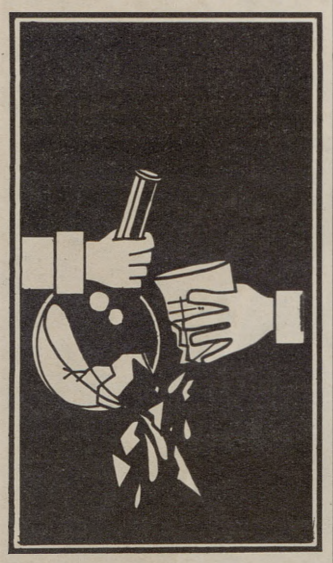
BY BOB WOODS



A Toast to Science

Cutty Sark, of whisky fame, diverted some attention away from bar bottles and toward laboratory beakers, culminating in the recent presentation of the first annual Cutty Sark Science Award. The recipient is Dr. Arnold J. Lande, a surgeon at the University of Texas. Lande is honored for developing three artificial organs: an implantable artificial gill that could enable future divers to work indefinitely underwater; a portable artificial kidney that can be worn as a bracelet; and a heart-lung device that will pump and oxygenate blood.

Richard J. Newman, president of Buckingham Corp., the U.S. importer of Cutty Sark, states that the award was created to spotlight individuals whose work was accomplished outside the established subsidized research structure — and therefore might not already be acclaimed by the scientific community. Members of the nation's science press nominated 83 scientists; seven finalists were chosen by the editors of *Science Digest*, after which a panel of six distinguished scientists reviewed the work, and named Dr. Lande the 1981 honoree.

Dr. Lande's artificial lung uses liquid fluorocarbons to carry oxygen to the diver and expel carbon dioxide from the bloodstream. The diver wears the gill in his or her backpack, and the gill is connected to an external tank. The artificial gill connects to the diver via a skin-line tracheostomy in the windpipe, and to the large vein and artery in the groin. The system offers deep-sea divers the possibility of a closed-circuit breathing system that eliminates the CO^2 buildup that leads to the "bends."

The artificial kidney is a miniaturization of currently available dialysis machines which, utilizing sorbent-based technology, filter out harmful toxins from malfunctioning kidneys with a mixture of silicon and charcoal that absorbs impurities. Lande's bracelet-size device performs a constant dialysis, rather than the periodic dialysis from larger systems. The bracelet is worn on the wrist and is activated by sorbent cartidges that can be renewed several times a day.

To eliminate the accumulation of dangerous blood clots associated with the implantation of artificial lungs, Dr. Lande has developed an artificial heart-lung combination. The artificial lung acts as a centrifugal pump to spin a self-cleaning artificial lung.

Entrepreneurs on Campus

Incubator Space Project is not a NASA program for an extraterrestrial maternity ward. Quite to the contrary, it's a very grown-up program at Rennselaer Polytechnic Institute, the oldest engineering college in the nation, and was designed to set up small businesses on campus. The long-term goal of the project, according to R.P.I., is to strengthen the ties between business and education.

This signals the increased fusion of business and academics. An early example of the trend occurred in the 1950's when a Stanford University-built research park evolved into northern California's Silicon Valley. More recently, M.I.T. and Harvard went into the genetic engineering business.

But R.P.I.'s program is unique in offering low-rent space on campus, plus access to computers, libraries, and consultation from the faculty. What the school's administration hopes to get from the deal is attention, and potential business, for its Capital District Technology Program, set up to increase Upstate New York's business environment.

Among the more promising campus enterprises is Raster Technologies, which company president Lou Doctor reports will soon begin marketing a computer graphics terminal; one estimate says Raster could have sales of $25 million to $30 million within two years. A few floors below is Power Kenetics Inc., which builds solar collectors — $300,000 worth in 1980.

Bucks in Space

American big business is planning to go where no business has gone before: outerspace. In conjunction with the development of the Space Shuttle program, NASA has tried to convince manufacturers of the benefits of space industrialization. In fact, the American Institute of Aeronautics and Astronautics has identified some 35 potential products that might profitably be produced off-planet, although only four warrant serious consideration before the turn of the century.

TRW Inc. is slated to deliver three mini-factories to NASA by 1985, after already spending $30 million on research and development. TRW scientists envision the manufacture of products such as metals that float, super-strong alloys, and perfect semiconductor crystals. Another promising area is pharmaceuticals. (See "Gray Flannel Spacesuits" feature in this issue.)

R&D costs can be staggering and prohibitive to smaller firms since it's estimated that a return on investment in space ventures will take seven or eight years. Undaunted, a small Miami electronics company, Microgravity Research Associates Inc., is working on a process for making perfect crystals in space — an impossibility on Earth because of gravity — for use in transistors and semiconductor products.

