MATCHING PERFUMERY

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The saying, "Imitation is the sincerest form of flattery," aptly describes the matching phase of perfumery, for the driving force behind matchwork is the effort to imitate someone else's success.

Matchwork (also known as "countersampling" or "duplicating") is the inverse of creative perfumery; it involves the production of a fragrance that simulates a fragrance idea already in existence. It may be regarded as a form of artistic plagiarism, since it is an exploitation of someone else's creative idea without his permission.

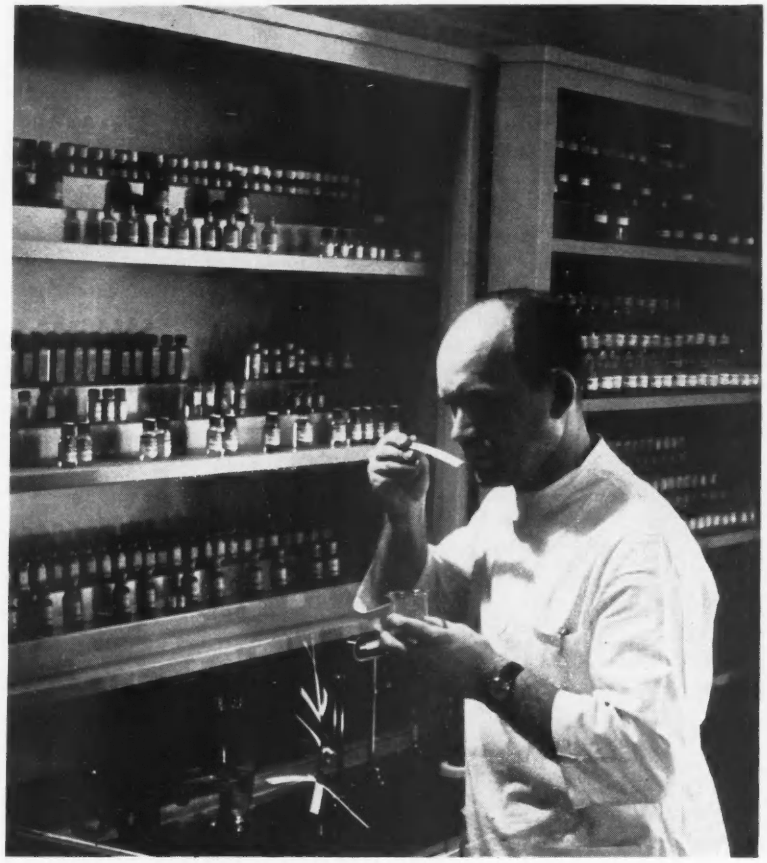
Matching constitutes a much higher percentage of the American perfumer's activity than of the European perfumer's because of the intensely competitive and price-conscious nature of the American market. The constant demand for a "good match" that is "just a little cheaper" places great pressure on the perfumer. As each successive price target is lowered, he must meet it by a corresponding sacrifice or compromise of some part of the quality of a match fragrance. Usually he begins by trimming the less conspicuous background notes, trying to save as much of the principal notes as possible, somewhat in the manner in which an automobile is stripped to a minimum weight for racing purposes. As the downward price trend continues, the principal notes eventually depreciate, and the match becomes more and more a caricature of the original fragrance than a simulation.

The buyer's price demands on one hand and the enforced depreciation of the match on the other become a pair of millstones between which the perfumer is squeezed. But the inescapable fact is that, in spite of the criticism that may be heaped on the perfumer, the customer is going to get exactly what he is willing to pay for.

In actual practice matching resolves itself into the identification of enough of the top, middle and bottom parts of a fragrance to set up a pattern that will have a resemblance to the product being matched. Having established this skeleton pattern, the perfumer fills in the background and gaps from his past experience and artistic judgment. The result is a fragrance which has a reasonable similarity to the one being matched within the limits of technical and cost restrictions.

There are certain points concerning matchwork that should be clearly understood to avoid misconceptions and friction. At its best, matching is one man's impression of another's creation. A "perfect" match just doesn't exist. No matter how much he tries, the perfumer can never capture every nuance; he must be content with a reasonable degree of accuracy. Just when he has achieved this degree of accuracy is determined by time, economic factors, and more often a simple exhaustion of ideas.

