短　　報
(Notes)

Reproductive Isolation between the Sympatric, Closely Related Species *Acartia omorii* and *A. hudsonica* (Copepoda: Calanoida)[1), 2)]

Interspecific copulation between congeneric calanoid copepods has been observed in laboratory experiments (JACOBY & YOUNGBLUTH 1983, MALY 1984). I made brief experiments on interspecific mating between the closely related species *Acartia omorii* Bradford and *A. hudsonica* Pinhey to learn whether they copulate with each other or not. Both species were formerly included in *A. clausi* Giesbrecht but distinguished by BRADFORD (1976). The two species co-occur in Japanese inlet waters (UEDA 1986), from which they have frequently been recorded as *A. clausi* without regard to BRADFORD's (1976) classification.

Zooplankton was collected with a 0.1 mm meshed plankton net at the pier of the Fisheries Research Station, Kyoto University, located in Maizuru Bay on the Japan Sea coast of middle Japan, at night on 19 March 1984. Soon after sampling, the animals were transferred into seawater with 0.25 g l^{-1} of MS -222, an anesthetic agent, in the laboratory. Under a stereomicroscope, adult males and fifth instar female copepodites of *Acartia omorii* and *A. hudsonica* were sorted with pipette and placed into 15 beakers containing about 60 ml filtered seawater. Eight beakers were used for the interspecific mating experiment and the others for the control (intraspecific mating). Prosome length of the copepods was measured with an ocular micrometer before placing them into the experimental beakers in order to distinguish the species. Copepod size is the most useful character separating the two species (UEDA 1986). A morphological examination made before pipetting indicated that both adult males and fifth instar females larger than 0.75 mm in prosome length were *A. omorii*, while those smaller than 0.70 mm *A. hudsonica*. Each experiment was started with two females and two males. As food for copepods, sufficient volume of laboratory-cultured diatom mixtures consisting mainly of *Skeletonema costatum*, *Thalassiosira* spp. and *Nitzschia* spp. was added to the experimental beakers at intervals of one or two days and water in the beakers was gently stirred up with a pipette once or twice a day. The experimental beakers were monitored under a stereomicroscope almost everyday; dead copepods were removed and examined. When a male died, another male of the same species was replaced from the stock culture. The experiments ended on 10 April 1984, or before 10 April on the date when the last of females died. Females, including those that died before the end of the experiments, were examined for presence of spermatophores. In calanoid copepods, males copulate with a female by attaching a spermatophore to the genital segment of the female. Because females at the start of the experiments were immature and underwent a final molt to become adult in the experimental beakers, the presence of spermatophores on the adult females is evidence that copulations were performed during the experiment. MALY (1984) stated that in calanoid copepod populations a spent spermatophore on the female genital segment drops off usually within 24 h after copulation. In the present experiments, however, no isolated spermatophores were found even in the control beakers, suggesting that spermatophores attached to *A. omorii* and *A. hudsonica* females may be retained at least for several days. These data are supported by observations of adult females of both species collected from Maizuru Bay which usually carry spermatophores, in contrast to other abundant *Acartia* species in the bay, i.e. *A. erythraea* Giesbrecht and *A. sinjiensis* Mori, whose adult females are seldom observed with spermatophores (UEDA unpubl.).

Most of the experimental females underwent the final molt within three days after the start of the experiment; molting was checked by the appearance of exuviae. The results of pairings are presented in Table 1. In the interspecific mating experiments, no females were found to carry spermatophores. In contrast, all the females in the control experiments had spermatophores. These results indicate strict

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[2)] 同所性近縁種 *Acartia omorii* と *A. hudsonica* (橈脚亜綱: カラヌス目) の生殖隔離

TABLE 1. RESULTS OF INTERBREEDING AND CONTROL EXPERIMENTS BETWEEN *Acartia omorii* AND *A. hudsonica*. O: *A. omorii*, H: *A. hudsonica*.

Pairing (2 females×2 males)	No. of males replaced	Duration of experiment in days	No. of females with spermatophores
Interbreeding			
O×H	0	14	0
O×H	2	19	0
O×H	0	22	0
O×H	1	22	0
H×O	1	22	0
H×O	1	22	0
H×O	1	22	0
H×O	3	22	0
Control			
O*×O	2	19	1
O×O	1	21	2
O×O	1	22	2
O×O	3	22	2
H×H	0	19	2
H×H	1	21	2
H*×H	1	22	1

* One of the 2 females at the start was missing during the experiment.

reproductive isolation between *Acartia omorii* and *A. hudsonica* and confirm BRADFORD's (1976) classification that they have diverged on the species level notwithstanding their close morphological similarity.

In previous interbreeding experiments on calanoid copepods (JACOBY & YOUNGBLUTH 1983, MALY 1984), males paired with heterospecific females attempted to copulate and place spermatophores. MALY (1984) suggested that in centropagid copepods the presence of females, whether they are conspecific or not, is needed for males to extrude spermatophores. However, the males paired with heterospecific females in the present experiments produced no spermatophores, suggesting that females of *Acartia omorii* and *A. hudsonica* do not induce the males of each other species to extrude spermatophores. Reproductive isolation before spermatophore extrusion has an adaptive value for these sympatric species because it eliminates wastage of gametes (JACOBY & YOUNGBLUTH 1983).

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