A Smelling Trip into the Past: The Influence of Synthetic Materials on the History of Perfumery

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Contemporary perfumery has its roots in the work of the past, and many of the perfumes from this time have long since disappeared. What follows is a short account of some of the most famous perfumes from the past which have been inspired by the novel synthetic materials of the time. These important creations include, '*Fougère Royale*' by *Houbigant* (1884) containing coumarin (**1**), '*Jicky*' by *Guerlain* (1889) containing vanillin (**2**) and linalool (**3**), '*Vera Violetta*' by *Roger & Gallet* (1892) containing α- and β-ionone (**4** and **5**, resp.), '*Trèfle Incarnat*' by *Piver* (1898) containing isoamyl salicylate (**6**), '*La Rose Jacqueminot*' of *Coty* (1904) containing *Rhodinol* (**7**), '*Après l'Ondée*' by *Guerlain* (1906) containing *para*-anisaldehyde (**8**), '*Quelques Fleurs*' by *Houbigant* (1912) containing hydroxycitronellal (**9**), '*N°5*' by *Chanel* (1921) containing the aldehydes C-10 (**10**), C-110 (**11**), and C-12 (**12**), '*Nuit De Noël*' by *Caron* (1922) containing 6-isobutylquinoline (**14**), and '*Femme*' by *Rochas* (1944) containing the so-called 'aldehyde C-14' (**15**, γ-undecalactone). The *Osmotheque*, the International Conservatory of Perfumes, was launched in 1990 and is regarded as a primary source of knowledge for the history of perfumery. Its vocation is to compile an amazing collection of 1700 perfumes (400 of them almost forgotten fragrances) – jewels of perfumery.

Welcome to the Past! – Over the last 165 years, the chemistry of odorant substances has attracted the attention of many scientists. They have studied, researched, analyzed, synthesized, and covered every aspect of the odorant world. In the middle of the 19th century and thanks to chemists, the perfumery world evolved from being a craft industry to a modern industry. The starting point was in 1833 when *Dumas* and *Péligot* identified cinnamic aldehyde as the chemical responsible for the scent of cinnamon oil. However, it took 23 more years before another researcher, *Chiozza*, managed to synthesize this new molecule. By the turn of the 20th century, many new synthetic notes were available for use in perfumes, and perfumers started to discretely experiment with them.

Scientists first isolated new molecules from natural oils, followed by synthesizing, one by one, the building blocks from which nature had composed the scents of romance. At this time, perfumers used all these new molecules, and a few of the resulting masterpieces of perfumery history will now be discussed.

1884, '*Fougère Royale*' by *Houbigant*. – The birth of modern perfumery. '*Fougère Royale*' (*Fig. 1*) was the first perfume that included a synthetic molecule in its formula. It was a landmark creation which was followed seven years later by *Jicky*. The perfumer responsible was *Paul Parquet* from the *Houbigant* Company. The new molecule in this creation was coumarin (**1**; *Fig. 2*), originally discovered in plants such as Tonka bean or

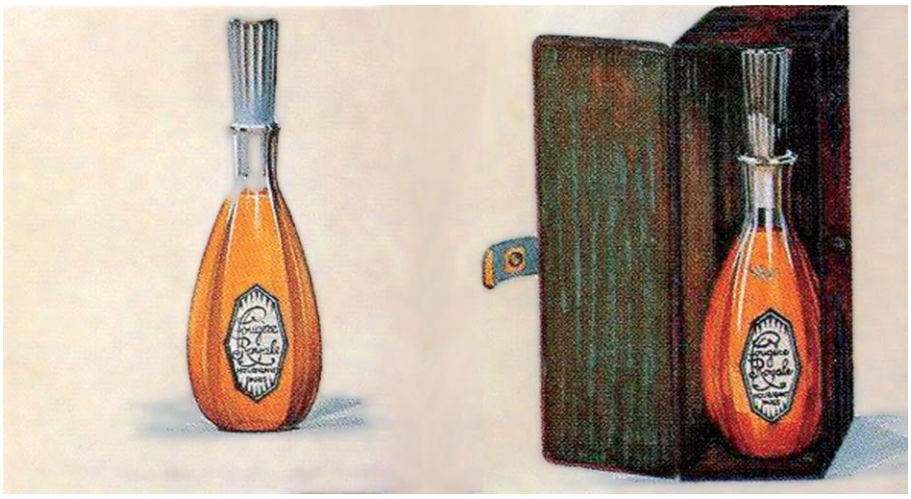

Fig. 1. *The bottle and package in which* 'Fougère Royale' *was launched in 1884 by* Houbigant, *Paris*

French lavender, and synthesized by *Perkin* from salicylic acid in 1875. It has the scent of new-mown hay or even marzipan, and blends well with vanillin (**2**) and heliotropin. The addition of coumarin (**1**) to perfumes gave originality and tenacity to the natural scents. Coumarin (**1**) gives strength to a large variety of compounds such as tobacco and fern, and was so different from the commonly used citrus notes that it opened a new direction of composition.

