STUDENT NEWS

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I am a first year doctoral student at Kyushu University in Fukuoka, Japan (Fig. 1). For my dissertation I am pursuing two separate research themes at the same time, one a taxonomic study of Japanese Phasiinae (Tachinidae) and the other an investigation into the larval behavior of tachinids inside their hosts using micro computed tomography (micro-CT) scans.

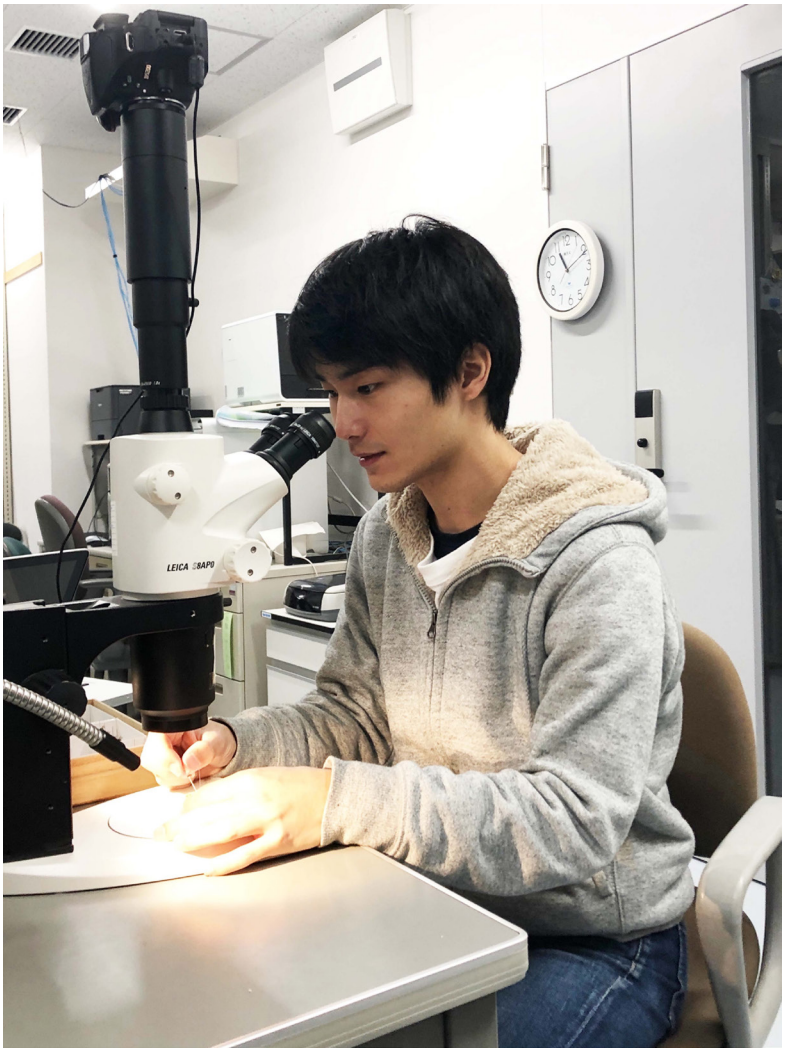

Figure 1. Shin at work in Kyushu University. (Photo by Daichi Kato.)

In Japan, Dr. Hiroshi Shima has been undertaking taxonomic studies of tachinid flies since the 1960s and continues this activity as a retired professor. His former student, Dr. Takuji Tachi, has taken over Dr. Shima's teaching role at Kyushu University and is himself studying the taxonomy and phylogeny of tachinid flies, while also training students in insect systematics. I am studying tachinids under the guidance of Dr. Tachi while also learning about this family of flies from Dr. Shima.

My study of the diversity of Japanese Phasiinae is based on the excellent tachinid collection of Kyushu University. There are currently 41 species of Phasiinae known from Japan (Shima 2014) and some of them are natural enemies of true bugs that are agricultural pests in the country; e.g., *Gymnosoma rotundatum* (L.) (Higaki & Adachi 2011). My work for this study is very simple: to describe new species and to create keys to identify all the Japanese species. I will also collect potential hosts from the field in an effort to expand the list of known hosts for Japanese Phasiinae, as currently documented by Shima (2006, 2015). I think that students doing this sort of traditional taxonomic and natural history research are becoming fewer in Japan (perhaps even in the world). Nonetheless, I believe that revealing local biodiversity is an important pursuit.

