Elytra, *Tokyo*, New Series, **7** (1): 21–23
June 25, 2017

Preliminary Report of Host Plants of a Supralittoral Beetle, *Cercyon* (*Cercyon*) *tolfino* (Coleoptera, Hydrophilidae) in Canada

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Abstract Non-choice feeding acceptance test was performed for Canadian supralittoral hydrophilidae beetle, *Cercyon* (*Cercyon*) *tolfino* Hatch, 1965. Almost all individuals fed on surf grass (*Phyllospadix* sp.), sea lettuce (*Ulva* sp.), and false kelp (*Petalonia* sp.), and their average numbers of fecal pellets were 1.78, 5.63, and 4.20, respectively. It is different from Japanese congenic species, *C*. (*C*.) *dux*, *C*. (*C*.) *tolfino* used not only seaweeds but also sea grass as food resources.
Key words: *Cercyon*, Supralittoral zone, Host acceptance test.

Introduction

Subgenus *Cercyon* (*Cercyon*) is a group of water scavenger beetles belonging to the family Hydrophilidae. These species inhabit supralittoral zone at sandy, cobble, and shingle beaches (Ôhara & Jia, 2006, Satô, 1981, 1989; Sharp, 1873, Shatrovskiy, 1989, 1992, Smetana, 1988).

Cercyon (*C*.) *tolfino* Hatch, 1965 is a species that is distributed at the northern part of western coast of North America, and their adults occurred on detritus such as sea grasses and seaweeds that drift ashore. Especially, this species frequently occurred on sea grasses (Kobayashi, Inari & Ôhara, personal observations). However, actual utilizations of sea grasses as food resource by *C*. (*C*.) *tolfino* were not clarified yet. For example, Japanese supralittoral beetle, *C*. (*C*.) *dux* did not feed on eel grass in the laboratory condition (sea grass; *Zostera mariana*, Jpn. Common name, Amamo) (Kobayashi, 2009), although they occurred on decomposed sea grasses and seaweeds in the field (Hansen, 1999; Ôhara & Jia, 2006).

Thus, it is still poorly known for the food plant utilizations of subgenus *Cercyon* (*Cercyon*). In this paper, we examined the non-choice feeding acceptance test of *C*. (*C*.) *tolfino* for commonly observed sea grass and seaweeds (green algae and brown algae) on seaside lines of western part of Canada.

Materials and Methods

Non-choice feeding tests were carried out to detect the acceptability for seaweed and sea grass. A total of 44 adult individuals of *Cercyon* (*C*.) *tolfino* and their possible host plants were sampled from seaside coast: Qualicum Beach, Vancouver Island, Canada (latitude: N49°21’23”, longitude: W124°26’17”). In this experiment, one species of surf grass (sea grass, *Phyllospadix* sp.), and two species of seaweeds, sea lettuce (green algae, *Ulva* sp.), and false kelp (brown algae, *Petalonia* sp.), were examined because these three plant species were well found at seaside beaches in Canada (red algae was very

rare at seaside beaches in Canada). Ten to eighteen individuals were tested for each plant species.

A piece of plants (about 0.01 g) was placed in a transparent plastic case (diameter 66 mm, height 36 mm), the bottom of which was covered with the moist filter paper by marine water. A beetle was released into the case and was allowed to feed on one of three plant species during 48 hours. Prior to examination, beetles were settled on starvation during 48 hours. The experiments were performed at room temperature with dark condition. Because it is impossible to assess the amount of the feeding trace, we checked the acceptance for each plant by the number of beetle's fecal pellet after 48 hours. We pooled data of different sex, because each sample size is very small. We examined the number of fecal pellets among the treatments using KRUSKAL-WALLIS test. And after, for pair-wise comparisons between treatments, we used MANN-WHITNEY *U* test. *P* values were adjusted by HOLM's correction method for multiple comparisons (HOLM, 1979).

Results

Table 1 shows the number of fecal pellets of *Cercyon* (*Cercyon*) *tolfino* in the food acceptance tests. Almost all beetles (17/18 individuals) fed on surf grass, although the average number of fecal pellets in this treatment (1.78) was significantly lower than other two treatments (sea lettuce and false kelp were 5.63 and 4.20, respectively) (MANN-WHITNEY *U* test with HOLM's correction method, $P<0.05$).

Discussion

The present study suggests that surf grass (sea grass) was one of food resources for *Cercyon* (*Cercyon*) *tolfino*, although surf grass was not so suitable than sea lettuce and false kelp. The present result was well consistent with the field observations. As mentioned above, adults of this species would frequently occur on surf grass as well as seaweeds such as sea lettuce and false kelp.

On the other hand, the incongruence of field observations and laboratory experiment was also reported as follows. Japanese supralittoral *Cercyon* (*C*.) beetles occurred on detritus such as seaweeds and sea grasses that drift ashore (HANSEN, 1999, ÔHARA & JIA, 2006). But, in the laboratory experiment for one of Japanese supralittoral species, *C*. (*C*.) *dux*, fecal pellets in *Zostera marina* (sea grass) treatment was not recognized, although those in seaweeds treatments such as sea lettuce (*Ulva*ceae: *Ulva* sp.; green algae; Jpn. common name, Aosa), sea tangle (Laminariaceae: *Laminaria* sp.; brown

Table 1. Number of fecal pellet of adult individuals of *Cercyon* (*Cercyon*) *tolfino* for three plant species during 48 hours in non-choice feeding test.

