

began a public education campaign about earthquakes themselves as well as about dealing with a possible disaster.

Precursory signs continued to increase. Besides growing crustal deformation and tilt, "a great deal of unusual animal activity was observed," an indicator that receives little attention in the United States although it has been noted for years in many parts of the world. "For example," says Press, "snakes came above ground and froze to death—an unprecedented phenomenon." A number of water wells in the area bubbled, grew muddy and rose in level. ("I only know of one that's being monitored in California for level," Press observes.) With the occurrence of a magnitude 4.8 quake about 40 kilometers north of Haicheng, officials instituted checks of all reservoirs, mine-shafts, industrial plants and possibly unsafe buildings, some of which were strengthened as a result. "Earthquake maneuvers" were widely practiced, including hospital drills and evacuation practice. "Earthquakes were taken out of the realm of mythology and given scientific basis," says Press, "in what must have been thousands of nightly lectures all over the province."

The precursors grew following the shock, including level changes in 70 percent of the 81 wells being monitored. In mid-January, the prediction was narrowed to the first half of the year, with an expected magnitude of 5.5 to 6.0. On Feb. 1, a few small tremors appeared in a previously aseismic region near one of the stations, and by Feb. 3 the number had grown to more than 500.

The big quake was declared imminent. The public was notified to build simple outdoor shelters, to move patients from hospitals and to make suitable arrangements for the old and the weak. Medical teams and rescue brigades were organized, and transport vehicles were removed from their garages to the open air. Outdoor movies were shown to get people out of their houses (despite a temperature of -24°C), with further urging from armed military street patrols. The final evacuation order was given at 2 p.m. on Feb. 4. The quake struck at 7:36.

Chinese society differs from ours, and experience there may not be directly transferable, Press told the recent meeting of the American Geophysical Union, of which he is president. But the message is clear: Planning pays off. □

Forest frogs with ears tuned by sex



Hamilton/Cornell Univ.

Coqui: 'Co' for territory, 'qui' for sex.

One can only guess at such things, of course, but it seems unlikely that many persons would spend hundreds of hours crawling through the undergrowth in a mountain rain forest in pursuit of knowledge. It seems unlikelier still that many would do so in order to play recorded sounds to small Puerto Rican frogs. This, however, is precisely what a Cornell University graduate student did. And his bizarre pursuit paid off: He reported the first known example of a vertebrate with ears "tuned" differently in the two sexes.

Peter M. Narins, a bioengineering doctoral candidate, and Robert R. Capranica, his major professor, report this "sensory sexual dimorphism" in the April 23 *SCIENCE*. They found, both through behavioral testing in the rain forest and electrophysiological tests in the laboratory, that the coqui frog (*Eleutherodactylus coqui*) of Puerto Rico's high-altitude rain forest has a specially tuned auditory system. The males emit a two-note call ("co-qui") for hours every evening. The "co" part of the call, the team found, is heard preferentially by other males, and tells them, in essence, "Male here! Approach my territory at your own risk!" The "qui" part, on the other hand, is heard preferentially by females, and tells them, "Sexually mature and interested male, this way!"

Narins played a series of tape-recorded natural and synthetic sounds (natural "co-qui's" and individual, synthetic "co's" and "qui's") to males in nature. "I was trying to answer a basic question in auditory physiology," Narins told *SCIENCE NEWS*. "Does the ear act as a filter for sequential notes? We know that the frog ear acts as a filter for specific frequencies, but does it also act as a processor for information that comes in a sequence?" Narins chose the shortest series he could find—the coqui's two-note

