Crowding, death rates linked in humans

Perhaps the first concrete evidence that crowded environments contribute to escalated death rates among human beings has been disclosed by researchers at the University of Texas at Arlington. In an unpublished report, the results of two studies examining institutional death rates during a total of 26 years reveal substantial increases in death rates as crowding increases. Similar correlations are found between crowding and increased blood pressure levels.

The report, presented to only a handful of listeners last week in Washington at the meeting of the Psychonomic Society, matches death rates with the populations of a state prison system (in an unidentified "northern state") between 1969 and 1976, and with that of a maximum security psychiatric hospital in the same state, biannually between 1953 and 1969. In addition, comparison blood pressures were taken among maximum security prison inmates who were housed in crowded six- and three-man cells, or in less crowded two-man cells.

The results, dealing primarily with inmates 45 years of age and older, show more than a doubling of the death rate in high crowding years as compared with low crowding years, as well as a significant jump in blood pressure among men in cramped, crowded cells.

"This is the first time we've run across anything like this in the human literature," says Garvin McCain, who conducted the research along with Paul B. Paulus and Verne C. Cox. Animal and human studies have suggested links between crowding and numerous social problems and crime (SN: 11/2/74, p. 282), but this may be the first solid link between crowding and human death rates, McCain told SCIENCE NEWS.

Most studies with humans have lacked the precision of animal research, McCain says, simply because researchers cannot control most of the variables of human existence. "Consequently, there is little data available regarding human reactions to long-term, intense and inescapable crowding," he says. But the rigid, structured prison and institutional system provides the closest thing to laboratory control, he suggests. "In a prison, everyone gets the same health care and diet, and you know how much time a person spends in his cell, or interacting with others," McCain says. And with a study population of 20,000 to 30,000 inmates in both surveys, other variables such as prior physical condition and various psychological factors tend to "cancel each other out," he says.

In the survey of the psychiatric unit, McCain and his colleagues found that the range of population from a low of 369 to a high of 630 correlated almost perfectly with a low mortality rate of 0.27 per 100 to a high of 2.8 per 100. (That survey was terminated in 1969 because of a change in admission policy.)

Similarly, the rise and fall of inmate populations among eight state prisons was closely matched by a death rate that ranged from 1.2 to 5.3 per 100. "And we don't have data on people who died outside of prison," McCain says. "Some may have been released and died two weeks later." Still, although the figures suggest death rates increased by as much as four to ten fold, the researchers place their official estimate of the high/low crowding mortality ratio at "about 2 to 1 . . . we just wanted to be conservative," admits McCain.

Nevertheless, he says, "significantly higher death rates for inmates over 45 . . . were highly correlated with the overall institutional population." McCain is reluctant to speculate about the overall implications of the findings, but he suggested in an interview that it is "quite possible" that the results could apply to other institutional settings such as schools and places of employment, and even to the overall crowding of neighborhoods or entire cities.

"In retrospect, we should not have been so surprised to find the relationship between crowding and death rates since there is a precedent for this in the animal literature," McCain notes. "The relationship of death rates to crowding might be anticipated since crowding has [previously] been shown to increase illness complaints and elevate blood pressures. And psychological stress can impair immunological mechanisms."

In the University of Texas blood pressure study, men in the crowded cells had just 19 square feet of space per person, compared with 29 square feet per inmate in the less crowded, two-man cells. "Sometimes the temperature in the top tier of the [crowded] cell goes to 110 degrees," McCain says. "And a lot of these people stay in there 24 hours a day, except when they eat or shower." The Texas team is working to further interpret the results, McCain told other experimenters at the meeting. For now, he says, the findings parallel "the kinds of things we found in animals." □

Did asteroid impacts help shape earth?

Mountain building on earth has been episodic: There are discrete periods of increased volcanic activity, folding, faulting and other such mountain-raising activity. There have also been, say two New York scientists, discrete periods, covering several million years, of marked increases in the numbers of large meteorites that have struck the earth. And yes, say geologists Carl K. Seyfert and John G. Murtaugh of Buffalo State University College, these two kinds of periods seem to coincide. They think there is a cause-and-effect connection.

The researchers propose nothing less than an extraterrestrial hypothesis for initiation of major events that have shaped the earth. Seyfert and Murtaugh suggest that the impact of very large meteorites (those creating craters at least 1 kilometer across) cause production of hotspots and mantle plumes, and that these in turn may cause continental breakups or changes in the directions and rates of sea-floor spreading.

Such sweeping explanations are often suspect, but Seyfert has compiled a considerable amount of at least circumstantial evidence to support his case. Impact events, like those that created the 65-kilometer-across Manicouagan impact structure in Canada, are centered at 2, 15, 35, 42, 70, 100, 130, 205, 350 and 450 million years ago, and also at 1.84 and 2.65 billion years ago. Seyfert calls these time intervals impact epochs. Most of these epochs do coincide with times of known orogenic (mountain-building) activity. For instance, around 15 million years ago—the second impact epoch—spreading initiated on the Chile Ridge, and the Mid-Atlantic Ridge and the Galapagos Rise shifted. Charting the impact epochs and the times of increased orogenic activity, Seyfert finds only one impact from a list of about 40 that does not correspond to a time of increased mountain building. And of the 18 periods of orogenic activity, 12 correspond to impact epochs.

"We suggest," Seyfert and Murtaugh told the annual meeting of the Geological Society of America in Seattle last week, "that the impact of large cosmic bodies (asteroids or comets) triggers the initiation of mantle plumes by the rapid removal of great thicknesses of crustal, and in some cases mantle, material by cratering." This thinning effect plus other side effects, such as isostatic uplift, may allow hot mantle material to well up and form a mantle plume. Such plumes become linked by impact-generated fractures, and soon you have a mid-ocean ridge or possibly even a continent breaking apart. Most traces of such impact catastrophes themselves would have been obliterated by the sea-floor spreading and by volcanism.

Needless to say, the Seyfert proposal has a long way to go before it gains acceptance. But there is a vacuum in understanding what starts particular episodes of plate motions, and Seyfert's impact hypothesis could help fill that gap. "On the one hand, it's a preposterous idea," Seyfert admits. "But on the other hand, people have been receptive." Columbia University geologist Rhodes Fairbridge agrees that the Seyfert suggestion sounds a bit far-fetched. But he cautions against too readily discounting it. The idea could turn out to be the right explanation. And no matter what, says Fairbridge, "It should stimulate some thinking on the subject." □