Plant species	(*N*)	Number of fecal pellet in each beetle	Mean ± SD
Phyllospadix sp. (Zosteraceae)	(18)	1, 2, 1, 2, 2, 2, 2, 1, 1, 1, 6, 3, 1, 2, 2, 2, 0, 1	1.78 ± 1.26^{a}
Ulva sp. (Ulvaceae)	(16)	1, 4, 12, 11, 3, 1, 1, 5, 6, 12, 5, 3, 7, 2, 13, 4	5.63 ± 4.19^{b}
Petalonia sp. (Scytosiphonaceae)	(10)	3, 3, 3, 3, 1, 12, 0, 4, 5, 5, 6	4.20 ± 3.29^{b}

N means the examined number of beetles. Values with different letters are significantly different (MANN-WHITNEY *U* test with HOLM's correction method, $P<0.05$).

algae; Konbu), and gulfweed (Sargassaceae: *Sargassum* sp.; red algae; Hondawara) were observed (KOBAYASHI, 2009). *Cercyon* (*C*.) *dux* did not use eel grass as food resources, although they occurred on the mixture of sea grasses and seaweeds.

In the present and previous (KOBAYASHI, 2009) studies, feeding acceptance tests for sea grasses and seaweeds of two congenic species, *C*. (*C*.) *tolfino* and *C*. (*C*.) *dux*, were carried out, but it is still poorly known the resource utilizations in subgenus *Cercyon* (*Cercyon*) beetles. To understanding for the diversity of food resource utilizations in subgenus *Cercyon* (*Cercyon*), further detail examinations for other Japanese and North American species would be required.

Acknowledgments

We are grateful to Dr. Naoki INARI and Mr. Shunsuke YAMASHITA for their kindly supports in field expeditions. We thank to Dr. Naoyuki FUJIYAMA for technical advice. This study was partly supported by Saitama Prefectural University Research (SPUR) Grant.

要　　約

小林憲生・大原昌宏：カナダ産の海浜性ケシガムシ *Cercyon* (*Cercyon*) *tolfino* HATCH, 1965 (鞘翅目ガムシ科) の食性．———— *Cercyon* (*Cercyon*) *tolfino* に対して，海草 *Phyllospadix* sp.・緑藻 *Ulva* sp.・褐藻 *Petalonia* sp. の 3 種類の植物の 1 つを 48 時間摂食させ，その糞粒数をカウントした．実験の結果，海草・緑藻・褐藻の平均の糞粒数は，それぞれ 1.78, 5.63, 4.20 であった．*Cercyon* (*C*.) *tolfino* は，日本産のフチトリケシガムシ *C*. (*C*.) *dux* とは異なり，緑藻・褐藻等の藻類だけでなく，海草も餌資源としていることが明らかになった．

References

HANSEN, M., 1999. Hydrophiloidea (Colepotera). World Catalogue of Insects, **2**. 416 pp. Apollo Books, Stenstrup.

HOLM, S. 1979. A simple sequentially rejective multiple test procedure. *Scandinavian Journal of Statistics*, **6**: 65−70.

KOBAYASHI, N., 2009. Food Plants of a Supralittoral Hydrophilid Beetle, *Cercyon* (*Cercyon*) *dux* (Coleoptera, Hydrophilidae). *Elytra*, *Tokyo*, **37**: 272–274.

ÔHARA, M., & F. JIA, 2006. Terrestrial hydrophilid beetles of the Kuril Archipelago (Coleoptera, Hydrophilidae). *Biodiversity and biogeography of the Kuril Islands and Sakhalin*, **2**: 129–150.

SATÔ, M., 1981. Hydrophilidae. *In* UÉNO, S-I., Y. KUROSAWA & M. SATÔ (eds.), *The Coleoptera of Japan in Color*, **2**: 208–217 [incl. pls. 38–39]. Hoikusha, Osaka. (In Japanese, with English book title.)

SATÔ, M., 1989. Hydrophilidae. Pp. 242–246. *In* Y. HIRASHIMA (ed.), *A Check List of Japanese Insects*, **1**. 540 pp. (In Japanese.)

SHATROVSKIY [as "SHATROVSKIJ], A. G., 1989. Hydraenidae, Hydrophilidae. Pp. 260–293. *In* LER, P. A. (ed.), *Opredelitel* '*nasekomykh Dal'nego Vostoka SSSR v shesti tomakh*, **3**. *Zhestkokrylye*, *ili zhuki* (part 1). 572 pp. Nauka, Leningrad.

SHATROVSKIY [as "SHATROVSKIJ], A. G., 1992. Novye i maloizvestnye vodolyubovye (Coleoptera, Hydrophiloidea) iz yuzhnogo Primor'ya i sopredel'iykh territorii. (New and little known Hydrophiloidea) from south Primorye territory and adjacent regions). *Entomologicheskoe*. *Obozrerine*, **71**: 359–371.

SHARP, D., 1873. The water beetles of Japan. *Transactions of the entomological Society of London*, **1873**: 46–67.

SMETANA, A., 1988. Review of the family Hydrophilidae of Canada and Alaska (Coleoptera). *Memoirs of the entomological Society of Canada*, (142): 1–316.

Manuscript received 20 February 2017;
revised and accepted 20 April 2017.