TECHNOLOGY

King Tut's Black Treasure

The "sweet root," licorice, was part of the treasure found in the tomb of the boy king of Egypt, Tut-Ankh-Amen. Still a treasure, licorice is used today by the millions of pounds.

By HORACE LOFTIN

➤ THE FAMILIAR buzz of ringing picks and shovels, songs, complaints and laughter that hovers about archaeological diggings had stopped after feverish days of work. The accumulated rock and rubble of 3,000 years had been cleared away, exposing the entrance to the buried tomb.

Then, while the whole world waited eagerly for the news, a party of 22 scientists, led by British archaeological Lord Carnavon and Howard Carter, broke into the sealed doorway to enter archaeology's greatest treasure chest, the tomb of King Tut-Ankh-Amen—King Tut, the boy ruler of ancient Egypt.

Newspaper readers gasped at the listing of the tomb's fabulous contents: gold, precious stones, amazingly beautiful works of art, the ruler's fine vestments, rare oils and ointments.

And among King Tut's treasures, the archaeologists discovered a generous store of an ancient root—licorice.

Today a modern King Tut might be happy to exchange all his gold and precious stones for a monopoly of this "sweet root." More than 40,000,000 pounds of dried licorice root are imported to the United States alone each year.

Once Used as Medicine

In Tut's time, licorice was used as a flavoring or sweetening agent, and for medicinal purposes. Today licorice root uses range from tobacco and candy ingredients to an agent for extinguishing raging petroleum fires.

Meanwhile, research scientists in the laboratories of such concerns as the Mac-Andrews & Forbes Company, Camden, N. J., largest processor of licorice and its by-products in America, are striking out to discover still other applications of this ancient root to modern living.

Licorice root is derived from a hardy green shrub, *Glycyrrhiza,* that thrives best on riverbanks and flooded fields of Mediterranean countries. Spain, Italy, Greece, Syria, and especially Turkey are major producers. Only the roots of the plant, which are gathered every third or fourth year, are of commercial importance.

The basic step in the production of licorice materials is the water extraction of the "licorice principle" from macerated root. Then from this licorice extract, several commercial forms of licorice can be made, the three principal ones being licorice powder, licorice paste and crystals of ammoniated glycyrrhizin.

Over 90% of the licorice used—most of it as paste—in the United States is consumed in the processing of tobacco. The majority of cigarette brands and pipe mixtures have licorice in their blending formulas.

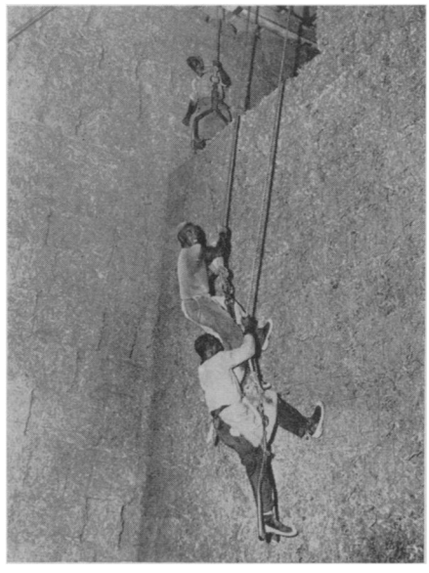
Cigarettes use licorice in relatively small amounts, while some plug tobacco may have up to 20% licorice content. Large quantities of both powdered licorice root and powdered extract are used in snuff production.

A great deal of licorice is used in the making of candy and other confections. Remember the black chewy licorice whips, the licorice shoestrings and jujubes? As a matter of fact, licorice does not have to be black. The licorice powder is a light brown, and artificially black coloring is often added to licorice candy just to humor the consumers' preconceptions of what licorice should look like.

Crystals of the sweet principle, glycyrrhizin, play an important part as a masker of disagreeable flavors and a base for pharmaceuticals. However, they have a much "pleasanter" job as a sweetening and foaming agent for beverages like root beer and birch beer.

After licorice is extracted from the macerated root, there is left behind as waste an enormous quantity of root fiber. What can be done with it?

Fires can be fought with it, for one thing. If aluminum sulphate and sodium bicarbonate are mixed with water, a thick foam results. If this froth could be made to hold up long enough, it could be sprayed on hard-to-extinguish fires, and it would quickly shut out the oxygen supply to halt combustion.



ALMOST A MOUNTAIN—A high pile of baled licorice root is being scaled by these workmen. The United States alone uses 40,000,000 pounds of dried licorice root each year, which is imported from Turkey, Syria and other Mediterranean lands.

Used in Fire-Fighting Foam

If spent licorice root is boiled with caustic soda, the resulting extract—Foamite-Firefoam stabilizer—will do the job of making the foam tough, long-lasting and effective in fire-fighting. The mixture of aluminum sulphate, sodium bicarbonate and the stabilizer is marketed as Foamite-Firefoam powder by the American-LaFrance-Foamite Corp.

A more obvious use for the sturdy fibers of spent licorice root is for insulation board and boxboard. The Plastergon Wall Board Co. produces a strong, efficient insulation board from licorice root wastes which is highly effective against penetration of noise, heat and cold.

Pulp made from spent licorice root is combined with wood pulp, waste paper and other conventional materials to produce a superior boxboard for quality packaging.

Illustrating again the wide variety of uses discovered for spent licorice root is a mushroom compost. The spent root is fortified with chemical nutrients and is set aside, or composted, for about a month, during which time bacteria begin to break down the fibers into a form usable by mushrooms for growth. When the compost is ready, mushroom spawn is planted in it, producing a yield of plump, white mushrooms in a few weeks.