A match represents a "tailored" composition. Merely because it appeals to one individual, there is no assurance that it will appeal to anyone else. Very frequently considerable adjustment is required before



the match will be accepted by another person.

The original fragrance formula as compared with the match formula is quite dissimilar in regard to the various aromatic chemicals used. If this situation did not exist, it would be impossible to simulate a fragrance on substantially lower price levels.

Matchwork Procedure

The first procedure involved in matchwork is to qualitatively identify some of the individual aromatic materials involved in the construction of the fragrance under consideration for matching. Although the information obtained from this exploratory procedure is not spectacular, it often has an important bearing on the subsequent work done.

The next procedure involves the selection of the perfumer's classification group which best represents the major part of the fragrance. This step is highly important as it determines the general construction of the match's skeleton formula. The "fill-in" or "bodying" of this skeleton formula to produce the completed match is absolutely dependent on the perfumer's command of his odor memory for aromatic materials and his ingenuity in employing it.

Although the mechanism of matchwork is simpler than that of creative perfumery, it is far from easy to obtain a good match, because there are so many chemical, artistic and personal variables involved. In an average match, much of the physical effort expended involves the "bodying" of the skeleton formula. Successful results depend upon the personal ingenuity of the perfumer, shrewd guesswork, and a substantial measure of luck.

There is perhaps even more theorizing about the technique of matchwork than of creative perfumery, but rather than engage in any lengthy theoretical discussion, the matching of a Crepe de Chine fragrance will be illustrated.

Exploratory Phase. Examination by "dry-out" is the first step in the exploratory phase. A perfumer's test blotter is carefully dipped in the Crepe de Chine fragrance oil of the to a depth of about ¼" and then quickly withdrawn. It is mounted vertically in a clamp so that it can drain downward and allowed to stand untouched for about 3 hours.

The objective of this "dry-out" is to force the breakup or "unbalancing" of the fragrance oil by a physical, fractional separation. By the process of selective absorption, the more volatile materials and those with the lowest viscosity will tend to remain on the top of the blotter. Those materials with less volatility and higher viscosity will tend to distribute

themselves towards the bottom of the oil saturation as it spreads downward on the test blotter.

In this "dry-out" the esters and volatile essential oils (e. g.: Bergamot and other citrus oils) tend to accumulate at the top of the test blotter. At the bottom are the resins, Nitro Musks, Vanillin, Coumarin etc. In between the two areas there is considerable overlapping, with top materials extending downward into this middle section, and materials from the bottom section occasionally showing up. In spite of this overlapping, the central section of this test blotter often unexpectedly shows up one or more materials that do not appear in either top or bottom. Ylang frequently shows up in the center portion of the test blotter, for example. Ionones and Hydroxycitronellal are other illustrations.

When the 3 hour draining period has expired, the saturated portion of the test blotter is carefully cut into 3 equal parts, representing the top, central, and bottom of this section. Each of these parts is then separately examined by holding it in a pair of tweezers, under the nose. The top cut will show some of the lighter aromatics. The bottom will show the heavier items such as the "powdery" materials, musks and fixatives. The central cut overlaps top and bottom, but does occasionally show something distinctive.

This blotter "dry-out" procedure was applied to the Crepe de Chine sample oil previously indicated. After the 3 hour "dry-out" the three cuts were made. The top cut showed possibilities of bergamot and benzyl acetate, with linalool and linalyl acetate. The middle cut was rather cloudy as to information. Both ionone and methyl ionone seemed to appear, in conjunction with hydroxycitronellal. There was also a suspicion of cardamon oil. The bottom was most informative. It clearly demonstrated the presence of all the nitro musks, musk ketone and musk xylol predominating. Coumarin and vanillin were in the background. Oak moss was obvious through all cuts, but particularly in the bottom. Aldehyde C-11 was very apparent, but in the bottom cut there was an appearance of what seemed to be aldehyde C-12 MNA.

From this "dry-out" operation the following olfactory evidence has been deduced:

Bergamot, linalool, linalyl acetate are present. The fact that they have remained clearly in the top cut after three hours, shows that they must play a substantial part in the formula construction. The presence of these citrus-like materials is commonplace in this type of composition, since Crepe de Chine is basically a Chypre plus aldehydes and "dress-ups." Chypre uses a large proportion of citrus character.