'*Fougère Royale*', an accord of oak moss, lavender, and coumarin, opened the way to a whole series of olfactory harmonies called '*fougère*' accords which are still used in many successful feminine and masculine fragrance compositions, examples being, '*Paco Rabanne*' for men, '*Azzaro*' for men, and '*Drakkar Noir*'.

'*Fougère Royale*' was discontinued in 1960 but lent its name to a family in the classification of perfumes. The *Société Française des Parfumeurs* (SFP) created a classification of perfumes in order to categorize them easily and to better understand the methods of formulation [1]. There are seven major families: citrus, floral, *fougère*, woody, *chypre*, oriental, and leather. Each family contains a few subdivisions and has its own type of accord. The process of perfume creation is the constant evolution of these different accords, and perfumers have continually tried to extend the existing accords into new olfactory directions.

About the Name. Of course, a fern has no scent. Oriental notes may not be acceptable in polite society but who could question the innocence of a fern? *Paul Parquet* said: '*If God gave ferns a scent, they would smell like* 'Fougère Royale'' [3].

1889, '*Jicky*' by *Guerlain*. – With '*Jicky*', *Aimé Guerlain* transformed the perfumer from a tradesman into an artist. '*Fougère Royale*' was the pioneer for use of synthetic raw materials, but '*Jicky*' (*Fig. 3*) is regarded as the first modern perfume because of its sophisticated composition. Before *Jicky*, perfumes had reflected single floral notes ('*soliflores*'). A perfume called '*Jasmine*' would be made of jasmine, '*Rose*' of rose oils,

