cited an Office of Technology Assessment estimate that biotechnology will be a $100 billion industry by the end of the century, and said that "It would be self-destructive to America's leadership position in biotechnology to allow the objections of a few opponents to lead to ill-advised restraints on the patenting of animals."

Moreover, he said, the marketing and use of genetically engineered organisms is already regulated by such federal agencies as the Food and Drug Administration and the Department of Agriculture. The simple act of issuing patents is "morally neutral," he said, adding that "the patent system is certainly the wrong place to regulate matters of ethical, social or moral concern."

A number of environmental, animal welfare and religious groups disagree, however, and have organized a coalition in support of the patent moratorium. "The recent federal government ruling that genetically engineered animals can be patented, just as automobiles and toasters [are], encourages the exceedingly dangerous notion that living beings are nothing more than commodities," the coalition said in a statement issued at the meeting. "Such genetic tinkering is sure to result in enormous suffering to animals and their offspring for generations to come."

In particular, said Arie R. Brouwer, a coalition member and general secretary of the National Council of Churches, "The combining of human genetic traits with animals . . . raises unique moral, ethical and theological questions."

Indeed, in light of the already successful injection of human genes into animals (SN: 6/29/85, p.405), and the ruling that humans may not be patented, an interesting question remains to be answered: How much human genome does it take to be human? — *R.Weiss*

Price tag for Price-Anderson Act

Congressional committees scrambled this week to try and beat the clock on renewal of an act that provides coverage to the public in case of a nuclear accident. The apparent failure to renew the act by its Aug. 1 expiration date won't affect commercial plants. But if a renewal is not passed by the end of September, it could leave several Department of Energy (DOE) contractors without coverage.

Called the Price-Anderson Act, the law currently requires each of the nation's 109 reactor licensees to subscribe to the full amount of private insurance available ($160 million) and be responsible for a retrospective $5 million regardless of who has the accident, bringing the total to $705 million available for compensation. The liability for nuclear contractors hired by the DOE is $500 million, all of which would be paid by the government.

If the act is not renewed, it means that the Nuclear Regulatory Commission and the DOE will not be able to enter into any new indemnity contracts. Existing commercial plants are indemnified for life and therefore wouldn't be affected, but the DOE usually contracts out for about five years, and has contracts expiring Sept. 30 with the Los Alamos National Laboratory, Lawrence Livermore National Laboratory and Lawrence Berkeley National Laboratory, all contracted through the University of California. Without renewal, those operations are no longer covered in case of an accident.

But DOE is looking into several options that would provide coverage to its California contracts, says press officer Jack Vandenberg. One proposal is to use the War Powers Act to indemnify defense-related contractors. This would provide coverage in case of an accident, but requires lengthy contract arrangements with all contractors and subcontractors involved. And if a company that was not separately contracted by DOE were to cause an accident, it would have to provide its own coverage for the damages, according to a DOE lawyer. Under Price-Anderson, payment is made regardless of who is liable.

In an effort to circumvent such a situation, three House committees responsible for nuclear power issues last week compromised on separate bills and introduced a consensus bill into the House. That bill recommends that the liability limit be set at about $7 billion, including a retrospective assessment of $63 million per plant. The measure was expected to reach the House floor for debate late this week, says Kevin Billings, legislative director of the American Nuclear Energy Council.

In the Senate, however, no such consensus was reached, leading two committees to separately introduce their own versions of the bill for consideration. The bills, which set liability limits at $6.7 and $7 billion, were not expected to reach the floor for a vote by the Aug. 1 deadline. Although the bills do differ somewhat, most address measures that:

- allow for periodic updating of the liability limit into current U.S. dollars
- strengthen the third tier of coverage of the act, which now says only that if an accident exceeds liability limits, Congress will take "whatever additional action is necessary"
- extend the act from 10 to 30 years
- raise the DOE's liability limit to the same level as that of commercial licensees. — *K. Hartley*

A chemical thermostat for fat?

