

## Fougère in Perfumery

# Fougère in Fine Fragrances

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The word *fern* is derived from the Old English *fearn*. The French term *fougère* is used in perfumery. Fougère is an important odor in perfumery. No natural oil is produced, and synthetic compounds are used.

### Origin and Botanical Data

The major group of living ferns has fossil records; their ancestry can be traced with reasonable, but not absolute precision.<sup>1</sup>

Fern belongs to numerous vascular plants of the class *Filicinae*. The plant is flowerless and seedless. It has fronds with divided leaflets and reproduces by means of spores.<sup>2</sup>

The majority of approximately 10,000 species of ferns grow in moist and wet tropical and subtropical and montane rain forest regions, and relatively few are found in cold and dry regions.<sup>1</sup>

### Synthetic Compounds

The fougère note in perfumery is purely a fantasy bouquet. The scent has no resemblance to the fougère plant's dominant odor, which is hexyl- or octyl butyrate.<sup>3</sup>

Cerbelaud classifies fougère under the folial, herbal odor group.<sup>4</sup> Fougère has common points with dried herbs

and hay odors (Tonka/coumarin) and also with lavender, amber (including oakmoss) and mushrooms. To a lesser extent fougère has common points with rose-geranium (linalool, geraniol or geranyl acetate); violet-orris; thyme, rosemary, camphor and borneol; wintergreen (methylsalicylate); and woody odors (sandalwood, cedarwood and vetiver).

The availability of coumarin enabled the perfumer to develop synthetic fougère compounds. Some perfumers consider fougère a complex lavender note, other relate fougère to hay odors, as well as chypre-type odors.

Thus, depending on the conception of fougère, the main bouquet may be built on coumarin/Tonka, lavender, oakmoss, vetiver and citrus oils, or it may be based on chypre and lavender, containing a spicy note, and bergamot added for the top note. Some fougère formulas of the past contained benzyl cyanide, the harsh green odor of which was toned down with coumarin, musk, patchouly and vetiver.

A whole range of fougère formulas was developed by various perfumers. A variety of components, including aromatics as they became available, were included in these formulas.

For the base, oakmoss was associ-

ated with such aromatics as p-methyl acetophenone, benzyl isoeugenol, amyl-, isobutyl-, and methylsalicylates, dimethyl hydroquinone, coumarin, methyl heptene- and methyl octine carbonates, isobutyl quinoline, and with such naturals as geranium, sandalwood, vetiver and patchouly.

For the floral note, rose Otto and absolute, as well as rose compounds, jasmin natural or synthetic, neroli or its components, cassie, mimosa, fleurs d'oranger, reseda and tuberose absolutes, and ylang ylang were added.

Civet, natural musk or various synthetic musks, ambergris synthetic, musk ambrette, musk xylol, ethyl vanillin, heliotropin, vanillin, Peru and tolu balsams, benzoin, labdanum, myrrh, olibanum, opoponax and styrax resinoids served as fixatives.

For ethereal and piquant notes, the following compounds were added: benzyl cyanide; geranyl-, hexyl-, and linalyl formates; benzyl-, terpinyl-, and neryl propionates; anisyl acetate, ethyl anisate; methyl- and ethyl amyl ketones; lime and petitgrain oils.

Nuances and special notes could be achieved by using acetyl isoeugenol, anisic aldehyde, geranyl acetate, benzyl phenyl acetate, dimethyl benzyl carbinyl acetate, guaiacwood acetate,

This is the first of two Anonis articles on fougère in perfumery.  
A future article will discuss fougère in colognes, cosmetics, soaps and men's line fragrances.

isoeugenol, methyl benzoate, methyl ionone, alcohol C-9 and aldehydes C-8, C-9, C-10, C-11, C-12(MNA) and C-14 (undecalactone). Among the naturals, angelica root, calamus, cardamon, carrotseed, cascarilla, clary sage, coriander, elemi, estragon, hysope, immortelle, pepper, pine, rosemary and thyme may be cited.

In addition to fougère fragrances, the perfumer's imagination extended to fragrances denoting the place where fougère plants were growing. The French term for such a place is *fougèraie*.

The following formula is an example of such an early fragrance compound.

