SPACE SCIENCES

Palomar Sky Survey updated

One of astronomy's standard reference works is the Palomar Sky Survey, a compilation of 1,758 photographs that have served for nearly a quarter-century as the basic map of the heavens. Conducted from 1949 to 1957, the survey was made with the 48-inch (1.2-meter) Schmidt telescope on California's Palomar Mountain, and catalogs stars, galaxies, galactic clusters, comets, asteroids and more. From its low latitude, barely a third of the way from the equator to the North Pole, the instrument was able to include some 75 percent of earth's sky.

Now the survey is being repeated, not only with additional telescopes that can fill in the missing 25 percent, but with improved instrumentation and film emulsions that can record light four times as faint as the limit of the original project. This could double the distance and more than octuple the volume of space encompassed by the first survey.

The southern-hemisphere portion is already underway, using a similar 1.2-meter Schmidt telescope at Siding Spring Mountain in New South Wales, Australia, and the 1.0-meter European Southern Observatory instrument in Chile. The new northern survey is set to begin in 1983, with the same telescope that took the original plates.

There will, however, be some changes made. A new achromatic corrector plate will minimize distortion in the photos, and fine-grained emulsions developed since the original survey will permit longer exposure times that can bring out fainter sources. In addition to taking photos in red and blue wavelength bands for temperature calculations, the new survey will use an infrared band for greater penetration through galactic dust.

The northern portion is supported by the National Geographic Society, Alfred P. Sloan Foundation and Eastman Kodak.

Cometary magnetic fields from afar

Unlike the increasingly sophisticated solar-system studies conducted by remote sensing from earth in recent years, magnetic-field measurements have had to be made *in situ,* which means by magnetometers with expensive space probes to carry them. (An exception is the sun, whose powerful field causes spectral-line shifts that can be detected by spectroscopy.) Now two Soviet researchers have proposed that it may be possible to determine from earth the magnetic-field orientation of the heads of comets.

It is not even known that comets *have* magnetic fields, though scientists have cited various reasons to expect them, such as from induction by the solar wind. But if they do exist (as probes to comet Halley may confirm), the ability to monitor them without depending on spacecraft could be valuable.

The key, according to D.A. Varshalovich and G.F. Chŏrny of the A.F. Ioffe Institute of Physics and Technology in Leningrad, is neutral sodium atoms, often detected in cometary outer atmospheres. It has previously been noted (F. Mies, 1975) that the spin alignment of these atoms can be influenced by the directionality of incoming sunlight, via the resultant "optical pumping," and that the alignment effect shows in the polarization of the scattered light. Taking that effect into account, the Soviet authors report in ICARUS (43:385), it may be possible to determine the direction of the comet's magnetic field by earth-based measurements of the intensity ratio between the sodium's D_2 and D_1 spectral lines, and of the D_2 line's degree of polarization.

They would be subtle measurements, requiring that the comet not be too close to the sun's stronger field and assuming that the sodium atoms would be relatively free of collisions with other particles that could disturb the slight spin-alignment tendency. But appropriately sensitive ground equipment, the authors observe, is an easier goal than "an expensive cosmic vehicle."

ENVIRONMENT

Environmental links to behavior

An information exchange on research that links behavioral changes with exposure to environmental agents — such as food additives, pollutants and artificial light — has just been created by the Center for Science in the Public Interest. Director Bambi Batts Young said it will track ongoing research, encourage new research and use the findings to stimulate regulatory action.

Behavior changes may offer the earliest warning of toxicity. What is needed, Young says, is the equivalent of an Ames test to quickly and inexpensively signal which substances threaten damage to the brain and central nervous system. Widespread agents that impair concentration, memory or learning skills could affect the mental development of the next generation, Young warns. Initially focusing on lead in food, caffeine in soft drinks and synthetic food dyes, the Washington-based group will disseminate information via a quarterly newsletter and direct contact with researchers.

Love Canal: How culpable is the city?

"If you believe that the guilty party in the Love Canal tragedy is the Hooker Chemicals & Plastics Corporation... rather than the Niagara Falls Board of Education, which bought the dump from Hooker in 1953 ... then you've been snookered." So begins an investigative report in the February issue of REASON magazine.

Author Eric Zuesse, director of Consumers' Alliance, a New-York-based consumer advocacy group, waded through city documents — from minutes of the school board's meetings to architect's reports on erecting storm sewers through the "canal" and excavating roads atop it. His research asks: Why would the city ever decide to site a school atop such a potentially dangerous hazard? What he documented was a school board strapped for cash and so desperately in need of places to build schools to handle the "baby boom" that it knowingly and willfully procured lands with chemicals (and, at one site, even radioactive materials) buried beneath them.

The report also explains why Hooker deeded its dump to the city. School board records indicate Hooker only sold the land after being threatened with "eminent domain" proceedings to condemn the site for city use. City records — dated two years prior to Hooker's turning over the property — already showed plans for a school to be erected atop the canal. And the school board was not unaware of what lay beneath the canal's surface. Hooker personally escorted school board members to witness the drilling of core samples at the site: Chemicals were found no more than four feet below the surface at two spots.

Knowing that, the city built there anyway. And it excavated at least 17,000 cubic yards of "fill" from the site for grading other property (including a school now closed due to fears of chemical contamination). Several times the city punctured the canal's walls and clay cover for sewer construction. It even tried in 1957 to sell canal property to housing developers. Admonitions by Hooker officials — then as at numerous other public hearings — eventually quashed the venture.

"It's clear to anyone who digs into this matter," Zuesse writes, "that Hooker may well have been the only party ... to behave responsibly. Hooker chose ... [a] fine dumpsite; it ceded the dump to the School Board [only when] the threat of condemnation was real ... it warned the ... Board that [buried] chemicals could kill and insisted that the Board pass this warning on to any subsequent owners of the property; it urged the Board not to construct ... buildings directly over the Canal; it protested the prospect of any subsurface construction." The irony of it all, Zuesse says, "is that ... Hooker Chemicals may very well have botched others of its many chemical dumps, but not Love Canal."