cognizance of the benefits it and the entire industry gain from the contributions of the nonrelated confraternity whose work affects fragrance.

The past chairmen and their committees have brought all of these subjects to your attention at earlier symposiums, and today we continue with an excellent program, well balanced and of high interest.

Two years ago when I asked Simone Fedak to chair this symposium, I was not concerned with a title of "Ms." or chairperson or the like. I was concerned with appointing someone who could put across, once again, a successful symposium. This morning, I am quite proud to present our First Lady of the Symposium, always willing, always cheerful, and always helpful—Simone Fedak.

Chairwomans Address
Simone A. Fedak

Mr. President, dear friends, ladies and gentlemen: Every year we meet at this symposium to review a feeling of personal and social unity among American perfumers, their friends, and others connected with this industry. Today, as never before, the public anticipates with much delight and interest the coming out of any new perfume or well-perfumed product. We are living in a boomtime of emotional appeal for everything new in art, fashion, and all sources of pleasure. There was never a better time to gather all our knowledge, techniques, and artistic abilities to create new products in abundance.

Before I introduce the first speaker, I would like to thank my co-chairman Tom Lombardie and the full committee for their great assistance in making this symposium successful. Committee members are Josephine Catapano, Raymond Melio, William Doughty, Selma Weidenfeld, Emil Buongiorna, Raymond Ramanauska, and John Porter. My special thanks to the president, the officers, and the board of this society for trusting me with this great challenge.

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Our first speaker, Dr. Hugo H. Peter, was born in Berne, Switzerland. He holds a degree in chemistry from a Swiss institution, and a PhD from Washington University in St. Louis, Missouri. He has held research positions with the Illinois Institute of Technology and Standard Oil of Indiana in the U.S. and in Europe. Since 1965, he has been with Pfizer International, Europe, in various positions. He was named general manager of Camilli, Albert & Laloue, Grasse, in 1967.

Emerging Essential Oils in Africa

Dr. Hugo Peter, Camilli, Albert & Laloue Co.

Grasse, an ancient town located in the foothills of the Côte d'Azur in Southern France, is, due to a set of unusual circumstances and an exceptional climate, not only the cradle of modern perfumery, but also, and for well over a century, the capital of the perfumery industry.[1] At one time, Grasse was the main producer of many natural key perfumery raw materials and, in addition, controlled the production of such materials in other parts of the globe. Grasse has also long been a training center for perfumers; even today many famous perfumers, employed all over the world, are proud of having their origins in this venerable center.

The decline in the predominance of Grasse over the perfume industry began in earnest in the 1930s —on the initiative of the Grasse firms themselves. The underlying reasons, primarily economic, were based on the fact that the Grasse area was rapidly developing into a tourist area. As a result, land values and labor costs rose very quickly. Since jasmin and other important raw materials require intensive labor (about 2000 man hours are needed to pick the flowers for one kilo of jasmin absolute), there was a sharp rise in production costs and, consequently, in prices. Not surprisingly, the Grasse firms sought to relocate in areas with suitable climates and large labor pools. It was quite logical for them to choose French possessions across the Mediterranean.

One of the leaders in this relocation move, the firm Chiris, established production sites not only in North Africa, but also on the French islands in the Indian Ocean and in Indochina. Others began production in Lebanon (Lautier Fils), in Spain (Robertet), and elsewhere.

Today the production of florals on the African continent has dwarfed the Grasse production quite considerably. Yet, Grasse has maintained its position in the industry by controlling production, at least in part, and by marketing a large share of the total production.

A review of the production situation in various areas of the African continent shows a healthy development.

Morocco

This country with its vast spectrum of climates, from the snow-capped Atlas mountains to the Mediterranean and Atlantic coasts and to the torrid desert, is the largest and most diversified producer of natural raw materials in Africa. In addition to the climatic advantages, the local government's liberal attitude has aided the industry's development.

Local producers, about a dozen in all, include Baillot, Santorini, and Sohogharb. The dominant firm, particularly so far as floral materials are concerned, is Chauvet-Delubac. The firm's output is marketed by Chauvet, headquartered in Seillans, France.

