

Wine Talk: May 2013

The newsletter of Living Wines: Edition 35

We have just returned from our annual visit to our suppliers in France. Over the past four weeks we have driven some 7000 kilometres from Normandy where we have started working with a brilliant producer of naturally-fermented apple cider, through the Loire Valley to Provence then to the Languedoc and Roussillon and then up to the Aveyron and across to Beaujolais. The trip finished with visits in Burgundy and the Jura including a number of new suppliers that we list later in the newsletter.

We were privileged to walk through many beautiful organic and biodynamic vineyards which radiated life in contrast to the chemical wastelands all around them. We became even more convinced (if that is possible) that good wine can only come from healthy grapes produced from healthy, chemical-free soil. You can read more about soil and minerality in the second part of our series this month.

Another aspect to the trip was the increase in the number of producers we have found who are not using any sulphur in the winemaking process. We now have a quite strong contingent of winemakers who fall into this category. And despite what some of the naysayers claim, their wines are stable, pure and capable of lasting many years (we drank a 1996 Saint Aubin from Dominique Derain on this trip which was still very fresh and very lively).

We have six special packs for you this month. The first is a pack of three ciders from our new supplier Julien Fremont from Normandy (see the story about our visit in this newsletter). We are getting more and more requests for wines with no added sulphur so we have put together two packs, one white and one red, of no added sulphur wines. To overcome the myth that sparkling wines are only for summer drinking we have a six pack that are perfect for drinking at any time of the year. We also have two special packs of our selection of interesting wines of the moment – one pack for reds and one for whites.

Remember that the special packs attract a 15% discount instead of a 10% discount, so if you order a special pack you really are getting a special deal!

There is a link to our order form for these packs and any other wines at the end of this newsletter. But there's no need to use the order form. Just send us an email listing the wines and/or packs you would like to order if that suits you better. We'll confirm the price by return email before processing your order.

News from Living Wines

A visit to Julien Fremont in Normandy

Julien Frémont is a cider and Calvados maker from Normandy who makes cider much the same way that his family has made it since the early 1700s - and using the same beautiful wooden press that the family has owned since that time.

We recently travelled to Normandy to visit Julien and to talk to him about the methods that he uses to craft his flavoursome ciders using techniques that have been used in the area and by his family for hundreds of years.

The area is the Pays d'Auge area of central Normandy which is home to Calvados and the cheeses Livarot and Pont-l'Évêque.

Julien tends his orchard using organic and biodynamic principles. Cows graze between the trees to keep the ground cover healthy and fertilised. No sprays are used to kill weeds or insects. Birds sing in the trees and hedgerows. The cows eat apples that are within reach despite the high pruning technique that Julien employs.



Julien's high-pruned apple trees

After he hand-harvests the apples (there are 26 local varieties in the orchard) they are carried to the loft in the large, ancient building that dominates the farm using a 'home grown' pulley system of little buckets that carry them upwards.



The ancient “apple elevator”

Here he 'cures' them for at least two weeks up to more than a month so that the flavours concentrate and the sugar levels rise as the apples dry out. This dramatically reduces the juice yield when the apples are finally pressed but significantly improves the flavour. This cider tastes dramatically like apples.

After this curing period he pulps the apples and arranges them in layers on porous hessian mats stacked one on top of the next. These are then placed in the ancient press and weighted down until the juice is extracted. The juice is then transferred to large wooden barrels where it ferments using only the natural yeasts in the air.

He produces three versions of apple cider. The first using apples from trees that grow in clay soil in his bottom orchard which he calls Argile (French for clay). This cider is only 3.5% alcohol and has a little residual sweetness. The second is made from trees much higher up the hill where quartz stones abound. This one he calls Silex (the French for quartz) and it is 4.5% alcohol. His premium cider is called “par Nature” and is made from a selection of apples from across his orchards. This cider is 5.2% alcohol and most of the natural sugars have been fermented out to a nice level of dryness.

Note that there is a Special Pack this month which is a sampler of each of the three ciders from Julien Fremont.

Arrival of new Vouvray producer – Vincent Carême



We are delighted that the stunning Vouvray wines of Domaine Vincent Carême have arrived in Australia. Vincent is a very thoughtful winemaker who has some excellent vineyard plots near the villages of Vouvray, Vernou and Noizay which lie just to the east of the city of Tours.

These plots are littered with limestone rocks and tuffeau which give the wines a beautiful mineral finish. His vineyards are tended organically with some biodynamic principles and it was delightful to walk through his vines to see how healthy they were and to see the life in the soil that he manages so carefully.

We have sparkling wines, still dry, white wines and the lovely Tendre that has a little residual sugar making it a perfect match for savoury desserts. The l'Ancestrale sparkling wine is a particular treat.

Increase in “no added sulphur” wines

One of the trends we have noticed on our most recent trips to France is an increase in the number of winemakers who are eschewing the use of sulphur in the winemaking process.