Enticed by theories that there are chemicals in the body that work as a thermostat and signal a satisfied appetite, scientists have been searching for these "adipostats," hoping to better understand and treat the different types of obesity. After finding abnormal levels of a substance called adipsin in overweight rodents, researchers in Boston said last week that adipsin may be a contender for the adipostat title, as well as a marker to differentiate among obesities due to defects in genes, metabolism or just plain will power.

Reported in the July 24 SCIENCE, experiments by scientists at Beth Israel Hospital and Harvard Medical School showed that adipsin is primarily found in adipose tissue (fat), is carried in the bloodstream and is produced in abnormal levels in certain types of obesity. In earlier reports, the Boston group had described adipsin as a substance — probably an enzyme — secreted by fat cells.

To determine adipsin levels in different tissues, the scientists measured the messenger RNA (mRNA) responsible for adipsin production, finding that some obesity syndromes "are associated with profoundly reduced expression of adipsin mRNA and circulating adipsin protein." For example, adipsin mRNA levels in two different mouse models were at least 100-fold lower than those in normal controls. Victims of defective genes, both groups of mice become grossly overweight soon after birth, and have blood sugar and insulin imbalances. Adipsin itself is "radically reduced" in their serum and "virtually undetectable" in their fat tissue, say the scientists.

Suppressed mRNA levels also occurred in animals with chemically induced obesity. Those experiments used mice injected with large amounts of monosodium glutamate (MSG), causing impaired energy utilization and obesity despite a normal appetite. The scientists say these data represent one of the first examples of obesity related to abnormal gene expression. They also suggest that some aspects of obesity may be caused by adipsin deficiency, not by overeating.

But there apparently is no adipsin-based excuse for the can't-say-no crowd. Similar decreases in adipsin were not seen in the "cafeteria-fed" rat model, which the authors say is "more representative of simple gluttony." They add that other experiments indicate there is no problem using the two different species (rat and mouse) in drawing overall conclusions about adipsin.

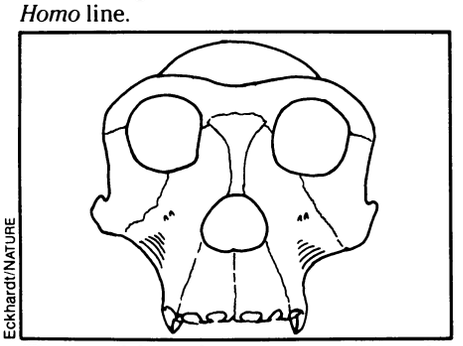
Based on the recent findings, the authors suggest that "adipsin meets the initial criteria required of the [adipostat] involved in lipid metabolism or energy

balance." They say the fact that similar enzymes help control blood pressure adds "further credence" to their proposed regulatory role for adipsin. It also may solve the difficult task of determining whether obesity is caused by a metabolic or genetic problem, or by gluttony. If what occurs in rodents holds true in humans, "circulating adipsin levels could serve as a highly useful marker for characterizing obese patients," conclude the authors. — *D.D. Edwards*

Hominoid lineages and keystone clues

When attempting to distinguish between early members of the human line and their now-extinct relatives known as the robust australopithecines, does the nose know?

In 1985, Todd R. Olson of the City University of New York Medical School answered in the affirmative. Connecting the nasal bones, he reported, was a keystone-shaped pattern of sutures that characterizes only robust australopithecines, also known as *Paranthropus*, as well two other distinct suture patterns marking modern apes and humans. He used these patterns to label the more than 3-million-year-old skull of a child found at Hadar, Ethiopia, as a member of the *Paranthropus* line, and another infant skull from about 2 million years ago — the Taung child — as a member of the *Homo* line.



Eckhardt/NATURE

The nasal bone keystone pattern on the skull of a modern chimp.

