

*«auctorem neminem unum sequar, sed ut quemquam
verissimum in quaque parte arbitror»
(G. Plinius Secundus)*

The grapevine and wine production through the ages

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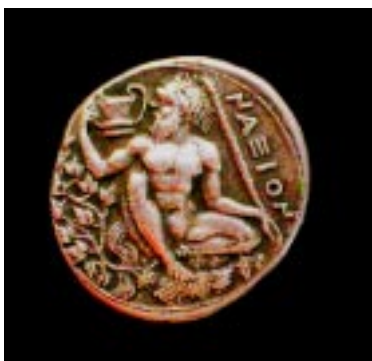
On account of all the inspiration it has given to mankind in the way of history, culture, art, fine cookery and healthful living, the grapevine and its end-product, wine, represents a heritage that unites past, present and future generations. In Greece the myth of Dionysos, the god of wine and the vine, was current as early as Mycenaean times. When Dionysos came to Attica he was hospitably received by Icarius and his daughter Erigone. The god, perhaps from gratitude, although one Greek tradition had it that he escaped from Mesopotamia, carrying the secret of the vine with him, because he was disgusted at the local population which was too much given to the drinking of barley and/or wheat beer, taught Icarius how to grow vines and how to make wine from its fruit. The latter, obeying Dionysos' urging, attempted to initiate others into the cultivation of the plant and the production of wine. But the shepherds of Attica became intoxicated by Icarius' wine and killed him, in the belief that he had poisoned them. They hid his dead body by burying it under a tree. Erigone wandered about for many days in search of her father and was eventually enabled to find it only with the aid of her faithful dog Maera. She was so grief-stricken that she killed herself. The gods of Olympus were sorry to see these virtuous people lost and metamorphosed them

into bright stars, Erigone ("born in spring") a star in the constellation Virgo, Icarius as Bootes (Arcturus) the Wagoner, and the dog Maera became Sirius, the Dog Star, visible in mid-summer during the so-called "dog-days", very hot days when the grape draws close to ripening.

If Icarius was the first wine-grower in Greek mythology, for others this honour belonged to Noah: "Noah, who was a farmer, was the first to plant a vineyard" (Genesis, 9, 20-25).



Red-figure crater (ca. 460 B.C.) found in the necropolis at Rutigliano (Bari, Apulia), now at the National Archeological Museum of Taranto. A satyr carries a basket full of grapes which a companion helps him to unload, pressing the grapes, the juice of which runs out into a recipient (pithos) below. A third satyr on the left also presses grapes while supporting himself by holding on to two hooks overhead. The pressing operation is attended by the god Dionysos himself, who with his right hand as a sign of good omen raises a cup (kantharos) brimming with grape juice.



Coin from Naxos (Sicily, Magna Graecia), 461-430 B.C. depicting a satyr (Silenus?) raising a kantharos full of wine with his right hand and a vine-shoot bearing grape clusters.

Whether it was Noah or someone else, certain it is that the cultivation of the vine goes back to very ancient times, and wine production started probably in the late Neolithic age, after vine grapes that had grown spontaneously were placed in rudimentary containers and chanced to ferment. And indeed the wild vine thrived in the Transcaucasian region and was probably first cultivated there (two other recognized centres of origin for the genus *Vitis* are north America and eastern Asia). By about 3000 B.C. it had reached Mesopotamia and Egypt, where wine was at first used almost exclusively in religious rituals. When Greek influence began to make itself felt in Egypt, in the first millennium B.C., private vineyards seem to have spread thither and wine became a popular beverage. But the possibility cannot be excluded that the Greeks merely re-exported to profane Egypt the skills they had themselves imported much earlier from priestly Egypt and Mesopotamia.

From about the fifth and until the first century B.C. Greece and the Greek islands were the main centres in the Mediterranean for the production for wines of quality. The wine of Pramnos, often mentioned by Homer, seems to have had a taste similar to present-day Tokay.