What we are witnessing is that there are some preconditions for this to occur. First the winemakers have to be skilled in their trade. The second is that wine can only be made without sulphur if the quality of the fruit is high and this, in turn, requires the quality of the soil to be exceptional.

But if all these line up then great wines can be made without the addition of sulphur and these wines can last for a very long time.

We will write more about this topic in a forthcoming edition of this newsletter. Meanwhile we have both a **white six pack** and a **red six pack** of wines where no sulphur has been added at any time during the making of these wines.

Note that this does not mean the wines are sulphur free as small quantities of sulphur are generated naturally during the fermentation process.

New suppliers

We are delighted to announce that during our recent trip to France we visited a number of new suppliers and placed orders for their wines. They will be arriving in Australia over the coming months.

First cab off the rank will be **Mark Pesnot** whose white wines are snapped up by an army of devoted fans particularly in Japan. These will be landing very soon. The three wines we have arriving are all made with Melon de Bourgogne and Pesnot's vineyards are around Nantes but none are appellationed as Muscadet. Like many of our producers, he has eschewed the appellation and bottles them as Vin de France.

Next will be the wines of **Mylène Bru** from the Languedoc who makes a number of red cuvées from various combinations of Grenache, Shiraz and Carignan and who also makes a delightful white wine from Chasselas grapes! Now we know that Chasselas is not a grape that is found in the Languedoc, but when she bought the vineyard the vines were there, traditionally for table grapes, and the wine she makes from these grapes is a delight!

We also had a great visit to a domaine in the Roussillon near the Spanish border. **Domaine Jolly Ferriol** is the domaine of Isabelle Jolly and Jean-Luc Chossart who have set up their winery in a group of very old Catalan buildings near the village of Espira de l'Agly. Here they make red wines from Syrah, Carignan and Grenache and white wines from Maccabeu and Grenache Gris. But they also make a fabulous Muscat de Rivesaltes and Rivesaltes ambré and a stunning Rancio that is placed out in the sunshine for six months in glass demijohns.

And we have added two new producers from the Jura to our list. We are delighted to welcome the wines of **Domaine de l'Octavin** to Australia soon. They have gained a reputation for creating exciting wines that are a twist on the Jura traditions while respecting the traditional approaches. Their treatment of Savagnin is very exciting and they even make a white wine from the red Poulsard grape. Our other new supplier is the tiny domaine of **Renaud Bruyere** and Adeline Houillon who currently have about 2.5 hectares and make the most ethereal wines from their small holdings. The Octavin wines will be arriving soon. It might take a little longer for Bruyeres as the supply is so limited.

And last but not least we visited the farm of **Michel Guignier**. We use the word farm advisedly because although the main activity is winemaking, it is an integrated farm with cows that graze in the vineyard over winter, a horse that does the ploughing, lush pastures and beautiful forest that provides amazing biodiversity for the vines. Michel makes all his wines without the use of sulphur and has a growing export market particularly in Denmark where there is a very strong demand for his pure, elegant wines. They will be in Australia in two or three months depending on shipping timetables.

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Pack 1: Julien Fremont Cider 6 pack



Julien Fremont produces intensely flavoured apple ciders using a special technique which is described in the accompanying story about our recent visit to his orchards in the Pays d'Auge in Normandy. Up to 26 different varieties of local apples are used to make these complex drinks.

Julien Frémont Cidre Brut par Nature (4 bottles) – This enticing dry cider begins with a very slow natural fermentation of the juice during the cold Normandy autumn and winter. The cider is then bottled and continues fermenting in the bottle until the sugar is fermented out. This usually results in an alcohol level between 5.5% and 6.1%.

One writer says about this cider "*Very generous on the palate, incredibly quaffable, with assertive sparkle at first that quickly calms down in the glass; the yeasty muskiness hanging around the fringe of this wine gives it the charm of an Alpine cheese of sorts. Outstanding!*"

Julien Frémont Cidre Silex (1 bottle) – Julien makes two special ciders from different terroirs. This one is made from apples picked from trees that grow in quartz soils on the higher slopes above the house where the ground is littered with quartz "cailloux". The cider reflects the minerality of the soils. The alcohol level is 4.5%.

Julien Frémont Cidre Argile (1 bottle)– This one is made from apples picked from trees that grow in clay soils on the lower slopes near the road that runs in front of the house. Here the clay is quite deep and is packed with minerality leading to very healthy trees due to the good drainage. This cider has a little residual sweetness because it has only fermented to 3.5% alcohol. The residual sweetness makes it attractive as an aperitif.

The RRP for this selection of 6 bottles of cider is \$142 but the pack price is **\$120.70 including freight.**

Pack 2: No added sulphur red 6 Pack



The following selection is of red wines that have been made without the addition of any sulphur. There will be traces of sulphur created naturally during the fermentation process but these winemakers add no sulphur at any time.