The identification of benzyl acetate is valuable. It shows that the designer has incorporated jasmin notes in his work, and is probably employing the benzyl acetate to give a flowery, sweet "lift" in harmony with his design.

The inconspicuousness of the ionones in the middle cuts indicates that these materials do not play too great a role in the fragrance design. It was difficult to estimate whether a mixture of Alpha Ionone and a good Methyl Ionone were used, or whether an ultra-refined fraction of Methyl Ionone Gamma was used. The decision that the first two were used was reached by a consideration of the price of the matching fragrance. Its price was such that the use of the expensive special methyl ionone was doubtful. The best bit of information from the middle cut was the possibility of cardamon oil. This material presents many faces in association with other aromatics, so that its identification is not easy.

In the bottom cut the presence of musk ketone and Musk xylol is normal for a Crepe de Chine effect. The appearance of musk ambrette suggests that it was brought in through an amber specialty composition. The recognition of coumarin and vanillin in the background tends strongly to confirm this. The best information in this bottom cut was the recognition of the coumarin and vanillin, confirming the amber possibility, and of the secondary aldehyde, the aldehyde C-12 MNA. The observation of the latter was a bit of good luck, since because of their intensity, a mixture of Aldehydes is difficult to identify separately.

So far, a physical method has been used to produce an unbalancing or "break-up" of the fragrance oil being matched. The next move is a chemical trick to produce another kind of unbalancing to give another viewpoint of the fragrance composition, qualitatively. For this purpose phthalation is used.

About one gram of the fragrance oil in question is heated with an equal weight of pure phthalic anhydride on a hot water bath for an hour. The phthalic anhydride esterifies the alcohols (phenylethyl alcohol, citronellol, geraniol, rhodinol etc.) that are present, and also the phenols (eugenol, isoeugenol, etc.). Phthalic esters are odorless, so these aromatics are removed from activity to permit another view of the fragrance oil composition. When the heating is finished, a test blotter is dipped into the melt, and smelled in its fresh state. A "dry-out" is not useful at this point, since the phthalic esters disturb the mechanism of selective absorption. This processing applied to the match sample confirms the present of two ionones more clearly. Orange oil and the possibility of petitgrain oil (both previously unspotted) seem to appear. The existence of a rose composition is suspected by the complete absence of Rose sweetness in the processed sample when compared with the original.

The objective of the next step is to determine which of the perfumer's group classifications (Rose-Lilac - Jasmin - Muguet - Violet - Lavender, Fourgere Chypre) are employed in the construction of the original fragrance.

A casual examination of the original sample, in its bottle shows that it is actually a Crepe de Chine as it is labelled. The obvious Chypre character, coupled

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of private citizens. Each can strengthen the other; neither one need cause harm to the other. When the efforts of government strengthen those of its citizens, the nation as a whole is made stronger. Without doubt this was the intention of those who set forth the basic principles in our Constitution more than 165 years ago; it was the intention of those who recognized the responsibilities of private citizens in manufacturing and distributing drugs, and in establishing standards for them, in the Food and Drugs Act fifty years ago; and it was the intention of those who saw the need for more support of basic medical research in setting up the first National Institute of Health about twenty years ago.

These wise intentions should not be overlooked. It should be our purpose today, and our responsibility as citizens, to see that a healthy balance is maintained between the functions of government and those of private organizations in all facets of medicine and pharmacy. The tremendous amounts of money which the federal government has to spend should be carefully directed in its procurement of drugs, its regulatory activities, and its support of medical research. It is always the citizen's responsibility to chart the government's course.

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with the presence of aldehydes, confirms this. A closer inspection of a fresh dip of the fragrance oil on a test blotter shows that a rose effect and a jasmin are involved, with a distinct possibility of a muguet composition or a muguet fragment of aromatic chemicals, being used.

The basic group employed in the original Crepe de Chine is Chypre. Therefore the application of Step #2 will start at this point. Referring to the various formulas for Chypre in the Chapter X (Lavender-Fougere-Chypre Group) it is seen that bergamot and oak moss are predominant materials in making up a Chypre composition. The presence of these materials has already been confirmed in Step #1, so the composition of the match will be started as follows:

CREPE DE CHINE TYPE E.056

100 Oil bergamot Natural
100 Oak Moss "Green" (Polak Frutal)
120 Linalyl acetate

Linalyl acetate possesses a fruity note quite similar to oil of bergamot. It is used here to body and fortify the bergamot, and produce a balance between it and the oak moss.

