Peculiar Molting Behavior of Large Hermit Crabs1

Authors: Ohashi, Rise, and Kamezaki, Naoki

Source: Pacific Science, 76(2) : 197-200

Published By: University of Hawai'i Press

URL: https://doi.org/10.2984/76.2.7

Peculiar Molting Behavior of Large Hermit Crabs[1]

Rise Ohashi[2,*] *and Naoki Kamezaki*[2]

Abstract: The behavior of hiding molted shells has not been documented in any crustacean. The White-spotted hermit crab (*Dardanus megistos*) inhabiting tropical coral reefs has a unique molt behavior in which it hides its outer, shed shells in the sand. Video cameras were used to capture the molting behavior. After molting, the crab folds the molted exoskeleton, pressing the cephalothorax with both forceps, and buries the shell with its walking legs, until it is no longer visible.

Keywords: molting behavior, hermit crab, anti-predator strategy, *Dardanus megistos*, marine invertebrate

In crustaceans, molting is an extremely important process for growth. However, immediately after molt, the exoskeleton is soft and exposed to danger. To overcome this situation, animals have evolved various behaviors to protect themselves. The coconut crab (*Birgus latro*), a member of the hermit crab family, eats the old exoskeleton after molting, reabsorbing the calcium (Fletcher et al. 1990, Fletcher 1993). Other crustaceans have also been observed, such as Macrobrachium (*Macrobrachium nipponense*) fighting over molted exoskeleton (Mashiko 1992).

White-spotted hermit crabs (*Dardanus megistos*) live in tropical coral reefs and are among the largest hermit crabs in the order Decapoda, with a cephalothoracic carapace length of 46–53 mm (Miyake 1982). The White-spotted hermit crabs has a peculiar molting behavior in which it hides its old outer shell in the sand. This report describes this molting behavior and examines its possible ecological significance.

[1]Manuscript accepted 6 January 2022.

[2]Department of Biosphere-Geosphere Science, Okayama, 1-1, Ridai-cho, Kita-ku, Okayama 700-0005, Japan.

*Corresponding author (e-mail: ku.or06@gmail.com).

Pacific Science (2022), vol. 76, no. 2:197–200
doi:10.2984/76.2.7

Materials and Methods

Three individuals were observed over a period of five months, from June to October 2019 (Table 1). They were kept one by one in a tank (450 × 300 × 300 mm) covered with coral sand of 1 to 2 mm in diameter and 100 mm thick. The tank was equipped with an external filtration system (EHEIM 2210, Warner-Lambert Co., Ltd.), an aquarium heater (GEX,) and a throw-in filtration system (GEX, Roca Boy). The room temperature of the laboratory was maintained at 26 °C by heating. Since the molt of White-spotted hermit crabs is not known in detail, we recorded their behavior by filming them with a video camera.

Results

Three individuals were observed molting and burying their molted exoskeletons a total of four times. In order to analyze the order in which the series of behaviors are performed, the behaviors after molting were summarized in a time series and made into an ethogram. From these ethograms, it was found that, except for the time when the hermit crab doesn't move, the behavior occurred in a consistent sequence (Table 2, Figure 1). First, after molting, the cephalothoracic and caudal exoskeletons were separated from the individual; the molt exoskeleton was then spread in front of the body with the legs and inverted so that the dorsal part of the lower molt exoskeleton was positioned above

TABLE 1

Individual Details

Carapace Length (mm)	Sex	First Experimence	Second Experimence
57.5	F	2019.7.22	–
57.4	M	2019.7.25	2019.9.22
74.2	F	2019.7.23	

TABLE 2

Classification of Behavior

Behavior	Code
Set	S
Bury exoskeleton by holding it down with both Chelipeds	BBC
Bury exoskeleton by holding it down with single Cheliped	BSC
Burry with all legs	BAL