La Paonnerie Coteaux d'Ancenis "Simplement Gamay" 2012 – Simplement Gamay got its name because that is all that is in the bottle. No additives of any kind. It was fermented with the natural yeasts and no sulphur was added at any stage. It is just Gamay and very nice Gamay indeed from this excellent Loire producer.

Le Temps de Cerises Vin de Table Un Pas de Côté 2011 – Un Pas de Côté is a dark purple wine that has a beautiful, soft tannin structure with complexity coming from the blend of grapes used. This vintage is 40% Merlot, 40% Grenache and 20% of a blend of Cinsault, Aramon and Carignan (Aramon is a grape that is native to the Languedoc region).

Michel Gahier Arbois Trousseau Le Clousot 2011 – Le Clousot is a Trousseau that is light in colour but has a vibrant freshness and hints of smokiness. It has good structure, very good length and is quite juicy - hence is very drinkable. The 'young' vines are twenty years old and lie on a south west facing slope.

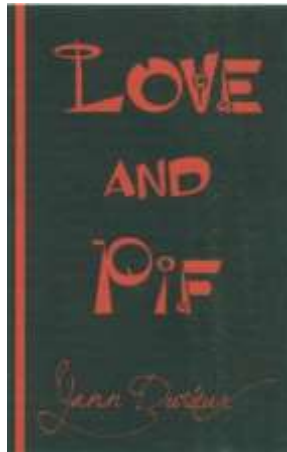
Philippe Bornard Arbois Pupillin Ploussard Point Barre 2011 – The Point Barre is made from the Poulsard (aka Ploussard) grape and is a light, delicate almost translucent red wine that gives off aromas of red currants, citrus and saddle leather with a touch of cinnamon. There is a purity and silkiness to this wine that makes it quite ethereal. It matches with just about any food you care to think of.

Domaine Milan Sans Soufre Ajouté Rouge 2010 – Made with the grape varieties Grenache, Shiraz, Mourvedre, Cinsault and Cabernet Sauvignon and it only spends 8 months in old barriques. No filtration or fining has been applied to this wine and only indigenous yeasts have been used to ferment the grapes. It is only 12.5% alcohol.

Domaine la Paonnerie Anjou Villages La Jacquerie 2011 Sans Soufre – The Domaine la Paonnerie Anjou Villages 2011 Sans Soufre is a blend of 66% Cabernet Franc and 34% Cabernet Sauvignon picked from the Clos de la Jacquerie which the Carroget's own exclusively. The grapes are picked when the Cabernet Sauvignon has reached the desired level of ripeness. This is a lively, vibrant wine that is very gluggable!

The RRP for this selection is \$220 but the pack price is only \$187 which includes freight.

Pack 3: No added sulphur white 6 Pack



The following selection is of white wines that have been made without the addition of any sulphur. There will be traces of sulphur created naturally during the fermentation process but these winemakers add no sulphur at any time.

La Paonnerie Muscadet Coteaux de Loire Rien que Muscadet 2011 – The la Paonnerie Rien que Muscadet 2011 is made from 100% Melon de Bourgogne. This wine is billed as "Just Muscadet" - nothing more, nothing less. The wine relies on the vibrant fruit obtained due to the biodynamic practices in the vineyard.

Michel Gahier Arbois Chardonnay Les Crêts 2009 – There is the trademark oxidative quality to this wine which provides a nutty spiciness and umami flavour. This is Jura Melon (a variant of Chardonnay) at its best! There are honey and pear and almond flavours in abundance and a long, lingering minerality that reflects the amazing terroir of the area around Michel's village.

Domaine Milan Sans Soufre Ajouté Blanc 2010 – Grenache Blanc, Rolle (the local name for Vermentino), Roussanne, Chardonnay and Muscat Petit Grains are used in the blend. The wine was kept on lees in old barriques for 5 months. This is a beautiful wine that is fresh and lively now but will continue to change character and improve well into the future.

Le Petit Gimios Vin de Table Muscat Sec des Roumanis 2011 – This wine is unlike any other Muscat you are likely to have tried. The Lavaysse family add nothing to their wine to change the essential characteristics of the Muscat a Petit Grains grape variety. As such they produce a wine of great interest and complex characters.

Yann Durieux Bourgogne Aligoté Love and Pif 2011 – This wine displays subtlety and depth of flavour along with an intriguing length to the wine. This is Aligoté at its best taking full advantage of the excellent terroir in the Hauts Cotes de Nuits.

Domaine Vincent Carême Vouvray l'Ancestrale 2010 – The l'Ancestrale is a natural sparkling wine made in the pétillant style. There is some residual sugar which gives the wine a pleasant balance due to the lingering acidity. This is an incredibly elegant wine that displays a distinct minerality and a very fine bead.