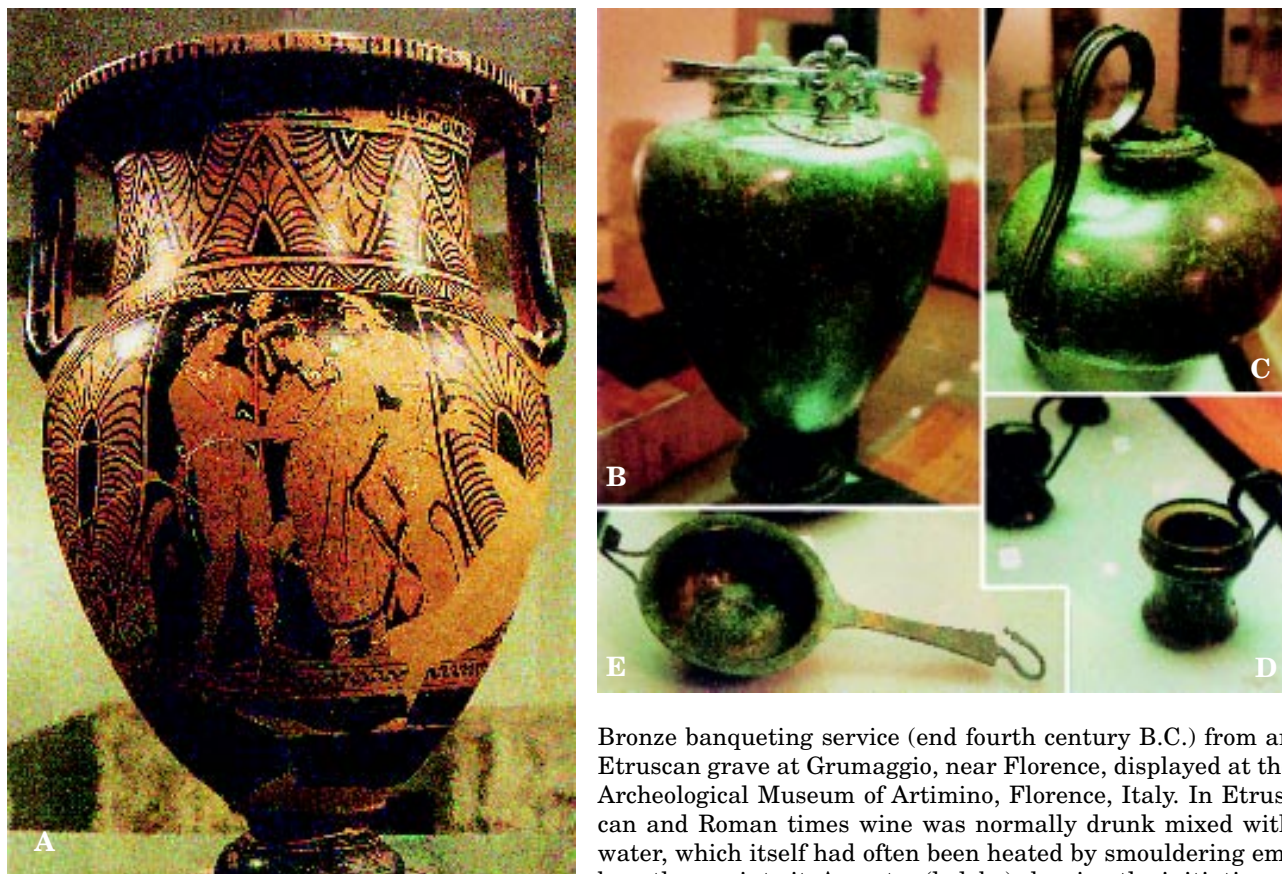
Grape harvest depicted on an amphora at the Louvre Museum. Men and boys picking grapes from a vine wedded to a tree. From C. Perrot and C. Chipiez, *Histoire de l'art dans l'antiquité*, 10 [Paris, 1914]127, Fig. 91.

