



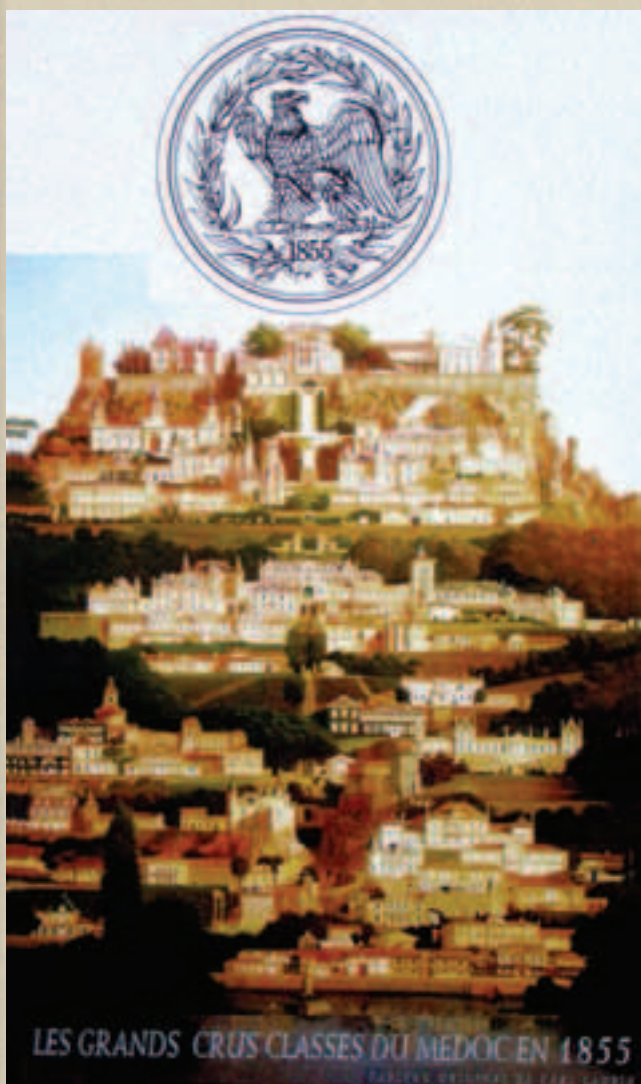
Field Trip Guide Book - P33

Florence - Italy
August 20-28, 2004

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**32nd INTERNATIONAL
GEOLOGICAL CONGRESS**

**WINES OF BORDEAUX
AND COGNAC:
GEOLOGY OF THE VINEYARDS**



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Associate Leaders: M. Broquedis, G. Darne

Post-Congress

P33

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**WINES OF BORDEAUX AND COGNAC:
GEOLOGY OF THE VINEYARDS**

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Front Cover:

«Les Grand Crus Classés du Médoc en 1855», by Carl Laubin, or the classification of the Médoc Châteaux for the Universal Exposition, Paris, 1855, initiated by Emperor Napoléon III; poster reproduced with the special authorization, but only for this field guide, of the C.I.V.B., Bordeaux, France.

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The field trip

The purpose of this field trip is to examine the geological conditions which govern the growth and development of the vineyard, in close relationship with the geographic and climatic controls, which all together determine the characteristics of the terroir and soils, which then determine the vintage. However, the final touch in the production of the wines is, undoubtedly the invaluable art of the vine-grower himself.

The field trip will examine four main areas:

- the Médoc, Graves, Pomerol and Lalande de Pomerol, Saint-Emilion, Sauternes and Barsac area
- the Entre-Deux-Mers area, east and south-east of Bordeaux
- the Cognac area, which will be examined both for its wines and its Cognac.
- a fourth, very specific area, related to the Bordeaux wines and Cognac, will be also examined: the Marennes-Oléron Island Ostréiculture.

This field trip guide book is thus organized in 4 sections, each corresponding to one of the above-mentioned areas. Each section will include an introduction and a regional geological setting. Then, finally, the specific, 6-day field trip itinerary is detailed in the last part of this paper.

Field references:

Topographic and road maps: General road map of France Michelin, n° 989 at 1x10⁶

Regional road maps: Michelin n° 233 Poitou Charentes, n°234, Aquitaine, 1x 200 000

Guides verts: Michelin Pyrénées Aquitaine, Côte Basque, ISBN 2-06-036705-0; Poitou, Vendée, Charentes, ISBN 2-06-037105-8.

Geological map of France, at 1x10⁶; Regional maps at 1 x 50⁴: n° XIII-30, Oléron; n° XIII-31, Marennes; n° XIII-33, Soulac; n° XIII-34, Lesparre; n° XV-34, Montendre; n° XV-35, Blaye; n° XV-36, Bordeaux; n° XV-37, Pessac; n° XVI-32, Cognac; n° XVI-36, Libourne; n° XVI-37, Podensac; n° XVI-38, Langon.

Geological guides: Vigneaux, M. (1975), Aquitaine occidentale, Guides géologiques régionaux, Masson Ed., Paris, 223 p., ISBN 2-22541118-2. Gabilly, J., Cariou E. et al. (1997). Poitou, Vendée, Charentes, Guides géologiques régionaux, Masson Ed., Paris 223 p., ISBN :2-225-82973-X,

Internet: for geological maps:
 e-mail: infoterregu@brgm.fr

For vineyards and Bordeaux wines:

<http://www.vins-bordeaux.fr>,

e-mail: civb@vins-bordeaux.fr

<http://www.vins-entre-deux-mers.com>,

e-mail: contact@entre-deux-mers.com

For vineyards and cognac:

<http://www.bnac.fr> or, <http://www.cognac.fr>

Bordeaux and its vineyards and wines

General introduction

The town of Bordeaux, the biggest town in the Gironde department (region), is located in the heart of the large viticultural region of the Aquitaine basin. The Bordeaux vineyards constitute a mosaic of viticultural terroirs, extending over 112,000 hectares, and whose production represents almost half of all the wines produced in France: that means a bulk volume of 6.4 million hectolitres (of which only 14% are white vines) and more than 850 millions bottles delivered yearly on the market.

The bordelaise production comes from 57 different appellations among which 171 registered vintages have been distinguished. Vineyards are grown by 12,000 proprietors, half of them making their own wines, the others utilising the current 57 viticultural cooperatives to process their grapes.

The vine-growers belong to the association of their own appellation, and all together these form the «Fédération des Grands Vins de Bordeaux» which administers the vinicultural interests and directs the orientation of the Bordeaux vineyard politics.

400 trade entreprises exist in the Gironde region; these sell 75% of the production to more than 160 different countries. Also there are brokers who work as go-betweens between the vine-growers and the sellers.

Established in 1948, the C.I.V.B. (Conseil Interprofessionnel du Vin de Bordeaux) has the duty to be the permanent link between vine-growers and wine shippers, upholding the quality of the Bordeaux wines, taking care of the commercialization of the wines, constantly striving to improve their quality and regional character, as well as taking care of their worldwide promotion.

There are also 18 winemakers' associations, which

include vine-growers, shippers and brokers, but also honorary members. In any given A.O.C., or region, these people are doing their best to uphold the traditions of top quality of the wines, and vineyards. All together they make up the Grand Conseil du Vin de Bordeaux.

History

The Gallic kingdoms up to the 1st Century BC: the first vineyards in Bordeaux

The origin of the vineyard is Gallic; the Gallic tribe of «Biturige» introduced and grew a new cepage, the «Biturica». This grape was well adapted to the bordelais climate; it is the ancestor of today's Cabernets.

The Romans

The vineyards were grown largely before the Roman conquest (53-50 BC) of the Gauls. After the area became part of the Roman Empire, wines were exported all throughout the Empire, and appreciated by the Roman aristocracy as well as by the common people. Exportation of Gallic wines to Italy was so important that in 60 AD, Roman vine-growers asked the Imperial Roman Authorities to take countermeasures, which they did, ordering that half of the Gallic vineyard be uprooted. But the vineyards rapidly increased again, in fact so intensively that during the IVth Century, in Aquitaine, the Gallo-Roman poet Ausone (Decimus Magnus Ausonius, 310-363 AD, born in Burdigala = Bordeaux) claimed that «the Glory of Bordeaux and its universal fame comes from its wines». Like Montesquieu, the philosopher who lived fourteen centuries later, Ausonius was prouder of his bordelais vineyard than of his literary works.

However, before the XIIth Century, very little is known about the vineyards.

XIIth Century: England and the birth of the great commercial vineyards.

In 1152, Aliénor, Duchess of Aquitaine, married Henri Plantagenet, the future king of England. Up to this time, important commercial trade had developed as the English exported food, textiles and metals, and imported Bordeaux wines. The English called the wine « Claret », due to its clear colour.

The importance of the English trading fleet, and their easy accessibility to the Bordeaux harbour by means of the Gironde Estuary, favoured the wine trade by fluvial and maritime routes, allowing the vineyards and the Bordeaux harbour to grow. During this time, wine was shipped in 900-liter oak barrels, also known as « hogsheads » or « tonneau » = tonne, ton (either 4

times 225 liters bordelaise barrels or 1,200 bottles of 0.75 liters in a bordelaise shape). Later, the tonneau/ton, became the international measure of volume for gauging ships' capacity.

XVIIth Century: Then came the Dutch

During the XVIIth Century, a new commercial era began, with new customers: the Dutch, the Hanseatic cities, and the Britons. The Dutch, who loved brandies, opened new and different trade procedures. They bought significant quantities of wine, which they then distilled in their own warehouses. Thus, Bordelais vine-growers produced, in addition to the traditional « Clarets », some dry and sweet white wines to be distilled.

XVIIIth Century: the West Indies

With the XVIIIth Century, the bordelais vineyards intensively developed and experienced a growing prosperity, due to the West Indies' market, and particularly thanks to St. Domingue and the Lesser Antillas, to which the Bordeaux wine production was shipped. By means of this colonial trading, Bordeaux continued to have an extraordinary prosperity, up to the French Revolution. England, for her part, only represented 10% of the Bordeaux wine exports, but these extra fine wines became fashionable and were sought by London High Society. It is also during this time that bottles taped and sealed with red wax first appeared. Bottling was done either in 0.75-liter bordelaise-shaped bottles, or in half bottle (0.375 l), magnums (1.5 l), double magnums (3 l), jeroboams (4.5 l) or imperials (6 liters).

XIXth Century: Slumps and prosperity

Near the middle of the XIXth Century, a terrible cryptogamic illness came from the United States and attacked the bordelais vineyards: oïdium. Thanks to sulphur, oïdium was rapidly conquered and the bordelais vineyards prospered again.

As a matter of fact, it was in 1855 that a first classification of the Bordeaux wines was requested by Emperor Napoleon III, and elaborated by the « Chambre de Commerce de Bordeaux ». Its purpose was to present the Bordeaux Wines at the 1855 Universal Exposition. Up to the present, this classification has continued to be in force and has, in fact, only had one modification, in 1973, for château Mouton-Rothschild, which joined the other four registered «grands crus».

The Industrial Revolution and the free-trade behaviour encouraged development among the traders and the vine-growers, contributing significantly to the prosperity of the Bordeaux vineyards. This prosperity reached its apogee between 1865 and 1887, with

increasing production and exportation to Germany, Belgium, the Netherlands, Scandinavia and... England.

Then, at the end of the XIXth Century the *Phylloxera* disaster occurred, destroying almost all the Bordeaux vineyards. Reconstruction of the vineyard would require tens of years, and was made possible by the grafting of French cepages on American stocks resistant to *Phylloxera*. A short time later, another mushroom or mildew appeared as a new, powerful vineyard disease, and it was only thanks to the discovery of the «bouillie bordelaise» («bordelaise porridge»), made with SO_4Cu , that it was possible to defeat this pathogenic mushroom.

XXth Century: time for making rules

Smuggling and lower prices provoked a new slump. To prevent this, the Girondins elaborated a national set of laws (1911) on wine origin, which determined the area of vintages (excluding from the official « bordelais » vineyards all other departments except Gironde).

This delimitation paved the way for the birth, in 1936, of the I.N.A.O. (Institut National des Appellations d'Origine) and the A.O.C. (Appellations d'Origine Contrôlée) administered by the « control ordinances » («décrets de contrôle») which very specifically define production: geographic area, cepages, efficiency, percentage of alcohol, growing and vinification methods. New classifications were established for the Graves wines, and, then, from 1955, for the Saint Emilion wines, which had not been registered prior to this time. Today, A.O.C. wines represent about 98% of the bordelaise production.

After the terrible hard frost of 1956, the vineyards have little by little recovered all their dynamism, helped in particular by the increasing demand of the world trade.

The terroirs

The terroirs are quite diverse, and their individual characters are closely related to the different wines' main organo-leptic qualities. When the terroir is partly constituted by Asteries limestones (*calcaire à Astéries*), wines are generally structured (charpentés), true to stock (racés), fine, and full-bodied (corsés), aging well. For pebbly-gravelly («*graves*») and sandy-pebbly («*gravelo-sableux*») terroirs, the wines are complex, with much finesse; these also age well. Wines which should be stored («vins de garde»), which are powerful and structured, generally come from argillaceous-limestone/argillaceous-sandy («*argilo-calcaire/argilo-sableux*») terroirs. Lighter

wines, to be drunk young, come from sandy terroirs.

Cepages

In contrast to other winemaking regions, vine-growers do not produce wines grown from only one cepage. Each viticultural exploitation is characterized by two or three main cepages, adapted to the nature of the soil of each patch of cultivated land. During the preparation of a wine, the relative proportions of each cepage are a determining factor of the individualized quality of the wine. Thus, there exists a large natural diversity of taste among the Bordeaux wines, reinforced by the fact that the terroirs and the cepages are diverse. Bordeaux wines are thus stable, blended wines, very amenable to aging.