Moroccan rose and jasmin are well regarded and enjoy a reputation of high quality. The same is true for other materials, particularly armoise, rosemary, and cedarwood.

Recently, some of the Moroccan essential oil firms have begun to diversify into the flavor area by producing concentrated fruit juices, such as raspberry, strawberry, and others.

Table I shows an estimate of the actual production of the major essential oils and extraction products of Morocco. It should be noted that the 2 tons of jasmin concrete, produced in this country, represent a self-imposed limit. Production could be increased very promptly if the market should demand it.

The future of the essential oil industry in Morocco is closely linked with the stability of the present government. Nationalization of the industry, removing the French influence, most certainly would have a devastating effect.

Tunisia

Production of perfumery raw materials in Tunisia lacks the diversification of the industry in Morocco, but Tunisia occupies a dominating position in the production of neroli. Neroli production, from about half a dozen small processing plants located in the ancient marketplace of Nabeul, rests largely under French control. After processing the orange blossoms, most of these production units remain idle for the balance of the year.

Production of two other major products—rosemary and armoise—is effected by mobile stills at the site of the spontaneous growth of the plants.

Jasmin is produced in experimental quantities only. The estimated present production is shown in Table II.

Algeria

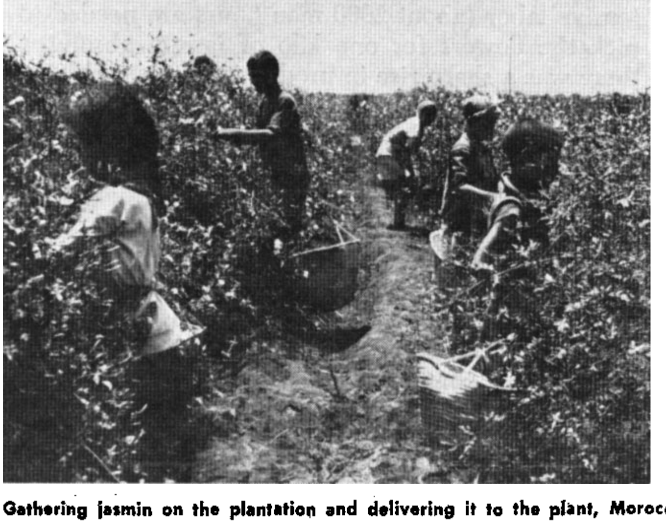
Upon nationalizing the essential oil industry after the departure of the French, Algeria lost much of its importance in production of perfumery materials. In 1975, the country produced 280 kg of jasmin concrete of excellent quality as the major product. Production of neroli, geranium, and other materials is not of great importance. There is little reason to expect this oil-rich country to put much emphasis on the production of naturals in the future.

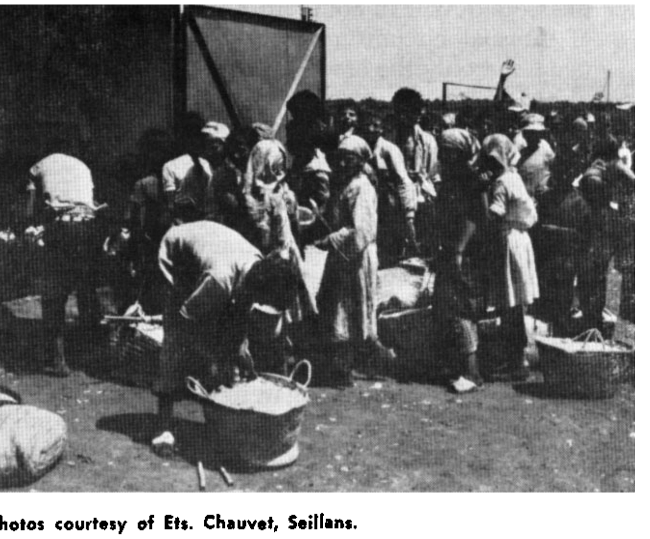
Egypt

Production of essential oils and extractive products in Egypt is of fairly recent development. The major producers in this country are the state-owned Cairo Food Co. and two private firms—Kamel and Momessin. They concentrate mostly on two products, jasmin and geranium.

