Classification of Perfumes and Fragrances

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For the production of a computerized database about the classification of perfumes and fragrances, the main aspects of 5,200 perfumes and fragrances were studied. During the past decade, a series of publications appeared about the classification of these materials. These publications were analyzed in detail. The main features for the classification of fragrances are:

- commercial names, brand names and sales companies;
- application fields and concentrations;
- creators and fragrance houses;
- container designers and producers;
- odor descriptions and compositions;
- and references to detailed information.

All of these aspects will be discussed herein. The odor classification and composition of some classic fragrances will be provided.

Introduction

Every year, about 200 new fragrances appear on the market. However, many of them disappear within 10 years. It could be worthwhile to classify existing perfumes and fragrances with the aim to gain more knowledge and to stabilize the market.

According to "New Webster's Dictionary and Thesaurus of the English Language," a fragrance is simply "a sweet scent," and a perfume is more precisely defined as "a sweet-smelling liquid for personal use prepared from essential oils and flowers or aromatic chemicals and fixed, e.g. with musk." It will be clear that one can argue about these definitions. For the purpose of this publication, it will be assumed that a perfume is for a personal use and that a fragrance—in general—also may have a broader application. The perfumes and fragrances in this study will be regarded under the scope of alcoholic perfumery.

A series of interesting publications about the classification of perfumes and fragrances have appeared during the last decade.[1-11] In Table 1, some classifications and reviews of fragrances are shown.

There is, of course, a great deal of overlap between the fragrances, which are treated in the various publications. Apart from these publications with an overview of perfumes and fragrances, several books have been published dealing with various aspects of perfumery and selected perfumes.[12-20]

This article will cover the following aspects of perfumes and fragrances:

- commercial names, brand names and sales companies;

Table1. Classifications and reviews of fragrances

Years	Author/Company	Title	Type	No. of Fragrances
1976/96	Haarmann & Reimer	The H&R Genealogy	Classification	200-850
1990/94	French Society of Perfumers	Classification des Parfums	Classification	800
1992	Givaudan	Fragrance Information Reference	Review	1,800
1992/94	Dragoco	Hexagon der Dufttfamilien	Classification	300
1992/97	Nigel Groom	The (New) Perfume Handbook	Review	1,800
1999	Michael Edwards	The Fragrance Advisor	Classification	1,900
2000/01	Michael Edwards	Fragrances of the World	Classification	2,700
2000/01	The Fragrance Foundation	Reference Guide	Review	1,000
2001	Podium Ediciones	11° Diccionario de las Review Fragrancias	Classification	1,000
2001	BACIS	Perfume & Fragrance Classifications	Classification	5,200

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- type of fragrance: application fields and concentration;
- creators and fragrance houses;
- container designers and producers;
- and odor descriptions and compositions.

Discussion

In 1976, Haarmann & Reimer published their first genealogy of extrait perfumes.[1,2] They classified 200 international perfumes, commercialized from 1900 until 1975. In the eighth edition of the publication, (1996), the feminine and masculine fragrances were separated: 450 feminine, 400 masculine.

In 1990, the technical committee of the French Society of Perfumers published a "Classification des Parfums."[3]

In 1992, Givaudan published its "Tableau des Fragrances" (Fragrances Information References), including approximately 1,800 fragrances, with names, brands, type (male/female), creator, container designer and glassmaker.[4]

In 1992-1994, Dragoco perfumers developed a "Hexagon der Duftfamilien" (Hexagon of Perfume Families).[5]

Nigel Groom, in his "New Perfume Handbook," treated 400 perfumes in detail and gave an appendix with about 1,800 fragrances, which were divided into: 1,160 feminine, 605 masculine, 18 unisex, 12 juvenile and 5 baby perfumes.[6]

The Beauty and Perfumers buyer's guide, which was published in 1997, provides the names and addresses in France of 282 companies for perfumes and perfumed products.[8]

In 1999, Michael Edwards, with the help of technical advisor Guy Robert, prepared the "Fragrance Adviser" with 1,900 fragrances.[9] In 2000/01, Edwards published "Fragrances of the World" with about 2,700.