For the red wines, the most important cepages are **Merlot**, the most widely represented, and the **Cabernet Sauvignon**, which is the most traditional grape of the bordelais vineyards. To a lesser degree, **Cabernet Franc**, **Malbec** (or **Côt**), **Carmenère** and **Petit Verdot** are also utilized.

For the white wines, first off **Sémillon**, **Sauvignon** and **Muscadelle** are the more frequent cepages. Three other white cepages are also utilized as auxiliaries: **Colombard**, **Merlot blanc** and **Ugni blanc**.

The **Cabernet Sauvignon** is certainly the most world famous. The wines which are produced from this grape, are very coloured, tannic and long in the mouth, with berry aromas when they are young, aromas which then evolve over time toward a complex bouquet of cedarwood and havana. This is a late ripening cepage, propitious to warm terroirs of graves (same origin as the word «gravels»; graves are deposits of alluvial terraces constituted by small pebbles, gravels, sands and clays), and resistant to grey rot. Very aromatic when young, this cepage brings to its wine, body, structure and complexity, yielding tannic wines, which require sufficient aging to be most drinkable.

The **Merlot**, the other important and the most cultivated cepage of the Bordelais, is dominant in the Saint Emilion and Pomerol regions. It gives to its wines a plump fullness («rondeur») and a taste of fruit which can evolve over time into flavours of wood and touches of toast. It is an early cepage which matures well, but which is sensitive to «couleur» (a decay of the young flowers and grains of the grape) and to grey rot. It gives supple wines, quite tender, which can evolve faster than the Cabernet Sauvignon wines. Merlot is generally considered less noble than the latter but, nevertheless it gives one of the most famous wines in the world: the Pétrus in Pomerol,

which is at least 95% Merlot.

The **Cabernet Franc**, similar to Cabernet Sauvignon, also produces tannic wines which are often stiffer when young. It is a traditional bordelais cepage, making good wines for bottle aging, quite rich in alcohol and polyphenols. It gives aromatic wines often with raspberry aromas.

The **Petit Verdot** is a late-ripening cepage, which is frequently not able to reach its maturity. When it can do so, it is much appreciated in the wines, because it gives a fine acidity to the blend.

The **Malbec** is utilized in small quantities in the blend and has a high rate of production. It produces lower quality wines than those produced with the former cepages. However, it can also bring very good results when its productivity is controlled.

The **Sauvignon** gives dry white wines, wiry, thirst-quenching, with flint, citrus or boxtree aromas, easy to recognize.

Thanks to its holy combination with the Sémillon, the Sauvignon has won entry into the prestigious club of classical cepages.

The **Sémillon** is the most cultivated white cepage in Gironde. However, it is rarely used alone in the elaboration of great dry white wines from the Graves, or of great sweet wines of Sauternes. Sémillon takes well to the «noble rot» of *Botrytis cinerea*, but it reveals a tendency to be short in aroma and in strength. Thus, it is usually blended with the deep aroma and the wild acidity of the Sauvignon, so that it will give its best in a temperate climate such as the Bordelais. When perfectly mature, the Sémillon gives a rich, high-alcohol wine, but quite poor in aroma and acidity. Often with a citrus flavour when young, the derived wine becomes better after aging in oak barrels, picking up a rich lanoline aroma, said by some people to be «waxy», and mellowing with age into a deep golden colour, with just a touch of orange.

The **Muscadelle** is a bordelaise variety whose blossoming is late yet whose ripening is precocious, which translates into a short growing period. The derived wines are simple, a bit acid, with flowery aromas. Muscadelle is quite sensitive to disease, so it is presently less commonly grown. However, it can sometimes be added to Sémillon and Sauvignon to give to white sweet wines a touch of musky aroma.

Climate

Situated on the 45th parallel, exactly midway between the North Pole and the Equator, the Bordeaux area has a temperate oceanic climate. The Gulf Stream brings warm waters into the Bay of Biscay and along

the Armorican Coast, NW of Bordeaux, warming the Atlantic Ocean waters and equilibrating the temperatures of the whole area. The green forest screen of the Landes pine forest shelters the vineyards from the rainy and cold western winds of the Atlantic Ocean, and also from the cold southern winds blowing down from the Pyrenean Mountain belt. Thus, the bordelais climate offers sweet and rainy springs, pleasant sunny summers, beautiful autumns and rarely frosty winters. Exactly what is required for an exceptional vineyard.

The A.O.C., or Appellations d'Origine Contrôlée

There are 57 different A.O.C.s which cover the large variety of the bordelais vineyards, grouping red, rosé, dry and sweet white wines as well as clarets, sparkling wines, and the «crémants» (A.O.C. sparkling wines) of Bordeaux.

The true to stock and peculiar character of the Bordeaux wines are mainly the result of the mildness of the climate, tempered by the Ocean and protected from the winds. This climate slowly brings the grapes to optimal maturity, favouring the blooming, fruitfulness, and sap of the vineyards, and the bouquet of the wine. Another feature derives from the large diversity of terroirs. In one place the limestone-derived soil gives hardness to the wine, while in another, the vineyard gives a lighter wine its delicacy of taste and aroma thanks to its pebbly and sandy soils. The very diverse and varied spectrum of wines certainly meets all tastes. In Gironde, «château» is a traditional term to name a vintage, as well as the large estate where the wines are grown. Generally the building is an unfortified castle, sometimes not very old (XVIIth to XXth Century), which looks like a mansion. Calling a wine «château» is not really a name but an indication of localization in a specific area. In 1938, an edict defined «château» in Gironde as synonymous to *domain*, an *enclosure* («clos»), or a *vintage* («cru»). Another particularity of the Bordeaux vineyards and wines is that these are the only high quality vineyards situated at less than 50 metres of altitude, and which offer so many good wines in such a so low altitude and a so well defined area. Generally in France, the best vineyards are situated between 250 to 350 metres elevation.

The bordeaux vineyards and wines The Médoc vineyards

(plate 1, figures 1 and 2)

Introduction

Médoc vs Graves or Médoc and Graves ? For centuries, the two large vineyards areas of Médoc and Graves have been well known world-wide but separately, and for different reasons. Thus, why compare them together now ? The reason is that they are historically and geographically close. Both vineyards develop along the same narrow strip, about 180 km long, which forms the Gironde estuary's left bank and the Garonne southern bank, from the Grave Point to the south of the Langon city.

The **Médoc** is the kingdom of the great red Bordeaux wines. Its vineyards give wines of great lineage, full-bodied, but not too much, distinguished by their sap, their bouquet and their ruby colour, as well as their very good aptitude for aging.

The **Graves** are either known for their whites and red wines, these later being of the same geologic blood as the Médoc ones, i.e. growing on the alluvial terraces of the Paleo-Garonne. Like the Médoc, the red Graves are generous, having a deep red colour, changing to red-orange when aging. Thus the answer of the question is now: Médoc *and* Graves.

Regional geological setting and climate

The Médoc country forms a triangular peninsula on the left bank of the Gironde estuary and extends from Graves Point up to the NW of Bordeaux, bounded there by a small river, the «jalle de Blanquefort». The vineyard covers about 120 km along the Gironde estuary up to the Graves Point.

There are two areas of A.O.C.: Médoc and Haut-Médoc.

Just right on the 45th parallel, the climate of Médoc is quite warm and wet; it is sunny with quite mild winters. Its location between two large water masses, the Atlantic Ocean to the west and the Gironde estuary to the east thermo-regulates it; thus the area has a microclimate which favours the vine's growth.

Terroirs

Médoc is quite low, with a maximum altitude of 43 m at Listrac. We can distinguish two areas, one formed along the river by modern alluvial pebbly deposits (graves), with some outcrops of older formation, the other one formed by the basement.

From Margaux to Saint-Estèphe, constituting the most famous vineyards of the «Grands Crus», the vineyards spread out over smooth hills covered by pebbly alluvial deposits, by ferruginous sandstones, and/or limestones. The hills smoothly pass into

lowlands constituting the estuary bank, and which are dissected by sinuous small rivers or «jalles». As well as the soils, the topography and the jalles constitute a natural drainage system i.e. an ideal support for the grand vineyards.

More inland, on the western part of the Médoc, particularly around the town of Listrac, the second area is made up of hills, developed more on the Aquitaine basement, i.e. on tertiary limestones.

In between these two classical graves vine areas, calcareous and argillaceous crop out, which are also good places for vintages.

Cepages

Four cepages are currently used in Médoc:

The **Cabernet-Sauvignon** is the most used and is the typical Médoc cepage. It gives to the wine a very nice colour; it makes it full-bodied, with a pleasant bouquet, and allows the wine to bottle age well.

The **Merlot**, is the second most used cepage. Its best effect is to give the mellowness to the wine, but it is less interesting as a wine for aging.

The **Cabernet Franc** gives a clearer but brighter colour and a rich bouquet to the wine.

The **Petit Verdot**, grown in small quantities, late to ripen, brings to the wine body and colour.

Appellations

Two A.O.C. : Médoc and Haut-Médoc.

To the north of the area, the **Médoc** (formerly «Bas-Médoc»), produces wines of Médoc A.O.C., light, supple and pleasant.

In the central and southern part, the **Haut-Médoc** A.O.C. consists of six town appellations: **Saint-Estèphe**, **Saint Julien**, **Listrac**, **Moulis**, **Margaux** and **Pauillac**, these later two include the famous **Château-Margaux**, **Château-Lafite**, **Château-Latour** and **Château Mouton-Rothschild**, registered as first great vintages (Premiers Grands Crus). If we would have to qualify them, we would say that Margaux wines are generous with a bland bouquet, those of Pauillac more mellow and vegetal, the Saint-Estèphe less full-bodied but more aromatic than the Pauillac, the Moulis ample and voluptuous, the Listrac full-bodied and also vegetal.

The Médoc town appellations

Saint-Estèphe A.O.C. (11.09.1936 decree).

Saint-Estèphe appellation is only granted to the vintages grown in the town territory. Its identity is strongly related to its peculiar terroir, which is mainly characterized by pebbly and argillaceous-sandy

alluvial (graves) soils. To the west, they are locally intercalated and covered by eolian sands. This terroir allows for a good drainage of the vineyards.

The various successive alluvial drapes are covering the argillaceous-limestone basement of the «calcaires de Saint-Estèphe», which are Miocene and contain fossils of Echinoderms and marine molluscs.

Pauillac A.O.C. (14.11.1936 decree).

Pauillac A.O.C. is not only limited to the wines grown in the town territory, but also to some parts of the neighbouring Saint-Estèphe, Cissac and Sauveterre towns. Cabernet-Sauvignon is the most used cépage. Besides the classical grave terroir, the other terroir is composed of complex soils derived from ferruginous climatic residual crusts (alios) resting on a marly calcareous basement, which allows good drainage and good rooting of the vine. Pauillac wine can be kept for years, at least 15 to 20 years, if not more.

Saint Julien A.O.C. (14.11.1936 decree).

A small A.O.C. but with a great fame, it offers an extraordinary homogeneity of quality. The Saint Julien wines represent the organo-leptic transition between the elegant Margaux wines and the vigor of the Pauillac ones. They can be kept a long time, 10 to 15 years and more.

The terroir landscape is formed of smooth, pebbly hills around Saint Julien and Beychevelle. Towards the west, graves become more and more siliceous and the soils are derived from pebbly argillaceous graves resting on alios. Drainage is perfect and the vineyard grows well.

Listrac Médoc A.O.C. (08.06.1957 decree).

This district lies more to the interior, and thus has a more continental climate compared to the other town appellations, with frosty winters and cold springs, which can sometimes be disastrous for the vineyard. The terroir is gravelly to the north, calcareous (St-Estèphe limestones) to the center, north-east and the east, and ferruginous to the west (alios) and more sandy when approaching the Landes forest. Thus, mainly derived from calcareo-argillaceous soils, the wines have a rich vegetal (thicker) taste and a strong body. The Listrac wines rarely take an orange colour with age. They can age 10 to 15 years or more.

Moulis en Médoc A.O.C. (14.05.1938 decree).

Set among old mills, which gave the name to the area, the Moulis vineyards are not so well known as the preceding ones. The vineyard is about 350 m large

and 12 km long, installed on old graves (Günz); the derived soils are often mixed with clayey-calcareous components, given by the paleosols and the limestone basement.

The Grand-Poujeaux, on its large, rounded hill, is the most typical vineyard, as well as the best known, grown on Günz river deposits. These alluvions are more abundant and pebbly on the eastern part. Meanwhile to the south-west, graves are more and more mixed with marly elements and alios. In the center of the strip, the basement is closer, and argilo-calcareous soils allow the Merlot to develop. With this cépage, wines of this area are finer and more delicate. Due to the complexity of these terroirs, it would be difficult to define typical features of the Moulis wines; that is more the duty of specialists. Note also that many of the red wines from Moulis can be drunk with sea-food and fish, which, although it is not very well known, yet is delightful. Wines can be kept at least 8 to 12 years.

A.O.C. Margaux (10.08.1954 decree).

The mere name of Margaux is world famous. This A.O.C. is the wine, the town and a château. The vineyard has been famous since 1720-1730, but the official birth decree came only in 1954. Five towns have the right to be Margaux A.O.C.: Soussans, Margaux, Arsac, Cantenac and Labarde.

The Margaux fame is mainly due to its terroir. Derived soils come from very poor graves, which reach their maximum thickness there, i.e. 11 m thick.

A large plateau of white graves forms the central part of the Margaux area. Pebbles of quartz, cherts and flints are abundant, with a low proportion of argillaceous elements. Soils are pebbly, thus very porous, so the drainage is natural and very efficient, producing good subterranean thermo-regulation. The basement is argilo-calcareous (marly) or calcareous, and contributes to reinforcing the soils.