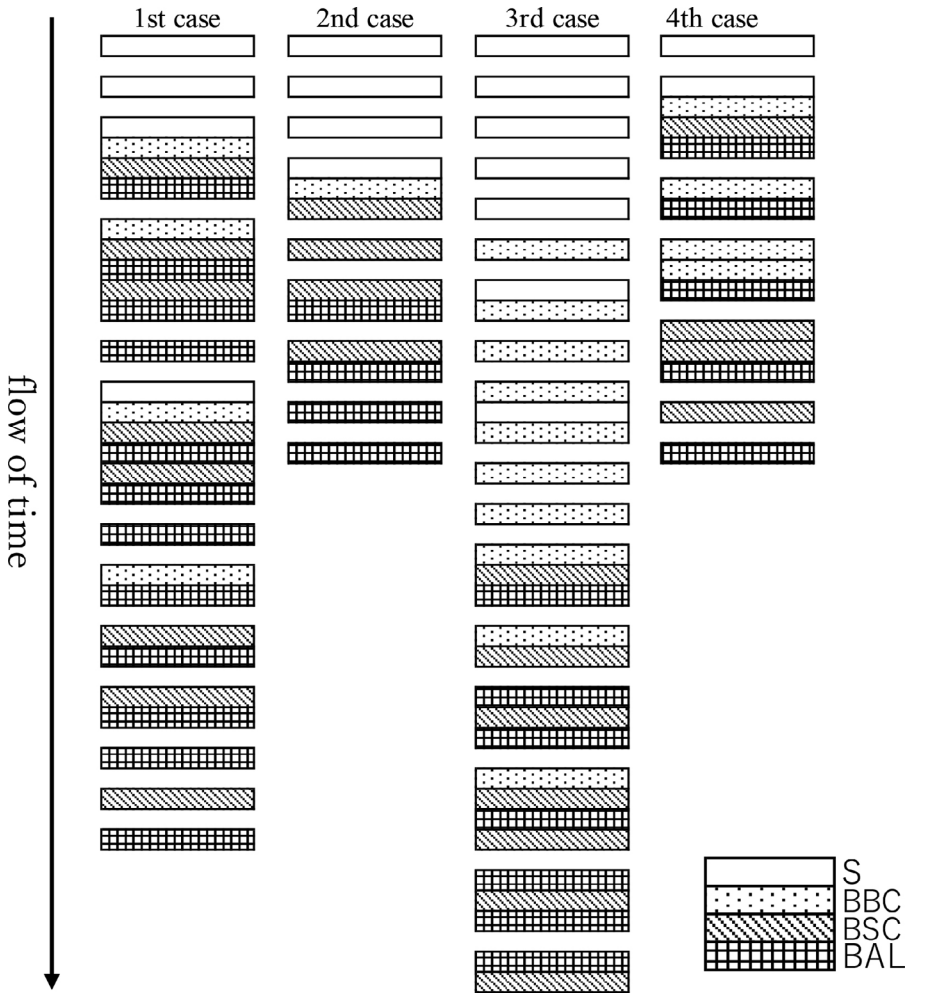
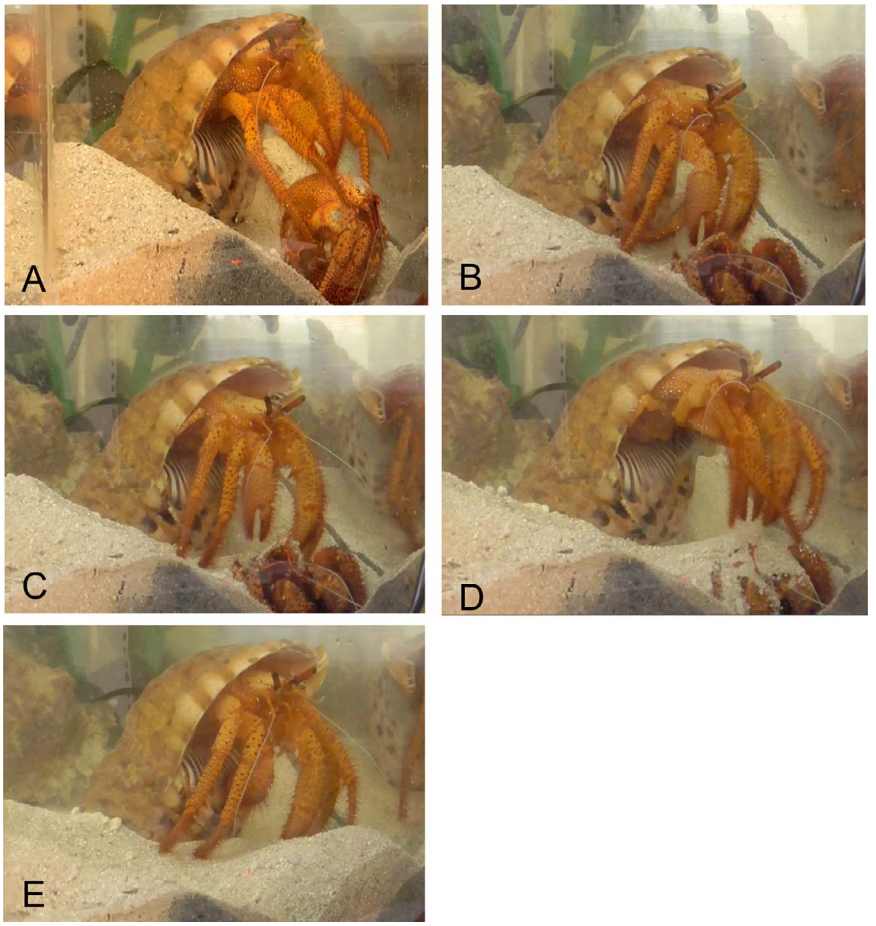