"The Fragrance Foundation Reference Guide 2000" mentioned 164 US sales companies with addresses, phone and fax numbers, comprising 270 national and international brand names for about 1,000 fragrances.[10]

Fragrance Type: Application Fields and Concentration

Perfumes have a wide field of applications for personal use: unisex, feminine, masculine, juvenile and baby. Fragrances may also be used for environmental applications, fragrance ambiance and aromatherapy.

Perfumes are commercially available in various alcoholic concentrations. Extrait parfum is the highest concentration perfume, which contains 15-30 percent perfume oil in high-grade alcohol, mostly 90 percent. Eau de parfum is the highest grade of so-called eau, consisting of 15-20 percent perfume oil in 80-90 percent grade alcohol. Eau de toilette contains 5-10 percent perfume oil in about 80 percent grade alcohol. Aftershave, a men's line perfume, also contains 5-10 percent perfume oil. Eau de colognes are toilet waters, which contain 3-5 percent of perfume oil

Table 2. Odor aspects of perfumes

Type	Characteristic
Aldehydic	Fatty aldehydes (e.g. octanal, decanal, dodecanal) etc
Ambery	Amberoxide, ambrinol
Animalic	Indole, skatole, civettone
Aromatic	Vanilla (vanillin), tonka (coumarin), heliotropin
Citrusy	Bergamot, lemon, lime, mandarin, orange, petitgrain, neroli
Floral	Carnation, freesia, jasmine, lily, lily-of-the-valley, orris, rose, tuberose, violet, ylang-ylang, etc
Fruity	Apricot, berries, cherry, peach
Herbaceous	Herb oils, basil, thyme, mint, etc
Leathery	Leather compounds (substituted phenols)
Mossy	Oak and tree moss compounds, orcinol and derivatives
Musky	Natural and synthetic musk compounds, biomusks
Spice	Spice oils, anise, cardamon, clove, nutmeg, pepper
Watery	Watery compounds (unsaturated aldehydes), watermelon
Woody	Cedarwood, patchouli, sandalwood, vetiver oils and compounds

in 70 percent grade alcohol. Splash colognes are perfume waters, containing only 1-3 percent perfume oil in highly diluted alcohol.

Creators and Fragrance Houses

The creators of the most important perfumes of the world are detailed in the books of Nigel Groom and the "Tableau des Fragrances" (Fragrances Information References) by Givaudan.[6,4] Perfumes are primarily created by perfumers of the international fragrance houses, including Creations Aromatiques, Dragoco, Drom, Firmenich, Givaudan, Haarmann & Reimer, IFF, Mane, Quest, Robertet, Synarome, Takasago and many others.

There have been numerous great perfumers. The list is too long to mention here, but we should name some, including Ernest Beaux (Chanel 5, Cuire de Russie, Soir de Paris), Sophia Grosjman (Eternity, Spellbound, Tresor and many others), Jean Kerleo (Mille, Eau de Patou, Sublime, Voyageur), Guy Robert (Madame Rochas, Dioressence, Gucci No. 1, Amouage) and Edmond Roudnitska (Diorissimo, Femme, Eau Sauvage and many others). As in every profession, there are normal, good and excellent practitioners. A good perfumer is a perfumer whose perfumes sell frequently. The perfumes of a normal perfumer sell once in a while. The creations of excellent perfumers always sell. A creation of such a perfume can take months, even a year. Excellent perfumers can truly be called "noses." There are so few in the world.

Perfumers are composers, and as such, they are artists. A good perfume is a piece of art. As in musical composition, fragrance evolution requires composers, performers and tuners. The performers are the commercial and retail people who have to sell the perfume to clients (perfume houses) and customers (in shops). The tuners are the technical people who, for instance, are involved in research and development and quality control. These people supply perfumers with the right materials. Of course, a perfumer may also be a performer, discussing the perfume quality with clients, and a tuner, taking note when a raw material is inferior. However, the perfumer's main task is to compose the perfume. As said earlier: the perfumer is an artist and his/her work is a piece of art, meaning that a perfume is unique unto itself. In its uniqueness, each perfume evokes fantasy, imagination and illusion. As a creation of art, it imparts a good feeling and makes one happy. A good perfume is a harmony of odor themes and accords. For good communication amongst perfumers, commercial and technical people, and clients, a common perfume language is necessary. Therefore, a reasonably objective classification of perfumes and fragrances could be helpful in fostering clear communication.

