

Lever's research and development

The following article on Lever Brothers Co. research and development activities was written by Daria Sheehan, manager of corporate affairs for Lever. It was prepared on the request of Arno Cahn of Arno Cahn Consulting Services, Associate Editor for JAOCS News for Surfactants and Detergents.

At Lever Brothers Co., research and development has played a significant role in making the company a major U.S. manufacturer of soaps and detergents as well as food products.

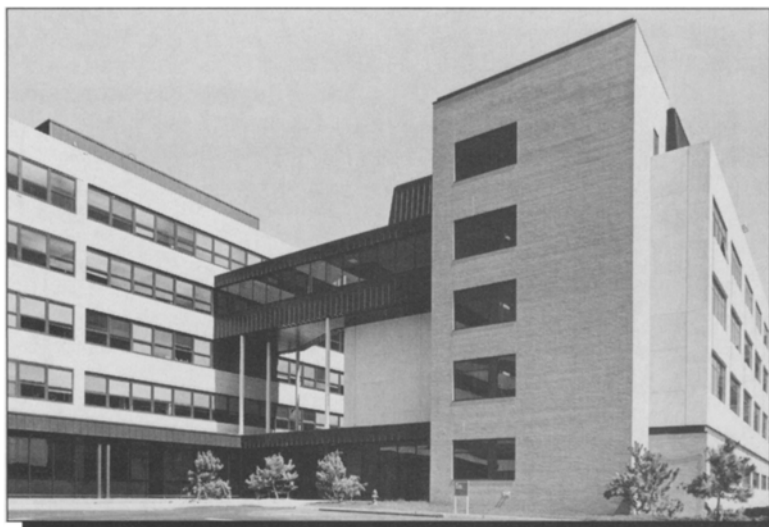
Lever's technical research function began in 1902 in a small laboratory at Cambridge, Massachusetts, site of Lever's first factory in the U.S. The research staff consisted of one chemist and an assistant. Fifty years later, Lever opened its integrated research and development center in Edgewater, New Jersey, bringing under one roof for the first time research and development activities formerly conducted in company plants throughout the country.

Since 1952, the Edgewater laboratories have created a stream of "firsts" in household products. These have included Wisk, a heavy-duty liquid laundry detergent; Dove, a non-soap toilet bar with moisturizing cream; Close-up, a gel toothpaste; Imperial, a margarine designed to taste like butter; and most recently, Surf, a laundry detergent designed to remove both dirt and odors.

By 1980, Lever and its parent company, Unilever, saw great growth potential for its U.S. business.

"We recognized the need to greatly expand our R&D facilities in order to provide the scientific know-how and advance technology to create the new and improved products so vital to feeding that growth," Frank H. Healey, president of Lever Research, said.

The resulting expansion project, completed in 1985, cost more than \$50 million and increased laboratory space and the scientific staff



Lever's R&D center in Edgewater, New Jersey, is one of Unilever's four principal laboratories worldwide.

by two-thirds. Six new buildings were added to the existing five-story laboratory building and pilot plants at the Edgewater research complex. New construction included a four-story laboratory building for the life and physical sciences; a safety assurance laboratory; a new pilot plant for household products; and a new consumer testing center that consolidated the various test facilities located throughout the complex. Lever's research complex covers 26 acres on the Hudson River facing the New York skyline.

Lever also recruited scientists and engineers from universities and industry to augment its research and development groups. Today, Lever's scientific staff includes 400 researchers in addition to a support staff of about 100 persons.

When the new Edgewater facilities were dedicated in May 1985, Unilever designated the center as one of its four principal laboratories in the world. Unilever's other major research centers are in Bedford and Port Sunlight, England, and Vlaardingen, Holland. Each specializes in specific segments of Unilever's international business.

"One of our functions at Edgewater is to work with Unilever's

overseas labs to exchange scientific information. Science is easy to transfer across geographic boundaries because molecules and bacteria behave the same way regardless of what country they are in," Healey said. "On the other hand, people's habits, appliances and local conditions vary widely, so our development group's work is focused primarily on products for the U.S."