Margaux wines have a certain body homogeneity, but differentiated bouquets. Cépages are those of Médoc, and the Malbec. Margaux wines can be kept a long time, at least 12 to 15 years and more.

Graves (plate 1, figures 2 and 3)

The Graves region and vineyards extend from the walls of Bordeaux on for about 60 km, all along the left bank of the Garonne river. More than 2,000 years ago this constituted the cradle of the Bordeaux vineyards. The terroir is closely related to the glacial-interglacial evolution of the Paleo-Garonne and Garonne rivers, because its soul is the alluvial river

deposits: pebbles, sand, argillaceous material, what we call here «graves». During the XVIIIth century, the «New French Claret», or the modern Bordeaux was born here, around Haut Brion.

Wines which have the name of their soil

A.O.C. Graves is the only example in France, where the wines have the name of the soil which characterizes them.

Could we thus conclude that wines are similar if they have a single geological or topographical location? Certainly not, because if the geological and topographical location are certainly the basis of a vineyard's production, microclimates, sun brightness, winds and rains, as well as the art of the vine-growers are all factors that determine a wine's fame.

If we carefully consider, as geologists, the alluvial history of the Graves, we will observe that they are constituted by several superimposed and erosional alluvial drapes, reflecting at less one million years of glacial-interglacial history. Thus, if the Graves are alluvial terraces, there is not only one terrace along the left bank of the Garonne river, but a lot of superimposed and erosional terraces, from different periods of time, and with various sedimentary supplies. All this region has in common its alluvial and pebbly nature.

Thus, there is a large diversity in the Graves vineyards and, for example, Graves wine from upstream (Langon) is not comparable with Graves wine from downstream (Pessac), because the local geological history and other factors are different. The definition of the A.O.C. and its borders are founded on this notion.

Pessac-Leognan A.O.C.

This is why I.N.A.O. delimited in 1987, on the old vineyard area of Graves de Bordeaux, the terroir of a new A.O.C., «**Pessac-Léognan**», which extends across 10 towns: Cadaujac, Canéjan, Gradignan, Léognan, Martillac, Pessac, Saint-Médard d'Eyrans, Talence and Villenave d'Ornon.

-Terroir : an exceptional combination of favourable elements

With a thickness varying from a few centimeters to more than 3 m, the Graves closely reflect the Late Tertiary and Quaternary paleo-glacial history of the large rivers which drained the area, long before the modern Garonne. The Graves of Pessac-Léognan

overlie a complex basement of sand, argillaceous material, alios and limestones. Among the pebbles are white vein quartz, white, yellow, pink, red quartzites, lydites and jaspers, cherts and flints, which have a high albedo and which reflect the sun light and heat, giving back light and warmth to the lower part of the leaves and to the grape bunches, limiting the role of the I.R., and helping the ripening of the grapes.

The almost exclusive nature of the soils, pebbles and/or sands, only allows the vineyards and the forests to grow, producing the typical landscape of the Graves area, with large areas of vineyards, just interrupted by the deep green hues of the Landes forest. Vineyards are grown mainly on the undulating pebbly hills of the old graves, well exposed to the sunlight and particularly well drained along the steeply inclined slopes and by the dense, small-scale hydrographical system.

This is why the Pessac-Léognan Graves wines are so typical of their region.

A well defined micro-climate

Situated in the northern part of the Graves, south and southwest of Bordeaux, the Pessac-Léognan Graves terroir is called also «Graves du Nord» or «Graves de Bordeaux», to differentiate it from the central (Portets) and the southern (Langon) parts of the Graves. Pessac-Léognan vineyards take advantage of the protection of the Landes Forest, which screens them from the always moist, and sometimes stormy, Atlantic westerly winds. This climate is very representative of the Gironde area, so adapted to the vine, because it is temperate due to its position under the 45th parallel, and hygrometrically equilibrated, under the influence of the Ocean, and most of all, largely ameliorated by the Gulf Stream. Curiously, the small river «le Saucats», which flows through the village of La Brède, and near the Medieval castle of the XVIIth Century philosopher Montesquieu, is a climatic border.

I.N.A.O. recognized this river as a climatic border and a limit of the spore maturation of a microscopic mushroom, *Botrytis cinerea*, which is necessary to the making of the sweet and mellow wines of Sauternes.

South of «le Saucats», the microclimate is wetter, and the noble rot - or «pourriture noble» - caused by *Botrytis cinerea* allows the maturing of the wines of Sauternais and Graves Supérieures.

To the north, the *Botrytis cinerea* occurs only by accident, but gives only the grey rot or «pourriture grise», and the vine-growers, to avoid disasters, are immediately wrestling against the mushroom, which

becomes the primary enemy of the grape.

Exceptional Wines

The annual production reaches about 70,000 hl, or about 9 millions of bottles (80% of red and 20% of white dry wines).

Château Haut-Brion is presently the foremost of the great Graves vintages, which are all located in the Pessac-Léognan A.O.C.; it is the primary mover of the 63 Châteaux and Domains, which constitute it.

The red wines are predominantly derived from the **Cabernet-Sauvignon** cepage, together with **Merlot**, while the white wines, of a great elegance and high class, come from **Sauvignon**, often mixed with **Sémillon**.

Wines here are mainly stored in oak barrels, and can be kept for years, which is the sign of high class wines. They are stored in the different Châteaux, and mainly sold as «primeurs» by the Bordeaux trade.

Graves white wines

The Pessac-Léognan dry white wines are generally of pale, straw yellow colour, this hue is due to their 6 to 10 months aging in oak barrels, with, during the earlier months, a constant cudgeling of the wine lees to keep them in suspension, which gives more body to the wine and gives off the best aromas. When young, those white wines are fine, delicate, aromatic and fresh. Their fragrance is marked by the **Sauvignon**, which here recalls the muscat aroma.

Sauvignon is used predominantly in this area, bringing freshness and fruit, at times affiliated to **Sémillon**, which brings the strength of its unique aromas of crystallized fruits.

White wine are fruity, thicker and exciting. Well equilibrated, they can age, changing little by little to a golden colour, and acquiring very fine aromas, sometimes bright, with floral notes, which recall lime-trees and genista. We can say that those wines are all, but not only, perfumed. In the mouth, their aroma is powerful but subtle, and the taste recalls crumpled laurel or black-currant leaves. As soon as they reach their maturity, these white wines are complex, voluptuous, round; they seem sweet, although very dry. Very long in the mouth, their aromatic persistence is very high. What is very rare for dry white wines is that they can age with bliss for a long time, like the red wines, i.e. more than 20 years.

Surely they are unique and different from the other dry white wines. When young, they have to be drunk cool (around 10°C). But, after 4 or 5 years, it is better to drink them after letting them breathe, and at 12 to

14° C they will be pleasant.

Graves red wines

These red wines are of a deep and intense, bright purple colour.

When young, their aromas are very fine. They consist of fragrances of crushed berries, of ripe fruit, but also of vanilla and grilled almonds.

When in the mouth, they have body, are voluptuous and are very savoury, having nice tannins, generally mature and well concentrated.

Just a bit secret, quite serious and sometimes severe when young, they become supple and sweeten with aging. Then, with time, the fruit's tannins blend with those of the oak, to give a rounded and mellow wine in the mouth.

When aged, they develop an excellent bouquet, which mixes perfumes of wild game of the forest, but also of truffle or even of dried plums.

When drinking them, the olfactory sensations develop and mix with the wine's perfumes to give a good equilibrium, with beautiful strong and supple tannins, with a lot of body and spicy taste; it finishes slowly and long in the mouth with a long and great, supple, velvet richness.

Pessac-Léognan red wines are together complex and well equilibrated, all finesse and suavity. They have an exceptional personality; they are high class wines of stature.

They can age many years, thanks to the **Cabernet-Sauvignon**, the main cepage used, allied with **Merlot** and sometimes **Cabernet Franc**, which brings suppleness and adds to their elegance.

They have to be drunk at the right temperature, i.e. around 18°C, and have to be carefully decanted if they have settled natural deposits on the bottom of the bottle.

Wine growing and commercialisation

Wine growing is the translation of the French word "élevage" which is a term applied to the Great Vintages

White wines as well as red ones are, for the most part, fermented in oak barrels. Depending on the vintages, 25 to 100% of the vintage is aged in new oak barrels, which come mainly from oaks of the Central French Massif, i.e. from the Allier department (region).

Pessac-Léognan wines are commercialized in a special way. All the whites and reds are sold in bottle, the bottling being done at the château. Traders on the Bordeaux market are the most important buyers. The explanation lies in the seniority, notoriety, quality and easily-recognizable nature of these wines, which

are the only ones, together with the greatest Médoc A.O.C. wines, to have this quality of origin and long-term high commercial performance.

Other singularities: almost all these wines are sold «en primeur», which is a unique tradition, typical of Bordeaux. The sale «en primeur» is done the spring following the harvest, between the vine-owners and the traders, with the Bordeaux brokers serving as middlemen. The sale means that the wine is just in its early stages of development and its quality is not really known, but traders and buyers are betting on the vintage.

After the transaction, the wine remains under the responsibility of the seller and is conserved, and processed in the château, up to its bottling, 18 months later. This sale procedure is reserved only for the high class wines.

Bourg and Blaye (plate 1, figure 1)

Côtes de Bourg, Côtes de Blaye, situated on the opposite side of Médoc, on the right bank of the Gironde estuary, the vineyards and wines of this area are sometimes forgotten. However, as soon as the wine-lover crosses the estuary, these vineyards become a priority for visits.

The city of Blaye developed on the right bank of the estuary as a holding area for waiting to cross by boat the estuary and to secure passage towards Bordeaux's harbour. During the XVIIth Century, Vauban designed and built the huge and powerful fortified citadel of Blaye, which was still used during WW II.

In the shadow of the citadel, and amid 60,000 ha of land devoted to agriculture, **the vineyards of Côtes de Blaye** represent 5,000 ha of vineyards, worked by 450 Blaye vine-growers, producing approximately 300,000 hectolitres of red and white wines. Several different grape cepages are used to grow a wide range of complex wines. Five A.O.C.s constitute the Red and the White Premières Côtes de Blaye, making the most of this bountiful land, then the Côtes de Blaye, and finally the Red and White Blaye.

Côtes de Bourg's vineyards cover about 3,600 ha on an approximate 15 km-long and 10 km-wide area, grown by 650 vine-growers. Remains of prehistoric man were discovered in 1881 in the Pair-non-Pair cave, near Marcamps, with wall (parietal) paintings aged 30,000 years old. Marcamps and Prignac have large limestone quarries, which have furnished a large part of the building stones for the whole area. Bourg is a fortified city, and its ramparts offer a vast view of the countryside. Often called the « Girondine Swiss », the Bourg region has a composite terroir, which develops

mainly on the Oligocene Stampian « calcaires à Astéries » marine limestones. Approaching the estuary, graves appear, with, very often, brownish-reddish, fine argillaceous formations. Three main kinds of soils are distinguishable :

- on Quaternary, fine argillaceous deposits overlying Asteries limestones: vines develop deep roots, giving generous wines. Predominantly Merlot is grown, accompanied by Malbec.

- on argillaceous-sandy graves : vine roots highly develop near the surface, with difficulty going deeper, due to the high amount of clays. Cabernet cepages are preferred, accompanied by Merlot.

- argillaceous-calcareous soils derived from various kind of calcareous rocks, partly covered by clays: limestones, marls, molasses. Given the thickness of the soils, Merlot, Cabernet, Malbec are grown.

Thus, Bourg vineyards are characterized by their soil diversity, but, in addition, by a relative homogeneity of cepages and climates.

Pomerol and Lalande de Pomerol (plate 1, figure 4)

Among the Libournais vineyards, **Pomerol** extends over 760 ha of various terroirs: an argillaceous plateau, sandy soils to the west, but generally siliciclastic soils resting above a ferruginous and calcareous basement. Vineyard work is more difficult when argillaceous soils are present, but the deep, dark colour, the nice taste, and the aptitude to age of the Pomerol is due to the iron oxides.

Regional geological setting and climate

The uniqueness of the whole area, including St Emilion, is the extreme diversity and thus complexity of its terroirs and soils. So, the various vineyards, and even parts of a same vineyard itself, have different and unique derived soils, textures, structures, porosity and permeability. These physical properties are mainly related to the variety in topographical settings, rock basements, derived soils and microclimates.

More precisely, specialists separate 5 main kinds of soils:

- 1. The high terrace, forming an elevated surface similar to a plateau, of ancient graves. It is on this that the most famous vintages of Pomerol are grown, including Château Cheval Blanc de Saint-Emilion, which should have been a *Pomerol*, had it not been in the territory of Saint-Emilion township.

- 2. These graves surround Pétrus and another part of

Pomerol, which thus appear like a button-hole, or a privileged « island », of 11.5 hectares of deep fine (2 microns) clays and very fine and argillaceous soils.

Château Petrus is one of the most world-famous châteaux, and one of the most expensive wines (about US\$ 800 for a 1996 vintage bottle, 2004 prices). It is made with 95% Merlot and 5% Cabernet Franc. The average age of vines is 42-45 years. Petrus's owner also owns the Dominus Estate in the Napa Valley, in California.

- 3. To the west of area 1, an area composed of a mixture of sand and fine gravels, resting on the Lower Sannoisian (Oligocene) Fronsadais calcareous molasse.

- 4. The area closest to Libourne is siliceous and produces supple wines.

- 5. Superficial soils, derived from Stampian limestone («calcaire à Astéries»), in which the high percentage of calcium gives the vine stability.

Four châteaux represent 16% of the A.O.C., the remaining being managed by 160 single owners. All together, they produce about 4 million bottles. Pomerol wine is of a delicate, sensitive taste, having the fineness of the Médoc wines and the vigor of those of Saint Emilion.