In time, Greek wines were supplanted by those produced in Italy where grape cultivation had gradually become more established, first with the Etruscans, then with the Romans. The first great Italic wine was Opimian, which appeared in 121 B.C. and was followed by Sabine, Setinian, Sorrentine, Falernian and others.

The pages which Pliny the Elder devotes to wine and olives give a precise idea of the importance of these products already in the Etruscan imperial era. Etruscan muscatel, the practice of wine blending and vine pruning (perfected by Greeks), the Chiusina vine cultivar, and the transplantation of the Paros vine variety to Pisa all reveal to us a great specialisation in viticulture

in northern Etruria comprising the modern territory of Tuscany. The Etruscan word *vinum*, as attested by the *liber linteus*, a sacred Etruscan calendar on linen which was cut into strips to wrap an Egyptian mummy, that of a woman who was perhaps Etruscan and had migrated to Egypt in Hellenistic times, seemed to suggest a probable Latin origin of the word. However the discovery at Gravisca (a Roman harbour on the Tyrrhenian Sea) of a large jar (dolium) dating from the fifth century B.C. and bearing an inscription with the word *vinum* makes it more likely that after all the word was not derived from Latin but directly from the Doric Greek *voīnon*. On the other hand the mode of vine cultivation practised in Etruria, in long festoons hung between living supports (poplar, maple, elm, etc.) is also called *Aminaeum*, that is of the hills near Neapolis and therefore linked to the town of Cuma, founded by Greeks from Euboea around 750 B.C.

Etruscan viticulture was enormously developed by the Romans and became so remunerative that land owners were encouraged to plant ever larger areas with this crop. The grammarian Palemon in the year 50 purchased an estate some 10 miles from Rome for 600,000 sesterces, planted it with vines and after eight years with a single harvest obtained a return of 400,000 sesterces on his initial investment. According to Varro and Columella, the best vineyards in some places in Italy produced from 165 to 200



Bronze banqueting service (end fourth century B.C.) from an Etruscan grave at Grumaggio, near Florence, displayed at the Archeological Museum of Artimino, Florence, Italy. In Etruscan and Roman times wine was normally drunk mixed with water, which itself had often been heated by smouldering embers thrown into it. A. crater (kelebe) showing the initiation of a bride. In the crater the wine is shown being mixed with water, contained in the situla (B). C. Olpe or jar, with which the wine was poured into the crater. D. Scoop or dipper (kyathoi) to draw wine from the crater. E. Strainer to filter the wine before it was drunk.

hectolitres, sometimes as much as 300 hectolitres of wine per hectare. [In Gaul the vines were called *trecenariae* by Cato as reported by Varro because they were capable of producing 300 amphorae per jugerum, or more than 300 hl/ha.] However, when viticulture also became established in Gaul, Spain and Africa, the economy of wine-production became precarious in Italy and the emperor Domitian, esteemed by many to have been one of the ablest administrators of the Roman Empire ever, felt constrained in 92 to forbid the planting of new vineyards in the foreign *provinciae*, and to order half the existing vineyards in those areas to be uprooted, in order to safeguard viticulture at home. But Domitian's edict could also well have been prompted by the fact that vineyards were spreading to the detriment of cereal cultivation because the latter was less profitable.

In the third and fourth centuries, with the Roman Empire in crisis, viticulture also fell into a decline, and now it was the emperor Theodosius who, in the fourth century, made it a crime punishable by death to cut down vines, a practice which farmers resorted to so as to pay less taxes. Between the fifth and tenth centuries and later, during the Renaissance, it was above all the Christian religious orders and the lay nobility that maintained, and sometimes improved and spread, the practice of wine-growing to the farthest borders of Europe. In the sixteenth century viticulture was also introduced into the New World; already in 1524 Cortès decreed that in every concession of land one thousand vines must be planted. Charles V established a prize to promote vine cultivation in the colonies of the Crown. From Mexico viticulture spread to South America and by the end of the sixteenth century it had become so extensive



Landscape around Siena as pictured by Ambrogio Lorenzetti in the 14th century with cornfields and hills with vines and olive trees.

that Philip II felt it necessary to prohibit the planting of new vineyards. Today the vine is grown in all the continents, with a total land area under cultivation that is little less than 8 million hectares.