Perfume Container Designers and Producers

Although the most important feature of a perfume is its smell, its container also plays a significant role in successful commercialization. The containers are mostly produced from glass, although there are some of fine porcelain work (Wedgewood and Worcester). In the last century, glass atomizers were introduced. Important packaging designers include Joel Desgrippes, Pierre Dinand, Rene Lalique, Ira Levy, Jacques Llorente, Serge Mansau and Peter Schmidt. These designers have worked for various glassware producers as mentioned in publications by Givaudan and Groom.[4,6]

The designers of perfume containers are, like perfumers, artists. These designers can be compared with sculptors. Thus, perfume containers are pieces of art. There are collectors of perfume flacons all around the world. There are museums for perfume bottles (e.g. in Winkel, The Netherlands), international societies and books about perfume miniflacons (more than 5,000 flacons). Antique and classic perfume flacons are sold at auctions; an exceptionally rare Lalique flacon may cost around $15,000.

The largest producers of perfume containers include Baccarat, Brosse and Pochet et du Courval in France; Apsley Pelatt, Thomas Webb and Steven & Williams in the UK; Val St. Lambert in Belgium; and Moser in Bohemia.

Perfume Odor Descriptions and Composition

As mentioned before, odor is the most important feature of fragrance. Therefore, much work has been carried out to obtain a reasonable objective odor classification. In the first

Table 3. Flower type, characteristic/essential constituent and corresponding synthetic aroma chemicals

Flower Type	Characteristic/Essential Constituent	Synthetic Aroma Chemicals
Carnation	Eugenol, isoeugenol	(iso)-Eugenol derivatives
Jasmine	cis-Jasmone, methyl jasmonate and jasmolactone	Jasmone and methyl jasmonate analogoues α-Akylcinnamaldehydes and -acetoacetates
Lily-of-the-valley	Unsaturated aliphatic tert. alcohols	Hydrocitronellal, lyral dupical
Rose	δ-Citronellol, phenethanol, damasc(en)ones, phenyethyl derivatives, isodamascone, ethyl safrante, rose oxides and neroloxide	Ethyl chrysanthemumate
Tuberose	γ- and δ-Lactones C8-C10	β-Methyl-γ-decalactone
Orris	α-, β- and γ-Ionones	(iso)Methyl ionones
Ylang-ylang	p-Cresol, p-cresyl methyl ether	P-Cresyl derivatives (acetate, isobutyrate)

Table 4. Normal and exaggerated concentrations of aroma chemicals in perfumes, according to Martin Gras[3]

Aroma Chemical Manufacturer)	Concentration (percent)	Perfume	Year	Brand
Hedione (Firmenich)	3	Eau Sauvage	1966	Dior
	20	Coriandre	1973	Couturier
	30	Cristalle (EdT)	1974	Chanel
Galaxolide (IFF)	20	Tresor	1990	Lancome
	25	Sacre	1990	Caron
Tonalide (PFW)	11	Fahrenheit	1988	Dior
Vertofix Coeur (IFF)	10	Cacharel pour Homme	1981	Cacharel
Iso E Super (IFF)	1-3	Halston feminine	1974	Halston
		Fahrenheit	1988	Dior
Lilial (Givaudan)	2	Paco Rabanne Homme	1973	Paco Rabanne
	20	Calyx	1986	Prescriptives
Dihydromyrcenol (IFF, Quest)	<5	Azzaro	1978	Couturier
	10	Drakkar Noir	1982	Guy Laroche
	20	Cool Water	1988	Davidoff
Allyl amylglycolate (IFF)	0.02	Alliage	1972	Estee Lauder
	1	Drakkar Noir	1982	Guy Laroche
	3	Cool Water	1988	Davidoff
Damasc(en)ones (Firmenich)	~0.5	Tea Rose	1976	Perfumer's Workshop
	1	Nahema	1979	Guerlain
	~0.5	Poison	1986	Dior
Ambroxan (Cognis)	1	Cool Water	1988	Davidoff
γ-decalactone	<0.5	Charlie	1973	Revlon
	>0.5	Poison	1986	Dior
	>1	Anne Klein	1984	Parlux
Rose oxide (Firmenich, Dragoco)	<0.5	Norell	1970	Revlon
	0.5	Metal	1979	Paco Rabanne
	~1	Rive Gauche	1971	Yves Saint-Laurent
Evernyl (Givaudan, IFF)	0.1	Calandre	1969	Paco Rabanne
	0.5	Charlie	1973	Revlon
	5	Man III	1987	Jil Sander

