

L I O N R & D O F F I C I A L B O O K

The Color White

Curtains rustling in the breeze, a freshly washed T-shirt.
Plates on the dining table and your usual toothpaste.
There are many white things in our daily lives.

Since our founding, we have created and
provided products like toothpaste,
detergent, and pharmaceuticals backed by the research
that is the foundation of our business.
The color white symbolizes healthy,
comfortable, clean, hygienic and safe living.

We hope that we can continue to support people's lives
in the ever-changing world of today,
tomorrow, and every moment.

Today, researchers wear white and stand tall.
We will continue to take on the challenge,
thinking of you and your loved ones' health every day.

— LION R&D

Becoming an advanced daily healthcare company consistently pursuing innovative R&D

Since its founding on October 30, 1891, Lion has worked closely with consumers to better their daily lives, accumulating knowledge along the way. Our relationship with consumers is rooted in the role our products play in their daily lives. This is the greatest strength of Lion R&D.

Moreover, our many original technologies support product development from the ground up. We continue to take on the challenge of creating new value that will enable better habit creation and thus contribute to better lives for people as well as a sustainable society.

We aim to accelerate these initiatives by leveraging our unique strengths to engage in innovative collaboration, not only across departments, but also beyond Lion. We seek to make tomorrow even more comfortable than today.

We will continue to enthusiastically pursue R&D every day with an eye toward the further evolution and development of healthcare and the creation of better habits through products and services only Lion can provide.

LION
OFFICIAL
BOOK

Becoming an advanced daily healthcare company
to realize healthy minds and bodies for all

Lion R&D Framework

Consumer Research-Oriented Research Activities

Through its research, Lion aims to realize healthy minds and bodies for all and to contribute to people's health, comfort and cleanliness in everyday living.

Our goal is to become a leading company in advanced daily healthcare by creating new value through a combination of basic technology research that supports our technological development capabilities—in areas that include oral science, interface science, life science, flavor and fragrance, analytical chemistry and environment and human safety—with our strengths in consumer research and a wide range of product development research while promoting digital transformation and open innovation.

“Becoming an advanced daily healthcare company”

Achieve healthy minds and bodies for all
by making everyday habits more natural,
easy and enjoyable

Research Areas Where We Create New Value

Basic Technology Research	Product Development Research	New Research Initiatives
<ul style="list-style-type: none"> • Oral science • Interface science • Life science • Flavor and fragrance • Analytical chemistry • Environment and human safety 	<ul style="list-style-type: none"> • Dental and oral care • Body care • Medicated care • Living and fabric care • Containers and packaging 	<ul style="list-style-type: none"> • DX • Open innovation
Consumer Research		

R&D Facilities in Various Regions

In Japan, Lion pursues R&D at the Hirai Research Center (Edogawa-ku, Tokyo) and the Odawara Research Center (Odawara City, Kanagawa Prefecture). In addition, Group affiliates maintain five development bases in Asia where researchers are posted to work or on shorter business trips in collaboration with each other for speedy development.

By broadening our vision to encompass the globe, we will leverage the synergy of the Lion Group's R&D to contribute to the realization of healthy minds and bodies not only for the people of Asia but all the world.

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life.love.
LION

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For more information about Lion's research and development,
please visit our website.

