



Scent and Component Analysis of the Hybrid Tea Rose

By Shoji Nakamura,
Shiseido Laboratory, Yokohama, Japan

Among all flowers it is the rose that is loved best. The rose provides one of the most important natural oils indispensable in perfumery. An essential oil of the rose is presently obtained from the *Rosa damascena* cultivated in Bulgaria and Turkey. And an absolute rose oil is extracted from the *Rosa centifolia* in southern France and Morocco. These two roses bloom once a year in spring. The important and expensive rose oils have been studied by many workers, and over 270 components have been identified. However only a few reports, if any, have yet appeared on the hybrid tea rose which is the topic of my presentation here.

The hybrid tea rose as a group is one of the major modern roses cultivated as a garden rose today. It was developed and has been bred since the latter half of the nineteenth century by cross breeding the hybrid perpetual rose with the tea rose. The roses which the Goddess of Spring is holding in her arm in the painting, "La Primavera," painted by Botticelli in the fifteenth century, incidentally, were not the hybrid tea roses commonly found today in our gardens, but were rather the original varieties such as the *Rosa gallica*, the *Rosa alba* and the *Rosa centifolia*.

The hybrid tea rose is characterized by the repeat-flowering properties which originated from the *Rosa chinensis* (China rose). Numerous



varieties have beautiful colors and shapes, and vigorous habit as well.

The hybrid tea rose has different notes compared to those of the roses used in perfumery. Owing to its complex hybridization history, numerous varieties have appeared, having various notes. Many carry pronounced perfumes. Their scents are soft and refreshing rather than sweet. In fact, it was named "Tea Rose," because its flower had scents reminiscent of tea notes.

We selected two hundred kinds of fragrant roses among about a thousand at Keisei Rose Nurseries, which has the reputation of being the best rose breeder in Japan. After olfactory evaluation by perfumers, half-bloom roses possessing the most outstanding scents were chosen for

We show the results of the head space analysis in Table I. The content of phenyl ethyl alcohol, citronellol and geraniol differed from breed to breed considerably. 1,3-Dimethoxy-5-methylbenzene was found to exist from 1% to 74% in the *Rosa gigantea*, the tea rose and the hybrid tea rose. However, it is noteworthy that this compound did not exist in the *Rosa damascena* and the *Rosa centifolia* as used in perfumery. This compound disperses a humid and fresh green note with a little phenolic and spicy character, and reminds us of a flower shop. This compound appeared to be the fragrance component that gave the scent of the tea rose and the hybrid tea rose a character distinct from that of the perfumery rose.

Table I. Component Analysis by Head Space GC

Breed	Classification	Component			
		1,3-Dimethoxy-5-methyl benzene %	Phenyl ethyl alcohol %	Citronellol %	Geraniol %
<i>R.gallica</i>	Rosa	-	26	3	18
<i>R.damascena</i> trigi.	Rosa	-	32	18	17
<i>R.centifolia</i>	Rosa	-	50	20	8
<i>R.chinensis minima</i>	Rosa	t	t	2	29
<i>R.gigantea</i>	Rosa	51	t	-	-
Lady Hillingdon	Tea	74	2	1	2
Duchesse de Brabant	Tea	5	2	t	-
Kampai	HT	60	11	2	-
Diana	HT	52	13	-	t
Double Delight	HT	9	35	9	6
Papa Meilland	HT	8	10	6	45
Hojune	HT	1	57	8	13
Duftwolke	HT	1	31	14	11

HT = Hybrid tea rose
t = trace

analyses. In order to directly analyse the naturally dispersing odoriferous components from the fresh flowers, head space techniques (HS-capillary GC, GC/MS, GC/IR) were applied. Several species of the tea rose and the hybrid tea rose were planted in units of fifty stocks each, their petals were collected, and their oils were separated by four methods: liquified CO₂ extraction, pentane extraction, steam distillation, and N₂ purge and trapping. The flower oils were analysed by up-to-date analytical instruments such as GC/MS and GC/FT/IR.

Table II. Unreported Components of Rose Oil

Breed	Duftwolke	Hojune	Diana
Indole	X		
Dihydro β-ionol	X	X	
Dihydro β-ionone	X	X	
Theaspirane		X	
p-Methoxy styrene			X



This compound plays a significant role in the complex genealogy of the rose. After studying the history of breeding from the point of view of chemotaxonomy, we learned that this compound, 1,3-dimethoxy-5-methyl benzene, came from the *Rosa gigantea*, which grew wild in China and carried a tea fragrance. The fragrance of the hybrid tea rose can be traced back to the *Rosa gigantea* and the *Rosa damascena* (see figure 1).

From the component analysis of the oils from rose petals, about eighty compounds were identified. The five compounds shown in Table II have not been reported yet in the rose oil. Indole, dihydro- β -ionol and dihydro- β -ionone make the rose scent powerful and diffusive. Theaspirane makes it rich in fragrance. p-Methoxy styrene gives Diana freshness and diffusiveness.

Nature has always been the great mother that gives us significant raw materials in perfumery. The results obtained may be helpful for duplicating the endearing scents of the modern rose and also for the creation of floral notes.

