Artistry and Craft

Perfumery: Techniques In Evolution. Part V*

A meditation on the art, craft and latest science of fragrance creation

by Arcadi Boix Champs, Auram International Group Co. Ltd.

Woody-Rooty

The woody family and subgroup of rooty is often is confused with vetiver, because vetiver is rooty and woody at the same time. In the past I have mentioned products like Vetykone, Rhubaflor, Vigoflor (IFF) and Rhubafuran (Soofi) (rooty-vetiver), Rootanol (rooty-floral-woody), Geosmin, Huminol and Huminol M (humid and rooty), *trans*-2-nonenal, and Irivone, among others.

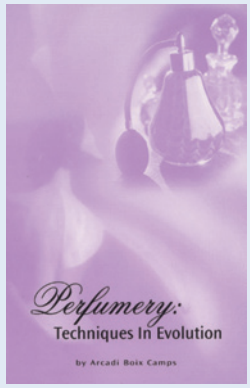
Roots are as ambiguous as woods are. Vetiver, patchouli and sandalwood are "woods," but do they really resemble each other? This is again proof of the difficulty of expressing emotions and sensory experiences through wording. I discussed this topic very often with Edmond Roudnitska. We both dreamed of having had Marcel Proust beside us in our laboratories and judging his assertions when smelling essential oils and chemicals. Unfortunately, we were born too late, or Proust too early. It would be interesting to see how Proust would describe contemporary olfactory ingredients (which he would surely love), not to mention how he would judge our modern arrogant society.

Within woody-rooty I would like to mention:

6-Hydroxydihydrotheaspirane: Previously, within the herbal tea subgroup of agrestical products, I described 6-acethoxytheaspirane as being herbal, slightly fruity and softly woody. However, 6-hydroxytheaspirane is totally different. Its scent is humid-earthy, such as when one opens a long-closed room for the first time. Yet there are more dimensions to 6-hydroxydihydrothesapirane. The material is more complex than Geosmin, Huminol or Huminol M. It is slightly fruity, herbal and combines well with all the damascones and cyclo geraniates, giving extremely good accords with Romascone, Deltanate of ethyl safranate. 6-Hydroxytheaspirane is also extremely good with alcohol NU and woody chemicals. In addition, it makes very good accords with Mitti attar (a codistillation of

*Parts I-IV in Arcadi Boix Camps occasional series appeared in *Perfumer & Flavorist* in 1977, 1978, 1985 and 1999. The first segment of Part V appeared in *Perfumer & Flavorist's* June 2004 issue. The final installment will be published in the September issue.

Further Reading



This latest installment of Arcadi Boix Champs' perfumery series follows the publication of his collected articles (1978-1999) — *Perfumery: Techniques in Evolution*, presented by Allured Publishing. Never before has a perfumer of this calibre provided such a constructive and open analysis of new perfumery materials. *Perfumery: Techniques in Evolution* reveals a profound knowledge in the use of perfumery materials in both new and traditional formulas. Though not a book of perfume formulas, *Perfumery: Techniques in Evolution* is an excellent guide for perfumers, as well as those involved in research and development in adopting new perfumery materials in their daily creative work.

Arcadi Boix Camps provides a remarkable review of new perfumery chemicals that have been introduced to the industry in the past 20 years. A definite staple in any creative perfumer's reference library.

Hard cover, 125 pages, Published 2000,
ISBN: 0-931710-72-3

For more information, contact Allured Publishing's customer service; tel: 630-*653-2155, x590; e-mail: customerservice@allured.com; www.allured.com*

humid earth over sandalwood oil). I also frequently use it in new oriental creations in tandem with valerian root oil, costus oil (I apologize if I harm the sensitivity of anyone, but I still love it in spite of the harm its smell can supposedly do to my health), kunzea oil (an interesting and almost unknown natural product), rosemary (a natural oil mostly unknown since it is very hard to find pure), lavender spike, the so-called cantueso oil and hyssop. I also like its effects with special fruity chemicals, including oxo-α-ionyl isobutyrate, Roman and wild chamonile oils, Givescone, decenylcyclopentanone, and the so-called patchouli coeur. The material blends well with orris products, creating unbelievably beautiful effects. I like to mix it with natural thyme oil, too, in addition to gingergrass and, naturally, members of the limbanol family, which create an accord of unsurpassed beauty. 6-Hydroxytheaspirane is yet another underused gem, and not all of its properties have been discovered. I trust one day it will become an important chemical.

Woody-Floral

The subgroup of woody-floral, or violet-soft-flowery, has many interesting chemicals. This subgroup is extremely important in perfumery because some of its most prominent ingredients belong to it, including Iso E Super, Kohinool (IFF), Koavone (IFF), the ionones and methylionones, among others. Herein I would like to mention the following:

Tetrahydroionol: It has been said that the diastereomeric mixture of tehrahydroionols possesses only very weak and uncharacteristic odor notes, and the research has insisted in elongating the side chain by two carbon atoms, which has garnered us a series of chemicals that started with Timberol (*cis*-nor-limbanol) (Symrise), nor limbanol, dextro nor limbanol and Limbanol (Firmenich). Well, no doubt those chemicals are jewels, but why disregard tetrahydroionol? The material is less woody, but it has a lovely floral-woody note reminiscent of parts of the violet flower — the queen of the floral-woodiness. In my opinion, tehtrahydroionol is a very impressive and delicately warm woody chemical. It's not as strong as Limbanol, and of course not as delicate as the nor limbanols, but it is delicately warm, floral-woody, ambery, soft, and stronger than "pure" timberol (which is indeed more floral than tetrahydroionol) As a side note, do not forget that "commercial" timberol is more woody than tetrahydroionol only because it has as an impurity in its *trans* isomer (nor limbanol) (around 25 percent). There is also a so-called "timberol" made in India that contains but 11 percent nor limbanol, and which is comprised of a lot of dehydrotimberol, an almost odorless chemical. Pure *cis*-nor-limbanol, the main isomer of timberol, is not odorless as stated by some experts, but rather is delicately floral-woody. In fact, the isomer is more floral and less woody than real tetrahydroionol, a extremely elegant and pleasant chemical that has not been widely used. (Again, many people will ask: "What do you mean by pleasant?" It is for the reader to estimate — those having read my past writings may divine what I mean.) Tetrahydroionol is extremely pleasant, possessing a soft, delicate, woody scent that has filled my soul quite often. I believe tetrahydroionol cannot be compared in quality to timberol, Limbanol or nor limbanol, but aren't we perfumers using cedryl acetate — a material that cannot be compared to those described jewels, either? We do so because the latter adds special nuances and elegant velvety notes to many fragrances. I could say the same about tetrahydroionol. If I compare it to nor limbanol, I prefer nor limbanol, but perfumery combination is a great world, and tetrahydroionol can contribute interesting elements to accords that I would certainly not disregard. The same is true between Sclarex and Sclareolate. Sclarex is almost abandoned, and

It is very risky to judge what should be promoted and what should be withdrawn — one never knows all of a material's secrets.

Sclareolate is on the rise. But couldn't we find very good accords with Sclarex? Of course we could. The birth of a new chemical is naturally something to be happy about — to withdraw a chemical is always negative. We perfumers have seen that sometimes when a product is widely disregarded, suddenly one of us will find a great, unexpected accord with it. Let's just remember the cases of Magnolan (Symrise) and Majantol (Symrise). Would have been wise to discontinue Majantol because, maybe, Lyral (IFF) was better and cheaper? I believe Lyral is an undisputed jewel, but Majantol and Magnolan are also good. It is nice to have them around to experiment with, discovering all their possibilities. It is very risky to judge what should be promoted and what should be withdrawn — one never knows all of a material's secrets. I would not like to be forced to make such decisions. I believe that sooner or later tetrahydroionol will be discovered, just as dihydro-β-ionone and dihydro-α-ionone (charming and lovely violet chemicals) once were, following stints in oblivion.

Dihydro-α-ionone: This material is difficult to classify as floral-woody or floral-violet, just as β- and α-ionones and methylionones are. Actually, when we talk about violet we often incorrectly associate the so-called absolue de feuilles de violette — a very green material based on chemicals such as *trans*-2-*cis*-6-nonadienal or *trans*-2-*cis*-6-nonadienol — which is nowhere near as floral woody as the real flower. Real violet flower oil is something I have smelled just once in my life, while most perfumers have never had the opportunity. The real material is something that many totally ignore. Production of real violet flower oil would be the most expensive essential oil in the world market, if produced commercially — more than musk absolute of orris absolute — since the yield of the flowers is extremely low (around 35,000 kilos of petals are necessary to yield 1 kilo of oil). The natural smell of the flower of violet it is not green, but rather deeply floral-woody. For many years, chemists confused ionones and irones, labeling irones as "ionones," while believing that α-ionone was not a nature identical product. I am not talking here about the 19th century, but of a period as close to us as 1950. The research of the "key" element of the violet flower was indeed full of obstacles since the natural oil was too expensive to start a serious work with. When parmone was discovered, it was thought of as being the key of violet oil. However, after much research, it was proven that parmone was simply a mixture of α-ionone, dihydro-β-ionone, β-Iinone and dihydro-α-ionone.

