is the "significant amount of mortality" in two to six year olds. The mean mortality in that group was 14.5 percent, ranging from 8.9 to 23.3 percent.

Clarke concurs with others that the previously recognized phenomenon of high mortality in the 20 to 30 range may be largely due to the trauma of childbirth. He notes that a larger proportion of females than males died during that interval. Warfare and/or hunting are hypothesized as contributors to the male death rate.

The anthropologist postulates that the high mortality percentage among youngsters is "the result of post-weaning nutritional stress. . . . The years immediately following weaning are years during which individuals are extremely susceptible to stress and thus an increased rate of mortality." Various types of cranial lesions—spongy, pitted or perforated skulls—were found among many of the skeletons, particularly younger ones, Clarke notes. He suggests this may be due to iron deficiency anemia, malnutrition, parasites or other nutritional, post-weaning disorders.

Clarke's work ties together the various findings of George Armelagos, Ken Bennett, Alan Swedlund and John Lallo, who performed the studies that Clarke surveyed. "More important about these prehistoric populations than their proximity in time to each other is their common [agricultural] way of life," Clarke says. The combined evidence demonstrates "the general etiology of nutritional disorder and parasitic susceptibility to all of the populations under consideration," he adds.

Clarke says that similarities in the "cultural-ecological" patterns of such early agrarian societies may have contributed to their susceptibility to certain diseases, and he suggests further studies in that direction. □

Ho hum–cholinergic nerves are the culprit

Urbá-Holmgren et al./Nature

Physostigmine-induced yawning in a rat.

Yawning, a universal human and mammalian function, consists of an involuntary opening of the mouth, usually accompanied by breathing. It may be a sign of drowsiness or depression and is often sparked by the power of suggestion. Frequent yawning has also been mentioned as a symptom of certain central-nervous-system diseases, notably tumors of the frontal area of the brain and encephalitis. Beyond these insights, however, little has been known about the behavioral and physiological functions of yawning.

Now some new information about yawning is reported in the May 19 NATURE by Ruth Urbá-Holmgren, Rosa Maria Gonzalez and Bjorn Holmgren of the National Center of Scientific Investigations in La Habana, Cuba. They have found that yawning involves certain nerve fibers; that the yawning mechanism matures at an early age; that it seems to be more common among males than females, and that the involved nerves are probably in the central nervous system.

During the course of research into the effects of certain drugs on infant rats' behavior, the investigators noticed that the drugs seemed to induce yawns. These were drugs that alter cholinergic nerve fibers—nerve fibers that use acetylcholine as their nerve transmitter. So they decided to further study the yawn phenomenon.

They injected one drug that affects cholinergic nerves—physostigmine salicylate—into 62 rats 1 to 90 days old. They found that the drug triggered yawns in all the animals and that yawning was dose related. This result strongly suggests that yawning involves cholinergic nerve fibers. What's more, there was a difference in the frequency of yawning among the rats depending on how old they were, with the youngest rats actually yawning more than the older rats. Whereas rats aged 14 to 90 days produced two or three yawns within a 15-minute time span after drug injection, rats under 14 days of age produced 10 or 12 yawns. So the researchers conclude that yawning must be age-related and that the yawning mechanism matures at a very early age.

Even more intriguing, they found that yawns were far more frequent among male rats than among female rats regardless of age. Males yawned an average of 3.1 yawns during the 15-minute period after drug injection, whereas females performed only 0.5 yawns in the same time span. This difference is highly significant statistically. Although it is not known whether men yawn more than women do, the investigators do point out that male monkeys have been found to yawn far more frequently at their mirror images than female monkeys have.

Finally, evidence that the cholinergic nerve fibers involved in yawning are probably in the central nervous system rather than in the peripheral nervous system came when the scientists injected another drug that alters cholinergic nerve fibers—bilocarpine hydrocholoride—into infant rats. This drug, which induced as many yawns as physostigmine, is known to pass readily into the brain. In contrast, when they injected, into infant rats, still another cholinergic nerve-altering drug that has trouble getting into the brain, it produced only one-sixth as many yawns as physostigmine had. Thus it appears that yawning involves cholinergic fibers in the central nervous system.

All of these findings should put investigators in a better position to learn still more about the role of yawns in health and disease. □

Third Intelsat IV-A satellite launched

The third in the Intelsat IV-A series of multinational communications satellites was successfully launched on May 26, destined to be positioned over the Atlantic off the west coast of Africa. Like its two predecessors, it uses a cross-polarized antenna design which gives it about two-thirds more communications capacity than the satellites in the earlier Intelsat IV series.

The day after the launching, the satellite's built-in rocket motor was fired to change its orbit from a long ellipse to a circle nearly 36,000 kilometers above the earth. At that altitude, because the speed of the spacecraft nearly matches that of the earth below, the satellite is drifting very slowly—about 11.5° per day—relative to the surface of the planet. It will continue to drift until it reaches a longitude of 19.5°W, where it will go into operation in August, serving the 95 nations in the Intelsat consortium.

The cross-polarization technique enables the satellite to make the most of its power by focusing on the continents instead of spreading its efforts all over the ocean. From its lofty altitude, the latest probe will be able to "see" as far west as Mexico and as far east as Iran, serving countries in Africa, the Middle East, Europe, and North and South America. It has the capacity for about 6,250 two-way voice circuits as well as two television channels.

The last of the less-efficient Intelsat IV's was launched on May 22, 1975, and stationed over the Indian Ocean. The IV-A's were launched on Sept. 25, 1975, and Jan. 29, 1976, and positioned over the Atlantic at 24.5°W and 29.5°W respectively. Each of the big IV-A's is nearly seven meters high and weighs about 825 kilograms in geosynchronous orbit. The Intelsat member nations have invested about $295 million in the IV-A program, 30 percent of which comes from the United States through its investment in its own Comsat consortium. The next largest contributor is the United Kingdom, with 10.6 percent. □