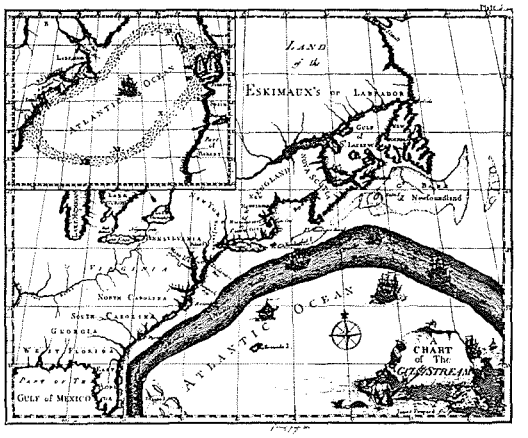
Nantucket whaling captains gave Ben Franklin the data to prepare this 1769 chart of the "Gulph Stream."



Courtesy of the American Philosophical Society

to determine exactly when they entered or passed through the stream.

Franklin found 18th-century mariners reluctant to take advice from a landsman. Modern day scientists, Schmitt observes, recently employed satellite photographs—not Franklin's charts—in a study aimed at persuading captains of ocean-going vessels to take advantage of the Gulf Stream's swift currents to save fuel.

"Greenhouse" for Truffles

"French Science Robs the Truffle of its Gallic Romance and its Rarity, with the First Crop from a Greenhouse" by Rudolph Chelminski, in *Horticulture* (May 1978), 125 Garden St., Marion, Ohio 43302.

The black truffle *(Tuber melanosporum),* so highly prized for the mysterious subtlety of its flavor in *pâté feuilletée, foie gras* and *poularde de Bresse,* has become prohibitively expensive ($160 per pound at retail) for all but the wealthiest, most obsessed gourmands. But now a research team for the French Institut National de la Recherche Agronomique (INRA) has, for the first time, succeeded in seeding, cultivating, and bringing to fruition the highly prized delicacy.

All past attempts at truffle seeding have failed, says Chelminski, a former *Life* staffer now living in France. Moving truffle-producing soil from one locale to another did not work; and all too often, productive truffle grounds have mysteriously turned barren. Truffle production in France, which amounted to 2,000 tons in 1892, now average 25 to 50 tons per year.

The successful "greenhouse" cultivation of truffles was the work of agronomic engineer Jean Grente, director of INRA's plant pathology station at Clermont-Ferrand. Grente began his efforts on the assumption that the truffle is not a parasite, as commonly believed, but rather mycorrhizal in nature—living in mutually beneficial symbiosis with

the root system of its host tree.

Grente synthesized the mycorrhizal association between truffle (really a mushroom) and tree, obtaining pure cultures from fresh truffles and cooking them in a controlled environment until they germinated and produced mycelia, the plant's vegetative part. The truffle mycelia were then married to oak and hazel tree seedlings in a calcareous (chalky) soil free of other competing microorganisms. A transplanted hazel seedling produced its first truffle in December 1977.

Some 150,000 mycorrhized seedlings have been sold, at prices ranging from $3.50 to $6.50 per plant, and distributed (exclusively within France and Italy) through Agri-Truffe, a private society. They are expected to produce high quality truffles within 3 to 5 years, and Grente predicts production of 250 tons a year in 10 to 15 years.

The Artful Origins of Knowledge

"Art Opens Way For Science" by Jon B. Eklund, in *Chemical and Engineering News* (June 5, 1978), American Chemical Society, 1155 16th St. N.W., Washington, D.C. 20036.

As a general rule, "pure" science discoveries are later elaborated by engineers and other technicians as "applied" science. However, says Eklund, curator of chemistry at the Smithsonian Institution's National Museum of History and Technology, the reverse is often the case; a broad body of empirical knowledge is developed first from which scientific principles and basic research follow later.

This is particularly true of the artists and artisans who throughout history have discovered and exploited particular properties of matter long before scientists noted these properties or attempted to explain them.

For example, early Chinese bronze castings (1200 B.C.) reflect the design limitations imposed by the use of sectional clay molds and the properties of bronze at the temperatures that the metal worker could achieve. The same was true of the red and black vases of classical Greece (500 B.C.), which could only be produced by artists with an empirical knowledge of the subtle properties of the clays and glazes used.

Eklund argues that the so-called "scientific revolution" of the 17th century produced a science of chemistry stemming from a knowledge of acids and corrosive alkalies associated with art, particularly etching. And the 18th-century European search for true "hard-paste" porcelains to match the hardness and luster of those from China and Japan produced a vast amount of experimentation with the behavior of different materials at high temperatures and led to the invention of crude devices to measure temperatures by the amount of shrinkage observed in a small cylinder of clay. The geologist subsequently borrowed the instruments and techniques of the ceramist to prove the vital role of heat in the development of the earth's mineral formations.