Haarmann & Reimer genealogy, a selection of perfumes that appeared on the market between 1900 and 1975 were classified with the general odor notes, green, floral, aldehydic, chypre, oriental, tobacco and leathery, and fougere. Feminine as well as masculine fragrances were classified under these notes. In the eighth edition in 1996, the genealogy separated masculine and feminine fragrances. Four-hundred fifty feminine fragrances were classified in the following odor notes:

- floral: green, fruity, fresh, floral, aldehydic and sweet types;
- Oriental: ambery and spicy types;
- and chypre: fruity, animalic, woody, fresh and green types.

Masculine fragrances (400) were classified in the following notes:

- fougere: fresh, woody and ambery types;
- oriental: ambery and spicy notes;
- and chypre: with woody, leathery, fresh and citrusy notes.

The technical committee of the French Society of Perfumers in 1990 published a "Classification des Parfums." In this classification, feminine and masculine perfumes were divided into the following families and subfamilies:[3]

- citrus: general citrus, floral chypre citrus, spiced citrus and woody citrus;
- floral: single flower, lavender-single flower, floral bouquet, floral green, floral aldehydic, floral woody, floral fruity woody;
- fougere: general fougere, soft amber fougere, floral amber fougere, spiced fougere, aromatic fougere;
- chypre: general chypre, floral chypre, floral aldehydic chypre, fruity chypre, green chypre, aromatic chypre, leather chypre;
- woody: general woody, woody citrusy coniferous, woody aromatic, woody spicy, woody spicy leather, woody amber;
- amber: floral woody amber, floral spicy amber, soft amber, citrus amber, floral semi-amber;
- and leather: leather, floral leather, tobacco leather.

Masculine and feminine perfumes may also be unified within this classification. Surprisingly, the word "oriental" does not appear in this classification.

Table 5. Application of aroma chemicals in various fragrances during the 20th Century (according to Pybus)[9]

Decade	Aroma Chemicals	Fragrance Application
1900s	Coumarin, heliotropine and ambriene	L'Origan
1910s	Undelactone	Mitsuoko
1920s	Aldehydes C10, C11, C12	Chanel No. 5
1930s	Phenylethyl acetate and civettone	Tabu
1940s	Hydroxycitronellal and musk ketone	L'Air du Temps
1950s	Isoamyl salicylate, cedryl acetate and nitromusks	Youth Dew
1960s	4-tert-Butylcyclohexyl acetate and (Z)-3-hexenyl salicylate	Fidji
1970s	Methyl dihydrojasmonate	Chanel No. 19
1980s	Ethylene brassylate and helional	Obsession
1990s	Dihydromyrcenol, nitro-free musks and ambrox	Cool Water

Table 6. Main odor aspects and approximated composition of Chanel No. 5 (Chanel, 1921; perfumer: Ernest Beaux; bottle designer: Sem)

Source/Author (Year)	Qualification
The H&R Genealogy (1976/96)	Floral, aldehydic
Technical Commission of the French Society of Perfumers (1990/94)	Floral, aldehydic
The (New) Perfume Handbook by Nigel Groom (1992/97)	The aldehydic top note, fresh and floral, with ylan-ylang and neroli, gives way to a floral heart, mainly blended jasmine and rose, and to woody base notes dominated by sandalwood and vetiver (about 130 ingredients)
The Fragrance Adviser-Fragrances of the World by Michael Edwards/Guy Robert (1999/2001)	Soft floral and aldehydic (classical)
The Fragrance Foundation Reference Guides (1995/2001)	Sparkling, modern floral/aldehyde

