

DYE INSECTS by Don Wright

A recent stamp from Armenia (uncat., 170d, March 28, 2006) shows the Ararat cochineal scale (*Porphyrophora hameli* Brandt) in the family Margarodidae. The stamp shows the winged male (2-3 mm long) in the upper left, the immature scale in the upper right and the wingless female (4-12mm long) in the lower part of the stamp. This is one of five insects that were used to produce a red dye in the days before the production of modern chemical dyes. To date this is the only dye insect shown on a stamp although stamps were printed with an American cochineal dye.

Before I discuss the above use of insect dyes I will briefly point out the three other insects that are sources of a red dye, but have not yet appeared on stamps:

The Kermes oak scale, *Kermococcus vermilis* Donkin, family Kermesidae. This dye has been found in fragments of Neolithic cloth in France from the 15th Century BC. The insect contains 1% kermesic acid as the dye. This insect was cultivated on oak plantations around the Mediterranean since pre-historic times..

In addition to being the source of shellac, the lac insect, *Kerria lacca* Kerr, family Kerriidae, also produces a red dye. This is laccaic acid and represents 10% of the initial stick lac, the hardened resin scraped off the twigs in processing the insects. This was the primary source of red dye in the Far East.

The Polish coccineal, *Porphyrophora polonica* L., family Margarodidae, is similar to the Ararat cocineal in usage and contains 2-5% carminic acid. It was the primary source of red dye in Central and Eastern Europe.

The Ararat cochineal, shown on the Armenian stamp, has been the source of Armenian red, an intense red dye known in the literature since at least the time of Sargon II in Assyria in 714 BC and obviously in use long before that. Since it contains 2-5% of the dye carminic acid and can more readily be collected, it replaced the less concentrated dye from the Kermes oak scale.

The Ararat cochineal insect feeds on roots of *Aeluropus* grasses in the salt marshes of Azerbaijan and Armenia, where a 2000 hectare preserve has been established for studying the propagation and cultivation of the insect. The insects are collected from and among the grasses during the above-ground mating season in early fall. Fertilized females then go down into the soil to lay eggs which hatch the following spring. The collected insects are dried in the sun or over low heat and then boiled in water to extract the dye. Since all these insect dyes are water soluble, the material being dyed must be treated with a mordant – commonly tin chloride – to make the dye become permanent. Once so treated, these dyes are remarkably resistant to fading and are more stable than some synthetic dyes.

The final insect used to produce a red dye is the American cochineal insect, (*Dactylopius coccus* Costa, family Dactylopiidae. This also contains 2-5% carminic acid. It takes about 70,000 insects to yield a pound of dye. While the insect is not shown on any stamp to date, it is reported that the dye was used to print United States #65, 3c, August 19, 1861. It can be presumed that there are many other early red stamps that have been printed with this dye, since until the advent of the aniline dyes in the last third of the 1800s, this was the only available red dye that did not fade

This insect lives on cacti of the genus *Opuntia* and is found in tropical Central and South America. The dye from the cochineal insect was known to the Aztecs and Mayans and was valued as much as gold by

both the native Americans and the Europeans. The Spanish colonials took the dye back to Europe where it was used in textiles and cosmetics. In the 19th Century this insect was grown on a large scale in Africa. In 1868, records show that six million pounds of cochineal dye was exported from the Canary Islands. The use of cochineal dye dropped suddenly with the advent of synthetic dyes in the mid-1800s. Most of the carmine today comes from Mexico where it is grown on large cactus plantations.

With the advent in the 1970s of concern about the carcinogenicity of food additives, it was found that several of the artificial red dyes could no longer be used and cochineal is now used for coloring food and cosmetics. On the labels it is called either carmine, cochineal, carminic acid or Red E120. When it was first revealed that the red dye added to orange juice and other foods was an extract from insects, vegetarians and some religions were very upset to find that they had unknowingly been eating flesh in their foods. This dye is also used as a food coloring for baked goods, beverages, jam and jelly, ice cream, sausages, pies, dried fish, yogurt, cider, maraschino cherries and tomato products as well as chewing gum, pills, cough drops, rouge, lipstick and other cosmetics. The red insect dyes serve to protect the scale insects from attack by ants and the material is still used as an organic ant-repellent.

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