FIGURE 1. Ethogram in post-molting behavior.



FIGUTR 2. Sequence of molting behavior. (*A*) Folding the molt shell; (*B–D*) Bury the molting exoskeleton; (*E*) Be buried.

(S: Figure 2*A*). Next, both forceps held down the molted exoskeleton and buried it with their walking legs (BBC: Figure 2*B*). When about 30% of the exoskeleton was buried, the next step was to press down the molted exoskeleton with only the larger forceps and bury it with the walking leg (BSC: Figure 2*C*). Later, when the molt exoskeleton was stable, the crab buried it with all its walking legs (BAL: Figure 2*D*). Eventually, it was completely buried (Figure 2*E*). White-spotted hermit crabs always buried their molted exoskeletons.

DISCUSSION

The shallow waters of coral reefs are inhabited by a wide variety of animals, and complex predator–prey relationships exist there. Large hermit crabs in coral reefs are protected by shells and are unlikely to be easily preyed upon. They are especially vulnerable however when the exoskeleton is soft immediately after molting and they can be relatively easily attacked. If molted exoskeletons were left on the surface, predators could recognize the presence of vulnerable hermit crabs immediately after molt and target them for predation. Hermit crabs hiding their molted exoskeletons in the sand would reduce their vulnerability. Coconut crabs are also known to eat molted shells as a source of nutrition (Shokita and Tauchi 1996), but White-spotted hermit crabs did not appear to forage even after leaving the molting shells for several days. Therefore, it is unlikely to be a nutritional strategy. There are other species of large

hermit crabs. It will be interesting to see what kind of behavior they exhibit.

ACKNOWLEDGMENTS

We would like to express our gratitude to Asakura Akira (Seto Marine Biological Laboratory Kyoto University) for his important advice on our experiments, and we thank Takahide Sasai (Okinawa Churashima Foundation) and Kazunari Kameda (Kuroshima Research Station attached to NPO Japan Sea Turtle Council), Toshiaki Nakanishi (Urasoe Ginowan Fisheries Cooperative Association) Tatsuya Shima (Okinawa pre.), and members of the Laboratory of Natural History of Animals, Okayama University of Science for their aid in obtaining the specimens.

Literature Cited

Fletcher, W. J. 1993. Coconut crabs. Pages 645–681 *in* A. Wright and L. HillNearshore, eds. Marine resources of the South Pacific. IPS, Suba FFA, Honiara ICOD, Canada.

Fletcher, W. J., I. W. Brown, and D. R. Fielder. 1990. Growth of the coconut crab (*Birgus latro* L.) in Vanuatu. J. Exp. Mar. Biol. 141:63–78.

Mashiko, K. 1992. On the evolution of reproductive behavior in *Macrobrachium*. CANCER 2:17–20.

Miyake, S. 1982. Original color Japanese large skull catalog I. Conservation Society, Osaka. 261 pp.

Shokita, S., and H. Tauchi. 1996. Molting habits of coconut crabs. CANCER 5: 7–9.