The RRP for this selection is \$246 but the pack price is only \$209.10 which includes freight.

Pack 4: Winter sparkling wine 6 pack



The wines in this 6 pack have been chosen to represent many of the different winemaking techniques that are used in France for producing sparkling wines.

Domaine Mosse Vin de France Moussamousettes—It is pale, light, delicious, limpid, slightly sweet and the perfect aperitif or for late night sipping. This year it is made mainly from Grolleau Gris and a little Cabernet Franc which have been co-fermented. The wine making method is known in France as "Méthode Ancestrale".

Domaine Vincent Carême Vouvray l'Ancestrale – The l'Ancestrale is a natural sparkling wine made in the pétillant style. The fermentation starts in tank and the wine is then bottled while still fermenting and finishes in the bottle without the addition of any sugar and using only the natural yeasts. This is an elegant wine that displays a distinct minerality and a very fine bead.

Les Capriades Piage à Filles – The Rosé Piège à Filles in the 750ml bottles is a pale pink Petillant Naturel which is a blend of organic Gamay (approx 90%) and Cabernet Franc grapes. The wine is made without any dosage (the addition of sugar) and also without the addition of any sulphur. It is possible to detect a tiny bit of residual sugar but it is at a level that makes the drink even more alluring.

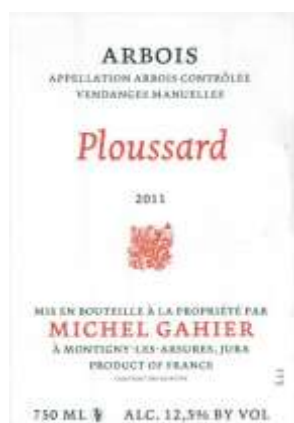
Domaine du Moulin Vin de Table Bulle Rose – This petillant naturel is presented simply with an attractive label and crown-seal closure (just like a beer bottle). This wine is ideal for sipping at any time of year. This cuvée is a blend of 50% Pinot Noir and 50% Pineau d'Aunis, two grape varieties that provide great depth of flavour.

Michael Gahier Cremant du Jura NV – This sparkling wine is made in the Champagne style, hence qualifying for the appellation of Cremant du Jura. The wine is made from 100% Melon de Arbois (a local variant of Chardonnay), a grape that Michel has a particular affinity for. This wine has fine bubbles, some yeast, a lively fruit flavour and a good, long finish.

Domaine Belluard Vin de Savoie Ayse Brut 2009 – A lovely sparkling wine made from 100% Gringet, a traditional grape of the Savoie region. Dominique is a master of the art of making sparkling wines that display complexity, freshness and minerality. This wine is left for two years on lees before it is disgorged thus adding to the complexity of the wine.

The RRP for this selection is \$205 but the pack price is only \$174.25 which includes freight.

Pack 5: Living Wines May red selections 6 pack



Here are six red wines that we are particularly enjoying at the moment. This six pack will introduce you to a range of styles and a variety of appellations across France.

Michel Gahier Arbois Ploussard 2011 – Michel only has a small, red marl plot of 50 year old Ploussard vines (about half of one hectare) so does not produce very much. The grapes are hand harvested, and allowed to ferment naturally in large wooden casks. This is a light, juicy, quaffable Jura Ploussard with lovely cherry and blackberry aromas.

Domaine Milan Vin de Table de France Le Vallon Rouge 2007 –The grapes for this cuvée are all hand harvested. The wine is fermented with wild yeasts then is matured for a year in old barrels after a short whole-bunch maceration. The grape varieties are Grenache, Syrah, Cabernet Sauvignon, Cinsault and Mourvedre.

Domaine de la Cadette Bourgogne l'Ermitage Rouge 2011 – This wine is made primarily from Pinot Noir (80%), but it also has 20% of the rare César grape that is permitted in the Yonne region of Burgundy. This grape has been grown in this area since Roman times (hence the name). This is a beautiful, savoury Burgundy with a lingering finish and with a hint of exotic spices from the use of the César grape.

Bainbridge and Cathcart Vin de France Highway.8 2011 – The Highway.8 is a 100% Cabernet Franc. It is fresh, lively and eminently drinkable. It is packaged in clear bottles and is sealed with a crown seal.

Domaine St Nicolas Fiefs Vendéens St Jacques 2007 – This silky cuvee from the west of France on the Atlantic Coast is named after Thierry's grandfather and is a blend of Pinot Noir (85%) and Cabernet Franc (15%). It was aged in barriques for 18 months prior to bottling.

Domaine Stéphane Guion Bourgueil Cuvee Prestige Rouge 2010 – This wine is 100% Cabernet Franc. This is a fine, savoury wine with lovely tannins and good length on the palate. There is a streak of acidity running through this wine that will ensure that it will last for many, many years. It represents excellent value for money and is currently drinking very well, but will also last for a considerable time in the cellar.