## Dans la Fougèraie<sup>5</sup>

|     |                 |                                       |
|-----|-----------------|---------------------------------------|
| 100 | cm <sup>3</sup> | Oakmoss decolorized infusion          |
| 15  |                 | Civet infusion                        |
| 50  |                 | Tonka infusion                        |
| 15  |                 | Vanilla infusion                      |
| 10  |                 | Civet synthetic 10%                   |
| 475 |                 | Rose flower pomade extract No. 36     |
| 50  |                 | Tuberose flower pomade extract No. 36 |
| 50  |                 | Mimosa flower pomade extract No. 36   |
| 200 |                 | Reseda flower pomade extract No. 72   |

|     |                 |  |
|-----|-----------------|--|
| 50  |                 | Fleurs d'oranger pomade extract No. 36 |
| 10  |                 | Oakmoss absolute                       |
| 5   |                 | Rose d'Orient oil                      |
| 10  |                 | Geranium terpeneless                   |
| 5   |                 | Neroli Bigarade                        |
| 2   |                 | Lemon oil terpeneless                  |
| 6   |                 | Bergamot terpeneless                   |
| 15  |                 | Lavender                               |
| 2   |                 | Clary sage                             |
| 3   |                 | Vetiver                                |
| 10  |                 | Linalool                               |
| 1.5 | g               | Alcohol C-9                            |
| 0.5 |                 | Aldehyde C-8                           |
| 0.5 |                 | Aldehyde C-9                           |
| 0.5 |                 | Aldehyde C-10                          |
| 5   | cm <sup>3</sup> | Methyl acetophenone                    |
| 5   | g               | Coumarin                               |

Extracts No. 36 contain approximately 12.5 grams of the absolute flower oil.

Extract No. 72 contains approximately 25 grams of the absolute flower oil.

The same idea was expressed in the following fragrance compound, depicting even the time of the day, namely twilight (French *crêpuscule*).

## Fougèraie au Crêpuscule (Coty type)

|     |  |                      |
|-----|--|----------------------|
| 180 |  | Amber synthetic      |
| 100 |  | Coumarin             |
| 90  |  | Bergamot             |
| 55  |  | Sandalwood E.I.      |
| 35  |  | Anisic aldehyde      |
| 35  |  | Lemon c.p.           |
| 30  |  | Jasmin synthetic     |
| 30  |  | Musk ketone          |
| 25  |  | Vanillin             |
| 23  |  | Geranium African     |
| 22  |  | Lavender             |
| 20  |  | Patchouly            |
| 20  |  | Methyl ionone        |
| 20  |  | Orange sweet         |
| 18  |  | Coriander            |
| 25  |  | Ethyl anisate        |
| 17  |  | Vetiver Java         |
| 15  |  | Benzoin resinoid     |
| 12  |  | Geraniol palmarosa   |
| 10  |  | Linalyl acetate      |
| 10  |  | Petitgrain Paraguay  |
| 40  |  | Tonka resinoid       |
| 9   |  | Orange bitter        |
| 7   |  | Isobutyl salicylate  |
| 6   |  | Oakmoss              |
| 3   |  | Clary sage           |
| 3   |  | Phenyl ethyl alcohol |
| 3   |  | Styrax resinoid      |
| 2   |  | Linalyl propionate   |
| 2   |  | Cloves               |
| 2   |  | Opoponax resinoid    |
| 2   |  | Civet resinoid       |

|       |  |                          |
|-------|--|--------------------------|
| 2     |  | Myrrh resinoid           |
| 1.3   |  | Cassia                   |
| 1     |  | Orange sweet terpeneless |
| 1     |  | Peppermint               |
| 0.2   |  | Cardamon                 |
| 0.1   |  | Cascarilla               |
| 876.6 |  |                          |

The following are a few examples of later conventional fougère compounds for perfumes:

