Diet and longevity: The link confirmed

There is ample evidence that overeating early in life leads to irreversible obesity (SN: 6/10/72, p. 379; 9/20/75, p. 185). There is also evidence, from M.H. Ross of the Fox Chase Cancer in Philadelphia and from G. Bras of the Rijks University in Utrecht, Netherlands, that overeating early in life predisposes one to cancer.

Now Ross and Bras report in the Oct. 10 SCIENCE that overeating also shortens life-span.

Such a finding is hardly surprising, but scientific confirmation is valuable. As Ross explains it: "Obviously there are all sorts of ways to shorten life-span. But diet is apparently the only way we know of to date that will increase the length of life of a warm-blooded animal. I think that what we have done here is confirm the fact that under natural conditions there is a relationship between dietary habits and life-span, whereas in previous work the study was always on animals under some kind of stress."

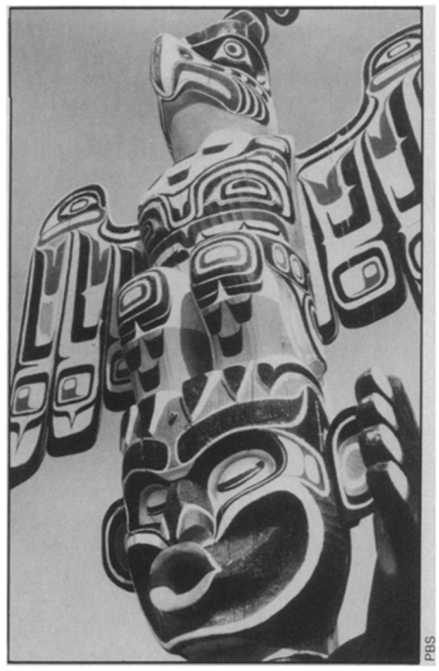
What Ross and Bras did, essentially, was allow 121 rats to select their own diets after the first 21 days of life and to follow these diets until they died. The rats, like people, selected widely varying amounts and choices of foods. There was a dramatic correlation between how much the rats ate and how long they lived. The average life of a rat is 630 days. The rats in the study lived anywhere from 317 days to 1,026 days.

Length of life was inversely related to the amount of food consumed. However the magnitude of the food intake effect changed with age. It was maximum during age period 100 to 199 days and by midlife it was negligible. If the amount of food was not considered, a low-protein diet early in life was more likely to be associated with a short life-span than a high-protein diet was. The importance of sufficient protein early in life for longevity was underscored by the fact that many of the short-lived rats who ate little protein early in life often ended up eating more protein later in life than did the long-lived rats. What seems to be an attempt to make up for early protein deprivation is, however, apparently unsuccessful.

Ross believes the study has implications for human diet and life-span. "It's what you eat during the early phase of life that counts," he says. "An ample diet and a nonexcessive rate of increased body weight is apparently conducive to a long life." He is reluctant to extrapolate further because of the complexities of mammalian nutrition. For example, the rats in his and Bras's study were from different genetic backgrounds and obviously had different caloric needs as well as different food preferences. So saying that so much protein early in life would be good for all rats (or people) would be risky, to say the least.

Nonetheless Ross and Bras will probably continue to shed light on the influence of diet on life-span. Since they submitted the SCIENCE paper for publication, they have found that they can predict, on the basis of what rats eat and how fast they grow, how long they will live. "We are now trying to see whether imposing a change on such animals truly increases their life-span," Ross says. □

The Tribal Eye: Ways to be human



Northwest Coast Indian totem pole: The why and how of tribal art.

A tribal mask, beautifully mounted and tastefully lit in one of our museums, may have been designed to be seen on a dancer's head, in movement, lit only by the flickering flames of a fire and accompanied by the hypnotic throb of drums. When seen as they were meant to be seen, such artifacts become more than cultural curiosities. They become meaningful and integral parts of living societies. That's what David Attenborough has attempted to do in his documentary examination of a number of tribal societies. The result is a seven-part anthropological film series, *The Tribal Eye*, to be seen on most PBS stations this autumn.

Attenborough and his film crew visited 16 countries from the Arctic to the South Seas and examined the beliefs and behaviors of various tribal societies. The series, made possible through a grant from the IBM Corporation, will be telecast weekly beginning Wed. Oct. 15, from 8 to 9 p.m. ET. Many stations will rebroadcast each program on Sundays at 6 p.m. ET. □

Does the sun have invisible companions?

Jupiter, the sun's largest planet, has characteristics that make it look like a dead star or a star that never got quite enough together to initiate nuclear burning in a big way. If there is one such starry sort of object orbiting the sun, why not more? Since we do not obviously see them, they would have to be very far away and quite dark.

Neither of these criteria rules them out, according to Kris Davidson of the University of Minnesota, who suggests that such things might be looked for (ICARUS 26:99). Years ago Peter van de Kamp of Swarthmore College noted that some suspected binary star systems have separations up to thousands of astronomical units (one AU is the radius of the earth's orbit) and suggested the sun might have a faint distant companion. Davidson points out that the protostellar gas and dust cloud out of which the solar system condensed should have had a radius of 10,000 AU because of the amount of mass in it. It appears in fact that some long-period comets have orbits that go that far out.

Suppose there were starlike bodies out there. They would have to be small infrared dwarfs, or they would have swept up the long-period comets. The upper limit on their mass would be about a hundredth of the sun's, but Davidson says that is uncertain because precision would depend on a knowledge of the orbits of the distant comets, which is lacking. Yet there are "surprisingly few" comets with aphelion distances between 1,000 and 5,000 AU so it may be that infrared dwarfs in that region swept them away.

If there were an infrared dwarf belonging to the solar system at 3,000 AU from the sun (280 billion miles) could it be detected? If reflected sunlight is the chosen means, it seems unlikely. The apparent brightness would be inversely proportional to the fourth power of the distance. Jupiter at that distance would have an apparent visual magnitude of 25. Therefore infrared seems to be the way. A body somewhat more massive than Jupiter and a bit hotter with a radius of 100,000 kilometers could be detected by present techniques. At a wavelength of 10 microns its flux would yield an apparent infrared magnitude of minus 0.2.

There is no way to know in what direction to look. Such an object need not even lie in the plane of the ecliptic. It would be recognizable, however, by its parallax. Its apparent position would vary by two minutes of arc a year. Davidson suggests naming one such discovery Lucifer, "which would depart appropriately from the traditions of naming more conventional planets; the selection of other appropriate names is left as an exercise for the reader." □