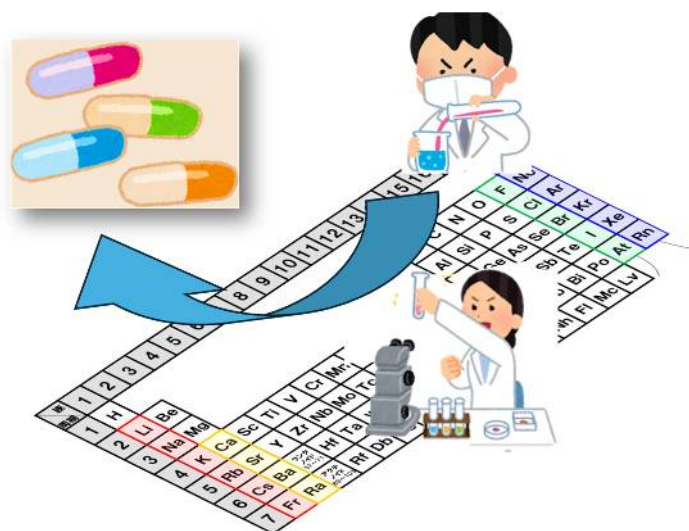


Drug discovery from natural product chemistry

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There are several fields in science. Physics, biology, geology and chemistry. Among these science research fields, now I belong to the school of science, department of chemistry. In junior high school, we didn't distinguish these fields, just studied as a science, but chemistry is the most impressive one, I guess. When we studied chemistry for the first time, we tried to memorize the initial part of the periodic table from hydrogen (H) to calcium (Ca).

The name of laboratory I belong to is "Natural products chemistry laboratory". The field of chemistry is roughly classified into four, Organic chemistry, inorganic chemistry, physical chemistry and analytical chemistry. Natural products chemistry is classified as organic chemistry, and organic chemistry, as the name implies, deals with organic matters. Probably, most of the combustible things around us are organic matters. More precisely and specifically, organic matters are

substances whose large part is composed of carbon (C). Generally, it also contains hydrogen (H), oxygen (O), nitrogen (N), and sometimes borane (B), silicon (Si).

Then, natural products are literally some materials found in nature. Namely, natural products chemistry is one of the academics which treat naturally occurring compounds, not an artificial one, and study organic chemistry using nature as a model. Nature has much better chemistry than ours, and most of their actual structures or mechanisms are still unrevealed. The strong points of nature are complexity, accuracy and speed. We still can not reproduce these points. On the other hand, our biggest motivation to study natural products chemistry is their abilities to interact with biomolecules or proteins, which means, we can get some hints for creating candidate compounds for medicines from a lot of natural products.

Now in my research, I am designing drug candidate molecules and trying to improve their abilities to inhibit some kinds of virus. In detail, I am trying to inhibit some large molecules such as protein by artificially designed small molecules. In the previous work, it turned out that our molecules have anti-HBV (hepatitis B virus) activity. On the other hand, these molecules have low target selectivity which leads to toxicity. That is why I am trying to improve the selectivity. Furthermore, I can understand the relationship between structure and activity, and actual mechanism of inhibition.

Studying natural product chemistry is interesting. Because we can contribute to drug discovery for people all over the world. Also, being inspired by the chemistries found in nature, we can touch sophisticated designs of molecules and synthetic

strategies which were developed in the whole history of evolution of the earth. Especially in my research, I try to develop actual candidates for medicinal molecules, therefore I can feel that I am contributing to society.

Of course, most natural products chemists also might be motivated for such kind of reason, but in my case, the most important thing is that I can spend my time and work hard in University of Tokyo. In this school, there are a lot of talented students around me. It is good for me to be motivated by such genius researchers and try to keep up with them. To be honest, it is still hard to follow them, and sometimes I make serious mistakes. Therefore, the strongest thing motivating me is the feeling I will overtake them one day.

Then, one thing is that different research has completely different difficulty, because all of scientific research is trying to solve something unknown, even if it is really tiny thing. That is why we must concentrate on our own task and precisely understand the exact positioning of them. Of course, it is very important and effective for us to learn a lot of things from the researchers around us, we must not worry too much about our surroundings. Learning from others is totally different from being too much aware of them. From this reason, I am strongly motivated by keeping up or competing with talented researcher around me to study organic chemistry.

As I have mentioned up to this point, scientific research, especially chemical research, is interesting. However, there are always frustrating and disappointing things brought by numerous daily failures. In the research of organic chemistry, we always repeat synthesis, analysis and revision of strategy, but actual results

don't follow the theory almost every day. As we can easily imagine, it is difficult to enjoy our experiments and research every day. But in other words, we can see unexpected things every day in our own research. That means, we can find new things that nobody knows ever. Nothing can be more interesting than such a situation. It can be one of the reasons I can recommend life as a researcher.

Now, I provide some advice according to what I learned in my daily research life. When you're truly committed to something, it is natural to be conscious of how others see you or to feel unsettled by those who are more talented than you.

In such moments, I encourage you to imagine yourself succeeding. Please make sure that you are the person who understands your concern most.

So don't rush, please move forward at your own pace. I sincerely hope that each of you will come to believe in yourselves, gain meaningful experiences, and grow both as individuals and as researchers.

○ Acknowledgement

This review was written with Chat-GPT to proofread the grammar and spelling.