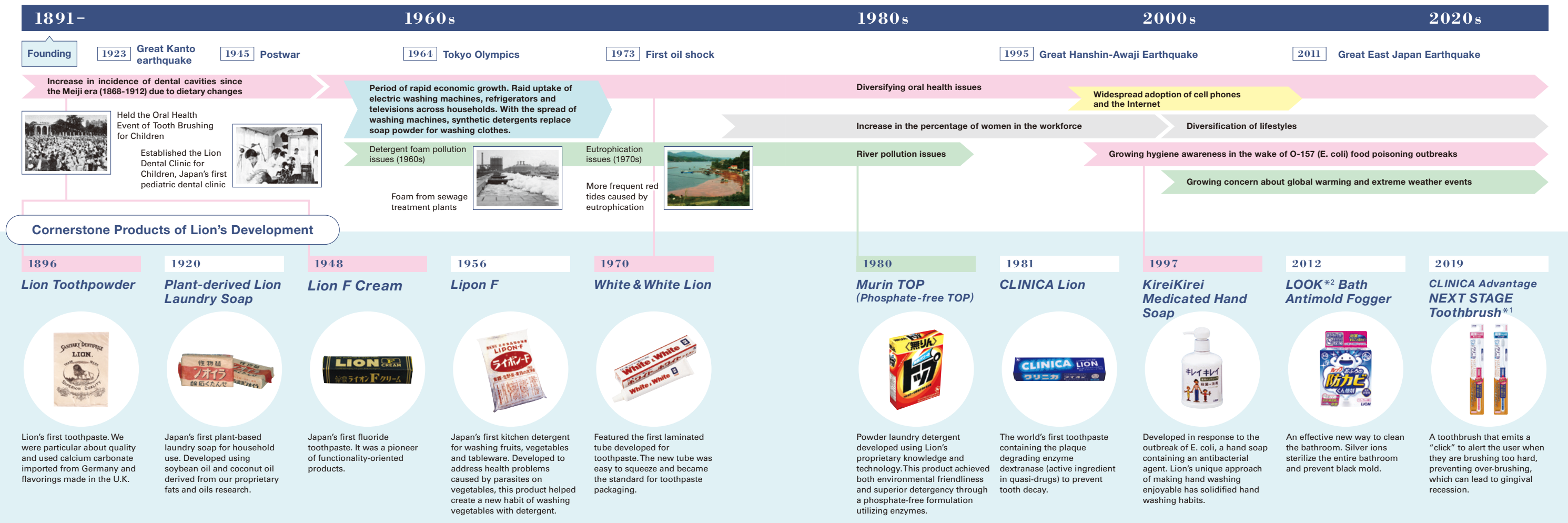
<https://www.lion.co.jp/en/rd/>



130 years of continuous contribution to health, comfort, cleanliness,
hygiene and the environment

Lion Products, Side by Side with People

Since its founding, Lion has worked together with consumers to propose new habits that contribute to healthy lifestyles. The following is a look back at significant changes affecting society and lifestyles that we have observed, and the products we have developed through our proprietary technologies.



Representative Products from Each Category



Supporting Your Own Healthy Days

While working on the essential elucidation of life phenomena, we are studying technologies for “visualizing physical condition” and developing products and services with the aim of maintaining one’s own health condition.

Supporting Your Daily Life by Enhancing the Comfort of Clothing

We are pursuing odor elimination technology based on investigations into the mechanisms causing unpleasant odors in laundry. In addition, to enhance consumer satisfaction we are pursuing research in the field of laundry behavior.

Wash Your Body Comfortably

To enhance the comfort of daily cleansing routines, Lion is pursuing the improvement of foam quality from a scientific viewpoint. We are also investigating a technology that helps manage skin texture by controlling the adsorption of complexes generated by charge reactions between surfactants and polymers.

Housework Made Easier and More Comfortable

Washing the dishes every day quickly and inevitably leads to the drain becoming dirty. There are many cleaning tasks in the kitchen that must be kept up with. Through the development of stain removal, stain prevention, quick-drying and other technologies, Lion offers new ideas that lessen the tedium of housework.

Supporting Overall Health from the Mouth Outward

The impact of the oral environment on overall health is increasingly clear. Lion supports health through research on oral tissue and oral flora as well as through the development of oral care products suited to individual oral conditions and habits.

Taking Care of Your Home More Easily

Lion continues to analyze the actual state of grime lurking in our homes and is exploring products to take care of these issues. We propose new cleaning habits that expand effortless cleaning and make it easy to maintain a comfortable living environment.

Assist Healthy Lives with Pharmaceuticals

We are studying combinations of active ingredients based on pain mechanism research and formulation designs that work faster. We have developed technologies for eye drops to enhance vitamin A functionality, to make them preservative-free and to stabilize the tear film lipid layer. We are also developing highly effective products for eye fatigue, blurred vision and eye dryness.

