

## Preliminary Survey of Tardigrades on Dead Bamboo-leaves from Chiba Prefecture

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### 千葉県の竹の枯葉に宿るクマムシ類予察

渡 辺 勇・佐々木繁子・平 研 一

Since the first water-bears or Tardigrades found in Japan were described by Richters in 1907, the knowledge of these animalcules in this country has considerably been extended by Mathews (1936—37, 1937 a, b), Rahm (1937) and a few others<sup>1</sup>. In recent years, with a simpler method of investigation devised by himself, Hatai (1956, 1959) studied the water-bears inhabiting fallen bamboo-leaves collected from various parts of Japan. This is a brief note of a preliminary survey of this animal group also on dead bamboo-leaves from more than twentyfive places in Chiba Prefecture. Before proceeding further, the authors wish to express sincere thanks to Professor S. Hatai LL. D. for his encouragement, advice and suggestions.

In the present investigation, most samples consisted of the leaves either of medake, *Pleiblastus Simoni* NAKAI, or of môsôchiku, *Phyllostachys heterocycla* var. *pubescens* OHWI, collected in August, 1959; in addition, were examined several samples of the above two bamboo species, and of hôraichiku, *Leleba multiplex* NAKAI, suhôchiku, *Leleba multiplex* f. *Alphonso-Karri* NAKAI, and azumanezasa, *Pleiblastus Chino* MAKINO, occasionally collected from several places in the three-year period, 1958—1960. The method employed for this work was essentially the same as that by Hatai (1956, 1959). The identification was made in the main on the basis of Marcus' "Tardigrada in das Tierreich" (2nd Ed., 1936), and mostly with live adult forms under complete asphyxia, but later with formalin-fixed specimens.

The authors were able to identify the following nine species, all belonging to the order Eutardigrada:

1. *Macrobiotus occidentalis* J. MURRAY; on medake and môsôchiku, 333—390 micra in body length.
2. *Macrobiotus intermedius* PLATE; on môsôchiku, 235—330 micra.
3. *Macrobiotus harmsworthi* J. MURRAY; on medake and môsôchiku, 205—226 micra (all young forms).
4. *Macrobiotus hufelandii* S. SCHULTZE; on medake, môsôchiku, hôraichiku, suhôchiku and azumanezasa, 212—799 micra.
5. *Macrobiotus grandis* RICHTERS; on medake, môsôchiku and suhôchiku, 476—544 micra.

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1 Recently, MORIKAWA (1951) described *Echiniscoides Sigismundi* (M. SCHULTZE) as a representative marine species from Japan.

6. *Hypsibius (Isohypsibius) schaudinni* (RICHTERS); on medake, môsôchiku and azuma-nezasa, 357—714 micra.
7. *Hypsibius (Isohypsibius) canadensis* (J. MURRAY); on medake and môsôchiku; 181—876 micra.
8. *Hypsibius (Diphascon) alpinus* (J. MURRAY); on môsôchiku, 187—211 micra.
9. *Milnesium tardigradum* DOYÈRE; on medake and môsôchiku, 886—1020 micra.

Besides these nine species, were found a few specimens of one form of 446—515 micra in body length, with no visible demarcation of the sucking pharynx nor well-defined bacilli therein, but with a distinct *Macrobiotus* type of claws present on each stelechopodium; the species, however, remains undetermined. According to the private information from Hatai, this peculiar form has been observed not infrequently in his collections of bamboo leaves, too, and it seems to be furnished with three pairs of bacilli, but for corroboration of the evidence however, it will be necessary to prove by the more effectual method of preparation (Hatai, unpublished data). Unfortunately, from the samples at hand, any specimen of *Macrobiotus echinogenitus* RICHTERS, *Hypsibius (Hypsibius) oberhaeuseri* (DOYÈRE) and *Hypsibius japonicus* MATHEWS could not be obtained, three of which have been listed by Hatai (1959) as among the water-bears dwelling on the bamboo leaves. The question as to these three species, however, still remains for future solution, since most of the present samplings were restricted only to two bamboo species medake and môsôchiku, and moreover, the survey did not extend to the mountains in the south of the peninsula. The localities from which the leaves with the water-bears were secured are listed below, with the numbers given to the species according to the order of their arrangement in the above mentioned list.

Yoshioka .....	4, 5, 6, 8	Izumi .....	4, X
Miyama .....	1, 2, 3, 4, X	Oh-ami .....	4
Nakayama .....	2, 3, 8	Shirako .....	4, 5
Matsudo .....	2, 4	Ichinomiya.....	7
Nagareyama .....	2	Kominato .....	4, 6
Noda .....	5	Amatsu .....	4, 5, 7
Hunato .....	4, 7	Kamogawa.....	4, 5
Abiko .....	2, 4, 5, 7	Chikura .....	4, 9
Kohoku .....	5	Tateyama .....	4, 9
Sakura .....	4, 5	Hoda .....	4, 7
Sawara .....	4	Kisarazu .....	4, 7
Shimomorito .....	4	Sodegaura .....	6, 7
Chôshi .....	4		