Egyptian jasmin, after some initial quality problems, is now well accepted. In 1975, production was 4.5 tons of concrete, representing about half of the world's production. About one-third of Egypt's jasmin was sold in the West for hard currency; the remaining 3 tons have been absorbed by the U.S.S.R. Egypt also produced about 90 tons of geranium oil last year, of which 80 tons went to Russia.

This is a situation which bears close watching—clearly the stability of the world market in jasmin and African geranium depends upon the political relationship between Egypt and Russia. It is impos-





Gathering jasmin on the plantation and delivering it to the plant, Morocco. Photos courtesy of Ets. Chauvet, Seillans.

sible, and certainly beyond the scope of this paper, to make any predictions.

Table III shows Egypt's production of leading essential oils in 1975.

Kenya

Kenya is an erratic producer of some essential oils. This country produces an acceptable quality of cedarwood oil as a by-product of the lumber industry. It also produces some marigold and geranium. Considering the climate and the political situation in Kenya, it is difficult to understand why it does not occupy a more important role in the production of essential oils.

Ivory Coast

In 1970 the government of the Ivory Coast, in partnership with several firms, including two French firms, Méro & Boyveay of Grasse and Chauvet, set up a company to produce the essential oils of citrus fruits, particularly lemon and bergamot oils. Unfortunately, although the company has the advantage of an ultramodern installation, production is somewhat handicapped by a worldwide overproduction of these oils.[3]

Citrus oil production unit in the Ivory Coast. Photo courtesy of Mero & Boyveau, Grasse.

Principal production for 1975

Table I—Morocco

	tons
Jasmin concrete	2
Rose concrete	3
Rose oil	0.4
Geranium oil	25
Rosemary oil	50
Atlas cedar	25
Peppermint	7
Armoise	15
Laurel leaf concrete	2
Wild camomille	5
Moss concrete	10
Lavandin	10
Cistus concrete	3
Clary sage oil and concrete	2
Neroli	0.3
Orange flower concrete	0.3

Table II—Tunisia

Neroli	1 ton
Rosemary	60 tons
Thyme	10 tons
Armoise	10 tons
Jasmin concrete	40 kg

Table III—Egypt

	tons
Jasmin concrete	4.5
Geranium oil	90*
Basil	2
Rose concrete	0.2
Orange concrete	0.2
Cassie concrete	0.05
Petitgrain oil	0.7-0.8
Neroli	0.07
Violet leaves concrete	0.03**

* exceptional, normally 45
** beginning production

Table IV—South Africa

	tons
Jasmin concrete	potential 0.3
Eucalyptus oil	50
Marigold	1
Marjoram	1
Basil oil	1
Cassie concrete	0.3

Swaziland

This country, an enclave of the South African Republic, produces some eucalyptus oil of the Smithii type, which is also produced in Zaire, again as a by-product of the lumber industry. Some lime and lemon oils are also produced. Trials conducted some years ago with geranium oil have been abandoned.

Angola

This country, before the recent political events, was producing minor amounts of vetiver and euca-

Marigold plantation in South Africa

Solvent extraction unit at Rolan Essential Oil Co., South Africa.

Distillation unit for Basil at Rolan Essential Oil Co., South Africa.

lyptus. The present disappearance of this source is without serious consequences.

Republic of South Africa

Considering the wide variety of climate in South Africa and a flora known to be the richest on the globe, it is astonishing that this country made such a late entry into the club of African producers of essential oils.

Less than a decade ago Roland de la Harpe established the Rolan Essential Oil Co., an operation combining a farm and a modern transformation plant for both essential oils and extractive products. This firm, now controlled by South African Druggists S.A., represents the largest single potential production site of jasmin with an ultimate capacity of 2 tons of concrete. In addition to some essences derived from indigenous plants, such as lanyana and eriocephalée, Rolan produces substantial amounts of cassie concrete, marigold, basil oil, and other naturals. These are shown in Table IV.