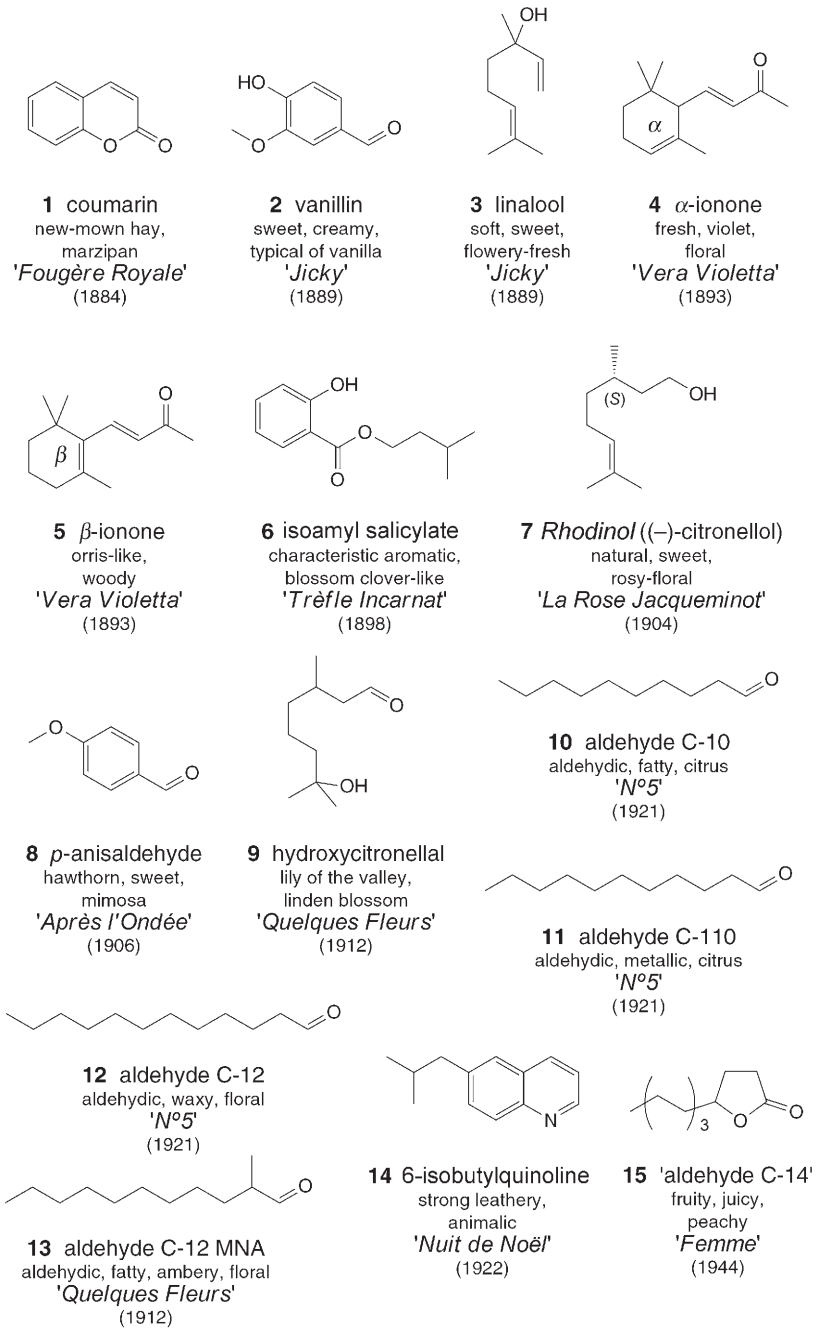

Fig. 2. *Overview of the presented trendsetting perfumery raw materials of the past, with odor descriptions and respective fragrances*

Fig. 3. *Flacon of* 'Jicky' *designed by* Gabriel Guerlain *to resemble the old pharmacy jars of his father* Pierre-François Pascal*, with a contrasting champagne-cork-shaped stopper*

and so forth, but '*Jicky*' combined different facets: fresh, flowery, spicy, oriental, animalic, and all at the same time [3]. *Aimé* used some new synthetic raw materials to add notes that nature had not given him. On top of using coumarin (**1**), he used two new molecules: vanillin and linalool. Vanillin (**2**; *Fig. 2*), discovered by *Karl Ludwig Reimer* and *Georges de Laire*, is a yellowish-to-white crystalline substance and was made using guaiacol from pinewood. It is now synthesized from the oxidation of isoeugenol. Linalool (**3**), from rose wood, is a colorless liquid with a soft and sweet scent.

In this creation, *Aimé Guerlain* added the fresh notes of bergamot and lavender, and these were dominated by the base notes of sandalwood oil and civet which gave a complex and modern scent. The vanillin (**2**) is a *fixateur*, modifier, and blender. *Guerlain* used the synthetics to amplify the intensity of the natural notes and to add an original note which could not be found in the nature. *Jicky* is the link between the *eaux de cologne* of the 19th century and the perfumes of the 20th century, and laid the

foundation of great French perfumery, which no longer attempted to imitate the scent of flowers, but sought instead to arouse emotion.

Aimé Guerlain was only 27 when the bad health of his father, *Pierre-François Pascal*, forced him to take over the most prestigious perfumery in Paris, which had been started in 1828. His father who had undertaken medical and chemical studies in England set himself up in Paris, and initially imported toiletries from England. For *Aimé*, the firm was too important to manage alone, and so his brother *Gabriel* took over the business side to allow him enough time to create and produce perfumes. Help was needed in the laboratory, and *Aimé* brought in *Gabriel*'s sixteen-year-old son, *Jacques*, who later went on to create such magnificent perfumes as '*l' Heure Bleue*', '*Mitsouko*', and '*Shalimar*'.

About the Name. '*Jicky*' is *Jacques Guerlain*'s nickname. *Jicky* was intended for men as it was originally found too *avant garde* for women. The bottle was designed by *Gabriel Guerlain* and slightly modified by *Baccarat* in 1947. To pay tribute to his father, who was trained as a chemist, the bottle looked like one of his old pharmacy jars. The stopper, by contrast, represents a champagne cork, symbolizing the sparkle and happiness of the perfume. Finally, too *avant garde* for men, it was only in 1912 that women's magazines began to sing its praise. *'Countless other perfumes have come and gone since 1889. '*Jicky*' alone survives'.*

1893, '*Vera Violetta*' by *Roger & Gallet.* – '*Vera Violetta*' is the first illustration of a new molecule called ionone (meaning '*violet*' in Greek), nowadays almost used universally. It was first isolated from the lemongrass oil and then prepared synthetically by the condensation of citral with acetone in the presence of base, which results in a mixture of two isomeric ketones known as α- and β-ionone (**4** and **5**; *Fig. 2*). '*Vera violetta*' is a *soliflore* created by *Henri Roger* (one of the owners of the company). It was initially compounded using only natural ingredients, but only when, in 1893, the perfumer introduced the new perfumery raw material ionone (**4**/**5**), the composition became convincing. Previously, *Henry Roger* had worked on a violet perfume called '*Violette de Parme*', compounded completely with natural ingredients. α-Ionone (**4**) has a great fresh violet scent, while other ionones like the β-ionone (**5**) smell more orris-like, woody. One of its particular properties is that it benumbs the olfactory nerves; therefore, the scientists believed that it was useless.