Reducing CO₂ by Improving LIB performance

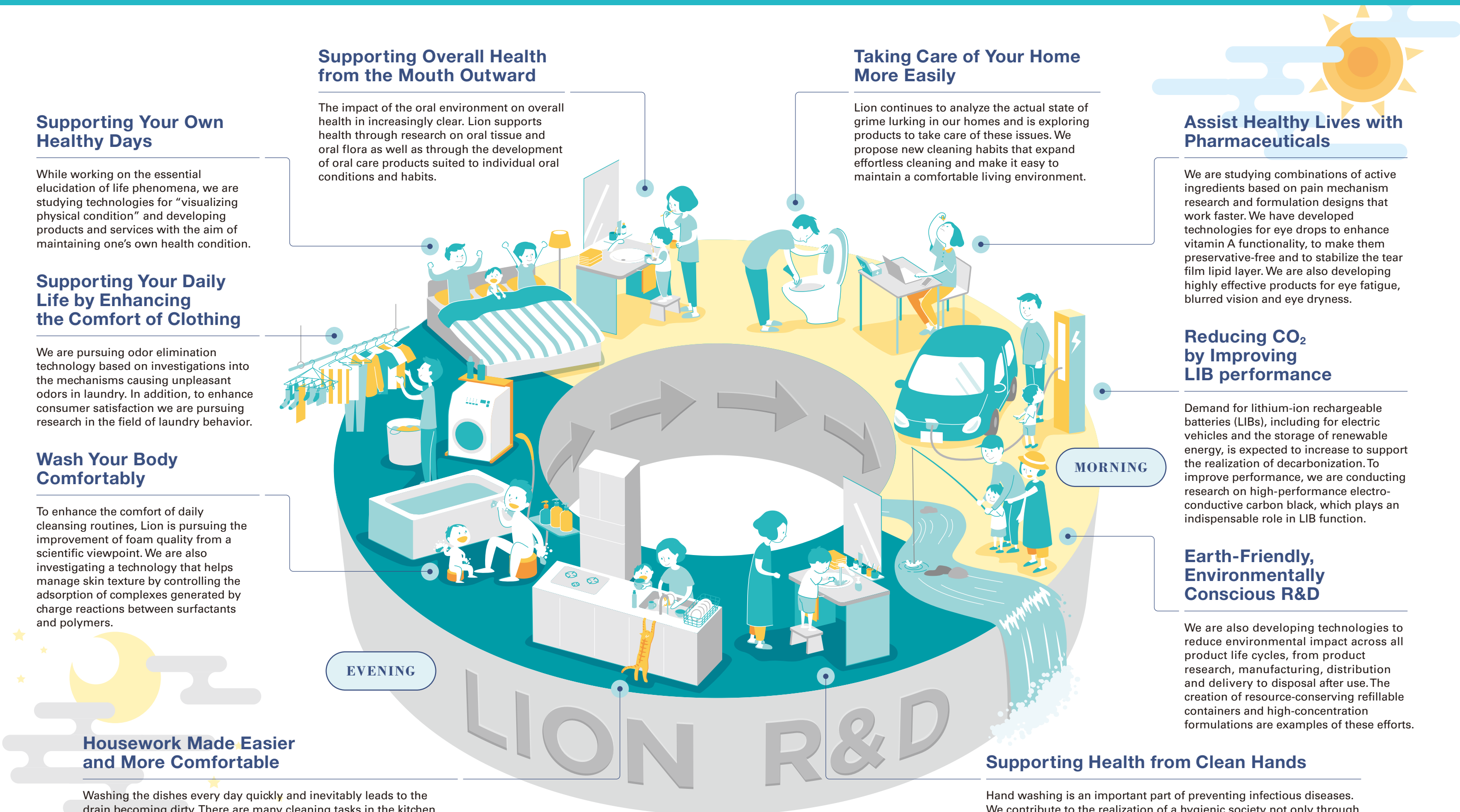
Demand for lithium-ion rechargeable batteries (LIBs), including for electric vehicles and the storage of renewable energy, is expected to increase to support the realization of decarbonization. To improve performance, we are conducting research on high-performance electro-conductive carbon black, which plays an indispensable role in LIB function.