The RRP for this selection is \$195 but the pack price is only \$165.75 which includes freight.

Pack 6: Living Wines May white selections 6 pack



Here are six white wines that we are particularly enjoying at the moment. This six pack will introduce you to a range of styles and a variety of appellations across France.

Michel Gahier Arbois Chardonnay Les Follasses 2010 – This wine is made in the 'ouillé' style where the barrels are topped up during maturation so that the wine does not oxidise in the barrel. This is a fresh, lively Chardonnay that is typical of this style of wine from the Jura with just a hint of those oxidative qualities that Jura aficionados just can't get enough of.

Causse Marines Gaillac Les Greilles 2011 – Les Greilles is a classy white wine blended from local Gaillac grapes Mauzac and Loin-de-l'Oeil with a little Muscadelle thrown in. The grapes come from a number of low-yielding parcels with the maximum yield being a low 35 hectolitres per hectare. The low yield leads to increased fruit intensity that shines through in this wine.

Domaine du Moulin Cheverny La Bodice Blanc 2010 – A blend of 70% Sauvignon Blanc and 30% Chardonnay picked from vines with an average age of 30 years, this wine is elegant, rich and lasts for a long time on the palate. It was aged in wooden vats and barrels in contact with its lees to provide additional complexity.

Domaine de la Cadette Bourgogne Vézelay Les Saulniers 2011 – Les Saulniers is a white cuvée made entirely from Chardonnay. The Les Saulniers vineyard is a beautiful parcel of land situated on an old road once used by salt smugglers. It has a liveliness and freshness that is very appealing for such an elegant wine. The finish is very long and interesting.

Domaine Belluard Vin de Savoie Blanc Gringet Les Alpes 2010 – This beautiful white wine is made from 100% Gringet, a traditional, indigenous grape of the Savoie region. Dominique Belluard crafts fine, elegant white wines such as this from this grape that thrives in the calcareous glacial moraines that line this valley. The wine is fermented with indigenous yeasts and only a tiny amount of sulphur is used. The alcohol level is 12%.

L Domaine Vincent Carême Vouvray Sec 2011 – The Carême Vouvray Sec is a dry white wine from the central Loire Valley that displays notes of pear and wild peaches. From interesting flint soils in both Vouvray and Noizay it has a generous palate and displays rich fruitiness and citrus overtones. It is a wine for drinking now.

The RRP for this selection is \$214 but the pack price is \$181.90 including freight.

Aramon grape variety

We have become obsessed by one of our new wines, the Le Petit Gimios Vin de Table Rosé. This is made from a field blend of grapes that includes the rare Languedoc variety Aramon. This is an intriguing wine that is incredibly complex – a true contemplative wine!

Aramon was one of those grapes that the establishment thought should be ripped out and the space planted with international varieties such as Cabernet Sauvignon or Shiraz. However, thankfully, a few stubborn people in the region refused to go along with the crowd and kept their now precious vines. In 1958 there was 150,000 hectares planted to this grape and by 2005 this had plummeted to a mere 4,500 hectares.

Notice the very long central lobe on the leaf of the Aramon grape vine.

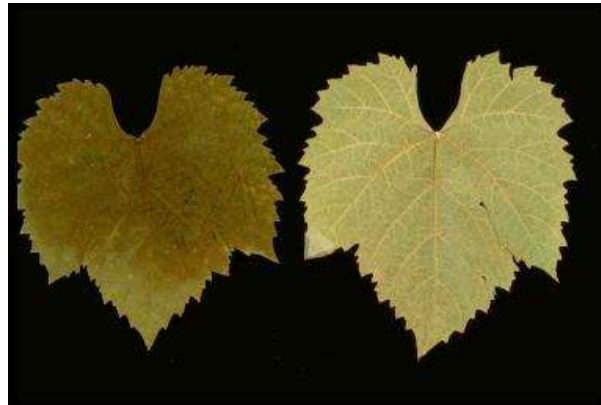


Photo courtesy of Vitis International Variety Catalogue

The parentage of the grape has never been firmly established although it is thought that one of the parents is the ever-present Gouais blanc.



Aramon grape bunches: Courtesy wine-grape.findthedata.org

Appellation: Vouvray



Vouvray is a wine appellation in the Loire Valley region of France which was one of the first established having been created in 1936. It is most famous for the production of crisp, full bodied white wines made from the Chenin Blanc grape. These wines are famous for being long-lived and prime examples of the expression of Chenin Blanc. The plantings of this grape within this appellation are some of the most extensive in France. A secondary grape variety called Orbois Blanc is permitted provided no more than 5% is used.

Sparkling wines are also produced here as well as a slightly sweet still wine.

