Galaxy map smooths out the vast cosmos

Assembling 185 overlapping images of the sky like pieces of a cosmic mosaic, British astronomers have produced a map depicting a larger chunk of the universe than any other two-dimensional survey in the past. Though the ongoing survey has so far covered only about one two-thousandth the volume of the entire observable universe, it already includes a record 2 million galaxies, revealing some structural surprises while also confirming some familiar concepts.

Like others who have created smaller galactic maps, Will J. Sutherland, Steven J. Maddox and their colleagues at Oxford University found that the lumps and clumps formed by galactic clusters begin to smooth out over regions longer and wider than about 50 million light-years. But while previous work indicated a rapid smoothing of galactic distribution at this scale, the Oxford astronomers report that some lumpiness persists up to a scale of about 150 million light-years.

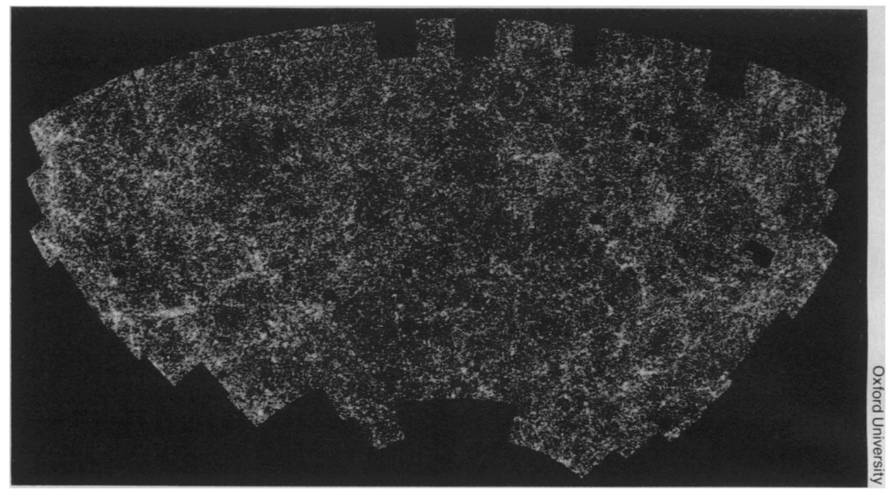
The team describes its findings, based on an analysis of galaxies contained in a cone-shaped region covering 10 percent of the sky's total area, in the April 15 MONTHLY NOTICES OF THE ROYAL ASTRONOMICAL SOCIETY.

Sutherland says the new results may prompt researchers to revise or perhaps abandon some theories about the evolution of the universe, including the cold dark matter theory, which he contends cannot account for such large-scale lumpiness. At the same time, he adds, the survey supports other findings – most notably the highly uniform glow of microwave background radiation left over from the Big Bang (SN: 4/21/90, p.245) – that indicate all parts of the universe look essentially the same on a vast enough scale. Theorists already base their models on a universe with limited deviations from uniformity, but "this survey is the first reliable confirmation that the distribution of galaxies in the universe becomes uniform on large scales [beyond 150 light-years]," Maddox says.

Using a sequence of photographs of the southern celestial hemisphere taken by the UK Schmidt telescope at Siding Springs Observatory in New South Wales, Australia, the team picked out images of distant galaxies and discarded those of individual stars with the help of a computerized scanning machine. In contrast, a 1977 map analyzed by Princeton astronomers James E. Peebles and Edward J. Groth – until now considered the largest galactic survey – relied on data painstakingly evaluated by eye at Lick Observatory in northern California.

Astrophysicist Simon D.M. White of the University of Arizona in Tucson, who helped developed the theory of cold dark matter, says the new survey and other recent observations may indeed force revisions in his proposed scenario for the evolution of the universe. "Some people might say, 'If a theory can't describe [an observation], drop it,'" he told SCIENCE NEWS. "I'm more practical. I say, 'Try and revise it.'"

Sutherland says a recent statistical analysis indicates the newly mapped portion of the southern celestial hemisphere contains several sheets or walls of galaxies – a phenomenon previously seen only in the northern hemisphere (SN: 11/25/89, p.340). The Oxford team plans to map the galactic distribution of nearly the entire sky, collaborating with researchers from Cambridge (England) University who are analyzing photographic plates from the Siding Springs Observatory and the Mt. Palomar Observatory in southern California. – *R. Cowen*



Two-dimensional sky map shows galaxy clusters (small bright patches), superclusters or filaments (elongated bright areas) and dark voids. Small-scale galactic clustering causes overall mottled appearance.

Cutting immunity with chemotherapy cues

After repeatedly experiencing the immune-suppressing effects of chemotherapy in the distinctive hospital environment, cancer patients may undergo immunity dips triggered merely by a return to the hospital, according to a new pilot study.

A group of 20 women receiving chemotherapy infusions for ovarian cancer displayed both decreased immune function and increased nausea several hours before subsequent hospital-based treatments, report Dana H. Bovbjerg of Memorial Sloan-Kettering Cancer Center in New York City and his colleagues in the April JOURNAL OF CONSULTING AND CLINICAL PSYCHOLOGY.

"These are intriguing but preliminary findings," Bovbjerg says. "Their clinical implications are unknown."

It remains unclear, for instance, whether the women with the sharpest plunges in immune function were at greater risk for infection.

Nevertheless, this is the first human study to support previous observations of acquired immune suppression in animals. In a process known as classical conditioning, researchers have exposed rats to both a "neutral" stimulus – say, sweetened water – and an "unconditioned" stimulus – injections of chemotherapy drugs that suppress immunity. After only one such trial, the animals' immune responses were conditioned to drop with just a taste of the sweetened water, which the rats had already begun to associate with unpleasantness.

Since chemotherapy can also cause nausea, researchers have speculated that classical conditioning promotes the nausea and vomiting experienced by at least one in four chemotherapy patients at the sound of the nurse's voice, the sight of the hospital clinic, or other hospital-related cues.

Bovbjerg and his co-workers studied women who had received at least three chemotherapy infusions. Blood samples were collected at patients' homes several days before the next treatment and at the hospital just before chemotherapy administration. Lab tests revealed that the average proliferation of white blood cells in response to two substances that promote cell division was significantly lower in samples drawn at the hospital than in those taken at patients' homes. This decrease in immune response was not related to anxiety levels reported by patients, Bovbjerg notes.

Most individual immune changes, though statistically significant, were not drastic. A few patients underwent dramatic immune reductions, but these may have been isolated fluctuations largely induced by the chemotherapy, Bovbjerg adds. – *B. Bower*