Even today, many people confuse products as basic as methylionones. Real γ-methylionone (or α-iso) is absolutely floral. Its best quality in the world, cetone α, is completely floral and much better than other well-regarded qualities, including isoraldeine 95, methylionone γ coeur and methylionone γ pure (which is only a mixture of isoraldeine 70 with slight amounts of caryophyllenyl acetate). The γ isomer is so delicate that, by itself, it smells of violet flower. However, the flower it does not have methylionone, but rather a combination, as I said before, of α-ionone, β-ionone, dihydro-β-ionone and dihydro-α-ionone.

Dihydro-α-ionone is indeed an old product that is really outstanding, and although it has yet to affect the evolution of perfumery, it will, just as its β isomer does. Dihydro-α-ionone is an extremely nice floral-woody and ambery chemical. It has important shades of the so-called Cashmeran, and is less green than its β counterpart. The material has important shades of ambergris, although not as many as compared to its γ isomer, which is one of the main ingredients of the natural delicacy thrown to the oceans by whales. Dihydro-α-ionone combines extremely well with: α-irone, another great chemical that smells (when pure) floral-woody; vetyverol and vetyveryl acetates, which will fix it; georgywood and Spirambrene (Givaudan); ginger oils that will add a spicy nuance; animal products, especially amber chemicals such as amber

ketal, belambre or ambrocenide; methyl ambrinol, dihydroambrinol sclareolide and ambrox; floral chemicals, including Florol, Lyral, Mayol, 2,3-dihydrofarnesol, and its aldehyde, dihydrofarnesal; and long-lasting *trans*-2-tetradecenal, a chemical that combines citrus, magnolia and frangipani deep aspects. The mixture of dihydro-α-ionone and the so-called super muguet, frambinone crist., Berryflor (Givaudan), Moxalone, Cashmeran, Helvetolide (Firmenich), Kephalis (Givaudan) and Nirvanolide forms another extremely charming accord. The material is indeed a great chemical that I believe will be used in the coming years, when suddenly somebody will use it, and the masses will discover its delicacies and properties.

Rosamusk — 1-(1-acetoxyethyl-1)-3,3-dimethylcycloxane: This is a very interesting chemical that smells of rose, floral violet and musk, coupled with a very nice powdery note. It can be considered a rose chemical, but I believe it is better to classify it within the woody-floral family. Rosamusk (IFF) smells clean, and therefore is fantastic in powder detergents and other functional fragrances. It blends very well with Rosacetat, in addition to very detergent-stable musks such as Globanone 100 percent and Isomuscone (although it can be also used with Exaltolide and Habanolide, which can stand detergent PH almost as well as those mentioned before). I believe Rosamusk will find increasing use, in part because its accords with violet-smelling products are great. A mixture of Violettyne IPM, Violiff (IFF) and Parmanyl (Symrise) with Rosamusk is used in one of the world's top fabric softener. In this example, Rosamusk's powdery, soft-violet and musky notes combine excellently with the green, bright and lively natural-violet leaf notes of the three chemicals. Accords of Rosamusk with Florantone and Orinox are also great, and both could kick off a revolutionary trend when mixed with Nerolione, a new and powerful molecule.

Dihydro-β-ionone: While dihydro-α-ionone — a more flowery, powdery, ambery and less green material than dihydro-β-ionone — has not been widely rediscovered, or even (in some cases) discovered, dihydro-β-ionone has succeeded. The latter material forms part of several great accords, including fragrances like "Dolce Vita," "Bulgari for Ladies," "Sonia Rykiel," "L'eau d'Issey for Ladies," "Façonnable," "Aquaman," "Lolita Lempicka," "Essenza di Zegna," "Nu" by Yves Saint Laurent (in which dihydro-β-ionone is mixed with a beautiful cedarwood accord), "Macis" and "Helvetolide." This irresistible chemical forms an important part of the composition of osmathus absolute, and therefore is also present in great Middle East creations such as "Assam," "Prachinese," the greatest "Diwan" and "Shillong" — all of them mixtures of Indial rose oil, many different varieties of agarwood oils and spices. I have personally made bases that improve most of the top notes, such as Vert Tilleul (which includes helvetolide and dihydro-β-ionone), Vert fruitée (coranol, woolfwood, helvetolide, nor limbanol and the related chemical), Vert Lactone, Violette Verte, and Vert de Magnolia. It is a pity that dihydro-β-ionol is not produced, because it is also a part of osmanthus absolute, and although weaker than the ionone, it imparts a very delicate floral note to the natural product. I very much like the mixture of dihydro-β-ionone, tobacco, and osmanthus chemicals such as Tabanone (Symrise) (megatigmatrienone), dihydrotabanone, edulan, oxo-edulan, tetrahydro edulan, oxo-β-ionyl isobutyrate, oxophorone, megastigmadienone epoxide, oxo damascones, α-damascone and γ-damascone tetrahydronaphtalenone, among others. Dihydro-β-ionone blends very well with orris floral chemicals such as the irones, and with all the methylionones and leathery products such as the great 5-ethyl-2-nonanol (alcohol NU). The material also works well with traces of Costacide, Cetone V (allyl ionone) (Givaudan), cedarwood oils, patchouli coeur, pink pepper oil, nigelle absolute (the jewels of all the jewels), the so-called Myrrhone, the old Pentambrette, and Damascenine (methyl 3-methoxymethyl anthranylate), a badly known but interesting chemical.

Myrrhone — (E)-4-(2,2,cis-3-trans-6-tetramethyl-R-1-cyclohexyl)-3-buten-2-one: This is a totally unknown chemical, and one of the most beautiful I have ever smelled. While new, this product will absolutely influence the future of perfumery. It smells of a combination of irones, some of the finest parts of jasmine, Paradisone, epi methyl jasmonate and myrrh. Myrrhone is extremely floral, radiant, elegant — the result of the great research done by our industry's chemists as is the case with Myrrhone, Helvetolide and its newer cyclaprop analogue, Paradisone, Pentambrette, dextro nor limbanol, nor dihydro-β-vetyvone, *trans*-α-bergamottenone, georgywood, Moxalone, Nirvanolide, muscenone δ, exaltenone, exaltone, exaltolide, habanolide, ambrettolide, ambrocenide, irone α, Limbanol, super muguet, anapear, Romandolide, Khusimone, woolfwood, the newest *trans*-oppositadienal, the rose ketone. Should I continue? I am approaching the notion of perfection, and "perfection" is a dangerous word. Can we remain humble (a condition of wisdom) when smelling such treasures that impart so much beauty? Did perfumers feel they'd arrived at perfection upon the discovery of the aliphatic aldehydes, isoamyl salycilate, vanillin, ethyl vanilline, heliotropin, and the ionones? Possibly. This phenomenon best describes how small we are when trying to get a handle on high

concepts like "eternity," a condition of the fine arts. But we must admit: art cannot be described. As I said before, Michelangelo knew Phidias, but not Marc Chagall. Poussin knew Leonardo, but not Picasso. Protagoras knew the sophists, but not Plato. Plato knew Socrates, but not Marcus Aurelius, Julian the Apostate or Maximus. What is perfection? The eternal search for truth desperately required by the anonymous writer who wrote the poem in the first half of this installment? We should never lose our humility. Still, we have Myrrhone, and this for a perfumer must be an explosion of joy. Myrrhone is one of the most elegant chemicals. When smelling its delicacy, the eyes close, and dreams, for a while, seem as if they might come true. Its radiant, floral-woody and floral-resinous shades are paramount. It smells of the best part of sacred myrrh, and combines well with Cashmeran, Firsantol, dextro nor limbanol, Helvetolide, Javanol, Ambrocenide, Paradisone, Koavone, a touch of Zingerone, georgywood (a woody resinous chemical, too, although woodier and less radiant than Myrrhone), Iso E Super, Kohinool, Jasmine Lactone, Pentambrette, epi methyl jasmonate, the best musks (the cleanest and more crystalline). Myrrhone will affect the evolution of our art and science for the coming years. The material will be another Hedione, another Paradisone, another Helvetolide, another Cetone α, another Ionantheme 100 percent. We are reaching glory in perfumery and our dreams are coming true and have we not said that future belongs to those believing in their own dreams?

Methyl-α-ionone glycidate: This is a very typical floral-woody chemical with exceptional sweet amber and velvet effects. The mixture of dihydro-α-ionone, dihydro-γ-ionone, dihydroambrinol, ambrinoloxyde and methyl-α-ionone glycidate is one of the best — deeper than I have smelled in the violet flower and amber tonalities. Methyl-α-ionone glycidate also works extremely well with georgywood, and both products are synergetic, mutually enhancing its soft velvety notes. Less green than α-ionol and α-ionyl acetate, methyl-α-ionone glycidate combines well with these two chemicals, as they all do when combined with woolfwood, giving a great new accord that is used in our Soft Violet. This base has been pre-selected as part of a fragrance in a fabric softener that also contains lots of methylionone, Vertofix Coeur, Iso E Super, Hevetolide and Globanone 100 percent. I am introducing in this accord now, Isomuscone (Symrise), which unbelievably enhances the soft violet tonalities. Methyl-α-ionone glycidate is a very soft chemical, in addition to being long lasting (almost as much as woolfwood).

