Active agents from liquor's origins

Alcohol is not the sole source of a stiff drink's biological kick. Some of an alcoholic beverage's long-term effects, both harmful and beneficial, appear to come from substances in the vegetables, fruits or grains that go into making the liquor. Plant chemicals have been identified in bourbon that, when consumed by rats, mimic estrogens, the female sex hormones. It is likely that other alcoholic beverages have similar effects, says Judith Gavaler of the University of Pittsburgh.

A variety of conditions that resemble effects of estrogens have long been observed in chronic drinkers who consume more than four drinks daily. In women, these include reproductive problems, early menopause and, some researchers say, increased risk of breast cancer. In men, chronic drinking can lead to impotence and sterility. Some alcoholic males with liver cirrhosis also show such female characteristics as breast development.

Previous studies have focused solely on ethanol as the active agent in alcoholic beverages. "But it is only one of the many ingredients," Gavaler last week told a seminar sponsored by the U.S. Alcohol, Drug Abuse and Mental Health Administration.

Gavaler and colleagues investigated whether bourbon, which is made primarily of corn, contains ingredients that have estrogen-like effects. Such chemicals, called phyto-estrogens, had previously been identified in corn as well as in wheat, rice and hops. The scientists evaporated the alcohol from bourbon and added two different doses of the resultant liquid to rats' drinking water. The highest dose of bourbon consumed by the rats daily for 50 days was equivalent to approximately four times the average daily consumption of alcoholic beverages by female alcoholics. The rats were adult females whose ovaries had been removed, so they produced little estrogen themselves.

The non-alcoholic bourbon caused a dose-dependent effect in two tests employed to detect estrogen-like activity. The bourbon increased the weight of the uterus and fallopian tubes, which had become wasted in the absence of estrogen from ovaries. In addition, the researchers observed changes in the blood levels of a pituitary hormone, called luteinizing hormone, that normally stimulates the ovaries to produce estrogen. Female mice that lack ovaries have elevated levels of this hormone. The bourbon reduced the hormone level, thus indicating the presence of estrogen-like activity.

Gavaler has demonstrated that components of the non-alcoholic bourbon interact, in a manner similar to estrogen, with estrogen receptors in mammalian cells. She has also identified three compounds in bourbon that have the same chemical structure as known phyto-estrogens. They are betasitosterol, biochamin-A and genistein. These phyto-estrogens have also been identified in human breast cancer tissue, although it remains uncertain whether they, or alcoholic beverages, play a role in that disease.

Moderate alcoholic beverage consumption has been linked to a beneficial effect —reduced risk of death from cardiovascular disease (SN: 11/10/79, p. 326). This effect may be due to a protective effect of increased blood levels of a substance called high density lipoprotein cholesterol (HDLc). Because estrogen increases the levels of HDLc, phyto-estrogens in liquor may be the source of this beneficial effect. But phyto-estrogens also are consumed in fruits, grains and vegetables in the diet.

Gavaler remarks that the observation of phyto-estrogens in alcoholic beverages, as well as in vegetables, may explain puzzling results of a recent study that showed higher HDLc levels in vegetarians who do not drink alcohol and in alcoholic-beverage drinking non-vegetarians than in non-vegetarians who do not drink alcoholic beverages. She says, "The presence of phyto-estrogens both in foods and alcoholic beverages might provide an answer." —*J. A. Miller*

Space shuttle: Stabilizing the dominoes

Despite the increase in activity brought about with the coming of the space shuttle era, shuttle missions have never been launched fewer than 60 days apart, and some of the intervals have been considerably longer. On Oct. 1, however, the National Aeronautics and Space Administration plans to pick up the pace, with launchings scheduled from there on out at intervals of barely a month or less (SN: 6/16/84, p. 374). Yet even as the beginning of this intense time looms, NASA has been struggling to ready its latest shuttlecraft, Discovery, for its maiden flight, following a pair of malfunctions in June that forced the mission to be called off, first with minutes to go and then, a day later, with mere seconds.

Besides technological concerns, NASA fears the domino effect, with the delay propagating down through the succession of closely packed launchings to come, threatening the shuttle's reputation as a reliable — which means marketable — launch vehicle. As a result, the agency last week announced a new target date for Discovery's first liftoff to be "no sooner than August 24," but canceled its second flight in hopes that the missions thereafter will be able to stay on track.

To do so, however, required reassigning items from that flight's payload to other missions, with the highest priority going to those from the private sector whose owners are paying NASA for the ride. "We are determined," says Jesse W. Moore, the agency's acting associate administrator for space flight, "to honor launch commitments to our commercial customers."

Three communications satellites were to have been deployed from the now-canceled mission, formerly scheduled for Aug. 29. One, the Hughes Leasat, has been shifted to a mission set for Nov. 1, while two others, AT&T's Telstar 3-C and Satellite Business Systems' SBS-D, have been moved onto the upcoming first flight of Discovery. But each of these missions already had full payloads, so other items were removed to make room.

Left behind during the Discovery flight will be the Large Format Camera, designed to take huge photographs for mapping and other studies. The LFC's researchers are enthusiastic about its potential, but it is a NASA device and thus did not stand a chance where the needs of the commercial satellites were concerned. Two other NASA instruments have also been postponed in the payload shuffle — a science package called Spartan that was to have flown on the canceled mission and a "Materials Science Laboratory" that has been deleted from the November flight to help make room for Leasat. Delayed into 1985 from that same flight is an electrophoresis experiment developed by McDonnell Douglas Corp. in St. Louis to process biological materials.

But there is more to the issue than shuffling payloads. The two communications satellites now added to Discovery's upcoming mission each require an upper-stage "kick motor" called the Payload Assist Module (PAM) to get them into their proper orbits once they have been lifted out of the shuttle. And the two PAMs previously used to deploy satellites from the shuttle both malfunctioned and left their payloads in incorrect orbits. The PAM's manufacturer, McDonnell Douglas again, believes the problem to have been due to density irregularities in the material used for some of the PAMs' rocket nozzles. Testing has indicated to the company that it is posssible to distinguish potentially malfunctioning nozzles from the good ones, and one official says that "we're recommending to the customers [the satellite builders] to proceed."

It is those customers, however, who face the loss of their satellites if the PAMs go awry, so their engineers have been looking over the PAM test results closely. "Our satellite engineers," says a Satellite Business Systems official, "have satisfied themselves quite well that the PAM-D that they've got assigned to this mission is a good one.... We're ready to go." AT&T is a bit more cautious: "We're confident that we will have the answers," says one official, "and we're proceeding with the thought that we'll have an August launch."

— *J. Eberhart*