The progress of the development of the match mixture is observed by comparison with the original sample which was to be matched. Separate blotters are dipped in each product, and comparatively examined under the nose. Prolonged smelling of either

paper should be avoided as much as possible, since this produces a kind of numbing sensation that temporarily interferes with the accuracy of odor comparison. In the subsequent discussion, the word "comparison" will be used to indicate the method of examination described in this paragraph, for the sake of brevity.

In the above mixture, the bergamot note is derived from the combination of natural bergamot oil (1) and the fortifier, linalyl acetate. It is apparent on comparison that this bergamot note needs variations for additional "color." So, these additions are made:

50	Oil lemon Italian
10	Oil bitter orange (Fritzsche)
40	Linalool

The lemon oil gives a fresher citrus touch. The bitter orange gives a "zesty" orange peel effect. The linalool serves as the blender to bring these new materials in harmony with the first group.

These additions were not arrived at as easily as they were written. They were reached by a series of experimental additions of small quantities that were juggled back and forth until a satisfactory position was attained. This "juggling" technique is the method used to arrive at the various figures subsequently shown for the formula development.

The mixture produces a base approximating the Chypre class. It is a skeleton fragrance and must be greatly amplified to resemble the product being matched. The need for this amplification leads to the next step, the "filling in" of the skeleton base. It has already been shown qualitatively that the ionones exist in the original match material. A comparison verifies their desirability so the following additions were worked out:

8	Methyl ionone
6	Alpha ionone

A flowery greenness reminiscent of gardenia is identified on comparison and is reproduced by these additions:

8	Amyl cinnamic aldehyde
24	Styrallyl acetate

Styrallyl acetate has been emphasized because this material is almost traditional in Chypre types. The amyl cinnamic aldehyde rounds off the comparative harshness of the styrallyl acetate.

A touch of Petitgrain was noted during the "dry-out" operation. In comparison however, this note seems to be a litle sweeter than would be expected if petitgrain alone were used. Therefore an adjustment was made as follows to produce this character.

16	Oil petitgrain South American
9	Yara yara

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The yara yara is intensely sweet but still in the neroli-petitgrain class, and contributes the degree of sweetness desired.

The possibility of a Muguet specialty being used in this product was indicated in the previous examination. However, the decision was made to use a Muguet "fragment" rather than an actual specialty, for reasons of simplicity, since the Muguet effect in the comparison was not too pronounced.

25	Rhodinol
25	Octadienol 1453
15	Benzyl acetate
10	Civettiane

Rhodinol produces the smooth rose sweetness that is so characteristic of Muguet. Octadienol is a single, new chemical, which has the most pronounced Muguet characteristic of any individual chemical. It has powerful tones, of rose, lily. The benzyl acetate gives the lifting Jasmin sweetness. The Civettiane provides the indoloid-like note.

A comparison indicates that there is a kind of precious wood effect woven through the original fragrance that blends the floral and citrus notes into a harmonious whole. For this work the two "woody" alcohols were used:

30	Vetiverol
40	Sandalwood oil natural

The vetiverol was chosen in preference to the vetivert oil, since it is softer and sweeter and thus more suitable for blending work. Sandalwood oil is of course comparatively mild and smooth. If desired, santalol could be used instead, since this aromatic is the alcohol isolated from the natural oil. However it is not felt that this higher priced santalol is justified in this situation.

Spice notes are next on the agenda. A comparison shows that warm spice effects are desirable to recreate the "life" of the original fragrance in the match. A threefold application is used:

