Earliest Samples of Royal Purple Found

Evidence points to the work of Bronze Age people.

By JOHN NOBLE WILFORD

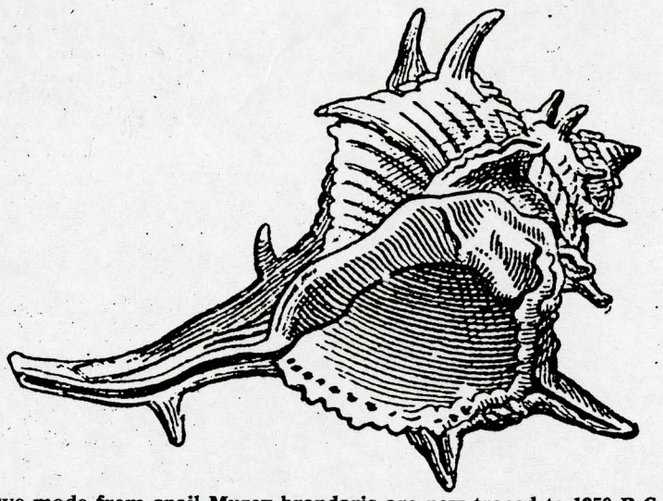
PURPLE has long been the color of royalty and high ecclesiastics, and through time the most regal of the purples came from a dye made from a gland of certain Mediterranean mollusks. The poet Robert Browning spoke of it as "the dye of dyes." In the Roman Empire, the dye's rich hue and colorfast properties were so valued, and its production so time-consuming, that the extract was literally worth its weight in gold.

The Phoenicians became proficient in the production of royal purple and in the first millenium B.C. engaged in a brisk trade in dyed fabrics. Wherever the seafaring Phoenicians went they set up dye factories, leaving mounds of mollusk shells to fascinate and inform future archeologists. Their name may even derive from a root meaning "purple."

Use in Bronze Age

Scientists have now come up with chemical evidence that people in the late Bronze Age, several hundred years before the Phoenicians, were also busy making the dye out of such mollusks as Murex brandaris and Murex trunculus. These marine snails are often called whelks.

In an analysis of a purple-colored accumulation in an earthen jar found in Lebanon, chemists at the University of Pennsylvania and E. I. du Pont de Nemours & Company identified what they said were the earliest known samples of the famous dye. Pottery at the site, at Sarepta midway between Tyre and Sidon on the Mediterranean coast, was dated between 1300 and 1200 B.C. The Phoenician culture rose in the beginning of the Iron Age, around 1000 B.C., replacing the Bronze Age Canaanites in that region.



Dye made from snail Murex brandaris are now traced to 1250 B.C.

Other evidence, from shell middens and references in documents, suggests that the dye industry was thriving as early as 1500 B.C., possibly in Crete and Syria.

The jar that was the object of the analysis was among many artifacts excavated in the 1970's by James B. Pritchard of the University Museum of Archeology and Anthropology at the University of Pennsylvania in Philadelphia. The jar was more than six inches high and had a spout. A nearby heap of mollusk shells led Dr. Pritchard to surmise that this had been a vat for processing purple dye.

Confirmation was provided by Patrick E. McGovern, an archeochemist at the University Museum, and Rudolph H. Michel, a retired Du Pont chemist. Their analysis, conducted at Du Pont in Wilmington, Del., the University of Delaware and the University Museum, was described in the latest issue of a journal published by the museum.

Findings From Tests

The two chemists submitted the pot's dark purple deposit to X-ray spectroscopic and infrared-radiation examination. The X-ray analysis revealed unusually high levels of bromine, a strong clue. The infrared test established more specifically the presence of dibromo-indigo, the known ingredient of the ancient purple dye. Further tests ruled out the possibility that this was a modern synthetic dye.

In an additional test, Dr. McGovern and Dr. Michel took scrapings from the deposit and produced a solution that exhibited the chemical behavior of the dyes made from two Murex species, either trunculus or brandaris. Most of the shells at the site were trunculus.

Dr. McGovern and Dr. Michel concluded: "The combined evidence from the spectroscopic and chemical investigations leaves no doubt that the major component of the purple deposit on the Late Bronze sarepta sherd is 6,6'-dibromoindigotin. This is the earliest chemical confirmation of the ancient dye."

From earlier studies scientists have determined that the source of the dye is the hypobranchial gland in the Murex. They believe the dye might be ejected by the mollusk as a defensive mechanism, much like the black ink of the octopus or squid.

Pliny Described Process

The best description of the dye-making process was given by Pliny the Elder in the first century A.D. In his "Natural History," Pliny said the mollusks were caught in baited wicker baskets and their flesh, containing the gland, was removed and thrown into open holes where they decomposed for three days. The strong odor was compared to rotting garlic.

The mass was then placed in stone or lead vats and, with water added, gently heated for 10 days. It took 8,000 pounds of mollusk flesh to make about 500 pounds of the dye-producing substance.

The dyes produced various colors, from blue to violet to black-purple, depending on the mollusk species and quantities used. Pliny noted that the most desirable color was that of congealed blood.