

On the Species Validity of *Nymphonella lecalvezi* (Pycnogonida, Ascorhynchidae): A Reevaluation of Some Morphological Characteristics*

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Introduction

Nymphonella tapetis Ohshima, 1927 is a pycnogonid endoparasitic on some bivalves in its larval and juvenile stages. After the first discovery from the Hakata Bay, Fukuoka in 1926, there were scattered and sparse records from several places in Japan before 2007 (Miyazaki *et al.*, 2010). In April 2007, *N. tapetis* appeared suddenly in bivalves on the Banzu Tidal Flat in the Tokyo Bay on a very large scale, which has resulted in serious damage to the bivalves in the area to date (Taru *et al.*, 2007; Miyazaki *et al.*, 2010).

In 1939, several specimens of *Nymphonella* were collected from the bay of Banylus-sur-Mer on the French Mediterranean coast. They were very similar to Japanese *N. tapetis* in morphology, and Le Calves (1950) identified them as a Mediterranean form of *N. tapetis*. Guille and Soyer (1967), however, described this taxon as a new species, *N. lecalvezi*, based on additional specimens from the same locality. Although these authors insisted that the ratio of palpal segment length and the number of denticulations on the compound spines of the ovigers were evident characteristics by which to distinguish the Mediterranean species from the Japanese one, some authors maintained the identity of the Mediterranean specimens as *N. tapetis* (De Haro, 1978; Arnaud, 1988; Munilla, 1993; Munilla and San Vicente, 2000). In “Pycnobase”, an online database of world pycnogonid taxa, *N. lecalvezi* is accepted as a synonym of *N. tapetis* (Bamber and El Nagar, 2010), but there have been no detailed comparisons between the Japanese and the Mediterranean taxa. Meanwhile, Stock (1959) established *N. lambertensis* from South African waters, which is distinguished from other members of *Nymphonella* based mainly on the presence of tubercles and projections in some trunk and appendage parts, and the shorter proboscis.

In the present study, the author examined the above-mentioned characteristics in specimens from the Tokyo

Bay, and compared them with those of specimens from the Mediterranean in order to determine the species validity of *N. lecalvezi*.

Materials and Methods

A semi-monthly collection of adult *Nymphonella tapetis* from the Banzu Tidal Flat has been made since June 2008 by the staff of the Tokyo Bay Fisheries Laboratory, Chiba Prefectural Fisheries Research Center. They kindly permitted me to examine the specimens. The length of palpal segments was measured under a light microscope. The number of denticulations on the compound spines of the oviger was counted using scanning electron microscopy (SEM) after a conventional process.

Results and Discussion

Palpal segment length

According to Guille and Soyer (1967), based on measurement of the palpal segment length of nine Mediterranean specimens, the ratio between the seventh segment length and the sixth segment length (7th/6th) was calculated as 1.96 ± 0.15 (1.66–2.1) (average \pm SD (range)), and the 7th/8th was 1.60 ± 0.12 (1.42–1.85). Guille and Soyer (1967) calculated values for both ratios of the Japanese form as 1.5 and 1.5 by measurement of the one drawing of the male palp in Ohshima (1935), and considered that the difference of the values was sufficient evidence to establish a new species.

I examined 19 specimens (12 males and 7 females) of *N. tapetis* from the Tokyo Bay. The 7th/6th and the 7th/8th were calculated as 1.45 ± 0.13 (1.25–1.65) and 1.34 ± 0.14 (1.0–1.6) respectively (Table 1). To the data set of Guille and Soyer (1967), I added additional data from two specimens of *N. lecalvezi* from the drawings of a male from the Mediterranean (Le Calvez, 1950) and of a female from the Namibian waters (Munilla, 1988). The

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values for these two ratios from the enhanced data set of *N. lecalvezi* became 1.94 ± 0.15 (1.66–2.1) and 1.58 ± 0.13 (1.33–1.85) respectively (Table 1).

The values for *N. tapetis* show a slight difference between males and females (Table 1). In Table 1 of Guille and Soyer (1967), however, the authors did not show the gender of each specimen of *N. lecalvezi*.

In *N. lecalvezi*, the seventh palpal segment is longest, the eighth is second, and the sixth is third (7th > 8th > 6th). According to Guille and Soyer (1967), the relationship in *N. tapetis* was 7th > 8th = 6th, but in the present study, it was found to be 7th > 8th > 6th. The values of both species still show differences (Table 1), but the present study narrows the gap.