In its millennial history the vine has had to defend itself against numerous natural enemies and in this it was assisted by man. However, as long as the cause of diseases remained unknown, disease control had perforce to rely on remedies that were sometimes bizarre, sometimes fantastic, but sometimes also quite reasonable in view of the times. Here are given some examples from ancient treatises, as annotated by G.B. Orlob:

Wrinkled grapes

“the dried and wilted parts of the grapevine should be separated from the sound ones; the cuts should be coated with ashes mixed with vinegar. Pour urine onto the roots, a treatment which not only protects the grapes, but also strengthens the whole plant and makes it more fruitful”

Bleeding of grapevine

“to avoid excessive bleeding of the grapevine during spring, an incision should be made in the stem; allow the excessive sap to flow out, then cover the wound with oil dregs (amurca). This remedy was recommended by Palladius and others”

Allelopathy

“between the cabbage and the grapevine there is enmity. If cabbage is planted in the vicinity of a grapevine, one of the two will die”

Canker (certain parts of the grapevine disintegrate)

“plant cucumbers, melons, beans or portulacas in the vineyard because they halt erosion and this particular disease”

Yellowing

“Democritus says that if grapevines or shoots are threatened with yellowing, laurel branches should be placed in the field and the ailment will not attack the vines. It is also recommended to soak the roots of caper and sprinkle the diseased parts with the liquid. The horn of a bull should be thrown, together with sheep manure, into a fire so that the wind carries the fumes into the field. The smoke drives the ailment away and increases the yield”

Frost damage

“to protect the vines against frost and cold, they should be covered with bean straw, or else ashes or manure should be scattered in the vineyard. One should also burn dry manure so that the whole area is covered with smoke”

Red-leaf

Leaves acquire a deep red colour; parts of the tendrils and grapes also turn red. Petioles show a blackish colour and the stem shrivels. Grapes become yellow, are less juicy, and remain small.

1. Boil water and oil, brush it on the plants, repeat with an oil-wine mixture. 2. Drill a hole in the stem or root and insert a wooden peg; water with salt water. 3. Apply human urine to stem thrice weekly; after 8 days rub stem with honey. 4. Mix equal parts of honey and vinegar, and apply the mixture to plants with a brush; then twice apply oak ashes moistened with cattle urine. 5. Make a hole in the stem, insert an acorn. This practice, with a modification (the trunk is cut and kept open by inserting a stone), is still used in some regions of the Mediterranean area to restore an esca-infected vine.



Fig. 23. — Le soufrage de la vigne chez M. de La Vergne, à Bordeaux.

Control of powdery mildew with sulphur applied with portable dusters. Country around Bordeaux in the middle of the 19th century. From “Journal D’Agriculture Pratique”, 1860, Tome I, Librairie Agricole de la Maison Rustique, Paris, France.

Wilting

Plants wilt, leaves and fruits fall off, sap flows out.

1. Leaves and stems of certain herbs (*Momordica elaterium* L., an *Equisetum* sp.) should be macerated and the extract applied to the diseased plants prior to sunrise. 2. Soak ashes in water and sprinkle around the grapevines.

Weakness, Chlorosis

This was recorded as the most damaging disease in the vineyard. Leaves gradually become chlorotic until all the green has disappeared. The branches, especially the shoots, are also affected; they shrivel and later turn black.

1. Stir ashes from grapevine with vinegar until the mixture has the consistency of syrup. Then rub it on the stem and the branches. Next dilute the mixture and sprinkle the whole plant with it. 2. Water the roots and the whole grapevine with ocean water.