According to Healey, the Edgewater research center focuses particularly on reactive chemistry, polymer science, oral hygiene and skin mildness. It also serves as a resource in these areas to the other major Unilever labs.

Each research center is charged with three main tasks. The first is to support existing product areas by improving both products and processes while maintaining a flow of new product ideas. The second task is to identify opportunities or challenges arising from advances in science and technology. These opportunities may apply to traditional Unilever product areas or they may be in new areas. Thirdly, Lever Research is responsible for ensuring the safety of products in manufacture and use and has the final say in this area.

Lever Research supports Uni-

lever's corporate strategy and the objectives of major product groups; it also helps formulate strategy in terms of projected scientific developments and their potential impact on the business.

"At Lever Research, the main thrust is on developing new and improved products. That means new ingredients, new processes and new packages as well as new combinations of known things that will provide an added benefit to the consumer," Healey said. "Some research projects are determined by marketing factors, other are technology-driven, and some are a combination of the two. Lever has been most successful at identifying consumer needs and finding the technological solutions to meet those needs," he explained.

The Edgewater lab concentrates most of its research efforts on household products—laundry detergents, dishwashing products and personal washing bars—and to a lesser extent, personal products for oral hygiene and foods derived from edible fats.

As president of Lever Research, Healey looks after the exploratory and applied research functions. Technical services, scientific affairs, general administrative and financial functions for the research center also report to him.

Exploratory and applied research

Two-thirds of Lever Research's activities are devoted to exploratory and applied research and technical services under the direction of Virgil W. Weiss, vice president for research and technical services.

Lever Research is comprised of departments in chemical science including polymer and reactive chemistry, physical science including physical chemistry and process technology, biochemistry and a new products technology group. The technical services department provides support for Lever in the areas of analytical chemistry, computer and statistical services, consumer tests and sensory evaluation.

"Consumer products often seem like they would involve simple chemistry, but the cleaning of today's fabrics requires very sophisticated and complex chemistry," Weiss said. He noted that Lever's exploratory research requires at least a five-year sustained commitment to produce the background science needed for significant new product benefits.

For instance, while consumers basically are satisfied in the area of general laundry cleaning, there still is a need to develop a laundry detergent that will get out tough stains and spots, particularly at lower water temperatures.

"There are several ways to approach this problem," Weiss said. "We can take a chemical approach using new bleaching agents or a biological approach using genetically engineered enzymes. More than likely, a combination of approaches will be used."

Many of Lever's research activities focus on establishing key science bases in areas that have a number of applications. Lever scientists are building a science base for polymers. Polymers can be used as thickeners in heavy-duty laundry and dishwashing liquids and as builders in fabric washing and other laundry products. By changing the physical and functional properties of polymers, the polymer chemist is able to control both the product properties and its performance in a particular application.

In the skin care area, the primary objective of Lever Research is to prevent or reverse skin damage. Skin metabolism, transepidermal water loss and inflammatory response tests are carried out in an effort to discover effective materials and suitable delivery vehicles that will help consumers maintain younger, healthier skin. Studies of the physical and biochemical changes in skin are aimed toward developing improved therapeutic agents for dry or irritated skin in both young and older people.

Safety and quality assurance

Ensuring the safety of Lever products is the primary function of the Safety Assurance Group. Allan H. Gilbert, vice president for scientific affairs, heads this department, which works with both the research and development groups. The safety assurance staff develops methodologies and conducts rigorous tests of ingredients, processes and finished products to certify that Lever products are not only safe and effective, but meet all applicable government regulations.

"This means we are involved in every phase of a product's development, from the exploratory research phase right through the manufacturing process," Gilbert noted, adding, "We continually are challenged to look for ways of auto-



Lever scientists at the R&D center use state-of-the-art instruments to identify organic molecules, define basic structure and quantitate trace elements in products.

mating our testing methods to achieve greater efficiencies.”

For example, Lever has automated the method by which it analyzes the amount of water in products, so that as many as 200 samples can be analyzed in an hour. Lever scientists also have furthered research in the area of in vitro procedures. Through the development of a battery of these tests, a greater variety of potential ingredients can be screened more quickly and accurately.