These wines typically are a blend of three quarters Merlot, with the remaining quarter from Cabernet Franc, with a small quantity of Cabernet Sauvignon (introduced here only in the 60s). The *Pomerols* are a bit tannic (which comes from the Cabernet Sauvignon). They can be kept years, but are not as long lived as the Médoc, Graves or Saint-Emilion best wines, giving their best between 5 to 15 years. Round and supple, but also full-bodied, they have a strong bouquet and warm taste. The best come from the plateau.

Lalande de Pomerol

This A.O.C. includes the Lalande de Pomerol and Néac townships, and grows on gravelly and sandy-gravelly terroirs, on smooth slopes. Néac is the town which provides, generally, the best wines: colourful, generous and with bouquet, having the vine taste of *Pomerol* and the richness of *Saint-Emilion*. 230 vine-growers are producing about 5 million bottles each year. *Lalande de Pomerol* wines are generous, fresh and steady, but without the richness of the *Pomerol*, with which it can not compete. Wines have to be drunk at between 5 to 15 years.

Saint-Emilion (plate 1, figure 4)

Saint-Emilion competes with Graves to be the

oldest wines in Aquitaine. Obviously, Julius Caesar drank much Saint-Emilion wine, and Ausonius was the first one to celebrate it. Saint Emilion town is a picturesque city built on a corner of a calcareous cliff. The limestones were intensively exploited in underground quarries, probably since Roman times, and Christians used the caves and the underground galleries of these quarries to take refuge starting from the VIIth Century, resisting the Arabic flood. Thus, it is possible to visit the VIIth Century hermitage of Saint Emilion. Later, the city grew and was walled several times, particularly during the XIIIth Century. With its sloping and paved medieval streets, its old houses and the remains of Henri III's castle, Saint Emilion is a beautiful city. Excavated into the limestones, the underground, monolithic, medieval church is probably unique in Europe and in the world.

Regional geological setting and climate

Today, the Saint-Emilion A.O.C. consists of about 1,000 vineyards, 5,400 ha and 8 townships. The vineyards are located on the calcareous plateau and hills («calcaire à Astéries») and grave terraces of the Dordogne river's right bank, starting from Libourne, in the following towns: Saint-Emilion, Saint-Christophe des Bardes, Saint-Laurent-des-Combes, Saint-Hippolite, Saint-Etienne-de-Lisse, Saint-Pey-d'Armens, Vignonnnet and Saint-Sulpice-de-Faleyrens and a block of the Libourne city, which was called, in older times, «Saint-Emilion sands». The small, La Bardanne river, which is the border between the French language (or «oï language») to the north, and the Roman languages (or «oc language») to the south, is also today the northern limit of the A.O.C., This area, including Saint Emilion is now one of the UNESCO world heritage sites, since December 4th, 1999.

More specifically, on the 5,400 ha of vineyards, we can distinguish four main terroirs and soils:

1. on the steep limestone slopes located near the town of St. Emilion. The vineyards which are responsible for much of the appellation's reputation here cover 2,400 ha; they include 11 of the 13 registered Premiers Grands Crus.
2. 2,000 ha of vineyards develop on the alluvial sands on the large fluvial plain bordering the banks of the Dordogne river.
3. West of St-Emilion, the calcareous plateau extends as far as the village of Pomerol and is locally overlain by periglacial eolian fine sands and aleurolites, which

have extraordinary filtering powers, conducive to producing fine wines. The vineyards cover nearly 1,200 ha here as well.

4. The fourth area is located in the far west and it is the smallest part of the A.O.C., made up of 60 ha of gravel, or «Graves de St-Emilion». This is where Château Cheval Blanc and Château Figeac are located.

Saint-Emilion wines

Saint-Emilion exclusively produces red wines made from Merlot (60%), Cabernet Franc and sometimes Cabernet Sauvignon. However, Great vintages like Château Ausone and Château Cheval-Blanc, are made half and half from Merlot and Cabernet Franc, meanwhile some other châteaux, like Château Figeac, use completely different proportions of grape varieties, on account of their fine, gravelly soil. The blend is made with 70% Cabernet, (half C. Franc and half C. Sauvignon), and only 30% Merlot. This latter wine looks like a close relative of the Médoc ones. Generous, full-bodied, warm, Saint Emilion wines have, generally, a taste of truffles, and are often more powerful than the Médocs.

The Saint Emilion district includes two quite different types of wines:

- the plateau and calcareous hills wines: generous, full-bodied, structured, with a good aptitude to age. Soils are derived from the Stampian limestones («calcaire à Astéries»).
- Dordogne graves wines are different from the *Pomerols* due to their fineness, suppleness and bouquet.
- Upon EEC request, as of 1985, only two A.O.C. still exist:
 - *Saint-Emilion*: with an average of 100,000 hl/year,
 - *Saint-Emilion Grand Cru (Great Vintage)*, with an average of 130,000 hl, is a selection of the best ones and the qualification is only given after two successive taste examinations.

The former wine corresponds to an estimation of the aptitude to aging during the first year; the second one is the confirmation, given in the two following years. By law, bottling has to be done in the châteaux. However, these 2 A.O.C.s cannot reflect the entire vintage and the diversity and richness of the Saint-Emilion wine district.

Around Saint-Emilion

Saint-Emilion overshadows a cluster of neighboring vineyards, whose vine-growers try hard to be

recognized as vintages as good as that of Saint Emilion. Obviously, some are right, and their wines are sometimes of a superior quality than some wines which have the right to be called «Saint Emilion», but which are in fact not so good.

Formerly, the neighbors were registered as follows:

1. *Saint-Georges Saint-Emilion*
2. *Sables Saint-Emilion*
3. *Montagne Saint-Emilion*
4. *Puisseguin Saint-Emilion*
5. *Parsac Saint-Emilion*
6. *Lussac Saint-Emilion*

From 1989, three changes have been made:

- the area of *Sables Saint-Emilion (St-Emilion sands*, see here above), immediately east of Libourne, was integrated into *Saint-Emilion* in 1989;
- the area of Parsac has been integrated into Montagne, although it still has the right to the A.O.C. *Parsac Saint-Emilion* but does not use it;
- Saint-Georges wines have the opportunity to choose between A.O.C. *Saint-Georges Saint-Emilion* or *Montagne Saint-Emilion*. Some châteaux have chosen *Saint-Georges Saint-Emilion*.

Montagne Saint-Emilion

220 vine-growers in Montagne, and 32 in Saint-Georges, together own 1,700 ha, yielding 78,000 hl of wine.

The calcareous plateau terroir gives a colourful wine, full-bodied, robust. Along the paleo-valleys, silico-argillaceous graves give a lighter and suppler wine, which brings to mind the *Pomerol* and the graves of *Saint-Emilion* wines.

Lussac Saint-Emilion

This town produces just a bit of white wine under the name of *Bordeaux* or *Bordeaux supérieur*, but most is red wine, produced by 215 vine-growers who own 1,250 ha, and 130 vine-growers producing 60,000 hl.

Puisseguin Saint-Emilion

130 vine-growers have 680 ha on a pebbly terroir; 80 among them producing 30,000 hl. Wines are generally more simple than *Saint-Georges Saint-Emilion*, and have to be drunk from between 5 to 10 years.

Sauternes and Barsac

(plate 1, figure 4)

Very fine and sumptuous, mellow and sweet white wines come from the south-eastern part of the Bordeaux vineyards, on both banks of the Garonne river.

On the left bank, in Sauternes and Barsac area:

- **Sauternes**: 1,400 ha, producing about 25 hl/ha.

- **Barsac**: 600 ha, 25 hl/ha.

- **Cérons**: 70 ha, 40 hl/ha.

On the right bank, but to the South of the Entre-Deux-Mers area and with specific A.O.C:

- **Cadillac**: 70 ha, 40 hl/ha.. Wines of this area. can also choose the A.O.C. **Premières Côtes de Bordeaux**.

- **Loupiac**: 300 ha, 40 hl/ha.

- **Sainte Croix du Mont**: 400 ha, 40 hl/ha.

- **Côtes de Bordeaux Saint Macaire**: 50 ha, 50 hl/ha.

The most famous mellow wines are those of Sauternes and Barsac, of which 27 vintages were registered in 1855 : 1 Premier Cru Supérieur, 11 Premiers Crus and 15 Seconds Crus.

Sauternes white wine (35,000 hl) is produced in 5 towns : Sauternes, Barsac, Bommès, Fargues and Preignac.

Terroir is a mixture of silica, clay and limestone. The fineness of *Sauternes* comes from silica, its powerful taste from limestone, while clay gives it its unctuousity. The Sémillon, makes up 70% of the wine, contributing also to its unctuousity; but it is the Sauvignon (27%) which gives to *Sauternes* its body and aroma, and the Muscadelle gives it its subtle bouquet. 25 hl/ha is the average production, but good vine-growers limit their production to between 15 and 20 hl/ha. At Sauternes, climatic -- mainly rainfall -- conditions do not always permit vintages of high quality, mellow wines. Misty fall to cool winter mornings followed by hot and bright evenings favour the development on the grapes of a mushroom called *Botrytis cinerea* or «Noble Rot». This fungus grows on the grapes and provokes the dessication of the grapes, giving a grape pulp richer in sugar, concentrating in the small grapes quite an amount of complex, intense aromas (the same processus will be also used for Loupiac and Cadillac wines, see here below with Entre-Deux-Mers wines). In dry years, the *Botrytis cinerea* mushroom does not develop adequately: noble rot is scarce, and the grape is only freckled. The wines that are issued are excellent, just as similar types around the world, but they don't have the so typical «roasted» taste of *Sauternes*. Neither if the rain is too abundant, does the noble rot not develop; in this case the grey rot cuts the concentration of sugar in the grape. When harvesting is unfavourable, vine-growers don't hesitate to abandon the class of their wines, in order to guarantee the quality and to perpetuate the prestige of the name.

Harvesting of *Sauternes* is only done by hand. Grapes

are collected individually (bunches are not permitted and thus not collected) once they become overtipe, and selectively sorted, over one to two months of harvesting. Four to eight sortings are often necessary. Issued Sauternes wine is thus mellow, powerful. It has a high fineness and elegance; it is sumptuously but delicately perfumed. Its taste lingers a while, in a range such flavours as honey, linden-tree, acacia, apricot, grapefruit and lemon, depending on the property of origin. *Sauternes* can be appreciated from an age of 3 years on. It is then fruity and youthful. However, its normal pathway is to age, and it can be conserved 10 to 70 years or more, depending on the vintages and year of harvest. Among the 5 towns which constitute the limited district of *Sauternes*, **Barsac** (600 ha) has a unique situation: its wines can either choose to be *Barsac* or *Sauternes* A.O.C. This advantage comes from its peculiar terroir: argillaceous reddish soils resting above sandstones. Barsac differs from Sauternes only by its stealthy tones and shades: less thick and liquorish, but more fruity and more flavorful.

The Entre-Deux-Mers area

(plate 1, figure 4)

Regional geological setting and climate

The Entre-Deux-Mers area forms a plateau and its name, «Between-Two-Seas», comes from its geographic location between the two large rivers, the Dordogne to the north, and the Garonne to the south, forming a plateau between the both (fig. 1). This plateau, thus situated between two large rivers, actually forms a «pays», i.e. a «country». It is a very beautiful charming countryside, where villages, castles, and chapels are widespread. The Entre-Deux-Mers area extends east of Bordeaux, about 60 km west to east, and 30 km north to south, up to Ste. Foy la Grande, Montségur and La Réole (plate 1, figure 4). Entering both rivers as a «mascaret» (name of the tidal wave entering a river), the Atlantic tides progress into the rivers and their valleys about 200 km or more from the sea shore, which marks the eastern limit of Entre-Deux-Mers. Due to its location, the area has played an extensive role in history. Romans most probably harvested the vineyards, and left evidence of some areas of settlement. By the foedus of 418 AD, Rome and Aquitaine welcomed the «Visigoths» as a federated people, but the largest period of settlement and extension of the vineyards would be the Middle

