. . . Gas

kan oil pipeline, yet it is now only in the early planning stages. Technology for competitive production of synthetic gas must pass through another generation of development. And an investigation of ERDA's enhanced recovery program, by the the Comptroller General, found a "lack of an effective management plan."

Meanwhile, in Washington, protagonists of various sides of the problem are deriving cold comfort by repeating, "I told you so." □

Grape products: Virus killers

For many centuries people have regarded grapes and wines as health promoters. For instance, Egyptian warriors mixed wine with water whenever they invaded foreign lands in order to disinfect it. The centenarians of the Caucasus Mountains of the Soviet Union drink red wine freely with their meals and prize it as their elixir of life. Grapes are also among their favorite fruits. And as for the Italians, they claim that grapes and wines help one toward a long and lusty life.

Is there any scientific evidence to support these attitudes? Yes, it appears so. The bactericidal properties of wines have been known for a few years. And now it looks as if grapes and wines can kill viruses as well—at least in the test-tube environment, according to a report in APPLIED AND ENVIRONMENTAL MICROBIOLOGY (32:757) by Jack Konowalchuk and Joan I. Speirs of the Bureau of Microbial Hazards of the Canadian Health and Welfare Agency, Ottawa. The microbiologists believe this to be the first study of the effects of grapes and wine on viruses affecting humans.

In the process of looking for microbial hazards to strawberries and some other fruits and plants, Konowalchuk and Speirs found an opposite effect—that such fruits and plants contain tannic acid, gallic acid, vanillin and some other compounds with antiviral activity. This surprising discovery then led them to see whether grapes and grape products—grape juice, raisins and wines—might also contain antiviral potency.

After growing human disease-causing viruses such as polio virus and herpes simplex virus in cell cultures, they purchased grapes, raisins and grape juice from local grocery stores and wines from local outlets of the Ontario Liquor Control Board, prepared extracts from the skins and pulps of the grapes and made infusions (clear liquids) from the raisins. The viruses were then placed in bottles containing grape extracts, raisin infusions, grape juice or wines. The cultures were shaken to allow adsorption of viruses, then incubated.

Konowalchuk and Speirs report that grapes, grape juice, raisins and wines indeed showed antiviral activity in the test tube. Grapes and grape juice were the strongest viral killers. Varying degrees of antiviral ability were also found in each of the other grape products.

For instance, viral inactivation among grape extracts was found to come mostly from grape skin, little from the pulps. Grape juice was more active against poliovirus and herpes simplex virus, the causes of polio and herpes infections respectively, than against coxsackievirus and echovirus, responsible for meningitis, fever, respiratory disease and diarrhea. In all instances, red wines killed viruses better than white wines did, and wines appeared to be more effective against herpes simplex virus, poliovirus and reovirus (an apparent cause of meningitis, mild fever and diarrhea) than against coxsackievirus and echovirus. In still another experiment, gelatin was added to virus-grape-juice complexes, and the gelatin reversed the inactivation of the viruses, but only to a point.

Since chemicals known as naturally polymerized phenols appear to provide the antibacterial property of wines, probably by binding to bacterial proteins, Konowalchuk and Speirs believe that these chemicals may also provide the antiviral activity in grapes and grape products by binding to viral proteins. With such binding, viruses might lose their infectivity. Indeed, phenols have been found in abundance in the skins of grapes, the part of grapes that contains most antiviral activity, have been identified in grape juice, and have been observed in large amounts in red wines but in lesser amounts in white wines. The lower phenolic content of white wines is probably the result of the method of preparation, since most white wines are produced from juice only, and red wines are made by fermentation in the presence of grape solids. The total phenolic measurements of white grapes, in contrast, compare favorably with those of red grapes.

Since the antiviral section of grapes and grape products were only shown at the test-tube level, Konowalchuk and Speirs caution that the results cannot yet be extrapolated to the human situation—that is, prove that grapes and grape products protect people against viral diseases. However, they will next attempt to see whether grapes and grape products protect experimental animals against such diseases.

This research was funded by the Canadian federal government and was in no way connected with the grapes, grape juice, raisins or wine industries, Konowalchuk told SCIENCE NEWS. □

Dating the Salton Sea Petroglyphs

Petroglyphs, carvings of figures and designs into stone, often provide curious insights into the cultures of the past. But when petroglyphs are found alone or without any apparent link to other datable artifacts, discovering their origin and purpose can be frustrating. Some dating of glyphs found in arid environments can be accomplished by measuring the amount of patination, the thickness of the patina oxides covering the stone after years of exposure. Another method, ethnographic dating, takes into account artistic styles and other historical data known about ancient cultures which might point to a possible date. These and other methods have tended to be somewhat imprecise and subject to differing opinions.

Two researchers in California have now been able to date with radiocarbon methods petroglyphs found in the Salton Sea area of California. The glyphs, which appear to be geometric designs, were carved into tufa, a calcium carbonate deposited on granitic rock by blue-green algae when the rock was submerged under water. The presence of the carbon allowed Wilson G. Turner of Rio Hondo College in Whittier and Robert Reynolds of the San Bernardino County Museum to subject the glyphs to radiocarbon dating analysis. Their results have recently been published in *Indian Rock Art in Southern California*, edited by Turner and Gerald A. Smith, the director of the San Bernardino County Museum.

Turner and Reynolds took a microscopic cross section of the tufa under the glyphs and found seven distinct layers of tufa formations, indicating the rock had been exposed to seven separate inundations of water and dry periods when the sea or lake in the area successively rose and fell. The glyphs were incised into the tufa between the fifth and sixth layers, apparently during one of the dry periods. By dating the layers above and below the glyphs, the researchers were able to estimate a date. The fifth layer was dated as 9,180 ± 135 years old and the sixth as 9,030 ± 135 years old. Interpolating between these bracket dates, the researchers dated the glyphs as 9,100 years old.

Although the glyphs have now been accurately dated, the frustration and confusion are by no means over. The random order of the geometric designs and the absence of any pictorial or figural elements provide no clue to their significance. The drawings might have been graffiti from passing travelers or esoteric symbols of an ancient religious rite. In addition, the glyphs are much older than any previously dated glyphs in the area. Finally, the glyphs do not appear to be related to any known people at that time. Turner and Reynolds are now searching for other clues such as trails or other glyphs to connect the Salton Sea glyphs with other evidence. □