These are some of the remedies given to protect vines from disease and insects. Perhaps the only effective substance available to the Roman arsenal of protective treatments was a mixture of sulphur and pitch boiled down to a viscous deposit which Cato spread on vine branches to keep caterpillars away. [As an alternative the ancients also recommended that a menstruating woman should be led through the

vineyard barefoot and with her hair exposed to the wind.] But the method to counter frost damage must also have been effective. Only in the nineteenth century did the true causes of diseases begin to be understood and was a start made with the development of suitable control methods. That was also the century when the first great epidemics devastated the vine in those areas where it had traditionally been cultivated. Powdery mildew was the first such epidemic and it came from America. It was first noted in 1845 in England by a certain Tucker, the gardener of a wealthy gentleman, J. Slater. By 1847 the disease was in France, the year after that in Belgium, and by 1849 it had reached Italy. Many ways were tried to counter the disease and in the end sulphur was found to be effective and saved European vineyards. In 1863 it was the turn of Phylloxera. After the havoc wrought by powdery mildew, American vines were imported, especially from the State of Georgia, to France, Italy, Germany, Spain and Portugal to replant the devastated vineyards. It is thought that it was on the cv. Isabelle, resistant to powdery mildew but susceptible to Phylloxera, that the Phylloxera insect was introduced, first to England then to other European countries and throughout the world. In a few years millions of hectares of vineyards were lost.



Kerkyra, Cyprus. An old but still healthy grapevine before a typical Mediterranean-style dwelling.

However, to this scourge too an answer was eventually found in the adoption of resistant rootstocks. Lastly came downy mildew, which arrived in France from America in 1878, and the remedy to which was found to be copper. After these major adversities many others, caused by fungi, prokaryotes, viruses, viroids, nematodes and the like have threatened the health of the grapevine. For virtually all of them, as for powdery mildew, Phylloxera and downy mildew, a remedy was sought and found by the combined efforts of generations of researchers. Now it is the turn of esca. This disease is not however an American import but has been present for a very long time in areas where the grapevine was always grown. Even the word esca is very old. In Latin esca signified food or aliment, and Cicero speaks of *escae et potiones*, food and drink; but it could also mean bait, and in many modern languages it passed into the meaning tinder, 'highly combustible vegetable material anciently used to make

fire'. Another substance used for this same purpose was the carpophores of *Fomes fomentarius* and *Fomes (Phellinus) igniarius* and the rotted wood of the plants they had infected, called touchwood. A carpophore fragment of *F. fomentarius* was found in the leather pouch beside the mummified body of the Similaun man, who lived near the Alps some 5,300 years ago. The words *fomes* and *fomentarius* are also related to fire: Virgil writes *rapuit in fomite flammam* 'whipped up a flame in chips of wood'; and almost certainly the word *Fomes* thus recalls the use to which the carpophores of these fungi were put. These same words also recall another use that for centuries was made of *Fomes fomentarius*, namely as bandages for wounds, or *fomenta: fomenta vulneribus nulla*, 'no bandages for his wounds' writes Tacitus. In a number of European countries, though more particularly in Italy and France, the two fungi, especially *Fomes fomentarius*, were worked on a domestic or industrial scale to obtain from the carpophores a spongy material that was rendered highly combustible by treatment with saltpetre (potassium nitrate) and used to make fire, or alternatively was not treated with saltpetre but cut into thin, soft slices to

staunch bleeding (*Fungus chirurgorum*). The advent of safety matches and absorbent cotton spelled the end of this industry.

In Greek the word yska (modern iska) was used to denote the fungus itself, the material used as touchwood or bandage-material and also the rotted wood of apoplectic vines.

In this connection a letter written by Th. Pavlou from a village near Smyrna in 1906 to M. Ravaz at Montpellier is revealing. In this letter Pavlou described the disease as it existed in his area and the methods used to control it, and asked Ravaz if the disease, there called iska, could correspond to the 'folletage' or apoplexy of which he had heard when he had been a student at Montpellier. The answer by Ravaz was positive.

