# **Collaboration with Startup Companies**

# Developing Nucleic Acid Medicine as Next-generation Treatments

In order to continue to grow sustainably, Sumitomo Chemical considers it essential to generate innovation and continually create next-generation businesses. And to promote the development of next-generation businesses, we are not only developing technology in-house, we are also focusing on promoting open innovation through collaborations with startup companies. This feature will introduce one of those initiatives, a collaboration in the field of nucleic acid medicine with the startup company Bonac.

# Development of Next-generation Treatments

**BONAC CORPORATION** 

**Feature** >

Issues in Society that Need to be Faced

## A Lack of Treatment Methods for Incurable Diseases

SUMITOMO CHEMICAL

Even today, with so many advances in medical technology, there are many incurable diseases that have still never been solved with existing medicine. Attention has been focused on nucleic acid medicine, a new type of pharmaceutical, as a treatment method for this sort of incurable disease.

Sumitomo Chemical is working with Bonac, a startup company that is working on development of nucleic acid medicine to make it more widely available. In 2013, we received consent from Bonac for the exclusive right to use intellectual property rights relating to the manufacture and distribution of nucleic acid medicine, thereby entering the business of contract manufacturing. Thereafter, in 2016, we invested in Bonac, strengthening their relationship as development partners. In September 2017, the two companies strengthened their partnership even further, with Sumitomo Chemical making an additional investment.



#### Comparison with Treatments such as Small Molecule Drugs and Antibody Drugs

Many existing pharmaceuticals, including small molecule drugs<sup>\*1</sup> and antibody drugs<sup>\*2</sup>, act on the anomalous proteins themselves. On the other hand, nucleic acid medicine acts directly on the genes that synthesizes the proteins causing the illness, so it is capable of inhibiting the illness.

- \*1 General pharmaceuticals manufactured through chemical synthesis. They are inexpensive because they can be synthesized industrially, but because they act on a broad range of various cells, they can sometimes not produce the intended effect.
- \*2 Pharmaceuticals that primarily consist of antibodies, which are the main part of the body's immune system. Their effects are quite strong, because their activity targets the proteins involved in the illness, but prices are high because of manufacturing difficulty.

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#### **Status of the Nucleic Acid Medicine Market**

Bio-venture companies have taken the lead in developing the seeds of drug discovery for nucleic acid medicine. Major pharmaceutical companies in the US and Europe have also entered the market with licenses from these venture companies. Moreover, several Japanese companies are also conducting clinical studies. The number of nucleic acid treatments that have been approved as medicines around the world is still quite small, but it is attracting attention as a next-generation treatment, and the market is expected to grow quickly going forward.

#### **Benefits of Nucleic Acid Medicine**

Nucleic acid medicine makes it possible to target RNA molecules for drug discovery, which could not be done with existing small molecule drugs or antibody drugs, and it is expected to be a ground-breaking, next-generation therapy. It is expected to enable the creation of treatments for difficult-to-treat conditions, such as hereditary diseases, cancer, and viral infections, particularly influenza, and development is ongoing around the world.

Diseases Targeted by Nucleic Acid Medicine

- Hereditary diseases
- Cancer
- Influenza

#### **Issues in Nucleic Acid Medicine**

Nucleic acid medicine is expected to provide next-generation treatments, but there have been some issues in achieving practical utility. These issues include the fact that the medicine is quickly degraded by enzymes when injected into the body, and there are also concerns about side effects. Drug delivery systems\* to solve these problems are still in development.

\* Technology to deliver minimum amount of drugs to the right part of the body at the right time.

#### Issues

- Easily degraded by enzymes
- Concerns over side effects
- Drug delivery systems still in development

# **Bonac Nucleic Acid**



Bonac is developing Bonac Nucleic Acid, a product that will solve issues with nucleic acid medicine. Unlike many existing nucleic acid products, which use a double-stranded structure, the major feature of the Bonac Nucleic Acid the company has developed is a unique single-stranded structure with secondary modification. As a result, Bonac Nucleic Acid has the following strengths.



(Source) Partially modified from Bonac's website

#### Strengths of Bonac Nucleic Acid





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### Synergies between Bonac and Sumitomo Chemical

#### **Reasons Sumitomo Chemical Entered the Nucleic Acid Medicine Business**

While nucleic acid medicine technology is currently still in development, and the scale of the market is still small, we believe that demand will grow in the future.