Earth-Friendly, Environmentally Conscious R&D

We are also developing technologies to reduce environmental impact across all product life cycles, from product research, manufacturing, distribution and delivery to disposal after use. The creation of resource-conserving refillable containers and high-concentration formulations are examples of these efforts.

Supporting Health from Clean Hands

Hand washing is an important part of preventing infectious diseases. We contribute to the realization of a hygienic society not only through the development of products such as hand soap and hand sanitizers, but also through the development of information and educational activities aimed at disseminating proper hand washing methods.



Technology and Research to Create Future Living Habits

Lion R&D continues to work diligently, pursuing not only new product development, but also the further evolution of the fundamental research that supports such products.

Researchers taking on technological innovations can be accessed at R&D Station.

<https://www.lion.co.jp/en/rd/station/>



For more information on Lion's technology, please visit our R&D website.

<https://www.lion.co.jp/en/rd/topics/>



CASE 1

Lion's fragrance creation technology creates experience-based value. The power of fragrance to convey a worldview as well as a product's functionality

Lion's proprietary evaluation technology and commitment to quality in fragrance, including natural mint, have been passed on to our researchers as part of our DNA since our founding.

In addition to enhancing products to meet preferences and improve

ease of use, fragrance plays a role in creating a functional value that conveys product features and emotional value that resonates with customers. To design and develop such experience-based values, we place the highest priority on understanding consumers, and focus on psychological research and global trends on a daily basis.

In recent years, we have been developing new flavors for children using our proprietary mint technology in the hope that they will acquire good oral care habits and grow up healthy as well as that toothbrushing will become a time to deepen the parent-child bond.



Fragrance Creation and Evaluation Technology Field Natsume Hagimori

Since joining Lion, I have been involved in the development of many flavors as a flavorist and have studied the effects on the body and emotions of aroma taken in through the oral and nasal cavities. Fragrance is integrated into our lives in various ways, and is an element that helps build prosperous lives by adding to the accumulation of small daily doses of happiness and the promotion of a healthy future through healthy habits. Therefore, I would like to strive towards understanding consumers, improving my fragrance creation skills and improving technology for proving effectiveness, and then to pursue the realization of aroma and flavors that directly affect the brain and emotions.



CASE 2

Technical and safety information is updated according to global standards. For people's safe and secure lives

The Safety Science Research Division is responsible for confirming product safety and collecting safety information from the product development stage through the post-marketing stage. We play an important role in ensuring the safety and security of all those who use our products.

Lion offers high-level evidence-based safety evaluations that draw on

a vast wealth of safety information accumulated through many years of product development and the implementation of global-standard safety evaluation technologies.

We are also actively taking on the challenge of developing new evaluation methods. Examples include the development of evaluation methods that make full use of technology to extrapolate results based on past test information and the establishment of new test methods in fields where alternatives have yet to be established. These efforts are also supporting the development of evaluation techniques that do not involve the use of animals.



Safety Evaluation Field Kyoko Ahiko

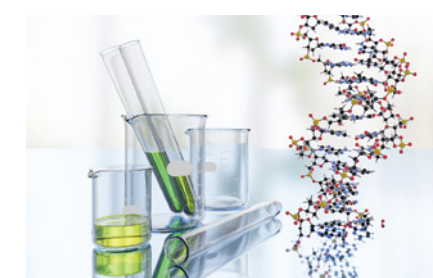
The advancement of safety evaluation technology should be addressed from an international perspective, including through mutual collaboration, a trend that should intensify moving forward. We are committed to improving safety evaluation standards across the industry in addition to ensuring the safety of our own products by keeping abreast of international trends in a timely manner, which will lead to a safer life for our customers.

Creating better habits depends on products that can be used safely. We will develop safety evaluation technology that can flexibly respond to innovative new products, and I want to be part of the foundation for the future that will enable us to propose many new habits to our customers.



