

When an artist meets natural history museums: technical development to create lifelike models of live land snails.

Kou KOUNO (Land Snail Museum “Rasen-kan), Ryoji TAKADA (Nishinomiya Shell Museum) and Katsuki NAKAI (Lake Biwa Museum)

Introduction

Land snails or terrestrial gastropods exhibit marked intraspecific variations owing to their immobility through geographical isolation. Such variations have been well-known in particular in external morphological characteristics such as coloration, banding patterns, and body sizes. The species belonging to the genus *Euhadra* (Pulmonata, Bradybaenidae), chiefly distributed in the Japanese Archipelago provide typical examples. Some *Euhadra* species are variable in shell size, shell color, and banding patterns not only geographically but also with environmental gradients. Specimens typically known as “snails in mountains” have larger and darker coloration and “snails in open lands” have smaller and brighter coloration. In addition, the bodies or “soft parts” of *Euhadra* species wear species-specific coloration patterns on their dorsal sides, which have been recognized as key characters for species identification among the species that have very similar shells. However, it has been technically difficult to preserve their soft parts in terms of body shape/posture and coloration patterns. A model sculptor, Kou KOUNO (referred to K.K., hereinafter). the first author of this paper has developed an original technique to accurately reproduce life-sized models of live land snails combining hand-sculptured soft parts with actual empty shells,

Making of Scaled-up Models for Museum Display

As a leather sculptor, K.K. has made a variety of leather masterpieces with a theme of insects, which he had long loved. A famous insect photographer, Mitsuhiro IMAMORI, recommended that K.K. contribute to a museum display of the Kashihara Insectarium some 30 years ago. The Kashihara Insectarium requested K.K. to make lifelike, scaled-up models of a leafcutter ant and a scarab beetle for the museum display. This was the first step of his career to create leather masterpieces for display in natural history museums. Thereafter, he has made many larger than life-sized models of small creatures, such as insects, for natural history museums, using his skill for leather sculpturing. The Lake Biwa Museum (Shiga Prefecture) requested K.K. to make a scaled-up, lifelike model of the snail-eating ground beetle *Damaster blaptoides* preying on a land snail to be displayed in the special exhibition on ground beetles in 2005 (Fig. 1).



Fig. 1. Scaled-up model of the snail-eating ground beetle preying on a land snail (Lake Biwa Museum).

Katsuki NAKAI, the last author, recommended to select the local land snail *Euhadra sandai sandai* for the model, considering its geographical and symbolic aspects. After the special exhibition, this model of the snail-preying ground beetle was moved to the permanent exhibit gallery until the gallery's large-scale renewal in 2016.

Technical Development to Make Life-sized Models of Live Land Snails

Since his first experience of making the model of a land snail, K.K. was fascinated by marked geographical varieties among land snails and started to collect them. Then, he noticed specific color and patterns on their soft parts but recognized that such uniqueness of soft parts could not be preserved even in museum specimens.

Taking advantage of his artistic and technical experience as a model sculptor, K.K. developed a manufacturing technology to create life-sized models of live land snails by assembling hand-made soft parts and actual shells. The process of making life-sized models of live land snails is summarized as follows: a) collecting live snails (or well-preserved dead, empty shells) in the field, b) taking photographs of the snail's soft part for reference of actual color and patterns, c) removing the soft part (for liquid-preserved specimens) from the shell, d) making the shape of the soft part using silicone clay with wire-cored tentacles, e) accurately sculpting and painting the surface of the clay model in detail, f) mending the shell, if necessary (e.g. shell surface without periostracum), and g) assembling the soft part and the shell. Through these steps, K.K. has created more than 600 real models of live land snails for some 400 species in Japan and 50 in other countries.

Contributions to Exhibitions and Displays in Museums

A museum curator of the Kashihara Insectarium, the late Nobuko HIBI, proposed that K.K. hold a traveling exhibition in association with the Network of Natural History Museums in Western Japan, using his original collection of life-sized land snail models. The traveling exhibition started in the Kashihara Insectarium from July to September 2016 (Fig. 2). Then, the exhibition was collaboratively held from October to December in the Nishinomiya Shell Museum where the second author Ryoji TAKADA works as a curator, and two more exhibitions were periodically displayed in the Museum of Nature and Human Activities (Hyogo Prefectural) and the Kishiwada Natural Museum in 2017. Due to the unfortunate passing-away of N. HIBI, the traveling of this exhibition ceased. In this traveling exhibition, a total of some 450 models arranged in more than 20 insect specimen cases were displayed.



Fig. 2. The traveling exhibition on land snails entitled "The World of Kou Kouno" starting in the Kashihara Insectarium in July 2016.

In the second stage of the comprehensive renewal of the permanent exhibits at the Lake Biwa Museum, a set of life-sized models of all the *Euhadra* species in Shiga Prefecture was installed in the new “Search and Discover” room in 2018 (Fig.3), and the Museum of Nature and Human Activities displays local *Euhadra* species in Hyogo Prefecture. K.K. also made life-sized models of endemic and endangered *Mandarina* snails and their invasive predator, the New Guinea



Fig. 3. Life-size models of land snails in Shiga Prefecture, displayed in the “Search and Discover” room of the Lake Biwa Museum..

flatworm *Platydemus manokwari* for the Ogasawara World Heritage Centre in the oceanic Ogasawara Islands. K.K. is now involved in the preparations for the opening of the Land Snail Museum “Rasen-kan”, a thematic private museum about land snails located in Kizugawa City, south of Kyoto Prefecture, which will open in September 2019. Recently, K.K. started a new project with museums in other countries to create life-sized models using one shell for the museum display if at least two shells and photographs of their soft parts are provided.

Since the land snails have restricted geographical ranges, the land snail fauna is generally known to be locally unique. Thus, they can be good materials to disseminate the uniqueness and importance of local biodiversity to museum visitors. We expect this new technique to make life-sized models of live land snails could contribute to a deeper understanding of the specific properties of local land snails in natural history museums.