Epilogue

My major was organic chemistry, and I knew absolutely nothing about animal hormones. It just so happened that Sankyo Co., Ltd., a pharmaceutical company I was once working for, wanted a detailed study of the work of the first company president, Jokichi Takamine, and as I sorted through all the documents and information I acquired during the course of the study, I found myself becoming more and more interested in adrenaline, an animal hormone.

And then something struck me. While there were papers looking at different parts of the long and convoluted history of research into this fascinating active substance, I could not find a single work that gave a complete overview.

I had to keep in mind that when talking about adrenaline, there is no one single viewpoint. At the very least, there are the three perspectives of physiology, medicine, and pharmaceutical products.

As representatives of these, Oliver, Schäfer, and Abel investigated adrenaline from the perspective of physiology and pharmacology, Bates and Solis-Cohen studied it from the perspective of clinical medicine, while Parke, Davis & Co., Takamine, and Wooyenaka were interested in this active substance as a medicinal product.

Following the science history of the suprarenal glands from the anatomical lectures of Galenos, the medical giant of ancient Greece, to the accurate anatomical drawings of the Roman Eustachio, I noticed that this history gave a perfect illustration of how at any given time the development of the natural sciences is related to the influence of countries.

We saw that in the review published in 1896 by the Polish researcher Szymonowicz, who discovered the blood-pressure raising effect of the principles of suprarenal medulla (Table 3-1, pages 53-54), over 50% of the 111 papers he cited were in French, followed by German and Italian.

English, however, accounted for only a small percentage of his publications. It was remarkable how French and Italian all but vanished from that time onward, while the vast majority of work in this field came to be in English or German.

Incidentally, the *lingua franca* of academia in Europe up to the 18th century was Latin.

When Schmidt made his astute observation in 1785 that the adrenal gland secreted something into the blood that acted on the heart, he wrote it in Latin. I well remember feeling greatly moved when I learned that he passed away just two years after this, at age 26.

One thing I feel when I study the history of natural science is that there are those who have found success by attacking a problem head-on, and there are others who have made great breakthroughs in a more unobtrusive manner.

In the history of the race to extract adrenaline, over 20 researchers pounded away at the problem for 44 years without success. Eventually, a researcher appeared who was not quite so ambitious. His approach was to wait, quietly and intently, and he was able to readily isolate the crystals that the other researchers had found so elusive.

As Wooyenaka himself said, it was as if the prize had been snatched from under their noses. I hope the researchers of today, who carry the responsibility for the future, will carefully heed the different paths taken by these pioneers, and learn to take the right path at the right time.

After I finished writing the long story that led to Takamine isolating adrenaline, I spent many days mulling over the question of what exactly had been the key to his success. Finally, it came to me—the key was his use of wheat bran, which was industrial waste, for the cultivation of *Nihon Kojikabi* (*Aspergillus flavus* var. *oryzae*) (see Chapter 5, section 3).

Takamine had shown abundant wit and intelligence through his difficult journey until then, but I concluded that this was the point at which fate really smiled on him. His association with Parke, Davis & Co., lead to the production of the world's first biotechnology product, Taka-diastase, and then to the first ever crystallization of a hormone, adrenaline. The wealth Takamine acquired as a result allowed him to act as an "unofficial ambassador," and gave him a luxurious lifestyle.

Vulpian's paper describing the discovery of the secretion of adrenaline from the suprarenal glands was written in French. I read it while keeping a mental picture of the level of science and technology of the time, and I remember how impressed I was by the high quality of the content, and later how my heart beat at the instant when I dripped ferric chloride and iodine solution into an aqueous solution of adrenaline in a glass dish and saw the color reaction for myself (see Chapter 1, Figure 1-3). As I pressed the shutter button for what I imagined was probably the first ever color photograph of the Vulpian reaction, I shared the emotion Wooyenaka must have felt around 100 years earlier in that cramped New York laboratory. It was an unforgettable moment. I would like to thank my late parents, who gave me the gift of a French-Japanese dictionary and let me study French at university.

Sometimes in life, the completely unexpected occurs. The year after this book was published in Japanese, a medical scientist called Dr. Brian B. Hoffman, who had been tracing the story of adrenaline far away in Boston, US, published a magnificent book, titled *Adrenaline*. I hope readers will be able to see for themselves that the two books were written from different viewpoints, and have many parts that complement each other. I was delighted to receive an e-mail from Dr. Hoffman, in which he said, "I am sure the two of us represent the most interested in adrenaline people in the world."

This has been a long path—I learned that people in the times of the Old Testament used the suprarenal glands, which they regarded as "lumps of fat," as offerings to God. I recreated the Vulpian's color reaction and delved deeply into the fierce research race between France, Germany, and the US.

With the crystallization of adrenaline by Takamine and Wooyenaka as a second starting point, I saw how the seeds of their work bore fruit in the fields of physiology, medicine, and chemistry.

I am deeply grateful for the good fortune to have been able to follow the tracks of the Hormone Hunters across the vast expanse of their 500-year history, which has been a source of limitless fascination.

(Please note that honorific titles have been omitted in historical descriptions.)