

gether are inconsistent with results of observations of distant galaxies. These examined the redshifts of the galaxies to determine trends that could be interpreted as a velocity of our galaxy toward some preferred direction or other. For the velocity of the local group of galaxies, the observations of distant galaxies give either 450 kilometers per second toward galactic longitude 160° and latitude -10° or 310 kilometers per second toward longitude 180° and latitude +50°, depending on the sample of galaxies used. The present microwave background work gives 540 kilometers per second toward longitude 280° and latitude +30°.

In a well-behaved universe, as cosmologists have conceived it, our local group's velocity with respect to these two frames of reference should be the same. Scientists are striving to reconcile the discrepancies, but Wilkinson and collaborators suggest

that other alternatives be considered. One of them is that the cosmic blackbody has an intrinsic "dipole moment". "Suppose part of what we're seeing is due to a built-in primordial dipole moment, and not motion," Wilkinson says. He has no physical picture of what process in the early universe might have made the blackbody thus anisotropic, but physicists should keep it in mind as a possible explanation of the "sharp disagreement" between the two kinds of velocity measurement. Another possible explanation is that there are random motions at velocities around 500 kilometers per second by large-scale gangs of galaxies (gangs around 100 megaparsecs across). In that view the galaxies used by the galaxy measurers (principally Vera Rubin and Kent Ford) are going somewhere, we're going somewhere, and what is being measured is the sum or difference velocity. □

workmen's compensation — and attached it as a rider to the public-works bill.

President Carter said he signed the bill "with regret" to avoid a "divisive veto battle" that might divert congressional attention — and undoubtedly support — from more pressing issues.

And what about the fish? Some 2,000 transplanted snail darters appear to be thriving in another Tennessee river. □

Heart death decline examined

During the past few years, deaths from heart disease have fallen off dramatically in the United States, regardless of age, sex or race (SN: 11/11/78, p. 328). Between 1968 and 1976, for instance, the decline was 20.7 percent. Michael P. Stern, a physician with the University of Texas Health Science Center in San Antonio, has examined all the scientific studies published on heart disease that might illuminate which factors contributed to the decline in heart disease deaths between 1968 and 1976.

As he reports in the November *ANNALS OF INTERNAL MEDICINE*, the fall could be largely attributed to changes in lifestyles — eating less cholesterol and animal fats and smoking fewer cigarettes — and also to improved medical care for heart attack victims, especially in the form of coronary care units.

A number of studies, Stern explains, convinced him that a decrease in a high cholesterol-high animal fat diet (implied in the past as a coronary artery disease risk factor) has been a major contributor to the decline in heart attack deaths between 1968 and 1976. Estimates prepared annually by the U.S. Department of Agriculture show that the consumption of animal fats, which contain cholesterol and are largely saturated, has declined between 1909 and 1973. Concomitantly, consumption of polyunsaturated, cholesterol-free vegetable fat has tripled. Thus, these dietary changes may have led to a gradual decline in the average blood cholesterol concentration in the United States, particularly since the early 1960s (SN: 7/23/77, p. 58). And two Scandinavian studies demonstrated that the protective effects of the lower cholesterol levels occur quickly.

Another significant contributor to the lowered heart disease mortality between 1968 and 1976, Stern continues, is a decline in cigarette smoking—a well-documented heart disease risk factor. The Framingham Study showed that between 1950 and 1968 cigarette smokers declined from 61 percent to 37 percent among men and from 40 percent to 31 percent among women. The National Clearinghouse for Smoking and Health found that the percentage of male cigarette smokers declined from 53 to 37 percent between 1964 and 1975, and that a modest decline in the percentage of

Snail darter vs. dam: 'Pork barrelers' win

Admitting that he was bowing to political pressures — which he presumably felt could weaken his bid for reelection — President Jimmy Carter signed into law a \$10.8 billion public-works appropriation bill last week. In so doing, he removed the last obstacle standing in the way of completing the \$145 million Tellico Dam project in Tennessee, famed for its role in the threatened extinction of the snail darter.

The continuing saga of the fish versus the dam has played before audiences large and small, from the Supreme Court (SN: 6/24/78, p. 403) and the Cabinet-level Endangered Species Committee (SN: 1/27/79, p. 55) to local affected homeowners. It has also figured prominently in both the threatened demise (SN: 10/7/78, p. 247) and later revision of endangered-species law. But this newest chapter introduces a specter that environmental lobbyists had hoped to elude — a complete and uncompromising exemption from all federal laws so that a "pork barrel" project might survive unabated.

