BIOLOGY

Eye to eye with an owl

The *Guinness Book of Records* says that an owl's eye is 100 times more sensitive than a human eye. Graham Martin of the University of Birmingham, England, disagrees. His studies of the tawny owl, reported in the Jan. 12 NEW SCIENTIST, found the owl eye, on the average, only about 2.5 times more sensitive than the human eye. "There must be some individual humans who are, in fact, more sensitive than some individual owls!" Martin says. Because of different absorption, scatter and reflection, the owl eye gathers slightly more light from a given source. For the photography buffs, Martin calculates the f-number of eyes: 1.30 for owl, 2.10 for humans.

Another surprising finding of Martin's experiments is that the tawny owl sees "perfectly adequately" in daylight. Although the owl needs only 1 percent of the light required by the diurnal pigeon, the owl's visual acuity in daylight equals that of the pigeon and is only slightly inferior to that of the human.

From the comparison with owls, Martin suggests that the source of human diurnal habits cannot be that people are more blind in the dark than are nocturnal animals.

Sopping up an overdose

In treatment of poisonings and suicides, drugs must be captured before they are absorbed from the gastrointestinal tract. Christopher T. Rhodes and colleagues at the College of Pharmacy, University of Rhode Island, and John W. Frankenfeld of Exxon Corporate Research suggest that liquid membranes may be effective drug traps. Liquid membranes are stable bubbles of oil with water on the inside and on the outside. In a model system, Rhodes and co-workers put within the membrane a solution that is extremely basic (pH 12) to trap drugs. Uncharged molecules of barbiturates (the drugs most frequently used in suicides) cross the membrane and, in the central solution, become ionized by the high pH. Once ionized, molecules cannot return across the oil membrane. In test tube experiments, liquid membranes removed more than 90 percent of each of three barbiturates within 10 minutes, the investigators report in the January JOURNAL OF PHARMACEUTICAL SCIENCES. However, bile salts make the liquid membranes less effective. Because food interacts with bile salts in intestines, future animal studies may still show liquid membranes effective for overdose treatment.

Hormonal balance in focus

The gangly teenager who feels out of sorts, may also be out of focus. Researchers from the University of Leiden in the Netherlands suggest that a hormone may simultaneously cause an adolescent growth spurt and nearsightedness. C. C. Kok-van Alphen noticed among young patients that adolescent myopia is frequently accompanied by a height increase. Now he and E. L. Noach report animal experiments that link pituitary hormones to a change in refraction of the eye.

Alphen and Noach studied the effects of two pituitary hormones on the eyes of "adolescent" rats. First they surgically removed the pituitary glands. Then they gave daily injections of thyrotrophin (TSH). The hormone made the rats' eyes focus at a shorter distance. That effect persisted for at least three weeks after the treatment period.

Because an intact rat does not become nearsighted in the presence of its own TSH, Alphen and Noach suspected another hormone compensates. They injected the experimental rats with adrenocorticotropic hormone (ACTH). Although ACTH did not act alone, it reversed the effect of TSH. In the Jan. 5 NATURE Alphen and Noach suggest these results may open up possibilities for drug treatment of juvenile eye problems.

EARTH SCIENCES

Weather records from tree isotopes

Tree rings typically yield climatic data through study of the variations in ring widths. But several research groups have been developing ways of gathering climatic information directly from isotopic analysis of the wood within the rings. Prominent in this effort have been geochemists Samuel Epstein and Clayton Yapp of the California Institute of Technology. They have been analyzing the ratios of deuterium to hydrogen in the cellulose of the wood.

Epstein and Yapp have now announced that their studies show that trees definitely do keep a record within their cellulose of the climatic temperatures within their lifetimes. Using their technique, they have produced the surprising finding that the climate of ice-free sections of the United States during the last ice age appears to have been, on the yearly average, not much colder or perhaps even milder than today.

The D/H ratio in the wood is directly related to the D/H ratio of the water used to build its cellulose molecules. That ratio, in turn, is directly related to the temperature at the time the water precipitated from the atmosphere. Heavier deuterium-containing water molecules condense out of moving air masses at warmer temperatures than do ordinary water molecules. This leaves a lower fraction of deuterium-containing water for the rain in cooler regions.

Analyzing wood samples from 40 ancient trees that grew throughout North America during the last ice age, the geochemists were able to assess temperature changes over a period from 9,500 to 22,000 years ago. The trees' ages were determined by carbon-14 dating.

The cellulose in the trees at the time of maximum glaciation 14,000 to 22,000 years ago was richer in deuterium than is typical today. This, say the scientists, suggests that conditions were milder on the average, and most likely that winters were warmer and summers cooler. Such a climate would mean that continental glaciers would melt less rapidly in the summer and grow more rapidly in the winter, due to an abundance of moisture-laden air flowing over them from the ocean that could produce much snow.

This is in contrast to today's situation of cold, dry winters (little snow) over the ice sheets of Greenland and Antarctica.

The analysis of trees that grew 10,000 to 12,000 years ago confirms other evidence that the transition from ice age conditions to today's climate occurred rapidly — in about 2,000 years.

The D/H isotopic analysis of tree rings, say Epstein and Yapp, should prove a powerful tool to climatologists.

Warm sea eddy fed Hurricane Anita

Hurricane Anita last August may have drawn part of its power from an eddy of warm Gulf of Mexico water. This is the conclusion of analyses based on detailed oceanographic data taken immediately before and after the storm.

The slowly rotating 225-mile-diameter ocean eddy — about a degree warmer than surrounding waters — had been discovered a month earlier by Harris B. Stewart and John Proni of the National Oceanic and Atmospheric Administration. Its continued existence was confirmed on Aug. 28 as the storm was developing. As the storm moved toward the center of the warm eddy, it intensified, reaching hurricane strength as it passed the eddy's western edge. Measurements afterward showed the sea surface had cooled by 4°C.

The observations may hold important implications for understanding the ocean's role in hurricane formation. "We wonder," says Proni, "whether the presence of a ... warm eddy in the central Gulf makes passing storms more likely to intensify into hurricanes."