The publicity given to the Rolan operation, both at home and abroad, has encouraged other groups to study the possibility of beginning new essential-oil operations in South Africa, and, in all likelihood, some of these projects will materialize. In particular, Fort Hare University in Alice, Cape Province, an institution with a heavy emphasis on agricultural sciences, having been established to study the needs of the future independent homelands, has a very active research program in the field of essential oils. It is hoped that this program will lead to increased essential-oil production in this part of the country.

Conclusion

The African continent has become one of the most important production areas for a number of key fragrance and flavor materials. If we consider the vast resources of labor, the many types of climate, and the low investment for essential oil production, it seems certain that other African countries, besides those mentioned, might join the ranks of producers for this industry.

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Ms. Fedak: Our next speaker, Dr. Jacques Sibeud, was graduated from the University of Lyon with a degree in chemical engineering in 1949 and with a PhD in chemistry in 1952.

After starting with Rhone-Poulenc in France, the parent company of Rhodia, he was transferred to the United States in 1955 to start up Rhodia's first plant in New Brunswick. As technical director and director of operations there, he supervised the firm's first production of coumarin, alpine violet, isobornyl acetate, and other products. Later, as vice president, R & D, Dr. Sibeud served on the Rhodia team which conceived, built, and started the Freeport, TX, plant where Rhodia manufactures terpene products, using a series of original processes.

Now vice president-technical, Dr. Sibeud is responsible for corporate research, development, and engineering for Rhodia Inc.

More Perfume Materials from Isoprene

Dr. Jacques Sibeud, Rhodia Inc.

When I told our chemical research director, Peter Gradeff, that I intended to give a talk at the American Society of Perfumers' Symposium, his first comment was rather blunt: "Do you really believe that perfumers would appreciate a lecture in chemistry?" My answer was simple: "Perfumers do buy our research on aroma chemicals. It is essential that we—chemists, engineers—tell them what we are doing and what we can do for their industry."

The aroma chemical industry has undergone some fundamental transformations in the last twenty-five years. Of course, these changes have affected the direction of our research and have imposed new requirements in the choice of our new processes.

1. Until the late 1950s most aroma chemicals were derived from essential oils. The demand for larger quantities of these products at lower prices has compelled the industry to search for more abundant and cheaper raw materials. Most aroma chemicals are now made from acetylene, isoprene, acetone, phenol, and α and β pinenes. Any new processes should be based on readily available synthetic raw materials at a stable price.

2. Twenty years ago, most of the aroma chemicals were produced batchwise in relatively small, unsophisticated, multipurpose units. The high-volume aroma chemicals are now manufactured in large, integrated units. This type of installation is very expensive. To keep capital expenditure at an acceptable level, processes have to be simple and include a minimum number of steps, even at the price of greater raw-material consumption. This accent on simplicity has become a very important consideration in the choice of a process.

3. Chemists and engineers, when developing new processes for aroma chemicals, have to become sensitive to the very special problems of our industry.

For instance, chemists should understand that an aroma chemical does not have to be extra pure but must have an acceptable odor. However, impurities will affect odors. These impurities should be identified, their formation understood, and their effects recognized. Some impurities should remain in the final product; others must be eliminated. Fortunately, remarkable advances in analytical chemistry have provided us with the tools to resolve these problems.

Engineers should be aware that most aroma chemicals are heat sensitive and may acquire, if mistreated, a "burnt or still" odor, which may be very difficult to eliminate either by redistillation or recrystallization. Fortunately, chemical engineering has made some substantial progress, especially in regard to vacuum distillation so important in our field of activity. It is possible now to build a vacuum distillation column equivalent to 50-100 theoretical plates, functioning below 3 mm of Hg vacuum, with a pressure drop of less than 10 mm.

Reboilers with a very small temperature differential between the heating fluid and the product to be evaporated could be designed to minimize the effect of overheating. I feel strongly that basic olfactory training of all chemists and engineers involved in manufacturing aroma chemicals is a necessary requirement for success.

These general principles represent part of the experience acquired at Rhodia in designing, building, and operating large production units for aroma chemicals, such as coumarin and terpene chemicals. And these principles have guided Rhodia's research in developing new processes for aroma chemicals.

The terpene chemicals which Rhodia produces in its Freeport plant are made from isoprene. Of course, we had been very interested in developing