Musks

I will continue with the musks and I have mentioned before — Muscone, Exaltone, Exaltolide, Civettone, Ambrettolide, Ethylen Brassilate, Hexadecenolide, Habanolide, Muscenone δ, Exaltenone and so on. I will go to:

Helvetolide (+) 1'R,4S)-4-(3',3'-dimethyl-1-cyclohexyl-2,2-dimethyl-3-oxapentyl propionate: This chemical, relatively recently used in perfumery has become paramount. I would dare to say that it is as unique as Hedione or Paradisone. Helvetolide is musky, floral, having a certain fruitiness reminiscent of pears. It is very diffusive, and there are not many musk odorants, (although many diverse olfactory richness, it is mainly a musky chemical), that are diffusive but normally heavy. They are very clean and transparent notes, but heavy. On the contrary, Helvetolide is all aura, all diffusion. It has a capacity to harmonize the regular top notes based on linalool, ethyl linalool, dihydromircenol, coranol, sclareaolate, and green odorants, among others, and with the heavy musks like Galaxolide, Habanolide, ethylene brassilate, Ambrettolide, Scentolide, Isomuscone, Romandolide, Nirvanolide, Muscenone, Exaltenone, Globanone 100 percent, Muscone FAB, and others. All of these qualities make Helvetolide absolutely unique. It can't be replaced. (Naturally, the gentleman who made Sandalwood Givco without Javanol will be able to replace Helvetolide as well — but only him, nobody else, only him.)

Helvetolide is one of the chemicals that most affected the evolution of perfumery since 1999. The material has been used in so many accords in quantities that range from 0.5 percent to as much as 15 percent (its normal average dosage it is around 4 to 5 percent). Helvetolide possesses a very unusual chemical structure, considering it smells of "musk." However, as I mentioned before, it is not simply musky in character. The material is radiant, with aspects of flowers, cleanliness, harmony and softness. I have used this indispensable material many times. One remarkable perfume including Helvetolide (around 7 percent) is "Miracle" by Lancôme, a fantastic combination of ethyl linalool, linalool, linalyl acetate, pink pepper, ginger oil, Coranol, Florol, Neobutenone, Helvetolide, Cyclogalbanate, Irone α, cyclamen aldehyde, lilial, glycolierral, Iso E Super, muscenone (around 3.5 percent), Exaltolide, cassis bud absolute, Prunella, lots of Galaxolide, lyral and many other ingredients that have made possible one of the best fragrance creations of recent years. Other fragrances using Helvetolide are "Ultraviolet" for women in which the material is mixed with Mysoral, "Aquaman," "Oxygène," "Too Much Champs Elysées," "Flower" by Kenzo (a very good soft violet and flowery note), "BLV for Ladies" (Hel-

vetolide, ginger oil), "Nu," "Chance," "Chic," "Colgne de Thierry Mugler," "Creed White," "Pleasures Intense," "Sensi," "Freedom" by Tommy Hilfiger for men and just recently in "Bulgari Onmia" (around 15 percent). However, this list is too long to mention all that is being created and achieved by/with this key chemical. Research brings to us many great ingredients. Many of them are merely good. Others selected by a few visionary perfumers become the giants that set the trend — Helvetolide is in this class of materials. Hedione created history since it was first used by Edmond in "Eau Sauvage" in 1966. Then, the material was just a secret chemical called N378 B. Several other history-making chemicals followed: Iso E Super, Cashmeran, the damascones, Florol, ethyl linalool, nor limbanol and variations, Firsantol, Coranol, and others. Helvetolide is absolutely in the top level. Understanding this fact is of great importance in understanding the essence and the real meaning of this article — the creative evolution of perfumery.

Isomuscone — cyclohexadecanone: This is a crystallized chemical when pure, normally used at 50 percent. Isomuscone is an extremely good product. For me, after having smelled more than 900 musk chemicals, I felt that one of my favorites — because of its intensity, harmony, radiance, beauty, diffusion and auratic breathing — is Muscone. However, Muscone, which is slightly more animalic than Isomuscone, is very expensive and its use is therefore limited (despite its strength). Isomuscone, a captive chemical, is the closest musk that I have smelled to Muscone, but it is around 10 times cheaper. Isn't this a delight? Chemically, the two chemicals are similar, because Muscone is methyl cyclopentadecanone while Isomuscone is cyclohexadecanone.

Musks are very difficult to describe since every person smells them differently. As I said before, I do not smell Civettone, and I smell Muscone and Isomuscone quite vividly, yet some people have told me that Civettone is the strongest musk. The realistic solution we perfumers have adopted is to blend different musks, because they work together synergistically. Although I love Isomuscone on its own, mixtures of it with other musks increase its perception. For instance, a mixture of Isomuscone with ethylene brassilate at a ratio of 80/20 is stronger than both chemicals smelled separately. This results from a strong synergy amongst ketones, lactones and dilactones. The same happens when mixing Globanone and Isomuscone. The mixtures of 20 percent Isomuscone + 80 percent Globanone, or the inverse, 20 percent Globanone + 80 percent Isomuscone, are stronger than the chemicals smelled separately. It is very common to see mixtures of Galaxolide, Helvetolide, Habanolide, Muscenone, Ambrettolide and ethylene brassilate. Mixtures of Isomuscone, Habanolide, Velvione and Globanone are very, very good — approaching perfection.

These effects are very noticeable in applications. For instance, a mixture of Habanolide, Isomuscone

and Exaltolide is excellent in powder detergent, fabric softener and shampoo. As it is well known, the chemical stability of products like Velvione, Globanone and Isomuscone in powder detergent are even higher, than the stability of Habanolide and Exaltolide although these are very stable too. When seeing the same in the dilactones like Ethylene Brassilate it is very bad since dilactones almost degrade after some weeks. Isomuscone, absent in most laboratories and unknown to most perfumers, will have an important and bright place in the future of perfumery. Actually, the material has already been used in several new fragrances, including "Armani Night for Her," "Celine Dion" (so far only launched in the US, but with good success), "Into the Blue," "Versus Time for Action," "Dior Chris 1947," "So de Givenchy," and "Celine for Women."

I feel very excited, having found a scent so close to that of Muscone at such a good price.

Nirvanolide — 13-methyloxacyclopentadec-10-en-2-one: This musk is very different from Helvetolide, and is absent from most laboratories, just as Romandolide or Helvetolide are. It performs as a real musk chemical, but it is maybe the only material that is as powerful as musk ketone. Nirvanolide (Givaudan) is one of my preferred musks: powerful, clean, dry, not too long-lasting as compared with Exaltolide or Muscenone, yet still blending especially well with the key musks used today. Nirvanolide blends extremely well with a combination of Ambrettone, Ambrettolide, Moxalone and Ethylene Brassilate. The chemical's use is starting to be noticeable: "Higher Energy" by Dior and "Forever Elizabeth" from Elizabeth Arden, among others. This is yet another great product of research — this chemical is already starting to affect our profession, and will be of utmost importance in the future. When describing musks individually, as I do, it is really a tough job. It is well known that we all smell musks very differently. But what is certain is that Nirvanolide is among the most powerful musks, along with Vulcanolide. I would dare to say that the best musks are Muscone FAB, Muscenone, Exaltenone, Moxalone, Ambrettone, Globanone 100 percent, Isomuscone and Nirvanolide. However, it is so difficult to assert something like this. What about Exaltolide, Habanolide, Ambrettolide, Romandolide, Exaltone, Hexadecenolide and Isoambrettolide? They are just as beautiful as those rated as top.

Romandolide — (1S,1'R)-1-[3',3'-domethyl-1-cyclohexyl)-ethoxycarbonyl]-methyl propionate: This material is clean, heavy, long-lasting, and similar to Galaxolide in many respects — though it is less fruity and more camphoraceous. Chemically, Romandolide is, again, an unusual structure. Romandolide, however, is less radiant than Helvetolide, and less interesting since it is heavier. Although more diffusive than macrociclic and polycyclic musks, the material performs in a way quite similar to these musk chemicals. Romandolide is just now finding use in perfumes, including—"Absolu de Rochas" and "Angel Schlesser" for men.

This latter fragrance is remarkably creative, combining a green note essentially made of Triplal with a citrus-fresh floral note comprised of bergamot, lemon, mandarin, mandarin aldehyde, linalool, dihydromircenol and ethyl linalool, and an important fresh ozone character with traces of Floralozone and Melonal, in addition to considerable amounts of Calone and Helional — it is an important musky note using the described Romandolide, Habanolide and Ethylene Brassilate. The chemical possesses strong Hedionic diffusion with Hedione, Paradisone and Hedione HC, sandalwood with polysantol, agrestical shades of clary sage oils, violet harmony with traces of octine methyl carbonate, floral musk with Cashmeran, and an important shade of star anise oil that is difficult to combine in this accord.