6	Eugenol
6	Isoeugenol
6	Oil nutmeg natural

The blend of eugenol and iso-eugenol produces a touch of the Carnation "pink" flower that is very livening. The nutmeg contributes a spice note that is peculiarly warm because of the presence of terpenes in its oil. The use of this spice bouquet represents the kind of decision that must be constantly made by the perfumer in his match work. There is an excellent chance that the man who designed the original fragrance used a carnation specialty of some kind. Perhaps it was his own, or perhaps one of the famous bases, of which there are many. The little base

touches only the highlights of such a spice effect. It is not completely satisfactory. The matching perfumer can set up a side experiment to create a specialty spice base that will give a better effect in the match composition. Nevertheless, no matter how much effort he puts into the project, he will not be able to achieve perfection. The decision the perfumer must make is how far he should go in his striving for perfection. If the effect under consideration plays a substantial part in the fragrance being matched, then he is justified in a side excursion to create a specialty base. Practical experience however shows that the simple "fragmentation" bases as the spice and Muguet will suffice in the majority of instances. The blunt fact is that the ultimate consumer does not possess a sufficiently acute judgment to recognize subtleties of fragrance well enough to justify straining for perfection. The perfumer being by nature something of a perfectionist, he must discipline himself on this point to avoid wasting time.

The match has now progressed to the stage where the broader aspects may be considered. Comparison shows that although the main points have been outlined something is lacking, best expressed as a generalized or non-specific floweriness. To satisfy this situation the following addition is made:

50	Hydroxycitronellal
5	"Cumin" ketone (Verona)

Hydroxycitronellal is traditionally used for this flowering purpose. The "Cumin" ketone is a comparatively new chemical, very powerful, which produces another nuance in conjunction with the hydroxycitronellal that is strikingly effective. The "broad" spectrum" character of this "Cumin" ketone is such that it should be kept in mind during all matchwork for its valuable utility.

A comparison indicates that a contrasting herbal effect is desirable to accentuate the moss and bergamot. To achieve this the following additions were made:

2	Oil estragon, French
4	Oil cardamon

The estragon gives a bittersweet green note reminiscent of anise. The cardamon gives a bitter peppery touch. Incidentally cardamon is often used in traces in lily-of-the-valley fragrances, and its origin in this match job may have been through a Muguet composition.

Completing the Chypre picture are these materials:

50	Rose otto type E.024
10	Ylang absolute (*Cammili-LaLoue*)
40	Astrotone BR 100%
10	"Phantolid" (Polak Frutal)

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The Rose otto type RE.024 is a simulation of the expensive rose otto and is used to keep the composition down to a reasonable price level. Rose otto itself can be used, and most desirably, but its use is almost impossible to justify except in the most expensive compositions. The ylang absolute is used to produce the nuance of naturalness at a fair cost. The Astrotone BR contributes fixation, blending power, and a sweet muskiness. The latter characteristic was quite apparent on comparison.

Two steps remain to complete the match job: the production of the sweet note often described as "powdery" and the aldehydic note that is so characteristic of Crepe de Chines.

There are a number of specialties on the market showing the "powdery" effect, and range from relatively deep amber tones to intense, candy-like sweetness. For simplicity however, a "fragmentation" base is used as follows:

24	Musk ketone
24	Musk xylol
18	Musk ambrette
18	Coumarin
12	Ethyl vanillin

In the experimental introduction of this base the ratio of the materials was 4-4-3-3-2. It had to be expanded six times before a sufficient "powdery" effect was created to satisfy a comparison. Ethyl vanillin is preferentially used here because it is more flowery than vanillin.

Now comes the final critical step, the introduction of the aldehydes that convert the Chypre into a Crepe de Chine. The comparison shows that the aldehyde effect is very fancy and difficult to separate into its possible constituents. Therefore, from past experience, it is assumed that an aldehyde bouquet of some sort was used in the original fragrance. The construction of an aldehyde specialty is an exasperating and time-consuming job because of the intensity and deceptiveness of the aldehydes. Therefore it was decided to try a "fragmentation" base instead.

Aldehyde C-11 is traditionally the aldehyde of preference in Crepe de Chine. However our "dry-out" indicated that aldehyde C-12 MNA might also be present. Since the rose touch seemed to be stronger and sweeter than would be generated by aldehyde C-11, citronellyl oxy-acetaldehyde was considered as a possible material. The "Veronol" aldehyde was used as matter of principle to try and create as much "bouquet" effect as possible in this limited base. "Veronol" has the most versatile odor of the aldehyde group, representing several aldehydes in a sort of tight bouquet, even though it is a single chemical body.