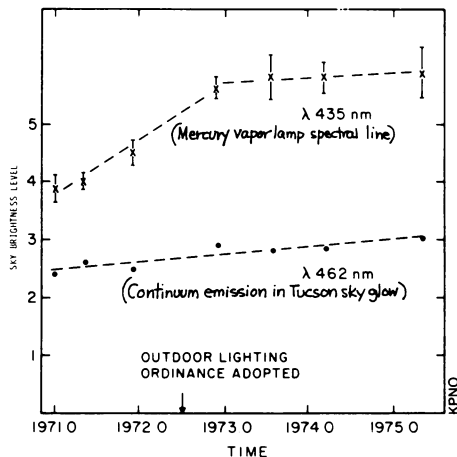
Light pollution: Law cuts sky glare

Back around 1970 the staffs of the many observatories in the southern Arizona mountains were becoming concerned about what astronomers call light pollution. The same urban sprawl that bothers lovers of the fragile desert ecology was bringing city lights closer to their mountains, and the upward glare was beginning to hamper their observations. Before things got really bad, they wanted to see if they could stop the trend.

Monitoring indicated that Tucson's night brightness was increasing by about 10 percent a year. Although seeing conditions at the observatories were still fairly ideal in 1970, if the trend continued, the city's glare would double in 10 years, and that could be purgatory for the astronomers. In 1972 they persuaded the city to adopt an ordinance regulating outdoor lighting.

Monitoring since the adoption of the ordinance shows a significant slowing of the growth of the city's sky brightness. The change is especially dramatic at the wavelength emitted by mercury vapor lamps, one of the chief kinds of outdoor lighting. The lines of mercury vapor wavelengths from street lights can show up in the spectrograms of celestial objects, impairing and sometimes falsifying their interpretation. Kitt Peak National Observatory astronomer A. A. Hoag will report details of the follow-up in a forthcoming issue of *PUBLICATIONS OF THE ASTRONOMICAL SOCIETY OF THE PACIFIC*.

Tucson's ordinance requires that new outdoor lighting must be directed only



Brightness leveling off: Astronomy's gain.

where it is useful and it must be filtered to limit the color output to the range useful to the eye. Use of advertising and recreational lighting is curtailed between midnight and sunrise. Success of the Tucson ordinance has led to adoption of similar ordinances in other observatory centers. They are Pima County (which surrounds Tucson and includes suburbs not within the city's corporate limits), Coconino County, Ariz. (which surrounds Flagstaff), Hawaii County, Hawaii (the big island where observatories are located and being built), and Richland, Wash. If the trend spreads, perhaps not only astronomers but also ordinary citizens will be helped to a clear view of the night sky, which is now almost invisible from urban areas. □

call—to answer that question.

By presenting the “co’s” and “qui’s” in scrambled order, he found that the male frogs did not distinguish between “coqui” and “quico,” and responded the same way regardless of sequence. He did notice, though, that males and females responded somewhat differently to the tapes. Subsequent laboratory tests showed that auditory nerve cells in the two sexes are tuned for maximum response to different frequencies—males to the “co”

frequency and females to the “qui” frequency—thus, the sexually dimorphic (two-formed) sensory system.

This early, basic study relates to at least two larger concerns, Narins says: the questions of interpreting sequential information and of whether sounds with “biological meaning” (mating calls, aggressive warnings, etc.) are processed differently than background noise. Narins will continue looking for answers, he says, perhaps even in the rain forest. □

Olds and Selye share psychiatry prize

It’s well known by now that electrical stimulation of the brain can be a powerfully pleasant experience. But this wasn’t even suspected in the 1950s when James Olds found that rats will work long and hard for stimulation in specific areas of the brain. Many of the causes and effects of stress are also well known. But the word “stress” wasn’t even in use as a clinical or medical term 40 years ago when Hans Selye first wrote a letter to *NATURE* about what is now known as the stress syndrome. For their far-reaching discoveries, these two men, James Olds, professor of behavioral biology at the California Institute of Technology, and Hans Selye, director of the Institute of Experimental Medicine and Surgery at the University of Montreal, will share psychiatry’s largest prize, the \$25,000 Kittay International Award.