The future of Romandolide? This is difficult to guess, but it will certainly be an expensive replacement for Galaxolide — if this product finds, eventually, problems with IFRA and other authorities that "care" about our health.

Ambrettone, Velvione — cyclohexadec-5-en-1-one: This is a relatively old but beautiful, transparent and very floral musk. Ambrettone is more floral and less animal that Muscenone or methyl cyclotetradecenone, a totally ignored great and new chemical that is more long-lasting than these two chemicals. Ambrettone works very well in enhancing very clear and white floral accords. It blends extremely well with the most floral musks, including Exaltolide and Ambrettolide, and forms nice accords with lilial, Florhydral, Precarone, Berryflor, ciclamen aldehyde, super muguet and many floral fresh ingredients. It also blends extremely well with the most floral musks such as Exaltolide, Ambrettolide, Ethylene Brassilate, Arova N, Scentolide, and cyclohexadecenolide, among others.

I sometimes repeat products already described in my work because it is very difficult to assert and accurately describe a chemical. This is not an inflexible series of writings, but a mutable dialogue that respects this art's inexactness. These writings aim to increase the understanding of the evolution of perfumery. To be as coherent as possible, I need to say that chemicals sometimes are very diverse, with many shades of scent. Therefore, the more one works with materials, the more one understands them in new ways. This allows perfumers to employ materials in ways more advanced than when the material is just launched or discovered. Perfumery is art and science — a very empirical profession. Observation, understanding, sharing concepts, feelings and ideas are supremely important. Unfortunately, as with many arts, perfumery is very often confused with design, and is affected by trends and passing fashions.

Now we see Muscenone being used widely. It is indeed a fantastic chemical, but it has animal and powdery shades in its smell, while when using Ambrettone we have a much more clean and floral impression. Ambrettone, I believe, has a very good future if we do not copy trends and keep our creativity free of influences in order to set our own trends. Doubtless Ambrettone is a great clean and floral white musk, and I adore the possibilities we may develop by using it.

Moxalone — 1a,3,3,4,6,6-hexamethyl-1a,2,3,4,5,6,7,7a-octahydro-1-oxacyclopropa-β-naphatlene: This is another interesting chemical structure that was discovered after the synthesis of Klausenone. Klausenone has a very clean and strong musky note, but though interesting, it is very difficult to synthesize. Thus the search for an industrially available molecule that smelled close to Klausenone was paramount, resulting in

Moxalone. The chemical has been used in very important perfumes, including "CK Be" and "Baby Doll," in which its special effect at a relatively low dosage, around 1 percent, shows its value. Moxalone blends very well with Habanolide and fruity notes such as Frambinone cryst. and the subtler Berryflor. This mixture of Habanolide, Frambinone and Moxalone is already a fantastic and very creative fragrance. If one adds to it Nirvanolide or Exaltenone, it becomes more powdery, a bit more heavy, but extremely good. Moxalone blends extremely well to with maltol, ethyl maltol, furaneol and some of its ethers — especially furaneol — *cis*-3-hexenyl ether (which is a completely unknown chemical that deserves to be described and used), and fir absolute. Its uniqueness in products with fruity powdery accords is really remarkable. Moxalone improves profiles like "Escada Collection," the newest "Escada Magnetism," or "Angel Innocent" in which Moxalone is not present, but if added the whole accord becomes magically harmonized, and imparts an impressive olfactory beauty that is simply unforgettable. Its warmth is a simple and angelical scent. Moxalone is very diffusive, floral, slightly fruity and musky. It is one of the musk chemicals with more top note, as with Helveloide, but it is less radiant than the latter, and more powdery. Moxalone is not as long-lasting as Habanolide, Globanone, Isomuscone or Ambrettone, but it is amongst the best of the hundreds of musky chemicals I have smelled.

Globanone — cyclohexadecen-8-one: This is another great chemical — a bit less animalic than Velvione (cyclohexadecen-5-one) and more floral-fresh, though Velvione is also very floral. Globanone (Symrise) and Velvione behave in quite the same way since both are very elegant floral musks. Blends of both with Isomuscone are quite interesting, although Velvione is much more expensive and thus it is advantageous to use Globanone. Globanone is one of the most stable musks in detergent powder. It also burns very well, and is therefore a very suitable musk for use in agarbati, joss stick and bakhoor fragrances. I have made a powdery rose-kewra perfume that won a big briefing for agarbatis and before finishing I tried many different musks. Those performing better were Velvione, Isomuscone, Muscone, Exaltone and Globanone. While taking into consideration the price, I simply used Globanone. Globanone works extremely well in very floral fragrances such as "Into the Blue" by Givenchy. The material produces a very interesting effect when mixing it with muscenone δ, benzyl salycilate, Galaxolide, Habanolide, Isomuscone, Nirvanolide, Moxalone and exaltenone, citrus oils like grapefruit and expressed lime oil (Globanone is the most 'citrus' of all the musks, and thus blends particularly well with grapefruit and expressed lime oils). The material also works well with Vulcanolide, in which the former is so strong that it enhances the whole musky accord.

I made a beautiful fragrance using around 35 percent of Iso E Super, 10 percent thujopsene pure (one of the most lovely and unbelievably unused sesquiterpenes). The thujopsene pure produced a velvet effect. Its synergy with Iso E Super increased the softness I'd been seeking. The formulation also included several green ingredients like Liffarome (IFF) and Triplal (IFF), nor limbanol, Helvetolide, Galaxolide, Isomuscone, Globanone, Muscenone δ, grapefruit and expressed lime oils, Ambrettolide, highly purified α-cedrol, amber ketal, lime dienes, cyclogalbanate, a touch of nootkatone, Ysamber K, a trace of rhum absolute, and other traces including cinnamon bark oil, cascarilla, Araucaria (a fantastic and unknown natural essential oil from New Caledonia, which possesses the most beautiful velvety-fruity effect), Javanol, Coranol, woolfwood, and many rare essential oils. Well, I will not give the formula because it is the result of more than a year of labor. The result, I can tell you, is auratic, clean and extremely pleasant. If one removed Globanone and Isomuscone, the charm and body would be greatly diminished. Globanone is a jewel with a smell/value that I consider when using Isomuscone.

Vulcanolide: This polycyclic musk (molecular formula: $C_{18}H_{26}O$) is a constitutional isomer of Fixolide, though it is an aldehyde with a methyl group added. The material is much stronger than Fixolide. Its effects are also unique and impossible to replace since it has an unusual humid note for a musk. Normally, it is used with many other musks, and it just rounds-off the whole accord, making it absolutely unique. Examples of its use are "CK one," in which it imparts the great final effect and "Light Blue" by Dolce & Gabanna, an absolutely great accord of lovely citrus oils such as lime expressed and grapefruit. The fragrance is very green, with Triplal and Liffaroma (around 0.2 percent pure) (an interesting woody amber note with a wonderful accord of amber ketal, nor limbanol, cedrol, Cetalox and Boisambrene Forte), with lots of Iso E Super (a great musky balance with Galaxolide), Muscenone (around 2.5 percent), and many more interesting ingredients. I modified the original perfume into an accord called Rainbow. In this exercise I changed the cedrènes and the crystallized cedrol via combination with a rich accord of cedrenols that included cedrol and thujopsene. The harmony is sacred and paramount. It is a kind of perfume that everybody likes, especially young and cultured ladies who look for a special freshness. The secret of the extreme freshness of Rainbow's top note

is the rare nature identical lime chemicals, in addition to the top and high volatile fractions of the natural essential oil of distilled lime.

Dimuscan — 1-(1,1,6,6-tetramethyl-1,2,3,6,7,8-hexahydro-as-indacen-4-yl)-ethanone: This material is indeed a great musk, though unknown to most perfumers. It has an empirical formula close to Vulcanolide, but with two less hydrogen ($C_{18}H_{24}O$). Like Vulcanolide and Fixolide, it is a crystallized chemical.

After so many musks and such lengthy, wide-ranging descriptions, one might be left to wonder: which is the best musk? It is very difficult to reply to this question because it is like asking a painter what the best color is. As in sculpture, painting, music, and all the arts, we know that choosing 'bests' is both foolish and useless. Each formulator may have his/her favorites, but in general there is no 'best,' but rather many great musks. Muscone, Exaltone, Exaltenone, Isomuscone, Helvetolide, Ambrettolide, Exaltolide, Habanolide-Globalide 100 percent, Globanone 100 percent, Velvione-Ambrettone, Hexadecenolide, Scentolide, Muscenone δ, Nirvanolide, Romandolide, Moxalone, ketodecanolide-cetolide, Ethylene Brassilate, Galaxolide, Tonalide, the powerful musk cetone, Civettone, etc. — which are the best? The truth is: probably mixtures of several, because, as I mentioned before, it is proven that combined musks improve synergistically, producing better results.