The appellation covers eight communes of the right bank of the Loire near the village of Vouvray. They are: Chançay, Noizay, Parçay-Meslay, Reugny, Rochecorbon, Tours-Sainte-Radegonde, Vernou-sur-Brenne and Vouvray. Old, used barrels are the norm here.

Because of the geographic position of these communes, the harvest is always very late, often extending into late October and early November. Very little use is made of modern wine making techniques such as maturing in new oak.

'-age' words in French winemaking

Remontage

Remontage literally means 'pumping over'. When red grapes are put into a container to ferment, the carbon dioxide generated by the fermentation process carries the grape skins and stalks to the top of the liquid. This is a problem because most red grapes have clear juice and this needs to be in contact with the skins to ensure that the colour in the skins is extracted to colour the juice.

There are two ways that this can be done. The first is called pigeage where the 'cap' is broken up and pushed down into the juice. The second is remontage where a pump is connected to the vat at the bottom and the juice is pumped over the cap.

Minerality in wine: Part 2

Sue Dyson and Roger McShane

We want to explore the importance of the soil in more detail, because in Part 1 of this series published in last month's newsletter (April 2013) we explained that only three of the sixteen essential elements for plant growth enter the plant via the leaves. The other thirteen enter via the roots.

In Part 2 we will show that a healthy, living soil is essential for these elements to enter the plant via its root system. And we will also claim that a soil cannot be healthy if it has been sprayed with herbicides such as glyphosates or 2,4-D or treated with chemical fertilisers which disturb the balance of the soil and also kill off much of the microflora in the soil.

In Part 1 we also concluded that geological minerals (known by chemists as inorganic minerals) are not volatile and are present in such low concentrations that they cannot contribute to either aromas or taste in wines. This point has been made clearly in many scientific papers including a recent one by Alex Maltman from the Institute of Geography and Earth Sciences at the University of Wales¹.

His conclusion was:

"Minuscule amounts of inorganic ions might conceivably have indirect roles in grape development and vinification, through acting as catalysts, enzyme cofactors, etc., and these could turn out to be important. But at present this is purely speculative. The widely cited direct, literal connection between vineyard geology and wine taste seems scientifically impossible. Whatever "minerality" in wine is, it is not the taste of vineyard minerals."

¹ Maltman, Alex, *On Vineyard Geology And "Minerality" In Wine Geological Society of America, Vol. 41, No. 7, p. 695*

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However we are going to claim that there is a relationship between *elements* in the soil and what is known as minerality in wine. We are also going to explore the role of acids in helping our senses detect minerality.

But first we will continue to look at how nutrients are transferred from the soil into plants and particularly into vines.

Speaking at a meeting of the Biodyvin Syndicat International des Vignerons en Culture Biodynamique in London in November 2011, Alsace winemaker Olivier Humbrecht from Domaine Zind-Humbrecht said²:

“a soil should be able to feed a plant without doing anything. For us having a living soil means having a soil that is able to supply all that the plant needs at different moments in the year. And this is something modern agriculture has forgotten.”

The report of his speech by Sally Easton stated that he then went on to explain how there are many forests that have survived centuries in a sustainable fashion without man’s interference in the form of soil additions, be they fertilisers or chemicals.

In talking about biodynamic producers who add humus to their vineyards Humbrecht said *“it’s not really to bring fertilisers to the soil, but to bring something alive, microorganisms, and the elements of humus to stabilise the mineral fraction in the soil and bring energies to bring back harmony into our wines. We want our soil to be alive, with worms, fungus, micro-organisms, everything it takes to allow the mineral fraction to combine with organic fraction in the soil. If you don’t have this link the soil will fall apart”*.

Importantly he then went on to say:

“A vine that has a high mineral extract also has mycorrhizae on the roots functioning perfectly, able to absorb those minerals.”



Michel Guignier’s Beaujolais vineyard with healthy Gamay vines and healthy soil teeming with life

² As reported on the blog *Wine Wisdom* by Sally Easton MW

And this is where our thinking has taken us – to the vital role of mycorrhizal fungi and the fact that healthy, living soils are absolutely essential for the transfer of nutrients through the root system and into the plant. Study after study that we have read has confirmed this vital fact³⁴⁵.

And of course this is why we are so strongly committed to organic and biodynamic agricultural practices. If vineyards or fields are sprayed with herbicides or fungicides or pesticides it is not only the bugs on the plants or the weeds that are killed, it is also the ladybirds that fly through the vineyard eating insects, the worms that help aerate the soils and the microflora that provide life to the soil that are killed. These microflora contain essential enzymes that help the nutrients in the soil pass through the membranes of the roots via the mycorrhizae on the roots.

