most enduring myths about the environment is that prior to the industrial revolution humans lived more in concert with nature, free from the modern annoyances of pollution and escalating fuel prices. That nothing could be further from the truth is dramatically illustrated in an article by William H. Te Brake in the July TECHNOLOGY AND CULTURE, the quarterly journal of the Society for the History of Technology, published by the University of Chicago Press.

At the heart of the problem has always been rapid population growth and subsequent resource shortages. In London, for example, coal was substituted for wood because of decimated forests as early as the 13th and 14th centuries. The smoke from coal fires apparently drove Queen Eleanor from Nottingham Castle in 1257, and by 1307 a royal proclamation prohibited the use of coal in kilns around the city—under punishment of "grievous ransoms."

As England's population grew from 1.1 million in 1086 to 3.7 million in the early 1300's the cost of wood skyrocketed, and cleared, overfarmed land began to decrease in productivity. This contributed to a cycle of famines, beginning in 1316, followed by a cycle of plagues, beginning in 1348. By 1430, population had fallen by 40 percent and another cycle of deforestation, pollution, and overcrowding did not reach severe levels until the 16th century.