Based on the data obtained from the material thus far collected, distribution of the water-bear species are as follows: *Macrobiotus hufelandii* (4) was most widely distributed, and found almost in every corner in this prefecture, and from all the five bamboo species examined. *Hypsibius (I.) schaudinni* (6) and *Macrobiotus grandis* (5) were next widely distributed, but rather dispersedly; the former species was scattered throughout



the prefecture, except for the east part and the northeast corner near the mouth of the River Toné, while the latter was not merely gathered in the northwestern low land around the Lakes of Tega-numa and Imba-numa, but somewhat dispersed in the eastern localities facing the Pacific, though no specimen of this species being found along the coast of Tokyo Bay. *Hypsibius* (I.) *canadensis* (7) was still well distributed on either side of the southern half of the peninsula. In contrast, other six species seem to have very limited distributions. *Macrobiotus occidentalis* (1), *Macrobiotus intermedius* (2), *Macrobiotus harmsworthi* (3) and *Hypsibius* (D.) *alpinus* (8) were recognized exclusively in the bamboo leaves taken from a narrow zone (about fifteen kilometers in width) extending along by the Edogawa River, which divides Chiba Prefecture to the east from Tokyo Metropolis and Saitama Prefecture. Quite contrary to expectation, *Macrobiotus intermedius*, known as one of the commonest water-bears in Japan (Hatai, 1956, 1959), was not seen in the leaves from any place surveyed other than this relatively small area. For each of the three others, very few specimens could be obtained after repeated collections of the leaves from the same places, especially from Miyama, the nearest station to the laboratory. Similarly, one species mentioned above as yet undetermined (X in the list, p. 95) was observed in the repeated samplings of môsôchiku from Miyama, except a single specimen, which was recognized in a sample of medake from Izumi.

As regards *Milnesium tardigradum* in Japan, according to the extensive survey by Hatai, not a single specimen had been found in the areas facing the Sea of Japan, while it had been found in many localities, though discontinuously dispersed, along the Pacific coast, ranging from Kagoshima in the south up to Tateyama (Hôjô and Nishizaki), the southmost city on the west coast of this peninsular prefecture (Hatai, 1959). In the present work, thereupon, particular care was devoted to the searching for this species; notwithstanding, no specimen of this species was detected in all the leaf samples obtained from this prefecture, except for the samples from Tateyama (Kokubu) and those from Chikura on the southeast coast, from both of which were found *Milnesium* worms together with *Macrobiotus hufelandii*. Presumably, Tateyama and Chikura are at or near the northern borderline of the *Milnesium* dispersal in Japan. One of the present authors (Watanabe) began to investigate bamboo leaves from the more northern prefectures fronting on the Pacific, but in the samples so far collected therefrom, this species has not yet been detected.

Hatai (1956) had once suggested that the habitat of *Milnesium tardigradum* would have some intimate relation with such bamboo species as Kimmeichiku, *Phyllostachys bambusoides* f. *castillonis* MUROI, taiwan-madake, *Phyllostachys Makinoi* HAYATA, and taisan-chiku, *Leleba vulgaris* NAKAI, because of his earlier findings of this species in the leaves of these bamboos from Miura Peninsula of Kanagawa Prefecture as well as from the Island of Hachijô and other southern localities; later, however, from the elaborate examinations of the kimmeichiku leaves from various parts of Japan, he came to consider that *Milnesium tardigradum* is not necessarily related with these particular bamboos, but may occur in any leaves of indigenous bamboos (Hatai, 1959). The results from the present investigation support this view; *Milnesium tardigradum* was found in the leaves

of medake, a common native bamboo, from Chikura as well as in those of môsôchiku, a widely distributed, naturalized bamboo, from Tateyama, whereas no *Milnesium* specimen was seen on the fallen leaves of the naturalized hôraichiku and suhôchiku cultivated in Subtropical Arboretum of Tokyo University at Amatsu, not far from Chikura<sup>2</sup>. In general, it seems still difficult to establish any specific relation between the particular kind of water-bears and the bamboo species on which they live.

## 抄 録

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千葉県内 25 以上の箇所につき、昭和 34 年 8 月採集したメダケとモウソウチク、昭和 33 年より 35 年に亘りとときどき採取したメダケ、モウソウチク、ハウライチク、スホウチク、アズマネザサなどの枯葉を調査した結果、Eutardigrada (目) に属する次の 9 種を見出した。

<i>Macrobiotus occidentalis</i> J. MURRAY	<i>Hypsibius (Isohypsibius) schaudinni</i> (RICHTERS)
<i>Macrobiotus intermedius</i> PLATE	<i>Hypsibius (Isohypsibius) canadensis</i>
<i>Macrobiotus harmsworthi</i> J. MURRAY	(J. MURRAY)
<i>Macrobiotus hufelandii</i> S. SCHULTZE	<i>Hypsibius (Diphascon) alpinus</i> (J. MURRAY)
<i>Macrobiotus grandis</i> RICHTERS	<i>Milnesium tardigradum</i> DOYÈRE

竹の枯葉に宿るクマムシとして上の 9 種のほか、*Macrobiotus echinogenitus* RICHTERS, *Hypsibius (Hypsibius) oberhaeuseri* (DOYÈRE), *Hypsibius japonicus* MATHEWS の 3 種が挙げられている (畑井, 1959) が、今回の竹葉の標品中には認められなかった。この調査によると、千葉県でもっとも広く分布するのは *Macrobiotus hufelandii* で、*Macrobiotus grandis* と *Hypsibius (I.) schaudinni* とがこれに次ぎ、*Hypsibius (I.) canadensis* もなおよく分布し半島南半の両岸に見られた。反之、他の 5 種は極めて分布が狭く、*Milnesium tardigradum* は南方の館山と千倉にのみ見出され、残りの 4 種は江戸川の東側市およそ 15 料の地帯に限られて、本邦に極く普通の *Macrobiotus intermedius* まだが、この地帯以外に見出せなかったのは意外であった。なお *Milnesium tardigradum* は渡来竹であるモウソウチクにも在来竹であるメダケにも宿っていて、南方よりの渡来竹に限らないという畑井説 (1959) を支持する。

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2 As to the native bamboos and the influx of foreign bamboos in Japan, the reader is referred to Muroi's "the Japanese Bamboos" (1956), pp. 241~258.