As a leading player in the pharmaceutical chemicals business, we have many technologies that can be used in the field of nucleic acid medicine. Of the next-generation medicines, antibody drugs must be made by culturing cells, while nucleic medicine can be made through chemical synthesis. As a result, nucleic medicine is a field where we have high affinity, as a company with strong technical background in the field of chemical synthesis. Furthermore, by applying the organic synthesis technology developed through manufacturing active ingredients for small molecule drugs, along with the industrial process know-how to commercialize the business, we are capable of manufacturing high quality active ingredients of nucleic acid medicines.

#### **Synergies with Bonac**

The Sumitomo Chemical Group would like to combine the drug development, manufacturing of active ingredients and analysis technology, as well as the medical diagnostic technology it has developed, with Bonac's unique nucleic acid medicine technology. Currently, Sumitomo Chemical's and Bonac's researchers are working on a variety of projects, including joint research, while maintaining close communication.

In addition, pharmaceutical companies, our customers, are continuing development of nucleic acid medicine, so we expect demand for the active ingredients of nucleic acid medicine to also increase. In order to respond to these circumstances, we are working to prepare a supply system for the active ingredients in nucleic acid medicine. By doing so, we will contribute to the commercialization of the nucleic acid medicine that our customers are developing as soon as possible. We are already conducting contract manufacturing at a plant in Osaka (Utajima), and we are capable of manufacturing high-purity nucleic acid medicine. Moreover, that plant has a proven track record of manufacturing in strict compliance with GMP\*1.

Sumitomo Chemical hopes to work with Bonac in contributing to the spread of nucleic acid medicine from the active ingredient manufacturing perspective. In addition, the technology that we adopted from Bonac has the potential to be applied to an important tool for genome editing\*<sup>2</sup> as well. By continuing this sort of initiative, we are taking on the challenge of dealing with incurable diseases that modern medicine cannot handle.

- \*1 Good Manufacturing Practices. A standard for manufacturing and quality management for pharmaceuticals and other medical products.
- \*2 Technology to change a genome by deleting or inserting targeted genes. Research is ongoing for applications in gene therapy and breeding crops and livestock.



Hirotake Hayashi President and CEO Bonac Corporation

#### Bonac's Partnership and Collaboration

Message from Bonac President Hirotake Hayashi

By Further Deepening and Expanding Our Collaboration with

Sumitomo Chemical, We will Deliver Revolutionary Nucleic Acid Medicine.

Our company was founded to achieve the goal of bringing out never-before-seen revolutionary nucleic acid medicine using our proprietary Bonac Nucleic Acid technologies to help patients fighting against refractory diseases and to satisfy the needs of the front

We believe that the partnership with Sumitomo Chemical will certainly accelerate

not only reliable manufacturing and the supply chain of Bonac Nucleic Acid as active ingredients for nucleic acid medicine, but also the development of new platforms for Bonac technologies. By further deepening and expanding our collaboration under this trustful relationship in the future, we expect to make more progress than ever in creating platform technologies in the field of nucleic acid chemistry, utilizing our respective strengths, as well as making progress in commercialization with these technologies.

Foray Industries, Inc.	>
-ujifilm Corporation	>

lines of healthcare.

In December 2015, Bonac concluded a license agreement and capital alliance with Toray regarding BNC-1021/TRK-250, targeting idiopathic pulmonary fibrosis.

In July 2017, Bonac concluded a joint research agreement and capital alliance with Fujifilm, about a liposome formulation of a new nucleic acid medicine.

Many companies are currently evaluating the Bonac Nucleic Acid, developed by Bonac, and are in discussions about concluding licensing agreements.

Overview of Bonac		
Company Name	Bonac Corporation	
Head Office	Kurume, Fukuoka prefecture, Japan	
Capital	3,877 million yen (as of December 31, 2017)	
President and CEO	Hirotake Hayashi	
Main Business	Nucleic acid medicine platform licensing, synthesis of nucleic acid, etc.	

Additional Investment in Bonac		
Investment Date	September 2017	
Investment Amount	About 4 billion yen	
Investment Ratio	19.55%	

# DIALOGUE Welcoming ESG Investors

Hiroshi Ueda Director & Senior Managing Executive Officer Kunio Nozaki Director & Senior Managing Executive Officer Ms. Shizuko Ohmi Amundi Japan Ltd.