1898, '*Trèfle Incarnat*' by *Piver.* – '*Trèfle Incarnat*' was the debut fragrance of a new molecule called isoamyl salicylate (**6**; *Fig. 2*) which was discovered by *Darzens*, the chemist at *Piver*, which was the oldest perfumery company (started 1774). It is a colorless liquid with a characteristic aromatic scent, which recalls a blossoming clover field in the warmth of August, hence, its use in perfumes to impart a clover-type note. It was prepared by the action of hydrochloric acid on a solution of salicylic acid in isoamyl alcohol.

Jacques Rouché, the perfumer of the *Piver* Company, married *Berthe Piver* and managed the *Piver* Company in a very efficient manner. He recruited *Georges Darzens*, a doctor in mathematics, chemistry, and medicine of the *Ecole polytechnique* in Paris, who was very productive in the area of Organic Chemistry. Besides isoamyl salicylate (**6**), *Darzens* discovered many other odorants which remained carefully guarded

secrets before perfumers of other companies became aware of and used them in their compositions.

Rouché and *Darzens* created '*Trefle Incarnat*' by adding isoamyl salicylate (**6**) to a *fougère*. This was a real revolution in the *fougère* family, although today it would be hard to find a *fougère* perfume without any isoamyl salicylate (**6**). The perfume was sold in a crystal bottle which had a stopper representing a four-leaved clover, and in those days '*Trefle Incarnat*' was an incredible success.

1904, '*La Rose Jacqueminot*' by *Coty*. – Created by *François Coty* (*Spoturno*), himself – '*he was quite simply a genius*'. '*He was the mastermind who turned perfumery from a rough sketch into a work of art*'. '*L'Origan*' and '*Chypre de Coty*' were his two masterpieces. Yet, '*Rose Jacqueminot*', his first creation, marked a revolution not only in perfume creation, but also in the way perfumes were bottled, packaged, and sold.

Coty discovered the world of perfumery quite by accident. He helped a pharmacist who was a good friend of his to prepare prescriptions, not medical prescriptions but the pharmacy's *eau de cologne*. In those days, individual chemists blended their own *eau de colognes*. *Coty* discovered that he had a highly developed sense of smell, and perfume became his passion. For his professional training, he went to the *Chiris* Company of *Grasse* and learned composition techniques with great ability.

By 1904, *Coty* was ready to launch his first composition '*La Rose Jacqueminot*' which had been prepared in the kitchen of his own flat in Paris. It was built around an accord of *Rose Absolute* obtained by a new natural-product extraction process (viewed with caution by other perfumers), with two synthetic bases *Rhodinol* (**7**; *Fig. 2*) and α-ionone (**4**). *Rhodinol* (**7**; (−)-citronellol) from *Rhone Poulenc*, one of the main constituents of rose and geranium oil, is produced by saponification of geranium oil, followed by fractional distillation. The combination of the synthetic materials plus the strength of the rose absolute gave '*La Rose Jacqueminot*' originality and tenacity qualities quite unlike any other rose perfume available at that time.

Armed with a few bottles of his new perfume, *Coty* approached *Les Grands Magasins Du Louvre*, the most prestigious shop in Paris. The head buyer criticized the fragrance and refused to stock it. The story goes that *Coty* then dropped a bottle in the main entrance and many customers commented on the '*wonderful perfume*' asking where it might be bought. As a result, the buyer was obliged to include this new rose perfume on his shelves [3].

1906, '*Après l'Ondée*' by *Guerlain*. – *Jacques Guerlain* (*Aimé*'s nephew) created '*Après l'Ondée*' (*Fig. 4*), which was inspired by '*l'Origan*' from 1905, one of *Coty*'s masterpieces. One of the essential elements in '*Après l'Ondée*' is *para*-anisaldehyde (**8**; *Fig. 2*) which had been synthesized by *Ferdinand Tiemann* in 1887 from anethol. *para*-Anisaldehyde (**8**) has a typical hawthorn scent.

