

control over the actual cuts once OMB had established an amount. A rumored example of NASA's exercising of such an option was suggested to be that Jet Propulsion Laboratory (the agency's main planetary-research center, which would be radically affected by a cutoff of planetary missions) might be "given \$50 million and told to get something to Halley."

Even with such "freedom," however, the mood of this week's budget countdown did not bode for smooth sailing at NASA over the next few months. Said one concerned planetary researcher, "I think it's going to be a battle that's going to be protracted into the summer and into the fall."

● DOE President Ronald Reagan's let-the-marketplace-decide philosophy was nowhere better evident than in OMB's proposed cuts for the Department of Energy. Government support of energy-technology development should continue only through the "proof of concept" stage, OMB said, with funding for further scale-up and development to be paid by industry as the technologies prove economic.

For instance, solar research, development and demonstration cuts of 22 percent for FY 1981 and 60 percent for FY 1982 "can be justified and sustained," OMB said, "by adopting a policy that federal support should be restricted to long-term R&D with the potential for high payoff." The budget agency also advised that until the Solar Energy Research Institute's mission is better defined, and an "appropriate" size staff agreed upon, construction of a permanent facility at SERI's Golden, Colo., site should be deferred.

The federal budget agency also proposed giving the ax to:

- all fossil-fuel demonstration and development programs,
- the entire magnetohydrodynamics program,
- conservation projects "where commercial viability can be tested by the private sector alone," including energy from urban wastes, advanced automobile engines, industrial processes and electric and hybrid vehicles,
- hydropower demonstrations programs,
- most geothermal loan guarantees and hydrothermal demonstration programs,
- plans for gasoline rationing (with termination to come as quickly as possible by providing only program-closing costs),
- research on near-term technologies for storing energy and
- pilot-demonstration plants for five synthetic-fuels technologies — SRC I and II, two high-Btu gasifiers and the Memphis medium-Btu gasifier. OMB recommends that the newly formed Synthetic Fuels Corp. pick up funding for these plants.

OMB's proposals were not expected to prove a precise blueprint for the President's formal budget proposal. But they did suggest that the new administration sees plenty of fat in the nation's research budget and will be making every effort over the coming year to render it. □

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## Rubens: The artist and arthritis

*Although evidence for osteoarthritis and some other forms of arthritis is ancient, being found in the remains of dinosaurs and early humans, there has been little indication that the most excruciating form of arthritis, rheumatoid, predates the 19th century — until now. The origin of rheumatoid has been moved back at least 200 years by Belgian and U.S. investigators, and, as they report in the Feb. 6 JOURNAL OF THE AMERICAN MEDICAL ASSOCIATION, their evidence derives from the paintings of 17th century Flemish artist Peter Paul Rubens. For instance, Rubens's final self-portrait reveals a swollen wrist and some finger deformities — signs of advanced rheumatoid.*



Kunsthistorisches Museum, Vienna

## They sell no whey before it's wine

Frank V. Kosikowski and his colleagues can wine and dine on whey — the watery part of milk that separates from the curds during cheesemaking. Kosikowski, of Cornell University in Ithaca, N.Y., in collaboration with scientists in Poland, has developed a technique for producing a dry, white wine and a highly nutritious protein concentrate from whey, a cheese-factory waste.

Wine from cheese has been a research target since 1948, but technical difficulties have precluded the commercial feasibility of proposed processes. Kosikowski says his process has more potential because it involves a whey powder rich in fermentable lactose, or milk sugar. In addition, use of the easy-to-transport powder obviates the need for a wine-making facility close to a cheese factory.

The cheese industry has about nine pounds of whey on its hands for every pound of cheese produced. The 4.5 billion pounds of cheese produced annually in the United States, therefore, result in more than 40 billion pounds of whey. While whey once was dumped into streams and other waterways, environmental laws now require the whey instead to sit in holding lagoons until it loses its pollution potential.

Maintaining these whey lagoons costs the cheese industry money and energy, Kosikowski says; turning the whey into

wine, on the other hand, recycles the waste and keeps a food substance in the food chain. Moreover, a bottle of whey wine costs less than half as much to produce as does a bottle of grape wine.

Conventional wine is produced when yeast ferments the grape juice, or converts the juice sugar to alcohol. Whey wine is produced by fermenting the portion of whey rich in lactose. The process begins by adding water to whey powder, a mixture containing about 13 percent protein, 71 percent lactose and a small percentage of other components. The protein portion is removed by an ultrafiltration technique, forming the nutritious secondary food product, and the minerals are removed by a process called electrodialysis — the use of a current to remove unwanted ions from a solution. The remaining lactose-rich whey component is fermented for about a week by special lactose-fermenting yeast. The resulting wine is clarified (the suspended material, such as yeast cells, is removed) and citric acid is added to maintain acidity. After the wine is aged, the finished product — a pale-yellow, tart, dry wine with a subdued aroma and bouquet — can be baked to a sherry-like liquid or distilled and aged to a brandy.

Such products could be practical, says Kosikowski, in regions and countries where wine grapes cannot be grown economically. □

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