Ambergris/Amber-Woody

The family of chemicals smelling of ambergris has been treated extensively in my work. This class continues to be one of the main targets of research. The smell of natural ambergris is so complex, intriguing, mysterious and extraordinary that it has enchanted those familiar with it, making the material one of those natural products lodged in perfumers' consciences. Its impact is quite difficult to describe. I first spoke of amber ketal in 1978. In past writings I have described chemicals like α-ambrinol, ambrinoloxide, Ambrox, homo cyclo geraniol, Grisambria, Grisalva (IFF), Oxambrol, Muscambrol, Ambraldehyde, homo cyclogeranyl chloride, dihydroctinidiolide, dihydro ambrinol, methyl ambrinol, etc. As I said before, I have always admired the description of the natural product by Ohloff: humid, earthy, fecal, marine, algoid, tobacco-like, sandalwood-like, sweet, animal, musky and radiant. Many chemicals have woody and ambery notes that are difficult to place within the woody or ambergris families. Products like dextro nor limbanol, nor limbanol, Spirambrene, Kephalis (Givaudan),

cedramber, cyclamber, Limbanol, Ysamber K, amber core, Karanal, epoxycedrene, hydroxyambran, Trimofix "O" (IFF), and Boisanol, among others, all have many ambergris shades, but to my perception they are more woody than ambery, and therefore I tend to place them within the woody family. Products like amber ketal, although woody, are more ambery than woody, as are Ambrox, the ambrinols, Ambrinoloxide, Grisalva and Ambraldehyde. Some materials, such as the ambrinols or ambrinoloxide ambery, are fecal and not woody at all, and so fit perfectly in the ambergris family.

There is no doubt that the products bordering between ambery and woody are the most interesting and impressive I have smelled.

Amber ketal: In 1978, I described a product that was quite new then — amber ketal. When I first wrote of its wonders, amber ketal was only used as a trace in "Chanel 19," and as a key ingredient in "Anais-Anais." When I initially smelled the material in the early 1970s, I felt an indescribable emotion — an immense pleasure. I realized immediately that this chemical was going to affect and set the trend of the evolution of perfumery. Well, I was not wrong, and I was not wrong with my assessment of the damascones, damascenone and calone. Today, amber ketal is one of the most important chemicals enabling our modern perfumes — not only because of its particular smell, but because of its incredible fixative capacity. I would dare to say that amber ketal is as important as Hedione, Iso E Super, Helvetolide, Florol, ethyl linalool, Ambrocenide, Galaxolide, Muscenone, Muscone, Paradisone or lilial. Amber ketal is one of the most long-lasting chemicals. Its fixing properties are so impressive that it is added to many mixtures. It is still captive and used in certain bases, but the bases do not contain much of value, and one of them has a mossy effect, because it contains Evernyl (Givaudan), which distorts the real smell of the pure chemical. I like to use pure amber ketal much more than the base. Z-11 is a crude mixture of isomers and the real product. The crystalline version has one single isomer and is extremely beautiful. I use the pure isomer in my compounds and am quite pleased with its magical effects. However, when smelling its top note, it is not that impressive, as in the case of Sandela. The product develops with time, and to feel the real beauty of it, it should be sampled from the smelling strip at least 15 to 30 days after having been dipped. However, some jewels in this category have been discovered, and some of them will become absolutely essential to the development of perfumery in the coming decades. These materials will become gain classical status because they are among the top discoveries in the history of perfumery. I will describe several amber and amber-woody chemicals, including as following:

Ambrocenide — 4,5,7,9-octahydro-2,2,5,8,8,9-hexamethyl-methanoazulene-[5,6]-1,3-dioxole: If amber ketal is a diamond, the mixture of amber ketal with Ambrocenide is the River Kohinoor. Ambrocenide is the best discovery in the amber-woody family (where amber ketal also belongs) since Ambrox (Firmenich) was commercialized, mixed at 10 percent in the base Fixateur 404 and finally offered as a pure chemical.

Ambrocenide, a crystalline chemical, is the most powerful amber-woody odorant I have ever smelled. However, Ambrocenide is not as long lasting as amber ketal or hydroxyambran, and therefore the products are absolutely synergetic. If amber ketal was the product of the 1980s and 1990s, the mixture of Ambrocenide and amber ketal will be the key of the 2000s and beyond.

The top note of Ambrocenide is radiant, diffusive, elegant, ambery, woody — indeed, both precious and unique. The material is just starting to find use as a captive chemical, although many tons are produced annually due to its use in key detergents. However, it

has already impressed many fine fragrance creators who have begun using bases that include Ambrocenide, often without knowing exactly what it is they are using. One important base is San Dra C, which contains the old Indianol, a captive chemical on the sandalwood family that was discovered in the identification of important ingredients of the Indian oil. This was the early 1980s — the time of Dr. Klein, Hans Ulrich Warnecke and Ernst Joachim Brunke. (Brunke was one of the wisest and most humble men I have met in my life — a great friend and colleague until we lost him to a heart attack while still very young). I remember this time well, when Tabanone, dihydrotabanone, Brahmanol, Indianol, krishnanol, krishnanone, trimethyl naphtalenone, Isodamascone, cyclogalbanate and many other chemicals were discovered. I remember the attempts at synthesizing the pure isomer of amber ketal, and I remember the illusory optimism and energies we chemists and perfumers shared in our quest for new and outstanding chemicals. Brunke would have been extremely happy smelling Ambrocenide and Ysamber K, since without knowing it, while having dinners and long discussions about our dreamed chemicals, we in fact had Ambrocenide in mind. It is a wonderful thing that the product, the fruits of long research, effort and dreams, was finally achieved.

Another base of Ambrocenide is Timberol Forte, which is simply a mixture of Timberol and Ambrocenide; however, the whole spectrum is revolutionized. Timberol, the *cis*-nor limbanol isomer, which is weaker and more floral contains an impurity. *trans*-Nor limbanol, synthesized later and simply called nor limbanol, is a better chemical. A simple addition of Ambrocenide triples its strength. Ambrocenide will be one of the chemicals that will set a trend in the perfumery of this decade and beyond, during which it will be applied in perfumes at higher and higher doses.

There are not many products with a molecular weight of 278 that are so diffusive. Ambrocenide is a product like Calone, possessing an incredible perception by our senses. Therefore, I consider it the needed "sibling" I was seeking for its "older brother," amber ketal. Mixtures of Ambrocenide and amber ketal and, if still available, Hydroxyambran, are supreme. Mixtures of Ambrocenide, nor limbanol, limbanol and Ysamber K are also supreme. In these cases, we are again reaching close to perfection. Still, it is possible that new, amazing chemicals will be discovered in the future, leaving us to admit that art has no limit. Art cannot be contained in a single timeframe, because it is eternal. When, as young perfumer, I smelled amber ketal for the first time, I felt this was perfection. Well, 34 years later I realize it is very risky to talk about perfection, knowing that today the mixture of Ambrocenide and amber ketal is much better than amber ketal alone. Again I must state that we are achieving what I call olfactory glory, and I would rate Ambrocenide as one of the top 10 chemicals ever discovered. To date. What will the future provide us? This is one of the mysteries of life. The future is the key to the evolution of perfumery — this is our professional progress. The search for progress and truth is paramount in our profession and our lives. This search is identical to the expression of a poem (as the one I place in the first half of this installment) or the blending of a great fragrance or the cooperation of chemists in discovering a product like Ambrocenide.

What is this mysterious search for truth? We must go to the origins of our civilization again to find an answer. It was clearly expressed already in "The Odyssey." That work's main elements are: the situation in Ithaca, where Penelope, Odysseus' wife, and their young son, Telemachus, are powerless before her arrogant suitors as they despair of Odysseus' return from the siege of Troy; Telemachus' secret journey to the Peloponnese for news of his father, and his encounters there with Nestor, Menelaus, and Helen; Odysseus' dangerous passage, opposed by the sea-god Poseidon himself, from Calypso's island to that of the Phaeacians, and his narrative there (from book nine to book 12) of his fantastic adventures after leaving Troy, including his escape from the cave of the Cyclops, Polyphemus; his arrival back in Ithaca, solitary and by night, at the poem's halfway point, followed by his meeting with his protector-goddess Athena, his elaborate disguises, his self-revelation to the faithful swineherd Eumaeus and then to Telemachus, their complicated plan for disposing of the suitors, and its gory fulfillment. Finally comes the recognition by Odysseus' faithful Penelope, his recounting to her of his adventures, his meeting with his aged father, Laertes, and the restitution, with Athena's help, of stability in his island kingdom of Ithaca. This is simply wisdom. These elements are the forgotten origins of our once-great civilization. (And Antigone — do you remember Antigone?) Well, I cannot write here the whole wisdom of our Greek ancestors, but this wisdom is without exaggeration the spirit of those researching a chemical like Ambrocenide, and those mixing it. We must be optimistic, because although most of the Western world has forgotten Odysseus and Antigone, they — these great humanistic heroes — still live in the depths of our spirits and push us, Westerners, towards the invention of Ambrocenides, Paradisones, Helvetolides, hediones, georgywoods, nor limbanols and β-damascenones. These heroes also lead us towards the understanding of the real essence of our

lovely, mysterious and intriguing world. Culture may be at a weak point these days, but our syncretism, the eternal feeling with which we're born, remains unchanged. But despite partial declines in mankind's culture, we will definitely recover, in part with help from the discoveries achieved by great and humble chemists. Indeed, the public's embrace of the magical world of perfume is, I believe, a clear signal to we creators — if we are prepared to understand it.