Many of the scientific studies we have read have pointed to significant reductions in the presence of mycorrhizal fungi in vineyards or fields where glyphosate sprays such as Roundup have been used⁶. These sprays are widely used in agriculture and viticulture to kill weeds. In a detailed analysis of the effect of glyphosates, Cox (1995) concluded that:

Glyphosate reduces the activity of nitrogen-fixing bacteria. These bacteria transform nitrogen, an essential plant nutrient, into a form that plants can use. Glyphosate reduces the growth of mycorrhizal fungi, beneficial fungi that help plants absorb water and nutrients. Glyphosate also increases the susceptibility of plants to diseases, including Rhizoctonia root rot, take-all disease, and anthracnose⁷.

Let's talk about mycorrhizae a little more. Perhaps Humbrecht was slightly inaccurate when he said "mycorrhizae **on** the roots" – it is more a case of mycorrhizae **in** the roots. They are fungi which develop a beneficial relationship with plants and help the plants to absorb the essential nutrient elements that all plants need. They actually invade the root structure and become embedded in them with their filaments (called hyphae) protruding out into the soil.

These hyphae excrete enzymes that dissolve nutrients that then become available to the root system to absorb.

It is these filaments that allow the nutrients in the soil such as potassium, nitrogen and sulphur to be transported through the cell walls of the plant. Without these

³ Cheng, X., and Baumgartner, K. *Overlap of Grapevine and Cover-Crop Roots Enhances Interactions among Grapevines, Cover Crops, and Arbuscular Mycorrhizal Fungi* Pages 171-174 In: *Proceedings of the Soil Environment and Vine Mineral Nutrition Symposium*. American Society of Enology and Viticulture, 29-30 June 2004, San Diego, CA.

⁴ Baumgartner, K. 2006. *The Role of Beneficial Mycorrhizal Fungi in Grapevine Nutrition*. American Society of Enology and Viticulture Technical Update 1:3.

⁵ R. Paul Schreiner, *Effects of native and non-native arbuscular mycorrhizal fungi on growth and nutrient uptake of 'Pinot noir' (Vitis vinifera L.) in two soils with contrasting levels of phosphorus*. *Applied Soil Ecology*, Volume 36, Issues 2–3, June 2007, Pages 205–215

⁶ Mary C. Savina, Larry C. Purcella, Aaron Daigha & Andrea Manfredini. *Response of Mycorrhizal Infection to Glyphosate Applications and P Fertilization in Glyphosate-Tolerant Soybean, Maize, and Cotton*. *Journal of Plant Nutrition* Volume 32, Issue 10, 2009

⁷ Caroline Cox. *Glyphosate, Part 1: Toxicology*. *Journal of Pesticide Reform*, Volume 15, Number 3, Fall 1995

mycorrhizae the rate of absorption of these nutrients by plants is severely diminished.

This is clearly explained in a paper by Baumgartner⁸ of the University of California at Davis:

“Arbuscular mycorrhizal fungi are beneficial organisms that colonize plant roots. These fungi are members of the Order Glomales, and their ancestors are some of the oldest known fungi in the fossil record. They form elaborate structures called arbuscules. The fungus actually grows within the root itself, within the space between the cell walls and cell membranes of the root cortex. These fungi are obligate colonizers, meaning they cannot grow in the absence of a root. Their fungal filaments or hyphae extend outside of the root into the soil.... The fungus can absorb nutrients from the soil that can be transported to the root system via the hyphae of the fungus. The association of the fungus with the plant also permits colonization of and access to more challenging soils and is lower in “cost” to the plant in terms of carbon consumption needed to produce new roots versus feeding the fungal biomass.”

Researchers at the University of California at Irvine⁹ have used interesting techniques to track the movement of amino acids through these hyphae and into plant cells. This experiment was one of the first to demonstrate direct uptake of organic nitrogen by arbuscular mycorrhizal fungi by using fluorescent nanoscale semiconductors to track the amino acids as they moved through the hyphae and into the plant cells.

This is also important because the amino acid they followed was glycine which has the formula $\text{NH}_2\text{CH}_2\text{COOH}$ or more simply $\text{C}_2\text{H}_5\text{NO}_2$. Notice that this brings nitrogen into the plant!

As Humbrecht argued, healthy soils play a vital role for the transfer of nutrient elements from the soil into the plant. We also think there is evidence that if these nutrient elements are present in high concentrations then the wine will have more flavour. But will the wine ‘taste of minerals’?

In their interesting paper entitled Chasing after Minerality, Relationship to Yeast Nutritional Stress and Succinic Acid Production¹⁰ two Czech scientists, Mojmír Baroň and Jaromír Fiala, explored the concept of minerality in wine using a technique called isotachopheresis which is used to separate charged particles.

The research they conducted involved determining the minerals present in two wines from vineyards with different soil conditions. One of the wines was regarded

⁸ K Baumgartner, *The Role of Beneficial Mycorrhizal Fungi in Grapevine Nutrition*. American Society for Enology and Viticulture ASEV Technical Update. 2006. 1(1):3.