# **Creating Value through ESG Management**

ESG (Environment, Society, Governance) is something that long-term investors weigh heavily when measuring corporate value. We welcomed Ms. Shizuko Ohmi of Amundi Japan, whose headquarters is located in Europe, where ESG investing is expanding, and spoke with her about the current state and future of the Sumitomo Chemical Group, which is accelerating ESG management.

# Sumitomo Chemical's Way of Thinking about ESG

Nozaki I understand, Ms. Ohmi, that your company, Amundi, weights sustainability very heavily when evaluating companies. Ohmi Yes. As companies conduct business, factors such as the course of major trends around the world, and the changes made to regulations in light of those trends will impact long-term corporate value. Whether a company can respond to a variety of situations is extremely important when thinking about future corporate value. In that sense, we consider the importance of ESG initiatives to be extremely high.

**Nozaki** The origin of Sumitomo Chemical is as Sumitomo Fertilizer Manufacturing, which was founded to make fertilizer from harmful gasses. For this reason, the top leadership of the company has always been committed to solving issues in society through business. Because this idea has been instilled in



Executive Officer

our corporate culture, so to speak, it is easy for us to accustom ourselves to the ways of thinking found in ESG and the SDGs. **Ohmi** If we think about the fact that the chemical industry places a significant burden on the environment, I think there will continue to be a need for the industry to take a forward-looking position on subjects like the SDGs, as your company has done. You are actively working on these issues through such initiatives as the Sumika Sustainable Solutions (SSS), are you not? **Ueda** Yes. SSS is an internal program that designates products that contribute to reducing environmental burdens, and currently 44 products and technologies have been designated. **Ohmi** Your company recently established the Sustainability Promotion Committee, but what does this committee aim to do? **Niinuma** All of our divisions have been working on sustainabil-

tion from the world now, this committee was established out of a need for an organization that could look over Sumitomo

# It is easy for us to accustom ourselves to the ways of thinking found in ESG and the SDGs.

—— Kunio Nozaki

Chemical as a whole. We would like it to thoroughly absorb points brought up both inside and outside the company, and to consider how future measures should be taken on a company-wide basis.

**Nozaki** We would also like to hold debates in the committee going forward.

Ohmi I hope you do.

# The Environmental Issues and Responsibilities of the Chemical Industry

**Nozaki** We have been working hard in our own way, but from an investor's perspective, what are you focusing on when you look at our company or the chemical industry?

**Ohmi** Looking at the chemical industry from the environmental side, I think that, while there are many business opportunities, at the same time there is also the possibility of a significant burden. In that sense, it is also an industry in which the focus will be on environmental measures and responsible management. For example, the agricultural chemicals you deal with would generally be considered a high-risk business.

**Ueda** That is true, and it is for that reason that we are implementing a variety of initiatives in our agrochemicals business. We have Japan's only independent organization specialized in researching the safety of agrichemicals, to properly evaluate the environmental risks of products within our own company, and then thoroughly explain those risks to society.

**Ohmi** Yes, I think your company is taking a very thorough approach to handling risk management. At the same time, how do things look from an even longer-term perspective? For example, looking at the E in ESG (Environment), what measures are you taking in preparation for the arrival of a low-carbon society?



**Ueda** The technologies that would enable us to achieve the targets set out in the Paris Agreement still do not exist anywhere. Numerous companies and institutions are conducting a massive amount of research and development at the same time, working hard to somehow achieve an 80% reduction by 2050, and our company is among them. Our company would like its future research and development to proceed in the direction of global warming countermeasures and environmental measures.

**Ohmi** That is wonderful to hear. Right now, many companies are making long-term investments in research and development in order to preserve the planet. They will not generate returns right away, but I think that searching for solutions will ultimately generate significant value for both the planet and the companies.

### Information Disclosure and Long-term Goals

**Nozaki** We are undertaking a variety of efforts, but looking at it from an outside perspective, where is our company falling short?

**Ohmi** I thoroughly understand that you are undertaking a variety of efforts, but could you perhaps provide more specific and concrete transparency for them? It seems to me that you have a number of initiatives aimed at further raising outside evaluations of your company by more actively disclosing your efforts, such as the methods of safety management for agrochemicals mentioned earlier. Japanese companies are working on sustainability as a matter of course, so you might be inclined to think you do not need to specifically point it out. However, you have

### I think key performance indicators relating to sustainability initiatives should be shown in your management strategy.