## Fougère No. 221<sup>6</sup>

|      |  |                         |
|------|--|-------------------------|
| 164  |  | Sandalwood E.I.         |
| 84   |  | Linalyl acetate         |
| 55   |  | Linalool                |
| 5.5  |  | Citral                  |
| 82   |  | Citronellol             |
| 16   |  | Terpineol               |
| 68   |  | Oakmoss resinoid        |
| 38   |  | Geranium Bourbon        |
| 70   |  | Spice lavender          |
| 68   |  | Vanillin                |
| 68   |  | Heliotropin             |
| 55   |  | Musk ambrette           |
| 70   |  | Styrax                  |
| 15   |  | Labdanum resinoid       |
| 8    |  | Rosemary                |
| 55   |  | Patchouly               |
| 20   |  | Cananga Java            |
| 3    |  | p-Cresyl phenyl acetate |
| 8    |  | Cresyl phenyl oxide P&S |
| 45   |  | Coumarin                |
| 2.5  |  | Aldehyde C-12 (MNA)     |
| 1000 |  |                         |

## Fougère No. 14<sup>7</sup> (Fougère Royale type)

|      |  |  |
|------|--|--|
| 1    |  | Isobutyl quinoline                       |
| 18.6 |  | Coumarin                                 |
| 5    |  | Vetiverol                                |
| 5    |  | Patchouly                                |
| 2    |  | Estragon                                 |
| 1    |  | Carrot seed oil                          |
| 5    |  | Hyssop                                   |
| 3    |  | Oakmoss absolute                         |
| 10   |  | $\alpha$ -Ionone                         |
| 5    |  | Isobutyl salicylate                      |
| 5    |  | Linalyl formate                          |
| 3    |  | Santalol                                 |
| 2    |  | Rose d'Orient                            |
| 5    |  | Rhodinol sur rose                        |
| 1    |  | Jasmin absolute                          |
| 1    |  | Tuberose absolute, partially decolorized |
| 2    |  | Zamaya protéique (M.D.)                  |
|      |  | Cerb. (amber-musk type)                  |
| 0.7  |  | Phenyl acetic acid                       |
| 0.7  |  | Musk ambrette                            |
| 24   |  | Bergamot                                 |
| 100  |  |  |

# FOUGÈRE IN PERFUMERY

Formulas No. 15 and No. 16 illustrate fougère compounds containing benzyl cyanide.

## Fougère No. 15<sup>8</sup>

|    |                 |
|----|-----------------|
| 10 | Benzyl cyanide  |
| 4  | Lavender        |
| 10 | Linaloe oil     |
| 2  | Sandalwood E.I. |
| 10 | Bergamot        |
| 2  | Patchouly       |
| 6  | Neroli oil      |

|     |                       |
|-----|-----------------------|
| 8   | Geranium              |
| 4   | Musk ketone           |
| 16  | Coumarin              |
| 1   | Rose absolute         |
| 0.5 | Tuberose absolute     |
| 0.5 | Cassie absolute       |
| 35  | Civet infusion        |
| 20  | Musk Tonquin infusion |
| 129 |                       |

Use 100 cm<sup>3</sup> of the above compound in 1 liter (1000 cm<sup>3</sup>) of alcohol for the finished fougère perfume.

## Fougère No. 16<sup>9</sup>

|     |                          |
|-----|--------------------------|
| 2   | Benzyl cyanide           |
| 2   | Oakmoss decolorized      |
| 5   | Ylang ylang              |
| 5   | Lavender                 |
| 20  | Bergamot                 |
| 5   | Hexyl formate            |
| 1   | Patchouly                |
| 2   | Vetiver or Vetiverol     |
| 5   | Coumarin                 |
| 2   | Heliotropin              |
| 2   | Ethyl vanillin           |
| 10  | $\alpha$ -ionone         |
| 5   | Rose d'Orient            |
| 5   | Geraniol                 |
| 5   | Isobutyl salicylate      |
| 1   | Jasmin absolute          |
| 5   | Musk verduré (see below) |
| 18  | Linalool                 |
| 100 |                          |

## Musk verduré (R. Cerbelaud)

|        |                    |
|--------|--------------------|
| 14.25  | Phenyl acetic acid |
| 71.50  | Coumarin           |
| 14.25  | Musk ambrette      |
| 100.00 |                    |

The following are examples of conventional fougère compounds for perfume, developed along the line of a complex lavender bouquet.