CASE 3

Tackling the unknown microscopic world! Microbiological Science for Cleanliness and Hygiene



Lion has a long history of microbiological research, including the successful mass production of penicillin at the Kobayashi Bacteriology Laboratories,* which was triggered by research on oral bacteria. We have expanded to the microbes in the house and the body, and have recently utilized next-generation sequencers to gain new insights into the bacteria that cause odors and the relationship between oral flora and gum disease. We are also developing technologies to kill, suppress, inactivate and remove bacteria, fungi and viruses, as well as infection risk simulations.

* A predecessor of one of Lion's research centers

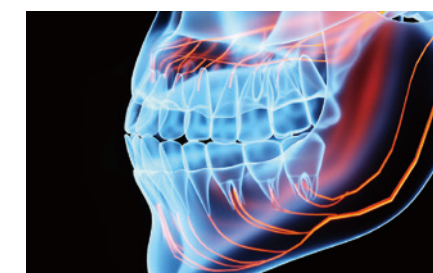
Microbial Science Field Takeshi Takizawa

From a microbial science perspective, in addition to microbiological analysis, I have been involved in the quality control of the products in Japan and other countries and the safety control of laboratories. There are still many unknowns about bacteria and viruses. I will continue to develop our research and technology, and Lion will keep on aiming to be a company that can be relied on for hygiene and cleanliness as well as infection prevention.



CASE 4

Oral Science Enables a Rich Life of Eating, Conversing and Laughing



Since the launch of Lion Toothpowder in 1896, Lion has consistently contributed to the establishment of toothbrushing habits. Throughout our history, we have developed products based on evidence through the skillful use of ingredients, clinical studies to prove efficacy, and the introduction of the most advance evaluation equipment.

Currently, we are developing new technologies and obtaining evidence to help more people keep their teeth beautiful and healthy, with a focus on the benefits these developments can provide for consumers.

Hard Tissue in the Oral Science Field Chika Akabane

We were one of the first to launch a formulation focusing on the tooth roots, which are at high risk of caries. I'd like to continue to understand consumer problems related to oral health and its changes and help develop technologies to provide leading-edge oral care and thereby enable people to enjoy eating, conversing and laughing throughout their lives.



CASE 5

Contributing to Healthy Living by Unraveling Various Phenomena through Analytical Chemistry



Analytical chemistry is an important fundamental technology that contributes to all kinds of research and development, from the identification of unknown components and functional ingredients to hypothesis testing of their effects, and even the elucidation of biological phenomena.

Recently, we have been working to elucidate biological phenomena by making full use of metabolomics technology,* aiming to fundamentally control physical disorders that differ between individuals. We hope to discover metabolites that indicate intervention points for malfunction control and thus provide new, preventive habits.

* Comprehensive analysis of metabolites in living organisms.

Analytical Chemistry Field Atsushi Sato

I hold monthly analytical chemistry consultation meetings so that everyone can become familiar with analytical chemistry and use it as a means to solve various problems. With analytical chemistry as my foundation, I would like to help improve consumers' quality of life by providing products and health management services that lead to a better life for as many people as possible.



Bringing Healthy and Comfortable Lifestyles to Asia and the World

Lion's Technology Spreading Across Asia

TOPICS

Localizing Toothbrushes with Thin Heads Developed Using Technology from Japan

Plaque removal is an important step to prevent cavities and gum disease. Lion has developed toothbrushes with a thin head and slim neck that improve maneuverability and allow for thorough cleaning of even the back molars. We are marketing these toothbrushes across Asia. The bristle shedding and head strength issues associated with products with thinner heads are addressed with knowledge accumulated through product development in Japan, while the specifications are tailored to meet the needs and preferences of each region.



TOPICS

Supporting Growing Trends Towards Hygiene and Cleanliness

In response to the global pandemic, there is a growing trend toward emphasizing cleanliness and hygiene in many parts of the world. In addition to expanding the *KireiKirei* brand to new countries and regions, we are also developing new products, such as antibacterial detergents, tailored to local awareness of cleanliness and hygiene. Regulations regarding antibacterial, disinfecting and antiviral claims vary from country to country, and we are working with local authorities and affiliate companies to secure relevant evidence to respond appropriately.

