Sweet discovery for the wine industry

Anaheim, Calif., used to boast of profitable vineyards, until Pierce's disease killed off the vines in the 1930's. Pierce's disease remains a problem for California grape growers, but some recent work by three University of California at Davis plant pathologists brings control of the disease a little closer.

Jaime G. Auger, Thomas A. Shalla and Clarence I. Kado report in the June 28 SCIENCE that they have identified the cause of the disease. They were able to isolate a small, non-motile, rod-shaped bacterium which is probably a new species and therefore as yet unnamed. Before their work, a virus was suspected of causing the dwarfing, leaf-burning disease.

It has been known since 1939 that the disease vectors are leafhoppers and spittle bugs. The leafhopper also infects alfalfa, California's number one acreage crop, transmitting alfalfa-dwarf disease. This was shown earlier to be caused by the same infectious agent that causes Pierce's disease and that the team has now isolated.

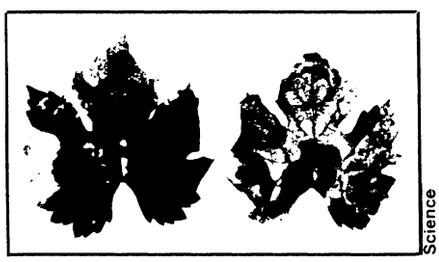
They conducted several tests to make the positive identification. First, two groups of noninfective leafhoppers were fed healthy plants and plants with Pierce's disease. Spittle taken from the insects was incubated on agar, and small white bacterial colonies grew from the excreta of those fed diseased plants. In another test, insects fed on diseased plants were treated, ground up, and the semiliquid material were spread on agar. More white colonies appeared. Finally, bacteria were injected into noninfective leafhoppers, and these were placed on healthy grape leaves. Controls were run with noninfective insects and sterile injections. After six weeks, all of the plants exposed to the infected insects showed the symptoms of Pierce's disease.

Until now, grape growers have fought the disease by trying to eliminate the leafhopper. "Any plants near streams, irrigation ditches or canals are more prone to catch the disease because of contact with leafhoppers," Kado told SCIENCE NEWS. "They try not to plant near streams and have been roguing out the weeds that grow along the banks, but that practice has become somewhat of a controversial issue here."

Now that the causative agent and vector are both known, more effective control will be possible. "You can regulate the vectors by spraying with insecticides, or it would be possible to use antibiotics against the bacteria" under FDA supervision, Kado said. "Or you could use biocontrol. Through tests, we found that the bacterium is highly labile to moderate temperatures. One possible therapy would be treating the grape vines with hot water to kill the bacteria but not harm the plants."

Kado explained that the Joachim and Napa valleys have had less severe problems with Pierce's disease than Anaheim and northern regions due to the hotter southern temperatures being less favorable to the bacterium.

"Before, when everyone thought it was a virus causing the disease, there really wasn't much to be done. Now that we know it's a bacterium, control should be easier. Bacteria are more susceptible to therapeutic treatment," Kado said.



Science

Leaves infected with the bacterium.

A cool solution for an energy problem

A refrigerator is the biggest single energy user in the average home. It uses more electricity than electrical space heating, air-conditioning and the television combined. And over the average 14-year lifetime of the appliance, the purchase price represents only 36 percent of the total cost. More than half (58 percent) of the total dollars goes into electricity bills.

But that may change if some relatively simple alterations are made in refrigerator designs, several scientists report. A large research team at the Center for Policy Alternatives at Massachusetts Institute of Technology and the Charles Stark Draper Laboratory, Inc., headed by J. Herbert Holloman, released a report on servicing consumer durable goods. In addition to considering the life-cycle costs of buying, operating and servicing appliances, the team also suggested design changes which would raise the initial cost, but lower the lifetime energy costs of the appliance. The team focused on refrigerators and televisions, which rank at the top of the list of annual consumer expense for major appliances.

The refrigerator's trouble really started with the addition of the no-frost feature. It approximately doubled the electricity consumption. But because the no-frost feature is so popular, the team examined ways to have that feature and energy conservation, too.

Substituting polyurethane insulation for fiber glass would mean a $14 markup in the purchase price, but a net savings of $85 over 14 years. Additional windings in the compressor motor would add $20 to the purchase price, but save $55 in energy costs.

Suggestions for energy-saving techniques, such as these, are a large and needed step towards an energy-conserving society. □

New California observatory?

Ambient light can pose severe problems for astronomers. City lights near an observatory produce a backscattered skylight that enters the telescopes and seriously degrades the images of faint objects (SN: 12/15/73, p. 381). As cities grow, a number of observatories that once had nice dark sites are finding themselves in trouble. A notable example is the University of California's Lick Observatory. The observatory is located on Mt. Hamilton just east of the southern tip of San Francisco Bay, and in recent years the growth of San Jose has caused difficult skylight problems.

Lick also shares another problem with just about every other observatory in the world: too little telescope time for the astronomers who want to use it. Lick's Director, Donald E. Osterbrock recently told the University regents that all available clear night time is used and some hours of the day, and still there is a long waiting line.

For these two reasons the observatory has resolved upon a long-term plan to construct a new astronomical observing center at a site much darker than Mt. Hamilton. The chosen place is Junipero Serra peak in the Santa Lucia Mountains some distance to the south of the present location of Lick's headquarters (the university's Santa Cruz campus).

