Biology

Pineal gland speaks to brain

The mammalian pineal gland, which sets the daily rhythm of hormone release that underlies many seasonal patterns of growth and behavior, keeps time in response to nerve signals received from the brain. Scientists have believed that the nerve signals go just one way—no nerve signals travel from the pineal gland back to the brain. But in the Feb. 14 SCIENCE, researchers at the National Institutes of Health (NIH) in Bethesda, Md., and at the Justus-Liebig University of Giessen in West Germany report evidence of connections from the pineal to the brain. The finding "dramatically changes our concept of the mammalian pineal gland," says David Klein of NIH.

To search to pineal-to-brain connections, the scientists took advantage of recently discovered similarities between the pineal gland and the retina of the eye (SN: 11/9/85, p. 298). From vision researchers, they borrowed a fluorescently labeled antibody that binds to a protein called S-antigen, found in both the eye and the pineal but not in other parts of the brain. In experiments on hamsters, the antibody revealed thin nerve connections running from pineal cells to the regions called the posterior commissure and the habenula. These regions in turn send signals to brain areas that influence mood and sleep.

Whether these pineal-to-brain connections exist in other mammals has not yet been established. But Klein suggests that such connections in the human brain might help explain the improvement that bright light provides for some patients who become depressed as the days shorten in winter (SN: 3/9/85, p. 152). In some reptiles the pineal gland acts as a light sensor, has direct neural connections with the brain and is thought to help control daily rhythms of sleep and wakefulness.

Elephant calls that humans can't hear

Don't look now, but the largest land animals may be talking behind our backs. Cornell University researchers have discovered that elephants produce low-frequency sounds inaudible to humans but well suited to communicating within herds.

The sounds, probably produced by the elephant's vocal cords, set up a sympathetic vibration in its forehead. Seeing that flutter and feeling a throbbing sensation in the air led Katharine Payne, William Langbauer Jr. and Elizabeth M. Thomas to discover the infrasonic sounds.

The vibrations were measured at 14 to 24 hertz. (The human hearing threshold is about 30 hertz, unless sounds are very intense.) Asian elephants are known to be capable of detecting tones with frequencies of 17 hertz, and Asian and African elephants alike probably can hear sounds of much lower frequencies than that, Langbauer says.

"We were only getting part of the picture in the past," says Thomas Lovejoy of the World Wildlife Fund in Washington, D.C., which is one of the project's sponsors. "The interesting question, of course, is whether there were certain kinds of things they were communicating so that we couldn't hear."

The researchers don't know for certain whether the elephants use these sounds to communicate. If they do, the infrasonic calls might indeed serve a different purpose than harder-to-miss bellows, since low-frequency sounds travel farther than those bellows in forests and open plains.

Long-distance, low-frequency communication could explain puzzling aspects of elephant behavior, including the ability of males to find females during the brief conjunction of male "must" (heightened sexual activity) and female fertility; and the highly coordinated movements within herds that seem to occur without signaling. In July, the researchers will travel to Namibia, in southwest Africa, to investigate the distance over which elephants can hear the infrasonic calls, and to look for correlations between the calls and elephant behavior.

Biomedicine

Artificial heart: The debate goes on

Earlier this month, artificial hearts were implanted in three people in one week, including one in a woman who received a second artificial heart after a transplant failed. Is the artificial heart a valuable new device that can save the lives of tens of thousands of people in the United States each year? Or is it instead something that will prolong dying and drain precious medical resources?

These questions were debated last week by artificial heart inventor Robert Jarvik of Symbion, Inc., in Salt Lake City, and Daniel Callahan of the Hastings Center, a biomedical-ethics research institute in Hastings-on-Hudson, New York. Their discussion was sponsored by the National Press Club, and occurred the same day a congressional committee held a hearing on the value of the device.

Past experience with the artificial heart, most notably in a Swedish recipient who lived for seven and a half months and during that time was able to climb five flights of stairs, "really showed us that we can achieve a good mobility and a good quality of life," Jarvik said.

But many recipients have suffered strokes and other problems. Only two of the five who received permanent implants are still alive, and both remain in the hospital. "We're not going to create healthy people with long life expectancies," Callahan said. "We're going to create people who are going to be chronically ill."

Of a recent study from the National Heart, Lung, and Blood Institute in Bethesda, Md., estimating that the artificial heart can add 54 months to a person's life, Callahan said, "[That] doesn't seem to me to be terrific."

Answered Jarvik, "It does to me." His estimate is much longer: "I foresee the possibility of maintaining a person for 20 years as a realistic goal." To free recipients from being tethered to a bulky power source during that time, his company is working on a battery-powered device worn in a vest, he told SCIENCE NEWS after the meeting. A completely internal power source would have to be nuclear, and such a device is unlikely to be accepted by the public or the medical community, he said.

The value of the artificial heart is a question not just for the potential recipient but for society as a whole, Callahan noted. The National Heart, Lung, and Blood Institute estimated last year that there are 17,000 to 35,000 potential candidates for an artificial heart each year. At a cost of $150,000 per implant, the procedure could add $2.5 billion to $5 billion to the United States' medical bill, the institute determined. "One hates to argue against something that has value for some individuals," Callahan said. But that money could be better spent on health education aimed at prompting behavioral and dietary changes to prevent heart disease, he said.

Jarvik, noting that $3 billion is spent on video games each year, countered that the artificial heart could allow people to remain productive members of society.

One margarita, but hold the lime

Okay, so your friends are going off to have fun in the sun, and you're stuck to brave winter on your own. But be consoled—at least you won't get Club Med dermatitis.

The condition, named and described by Wain White of the New York University Medical Center in the Jan. 30 NEW ENGLAND JOURNAL OF MEDICINE, is a skin rash that results from a drinking game. White observed it on the thighs of an 18-year-old woman who had balanced and rolled limes on her lap during a Caribbean Club Med vacation.

Limes, as well as celery and parsley, contain furocoumarin, an agent that makes skin more sensitive to the sun. Combination of the lime contact and sunbathing resulted in the rash, which eventually disappeared.