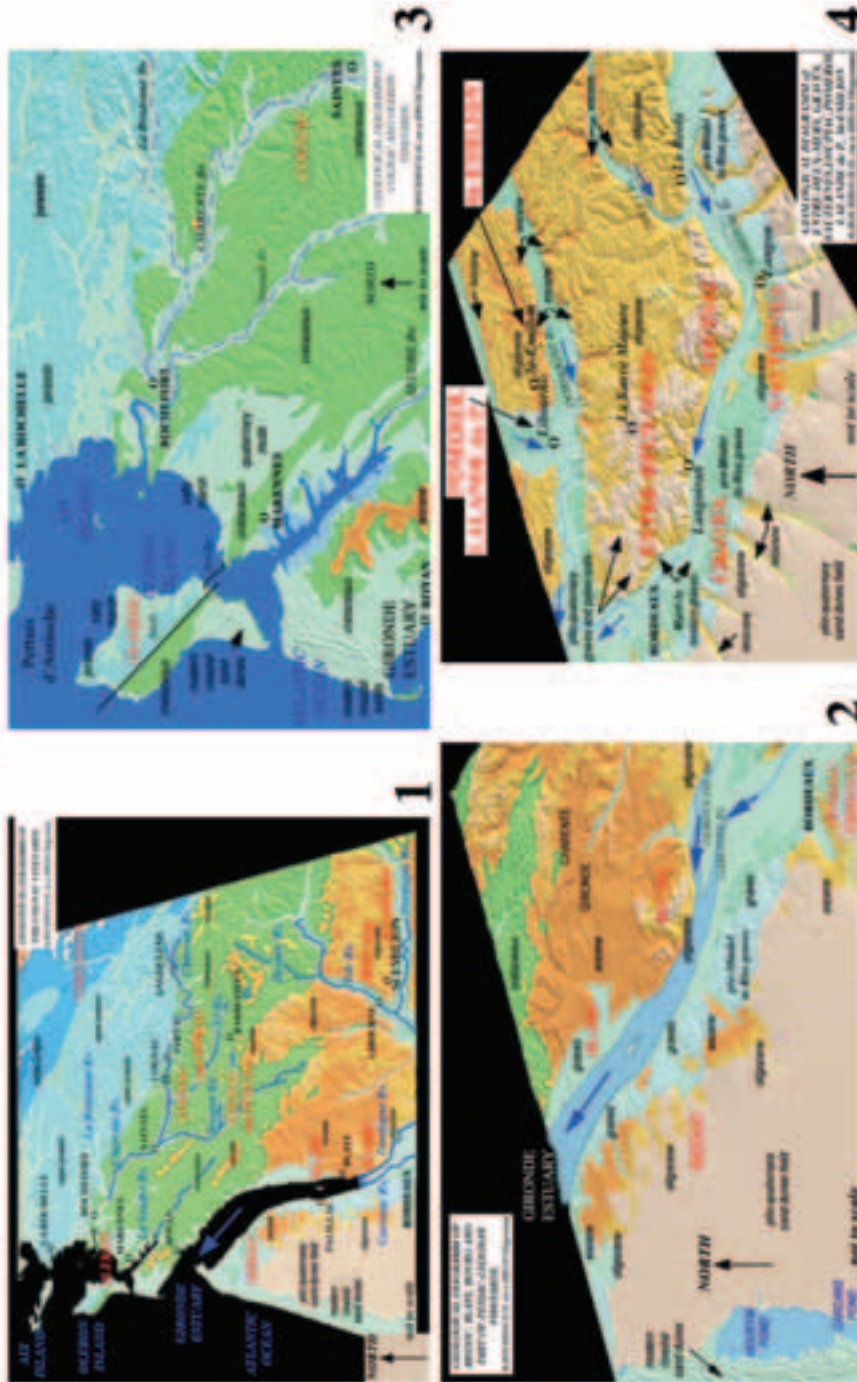


Plate 1: Regional geological settings of :

Figure 1: the Cognac Vineyards,

Figure 2: Médoc, Blaye, Bourg and part of Pessac-Léognan Vineyards

Figure 3: the Cognac and Oléron Vineyards,

Figure 4: Entre-Deux-Mers, Graves, Sauternes, Barsac, Loupiac, Pomerol, Lalande de Pomerol and Saint-Emilion Vineyards.



1



2



3



4



5



6



7

Plate 2:
Figure 1:
Margaux
Vineyards;
Figure 2:
Cos d'Estournel;
Figure 3: Château
Ausone;
Figure 4:
Saint Emilion
Vineyards;
Figure 5:
La Sauve
Majeure Abbey
and Entre-Deux-
Mers Vineyards;
Figure 6: the
Zanzibar Sultan
Palace's door at
Cos d'Estournel;
Figure 7: oak
barrels (Bordeaux,
Cognac) in the
cellars.
Photos:
R. Bourrouilh.

Ages. The large forest, «Silva Major» or «La Sauve Majeure», was cut by the Benedictine Monks, while vineyards were highly developed at the beginning of the XIth Century, together with agriculture and cattle raising. Romanesque abbeys were founded and constructed in deforested areas. La Sauve Majeure abbey was founded in 1079. Romanesque and Templar chapels accompanied smaller settlements. Many feudal castles, such as Langoiran, and walled cities like Castillon and Cadillac, controlled the rivers, north and south, as well the roads. Small villages and towns were created as «bastides» (walled towns), having sometimes peculiar laws or privileges. Fortified windmills, chapels and abbeys are also frequent in the heart of the vineyards. It was in Castillon-la-Bataille that the Hundred Years' War was ended in 1453, by the decisive victory of the French Army over the English troops led by Talbot, who lost his life there.

Geology and derived soils are governed by three main geological entities :

1. The calcareous basement: Entre-Deux-Mers is a calcareous plateau, successively constituted by mostly continental or lagunal Oligocene to Miocene facies : lacustrine limestones, sandstones, molasses.
2. Fine peri-glacial eolian deposits : the plateau is covered by fine peri-glacial loess and aleurolites (remember that 16,000 years ago the sea level was at -110 m in the Atlantic Ocean, and that icebergs were calving and drifting offshore of Bordeaux, while people were painting on the walls of the Lascaux cave).
3. Dordogne and Garonne alluvions, made up by pebbles, gravels, sands and siltstones, playing also an important role as «gravel claystones».

The vineyards

Covering about 30,000 hectares (ha), Entre-Deux-Mers is a total wine region, where red, rosé and mostly white vines are grown and produced. However, only the dry white wine, grown on only 1,500 ha has the right to be named «Entre-Deux-Mers». The «Côtes» vineyards, whose name comes from the hillsides along the banks of the Garonne and Dordogne, are spread across the entire region, producing reds, rosés and white wines.

The Entre-Deux-Mers plateau is world renowned as a principally dry, white wine-producing area. However, the area can also be divided into two parts: north of the road from Bordeaux to Libourne, the area is called the «Bonnes Côtes» and is predominantly characterized by red wines. Bonnes Côtes red wines are hard, with a bit of sourness and a deep red colour.

South of this road, predominantly dry, white wines are produced. The southern part is characterized mostly by dry white wines in the «Petites Côtes» area and a few red wines.

Along the southernmost part of the plateau, three special areas appear along the right bank of the Garonne:

- On the southern slope of the plateau, plunging toward the Garonne for about 20 km along the river, from Langon to the NW of Bordeaux, there are red and white wines of the «Premières Côtes de Bordeaux».

- First class, sweet, white wines, like Cadillac, Loupiac, are grown right in front of the Sauternes sweet wines, situated on the opposite side of the Garonne.

- As perhaps a souvenir of the English occupation of Aquitaine, rosés are also produced, principally in the Quinsac area, and they are called claret, a name which comes from the English name, «claret», given to the Bordeaux wines in England.

The production of Entre-Deux-Mers is stable; it was 95,000 hectolitres (hl) in 2000, of 100,835 hl in 2001, from about 240 producers, giving 13,300,000 bottles, of which 60% are exported. The main «appellations» or A.O.C.s of wines are: the Entre-Deux-Mers, Bordeaux and Bordeaux supérieur (a large district), the Sainte-Foy, the Graves de Vayres, the Bordeaux Haut-Bénauge, Entre-Deux-Mers-Haut Bénauge districts, and, along the right bank of the Garonne river, from west to south-east : Premières Côtes de Bordeaux, Cadillac, Loupiac, Sainte Croix du Mont and Côtes de Bordeaux Saint-Macaire.

The Entre-Deux-Mers are dry white wines, Graves de Vayres are red, dry white wines, and sweet (moelleux) white wines, Premières Côtes de Bordeaux are reds, sweet and liquorous, white wines, Sainte Foy are red and white wines, Côtes de Bordeaux-Saint Macaire are red and white wines.

Although wines from the châteaux, but also from the small growers, are excellent, personal taste will lead each of us to prefer one Château or producer to another. Château Bonnet, Château de Grain, Château de Mouchac, Château Vrai Caillou, Château de Castelneau, are generally mentioned among the numerous «châteaux». The Entre-Deux-Mers area is the most Bordeaux and Bordeaux supérieur productive area. They consist of reds, rosés, as well as dry and sweet white wines. The Premières Côtes de Bordeaux and Cadillac district deserve special mention. There, the Premières Côtes de Bordeaux are reds or white wines. The red ones come from Merlot, Cabernet Sauvignon, Cabernet Franc, Malbec and Petit Merlot

cepages, while the sweet and liquorous white wines come from a trilogy of Sémillon, Sauvignon and Muscatelle cepages.

Cepage blends for red wines

Merlot, Cabernet Sauvignon and Cabernet Franc are the three brothers of the deep, velvet reds wines of Bordeaux.

MERLOT cepage gives to the juice fermentation colour, and the richness of alcohol, making the taste of wine round and supple, with an aroma of ripeness, and a berry taste.

CABERNET SAUVIGNON gives the tannic backbone, i.e. the body of the wine or its structure. When young the wine has an aromatic Cabernet Sauvignon character, but as the wine ages, an enormously complex aroma gains ground in the wine.

CABERNET FRANC adds some sweetness and gentleness to the aroma, giving, generally a fruity, mixed flavour of fresh spring pudding of berries.

Cepages blends for dry white wines

Contrary to red wines, which are fermented with the skin, which gives red wines their colour and tannins, the dry white wines are grapes fermented without their skins. As soon as the grapes are harvested, the skins are separated from the «moût = must», or unfermented grape juice. Bordeaux dry white wines are exclusively made with a cepage mixture of Sauvignon blanc, Sémillon and Muscatelle.

SAUVIGNON BLANC gives to the wine sugar, i.e. alcohol and dryness or acidity. It also gives the young wine a deep aroma, ranging from a grassy tone to a flavour of lemon and exotic fruits.

SEMILLON brings a part of the wine body, with a rich, fresh, fruity aroma, generally evoking flavours of apricots and/or white peaches.

MUSCATELLE brings to the wine a special distinctive touch of sugary, slightly musky and floral aromas.

Naturally sweet white wines, such as Loupiac and Cadillac, are made principally of SEMILLON with some Sauvignon blanc, i.e. from sugar and aromatic cepages. Situated in front of Sauternes and Barsac, right on the opposite bank of the Garonne river, these sweet or dessert white wines benefit of the same microclimate. Like in Sauternes, the grapes, also dessicated by *Botrytis cinerea*, are generally harvested late in the year, up to mid-November.

Colour of the wines

The red Côtes are produced across the area and vary in colour and bouquet. A typical one will have a bright, deep claret-red colour and a flavour of berries, sometimes with spicy overtones. Merlot, when used, will bring a touch of tannin and will permit the wine to mature well. Entre-Deux-Mers and Bordeaux dry white wines have a very pale, yellowish colour when young. The colour will darken with time and becomes deeper, turning to straw-yellow with age.

Aromas of fresh fruit, sometimes acidic like fresh lemon, or flowers, give a mouth-watering taste. Top white wines become firmer with age, as Sauvignon is present and adds a bit of lanolin sweetness, while Sémillon gives it smoothness. Sweet wines such as Loupiac and Cadillac are based on Sémillon and have a warm golden colour, which will accentuate with age. For late harvesting, *Botrytis cinerea* will give a honeyed colour, with deep floral and fruity aromas. In many instances today, red and white wines are partly matured in oak barrels, and the sweet vanilla taste, or even just a bit of woody oak taste, will be discernable.

Cognac and its vineyard

(plate 1, figure 1)

Regional geological setting:

The city of Cognac is built on the Coniacian chalk (stratotype). To the south of Cognac, a large plateau develops, constituted by Santonian (stratotype, from the "Saintonge" Province) overlain by Campanian chalk (stratotype from the Saintonge and Cognac "Champagne"). Most of the Cognac vineyard develops thus on chalky basement and particularly on the Campanian, which is here about 60 m thick, composed by alternations of hardened chalky limestones and marly intervals. Regularly stratified, but highly fractured, soft and frost-riven, even the hardened chalky limestones turn very often into a marly facies.

Soils are mainly under the influence of frost, due to the presence of the Cretaceous limestone: freezing produces a large superficial alteration, leaving slabs of stronger Cretaceous limestones distributed in the argillaceous soils. Rarely are soils thicker than 30 cm. A very common field section shows :

- 0-15 cm : grey, gritty soil, containing a lot of small limestone angular clasts, of various sizes,
- 15-30 cm : pale grey horizon, very gritty, with larger limestone clasts, and cherty limestone blocks.

- Deeper, the whitish limestones are relatively soft and porous, and alternate with marly layers.

Thus, generally, soils contain a high proportion of carbonate, up to 50 to 80% ; pH is around 8, so soils are then exceptionally able to produce high quality wines, under a climate with very bright and sunny summers -- this district getting more than 2,000 sun hours a year. Vineyards are on the hillsides, receiving the first rays and heat of the sun, and protected from the spring frosts. The output is about 60-70 hectolitres for one ha. The Cognac are delicate and sweet, having a powerful body and bouquet; they improve very much when aging and are the finest and the most famous Cognacs.

Terroirs and A.O.C. : Around the city of Cognac, 7 vintages have been recognized for the Cognac vineyards since May 1st, 1909. They are characterized by their terroirs, i.e. by the nature and quality of their soils, the local climatology, and the vine care and viniculture. From the noblest to the most common, there are :

The Grande Champagne : 13,300 hectares (ha) make up this A.O.C., which extends south of the city of Cognac, amid the valleyed landscape around Segonzac, growing on the chalky limestones of the Upper Cretaceous -- more specifically, on the Campanian. With more than 40 cultivated ha per square km, viniculture is a monoculture, which takes advantage of the grey soils, or rendzine, derived from the alteration of the underlying chalky Campanian limestones.

The Petite Champagne : this terroir of 16,800 ha borders on the previous one to the south, from the town of Pons up to Châteauneuf, including Jonzac and Barbezieux. The grey calcareous soils are thicker; the Cognacs are also excellent, very close to those of Grande Champagne, but with just a bit less fullness, which appears mainly after aging.

Les Borderies : north of Cognac is the third district of the Cognac appellation, with 4,300 ha. Decalcified Cretaceous limestones are overlain by argillaceous soils, partly sandy and cherty. These heavy soils give softer and dryer Cognacs, having an original violet aroma. They are very sought after for blending with the Cognac.