The word esca was also used by viticulturists in southern Italy and is found in the Provençal language.

It seems therefore that the word esca or iska was in various countries associated first with the carpophores of *Fomes fomentarius* and *F. igniarius*, and with the spongy friable mass in which wood infected by the two rotting agents was transformed (touchwood). Later it became used to designate apoplectic vines, and then the entire esca syndrome, including the foliar symptoms. This last use of esca occurs first in an article by Marsais (1922) although Marsais stated he was reporting a lesson delivered by Viala.

For a number of centuries therefore esca has accompanied the history of the vine. Today however the disease has reappeared in vineyards of the Mediterranean Basin and of North and South America in a more destructive manner than ever before, and what is more, it is no longer alone. It may now occur preceded by or in association with other syndromes, such as the decline of young grapevines, and the brown-wood streaking of grafted rootstocks. Here too, plant pathologists in the field working together will have to get the better of this disease(s) and bring it/them back to the limits requisite for vine cultivation, as they have already done with powdery mildew, Phylloxera and downy mildew.

The first congress on "*Esca and grapevine declines*" was held in Siena (Tuscany), a region that seems made for painters, where the vine has been cultivated for at least 2,500 years and where wines famous throughout the world are produced. It was organised by the *Mediterranean Phytopathological Union* and the *International Council on Grapevine Trunk Diseases* (ICGTD) with the express purpose of bringing together researchers in the field from different countries to report on the results achieved so far, to identify areas of possible co-operation, and thus to hasten the development of effective control measures. All these objectives seem to have been met.



Left: grapevine with apoplexy caused by esca. Centre: a grapevine exhibiting the typical foliar symptoms of esca. Right: grapevine that was symptomatic one year but a year later is vegetating normally.

In the current number of *Phytopathologia Mediterranea*, the first in the year 2000, with its redesigned, Mediterranean-blue cover, the invited papers and oral presentations of the Siena Congress are published. The workshop speakers were requested by the scientific committee to write a paper based on their presentation. These papers were fully peer reviewed and revised to ensure high quality and clarity prior to acceptance for publication. This issue of *Phytopathologia Mediterranea* presents the result. It contains almost all the workshop papers plus this introductory article which, as editor of the journal, I wished to devote to the true subject of the workshop: the grapevine. All the other articles contain information of interest to all those who study grapevine diseases. Nevertheless it should be said that all these articles show clearly the desirability of entrusting a work group — possibly the ICGTD under the aegis of the ISPP — with the task of establishing incontrovertibly, on the basis of current data and findings expected over the next few years, what should be meant by esca, young decline and the brown wood streaking of rootstocks, how data on, for example, the incidence and severity of esca to be collected, and against which fungi the control effort should be directed. Moreover, numerous reports on the aetiology, the progress of the disease over time, and the pathogenic effects of *Fomitiporia punctata* and *Phaeoacremonium* species have been published of late and the time has now come to decide whether it is appropriate to continue talking of ‘microorganisms acting in succession’ or whether esca should henceforth be seen as a complex of diseases linked to each other, but distinct. It may seem superfluous to say so, but everyone should bear in mind that the research findings already made and reported can be discussed, refuted and even rejected, but not passed over in silence. The research work of Petri at the start of the last century, which was too long ignored, should guide our thinking in this context.

After some years of abeyance the scientific study of esca has now recommenced, but so far perhaps in a way that is too hectic and disorderly — as, indeed, was inevitable. Various laboratories, with the interests of their own countries in mind, tackled the same or similar topics, but always succeeding in broadening our understanding of vine wood diseases. Now it is time to carry these researches forward on the basis of results already achieved, in order to expand our knowledge-base still further. This may include confirming or invalidating earlier findings.

Both the subject matter of this issue of *Phytopathologia Mediterranea* and the articles published in it will certainly be of interest not only to regular readers of the Journal, but to all those who are concerned about the fate of viticulture in the world generally.