In the area of quality assurance, Gilbert's staff sets policy for manufacturing standards and monitors activities at Lever's factories to see that plant personnel are following the prescribed procedures.

Technical development

Lever's Household Products Development Group is charged with continually exploring opportunities to improve the performance of existing brands and, at the same time, developing new products. Development work at Lever's Research and Development Center is carried out as a function of the Household Products Division.

“Our primary task in development is to select the best possible solution to a specific consumer need based on all the technology that's available both from within our own research function and from outside sources,” according to John Hockey, technical development vice president for Lever's Household Products Division.

In the area of laundry care, for example, divergent factors have challenged Lever's research and development scientists. These include the controversy over phosphates, the increased use of liquid laundry detergents, and the need to clean clothes at lower temperatures not only because of the energy crisis but primarily due to the growing popularity of colored and synthetic fabrics.

“Perhaps the most influential factor driving the research and development effort at Lever Brothers has been the controversy over the use of phosphates in laundry detergents,” Hockey noted. “We've invested a tremendous effort toward finding acceptable alterna-

tives to phosphates for softening wash water.”

Lever's scientists have used a range of substitutes, including surfactants less sensitive to hardness and others based on natural fats and oils as well as on petrochemical derivatives, especially nonionics and polymers. This mixed surfactant approach is used in Lever's non-phosphate Surf powder and liquid, and in liquid Wisk and “all.”

One of Lever's recent laundry detergent introductions is Surf, with its patented deoperfume that provides the brand with odor removal as well as cleaning power. Drawing on technology originally developed for deodorant bar soaps, Lever's Household Products Development Group formulated a high-sudsing detergent powder with the distinguishing characteristic of odor removal. To permit national marketing of the brand, Lever's Development teams also devised a non-phosphate and liquid version of Surf. In four years, the brand has garnered an almost 9% market share for the powder and liquid versions combined.

The latest addition to Lever's bar soap line is Lever 2000. Currently in test market, Lever 2000 is a combination soap/DEFI (directly esterified fatty isethionate) bar with an antibacterial agent.

“Lever 2000 represents a major innovation in a technology that has been relatively quiescent over the last 15 to 20 years,” Hockey said, explaining that the challenge was to successfully combine a soap product with the technology used to create Dove, then to add a bacteriostat and deoperfume for deodorant protection that would not compromise Lever 2000's mildness. “The key technical work involved Lever's research and development team who produced a workable formula that could be run on a large scale,” Hockey said. The efforts paid off when Lever 2000 was introduced into test markets in June 1987 with favorable results.

While Lever R&D has grown dramatically over the past 86 years, its commitment to innovation has remained constant. Today, Lever continues to test its scientific ingenuity in one of the world's more competitive arenas.

Joint venture

Palmco Holdings Berhad of Malaysia and the Japan-based Kao Corp. have formed the joint venture company, Fatty Chemical (Malaysia) Sdn. Bhd., to produce methyl esters, fatty alcohols and glycerine. Kao will hold 70% of the equity, and Palmco will hold 30%.

An estimated \$180 million (Malaysian dollars) has been invested in the plant, which will be located at Palmco's oleochemical facility in the Prai Industrial Complex.

Scheduled to begin chemical production in 1990, the new facility will use Kao process technology and Palmco palm and palm kernel oil. Most of the chemicals produced will be shipped to Kao's facilities in Japan for further processing; the rest will be exported to other countries.

Palmco Holdings said it considers its agreement with Kao “a logical step in its strategy to go ‘downstream’ and use its current products as raw materials for more highly processed and value-added oleochemicals.” This is in keeping with Malaysian government plans to develop the palm oil industry, the company noted.

China plant

Bechtel has contracted to build a fatty alcohol plant in Guangdong Province, China, using natural fatty acid technology developed by Procter & Gamble, according to reports in *Chemical Marketing Reporter*.

The plant, which is scheduled to have an annual capacity of 10,000 metric tons (MT), will be built for the Guangdong Foreign Development Corp. The facility will be part of the Jiangmen Chemicals and Solvent complex near Guangzhou. The fatty alcohols produced there will be used to make cleaning products and lubricants.