Ancient Licorice Lore

The lore of licorice is nearly as ancient as civilization in the East. Egyptian hieroglyphics described it as "medicine and elixir of life." The Shen nung Pen Ts'ao King, one of the earliest written medical records, spoke of licorice as a magical root that gives youth to the aged.

The prophet of the Hindus, Brahma, also recommended licorice as an "elixir." In China, a liquid extract of licorice root was poured over Buddha's statue on his birthday. The fluid that dripped from the statue was caught by eager pilgrims and used as a potent medicine.

The armies of Alexander the Great and the conquering Caesars carried stores of licorice root with them for food and medicine. Early Greek physicians prescribed licorice for asthma and maladies of the chest. Licorice with honey was thought good for wounds.

In the Dark Ages, the "secrets" of licorice were kept alive in the monasteries of southern Europe, to become popular again during the Renaissance.

The usefulness of the "sweet root" has been known to mankind throughout the ages. But none of King Tut's priests, none of the learned Greeks, nor any of the medieval alchemists could ever have dreamed of the astounding ranges of uses modern man has found for this versatile root, licorice.

SCIENCE SERVICE *has prepared a kit containing specimens of licorice root, licorice powder and paste, and crystals of glycyrrhizin. There are also samples of Foamite-Firefoam powder, insulation board and boxboard to illustrate licorice by-products. A booklet accompanying the kit describes experiments that can be performed to test the qualities of licorice.*

These kits are available for the science-minded at 75 cents each from SCIENCE SERVICE, *1719 N St., N.W., Washington 6, D. C. When making a request, ask for the Licorice kit.*

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AERONAUTICS

Anti-Noise Program

➤ AN INTENSIVE "stop-that-racket" propram has shifted into high gear within the aviation industry as aeronautical experts match wits with the airport headache, noise.

More powerful piston and jet engines with lustier accompanying sounds have prompted the anti-noise program.

The battle against sound is not limited to airports, however. Design and test engineers are working on the problem at the grassroots level. They hope to build more "hush" into future planes.

But noisy present-day planes can be made less irritating if operators use airports away from the city. In big cities, other measures sometimes are required.

In New York, for instance, the lessening of airport racket has been guided recently by a special group called the National Air Transport Coordinating Committee. This group, sponsored by 12 noise-conscious aviation organizations, has made several recommendations now being tried out there. They are:

1. Runways that lead out over water or industrial areas should be used as much as possible in preference to runways that force planes to fly over densely populated areas.

2. Instead of circling the airport while gathering flying speed, pilots should climb to 1,200 feet as fast as they safely can. At this altitude, airplane noise is not so objectionable on the ground.

3. When necessary to "gun" airplane engines during maintenance ground checks, a site should be selected that is screened by airport buildings. Buildings help muffle engine noise.

The Aircraft Industries Association reports "creditable progress" has been made as a result of the NATCC's recommendations.

The "stop-that-fuss" program even reaches into the nation's scientific laboratories. Currently the National Advisory Committee for Aeronautics is working on some aspects of the problem. Aircraft builders are doing the same.

The NACA, a research organization, recently published a technical bulletin covering its studies of transport plane propeller noise. Summarizing the findings, NACA scientist Harvey H. Hubbard wrote:

"For future propeller aircraft, the adherence to current design trends will probably not be feasible if noise reductions are to be obtained, or even if present levels are to be maintained."

The NACA study showed propeller noise was cut down as the speed of the propeller tip was reduced. Ideally, new planes should have more propeller blades spinning at slower speeds.

Ideally, also, the planes should have better engine exhaust mufflers. But as always, aeronautical engineers must compromise the "ideal" aspects of plane design to efficiency and weight limitations.

A panacea that will eliminate all noise around airports probably can never be pulled from a hat. But with scientists attacking the problem from every angle, it is likely that the whine, throb and roar of airplanes will be diminished in the future.

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ELECTRONICS

Wrist Radios—Maybe

➤ COMMERCIAL PRODUCTION of Dick Tracy wrist radios some day may be made possible by the tiny electrical wonder, the transistor. However, vest-pocket television sets seem improbable.

Transistors are corn-kernel chunks of a rare metal, germanium. They can do some of the jobs of big tubes such as are in your home radio. In addition to their compactness, transistors are rugged and long-lived under ideal conditions.

Two engineers working for a large electrical equipment manufacturer fabricated an experimental wrist-sized radio using transistors. The radio was one and a half inches long, two inches wide and three-fourths of an inch thick. Its antenna is worn inside the coat.

Another company produced an experimental, transistorized portable television set that could be carried to the beach. But considering the complexities of television picture tubes, it seems unlikely that anyone will create a vest-pocket video set in the future.

Although plagued by the "bugs" that usually go along with new things, transistor research rapidly is revealing effective "bug-exterminating" methods.

However, imperfect as it is, today's transistor can perform certain non-critical jobs, although transistors are not yet sufficiently standardized in performance to be interchangeable in critical radar and television circuits.

Transistors, because of their small size, promise to permit great shrinkage in some electronic equipment. Following the trend toward smallness, manufacturers of electronic circuit parts are turning out baby coils, condensers and resistors.

Electronic experts who design military equipment are keeping sharp eyes focused upon transistors. If the tiny devices can be substituted for some of the regular vacuum tubes, radar sets and gun-aiming devices can be made smaller, lighter, more rugged and perhaps more reliable.

Transistors, however, are finicky temperature-wise. They do not work properly when hot. When mixed with regular vacuum tubes, which produce great heat in confined quarters, transistors frequently fail unless pampered by refrigeration.

Scientists, though, are working at these problems. They are learning to seal transistors hermetically against the damaging effect of high humidity. They are studying ways to fortify the devices against heat. They are trying to standardize the performance of similar units.

Future refinements of the electronic infant promise it a bright future, and promise Americans new "miracles" in electronics.

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