The different facets of this perfume have their origin in an accord of orange blossom, violet, hawthorn blossom, orris, and musk. The combination of these notes gave a floral oriental aspect to this perfume.

The difference between *Coty* and *Guerlain* (*Coty* was *Guerlain*'s biggest competitor) was that *Coty*'s background did not come from perfumery; he was instinctive, whereas *Guerlain*, on the other hand, worked systematically to evolve *Coty*'s perfumes.

Fig. 4. *Original bottle and package of* 'Après l'Ondée' *by* Guerlain *from 1906*

Jacques Guerlain enriched and glorified *Coty*'s creation to give birth to a real masterpiece. *Jacques Guerlain* was more subtle with his blending and was able to make rich perfumes that still remained light, fresh, and elegant. His way of working was a reflection of a long inheritance of professional knowledge from his uncle and his grandfather. *Coty*'s brilliant creations reflected his strong character.

1912, '*Quelques Fleurs*' by *Houbigant*. – Distillation of lily of the valley flowers (*Convallaria majalis* L.) never yields the true fragrance of the flower. Every perfumer has dreamed of capturing these tiny white 'little bells' in a bottle. This dream became a reality when the new molecule, hydroxycitronellal (**9**; *Fig. 2*), became available. First isolated from lemongrass oil, and then synthesized by *Philippe Chuit* of *Chuit & Naef* (which later became *Firmenich*) and *Givaudan*'s chemist *Laurier*. '*Quelques Fleurs*' was an innovation with its lily of the valley accord allied with a strong note from aldehyde MNA (**13**; *Fig. 2*). This combination gave the perfume a really modern

aspect. '*Quelques Fleurs*' was created by *Houbigant*'s perfumer *Robert Bienaimé*, who had succeeded *Paul Parquet*. The idea for the bottle, a pebble from *Etretat* beach, came from one of the owners (*Alfred Javal*). Launched in 1912, '*Quelques Fleurs*' became a huge success in Europe, the USA, and Russia.

1921, '*N°5*' by *Chanel*. – In an age of fussy clothes, the radical simplicity of *Gabrielle Chanel*'s wardrobe made her stand out. With one stroke, *Gabrielle* changed the look of the street scene forever. *Chanel* was the first significant designer to link perfume directly with couture. *Chanel* met *Ernest Beaux*, a Russian born perfumer of French nationality, through a friend, the Prince *Dmitri Pavlovich*. *Beaux* had a training as a perfumer in *Rallet & Co.*, a Russian company in Moscow, which had been bought by *Chiris*, the famous *Grassois* company, in 1898. When *Rallet* was nationalized by the Bolsheviks in 1917, *Léon Chiris* repatriated *Ernest Beaux* and his team to France where he established them in a small laboratory of his *la Bocca* factory near *Cannes* [2].

Chanel asked *Ernest Beaux* to create a perfume that would make the other perfumers jealous. To achieve this, he could and did use the most expensive products available, jasmine and rose from *Grasse*, and a special quality of ylang ylang. To brighten up all the richness, he added an aldehyde complex. *Beaux* presented his creations in two series, 1 to 5 and 20 to 24. *Chanel* chose the fifth creation, the '*N°5*'. To the question: '*What name will you give it?*' she answered, '*I show my collection on the 5th of May, the 5th month of the year, so let's leave the number it bears, and this 'N°5' will bring it good luck*'. *Chanel* asked how easy it would be for another perfumer to imitate '*N°5*', and *Beaux* answered that there was no guarantee that someone would not be able to prepare a pale imitation. The idea of this becoming a reality horrified *Chanel*, and the only solution *Beaux* could propose was to make the formula too expensive to imitate. '*Do it*!' said *Chanel*. On top of using rich natural raw materials, he lifted the level of the aldehyde accord, a cocktail of equal parts of C-10 (**10**), C-110 (**11**, aldehyde C-11 refers to the unsaturated C_{11} aldehyde, while C-110 in perfumery signifies the saturated compound), and C-12 (**12**) to 6% (of the 10% solutions, corresponding to 0.6% of the pure aldehydes).

Aldehydes became first available in 1903 when *Darzens* synthesized aldehyde C-12 MNA ('methyl nonyl acetaldehyde' (**13**), first used in '*Quelques Fleurs*'), and *Blaise* prepared the series of aliphatic aldehydes: C-8, C-9, C-10 (**10**), C-110 (**11**), and C-12 (**12**) which remained unexploited for years. Their odor can be described as being waxy, metallic, or the burnt smell of a snuffed candle. When used correctly, they, however, greatly enhance the impact of other materials. *Coco Chanel* used to say, '*No elegance is possible without perfume*', '*a woman without perfume is a woman without future*'.