Borax sells

U.S. Borax & Chemical Corp. has agreed in principle to sell its 20

Mule Team division to Greyhound Corp.'s Dial consumer products group. The 20 Mule Team product line includes "Borateem" dry bleach, "Boraxo" hand soap and "20 Mule Team" borax.

U.S. Borax's industrial specialty business, which includes industrial, institutional, health-care and automotive-related products, is not included in the proposed sale but may be spun off, *Chemical Marketing Reporter* reported.

Detergent gains

Detergent and personal-care products have made gains in the West German market due to a surge in the production value of detergents and cleaning materials, according to *Chemical Marketing Reporter*.

Those products experienced an average growth rate of 4% in 1987 with \$6.37 billion in sales.

Increased production values for concentrated laundry products were the major cause for the overall gains, with the greatest growth recorded in the specialty application segment. That segment experienced a growth rate of greater than 9% and a value increase of about 6%. Household cleaners had the poorest showing: negative 8% in value and negative 6% in quantity.

I&I growth

U.S. industrial and institutional (I&I) cleaning and chemical product sales are forecast to reach \$4.5 billion a year by 1992, an increase of nearly 6% annually, according to a report by the Freedomia Group Inc. of Cleveland, Ohio.

The report projected an annual growth rate of 6.9% for hand soap sales; vehicle washing aids sales were estimated to increase by 7.6% a year. Both types of products have been doing particularly well in the export market, the study said. Floor-care products were considered one of the fastest growing segments, with annual sales estimated to reach \$1.1 billion by 1992.

Growth prospects for commercial laundry, dry-cleaning and metal processing markets were projected to be well below average.

SDA Award

J.A. McDonell and A. Liu of Ecolab Inc.'s R&D, St. Paul, Minnesota, have been selected to receive The Soap and Detergent Association (SDA) Award for the best soap and detergents paper published in *JAOCS* during 1987.

The award was to be presented May 11, 1988, during award ceremonies at the AOCS 1988 annual meeting in Phoenix. The paper selected was "An Improved Method for Evaluating Detergent Builders for Water Hardness Control," published in the May 1987 issue of *JAOCS*, pp. 769-776.

News briefs

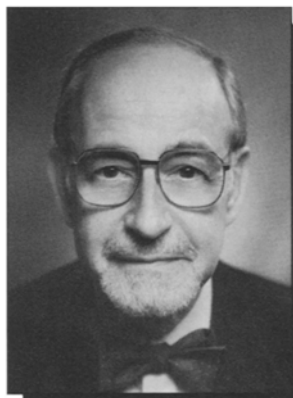
Henkel KGaA of West Germany has announced plans to open corporate offices in Beijing, China. Henkel supplies China with metal-cleaning surfactants, specialty

glues and other products from its subsidiary in Hong Kong. Henkel also said it will establish manufacturing facilities on the mainland, possibly in a joint venture with a Chinese partner.

Gregory A. Marchand has been named regional sales manager for surfactants by Vista Chemical Co. He will be based in Oak Brook, Illinois.

Lion-Akzo, a joint venture between Lion Corp. of Japan and Akzo Chemie, has begun production at its fatty amine manufacturing plant in Yokkaichi near Nagoya, Japan. The addition of the new facility has doubled the firm's annual production capacity.

PQ Corp.'s new general manager for specialty gels in the specialty chemicals division is Robert A. Ruhno. Meanwhile, PQ International Inc. has named Nicola A. Dellaquila international manager for finance and planning. Christo-



Arno Cahn



Ted P. Matson

Section officers

The Surfactants and Detergents Section of AOCS has elected Arno Cahn as its chairman and Ted P. Matson as its vice chairman.

Cahn has his own consulting firm, Arno Cahn Consulting Services Inc., based in Pearl River, New York. Matson, meanwhile, is chief technical officer for surfactants research, R&D Department, Vista Chemical Co., Ponca City, Oklahoma.

Wayne J. Stancel, technical director at DeSoto Inc., Fort Worth, Texas, was elected secretary.