Approximated chemical composition: rose oil (1.5 percent); jasmine absolute (2 percent); styrax oil (2.5 percent); sandalwood oil (1 percent); vetiver oil (0.5 percent); lemon, ylang-ylang, cedarwood oil, oakmoss absolute (all less than 0.5 percent; linalool (17 percent); linalyl acetate (6 percent); methylionones (13 percent); coumarin (8 percent); geraniol (7 percent); benzyl acetate (5 percent); hydroxycitronellal (6 percent); musk ketone (5 percent); citronellol (3.5 percent); aldehydes C-9-11 (2 percent); methyl p-cresyl ether (2 percent); musk ambrette (2 percent); isoeugenol (2 percent); eugenol (2 percent; and vanillin (1 percent).

Table 7. Main odor aspects and approximated composition of L'Air du Temps (Nina Ricci, 1948; perfumer: Francis Fabron; bottle designer: Lalique (Brosese))

Source/Author (Year)	Qualification
The H&R Genealogy (1976/96)	Floral (floral)
Technical Commission of the French Society of Perfumers (1990/94)	Floral bouquet
The (New) Perfume Handbook by Nigel Groom (1992/97)	Top note of gardenia and bergamot, the heart is a rose, ylang-ylang and orris; the base note is mainly sandalwood and musk
The Fragrance Adviser-Fragrances of the World by Michael Edwards/Guy Robert (1999/2001)	Floral (classical)
The Fragrance Foundation Reference Guides (1995/2001)	Floral blend with spicy undertones; contains jasmine, sandalwood, gardenia, irisantheme, carnation, spice, rose, ylang-ylang, musk and ambergris

Approximated chemical composition: ylang-ylang oil (5 percent); sandalwood oil (2.5 percent); orange oil (2.5 percent); lemon oil (2 percent); geranium oil (0.5 percent); lavender oil (0.5 percent); isomethylionone (14.5 percent); benzyl acetate (12 percent); linalyl acetate (11.5 percent); musk ketone (8 percent); linalool (7 percent); phenethanol (6 percent); hydroxycitronellal (6 percent); α-terpineol (3.5 percent); vetiveryl acetate (3.5 percent); eugenol (3 percent); α-amylcinnamicaldehyde (2 percent); α-terpineol (1.5 percent); and isoeugenol (1 percent).

Table 8. Main odor aspects and approximated composition of Chloe (Karl Lagerfeld, 1975; perfumers: IFF; bottle design: Joe Messina)

Source/Author (Year)	Qualification
The H&R Genealogy (1976/96)	Floral (floral)
Technical Commission of the French Society of Perfumers (1990/94)	Floral (soliflore)
The (New) Perfume Handbook by Nigel Groom (1992/97)	Fruity green top notes; principal middle note is tuberose, supported by flower fragrances, including jonquil, jasmine, rose, lily of the valley, iris and ylang-ylang, while the main base note is musk
The Fragrance Adviser-Fragrances of the World by Michael Edwards/Guy Robert (1999/2001)	Floral (rich)
The Fragrance Foundation Reference Guides (1995/2001)	An irrepressible bouquet of tuberose and orange flowers, jasmine and honeysuckle

Approximated chemical composition: tuberose oil (7 percent); sandalwood oil (3 percent); ylang-ylang oil (2.5 percent); patchouli oil (2.5 percent); rose oil and jasmine absolute (2 percent); jonquille (1 percent); jasmine compounds (25 percent); linalool and acetate (12 percent); phenethanol (10 percent); benzyl salicylate (10 percent); vetiveryl acetate (6 percent); hydroxycitronellal (6 percent); musk compounds (5 percent); and methylionones (5 percent).