As I said, Ambrocenide combines well with (the also perfect) nor limbanols. The material is stronger than pure Limbanol, a product not available because it is only used in dilution. Our Neo Agarwood mixed with Ambrocenide has produced a base with promising properties for modern perfumery. The combination includes the one isomer's amber ketal in big quantities, in addition to woolfwood and nor limbanol. It lasts on the smelling strip for more than one year. Agarwood could lead to a new trend in Western perfumery, too. It is currently being tested with success.

The mixture of Ambrocenide and amber ketal will improve many accords in which amber ketal has been used alone. As I mentioned before, we are just now seeing the beginning of a new era of great, novel fragrances that will mean real progress in the evolution of perfumery.

Nordidedhydroambrox: This is a very new chemical that imparts a novel and interesting twist to all the accords in which Ambrox, amber ketal, Ambrocenide, nor limbanol and Kephalis are used. It is still too early to predict its success since the product is only now being tested, but I like it — it is unmistakably ambergris in nature, with beautiful shades of wood and tobacco. It is indeed a challenge to write about something as new and as revolutionary as this chemical.

Sclareolide: It is well known that Ambrox is produced from Sclareolide, but many ignore the parent chemical itself, and have never smelled it. Although much weaker than Ambrox, Sclareolide is one of the best materials resembling natural ambergris. The only thing I can say is that when smelling ambergris, in Mahrah, Salalah, Aden, Al Mukhallah, the Maldives or Zanzibar, I have always felt something indescribable. It is a mixture of great pleasure, a total subjective feeling and charm, and I must say that I feel almost the same when smelling Sclareolide. Sclareolide is very expensive because relatively large amounts are necessary to achieve the desired ambergris notes. However, the material is the key in our Amber Gris. I want to use Sclareolide more and more, but it is a chemical whose qualities are not easily perceived. Great skills are necessary to impart the

sought note of the natural product, which has almost disappeared from our world except in the rich countries of the Persian Gulf and Saudi Arabia, where is still used by many. Sclareolide is another important material unbelievably considered by many as a lowly intermediate chemical. In truth, its beauty is overwhelming.

12-Norallisolongifolan-14-one: This is again a chemical in its early stages. Its smell is impressively natural, produced from the inexpensive isologifolene. What can I say about it? 12-Norallisolongifolan-14-one is being tested. The material impressed me because it is comprised, just as Sclareolide, of extremely interesting nuances of ambergris and tobacco. At the same time, the chemical is very different than Sclareolide, which is primarily ambery, just like Ambrox. This ketone is also woody and heavy, with a special fruitiness of tobacco and damascones. Again it is too early to predict this unique material's future success.

Belambre — 1,7,7-trimethyl-2'-(isopropyl)-spiro-(bicycloheptane)-2,4'-{1,3}-dioxane: If Ambrocenide is a diamond, Belambre is a Burmese Ruby, possessing many carats with magical, beguiling pink-red colors. This is another almost unknown material. Its smell is very natural-ambergris, and though less powerful than Ambrocenide, it can impart magic accords and very natural ambergris nuances. I should mention here that strength is not that important in perfumery. It is but one factor — relatively weak products like Sandela or Iso E Super count themselves amongst the bigger successes in our field. Belambre is 10 times weaker than Ambrocenide, but full of charm, beauty and warmth too. Can I describe it any better? Charm, beauty, warmth, velvety, softness — aren't these great and bewitching concepts?

Today, as I mentioned in previous parts of my work, we need to put "reason" in its place and not request from it more that it can give us. What is our biggest problem at the beginning of the 21st century? It is the fight between reason and our subjective world of emotions and feelings. Luckily we can realize that new relativist and quantic science is not rational anymore. Instead, as stated by Heisenberg, we lack a non-Aristotelian logic that complements the illogical results of quantic and relativist experiments.

We have reached the confines of reason.

The macro- and microcosmic reality is irrational or arational. We can no longer understand reality (such as it is) with reason alone. With reason we have rejected tyranny and settled upon secular ethics. The ideas that blossomed in the 18th century, the Enlightenment — which started not in France, as thought by many, but rather in England with Newton, Locke and Hume — is reaching an end. The ideas of that age were diffused by people like Voltaire, Diderot, Condorcet, Du Deffand and, finally, defined by Kant. According to Kant, the Enlightenment is the emergence of the humanity from its auto-imposed immaculate immaturity, its lack of courage to use the reason. This is Kant's assertion: "Sapere aude." Dare to know. The public use of reason, freely exercised, brought the Enlightenment to our society. The enlightened people of the 18th century used reason against religious dogma, a necessary controversy. However, today, this is no longer the struggle. Instead, we now struggle against the limits of reason. This is our young century's philosophical challenge.

Returning to Belambre, it does not matter if is weaker than Ambrocenide or stronger than Sclareolide. Belambre, Ambrocenide, Sclareolide, Ambrox, β-Coronal or Boronal, dihydro-γ-ionone, amber ketal, hydroxyambran and Karanal — all of these are great. Our friends the chemists have given us perfumers these treasures, and it is now our role to create beauty with them. Chemists provide us the materials, while we who speak a different creative language, must honor their efforts and energies by making successful scents.

Methyl phenylpropionate and ethyl phenylpropionate: It is well known that cistus oil's extremely complex odor is comprised by Ambrox and methallic ketones like 2,2,6-trimethylcyclohexanone, isocamphone, isocarvone, and L-bornyl acetate, among other important ingredients. Two of this precious oil's key ingredients are methyl and ethyl phenylpropionate. These materials are extremely strong, and can be classified between ambery and resinous. Certainly, cistus oil would not smell the way it does without these two chemicals. The oil is a combination, as I said, of amber, metallic and resinous notes. When deeply smelling cistus oil, it imparts notes of frankinscense, among other common chemicals. Methyl and ethyl phenylpropionates are very powerful, and thus need to be used carefully. I have worked with them for a long time, achieving beautiful accords that are quite unique.

Laevo-cetalox and dextro-cetalox: It is well known that commercial cetalox is racemic, produced via synthetic Sclareolide. Natural Ambrox is laevo (Ambroxan, Ambrox, Ambroxide), and although the racemic is quite similar to its laevo isomer, the latter is a bit more fecal and smells of key elements of natural ambergris. Laevo-cetalox is Ambrox produced through a synthetic source. Its smell is rather impressively identical to the natural product. Dextro cetalox is drier, a bit woodier and less fecal, and it has an interesting elegant note that, I believe, will be used in considerable quantities in the future. It is interesting to realize how chemistry evolves and how research al-

lows us to synthesize products that just few years back were simply unthinkable.

9-epi-Ambrox: Another interesting product on the amber family is 9-epi-ambrox, which is extremely powerful, even more so than Ambrox. The material is contained in Ambrox DL and Synambran (Symrise). Its synthesis is a reality, and soon we will see it used to impart notes that are an alternative to Cetalox (Firmenich).

Animal Coiraceous

The family of the animal coiraceous has some products that, while not new, are totally unknown by most. They deserve to be described.

Costacide: Costacide, I would again like to emphasize, is of great value. However, great care must be used when trying to formulate with it. The material's olfactive profile is: very strong, powerfully animal, lactonic, goat-like with strong costus tonalities than blend well with agarwood oils, musk-like, Muscone, Exaltone, and especially Moxalone, Ambrinol and Ambrinoloxide (a forgotten and unknown product), Ambrox and 9-epi-ambrox, Amberlyn, and several cresols and cresyl derivatives like p-cresyl ethylcarbonate. Important bases — such as Castorax, Castoral, Coirilys, Animusk, Bangla Desh and the revolutionary Muscambrene (an unbelievable product) — include it in its great formulas.

Costacide and its unsaturated isomer, Böcksaüre, has some resemblence to male sex hormones such as 3-α-hydroxy-δ-androsterone, a chemical that could be introduced in perfumes for its sex attraction. The material smells profoundly animal and ruinous. Its discovery and, later, synthesis by Karl Moore, Edward Doisy, Adolf Butenandt and Leopold Ruzicka was remarkable. They isolated estrone as well — one of the hormones responsible for sexual development and function in females. In 1931, Butenandt isolated and identified androsterone, a male sex hormone, and in 1934, the hormone progesterone. This hormone plays an important part in the female reproductive cycle. It was now clear that sex hormones are closely related to steroids, and after Ruzicka showed that cholesterol could be transformed into androsterone, he and Butenandt were able to synthesize both progesterone and the male hormone testosterone. The works culminated in the discovery that the molecules of muscone and civetone contain rings of 15 and 17 carbon atoms, respectively. Before this discovery, rings with more than eight atoms had been unknown, and indeed had been believed to be too unstable to exist. Butenandt's and Ruzicka's discovery greatly expanded research on these compounds. Both Butenandt and Ruzicka were awarded with the Nobel Prize in chemistry in 1939, although Butenandt was forced by the Nazi regime to refuse it. (He later accepted it in the late 1940s.) This hormone smells tremendously strong, and it could eventually be used in perfumes to achieve what very often those in charge of marketing desire: to show that perfumes stimulate the sex instincts. It is very expensive to produce such fragrances, but when smelling them, feelings become totally irrational. Could we expect some great surprises in future — something other than exaggerations by those in charge of marketing? I like the smell of Androsterone. It is not just that I like it, but that it affects me with very deep and strange sensations. I discovered that Costacid, a much cheaper product than androsterone and (perhaps) Aldrone, produced very strange feelings when deeply smelled and when used wisely dosed in fragrances. We are bordering, indeed, a fantastic area still to be discovered.