6	Citronellyl oxy-acetaldehyde
12	Aldehyde C-12 MNA 10% in DEP
12	Aldehyde C-11 10% in DEP
6	"Veronol" aldehyde 10% in DEP

The adjustment of the aldehyde notes must be done very carefully. Some people are insensitive to them and require a relatively high dosage for full appreciation. Others are supersensitive and require a lessening of the dosage. This aldehyde appreciation is a highly personalized matter and the perfumer should make every effort to appraise his customer's reaction before presenting a match containing aldehydes. The sale of his match can easily be made or broken on his understanding of this factor.

When the match has been completed to the perfumer's satisfaction his final move is to check over the formula that has been established and be sure that it has sufficient fixation and that the "wearability" factor has been taken care of.

In this particular instance, fixation is ample. The Astrotone and Phantolid plus the large amounts of crystals and the aldehydes all contribute to the total fixation. "Wearability" is taken care of through the Astrotone and Civettiane.

CAUTION

Working too long and continuously on a fragrance match often produces a kind of hypnosis leading to a deceptive evaluation of progress. Apparently this is due to a combination of nasal and mental saturation. Often a perfumer is tempted to work long and hard on a certain match, and feels that he has made progress. Next day when he checks his work he is dismayed to find that he has gone far off the trail. In matching, therefore, the jobs should be varied by rotation. At least two (and preferably three) matches should be worked on simultaneously to break the monotony.

THE PERFUMER'S "ORGAN"

Since there is a tremendous amount of exploratory work to be done in a satisfactory match, ways and means are sought to expedite this tedious and time-consuming effort. One of these is the so-called "perfumer's organ."

Briefly, this consists of a multi-tiered shelf, stacked with uniformly sized bottles containing 10 per cent solutions of the known aromatic materials. The solvent is usually diethyl phthalate. For convenience, the bottles are alphabetically arranged.

These bottles are equipped with a bulb, tube and dropping tip, built into the stopper. The tip is fashioned with a standardized orifice so that the size of the drops obtained will be reasonably uniform from bottle to bottle. This style of container is readily available from many makers of medicinal glassware.

With this kind of "organ" established, the perfumer is able to make rapid drop-wise experiments to "rough in" a fragrance or match idea. He works by considering each drop as one part by weight in his formula. This is not absolutely correct, but is an approximation within the accuracy of the size of the drops themselves. To contain these experiments, it is

very convenient to use the common bar-glass which is shaped in the form of a miniature brandy "snifter." The special structure of this type of glass permits ready and accurate examination of the odor of the material in it, since it was originally designed for the appreciation of the aroma of brandy.

In practice, the perfumer adds various aromatic materials, dropwise, from their various bottles. He smells his mixture by gently swirling the "snifter" glass and carefully applying his nose just above the open face. He keeps a systematic record of the drops and materials used. Since the various aromatics are diluted with diethyl phthalate, it is not a strain on the nose to make constant observation of the progress of the mixture in the glass. If an error or undesirable addition is made, it is only a matter of less than a minute to pick up a fresh glass and re-establish the mixture to the desired point. The speed and convenience of the "organ" and its dropwise procedure, must be tried to be appreciated.

When a satisfactory mixture has been created in the glass, the drops are totalled into a formula. This formula is then made up using the "straight" aromatic materials, and the match job continued to its completion.

The usefulness of the "perfumer's organ" is comparable to the artist's procedure of making a pencil drawing to serve as a guide for the final oil painting. It serves to expedite either a creative or match job, particularly the latter, and conserves aromatic material, and the perfumer's time. The conservation factor is important if expensive floral absolutes are involved.

Conclusion

The beginner must clearly understand two points concerning match work.

First, the illustration of a match job shown seems smooth and easy. It is far from that. A complete (and the word is really "complete") mastery of fundamental data and techniques is necessary before the intricate recognition of materials and group effects can be made. Coupled with this, there must be developed a temperament of infinite patience, to work out the various shading needed to give finish to a match. It takes time, hard application, patience and experience to become even a reasonably good matcher.

Second, the degree of perfection obtainable in other fields (as for example color matching) is not possible in fragrance work. If it were possible, the fragrances as we know them today, could not exist. The moment a famous and costly fragrance was developed and appeared on the market, it would be immediately matched and its originality and exclusiveness destroyed by relentless exploitation of low priced matches. However, many famous perfumes have been on the market for over 20 years, and have often been simulated, but never with the degree of perfection necessary to displace them in public acceptance.