Interestingly, both researchers sort of stumbled onto their discoveries. Olds and Peter Milner at McGill University implanted electrodes in what they thought were avoidance centers in the brains of

rats. If the animals were stimulated when they moved in a certain direction, they would react as if they had experienced a sharp pain and would thereafter avoid moving in that direction. But one day, the researchers miscalculated and placed the electrode in the wrong area. Instead of backing off, the animal moved forward in response to the shock. A “pleasure center” had been located, and in subsequent experiments rats pushed levers up to 100 times a minute for stimulation in that area.

Science adviser bill: Agreement reached

The last hurdles in the long struggle to reinstitute a White House science advisory apparatus have apparently been overcome. A House-Senate conference committee this week filed with the Congress a compromise bill creating the Office of Science and Technology Policy (OSTP) to advise the President on technical matters. Swift passage and signing were expected.

The bill represents a victory for those who fought for a strong science adviser—with direct input to military policy-making and the budget process. The director of OSTP will be a member of the Domestic Council and a statutory adviser to the Security Council (a position equivalent to that of director of the Central Intelligence Agency). Through those forums he will have responsibility for advising the Administration on national security matters.

The director’s influence in setting budgetary priorities will be more indirect and this section of the bill reportedly involved the hardest bargaining. First, OSTP is to prepare a five-year outlook on what role science and technology can play in meeting national needs. Then, at the beginning of each budget cycle, the director will submit to each government agency a set of program options, based on the forecast, that they are to incorporate into their budgets. Finally, he will assist the Office of Management and Budget (OMB) in setting priorities among the proposed agency programs. A spokesman for Senator Kennedy’s office told *SCIENCE NEWS*, “It’s not everything we wanted but we’re pretty happy with it.”

The director and four assistant directors will be appointed by the President, but

This research has since led to an intricate mapping of drive and reward areas along the midline and floor of the brain, to a better understanding of the chemicals at work in those areas and to the beginnings of an understanding of the mechanisms of learning.

Selye’s lucky mistake came about as a result of using impure extracts in an attempt to isolate a sex hormone (SN: 5/31/75, p. 356). Instead of discovering a new sex hormone, he produced the now well known three-part stress syndrome (alarm, adaptation, exhaustion). Selye has since explained the neuroendocrine mechanisms involved and has shown how any nonspecific stress (psychological or physiological) can lead to such things as ulcers, hypertension, colitis and migraine headaches.

At the announcement of the award last week in New York, Olds was cited for adding “a new dimension to the understanding of human motivation,” and Selye for opening “new perspectives for the field of psychosomatic medicine.” The prize will be awarded at a ceremony in New York in October. □

will be subject to Senate confirmation—another point of contention in the past. The director’s salary, \$44,600, will be the same as that of the director of OMB. (Though the word “engineering” was left out of the title of the bill and the name of the new White House unit, the conferees inserted a paragraph saying explicitly that the engineering community would be consulted on matters of policy.)

Whether there will be a standing advisory committee of “experts” to also advise the President—as in previous times—remains uncertain. The bill creates a temporary President’s Committee on Science and Technology (PCST), consisting of 8 to 14 persons, to conduct a major survey of current science and technology. At the end of one year the committee is to submit a preliminary report to the President on its findings. After a second year, a formal report will be sent to Congress. After that, the President can either let the committee continue to conduct studies on other topics, or he can disband it.

The bill also adds another bureaucratic unit to Washington’s alphabet soup: The Federal Coordinating Council for Science, Engineering and Technology, to prevent unnecessary overlap between programs of various Government agencies.

The Administration is already submitting a supplemental budget request for funds to finance OSTP and PCST for the remainder of this fiscal year. For fiscal 1977, OSTP has been authorized to spend \$3 million, and PCST has been allotted \$1 million. The President is expected to name a director of OSTP very soon, perhaps in early May. □



Olds and Selye (below) share Kittay Award.

Kittay Scientific Foundation



Karsh Ottawa/Kittay