The Tellico Dam has been the subject of intense and heated controversy since its inception around 1963. Supporters of the project have claimed that the recreational value of the dam reservoir, new construction jobs and the economic growth that would follow development of its reservoir's scenic shoreline would aid economically depressed East Tennessee. And TVA, for whom the dam is being built, expects to save \$2.7 million annually in electrical generating costs by diverting base-load capacity from coal and nuclear power plants to Tellico's somewhat less costly hydropower.

Opponents have countered, focusing on the natural, historical and cultural value of the river and its valley. For example, the dam reservoir will inundate some 5,600 acres of agricultural land and most of 280 archaeological sites — chronicling a his-

tory of human habitation dating back 10,000 years — that had been nominated to the national Register of Historic Places, in addition to seven sites already in the register. It will also partially flood a national landmark.

What's more, certain fish- and wildlife-habitat losses which will occur with the dam-reservoir development "are not fully accounted for in the TVA's comparisons of measured recreational benefits," according to a January 1979 cost-benefit analysis of the dam project by the staff of the new Endangered Species Committee.

In fact, when the Cabinet-level Endangered Species Committee held its first meeting, last January, its seven members voted unanimously against the dam on the grounds that finishing the already 90-percent-completed project was economically unjustifiable, irrespective of the snail-darter issue. At best there was a \$4 million annual net benefit for the dam over the originally free-flowing river, the new Endangered Species Committee's staff found. And Cecil Andrus, who chaired the committee, said his calculations showed a possible \$6 million annual net benefit for the river over the dam. Both calculations were arrived at before consideration of the acknowledged but largely unmeasurable value (in dollars) of the archaeological sites and wildlife regions that would be lost due to the project.

But no sooner had the committee decision been tendered than Tennessee Senator Howard Baker vowed he would abolish the panel. Ironically, it was his bill that only months earlier had established this panel and empowered it to waive endangered-species law. In the end, Baker and other disgruntled members of Congress just wrote a blanket exemption for the Tellico Dam from all federal regulations — including Occupational Safety and Health Administration laws and

female cigarette smokers also occurred during that period. Evidence also indicates that resistance to heart disease deaths occurs 5 to 10 years after a person has stopped smoking. Thus, smoking fewer cigarettes during the 1950s, 1960s and early 1970s might have provided protection against heart disease deaths in the late 1960s and early 1970s.

Stern also contends that a decrease in high blood pressure — another heart disease risk factor — might have contributed to lowered heart disease deaths between 1968 and 1976; there has been a steady improvement during the 1960s and 1970s in high blood pressure control in the United States (SN: 12/11/76, p. 377). However, two surveys indicated that the vast majority of hypertensive persons (84 percent) still did not have their high blood pressure controlled in the early 1970s. So precisely how much high blood pressure control contributed to reduced heart disease deaths between 1968 and 1976 remains to be seen. Stern likewise contends that physical fitness might have contributed to lowered heart disease deaths between 1968 and 1976. Various studies have suggested that physical fitness can prevent heart disease deaths (SN: 9/29/79, p.

214), and anecdotal evidence suggests that an explosive growth in leisure-time physical activity has occurred in recent years.

As for treatment contributions to the lower heart disease deaths between 1968 and 1976, Stern gives some of the credit to coronary care units. Three studies showed that hospital heart attack fatalities in the precoronary care unit era were 30 to 40 percent, and that such rates are only 15 to 20 percent in coronary care units. However, Stern believes that neither emergency medical services nor coronary-artery bypass surgery contributed to the downward trend in heart disease deaths since few persons had access to such treatments during those years. He concedes, however, that such treatments may eventually reduce heart disease deaths (SN: 5/13/78, p. 314).

On the basis of his analyses of existing scientific data, Stern concludes: "It is not possible at present to quantify definitively the relative extent to which the decline in ... heart disease mortality has been due to life-style changes with resulting improvements in cardiovascular risk factors, and the extent to which it has been due to improvements in medical care. It is likely, however, that both have played a role." □

least a minimal mission-control team at JPL (the team is now down to about an eighth of its original 800-person size, and part of the study is to see how much further it could be reduced if necessary), as well as to reduce the new data from its digital form.

The project's scientists have a number of reasons besides the continued high-resolution mapping for extending the observation period, says Nancy Evans of JPL. In January and February, for example, the cloudy haze of carbon dioxide and water covering the north polar cap will dissipate, letting in the sun's warmth and causing the rapid shrinkage of the cap itself — a process that the scientists would like very much to record in detail. In as little as 45 days, Evans says, the edge of the cap will retreat from its maximum extent — uncertain due to the overlying clouds but possibly as far south as lander 2, whose cameras have revealed widespread frost on the surface — to its residual minimum at about 80°N.

