



FRANÇOIS CHARTIER “CRÉATEUR D’HARMONIES” D.O. CAVA MASTERCLASS
4 February 2020, Barcelona

EXPLANATION OF THE MOLECULAR RESEARCH ON THE AROMATIC PROFILES OF FOUR TYPES OF CAVA AND THEIR PAIRING WITH THE CUISINES OF THE WORLD, ESPECIALLY WITH THE GASTRONOMY OF PERU, MEXICO, UNITED STATES, JAPAN AND THE MEDITERRANEAN DIET.

1- MOLECULAR ANALYSIS

ANALYSIS METHOD.

For this molecular analysis of the different types of Cava, we first carried out a summary of the different general aromatic profiles of the various types of cava. Note that we have also taken an account among those four different types of Cava that the Cava D.O. has asked me to analyse, there are many sub types, such as those created by using different grape varieties, and also different elaboration techniques, as well as different aging times once bottled, or aging in bottle, after disgorgement, in the winery or in a restaurant cellar, before tasting the cava.

Subsequently, once the standard aromatic profiles were well defined, an analysis of the dominant molecules of each of the Cava types was carried out, using our data following analyses by Gas Chromatography-Mass Spectrometry (GC–MS), as well as via the existing scientific literature of the laboratories with which I have collaborated since 2002.

Once the dominant molecules of each of the types of cava were targeted, using the aromatic science of molecular harmonies (created in 2002 and published in the book *Taste buds and Molecules – Papilas y Moléculas*), we carried out in-depth research of the ingredients (food and drinks) containing these same dominant molecules, in order to identify the ingredients that are complementary to each of the categories of Cava.



A reminder: the aromatic science of molecular harmonies (created in 2002 and published in the book *Taste buds and Molecules*) - recognised as a major advance in the world of sommelier and cuisine, by a range first-rate scientists , as well as by renowned chefs and sommeliers, such as Ferran Adrià and Ferran Centelles (El Bulli Foundation) -, makes it possible to create perfect aromatic harmonies between drinks and dishes. The aromatic harmony is explained by the pairing of ingredients and/or drinks dominated by aromatic molecules of the same family. The result is a powerful aromatic synergy.

In summary: 1 + 1 = 3. A new mathematics of taste.

Lastly, we linked those complementary ingredients with the dominant ingredients of traditional recipes (with a powerful aromatic synergy with different types of Cava) of the five markets that the D.O. Cava wanted to communicate at first: Mexico, Peru, United States, Japan and Mediterranean countries (especially those where the Mediterranean diet is present).

FRANÇOIS CHARTIER "CRÉATEUR D'HARMONIES"



MOLECULAR PROFILE SUMMARY OF EACH OF THE FOUR TYPES OF CAVA:

CAVA – YOUNG – MORE THAN NINE MONTHS –

This type of young cava has a strong general aromatic profile with notes of aniseed (especially when there is a strong presence of the xarel·lo grape variety), as well as white fruit (apple, pineapple, pear), white flowers (hawthorn, linden), without forgetting herbal and citrus notes.

Among them, we come across the following molecules: linoleic acid (herbaceous note); ethyl hexanoate (floral/fruity); anethol (aniseed); methyl p-tolyl (acacia); anisic acid (apple blossom and aniseed); amyl acetate (apple blossom); linaloöl (lavender); methyl 2-methylpropanoate (apple).

The main complementary ingredients of Cava D.O. **YOUNG** are: fresh coriander, green apple, basil, fennel, dill, osmanthus flower, jasmine, shiso, mint, lavender, pear, French fries, grapefruit peel, orange, peach, pork fat, sesame oil, olive oil and shrimp - but many more details are provided in the research results document of the molecular profiles of the CAVA D.O.

CAVA – RESERVA – MORE THAN 15 MONTHS –

This type of cava -due to having a more marked aging than young cava -, its general aromatic profile is that of ripe white fruit (yellow apple, pear), yellow fruit (apricot, peach, pineapple) and dried fruit (almond), with more gourmet nuances of coffee, pastry and honey.

Among others, it contains the following molecules: γ -decalactone (peach, apricot); amyl propanoate (apricot); amyl acetate (apple blossom); methyl 2-methylpropanoate (apple); decanoic acid (toasted); guaiacol (smoky/spicy); b-damascenone (honey); benzyl mercaptan (coffee).

The main complementary ingredients of Cava D.O. **Reserva** are: olive oil, honey, tomato, toast, *bull blanc*, almond, leeks, pistachio, cocoa, French fries, paprika, butter, yellow apple, curry, soy sauce, dried fig, nuts, mayonnaise, goat cheese, brioche, grilled crayfish, scallops, Catalonian calçots or scallion onion, *butifarra* or Catalonian sausage, apricot, apple, pear, rose water, coffee, smoked fish, - but many more details are provided in the research results document of the molecular profiles of the CAVA D.O.