Les Fins Bois : this vineyard surrounds the three above-mentioned ones, on 43,400 hectares. It is

the largest vineyard of the appellation, although the density of vines remains lower than those of the great vintages, i.e. 25 ha/km. The terroir develops on calcareous Upper Jurassic, Purbeckian and Portlandian derived soils, on reddish soils (groies); the Cognacs are lighter but less tasty, and they age quickly.

Les Bons Bois : this vintage is grown on 25,000 ha; it surrounds the previous one. The soils are («groies») heterogeneous, less calcareous, being mixed with sand and clays, thus giving a taste of «terroir» to very light Cognacs, which are sometimes short in character.

Les Bois Ordinaires and Bois Communs (or Bois à Terroirs) : this vineyard extends over only 3,000 ha, along the Atlantic coast; it includes the Oléron and Ré islands, as well as the SW part of the Deux-Sèvres department (region) and also some of the NW part of the Dordogne department. Soils are thick and sandy, giving common Cognacs having the taste of their terroir or, for the islander Cognacs, a taste of «iodine».

The Cognac viticulture History

Romans introduced the vineyard near *Novenus Pagus*, close to the city of Saintes, at the end of the IIIrd Century. The wine production remained local and was linked to the salt trading, which represented the main production up to the XIIth Century. Salt was extracted from the sea water along the Atlantic coasts of Saintonge and Aunis, and exported from the new harbours, which were founded on the coast. Duchesse Aliénor of Aquitaine married Henri II Plantagenêt in 1152, and the new alliance allowed the development of La Rochelle harbour and of a great trading market with England and the Northern Europe cities. A large vineyard then developed in Aunis and on the islands of Oléron and Ré; their white Chauché were soon being found on the good English and Dutch tables.

Besides this large vineyard, other small ones were cultivated near Saint-Jean-d'Angely and Cognac, shipped to the coast respectively by means of La Boutonne and Charente rivers. White wines from Chemère and Colombard, i.e. from Saintonge, were then shipped on these two rivers down to Tonnay-Charente harbour, where sea and river trades merged. At that point the Saintonge vineyards outdid the Aunis ones, and the «Folle blanche» («Mad Lady») cepage was preferred, giving more wine but lower in quality. But sailing ships and ocean shipping were very slow and the shipped wines quickly deteriorated and could not be kept a long time. Thus, at the beginning of

the XVIth Century, Dutch and then English traders enforced the technique of the «burnt» wine or «vin brûlé», i.e. the *Brandwine* (ancestor of *Cognac*): wines were distilled in a single alambic, giving a spirit which could be kept during a long ship journey. When arriving, water was added to the newly-distilled spirits, and the drinker could think that he had reconstituted a kind of original wine. The cognac vine-growers then adopted the «Mad Lady» cepage, preferring quantity to quality, and thus produced a high quantity of spirits. To reduce the shipping they even employed a double distillation, to have a higher degree of alcohol for a lesser quantity of liquid to work, to stock and to ship. Cognac vineyards outdid the Aunis and St Jean d'Angély vineyards, which then diminished in importance.

Paper mills from the Angoulême area also developed, and the paper was sold to the Dutch, which shipped it through the rivers to the harbours on the coast and then, to Holland. The Dutch then bought more and more Cognacs, which were distilled on the spot in the Cognac area. Vineyards developed and, after the very cold winter of 1709 (the Little Ice-Age) almost all the antique cepages were destroyed, but only the «Mad Lady» resisted, giving a high surproduction of wine, and thus of Cognacs. Cognacs were stocked in oak barrels and suprisingly, the vine-growers realized that the Cognacs became much better when aged, acquiring a fine bouquet, a mellow taste and a beautiful rich golden colour, becoming more attractive and thus more....sellable.

So, after the XVIIIth Century, Cognacs were then kept in oak barrels to be left to age. Trading posts were created, often managed by Dutch, English, Irish, Scottish and Danish traders, who settled in Jarnac and developed the wine and Cognac trading market. Even during the French Revolution, in 1792, they put on the market more than 90,000 hectolitres of Cognac. Trading and exportation extended to North America -- the USA and Canada -- the West Indies and the Indian Ocean Islands. However, wars and embargoes during the French Revolution, and the English-American War (1812), slowed the trade, which however increased up again after the French Empire fell.

During the XIXth Century, a lot of trading houses were founded, and made a major change to put the Cognac in bottles in place of barrels. This new manner favored the development of related industries, such as glass-making, wood box construction, cork-making, and printing houses, but also biscuit factories (to be eaten on ships). Production increased and was over 450,000 hectolitres before *Phylloxera* invaded the

vineyards. This bug accidentally came from the USA on shipped plants; it attacked the European vine roots and killed the vines. Found first in 1872 in Croûin (a Cognac suburb) and at Chérac in Charente-Maritime, the bug wrecked the Cognac vineyards in just a few years. From 282,667 hectares in 1877 the vineyards fell to less than 40,634 hectares in 1893.

Vineyard reconstruction became possible only after the work of Viala (1887) and the studies done by Ravaz, Vidal, Couderc and Millardet, who created stocks resistant to the *Phylloxera* and to calcareous soils, together. The treatment was done until 1914 around Cognac, to produce exclusively cognac. Then the vineyards slowly increased to about 75,000 ha. However, the «Mad Lady» was forsaken because it became stronger due to the grafting and more sensitive to the *Botrytis cinerea* fungus, which rapidly decays it. In its place White Ugni was used, being more resistant to the grey rot and with a late blooming time, avoiding the early spring frosts. This cepage ripens late, and so the derived wines are lighter, with a more discrete bouquet, a bit acid, and very adapted to be distilled, giving good Cognacs. Mechanical harvesting of the vineyards produces higher outputs. From 1975 on the Cognac production is so high that vine-growers have developed an alternative production of Pineau des Charentes, converting a part of their vineyard into a table wine vineyard, to produce and sell red and white wines, sold as « Charente countryside wines ».

Cepages

In older times:

the «saintongeais» or «poitevins» cepages: Balzac (= Balzat or Balzar or Banestat = white limousin), Black Chauché (= Chaussé-nègre), White Chauché, Chemère, Chenin (= Boullau = Clabat), Colombard (= or Colombé = Queue tendre), Côt (= Malbec, = Griffarin or Griffarin), Négrette (= Négrié = or Black Mad Lady) = Little Black= Dégoûtant), Teinturier (= Tintura), Vicane (= Bicane = Grous-blanc).

Today, to be distilled :

Colombard (903 ha), Follignan (White Ugni crossed with White Mad Lady) just created by INRA, White Mad Lady (= White Enrageat or Mad Lady of Bordeaux) (12 ha), White Ugni (= Saint-Émilion des Charentes) (77 334 ha)

And also for the Pineaux :

Cabernet franc, Cabernet Sauvignon, Malbec (Côt), Merlot, Montils, Sémillon

The main chlorose resistant stocks are :

41B Millardet and de Grasset (Berlandieri crossed with Chasselas), (I.P.C. = 60), 333 EM (Berlandieri

crossed with Cabernet Sauvignon), (I.P.C. = 70), 161-49 Couderc (Riparia crossed with Berlandieri), (I.P.C. = 60), Fercal (Berlandieri crossed with Colombard) crossed with (333 EM), (I.P.C. = 120)

Vineyard-growing techniques

Formerly only planted with white, non-grafted Mad Lady, with a density of about 6,000 vine-stocks/ha the vineyards were, after the *Phylloxera* invasion, planted with White Ugni, grafted and planted in lined, wired rows, with about 4,500 vine-stocks/ha. The double guyot trimming was generally used, before changing after 1970 with the advent of the harvesting-machines. Their use drove the vine-growers to adapt the vineyards, with higher wired rows, separated by larger pathways.

Cognac Distillation

As soon as they are harvested, grapes are pressed. After 5 to 6 days of alcoholic fermentation in tanks, wines are drawn off. Their alcoholic level is low (between 7 to 10% by volume) with a high acidity (A.T. > 5 g H₂SO₄ by litre). The finest lees are often conserved, because they are rich in organic complexes, which will give a better taste to the Cognac when distilled. Distillation is done in a copper alambic in two successive heating stages.

-The first heating is about 12 hours long. Wine is heated until boiling. The first steams condensate, containing around 55° of alcohol, and are thrown away as soon as they appear. These «heads» represent 0.5 % of the volume of the boiler. Afterwards, there flows a liquid with 25 to 32% vol. of alcohol, called «brouillis» in Charente. Finally the distillation «tails» are separated.

-The second heating, or «good heating», is between 12 to 14 hours long, the «brouillis» is put in the boiler and again distilled. As with the first heating, 1 to 2% of the «heads», with 78° of alcohol, are thrown away, and then the Cognac itself is taken out, between 78° and 60° of alcohol. The gained volume represents 30% of the «brouillis» which has been introduced in the alambic and has an average of 70% alcoholic volume. The liquid which flows off between 60° and 0° of alcohol is called the «seconde» and has between 28 to 32% of alcoholic volume. The seconde is taken out and kept to be mixed later with wines or «brouillis».

The Aging of Cognacs

Aging is done in 270- to 350-liters oak barrels. Oak-barrel aging is essential, because the Cognac is thus enriched in organo-leptics extracted from the

oak wood, while the naturally vascularized wood of the barrel allows the oxygen to enter slowly and continuously into the barrel. The high alcoholic concentration of the Cognac allows it to extract tannins, which slowly colour it while aging, as well as organic complexes which give it particular, characteristic aromas, evoking vanilla. Oxygen is fundamental: undergoing a slow, controlled oxygenation, the oak-derived compounds give to the Cognacs their characteristic, old Cognac aroma, called «rancio charentais».

Thus, a good white Cognac gains with time in oak barrels a more and more gustatory and olfactory complexity. However, due to the oak's porosity and the high concentration of alcohol, 2 to 3% of the Cognac evaporates each year. This is called the «*part des anges*», or «angels' share». Alcoholic vapors favour the development of a microscopic mushroom, *Torula cognacensis* Richon, which gives a black colour to the tiles and to the humid and nitrous walls of the aging wine cellars.

How to distinguish between the different Cognac appellations:

Appellation giving the origin of the:

Grande Champagne or Grande Fine Champagne: contains 100% Grande Champagne grapes.

Petite Champagne or Petite Fine Champagne: contains 100 % Petite Champagne grapes.

Fine Champagne: for Cognac blended with Grande and Petite Champagne and containing at least 50% Grande Champagne grapes.

Cognac as a generic appellation: Cognac blended from various harvests and ages.

Age of the cognac: Cognac age is only determined by its stay in the oak barrels, because it does not age in bottle. Thus, age is different and independant of the harvesting date. When various Cognacs of different ages are blended, only the age of the youngest one is considered. Minimum ages are thus fixed :

Cognac or V.S. (Very superior): minimum age: 3 years - **Cognac V.S.O.P. (Very superior old pale):** more than 5 years - **Cognac «Réserve», or «Napoléon»:** minimum 20 years - **Cognac « Extra », or X.O. (Extra old):** minimum 50 years.

The «Pineau des Charentes»

(plate 1, figure 4)

This is a liquorous wine or «*mistelle*», which is the result, put into an oak barrel, of 3/4 of half-fermented grape must with a minimum of 170 g sugar/l (or 10 % of potential alcoholic volume) and 1/4 of

matured Cognac having a minimum of 60% alcohol by volume. Annual production exceeds 100,000 hectolitres, and consists of 55% of white and 45% of pink Pineau.

500 winemakers, vine-growers and about ten cooperatives are making and trading Pineau. 100 traders represent more than 40% of the retail market. According to the legend, it is in the year 1589 that, by a stroke of luck, Mister Pineau, an absent-minded vine-grower, made a slip, putting grape juice and must into a barrel still containing Cognac. After a while, he noted that the must did not ferment, and so he left it. Some years later, emptying the barrel, he saw a clear and nicely coloured liquid. He tasted it, discovering a delicate, mellow, fruity beverage and thus Pineau was born. Some time later, the vine-grower spoke of his discovery, and the recipe spread like wildfire around the area; soon everybody was making Pineau. Drunk locally, the fame of Pineau also spread throughout France and then, throughout the world. The fresh grape musts used to elaborate the Pineau are only produced in the area of the Cognac appellation and blended with those Cognacs. They mainly come from White Ugni, Colombar, Montils and Sémillon for the white Pineau and from Cabernet Franc, Cabernet Sauvignon, Merlot and Malbec cepages for the pink one. The stocks have to be grown in short pruning, and cultivated without nitrated fertilizer, for a maximum output of 50 hectolitres/ha. Pineau has to age on lees in oak barrels at least a minimum of one year to obtain the equilibrium between the remaining sugar (120 to 150 g/l) and alcohol of the Cognac (lowered between 16% to 22% alcoholic volume). As for Cognacs, date is not indicated. The name «Vieux Pineau» is for Pineaus aged 5 years, and «Très Vieux Pineau» for those aged more than 10 years. Anyway, Pineau has to age and remain in oak barrels, and the quality and age is tested by a special, official tasting commission (Jury). Pineau can be drunk young (from 2 years on) already revealing all its aromas of fruits and its freshness. The red is generally sweeter and more fruity than the white one.

Pineau gets better when aging and has to be kept in upright bottles for several years, in cool cellars.

Traditionally, Pineau is served cool (12°C), chilled, or on the rocks (5 to 6°C) as an apéritif or with dessert. However, some gourmets have noted that its roundness goes very well with foie gras and roquefort, and that its mellow taste fits excellently with fruit, such as Cantaloupe (from Charentes), strawberries and raspberries ..., and that its fruity aroma brings a special freshness to the taste of oysters.