The site was chosen after a survey by Merle F. Walker of Lick, in which the "seeing" at various locations in California and elsewhere was compared. Seeing depends on atmospheric turbulence and clarity, and Walker concluded that the best seeing is at locations on the western edges of continents or isolated islands where cool sea air passes smoothly over the area. Junipero Serra also has the advantage of being in the Los Padres National Forest, which means that it is a dark

location now and likely to stay one for some time to come.

The main piece of equipment for the new observatory would be a 90-inch telescope. (Lick's biggest piece on Mt. Hamilton now is 120 inches.) Together with the University of Wisconsin Lick has applied for funds from the National Science Foundation and the Fleischmann Foundation. The estimated cost would be $8 million, of which the universities are prepared to put up $1.2 million in state funds. Though Osterbrock told the regents he has reason to believe the request has been favorably reviewed, the money has not yet been granted, and because of the current climate for Federal support of science he is not very optimistic about getting the whole of the sum very soon.

Meanwhile it is necessary to get some kind of observing program going at Junipero Serra, among other reasons to stake out the site, so to speak. Osterbrock proposes to move the observatory's twin 20-inch astrographs to Junipero Serra. Astrographs are telescopes used to measure stellar precisions precisely. The astrographs are among the worst affected by skylight, and they could do a better job of the project they are now engaged on, the measurement of stellar proper motions (SN: 8/18-25/73, p. 119), at the dark site. A longer-range plan is to build a new 60-inch telescope to be assembled first on Mt. Hamilton and later moved to Junipero Serra. Osterbrock concludes: "The University of California has always been at the forefront of astronomical research. We at Lick Observatory intend to do all we can to keep it there. . . ." □

Space shuttle to piggyback around

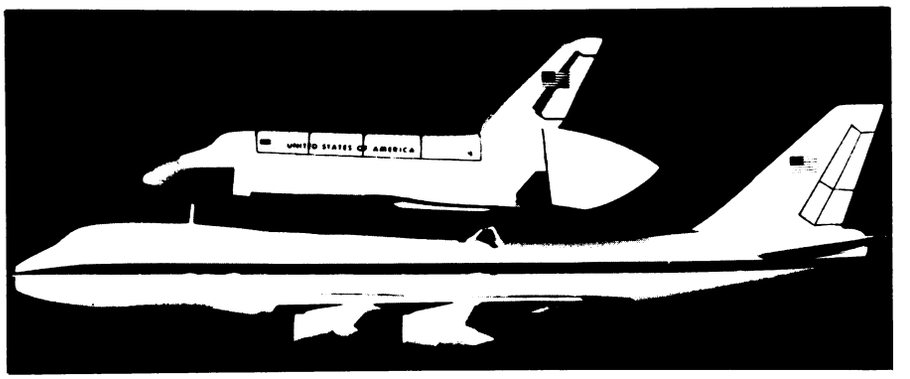
In the olympic-pool-sized alphabet soup of acronyms and abbreviations that is constantly a-simmer at the National Aeronautics and Space Administration, one of the more unusual terms is VPG. One might reasonably expect it to stand for Voltage Pressure Gradient or something, space jargon being what it is, but in fact it is short for Very Pregnant Guppy. The VPG and its slightly less ponderous relation the PG were a pair of preposterously bulbous aircraft, looking about as flightworthy as bumblebees, used for carting Apollo spacecraft and other unwieldy components around the country.

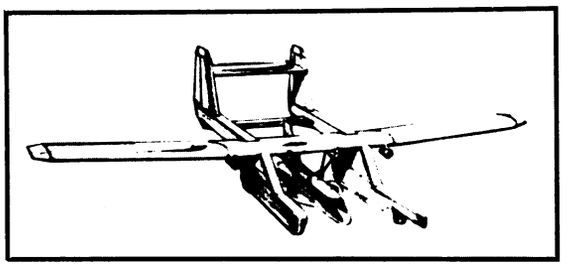
Of late NASA has been confronting an even hairier transportation problem: how to move the 30-ton, 122-by-78-foot orbiter section of the space shuttle (not to mention its 153-foot-long fuel tank). There needs to be an efficient way of carrying the orbiters on trips from the manufacturer in California to test sites in Alabama and elsewhere to launch sites at Kennedy Space Center in Florida and Vandenberg Air Force Base in California.

Last week, the space agency made its choice, but not before considering some exotic alternatives. One idea was to hang the orbiter from a dirigible (which would also please growing numbers of proponents of lighter-than-air craft), but the leisurely pace of such an approach, according to NASA officials, would expose the spacecraft to too much weather. Another plan was to use a design by John Conroy, who created the Guppies, calling for a pair of B-52 fuselages attached to a single, immense 450-foot wing with the orbiter fastened between them.

NASA's final choice at first seems more orthodox, but it is likely to look every bit as bizarre. The shuttlecraft will be perched atop huge, vertical stanchions above a Boeing 747 jetliner, equivalent to flying a 747 with a DC-9 sitting on the roof.

An advantage to the system is that it will be able to double as a flying test bed. For approach and landing tests of the orbiter, which will be the first spacecraft also to operate as an airplane, the original plan was to attach six jet engines, in order to fly it high enough to run through the landing sequences. The 747 will simply carry it aloft piggyback, then blow loose the stanchion mounts, allowing the orbiter to return to earth just as it will when it returns from its missions in the 1980's. □





The space shuttle's orbiter section will be transported and tested atop a 747 jet (top) rather than by a specially-built aircraft (center) or the ungainly Pregnant Guppy (bottom) of Apollo days, which is too small for the 122-foot spacecraft of the 1980's.

Photos: NASA