1 Lion Corporation (Singapore) Pte Ltd

Location Singapore

■ **SunoHada**

In Singapore, the number of people with sensitive skin complaints is increasing due to changes in the environment, diet and lifestyle associated with urbanization, and the sensitive skin care market is expanding. In response, we have utilized the findings of dermatological research and worked in cooperation with dermatologists to develop body soap, lotion and a moisturizing mist to control dryness and itchiness.



TOPICS

Entry into New Markets Becoming More Active in Many Regions

Combining ideas based on local insights with existing technologies and knowledge, we are entering fields we have yet to enter in Japan and taking on the challenge of nurturing overseas businesses as growth engines. The *SunoHada* skin care brand for sensitive skin, *AZZURA* color cosmetic brand and the *Smart Key* electric toothbrush are examples of this.

2 Lion Corporation (Thailand) Ltd.

Location Bangkok

■ **SALZ**

This original mouthwash, available in Thailand, was developed in response to growing interest in herbal ingredients and offers a harmony of salt and natural ingredients derived from Ayurvedic practices.

■ **Dentor**

The *Dentor* brand was launched to provide better oral care opportunities regardless of economic level. This toothbrush has a compact head and its soft, ultra-fine bristles are designed to gently clean every spot in the mouth. It also features a rounded grip that is easy to grasp with the whole hand.



3 Southern Lion Sdn. Bhd.

Location Johor Bahru

■ **TOP**

The *TOP* laundry detergent brand boasts the number one share* of the laundry detergent market in Malaysia. Malaysia is a multi-ethnic society comprising diverse groups of people, including those of Malay, Chinese and Indian heritage, whose lifestyles and product preferences vary greatly. To meet the diverse needs of this market, we are utilizing Lion's knowledge and technologies to develop a wide variety of functional products, including powder and liquid detergent for various types of washing machines.

* Market share research results of a fiscal 2021 Lion survey.



5 Lion Corporation (Korea)

Location Seoul

■ **7.Lab**

In South Korea, the capsule detergent market is expected to expand as demand for convenient products rises in line with income growth and increasing concentration of population in urban areas. Therefore, we developed a capsule detergent with triple care functions (anti-mite care, anti-dust care and fabric color care) that utilizes our unique washing ingredient concentration technology.



7 Lion Corporation (Hong Kong) Ltd.

Location Hong Kong

■ **NONIO**

As consumers become more hygiene-conscious, the number of mouthwash users is increasing across Asia, especially in urban areas. With technology developed in Japan as a starting point, we created an original mouthwash for the Hong Kong market that contains a high concentration of the antibacterial agent cetylpyridinium chloride.



4 PT. Lion Wings

Location East Jakarta

Indonesia is a key market in Southeast Asia for the expansion of the beauty care category, and we are working with the local affiliates to develop Halal products and further explore local needs.

■ **POISE**

This UV care day cream for the face offers a smooth and light feel achieved through a unique powder formula combined with the tone-brightening effect of plant extracts. This lineup includes four types of facial washes with different functions.

■ **AZZURA**

A line of long-lasting color cosmetics that meets the unique needs of Muslims, who wash their faces before praying. To meet the tastes of local consumers, we have developed six products in a wide range of colors that include a pigmented lipstick as well as a cushion foundation with high coverage and a natural finish.



6 Lion Daily Necessities Chemicals (Qingdao) Co., Ltd.

Location Qingdao

China, with its fast-growing high-end oral care market, is a very important country for our overseas business.

■ **Smart Key**

This electric toothbrush line offers three types of replacement brushes (Clean, Gum Care, and Whitening) and five different high-speed vibration modes for personalized brushing.

■ **Lightee**

A whitening toothpaste that removes stains accumulated in fine scratches on the dental surface to make the teeth naturally bright and white. We have developed an unique flavor based on beauty preferences and tastes in Japan and China. This is Lion's first product to be released simultaneously in both countries.



8 Lion Home Products (Taiwan) Co., Ltd.

Location New Taipei

■ **Dentor**

Aimed at a demographic that values design and comfortable bristle contact, we worked with a design company to create a distinctive triangular cross-section handle with a rubber coated neck. The combination of ultra-fine bristles and a flexible neck provides gentle brushing with just the right amount of elasticity.