But Olson's analysis is now being challenged. According to Robert B. Eckhardt of Pennsylvania State University in University Park, the paranthropine keystone pattern occurs on about 8 percent of modern ape skulls. This configuration of sutures appears to be a normal variation in facial structure and part of the common heritage of hominoids, or apes and humans, and is not confined to robust australopithecines, concludes Eckhardt in the July 23 NATURE.

He examined the crania of 66 chimpanzees, 99 gorillas and 108 orangutans obtained from the U.S. National Museum of Natural History in Washington, D.C., and the Field Museum of Natural History in Chicago. The three groups contained both sexes and ranged in age from infancy to adulthood. Most of the crania had been collected in the wild.

Nasal bone outlines sometimes display confusing similarities across different hominoid groups, adds Eckhardt. For example, one chimp had nasal bones resembling those of a recently discovered robust australopithecine even though the two specimens share no other cranial features. The lesson of the survey, he says, is that "the anatomical region including the nasal bones is so highly variable that to abstract a few patterns is seriously to misrepresent reality."

Olson, however, says his 1985 analysis has not been disproved. "There is certainly variation in hominoid nasal bone anatomy," responds Olson, "but there is a consistent pattern. More than 90 percent of Eckhardt's specimens fit my previous description [of nasal bone outlines] in hominoid groups."

On the basis of Eckhardt's finding, says Olson, the probability is that in 9 out of 10 cases a fossil skull with the keystone pattern will be of the paranthropine lineage.

Olson also holds that Eckhardt misinterpreted nasal bone anatomy by concentrating on the skull surface and not the pattern of sutures on the inside of the skull. Olson estimates that only one specimen in the three groups of apes actually displayed a paranthropine pattern.

— *B. Bower*

Dropping smoothly to a fiery end

How do you make a falling droplet stand still? With considerable difficulty, it turns out. Mechanical engineer Thomas Avedisian and graduate student Jiann Yang of Cornell University in Ithaca, N.Y., spent three years perfecting an apparatus to enable them to study how a droplet of fuel burns under near-weightless or "microgravity" conditions. Now they can track, on film, a burning droplet's complete life history — from ignition to extinction.

Their results, says Avedisian, will help test fundamental theories about how fuels burn and validate computer models of combustion. The information may also lead to a better understanding of how liquid fuels behave in spacecraft propulsion systems.

The basic idea sounds simple. It's a matter of releasing at the same time a fuel droplet and a camera focused on the droplet, allowing them to plummet 25 feet into a cushion of foam rubber chunks. Such drop-tower experiments have been done in the past, but researchers usually managed to observe less than half of a droplet's burning history. Furthermore, the sudden tug needed to release a droplet hanging from a fiber tended to give it an unpredictable initial velocity.

Avedisian and Yang overcame these problems by designing a special droplet generator and a precise timing circuit to control the whole experiment. Sitting in a clear plastic chamber, a tiny nozzle squirts a stream of droplets, each less than 0.5 millimeter in diameter, in a nearly vertical trajectory. The timing circuit shuts off the stream, and when the final droplet reaches the peak of its trajectory, the droplet is ignited and the whole platform on which the apparatus sits is released. At that instant, the droplet is stationary. "If the timing is correct," says Avedisian, "the droplet looks motionless with respect to the camera." The plunge takes about 1.2 seconds.

Claude Level/Cornell

Yang (left) and Avedisian prepare to drop their 350-pound instrument package.

To make the experiment work, the researchers had to ensure that the droplet generator yielded repeatable trajectories, even after numerous falls. In addition, they had to account for the slight delay between the time when the electromagnet holding the platform is shut off and when the platform is actually released.

These drop-tower experiments allow Avedisian and Yang to study combustion without the complicating effects of flows within droplets due to buoyancy. So far, they have done about half a dozen experiments on droplets of fuels such as heptane and hexadecane and various mixtures of the two components. Eventually, they hope to look at the effects of additives and changes in pressure.

— *I. Peterson*