Marenes-Oléron ostreiculture

(plate 1, figures 1 and 3)

The Romans of Julius Caesar brought with them some techniques for exploiting the natural oyster banks of *Ostrea* (plate oyster, called in French « Belon », due to their presence in the Belon river estuary, near Pont Aven, the city of painters, in Brittany), which grew in abundance on the Atlantic coast in the «Santon sea». As a result of salt production, the oysters were taken out of the sea, transported by boat and put along the Charente river, and then, after a while, exported everywhere in the Roman Empire to be eaten, the shells being then used, ground up, and given as a nutritional carbonate supplement to the geese and hens (for their egg shells), as well as also being used as a part of the mortar in Roman constructions. However, it is only during the XVIIIth Century that this seafood was rediscovered and that the Marenes oysters earned fame, while the salt trading, which was the wealth of the province, declined. Naturally, the over-exploitation of the natural, offshore oyster banks provoked the inevitable vanishing of the oysters by the end of the XVIIIth Century, when it was officially forbidden to collect the oysters.

In 1868, Hector-Barthélémy PATOISEAU, born on Oléron Island, came back from the Tage estuary, in Portugal, with a shipment of Portuguese oysters (*Gryphea*, or hollow oyster), which he had to deliver to Arcachon. But a storm stopped him and he had to weigh anchor in Le Verdon (the western approach of the Gironde estuary). However, the Portuguese oysters in the shipment were in a bad state, and many were affected by decay. Thus, Patoiseau threw them into the mouth of the Gironde estuary. Some years later, the robust Portuguese hollow oysters had prospered and settled on the rocky banks of the mouth of the Gironde estuary and of the Seudre estuary. Then, the newly-acclimated hollow oysters from Portugal and of the genera *Gryphea* competed with the indigenous plate oysters of the genera *Ostrea*, whose growth rate is slow and which is more expensive. In addition, *Ostrea* disappeared in the 20s, due to an epizooty. Up to the 50s, Portuguese oysters were the only cultivated oysters, but they too underwent two epizooties. Thus, oyster-growers imported several tons of more resistant *Pacific Gryphea* from Japan to reconstitute the Atlantic ostreiculture.

Oyster growing and care

At the beginning of summer, oyster sprat is collected when tides become important and water temperature

optimal. Then, various substrates are used, as for example Roman tiles, slates, old shells, iron pieces, wood pilings, or even plastic tubes. These substrates are cleaned, sometimes limed, and then submerged in the open sea, in the straits (or «pertuis») separating the various Atlantic islands, and off the Seudre estuary to collect the oyster sprat, which fixes on them. After collection, the new-born oysters are grown in intertidal sea parks, along the coast. Enclosed in wire-netting for 4 to 7 years, oysters grow up fast, becoming thick and fleshy. They are kept cleaned from other fixed shells like small young oysters, Gastropods (*Crepidula*) etc..., and finally size classified and refined.

Refining oysters called «fines de claires» and «spéciales de claires» is a speciality of the ostreicole Marennes-Oléron district. Claires are small square basins of salt water, linked to the open sea, with a flat muddy bottom, walled by muddy dikes. Very often, claires are old salt basins. In the claire basins a green-blue diatoma, *Blue Navicula*, develops, which gives the oysters a nice green colour and, together with the basin, a peculiar and fine taste of hazelnuts. The «fines de claires» remain in those basins only a few weeks, with a density of 40 to 50 oysters/m² while the «spéciales» will stay there 5 months, with a density of 4 to 5 oysters/m². Refining is highly-watched, even by satellite, in order to have the Marennes-Oléron oyster A.O.C.. Oyster sea parks and refining basins are terroirs parks, similar to wine terroirs. The claires are called with burgundy wines names (!) and controlled by location, with certain oyster populations being grown in specific sea-places, and climatic conditions which determine oyster vintages and dates.

Itinerary (see back cover)

Note: depending on the possibilities of visits, the stops listed here below may be changed to other châteaux, if necessary.

DAY 1

BORDEAUX TO PAUILLAC AND THE MÉDOC VINEYARDS

(see back cover)

Arrival and welcoming at Bordeaux, briefing and introduction to the field trip.

Departure for Pauillac, along the Médoc wine road, which runs along the left bank of the Gironde estuary, and all through the Médoc vineyards.

Along the way, we will pass near **Château Siran**, formerly a property of the Toulouse-Lautrec family,

near the prestigious **Château Margaux**, built in 1802, (*plate 2, figure 1*), **Château Maucaillou**, and near **Fort-Médoc**, a fortification designed and built by Vauban in 1689 on the opposite side from the **Blaye Citadel**, to protect the entrance of Bordeaux's harbour together with the island **Fort Paté**.

LUNCH

Château BEYCHEVELLE.

Formerly, this white mansion, renovated in 1757, was the property of the Duke of Epernon, who was Great Admiral of the French Fleet during the XVIIth Century. Ships lowered their sails (*baisse voile*) to salute the Admiral, but also to stop and pay a toll to reach the harbour of Bordeaux, upstream.

Château LÉOVILLE-LASCAZES (Margaux), near **Château TALBOT** (named for the XVth Century commander of the English Army, defeated in 1453), is one of the St Julien-Beychevelle terroir châteaux.

PAUILLAC, harbour which receives transatlantic liners, large sailing ships -- like the «Belem» or the «Sedov» -- as well as wine festivals. Pauillac is the township where the well-known Lafite-Rothschild, Latour, and Mouton-Rothschild châteaux are located.

Stop 1.1:

Château MOUTON-ROTHSCHILD, neighbour of **Château LAFITE-ROTHSCHILD**, lies in a beautiful park, and offers interesting «chais» in above-ground wine cellars, full of oak barrels (*plate 2, figure 7*) and of old and venerable bottles, and a complete Museum on vineyards and wines, but also a prestigious art collection and XVIth to XVIIth Century jewelry.

Stop 1.2:

Château COS D'ESTOURNEL, (*plate 2, figure 2*). This beautiful, oriental, XIXth Century castle, whose exotic style brings to mind the wine trade with East Africa and India, exhibits its «pagodons» on the top of a small hill. The main entrance is protected by a wood door, which formerly adorned the Zanzibar Sultan's Palace (*plate 2, figure 6*).

St. ESTEPHE. The village and its church are situated on the top of a hill, surrounded by a sea of the famous vineyards. From the harbour, a view of the Gironde estuary allows us to observe the old shorelines of the opposite bank of Blaye.

VERTHEUIL, with its XIIth Century castle, which protected the village but also the XIth Century Romanesque abbey --now a simple church, modified during the XVth Century --, was enlarged during the XVIIIth Century, in relationship with the vineyard

expansion.

St LAURENT-EN-MÉDOC presents a Gothic church with traditional English influences.

MOULIS-EN-MÉDOC : has an old Romanesque church built on former IVth and Vth Century sanctuaries; this is the main village of the A.O.C.

Château CHASSE-SPLEEN is a Moulis, whose name recalls the Romanticism of Stendhal and of the XIXth Century. Its world-renown wine defeats nostalgia.

DINNER

DAY 2

BORDEAUX TO THE GRAVES VINEYARDS (see back cover)

Departure from the hotel, trip to the Graves de Bordeaux vineyards.

GRAVES wines may be considered noble cousins of those of Médoc, but they also have their own character. The A.O.C. begins on the outskirts of Bordeaux and extends downstream along the left bank of the Garonne river, up to the far side of Langon.

PESSAC is, with Léognan, the main town of the Pessac-Léognan A.O.C., which we will visit now. It is an old village, which was formerly quite far from Bordeaux, but which is now almost incorporated in the Bordeaux Megapolis, with its neighbouring sister-villages of Talence, Gradignan and the other towns, surrounding Bordeaux. All together they form the CUB or Urban Community of Bordeaux, i.e. the Megapolis.

Despite their location within the confines of Bordeaux, vineyards are always grown on the gravelly hills and are very famous. Graves are white and red wines. The red ones can be considered to be cousins of the Médoc wines, to which they are very similar.

PESSAC-LEOGNAN A.O.C.

Stop 2.1:

Château PAPE CLEMENT is situated in the middle of urban activity. It rests on a hill of graves, developed on only 32,5 ha of vineyards. Cepages are for red wines: 60% Cabernet Sauvignon, 40% Merlot; and for the white wines: 45% Sauvignon, 45% Sémillon, 10 % Muscatelle. A very close cousin of Château Haut-Brion, the red wines are structured and generous, having a complex, spicy aroma. Whites are fine and savourous.

Stop 2.2:

Château HAUT-BRION. Among the Graves wines,

this is the only one to have been registered in 1855. It was a feudal property of Brion, then of d'Aubriion or Daubriion, Haut-Brion. It remained for a long time under the ownership of the Fumel and Pontac families, members of whose families served over the years as Bordeaux parliament members. On February 28, 1801, Charles de Talleyrand, Minister of the Foreign Office, bought the domain, selling it three years later. After some other owners, it was bought in 1935 by the US banker Dillon. Its wines are very well known world-wide.

TALENCE and **GRADIGNAN** are twin villages, which host the Universities of Bordeaux : Bordeaux I: Sciences; II: Medicine; III: Literature and Sciences; IV: Law. All together, there are more than 55,000 students who attend courses at the University.

LEOGNAN, together with Pessac, is the main town of the Pessac-Léognan A.O.C.

Château CARBONNIEUX, constructed around 1380, i.e. during the Hundred Years' War, is a registered Graves Grand Cru. It is located 10 km from Bordeaux and extends over about 60 ha. This impressive castle overlooks one of the largest Graves de Bordeaux vineyards.

LUNCH

Stop 2.3:

Château SMITH-HAUT LAFFITTE, at Martillac, is a registered Graves Grand Cru, and lies in the heart of the vineyards, offering a Middle Ages castle-like physiognomy, combining warm, Aquitaine building stones and strong structures in wood.

On the same property as Château SMITH-HAUT LAFFITTE, the **CAUDALIE** domain is associated with a natural, warm thermal water spring. This new thermal center is utilising the polyphenols obtained from the grapes, 10,000 times more active than vitamin E, to relax and give firmness and youthfulness to the spa users in a mansion made into a four-star hotel. A cosmetic line, « Caudalie », has been developed, utilizing anti-oxidant molecules to fight the aging of the body and of the skin's cells. A Caudalie center has also been opened in Las Vegas, Nevada.

LA BRÈDE is situated on the Roman road to Santiago de Compostella and is a pilgrims' stop after the La Sauve Majeure Abbey. Emperor Charlemagne stopped there, coming back in 778 from Zaragoza (Caesare Augusta), with the body of his nephew, Roland, killed in the Pyrenees. In the Middle Ages, Templars protected the pilgrims along the way to Santiago, and Château de LA BREDE was constructed. Later, it was the home of the XVIIth Century philosopher Montesquieu, who was born there in 1689. This historic castle has never been sold,

and it still belongs to the Monstesquieu family.

Stop 2.4:

Château FIEUZAL is a registered Graves Grand Cru, Pessac-Léognan. The name comes from the Fieuzal family, who were the owners up to 1851. Their red wines are among the best Graves de Bordeaux, and their whites wines, also called « golden sands » are highly appreciated.

Stop 2.5:

Château MALARTIC LAGRAVIÈRE is an old château, related to the family of Count Hippolyte de Maurès de Malartic, who fought alongside Montcalm in the Abraham Plains at Québec in 1756, as recorded by his name, given to a city NW of Montréal. Its red and white wines rank among the best ones of the Pessac-Leognan A.O.C.

DINNER

DAY 3

BORDEAUX TO ENTRE-DEUX-MERS AND THE SAUTERNES VINEYARDS

(see back cover)

Departure in the morning; the field trip continues to Sauternes vineyards

ENTRE-DEUX-MERS

Upon leaving Bordeaux to the south east and Entre-Deux-Mers, we will stay mainly on the Garonne alluvial terraces. The Garonne river itself follows a NW-SE direction, due to the Paleozoic Armorican fault of Bordeaux. This old fault was active many times during the Paleozoic, but also recently. Post-Oligocene offsets explain the topography: the Garonne river follows the fault direction on the lower SW compartment, meanwhile the Entre-Deux-Mers calcareous plateau is elevated on the higher compartment. The same structural direction affects the area up to the Oléron Island and off, focalising partly earthquakes (VIIth Century record in Bordeaux, up to the present).

LANGOIRAN is an old river harbour which is on the right bank of the Garonne. An iron Eiffel bridge crosses the river.

Stop 3.1:

MEDIEVAL LANGOIRAN CASTLE

A geological field section will be examined, while a visit to the XIIIth Century castle will take us back to the Middle Ages and will offers us a panorama of the Garonne valley and the Graves vineyards.

Stop 3.2:

LANGOIRAN COOPERATIVE CELLAR

This stop allows us to visit a typical cooperative cellar, where the grapes are collected and the wine is collectively produced, bottled and sold, with participation of the vine-growers themselves.

Stop 3.3:

ENTRE-DEUX-MERS ASSOCIATION AND LA SAUVE MAJEURE ABBEY (plate 2, figure 5)

After a visit to the cellar, the presentation of Entre-Deux-Mers wines and vineyards, and a discussion of the role and duties of the association, a visit will take us through the extraordinary Romanesque Abbey of La Sauve Majeure. Founded in 1079, the Abbey was a center of cultural activity, which developed a network between Spain and England. Romanesque in large part, particularly the abside and absidioles, as well as the choir and the thick columns, crowned by sculpted capitals, a part is, however, transitional to Gothic or fully Gothic, in its vault and its bell tower. Unfortunately, the barrel vault fell down in 1809. The remaining sculpted Romanesque capitals represent scenes of the Gospels and of Middle Ages life. An ascent to the Abbey bell tower (157 steps) offers a vast panorama of the old « Silva Major » and on the Entre-Deux-Mers vineyards.

LUNCH

The road goes SE along the right bank of the Garonne.