Table 9. Main odor aspects and approximated composition of Diorissimo (Christian Dior, 1956; perfumer: Edmond Roudnitska; bottle by: Baccarat/Crystiane Charles and Guericolas)

Source/Author (Year)	Qualification
The H&R Genealogy (1976/96)	Fresh floral
Technical Commission of the French Society of Perfumers (1990/94)	Floral (soliflore)
The (New) Perfume Handbook by Nigel Groom (1992/97)	Spring-like green note, achieved with boronia and calycanthys; heart of lily of the valley, jasmine and ylang-ylang; in the base note, rosewood predominates
The Fragrance Adviser-Fragrances of the World by Michael Edwards/Guy Robert (1999/2001)	Floral (fresh)
The Fragrance Foundation Reference Guides (1995/2001)	Family: floral bouquet; components: lily of the valley, jasmine, boronia, amaryllis, ylang-ylang

Approximated chemical composition: phenethanol (37 percent); hydroxycitronellal (17 percent); benzyl acetate (13 percent); citronellol (10 percent); methyl dihydrojasmonate (3.5 percent); phenylacetaldehyde dimethyl acetal (2.5 percent); geranyl acetate (1.5 percent); jasmine compounds (1.5 percent); linalool (1 percent); linalyl acetate (1 percent); geraniol (1 percent); indole (1 percent); p-cresyl methyl ether (0.5 percent); styralyl acetate (0.5 percent); methyl salicylate (0.5 percent); nerol (0.5 percent); and helional (0.5 percent).

Perfumers at Dragoco divided in their hexagon of perfume families the feminine perfumes into the following odor types: floral-fresh floral, floral-aldehydic, floral-fruity, floral-oriental, oriental and chypre.[5] The masculine perfumes were divided into the following six odor types: natural, woody-leathery, spicy, oriental, chypre and fougere-aromatic. Again, the feminine and masculine fragrances were separated.

In 1999, Michael Edwards published, with Guy Robert, the "Fragrance Adviser" with 1,900 fragrances.[9] They used the following categories: citrusy, green, water, floral, soft floral (aldehydic), floral oriental, soft oriental, woody oriental, mossy woody (chypre), dry woody (chypre, leathery) and aromatic (fougere). Although the classification is derived from the original one used by French perfumers, it shows distinct variations. The description "oriental" appears several times, and the whole classification is more compact than the original. The feminine and masculine perfumes can be classified within the same system. In following years, this classification was extended to about 2,700 perfumes as "Fragrances of the World 2000" and "2001".

The odor-family groups chypre, oriental and fougere need some explanation. The chypre family group of perfumes combines a fresh citrusy note with floral elements and a woody-balsamic mossy accord. Oriental perfumes have an exotic character of the East and unify spicy notes with woody-balsamic nuances. The fougere perfumes are

Table 10. Main odor aspects and approximated composition of Rive Gauche (Yves Saint Laurent, 1971; Perfumers: Roure; bottle: Pierre Dinand)

Source/Author (Year)	Qualification
The H&R Genealogy (1976/96)	Aldehydic floral
Technical Commission of the French Society of Perfumers (1990/94)	Floral aldehydic
The (New) Perfume Handbook by Nigel Groom (1992/97)	An aldehydic accord in the top note introduces a floral heart containing gardenia, honeysuckle, jasmine, ylang-ylang, orris, geranium and magnolia, with woody notes, mainly sandalwood and vetivert
The Fragrance Adviser-Fragrances of the World by Michael Edwards/Guy Robert (1999/2001)	Soft floral, aldehydic (crisp)
The Fragrance Foundation Reference Guides (1995/2001)	Totally harmonious with a dominance of floral, aldehyde, woody and warm notes; the floral notes
consist of gardenia, honeysuckle, jasmine, ylang-ylang,	iris, geranium and magnolia intensified with woody notes of Haitian vetiver and sandalwood from Mysore

Approximated chemical composition: geranium oil (8 percent); α-hexylcinnamaldehyde (15 percent); phenethanol (12 percent); 4-trans-butylcyclohexyl acetate (12 percent); methylionones (8 percent); limonene (5 percent); linalyl acetate (4 percent); benzyl acetate (3.5 percent); geranyl acetate (3.5 percent); phenethyl acetate (3 percent); musk ketone (3 percent); linalool (2.5 percent); sandela (2 percent); jasmine compounds (3 percent); aldehydes (acetals) (0.5 percent); lyral (2 percent); and citronellyl acetate (1 percent).