Combinations of Costacide and Böcksaüre with methyl 3-methoxyanthranylate (the so-called damascenine, a grape-honey-smelling, totally ignored chemical) are indeed very new and quite subjective. The material's combinations with Helvetolide, Ambrettone, Moxalone, Ambrinol, Muscone, Globanone, Ambrettone, Exaltenone, Muscenone δ, Isomuscone, Nirvanolide, Ambrinoloxide and cistus oil, etc., are, as I mentioned before, exceptional. These combinations produce an irrational subjective feeling similar to that suggested by perfume advertisements. Muscambrene and other variations are proof of this. This section will be more developed in Part VI of my writings.

Alcohol NU, 5-ethyl-2-nonanol: This is indeed another top discovery, though it is not new: the material has been a buried treasure. Alcohol NU is very elegant and leathery and combines very well with cedrene pure, thujopsene pure and cadinene pure (a fantastic mixture of δ-cadinene and *cis*-calamenene). This material is used in one of the best leathery bases ever created: allyl ionone. It is also used with orris chemicals such as Orriniff (IFF), Irivone, Ionones, methylionones, damascones, osmanthus absolute, linolenic acid, dephenolized fractions of birch tar oil, isobutylionone, isobutylquinoline, damascones, styrax gum derivatives, Prismantol (an unknown woody spicy, ginger-like chemical), isopropylquinolines and many other leathery ingredients. The chemical is also used in incredibly important bases, very often together with the corresponding aldehyde, Aldehyde NU, and 5-ethyl-2-nonanal, which smells more pungent and metallic.

Animal-Floral

The family of animal floral has great chemicals, including the following:

Jacinthaflor — 1,3-dioxolane, 2-methyl-4-phenyl: This chemical is indeed a great and new material. I must say that it does not smell chemical-like, but rather as a perfume compound, a harmonized base. Jacinthaflor (Symrise) smells typically of hyacinth and narcissus with a real animal note close to Indoflor (Symrise). The chemical is excellent compounded with ylang ylang and aliphatic aldehydes, especially 9-undecenal, Heliotropin and coumarin. It imparts a velvety, very natural top note superior to those provided by the various cresyl esters that smell less natural. The material is also good for developing classical accords like "Chanel No. 5," "Arpège," or to be combined with fruity bases like "Prunella." Jacinthaflor also works well in developing very new accords, as found in the last Cacharel fragrance "Amor Amor," a very nice new perfume. Combinations of Jacinthaflor with Narcisse ketone, Petunial and phenylethyl anthranylate are very beautiful, too. Another great accord is Jacinthaflor with dimethyl benzyl carbinyl crotonate, γ-decalactone, γ-nonalactone and diethyl adipate (which imparts more fruitiness to Jacinthaflor, as does another unknown chemical, prenyl ethyl ether). The combination of Jacinthaflor with Nigelle Absolute and rosoxime are also very, very novel.

Petunial — methyl 5-methylsalycilate: This is a strange chemical, smelling of gardenia, tuberose and wintergreen and, simultaneously, quite animalic. Pe-

tunial has an interesting flower bud note, very useful, as is Jacinthaflor, when seeking a more natural floral shade for compounds. The material also smells of leather. It works well with alcohol and aldehyde NU in imparting very new accords, thus achieving innovative tonalities in fine toiletries and functional fragrances.

Orinox — 4-terbutyl-2,6-dimethylacetophenone: This is another great product that can be classified in between the coumarin-tonka, orange flower, animal flower, woody flower and leather families. It is not well known, but is extremely powerful and very good in functional perfumery — especially in detergent powder fragrances. Combinations of Orinox with Rosamusk, Aphermate, coumarin, allyl phenoxyacetate, Nerolione, benzophenone, Coumarone and Rosacetat impart fantastic powdery-clean note. The material also combines well with cyclohexyl, methyl pentenyl and prenyl salicylates, Globanone 100 percent, isobutylquinoline, 5-ethyl-2-nonanol, isofreshal nitrile, isomuscone, ethylene brassilate and Muscenone δ.

Caramel/Balsamic

This is a very interesting family, and although most of its chemicals were in the past considered appropriate for the flavor industry, they are finding increasing use in perfumery. I described in other parts of my work chemicals like maltol, furaneol, methyl cyclo pentenolone, tiglic and angelic acids, ethyl cyclopentenolone, and ethyl maltol, maltyl esthers, among others. Herein I would like to add:

4-Hydroxy-5-methyl-3(2H)-furanone: This is a very nice chemical, sweet, but different from Furaneol, which is more powerful and strawberry-like. 4-Hydroxy-5-methyl-3(2H)-furanone smells more like chicory and burnt sugar (although less so than furaneol, the king of this family). The material blends very well in fruity, caramel fragrances as a top novel ingredient. It also blends well with vanilla accords, imparting a totally characteristic tonality.

Homofuronol — 2-ethyl-4-hydroxy-5-methyl-2(2H)-furanone: This is an extremely strong chemical. While the later-described 4-hydroxy-5-methyl-furanone is around six to seven times weaker than Furaneol, the best-known of the furanones, Homofuronol is eight to 10 times stronger! Its smell is, as in the case of 4-hydroxy-5-methyl-3(2H)-furanone, less strawberry, pineapple-like, and more maple, sugar cane and malt. It is used in trace amounts in relatively well-known bases like Maltarome. Its effects are drier than those achieved with Furaneol (and entirely different). Although it is not widely used in perfumery, I have applied it in many oriental accords. One of them, a variation of "M7" for men, included a small but essential dose of Homofuronol with natural rum absolute, introducing an extremely masculine top note to this remarkable fragrance. I have also mixed Homofuronol with success in a great fragrance that became one of the top selling in the Middle East — a fragrance of a "divine" singer in these Arabic territories. Therein, I used a combination of agarwood oils (Bio Indonesia, Bio Indian and agarwood Bio Cambodian) together with orris absolute, osmathus absolute, an important mossy note and honey accord, and lots of natural rose oils from many different origins. The result is a great, extremely diffusive fragrance in which Homofuronol imparts its role as one of the key ingredients (although a base called Vert de roses, full of rare rose and cassis notes, plays a role as important as Homofuronol). Homofuronol blends well with most fruits and "liquor chemicals" such as Levulinates, n-propanol and esters, furfuraldehyde and several of its diethylacetals, methyl furoate, fusel oil, lie de vin and the fantastic and not well-known wine lactone, a product that is still at the research stage and which is described in part IV of these writings. I like Homofuronol as much as Furaneol; they both have the same level of excellence, although they do have differences. Homofuronol is greener than Furaneol and blends very well with its n-hexyl and *cis*-3-hexenyl ether (furaneol *cis*-3-hexenyl ether and furaneol hexyl ether, both great chemicals almost unknown). Homofuronol is also great in herbal accords — even better than furaneol, which is too fruity and sweet. The material blends extremely well with benzoin resinoid, methyl cinnamate, Araucaria and Sunanda Kokhila oils, and other fruity, balsamic products. It also works well with Centifol Ether and Dianthox.

Sotolone — 4,5-dimethyl-3-hydroxy-2,5-dihydrofuran-2-one: This is again a product officially related to the flavor sector, but this classification is not correct. It smells of fenugreek oil and absolute, lovage, and celery. If we have always considered that propylidene phtalide and butylidene phthalide can be used in perfumery, and that they have actually been used in important perfumery bases like Chroniax, why not consider Sotolone, which is much more powerful and diffusive? Why can't it be used in perfumery? Sotolone blends particularly well when carefully and skillfully dosed with β-ionone, dihydro-β-ionone, α-ionol (a more long-lasting and violet-like chemical than those named previously), Violettyne, Violiff, Orriniff (a great orris-smelling pyridine almost unknown to everybody), the diverse irones, Myrrhone, the various quinolines, and the so-called Emoxyfurone (which, although extremely powerful, is slightly less so than Sotolone). The material also blends well with Precarone, Vetykone, woolfwood, Tetrascone,

Prysmilate and its alcohol Prismantol (a woody, spicy, important chemical), Tabanone, Tetrahydronaphtalenol, Oxo-Edulan and other tobacco chemicals, the diverse damascones, and strong coumarin-like chemicals such as ethyl laitone (these latter materials also blend quite well with Homofuronol). I believe Sotolone will be used in future, and perhaps we will see a new generation of fragrances influenced by it — naturally extremely dosed. Sotolone, as Homofuronol, is among the most diffusive chemicals I know. It works quite well too with so-called celery ketone, Toscanol and other rare products. Products like Sotolone and emoxyfurone must be handled with an extreme care since they can impart a total flavor note if not properly dosed. If properly dosed, its fenugreek tonality is wonderful.