## Fougère II<sup>10</sup>

|                     |                      |
|---------------------|----------------------|
| 250 cm <sup>3</sup> | Lavender             |
| 75 "                | Bergamot             |
| 75 "                | Neroli               |
| 30 "                | Oakmoss              |
| 35 "                | Rose oil             |
| 35 "                | Jasmin oil           |
| 50 "                | Immortelle oil       |
| 25 "                | Vetiver              |
| 15 "                | Clary sage           |
| 100 "               | Linalyl acetate      |
| 50 "                | Geranyl acetate      |
| 50 "                | Terpinyl acetate     |
| 25 "                | Aldehyde C-12 (MNA)  |
| 40 g                | Coumarin             |
| 10 "                | Vanillin             |
| 5 "                 | Aldehyde C-11 (enic) |
| 15 "                | Alcohol C-9          |
| 10 "                | Alcohol C-8          |
| 55 "                | Orris resinoid       |
| 50 "                | Benzoin resinoid     |

## Fougère II<sup>11</sup>

|     |                  |
|-----|------------------|
| 150 | Lavender         |
| 100 | Coumarin         |
| 50  | Bergamot         |
| 25  | Oakmoss absolute |
| 25  | Patchouly        |
| 30  | Rose absolute    |
| 20  | Jasmin absolute  |
| 10  | Musk ketone      |
| 10  | Musk ambrette    |

|      |                           |
|------|---------------------------|
| 25   | Vetiverol                 |
| 20   | Geranium                  |
| 30   | Musk Tonkin 10%           |
| 10   | Amyl salicylate           |
| 20   | Sandalwood                |
| 5    | Vanillin                  |
| 10   | Heliotropin               |
| 25   | Tolu balsam               |
| 50   | Linalool                  |
| 50   | Linalyl acetate           |
| 10   | Anisyl acetate            |
| 150  | Lavender absolute         |
| 10   | Cassie absolute           |
| 100  | Tonka resinoid            |
| 20   | Fleurs d'Oranger absolute |
| 25   | Styrax resinoid purified  |
| 10   | Angelica root oil         |
| 10   | Thyme oil                 |
| 1000 |                           |

Before World War II, perfumes containing no alcohol were developed in Germany. The solvents used were diethyl phthalate, castor oil and others. Among such perfumes was also fougère. Here is an example of such a perfume compound:

**Fougère  
(for perfume without alcohol)<sup>12</sup>**

|     |                 |                       |
|-----|-----------------|-----------------------|
| 850 | cm <sup>3</sup> | Fougère compound      |
| 25  | "               | Neroli synthetic      |
| 50  | "               | Ylang ylang synthetic |
| 10  | "               | Vetiver               |
| 5   | "               | Methyl acetophenone   |
| 10  | "               | Benzyl acetate        |
| 15  | "               | Geranyl acetate       |
| 25  | g               | Coumarin              |
| 10  | "               | Musk ketone           |

Due to dermatological considerations, several previously used perfume materials in fougère compounds are now restricted. Others have to be specially processed. Some have to be used with quenchers, and a few materials have been completely eliminated, as per the International Fragrance Association's guidelines. Among such perfume materials are angelica root, bergamot, lemon c.p., bitter orange, musk ambrette, oakmoss, styrax, opoponax, citral, Peru balsam, and verbenal oil.

### Application

The availability of coumarin (and salicylates) enabled the perfumer to develop fougère compounds.

Though purely a fantasy bouquet, fougère gave impetus to the development of feminine and masculine fra-

grances. Fougère Royale, created by Houbigant in 1882, was the first fougère fragrance in which coumarin was used. The fragrance was first used in soap, and later adapted to perfume and other related media. Since 1882, a number of variations of the fougère note have been developed. Among them are Fétiche (Piver), Fleurs des Indes, Khasana, Emeraude (Coty), and the more floral versions, such as Moment Supreme (Patou) and Blue Grass (Arden).

It is difficult to visualize why the imaginary fougère scent took such a prominent place in perfumery. Perhaps the folklore had an influence. It was generally believed that the spores of fern have the power to make one bearing them invisible. In Lithuania, there was a popular belief that a mythical single fern blossom would come into flower briefly at midnight on St. John's night each year. Only a good person could find this blossom, but only once in a lifetime. The one who

found it would become rich and all-knowing, and would be able to understand the language of animals and plants.

### References

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