—— Ms. Shizuko Ohmi

to make important information for your company public, and that is also extremely useful for outsiders like us. In particular, such information as the management of chemical substances and your future plans for handling substances of high concern are important in evaluating chemical manufacturers.

**Ueda** So you are saying that, even if it is obvious we are working on it, if we do not provide sufficient disclosures about it, it will not be sufficiently considered in outside evaluations of us? **Ohmi** Exactly.

**Niinuma** Certainly, when we pointed out the effort we are putting into promoting the SDGs to the government, we received an SDGs award from the Minister for Foreign Affairs. Until now, we had the sense that our efforts would be thoroughly evaluated even if we kept quiet, but I understand that now active PR is important.

**Ohmi** That really is true. Also, I think it is not just about publicizing your efforts. I think key performance indicators relating to sustainability initiatives should be shown in your management strategy. For example, if the theme of your Corporate Business Plan is "Innovation," then if you include diversity ratios in your goals for that Corporate Business Plan, we will be able to see your company's idea that promoting diversity will promote innovation. For intangible things like sustainability, by having indicators to review your degree of achievement fully incorporated in your KPls, it becomes easier to evaluate your company from the outside. ESG investment is taking off in Europe, but if a company does not have ways of measuring its performance when outsiders try to evaluate it, it will not lead to greater investment in the company's shares.

**Nozaki** So you mean that we should both disclose our performance and have long-term goals for it, right? **Ohmi** Yes, that is what I mean.

## **Governance Reform for Sustained Growth**

**Ohmi** In terms of your company's governance, I think your Board of Directors is somewhat lacking in diversity.

**Niinuma** There is a female executive officer and there are non-Japanese executive officers, but as you say, we still have an issue with diversity on the Board of Directors. We are currently working hard on this point\* (for details on our efforts to increase the diversity of the Board of Directors, please see pages 83-85).

**Ohmi** I also think that there is room to improve in executive remuneration. Currently, it is quite hard to understand how the results of your company's long-term initiatives will be reflected in executive remuneration. Do you not think it might be better to have initiatives that take sustainability indicators into account in annual remuneration?

**Niinuma** This is something that we are discussing at this very moment within the company. We are holding discussions in the Remuneration Advisory Committee about adding some variability to basic remuneration based on long-term indicators, as well.

**Ohmi** I see. Many Japanese companies are working hard to improve the environment, but when talking about governance, problems like the weakness of board oversight and their lateness in promoting diversity stand out, and when compared with companies in countries that are advanced in ESG initiatives, Japan is definitely falling behind. With regard to executive remuneration, as well, because of low transparency into remuneration schemes, outside evaluations tend to be quite low. I think it is important to clearly set out the ways remuneration is tied to performance.

**Niinuma** Yes. Our company is not perfect, but it seems we will be able to take several steps forward.

**Ohmi** It does seem that a number of new policies will be set out going forward. I hope that you continue to work hard on the governance front, as well.

\* As of the time of this conversation (May 7, 2018)

**Nozaki** I have once again felt the importance of transparency. There are some ESG evaluation institutions that have given us a low rating because we are not publishing things, even though we are doing them. We will try to rectify this going forward. You have given us a number of suggestions, Ms. Ohmi, and I hope we will be able to take those suggestions and move even further forward.

Even if it is obvious we are working on it, if we do not provide sufficient disclosures about it, it will not be sufficiently considered in outside evaluations of us.

—— Hiroshi Ueda

Our company is not perfect, but it seems we will be able to take several steps forward.

—— Hiroshi Niinuma



Profile



Ms. Shizuko Ohmi Amundi Japan Ltd. Ms. Ohmi graduated in 1991 from International Christian University with a Master of Arts in Comparative Culture. That same year, she joined S. G. Warburg & Co. After working at Lehman Brothers Holdings Inc. and Credit Suisse Trust and Banking Co., she joined Société Générale Asset Management (now Amundi Japan) in 2003. She has investigated companies as a corporate research analyst for industries such as the chemical, textile, oil, automobile, and machine industries. She became head of the investment analysis unit in September 2008 and then became head of the ESG research unit in April 2015. She is a member of the Ministry of the Environment's "Working Group on Incorporating Issues Regarding Sustainability into Investment" and a member of the working group for the "Environmental Reporting Platform Development Pilot Project."