Denticulations of ovigerous compound spines

Nymphonella spp. have compound spines with pairs of denticulations, on the distal four segments of the adult ovigers (Fig. 1).

Guille and Soyer (1967) showed that the number of denticulation-pairs of each spine in *N. lecalvezi* ranged from 4 to 7 pairs (6 on average), whereas Ohshima (1935) described the number in *N. tapetis* as about 8. The difference in the number of pairs was considered to be one of the characteristics by which to establish *N. lecalvezi* as a new species (Guille and Soyer, 1967). Munilla (1988), however, counted 7–9 denticulation pairs in the Namibian specimen of *N. lecalvezi* (Table 2).

I examined 42 spines of *N. tapetis* from the Tokyo Bay, and the number of denticulation pairs was 7 or 8 in

males and females (7.5 on average) (Table 2). Thus the range of the number in both species overlaps.

Remaining problems

Although the present study evidently weakens the validity of *N. lecalvezi* as a new species, it evaluates only two morphological characteristics of specimens from limited localities. Thus the taxonomic conclusion requires more detailed morphological as well as molecular analyses.

Pre-adult stages of the Mediterranean *Nymphonella* have been recorded only by Le Calves (1950) where six juveniles were collected by a plankton light trap. Such a free-living mode seems to be very curious, because larvae and juveniles of Japanese *N. tapetis* are always endoparasitic to bivalves (Ohshima, 1927; Kikuchi, 1976; Ogawa and Matsuzaki, 1985; Taru *et al.*, 2007; Miyazaki *et al.*, 2010). There has been little information on the life history of the Mediterranean *Nymphonella*, and a detailed study is necessary to resolve the taxonomic confusion of the genus.

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Table 1 Comparison of the ratios of palpal segment length.

	7th/6th	7th/8th
<i>N. tapetis</i> Total (n=19)	1.45 ± 0.13 (1.25–1.65)	1.34 ± 0.14 (1.0–1.6)
Males (n=12)	1.42 ± 0.14 (1.25–1.6)	1.33 ± 0.17 (1.0–1.6)
Females (n=7)	1.50 ± 0.08 (1.4–1.65)	1.37 ± 0.03 (1.33–1.42)
<i>N. lecalvezi</i> (n=11)	1.94 ± 0.15 (1.66–2.1)	1.58 ± 0.13 (1.33–1.85)

Average \pm SD (range). Data from the present study (*N. tapetis*), and Le Calvez (1950), Guille and Soyer (1967), and Munilla (1988) (*N. lecalvezi*).

Table 2 Comparison of the number of denticulations of ovigerous compound spines.

	Number of denticulations
<i>N. tapetis</i> (n=42)	7–8 (7.5)
<i>N. lecalvezi</i> (n=?)	4–9 (?)

Range (average). Data from the present study (*N. tapetis*), and Guille and Soyer (1967), and Munilla (1988) (*N. lecalvezi*).

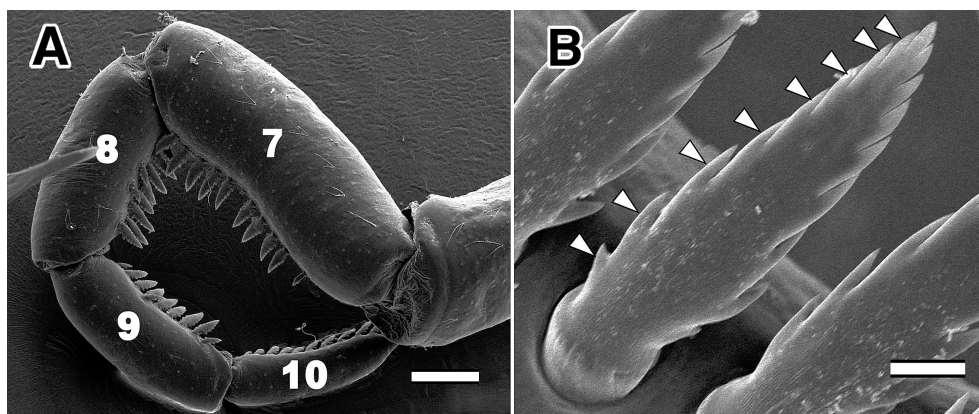


Fig. 1 *Nymphonella tapetis*. A. Distal part of adult male oviger showing four segments with compound spines. SEM. 7–10: 7th–10th segments of the oviger. Scale = 200 μ m. B. Compound spine with eight pairs of denticulations. SEM. Arrowheads show denticulations. Scale = 10 μ m.

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