Tobacco

This is one of my favorite families. I have previously described its key chemicals, including Tabanone (megastigmatrienone) (Symrise), dihydrotabanone, oxophorone, isophoryl acetate, oxotheaspirane, 4-oxo-β-ionone and others. Herein I will describe:

Mossenate — 2-ethylbenzoxazole: This is very strong erogenous-animal note with reminiscences of tobacco, orris and ylang-ylang. The chemical is quite new and more refined than the methyl homologue, which is more metallic, aggressive and synthetic. Mossenate blends well with ylang-ylang notes, and with aliphatic aldehydes. Its accords with 9-undecenal are absolutely great, and its beauty unparalleled.

Tabaxol — 2-methylbenzoxazole: This material is "chemical" and smells more metallic than Mossenate, but is useful when blending it with the quinolines, Castoreum, some ambergris pyrazines, and other ambergris chemicals such as Ambrox and ambrinoloxide. Tabaxol is also useful as a reinforcement of the tobacco note.

2-Acetyl furan: Tobacco leaf is a very complex smell — as complex as ambergris or tea. It has honey sweet notes, and herbal, burnt, fruity, spicy, and metallic characteristics. 2-Acetyl furan is similarly herbal and burnt, and smells of important tonalities of tobacco absolute. Perfumers very often ignore this chemical. It can give extraordinary tobacco effects, especially in the top note, and improves fragrances in which tobacco character is desired. The material combines very well with some of the caramel furanones described before, and also with key chemicals like 3,4-dimethylcyclopentadione and its isomer, and the very sugary and interesting 3,5-dimethylcyclopentadione (already described) in the caramel family. 2-Acetyl furan can improve profiles in which tobacco is sought, like "Davidoff" or the newer "Baldesarini" by Hugo Boss. The chemical also blends extremely well with osmanthus absolute, musk tonkin bases, furfuraldehyde, and agarwood oils in which 2-acetyl furan imparts very pleasant nuances. Its use with woody chemicals and woody essential oils is also great.

Some of the most impressive tobacco bases are our Cetotabac series, a series of bases to be used in flavors and fragrances that smell extremely close to the real tobacco leaf. The best one, a restricted item from our company only reserved for a very important tobacco maker, has some interesting and unknown ingredients such as Megastigmadienone and 7,11-epoxy-megastigma-5(6)-en-9-one.

Strength is not that important in perfumery; it is but one factor — relatively weak chemicals count themselves among the bigger successes in our field.

Tetrascone — 1-(1,2,3,4-tetrahydro-4,4-dimethyl-1-naphtalenyl)-propan-1-one: This is not a well known chemical, and is thus missing from most laboratories. Tetrascone is delicately floral tobacco, not very strong but long-lasting, and quite elegant. The chemical imparts the perfumery note that many perfumers try to get when blending tobacco-influenced fragrances. It blends very well with tobacco absolutes, myrrh, and the so-called and unknown essence of myrrh safranée. The chemical also blends well with tabanone, but only if skillfully dosed so as not to obscure the charm of Tetrascone. The material is fantastic with β-damascenone, β-damascone, all damascones, Precarone (which makes it more root-like), Myrascone, Romascone, Deltanate, ethyl safranate, and also with oils such as Roman chamomile, Eryocephalea, Santoline, wild chamomile and hyssop. The chemical is also great with Ysamber K, nor limbanol, Cetalox, Ambrinol and ambrinoloxide, muscenone δ, Exaltenone, Isomuscone, Velvione, Moxalone, Muscone, Globanone, Ambrettolide, ethylene brassilate, Exaltone and Ambrettolide, especially when touched by isobutylquinoline, sec-butylquinoline and Costacide. Tetrascone also has good accords with the linolenic, oleic and linoleic esters and with mimosa absolute.

Megastigmadienone: This is a very secret and impressive fine floral-fruity scent with an extremely deep and natural tobacco note. It will be more thoroughly described in part VI since it is too new and too captive to be discussed now. Megastigmadienone has been found in Virginia tobacco and passion fruit, where it occurs together with important sulphur-containing molecules like 3-acetylthiohexyl acetate, which in turn is also found in guava and grapefruit. These combinations of Megastigmadienone with other chemicals like oxane, tropathiane, thioterpineol, (a finer product compared to the better known and lesser thiocineol), 3-thiohexanol, 3-thiohexyl acetate, sulfocassione, mercaptomethylpentanone, the so called aruscol (an important chemical also to be described in Part VI), and the related previously mentioned 3-acetylthiohexylacetate are amazing and full of beauty. Megastigmadienone will have a good future in the development of our profession.

7,11-Epoxymegastigma-5(6)-en-9-one: This material is another impressive and magnificent jewel of the research, unknown by almost everybody. It is one of the newest and finest chemicals I have smelled. It is deeply fruity with strong tobacco, tea and osmanthus tonalities, with overall shades of great delicacy. It is more fruity than Megastigmatrienone or Megastigmadienone, and is still too new and too captive to be more widely described until Part VI. What is really amazing is that Givaudan chemists, in their published results, found around 79 percent of it in the headspace of the strong ionone-floral-smelling *Houlletia odoratissima*, a rare orchid native to the northern part of South America. In additional published results, the material was found at around 38 percent in another orchid from Peru, *Gongora cruciformis*. This chemical is so interesting, and I like it so much that I just have reprinted this rare "anecdote" of how exciting the future is for us…. A new base, Cetotabac, a 7,11-Epoxymegastigma-5(6)-en-9-one-containing accord I started in 1978 and have not yet finished, is one of the most complex, new and lovely creations of my career.

Coumarin

This family was well described in the Part IV of my work when I mentioned laitone, ethyl laitone, methyl laitone, tonkalactone, dehydrotonkalide, coumolide, tricyclone DIPG, cantryl and trivertanyl. And I would like to add:

Coumarone — benzofuran-2-yl methyl ketone: Extremely strong new structure, with more intense top note than coumarin but it has, as compared to it, a quite important tonality of methyl anthranylate and β-methyl naphtyl ketone that makes the product not only coumarin-like but also orange flower-like. However, it is more coumarin when compared to its relatively close and secret molecule Nerolione. It was found a bit by coincidence when a great chemist and its inventor, Berliner Steffen Sonnenberg, researched on the chemistry to find a non discoloring replacement for Methyl Anthranylate, and β-Methyl Naphtyl Ketone. He was successful and synthesized the badly known (since it is an important captive) Nerolione. When having synthesized Nerolione he played with the molecular structure and found Coumarone that did not smell only of orange but had a very unusual tonka-coumarine smell. Coumarone is stronger than coumarin. Coumarone is extremely important since the sought to push the impact of Coumarine in the fragrances based on it was a must. My friend Edmond Roudnitzka loved Coumarine and considered it one of the best chemicals ever discovered since its top qualities really smell of tonka, very natural and they

are unbelievably long lasting.(Coumarine is one of the longer lasting products in the world). Well, again as in the case of the Limbanols, Helvetolide, Paradisone, Ysamber K, Ambrocenide, etc. he could not smell Coumarone but I know because he was one of my best friends, he would have loved it. A 1 percent solution of Coumarone is difficult to control, its diffusion, as in the case of its orange flower brother, Nerolione, 1-(3-methyl-benzofuran-2-yl)-ethanone, is so impressive that once I smelled it, I realized I was again facing a product that will for sure be involved in the future evolution of perfumery. I need to work more with Coumarone, but I find its combinations with Ethyl Laitone DA, Tetrascone, Florex, Laitone, Dehydrotonkinolide, Oxophorone, the described tobacco chemicals Tabanone, Megastigmadienone, 7-epoxy-megastigma-5(6)-en-9-one, Osmanthus Absolute, Coranol, Dihydro-β and α-ionones, Cashmeran, the Limabnols, Ambrocenide, Javanol, Firsantol, Nirvanol, theaspirane, vityspirane and naturally Coumarine, are spectacular. Blendings of Coumarone and Florex are quite important. There is a need to rework important Coumarine fragrances like "Joop" for men, "Romeo & Gilli" for men, "Pandora for Men," etc. By introducing Coumarone and the sought diffusive effect boosting the coumarin accord it is possible to create a totally new "auratic breathing," that is to say a "new" perfume. And I say yes, a new perfume because although these fragrances are already well known, the inclusion of Coumarone will change them and will push the coumarine trend forward.

Isofreshal Nitrile: This is a floral-coumarine nitrile that works well with many products such as *trans*-2-tetradecenal, Methyl Decanile, Methyl, 4-dodecen-2-yl nitrile (a great and stable citrus nitrile that also belongs to Part VI as Nerolione and the newest citronone, a Nondienone derivative).

Address correspondence to Arcadi Boix Camps, Auram International Group Co. Ltd., Edifici de Vidre, Ronda President Company, 62, 08302 Mataro, Barcelona, Spain. n