Three members-at-large also were elected. They are Karl T. Zilch of Quantum Chemical Corp.'s Emery Division, Paul Sosis of Witco Corp. and George C. Feighner of Scientific Services.

pher J. Cimini has been appointed technical sales representative. PQ International Inc. is a subsidiary of PQ Corp.

Engineered Materials, a division of Hi-Purity Materials Inc., will distribute Lonza Inc.'s fused and calcined aluminas and its silicon carbide.

Henry F. Whalen, vice president and director of corporate development for the PQ Corp., has received the 1988 Chemical Marketing Research Association (CMRA) Memorial Award. The award is presented

annually to a chemical industry executive who has made outstanding contributions to the understanding, acceptance, methods and knowledge of chemical marketing research.

Robert Potts, formerly a research and development chemist with AZS Corp., has joined Unichema as a technical service representative.

Akzo Chemie America has named Charles M. Donohue director of regulatory affairs. Peter W. Spoor has joined the company as business manager of the polymer processing and



Charles M. Donohue



Peter W. Spoor

coatings group. Meanwhile, Akzo, the parent company, has unveiled a new corporate logo and new names for its five divisions, identified under the Akzo name: fibres and polymers, salt and basic chemical, chemical, coatings and pharma divisions.

Surfactants & Detergents Publications

Book review

Synthetic Detergents, 7th Edition, by A.S. Davidson and B. Milwidsky (John Wiley & Sons Inc., 605 Third Ave., New York, NY 10158, 1987, 315 pp., \$59.95).

This is the seventh edition of a book first published in 1938 under the title *Polishes*. The last edition was published in 1977, and therefore, a new updated publication is welcome. The book is divided into seven chapters: developments in the detergent industry; principal groups of synthetic detergents; inorganic components of detergents, builders and other additives; sundry organic builders; synthesis of detergents; manufacture of finished detergents; and application and formulation of detergents.

As pointed out by the authors in the preface, the book is designed as a training manual for new workers in the detergent industry, as a reference manual and as a textbook for the study of a typical chemical process industry. The book gives an excellent overview of the industry but tends to dwell a great deal on equipment and the engineering aspects in deference to the chemical aspects. In particular, the discussion of sulfonation goes deeply into the various types of sulfona-

tors and sulfonation processes but provides much less detail concerning the chemistry and applications of the various sulfonates and sulfates used in the industry. The treatment of nonionics is much more equitable between the chemical and engineering aspects of these surfactants. Cationics and amphoteric are very briefly mentioned. The authors refer the reader to recent publications and the patent literature for a more detailed discussion of the chemistry and processes that are just introduced in the book.

The book briefly discusses such new topics as fluorocarbons, peaked nonionics, and biodegradability and eutrophication that obviously were not addressed in previous editions. It does not mention recent issues such as dioxane content on anionics. It provides a good selection of examples of typical formulations and a good discussion of liquid detergents in the final chapter. Several typographical errors that could cause some misunderstanding to those who are new to the industry were found. The index is very complete and useful as are many of the figures and tables updated and expanded from previous editions of this volume.

Overall, this publication does meet the goals of its author to provide a concise overview of the industry and can be of use as a quick reference source for the experienced

reader and a training manual for the newcomer or student.

P.D. Berger
Organics Division R&D
Witco Corp.
Houston, TX

Other publications

Industrial Applications of Surfactants, edited by D.R. Karsa, The Royal Society of Chemistry, Blackhorse Road, Letchworth, Herts., SG6 1HN, England, 1987, 352 pp., \$65.

The Federation of Societies for Coatings Technology has published the 1988 edition of **Guide to Coatings Courses, Symposia and Seminars**. The guide lists coatings educational offerings in the U.S. and Canada, grouped by geographic region. Copies of the 43-page guide are available for \$5 each. Contact: Federation of Societies for Coatings Technology, 1315 Walnut St., Suite 832, Philadelphia, PA 19107.

The International Federation of the Societies of Cosmetic Chemists (IFSCC) has available its **Kosmet Database**, covering information on cosmetic and perfume science and technology, including raw materials, manufacture, analysis, control and use. Contact: IFSCC, Delaport House, 57 Guildford St., Luton, Bedfordshire LU1 2NL, England.