while significantly more males with bladder cancer are reported as having used saccharin than have controls, women with bladder cancer are reported using somewhat *less* saccharin. Thus, when results for both sexes are combined, no significant relationship can be found between saccharin use and bladder cancer, the editorial deduces.

Another criticism raised by the editorial is that no nonhormonal carcinogen in people is known to affect only one sex. So the case made by the investigators that "saccharin is the first such example is less than convincing."

Still another weakness in the study, the editorial stresses, is that it pays only superficial attention to subjects' use of cigarettes and coffee, yet there is ample evidence that cigarettes, and some evidence that coffee, can trigger bladder cancer. "Insufficient data are presented on these potentially important confounding factors to allow adequate analysis," the editorial charges. For instance, cigarette smoking was examined simply by dividing males into those with a lifetime consumption equal to or less than 10,000 packs, and those who had smoked in excess of 10,000 packs. Thus, lifelong nonsmokers, who would be of special interest in the study, were merged in the first category with smokers of, perhaps, 14 cigarettes per day for 40 years. Similarly, coffee consumption was studied only in relation to whether instant coffee was "ever consumed" or "never consumed," and other types of coffee were not considered.

Thus, "we judge that most readers will find the case against saccharin unimpressive," the editorial concludes and stresses that "there is need for further work on saccharin and bladder cancer in man." □

Soyuz 25 fails to dock with Salyut 6

Soviet cosmonauts Vladimir Kovalenok and Valery Ryumin were forced to return to earth only a day after the Oct. 9 launch of their Soyuz 25 spacecraft, when difficulties prevented their docking the capsule with the waiting Salyut 6 space station. Depending upon who is counting, this is somewhere from the third to the ninth Soviet docking failure in a string dating back to the late 1960s.

This mission, however, was to have had special significance in the Soviet Union, since the cosmonauts were expected to be aboard the Salyut at least through the Nov. 7 60th anniversary of the Bolshevik revolution, and perhaps long enough to eclipse the 84-day record set by a U.S. Skylab crew in 1974. Western observers have speculated that the failure may be due to a rocket too weak to carry a Soyuz with enough fuel for repeated docking attempts. Another launch may follow soon. □

Future fertilizer: Chemistry or biology?

On much of the world's agricultural land, availability of usable nitrogen limits crops. That is why nitrogen fertilizers, such as ammonia, have caused such a boost in productivity. Now the achievement of that high productivity may soon be limited by its cost in nonrenewable fuel.

Researchers with very different approaches are looking to plants' primary energy source, the sun, to provide them with nitrogen in a usable form. Gerhard N. Schrauzer and T. D. Guth of the University of California at San Diego announce they have produced ammonia in a prototype solar cell. The new method, described in the Oct. 3 CHEMICAL AND ENGINEERING NEWS, proceeds at low temperature and at atmospheric pressure, unlike the current process that requires conditions of 500°C and 350 atmospheres pressure. The catalyst for the new reaction is titanium dioxide doped with small amounts of powdered iron. To be commercially attractive, Schrauzer estimates that the catalyst's efficiency must be improved by a factor of 10 to 100.

Taking a more biological tack, speakers at a National Academy of Sciences public meeting last week reported some progress toward creating plants or plant partnerships that will themselves convert nitrogen from the air into a useful form. The energy for this process is stored in compounds made by the plants and, thus, initially also comes from the sun.

Legumes, such as soybeans and peanuts, when teamed with certain bacteria have no need for chemical fertilizer. In nodules on the legume roots, the bacteria continuously spew compounds containing nitrogen. Because the bacteria are particular about what plants they will inhabit, only a limited number of these natural partnerships exist. Marvin Lamborg of the Kettering Research Institute in Yellow Springs, Ohio, reported on a three-member potentially useful association. Lamborg described cavities in a photosynthetic water fern called Azolla, that contain filamentous membrane packets of blue-green algae. The algae supply nitrogen to the Azolla. In Vietnam these ferns are often grown in flooded rice paddies. Lamborg suggests that the degrading ferns fertilize the rice. Research on different varieties of Azolla should offer a means to take the best advantage of this potential alternative to manufactured fertilizer.

For several years researchers have been able to transfer genes for nitrogen fixation among different bacteria by using viruses and natural plasmids (SN: 11/15/75, p. 315). But the nitrogen-fixation process requires several steps, Raymond C. Valentine of the University of California at Davis points out. Transferring the potential for nitrogen fixation in bacteria such as *Escherichia coli* is relatively easy because that bacteria is only missing one necessary enzyme, Valentine says. In contrast, higher plants are missing two additional factors. "No plant has ever achieved nitrogen fixation in nature," Valentine says. "This may be telling us it is a difficult task."

Two new techniques promise to be useful in nitrogen-fixation research. Fusion of plant cells grown in a liquid medium in the laboratory bypasses the limitation that only closely related plants can be crossed naturally. Olaf Gamborg of the Canadian Research Council reports that cells of different species, such as barley and soybean, have been combined, but no whole plant has yet been regenerated.

The other recent technique uses recombinant DNA. This method might allow transfer of nitrogen-fixing genes into crop plants or alter the specificity of nitrogen fixing bacteria. Compared to the fierce arguments at the NAS meeting on recombinant DNA last March (SN: 3/12/77, p. 165), discussion of potential hazards at this recent meeting was calm. A statement drafted by eight scientists said the risk was minimal that genetically modifying the bacterium that infects soybeans would have adverse health or environmental consequences. They also point out that fixing nitrogen requires a large amount of energy, so there would be little chance of the nitrogen production getting out of hand.

The high energy requirement leads Ralph Hardy of E. I. du Pont de Nemours and Company to suggest that there are inherent problems in harnessing this biological process. For example, the price of fixing nitrogen may come out of plant growth and, therefore, crop yield, Hardy says.

So although solar energy in one way or another will probably be called to the aid of agriculture, it is still uncertain whether future fertilization will involve chemical or biological nitrogen compound production. □

Slicing open a soybean root nodule exposes a dense mass of nitrogen-fixing bacteria.

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