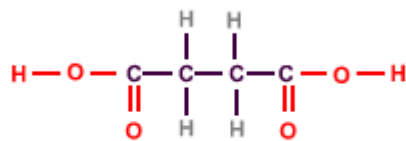
⁹ Matthew D. Whiteside, Kathleen K. Treseder, and Peter R. Atsatt. *The brighter side of soils: Quantum dots track organic nitrogen through fungi and plants*. Ecology 90:100–108, 2009.

¹⁰ Mojmír Baroň and Jaromír Fiala, *Chasing after Minerality, Relationship to Yeast Nutritional Stress and Succinic Acid Production*. Czech J. Food Sci, Vol. 30, 2012, No. 2: 188–193.

by expert tasters as displaying exceptional minerality and the other was regarded as being without minerality.

However, they concluded that it has nothing to do with minerals. They found that it was more to do with the relationship between the nutritional stress of yeasts and succinic acid production, which can result in a final difference in the taste of wine. The more succinic acid the more differences in perceived minerality there was in the wine.

Succinic acid ($\text{HOOCCH}_2\text{:CH}_2\text{COOH}$ or, more succinctly $\text{C}_4\text{H}_6\text{O}_4$) is produced naturally during fermentation in both wine and beer and tasters talk about saltiness, acidity and, sometimes, bitterness in a wine with detectable levels of the acid.



succinic acid
butan-1,4-dioic acid

When we taste good wines from good terroir saltiness is often a flavour we perceive in the wine. We find this in one of the wines we import to Australia called Les Saulniers¹¹ from Domaine de la Cadette where the vineyard soil is based on limestone and is incredibly alive.

The presence of small amounts of succinic acid is considered essential in the development of beneficial esters during the aging process. The presence of this acid (which, like lactic acid, is not found in grapes but is created during fermentation) was scientifically documented in a ground-breaking paper published by wine researchers from Gallo winery in California in 1965¹².

However it is not possible to draw simplistic conclusions in such a complex area as this. Another fascinating study published in a paper entitled *Geochemistry and Minerality of Wine* by Oze, Horton and Beaman showed a very high correlation between the presence of the aluminium and silicon rich Kaolinite ($\text{Al}_2\text{Si}_2\text{O}_5(\text{OH})_4$) and the aluminium-rich Gibbsite ($\text{Al}(\text{OH})_3$)¹³ and perceptions in expert tasters of minerality in wine. In fact the expert tasters only reported minerality when aluminium or silicon was present in the wine.

And so now we have three important areas of research which may point to a partial answer to the issue of detection of minerality in wine.

¹¹ Yes, we know that the name of the wine may skew our judgement but many people tasting it blind come up with exactly the same sensation of saltiness.

¹² G. Thoukis, M. Ueda and D. Wright. *The Formation of Succinic Acid during Alcoholic Fermentation*. *American Journal of Enology and Viticulture*. 1965 Vol. 16 No. 1 pages 1-8

¹³ Oze, C.; Horton, T. W.; Beaman, M., *Geochemistry and Minerality of Wine*. *American Geophysical Union*, December 2010

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We know that expert tasters can identify mineral tastes such as chalkiness in wines from Chablis. They can detect slate-like minerality in Rieslings from Germany and different mineral qualities in the granitic-based Rieslings of the Alsace.

And it seems that we more often talk about minerality in wines from cooler climates where levels of acidity seem to be higher. So it is very likely that provided the wines are grown in healthy soils that encourage mycorrhizal fungi which, in turn, permit a range of nutrients to be transported into the vines and subsequently into the grapes, the pre-conditions for minerality will be present. It then seems necessary for succinic acid to be created as a 'transport mechanism' that allows the palate to detect different types of minerality. It is only then that different elements such as aluminium and silicon can then be detected and provide the sense of minerality that everyone is talking about.

However we also reach the conclusion that the detection of minerality is not simply a binary association of terroir and minerality perception. During fermentation there are incredibly complex reactions that take place which not only involve nutrients that are present in the grapes but also the dozens of yeast types and other microbes that contribute to the fermentation process.

Of course there are then many complex compounds including succinic and lactic acid formed that impact on the taste and mouth feel of the wine.

This has been a complex topic and we will probably write more about it as we learn more. What we try to leave you with is that wine will be influenced by the terroir from which it springs and that the terroir may contribute to a perception of minerality. We know this because when experts say 'this is a Chablis' or 'this is a Riesling from Mosel' it is often a perception of a particular type of minerality that prompts them.

However we also think that there is sufficient evidence to show that the winemaking process is also involved and that wines are not simply an expression of terroir but also of winemaking styles and techniques that help to reveal the inherent minerality.

Maybe a quote from Harold McGee might be a good way to end:

"We don't taste a place in a wine. We taste a wine from a place — the special qualities that a place enables grapes and yeasts to express, aided and abetted by the grower and winemaker."

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