The number of rose varieties are said to be well over ten thousand and most varieties possess combinations of several typical odors. In Table III we propose a classification of the scent of the rose. We broke it down into seven types based on the results of our component analyses and olfactory evaluations.

Turning now to the market—recently in Japan, as a result of the back-to-nature trend, people have become more interested in herbs, spices, potpourri, room scents and aromatherapy than ever before. Within these trends of preference,

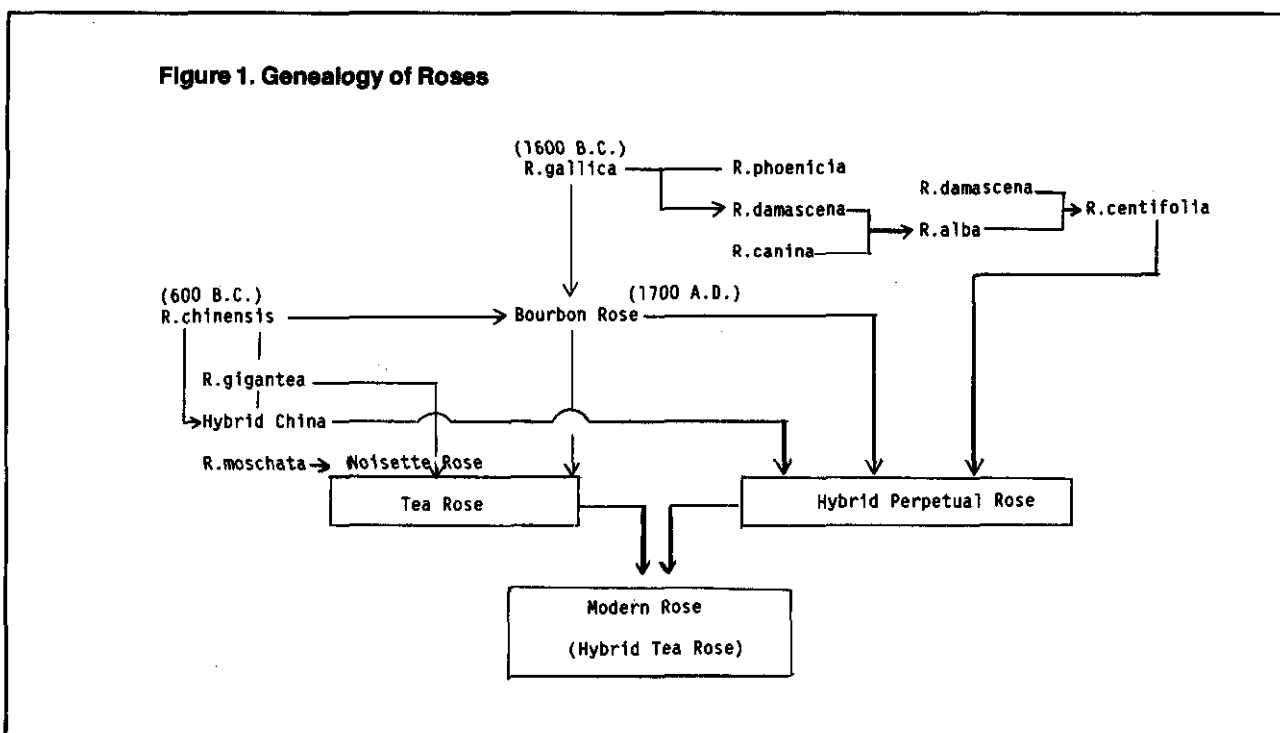


Table III. Classification of Rose Odor

Classification	Breed
Damask (classic)	<i>R. damascena</i> , <i>R. centifolia</i>
Damask (modern)	Papa Meilland
Tea	Lady Hillingdon
Fruity	Harmonie, Double Delight
Blue	Blue Perfume, Blue Moon
Spicy	<i>R. moschata</i> , <i>R. rugosa</i>
Miscellaneous	<i>R. multiflora</i> , Diana

the "Rosarium" series with a range of products featuring two exquisite perfumes, which duplicate the scent of the hybrid tea rose, has been well-accepted in the market. Sales of the products, in fact, exceeded our expectations. Though the fragrance market in Japan is not as lively as one would hope, this may give suggestions for the development of new successful fragrance products.

Address correspondence to Mr. Shoji Nakamura, Chief Perfumer, Shiseido Laboratory, 1050, Nippa-cho, Koho-ku-ku, Yokohama-shi, Kanagawa-Pref, Japan.





**Guillermo H. Fernandez,
Bristol-Myers Products;
Rich Smith, Takasago; Peter
W. Ricca, Fragrance
Resources.**

**Robert Bedoukian, Paul
Bedoukian, Bedoukian
Research.**

**Standing (from left):
Christian Truc, Bob
Hecking, Reynolds
Longfield III, Walter Jones.
Seated (from left): Nancy
Lambert, Maurice Raviol,
Gerald Goupy, all from
Robertet; and Susan
Nettesheim, Chesebrough
Pond's.**