Table 11. Main odor aspects and approximated composition of Eau Sauvage (Rochas, 1966; perfumer: Edmond Roudnitska; bottle designer: Pierre Camin)

Source/Author (Year)	Qualification
The H&R Genealogy (1976/96)	Fresh, citrusy, chypre
Technical Commission of the French Society of Perfumers (1990/94)	Floral, chypre, citrus
The (New) Perfume Handbook by Nigel Groom (1992/97)	Principal constituents are bergamot, lemon and basil in the top note, jasmine and patchouli in the heart, and oak moss in the base
The Fragrance Adviser-Fragrances of the World by Michael Edwards/Guy Robert (1999/2001)	Citrusy (classical)
The Fragrance Foundation Reference Guides (1995/2001)	Family: Citrus, chypre, aromatic; components: lemon, rosemary, petitgrain, basil, vetiver

Approximated chemical composition: bergamot oil (65 percent); litsea cubeba oil (6 percent)—or 3.5 percent citral; patchouli oil (2 percent); spearmint oil (1 percent); oakmoss absolute (0.5 percent); linalool (16 percent); methyl dihydrojasmonate (3 percent); methyl ionones (2 percent); benzyl acetate (1 percent); nopyl acetate (1 percent); eugenol (1 percent); α-hexyl-cinnamaldehyde (1 percent); and coumarine (0.5 percent).

characterized by fresh, herbaceous notes, combined with moss and fern-like odor types.

One may assume that there are three general types of odor descriptors for the classification of perfumes:

- general sophisticated: chypre, fougere, oriental;
- derived from specified materials: aldehydic, ambery, animalic, aromatic, citrusy, floral, fruity, herbaceous, leathery, mossy, musky, spicy, watery, woody;
- and non-specified adverbs: classical, dry, fresh, rich, sweet, soft warm, green.

The odor aspects of perfumes derived from specified plant or chemical materials are precisely detailed in Table 2.

It is common knowledge that fragrances in general today consist of more than 50 percent defined materials (natural and synthetic) and of less than 50 percent natural isolates. Because the floral theme or accord is the most important odor aspect in all perfumes and fragrances, it seems worthwhile to set up a list of natural and synthetic aroma chemicals, which are characteristic or essential for a particular flower odor (Table 3).

Several authors have discussed the application of natural or synthetic aroma chemicals in perfumes.[12-20] For instance,

Ohloff treated 45 perfumes in relation with defined natural isolates or aroma chemicals.[14] Martin Gras wrote some interesting publications, under the title "The Overdose," about the normal and exaggerated concentrations of aroma chemicals in perfumes.[13] An extract of his studies is illustrated in Table 4.

A nice example of the application of aroma chemicals is given by Pybus in an overview of the 20th Century as the age of fashion. In one of his tables, he shows the decades, background, development and exploitation of chemicals, fragrance used and the emergent fashion designers.[19] An extract of this work is presented in Table 5, showing the relation of aroma chemicals with fragrances during the decades of the last century.

In Tables 6-12 are a list of some classic perfumes shown with their odor aspects and approximated composition. One should always keep in mind the statement, which Guy Robert made some years ago about perfume formulas in literature.[21] "So read and enjoy the publications of classic perfume formulas, but understand that, at best, they are approximations that might come reasonably close to the original perfume."

Conclusion

Up to 5,000 fragrances and perfumes are currently commercially available around the world. These products are commercialized by approximately 900 brands and sales companies. Every year 200 new fragrances reach the market. Two important features of a fragrance are the olfactive quality and the packaging. Perfumers and container designers are the creative artists that are ultimately responsible for the economic success of perfume products.

Various classifications of fragrances and perfumes have been published over the years. These are based on several key odor aspects, including floral, oriental, chypre, fougere, and refined odor types like fresh, sweet, dry, green, fruity, aldehydic, ambery, spicy and woody.