RIONS: XIVth Century fortified village

CADILLAC: founded in 1280, this is a walled Middle Ages village, including the XVI to XVIIth Century castle of the Duke of Epermon, 1554-1642 (see above, Beychevelle).

LOUPIAC: this is the main village of the A.O.C., which produces sweet white wines quite similar wines from Sauternes. Loupiac was known during Roman times. Ausonius probably lived there, but probably also in Saint-Emilion, in a villa in place of the modern «Château Ausone».

SAUTERNES AND BARSAC

Covering 2,200 ha, these vineyards make up a «country», situated on the lower part of the Ciron river valley, near its junction with the Garonne river. In autumn, a microclimate develops, due to the proximity of both rivers, giving misty mornings and sunny and warm afternoons, favoring the development of *Botrytis cinerea*. *Botrytis cinerea* attacks the skin of the grapes, triggering a concentration of sugar, reducing acidity, and encouraging the formation of glycerine, leaving essential aromas. Mainly on sandy graves, sometimes more argillaceous, with

some carbonate amounts towards the hills, the terroir only consists of five townships: Sauternes, Barsac, Preignac, Bommes and Fargues. Harvest is done by hand, by successive pickings of grapes affected by *Botrytis cinerea*. Picking is done slowly on each bunch, for each grapes, little by little, with successive, carefully controlled selections over several weeks (up to three, four or more pickings). Average wine aging is around 25 years, but Sauternes and Barsac wines can age more. They can reach 100 years in bottle, and they can be drunk very old, if the owner is patient, or lucky, or both!

BARSAC has a peculiar, late-XVIIth to early-XVIIIth Century Gothic style.

BUDOS has a XIVth Century castle, built by Pope Clement V's nephew.

Stop 3.4:

Château GUIRAUD is a First Cru, covering 85 ha. Its wine is highly recommended, full-bodied, generous, with a honey colour, very long in mouth, and finishes with just a touch of light, siliceous taste when young.

Stop 3.5:

Château d'YQUEM or YQUEM is a First Great Cru and was owned by the family of Lur Saluce, but now by MVLH. It is very famous and was originally owned by a relative of the XVIth Century philosopher Michel Yquem de Montaigne. Constituted by 1/4 Sauvignon for 3/4 Sémillon, the vineyard of the Sauternes of château d'Yquem gives its best in this white sweet nectar, which is a First Great Cru, registered in 1855. Vineyards are grown on an clayous-marly basement, at the Oligocene-Miocene border, with some fine sandy layers.

Stop 3.6:

Château SUDUIRAUT is a First Cru covering 92 ha (on a total of 200 ha for the whole property), planted in vines on a sandy clayey soil, sometimes more pebbly (quartz, quartzite, radiolarites...). After vinification and wine growing, after the wines have aged between 18 to 24 months in oak barrels, different lots of wines will be carefully tasted several times to determine which will be the first choice and will become the first Grand Cru, and the second lots will constitute an excellent, and quite comparable cru, « Castelnau de Suduiraut ». The First Great Cru is only produced and sold if all the conditions for a great wine occur together. For example, rain dashed the hopes in 1991, 1992 and 1993, and so there is no Grand Cru for those years.

Château de MALLE is a Second Cru. The estate

appears through a superb wrought-iron portal. The gardens and the castle itself were designed at the beginning of the XVIIth Century. What is unique in the Gironde department is that the vineyards extend across both the Sauternes and the Graves A.O.C. s. DINNER

DAY 4

BORDEAUX TO SAINT-EMILION

(see back cover)

Leave from the hotel, heading toward Saint-Emilion.

Called "Lucaniac" in Roman times, **SAINT-EMILION** is right in the middle of its vineyards, built in an amphitheater outlined by the limestone cliff bordering the Saint-Emilion plateau, which looks down upon the Dordogne valley. The first human settlement was troglodytic, as demonstrated by troglodyte dwellings, which were gradually turned into subterranean quarries, and then wine cellars. Hermit Emilion came from Royan in the VIIIth Century and first lived in a cave, which it is still possible to visit; the settlement was then fortified and walled during Middle Ages. The village offers visitors its tortuous, small streets, with their large cobblestones, small squares, and its old houses and fortified gates. In 1948 the St-Emilion Medieval brotherhood, the «Jurade», was reconstituted, in order to promote and maintain the wines and the vineyards. These Aldermen go twice a year to the King's Tower to hold celebrations in honour of the wines.

Thanks to underground quarries and caves, the monolithic underground church was worked from the VIIIth to the XIIth Century. Burial was given through the centuries in the underground quarries or catacombs, around the subterranean church, and pilgrims, soldiers and knights coming back from the Holy Land and the Crusades are buried there below, as the palm trees on the sarcophagus show. The monolithic church communicates with the old network of the underground quarries, used as shelters in ancient times, as well as during the French Revolution, and by the French Resistance during WW II.

Walking along the XIIth Century ramparts is interesting, as well as observing the stone walls of Palais Cardinal, with some Crusader -- or Templar-influenced architecture.

Just outside the city, the graceful and delicate Dominican high wall represents the northern wall of a gothic church, destroyed during the Hundred Years' War.

Subterranean quarries, as well as caves, are still used today – but now as wine cellars.

The bell tower of the monolithic church was built from the XIIth to the XVth Century, but it only rests on two pillars of the underground monolithic church. Thus the underground church is fragile and has been renovated.

Stop 4.1:

SAINT-EMILION (*plate 2, figures 3 and 4*): just at the entrance of the town, this stop will show us the geology of the vineyards. Just below the «**CHÂTEAU AUSONE**», a first Grand Cru, the road runs on the Lower Sannoisian clayey-sandy molasse, giving greenish-derived soils. Very often, the molasse includes diagenetic nodules, or «calcareous dolls». The molasse is overlain by the «clays de Castillon», causing an impermeable level along which springs appear. Upwards, the clays gradually pass to marls and then to the Stampian limestone (calcaire à Astéries) which forms the calcareous, partly karstified, Saint-Emilion plateau. From this stop we can clearly observe the limestone cliff supporting Château Ausone. Stampian Asteries limestone shows cross-stratified and parallel-laminated sequences which are locally carved, showing entrances to underground quarries.

Stop 4.2:

Château AUSONE (*plate 2, figure 3*) is a 1958 registered First Great Cru. According to the legend, château Ausone is built on the Roman Villa of Ausonius (see the “introduction” above). There are a lot of old remains around the castle and in the vineyards, like a Middle Ages chapel, constructed on an old cemetery. The «chais» are carved into the limestone basement of the plateau, and large pillars support the limestone vault. All is silence and serenity, similar to a monastery, an impression which is confirmed by the burial crypts where now the wines are aging. The vineyards always partly include an old French vine, i.e. old native grapes rescued from the *Phylloxera* attacks, carefully grown and protected.

Stop 4.3:

Château FIGEAC is one of the 1958 registered First Great Crus. It rests on the « Graves de St-Emilion ». It is an ancient estate of the Gallo-Roman period, which continued to produce wines from the Middle Ages up to today. Many historic ruins are present on the property. It extends over 40 ha of vines, constituting the largest St-Emilion township vineyards.

Château LANIOTE is a Great Cru and is an example of a long-lived small property, belonging to an old family, going back at least 7 generations. This family also owns a part of the underground quarries and

catacombs, near the monolithic church. The Lanote vineyards cover 5 ha and, if we have time, the visit will allow us to have a conference on the St-Emilion vineyards, harvesting and vine-growing.

Stop 4.4:

Château CHEVAL BLANC is also a 1958 registered First Great Cru. It rests on the « Graves de St Emilion », just like Château Figeac. The site formerly was the «Cheval Blanc Inn», which welcomed the gentlemen riding mainly to Libourne, founded in 1269 by Roger of Leyburn, an English Seneschal. Château Cheval Blanc is situated on the area of Graves de St-Emilion, between the towns of St-Emilion and Pomerol, on mixed and original gravelly and argillaceous, but also partly alios-derived, soils. This soil probably gives to the Cheval Blanc wine its peculiar bouquet and taste.

LUNCH

AFTERNOON: FREE TIME to visit the city and the underground monolithic church.

DINNER

DAY 5

BORDEAUX TO MARENNES-OLERON AND COGNAC DISTRICT (*see back cover*)

Leaving Bordeaux to go to Marennes Oleron and the Cognac District.

The highway will take us north of Bordeaux and then, to the west, towards the Atlantic Ocean, to Marennes and Oléron Island, crossing the strait, or «Pertuis» de Maumusson, south of the island.

Oléron is the biggest French island on the Atlantic Coast, measuring 30 km long and 6 km wide. Its Roman name was “Uliaros”, which changed into Oléron over time.

Since Roman times, Oléron was known for its production of salt and oysters. Salt marshes were mostly developed in the central and eastern part of the island, while the oysters were cultivated in the eastern part and in the strait of Maumusson and around Marennes. But now, many salt ponds have been converted into «claires» for growing oysters.

The island is also known for the «Rôles d’Oléron», attributed to Aliénor, Duchess of Aquitaine, who enacted them in 1199. These are special regulations for navigation, ships, shipwrecks, sailors and traders. However, some wreckers bypassed these regulations and, in order to provoke the wreck of a ship, they put a lantern on the collar of a cow or a donkey and left the animal walking by night on the coast. The ship’s captain, thinking that a harbour was near, directed his ship right towards the moving light -

- thus encountering disaster and shipwreck. In the morning, people collected the result of the wreck on the beaches. Shipwreckers are recorded in an Oléron speciality, which is the «Shipwreckers» beer .

Stop 5.1:

MORNING will be devoted to a complete visit of the ostreiculture, the oyster parks and the claires.

LUNCH, will include oysters and we will try the Oléron Wines but also a typical beverage of Oléron Island, i.e. the Beer of the «Naufrageurs» (Shipwreckers).

We will leave at 1 p.m. to go to JARNAC

JARNAC, as many human settlements around, was first probably a paleolithic and, then, certainly, a neolithic village. Now, it is a quiet city built on the hills above the river Charentes. During the Hundred Years' War, Jarnac was captured several times alternatively by the English and the French. But Jarnac is very well known for a certain historical event, which took place in the XVIth Century: the 7th baron of Jarnac, Guy Chabot de St Gelais, duelled in front of the Royal Court in St Germain, near Paris, against the Lord of La Chataigneraie, who was one of the best duellist of the time, and defeated him, using a special sword hit or «coup de Jarnac».

Stop 5.2:

EVENING will be devoted to a trip around the Cognac vineyards and around Jarnac, showing us :

- the art of the vine-growers, how oak barrels are made, the vineyards' care and culture, distillation of Cognacs, how to make Pineau, and a Museum dedicated to the viniculture and vineyards of Cognac.

- a wine tasting of Cognac and Pineau will accompany the visit.

DINNER

DAY 6

FROM THE COGNAC DISTRICT TO BORDEAUX (see back cover)

Departure from Cognac-ville to Bordeaux and the end of the field trip.

Stop 6.1:

Since 1795, **Cognac OTARD** has owned the Château de Cognac which we will visit. This visit will include historical and technological aspects, as well as a tasting of Cognacs (*plate 2, figure 7*). In this Medieval castle, Richard Coeur de Lion's son, Philippe, married Amélie de Cognac. François the First, king of France was born there.

Stop 6.2:

Cognac RÉMY MARTIN. 4 km SW of Cognac, we will visit this famous Cognac factory, founded in 1725. The visit, including historical and technological points,

will be done by a small train.

We will leave at 1 p.m to the Merignac-Bordeaux Airport.

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References

- Anonymous, (1998), Bordeaux, Découverte du vignoble. *C.I.V.B. Ed., Bordeaux*, booklet.
- Anonymous, (1998), Bordeaux, Le vignoble de Bordeaux. *C.I.V.B. Ed., Bordeaux*, booklet
- Anonymous, (1998), Bordeaux, Les routes du vin. *C.I.V.B. Ed., Bordeaux*, booklet
- Anonymous, (1990). « Pineau des Charentes » *SOPEXA, Paris*, booklet.
- Bardin M., Soyez J.M. et Danvers A., (1980). Il était une fois...LE COGNAC. *Bureau National Interprofessionnel du Cognac, Ed.*, booklet, 12 p.
- Bernard G., (1980). Le vignoble charentais. *CDDP de la Charente, 16000 Angoulême, Ed.*, booklet, 23 p., 30 slides.
- Caumeil M., (1983). Le cognac. *Pour la Science*, Décembre 1983, 48-57.
- Coussié J.V., (1993). Le Cognac, Sa distillation, son vieillissement, ses marchés, son histoire. Le Pineau des Charentes. « *Le temps qu'il fait* », *Ed., Cognac*, 63 p.
- Delamain R., (1935). Histoire du Cognac. *Stock, Ed., Paris*, 142 p.
- Dion R., (1959). Histoire de la Vigne et du Vin en France, des origines au XIX^e siècle, *R.Dion Ed., Paris*. 768 p.
- Jacquelin L. et Poulain, R. (1960). Vignes et Vins de France. *Flammarion Ed., Paris*, 483 p.
- Lafon J., (1976). La station viticole de Cognac. *Vigne et Vins*, 252, 11p.
- Neveu J.L., (1995). Vigne et Cognac en Pays charentais. *Collection « La Boulite », Geste Ed.- BP 15 - 79370, Mougon*, 95 p.
- Pomerol C. (1984). Terroirs et Vins de France, Itinéraires oenologiques et géologiques. *Coordinated by C.Pomerol, BRGM et Total Ed.Orléans and Paris*, 343 p.
- Sépulchre B., (1983). Le livre du Cognac, Trois siècles d'Histoire. *Hubschmid & Bouret Ed., Paris*, 253 p.

Back Cover:
field trip itinerary

FIELD TRIP MAP

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