'*L'Aimant de Coty*', created in 1927 and inspired by the same concept [2], initially had more success than '*N°5*'. However, from the day a journalist asked *Marilyn Monroe*, '*What do you wear at night?*' and she answered, '*Five drops of* 'N°5'', the whole world fell in love with '*N°5*', and a true legend was born.

1922, *'Nuit De Noël'* by *Caron*. – Together with *Guerlain* and *Chanel*, the perfume House of *Caron* epitomized French perfumery for women around the world. *Parfums Caron* was founded by *Ernest Daltroff* in 1904, and, after two commercial flops, he created in 1922 a perfume to capture the smell of a Christmas Eve, evoking the magic of

a fairytale night. His lover, the fashion designer *Félicie Vanpuille* loved Christmas for its festiveness, and the luxurious scents of incense and fur coats, and *Ernest Daltroff* tried to capture this atmosphere in '*Nuit De Noël*'. The rich perfume is built on an accord between sandalwood, rose, and the warm animalic scent of *Mousse de Saxe*, a base created by *Madame Edgard de Laire* in 1912 around the strong leathery animalic scent of the new synthetic odorant 6-isobutylquinoline (**14**). *Mousse de Saxe* was probably the most original *de Laire* base, and resembled the smell of a tiger's lair [3]. This base introduced the rather brutal leathery animalic scent of 6-isobutylquinoline (**14**) to perfumery, and the success of '*Nuit de Noël*', which *Karl Lagerfeld* allegedly still wears every December, and which inspired such different creations as '*Bois des Iles*' (*Chanel*, 1926), '*Shocking*' (*Schiaparelli*, 1937), and '*Calèche*' (*Hermes*, 1961), made 6-isobutylquinoline (**14**) attractive for other perfumers, even in pure form. So, many even more pronounced leathery creations followed.

1944, '*Femme*' by *Rochas*. – '*Femme*' was the second perfume creation of *Edmond Roudnitska*. He met *Marcel Rochas* in November 1943 during the German occupation of Paris. *Monsieur Rochas* wanted to launch a perfume, which would mark the rebirth of French couture in its entire splendor. '*Femme*' was very seductive and new, thanks to the luscious prune scent of an unusual methylionone compound. *Roudnitska* wrapped this prune note around an accord of oakmoss and peach, the latter note of which was implemented by a new lactone, the so-called 'aldehyde C-14' (**15**; γ-undecalactone; *Fig. 2*). This γ-lactone had previously been used by *Jacques Guerlain* in the famous '*Mitsouko*', and previous to that by *Maurice Schaller* in '*Nuit de Chine*' by *Parfums de Rosine*. By mixing 'aldehyde C-14' (**15**) with a quantity of oakmoss, *Jacques Guerlain* created a marvelous accord that indeed became one of the most famous in perfumery.

Roudnitska said, '*I made* 'Femme' *very fruity to harmonize with the sugary note, woody to tone down the fruit, aldehydic for strength and fullness and to make it very flowery*' [3]. The perfume had an astonishing ability to fill a room. In his own words: '*The most intense emotion I have ever known*'.

Conclusions. – Chemistry introduced abstract art to perfumery, allowing perfumers to not only reproduce natural scents but also to compose new olfactory shapes, thus becoming true composers. Modern perfumery is an intuitive blend of art and science. In fact, a 'nose' (a perfumer) is an artist. Before the dawn of the 20th century, perfumes were very expensive products, which only rich people were able to afford. Without synthetic perfumery, raw-material perfumes would certainly still not be available to the average consumer.

Although natural raw materials will never disappear from our creative palette, synthetic materials contribute many positive aspect to perfumery, and we will always defend their use.

A final word from *Ernest Beaux* from 1952: '*We will have to rely on the chemists to find new chemicals if we are to make new original accords. The future of perfumery is in the hands of chemistry*'.

REFERENCES

[1] Comité Française du Parfum, 'Classification des Parfums et Terminologie', Société Française des Parfumeurs, Versailles, 2001, 70 p.
[2] P. Kraft, C. Ledard, P. Goutell, *Perfum. Flavor.* **2007**, *32(10)*, 36.
[3] M. Edwards, 'Perfume Legends, French Feminine Fragrances', HM Editions, Levallois, 1996, 296 p.

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