Table 12. Main odor aspects and approximated composition of Brut (Faberge, 1964)

Source/Author (Year)	Qualification
The H&R Genealogy (1976/96	Fougere, ambery
Technical Commission of the French Society of Perfumers (1990/94)	Floral, amber, fougere
The (New) Perfume Handbook by Nigel Groom (1992/97)	Lavender and anise in the top note, geranium in the middlenote and oak moss and vanilla in the base note
The Fragrance Adviser-Fragrances of the World by Michael Edwards/Guy Robert (1999/2001)	Aromatic, fougere (classical)
The Fragrance Foundation Reference Guides (1995/2001)	Citrus notes backed up with woods and nuances of geranium and the excitement of spice

Approximated chemical composition: sandalwood oil (1 percent); patchouli oil (1 percent); vetiver oil (0.5 percent); linalyl acetate (11 percent); musk ambrette (10.5 percent); dihydromyrcenol (9 percent); linalool (9 percent); citronellol (9 percent); myrcenyl acetate (5 percent); tonalide (4 percent); anisaldehyde (3 percent); cyclamal (3 percent); isoamyl salicylate (3 percent); lilial (2 percent); heliotropine (2 percent); benzyl alcohol (2 percent); fenchyl acetate (2 percent); dimethyloctanol (1 percent); and coumarin acetate (1 percent).

The names of naturals are useful for the classification and nomenclature of perfumes and fragrances. Thus, for good communication amongst perfumers, commercial and technical people, clients, and end users, reasonably objective fragrance and perfume classifications must be used.

References

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1. P. Woerner. Une histoire du developpement des parfums: Parfumes, cosmetiques, aromes no. 8-mars/avril 1976 (The Haarmann & Reimer Genealogy 1976-1996).
2. J. Mueller. H&R Book of Perfume, 1992; Allured Publishing Corp., Carol Stream, IL.
3. Technical Commission of the French Society of Perfumers, Classification des Parfums, October 1990-1994.
4. Tableau des Fragrances (The Fragrance Information Reference), Givaudan-Roure, 1992.
5. R. Halderman and T. Scheunemann. Dragoco Reports, 1993-1994.
6. N. Groom. The Perfume Handbook, Blackie Academic & Professional, Chapman & Hall, London 1992/idem, The New Perfume Handbook 1997.
7. Fragrance Guide-Duftatlas-Atlas Olfactif; Haarmann & Reimer, 1996.
8. Beauty & Perfumes Buyer's Guide, Cosmedias SA, Paris, 1996-1997.
9. M. Edwards (with G. Robert). The Fragrance Adviser 1999/idem, Fragrances of the World 2000 and 2001.
10. The Fragrance Foundation Reference Guides 1995-2001, The Fragrance Foundation, New York, 2000.
11. 11° Diccionario de las Fragrances 2001, Podium Ediciones, Barcelona, 2001.
12. P. Sermadiras 1990, Dictionnaire des Parfums, Paris 1990.
13. M. Gras. The Overdose, Perf & Flav. Vol. 16, Nov/Dec 1990, 25-28; Vol. 18 Jan/Feb 1992, 1-12.
14. S. Jellinek. Parfum-Der Traum im Flakon, 1992, Mosaik Verlag GmbH, Muenchen.
15. G. Ohloff. Scent and Fragrances, Springer Verlag, Berlin 1994.
16. P.M. Mueller and D. Lamparsky. Perfumes: Art, Science and Technology, 1994.
17. M. Edwards. Perfume Legends: French Feminine Fragrances, Allured Publishing Corp., Carol Stream, IL, 1996.
18. D.P. Anonis. Flower Oils and Floral Compounds in Perfumery, Allured Publishing Corp., Carol Stream, IL 1993.
19. D.H. Pybus and C.S. Sell. The Chemistry of Fragrances, The Royal Society of Chemistry, 1999.
20. A. Boix Champs. Perfumery: Techniques in Evolution, Allured Publishing Corp., Carol Stream, IL, 2000.
21. G. Robert. Perfume Formulas in Literature, Perf. & Flav., Vol. 21, May/June 1996, 49. ■