Another goal is to seek signs of a similar cloud cover forming over the south pole, difficult to identify in past photography (some scientists argue that it doesn't happen at all in the south) because of seasonal dust storms that interfere with the visibility. This year, however, there have been signs that the dust was less intense — which raises yet another scientific question: Recent photos of the south-polar region show the size and position of the southern cap to be similar to what they were a Martian year ago, when the dust was presumably thicker. Yet it had been thought that it was the dust keeping out the sunlight, so that this year's cap should have been smaller. Now the researchers are puzzling over the possibility that there may in fact have been some dust this year, which simply went undetected.

Another activity for the orbiter, says Evans, could be to make sequence-photo "movies" of cloud motions, showing such details as wave patterns that have been observed in clouds as they pass over craters on their way down from the north. There could also be stereo photos of surface features from orbit, made possible by re-photographing areas already covered. The landers, too, could have an expanded role, collecting and transmitting meteorological and photographic data on atmospheric, dust and frost effects more often than they now do. □

NASA studying Viking extension

Faced with delays in proposed planetary missions such as the Galileo orbiter and probe of Jupiter and a Venus-orbiting imaging radar, the National Aeronautics and Space Administration is now studying the possibility of extending the operations of the three Viking spacecraft still working on and around Mars. The two landing craft and one orbiter have been gathering data ever since they reached the planet in the summer of 1976 (a second orbiter ran out of gas months ago), but present plans call for them to be shut down in January. The new proposal, now being evaluated by Viking project officials at Jet Propulsion Laboratory in Pasadena for presentation to NASA headquarters next month, could result in keeping the craft active late into 1980.

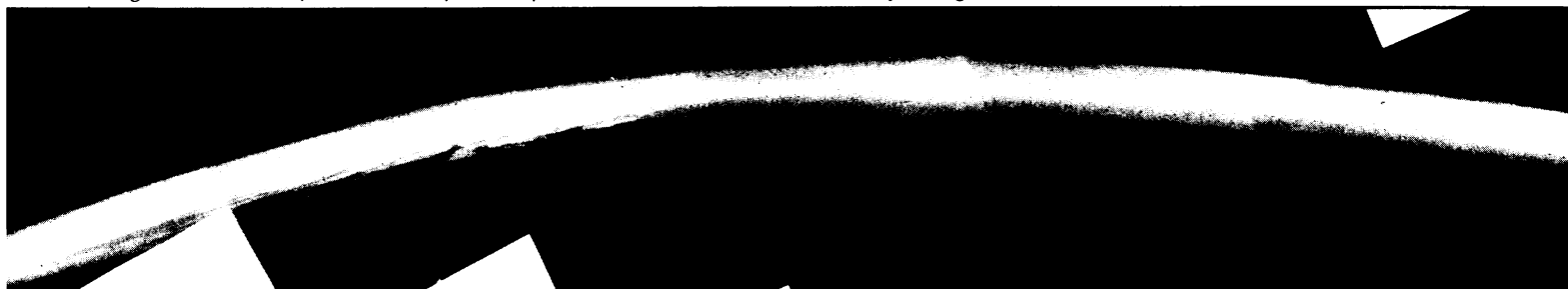
The limiting factor is the amount of attitude-control gas left in the orbiter. When it runs out, there will be no way to control the vehicle's orientation in space, keeping its antenna pointed at earth and its instruments at Mars. This will also end the

use of lander 2, located about 42° from the Martian north pole, since it long ago lost its ability to transmit directly to earth and must depend on the orbiter to relay its data. (Lander 1, closer to the equator, still has its "direct-link" capability, but it can only send 1,000 bits of data per second that way, compared to 16,000 bits when it uses the orbiter as an intermediary.)

Continuous operations could use up the orbiter's gas by January, but the supply could be husbanded by turning the craft off periodically. A key part of the mission-extension idea is that scientists could then wait for especially desirable data-gathering opportunities, such as when the satellite's orbit has shifted enough for it to pass low over portions of the planet that were missed by previous high-resolution photography. Eligible opportunities will not begin to occur until about next July, because the orbit's low points are now over Mars's night side.

The trade-off, however, is that the extension would cost money, to sustain at

Viking view of Mars's present south polar cap, similar in size to that a Martian year ago — but it was expected to be smaller.



N. Evans/JPL