Westinghouse Electric Corp. scientists contend that glass manufactured in space would be bubble-free and ultra pure, making it superior to Earth-produced products, and could be used in hi-tech optical applications such as lasers, photographic lenses and optical fibers.

A particularly far-flung vision foresees an orbiting fleet of giant solar power satellites. At $21 billion apiece (up to $70 billion would have to be spent to make the system pay off) each SPS would generate 5 gigawatts of power beamed to Earth in microwave form; the entire U.S. has a generating capacity of 600 gigawatts. A number of U.S. aerospace companies, including Grumman, Rockwell, and Boeing, have designed SPS systems.

Oddly enough, one of the major roadblocks to these efforts is the Shuttle program itself — the only tried and true component so far. All of the processes discussed here will be deployed by Shuttles. With increased federal budget cutbacks taking place at NASA, leaving the space agency with about half the money it needs for the Shuttle program alone, some of the target dates may be hard to meet.

Modern Times

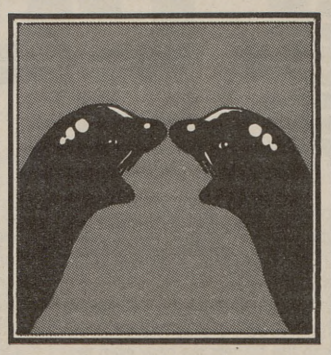
Isaac Asimov proposed ground rules for robot behavior in his famous tome

(Continued on page 8)

program

beyond reason

Beyond Reason is a special section reserved for contributions from our readers: send us information on unusual experiments, occurrences, products—documented, real, but mind-boggling. Send the items (no more than 500 words apiece; anything longer could be a feature, so send us a query) to Beyond Reason, *1680 North Vine, Suite 900, Hollywood, CA 90028.*



Hoover Want a Cracker?

BY KIEL STUART

He says his own name ("Hoover"), "How are you?" "Get out of here" and "Hey," among other things, but if he sat on your shoulder to nibble soda crackers, you'd probably suffer severe trauma.

Hoover is a 10-year-old, 200-pound Harbor Seal.

Now residing in Boston's New England Aquarium, Hoover mimics human speech, and is believed to be the only mammal to do so. The orphaned Hoover was rescued 10 years ago off the coast of Maine by Mr. and Mrs. George Swallow. The Aquarium adopted him almost immediately, and he began babbling in 1974. When his noises began to resemble human speech in 1976, volunteers and staff encouraged Hoover in his oratorial efforts.

Naturally, research is under way to determine why and how Hoover has this gift. It is interesting to speculate on what new vistas this could open up in interspecies communication, and whether Hoover will pass his talent on to future seal generations. However, his sole offspring thus far is not saying anything.

The Neurophone Story

BY G. BATZ

While most of us experience audio perception with our ears, there are some people who, thanks to the work of an Arizona scientist, have found a new way: *through the skin*.

Dr. G. Patrick Flanagan of Tucson has invented a bio-electronic machine he calls the "Neurophone," which transmits electrically processed sounds into the skin, then to the nervous system, direct to the brain, bypassing the normal auditory system. The device allows deaf people — even those with eighth cranial nerve damage — to "hear."

How is this possible? "The current hypothesis is based upon the fact that the skin is embryonically the source of all human sense organs," explains Dr. Flanagan. "The human ear evolves out of the convolutions of the skin of an embryo in the womb, and since the skin is the precursor of the ears, it should be capable of hearing."

Here is a simplified explanation of the Neurophone's operation: the device takes an audio signal, converts it to a 60-volt square wave, and then processes it through a zero crossing detector. From there the signal travels to two electrodes which produce a 20-volt electrical field. When this current is introduced to the skin, the signal modulates through the nervous system, sending the information directly to the brain.

Research conducted with biological energy measuring systems, including an "Acupuncture Energy Analyzer" which Dr. Flanagan has developed, "indicates that continued use of the Neurophone puts the entire acupuncture meridian system into perfect balance."

The Neurophone might also provide the technological foundation for the development of the direct access process for *all* humans and for communication between brain and computer.

Dr. Flanagan invented the first Neurophone at the age of fourteen. By the time he turned seventeen, he had also invented a guided missile detector that was purchased by the U.S. Government, a transistorized muscle stimulator for use in outerspace, and was named one of the nation's top ten scientists by *Life* magazine.

Now, at age 36, after many years of research, Dr. Flanagan has developed the eleventh model of the Neurophone, which he markets from his "Source of Innergy" laboratory/business, along with his many other inventions. He frequently publishes a newsletter, which is available free of charge. Write to: *Source of Innergy, 9989 E. Morrill Way, Tucson, AZ. 85715*