

The lives of ancient humans and apes

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Q. What is the one thing you want to know the most right now?

I am interested in how “others” close to us, such as humans/hominins who lived in the past, such as *Homo sapiens* from the Edo period or Jomon period, the Denisovans, and great apes closely related to humans, such as orangutans, chimpanzees, were born, experienced in their lives, and how they died. Such “others” will ultimately remain “others” to the end, but I wonder how real, how accurate, and how detailed we can make our understanding of the lived experiences of such “others”. I think it would be wonderful if we could clarify the life and death of such “others” and describe it as if it were a novel, in the form of a paper. Of course, since it is science, it needs to be based on facts, not fiction.

Q. What do you consider to be a challenge at the moment?

I think that the system for investigating the lived experiences of such “others” is still not well-developed. For example, biomolecules such as DNA and proteins are floating around or remaining in ecosystems and the remains of past organisms, but the challenge is to clarify what form they are left in and what methods can be applied to extract information more effectively from them. If we can extract information by capturing these biomolecules,

we will be able to reconstruct the life phenomena that these individuals experienced when they were alive from silent museum specimens, archaeological materials, fossils, etc. This is a method that allows us to reconstruct and investigate, retrospectively, life phenomena that have already become the past and cannot be seen or observed directly. I hope that we can develop and establish new methods like this and expand the range of targets that we can investigate.



Q. Could you share your thoughts on the future prospects of this field?

I am conducting research that applies biomolecular analysis to archaeology, paleontology, and primate ecology. I think there will be significant developments in the future in terms of how sensitive such biomolecular analysis can become, how far back in time it can be used to reconstruct the past, and how much information can be obtained from tiny traces. In this field, the emergence of new technologies opens completely new possibilities for appli-

cation. For example, ancient DNA analysis, which allows us to extract DNA from ancient remains and bring a snapshot or even process of the past's evolution into the present, like a time capsule, is one such example. With the development of next-generation sequencers, ancient DNA analysis has grown and significantly spread, and in 2022, it won the Nobel Prize in Physiology or Medicine. I think that if a technology that can effectively capture and analyze biological materials that have been degraded and are present in only tiny quantities, originating from materials in the past or the natural environment, were to appear, it would lead to completely new applications.



Q. What was the most enjoyable moment and the most challenging moment during your research?

When I analyze the results of the raw data obtained through measurement so that they can be understood by the human eye, I feel as if a tiny hidden aspect of nature is unfolding before my eyes, and I find it enjoyable. I also enjoy when students or collaborators present their own ideas or insights from their field of expertise, and we develop a new direction that neither of us had thought of. It is also lovely with individual research projects where you can work hard on your own, but there are also research projects that you can only achieve as part of a team where you can make the most of each other's strengths. Since becoming a PI, I have also been enjoying the research that I contribute to or lead as part of a team.

The difficult part is formulating a good question. Well, it could be argued what is a good question... But let's not get into that. Nature is full of mysteries so that anything can be a subject for research. I think that the most important thing for a researcher

is to find a question that many people are interested in but that only you can take on and actually solve. In this respect, I think I still need to learn a lot.



Q. Do you have a message for undergraduate and graduate students who are interested in joining your lab?

Before we are students or researchers, we are first and foremost human beings, and each of us has our own lives. I think it is important in the long term to have broad perspectives, and it is better not to push yourself too hard and think that this is the only way. At the same time, if you can be so passionate about something that you forget to eat and sleep, then I think that is a truly happy thing.

I think there is more than one path to becoming a scientist and conducting research. It may be difficult today, where so much emphasis on efficiency and short-term performance, but I think it is fine to take lots of detours. Although the time and effort spent in these ways may not be rewarded in terms of research or career, at the very least, I think it will increase the depth of your insight as a scientist who is part of society. I think that is the most important thing of all.