CAVA – GRAN RESERVA – MORE THAN 30 MONTHS –

This type of cava undergoes an aging period of more than 30 months, therefore structurally speaking, among others, it is marked by the autolysis of yeasts, differing from the two previous types of cava by a general aromatic profile that is more toasted, more buttery and spicier, with a fruitiness of a more candied flavour. The white fruits are ripe (stewed apple), the yellow fruits are also riper, even dried or candied (dried apricot) and the dried fruits are roasted (toasted hazelnuts). Roasted nuances are omnipresent (toast, coffee, dark chocolate), and mild notes of mushrooms and truffles may be present in some cases.

It contains, among others, the following molecules: *2-ethyl-3,5-dimethylpyrazine (earthy/roasted); thiazole (popcorn); 2-acethylthiazole (roasted hazelnut); thiophene-2-thiol (roasted coffee); furan (caramelised nuts); γ -decalactone (peach, apricot); decanoic acid (toasted); guaiacol (smoky/spicy); benzyl mercaptan (coffee).

**2-ethyl-3,5-DimethylPyrazine (earthy, roasted)*

The presence of lees and aging at a low pH (2.95–3.15), as in the Reserva and Gran Reserva Cava wines, lead to several modifications in the wine's composition. These conditions, combined with extended aging, result in the required environment for the Maillard chemical reaction, involving aromatic molecules, including sulphur, oxygen, and nitrogen heterocycles (such as thiazole, furan, and pyrazine derivatives), which may have a sensory impact on the wine. Aromatic heterocycles found (by the SPME-GC-MS method) in reserva and gran reserva Cava wines, highlight a strong correlation between certain heterocycle concentrations and the wine's age. The second revealed a correlation between heterocyclic compound and free amino acid concentrations measured in the cava, suggesting that these compounds are potential aromatic precursors when cava is aged on lees and, thus, potential key compounds in the bouquet of aged Cava.

The main complementary ingredients of Cava D.O. **Gran Reserva** are: corn, popcorn, chipotle, cooked apple, toasted hazelnut, toasted almond, osmanthus flower, coconut milk, butter, mature Cheddar cheese, mature cheese, Iberian ham, onion, clams, mussels, oysters, red prawns from Palamós, aged beef, guava, coffee, foie gras and scotch - but many more details are provided in the research results document of the molecular profiles of the CAVA D.O.



CAVA – PARAJE CALIFICADO – MORE THAN 36 MONTHS –

Paraje Calificado is the cava with the longest aging process, which gives it more sustained evolutionary notes (oxidation reduction) than the previous cavas. The result is a cava of great aromatic complexity, with a more toasted, roasted, candied, spicy profile, as well as with present of ripe fruit, and cocoa/roasted notes, more buttery and spicier, with more candied fruit. The white fruits are very ripe (baked apple), the yellow fruits are also riper, even candied (dried apricot) and the dried fruits are roasted (roasted hazelnuts). Roasted tones are omnipresent (toast, coffee, dark chocolate), and touches of mushrooms and truffles are often present.

Among others, we find the following molecules: *benzenemethanethiol (baked apple); *2-furanmethanethiol (baked apple); *Ethyl 3-mercaptopropionate (baked apple); furfuryl mercaptan (coffee); benzyl mercaptan (coffee); ethyl 3-mercaptopropionate (leather); thiazole (popcorn); 2-acetylthiazole (roasted hazelnut); 2-acetylthiazole (roasted hazelnut); furan (nuts); 3-methylbutanal (fruity/malty); ethyl propionate (Fig); ethyl formate (rum); 3-octenol (mushrooms); dimethyl sulphide (truffle/rancid); thiophene-2-thiol (roasted coffee); furan (nuts/caramel); γ -decalactone (peach, apricot); decanoic acid (toasted); guaiacol (smoky/spicy); benzyl mercaptan (coffee).

**Benzenemethanethiol, *2-furanmethanethiol and *ethyl 3-mercaptopropionate are present in CAVA at concentrations considerably above their thresholds of perception. Their concentration gradually increases in proportion to the aging period of the bottles on the lees, and even more so following the disgorgement of the latter. In summary, the contribution of these volatile thiols to the empyreumatic nuances of the aromatic profile of the baked/stewed apple type of these long aging Cavas on lees, then in bottles (after disgorgement) is one of the keys to the molecular signature of these Cava D.O. of long aging.*

The main complementary ingredients of Cava D.O. **Paraje** are: mushrooms, coffee, curry, aged veal, loin, truffle, miso, shitake, foie gras, "pain d'épices", dark chocolate, smoked meat, mature cheese, cinnamon, cloves, vanilla, maple syrup, huitlacoche, dates, soy sauce and rum - but many more details are provided in the research results document of the molecular profiles of the CAVA D.O.

FRANÇOIS CHARTIER "CRÉATEUR D'HARMONIES"