As I mentioned at the beginning, I am also carrying out a behavioral study of living tachinid larvae using micro-CT scans (Fig. 2). More specifically, I am investigating how the difference in the strategy of host body space use in different species of tachinids affects the parasitism style (such as host range and gregarious vs. solitary parasitism).

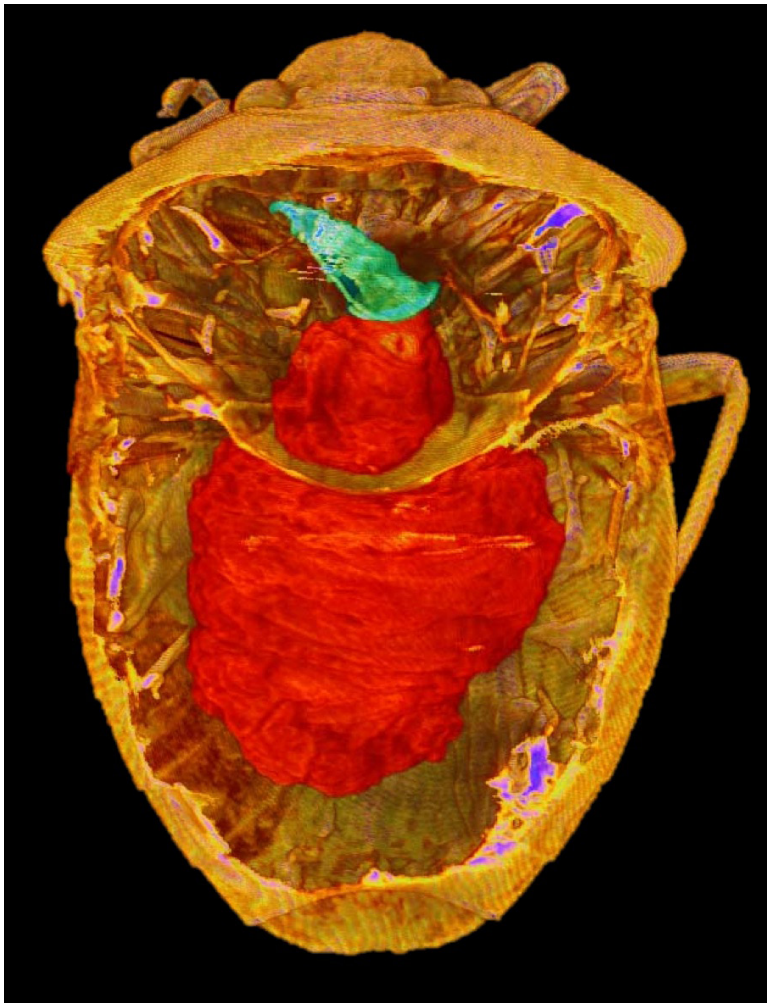

Figure 2. Larva of *Gymnosoma rotundatum* (L.) (red) inside the host (*Plautia stali* Scott) as visualized by micro-CT scanning. The respiratory funnel is shown in green at the hind end of the larva.

The unique life styles of tachinid flies can be seen in their larval stage and their life histories in various hosts must be attractive, interesting and diverse. However, the larval stage is hidden from our view inside the host. We have only learned a little about tachinid larval behavior in previous studies. Although observations have been few, their results have often surprised us. For example, the first instar larva of *Compsilura concinnata* (Meigen), a blondeliine tachinid that parasitizes a wide range of lepidopteran caterpillars, lives between the peritrophic membrane and the midgut of the host (Ichiki & Shima 2003). The larva of *Epicampocera succincta* (Meigen) (Eryciini), a natural enemy of *Pieris rapae* (L.) caterpillars, will kill another conspecific larva when they are present in the same host (Iwao & Ohsaki 1996). It is not easy to accurately observe what is happening inside a host because after dissection the structures will be destroyed and the host and its parasitoid will be dead. In order to solve this difficult problem, I am attempting to visualize tachinid larvae inside their hosts using micro-CT scans. By using this method, we can observe the same individual many times while both the host and parasitoid are living, and we can do a "virtual dissection" at any time from various angles. Within the next two years, I hope to be able to show you the wonderful world of tachinid larvae!

References

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