

Pukia ohtsukai sp. nov., a new species of “cydippid” ctenophore from Japan

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Abstract: A new species of “cydippid” ctenophore, *Pukia ohtsukai* sp. nov., is described from material collected in Nishino-omote Port, Tanegashima Island, Japan. It can be distinguished from the only other member of the genus by the presence of perradial canals, lack of bilateral diverticula beneath the comb plates, a lower number of comb plates per comb row (19–21), the presence of black pigment patches at the oral ends of the comb rows and around the statocyst, and by the length of the pole plate, which extends only to the aboral tips of the comb rows.

Key words: ctenophore, new species, *Pukia*, Tanegashima Island, Kagoshima Prefecture

Introduction

The Pukiidae Gershwin, Zeidler & Davie, 2010 is a recently described family of “cydippid” ctenophores that possess a distinctive crescentic morphology of the tentacle bulbs (Gershwin, Zeidler & Davie 2010). The sole present member of the family, *Pukia falcata* Gershwin, Zeidler & Davie, 2010 was reported as endemic to Australia in the original description, but has since been reported from Suruga Bay, Japan (Minemizu et al. 2015). During a cruise on the T/V *ToyoshioMaru*, Hiroshima University, between 18–26 October 2016, a species belonging to this genus was collected from the surface waters of Nishino-omote Port, Tanegashima Island, Kagoshima Prefecture. A further individual was photographed in situ off Maeda Cape, Okinawa. The morphological characters of these specimens suggest that it is a new species, which is described herein.

Results

Pukiidae Gershwin, Zeidler & Davie, 2010 (emended)
Monotypic for the genus *Pukia* Gershwin, Zeidler & Davie, 2010

Diagnosis. Cydippida with tentacle bases crescentic, curling around junction of interradian canals at aboral end of stomodaeum; tentacle sheaths open aborally; tentacles

with numerous fine coiling filamentous tentilla; with very long polar plate; with spherical or apple-shaped body, with protruding mouth.

Type genus. *Pukia* Gershwin, Zeidler & Davie, 2010

Pukia Gershwin, Zeidler & Davie, 2010

Diagnosis. Identical to that of the family.

Type species. *P. falcata* Gershwin, Zeidler & Davie, 2010.

Pukia ohtsukai sp. nov.

(Fig. 1A–F)

Material examined. HOLOTYPE: TYSM-20161020-P1, 0m in Nishino-omote Port of Tanegashima Island, in Kagoshima Prefecture (30°43.80'N 130°59.50'E), water temp 25.5°C, 2230 hours, 20 October 2016. 7mm total length, 6mm widest diameter, measured live. Scooped from surface waters with a long-handled ladle, photographed, video recorded at 4K resolution, examined under a dissecting microscope and then preserved in buffered 5% formalin-seawater solution. Images accessible via JAMSTEC's Marine Biological Sample Database (http://www.godac.jamstec.go.jp/bio-sample/index_e.html) under JAMSTEC Sample Number 1160052403. PARATYPES: TYSM-20161020-P2-2, 3, 4, same data as holotype, three individuals. Preserved in 99.5% Ethanol. Both holotypes and paratypes deposited in the JAMSTEC biological sample collection. ADDITIONAL MATERIAL: In situ photographs (Fig. 2), one individual, 5m depth off Maeda Cape, Okinawa Prefecture (26°26.80'N 130°59.50'E), water temp 26°C, 2110 hours, 3 June 2016.

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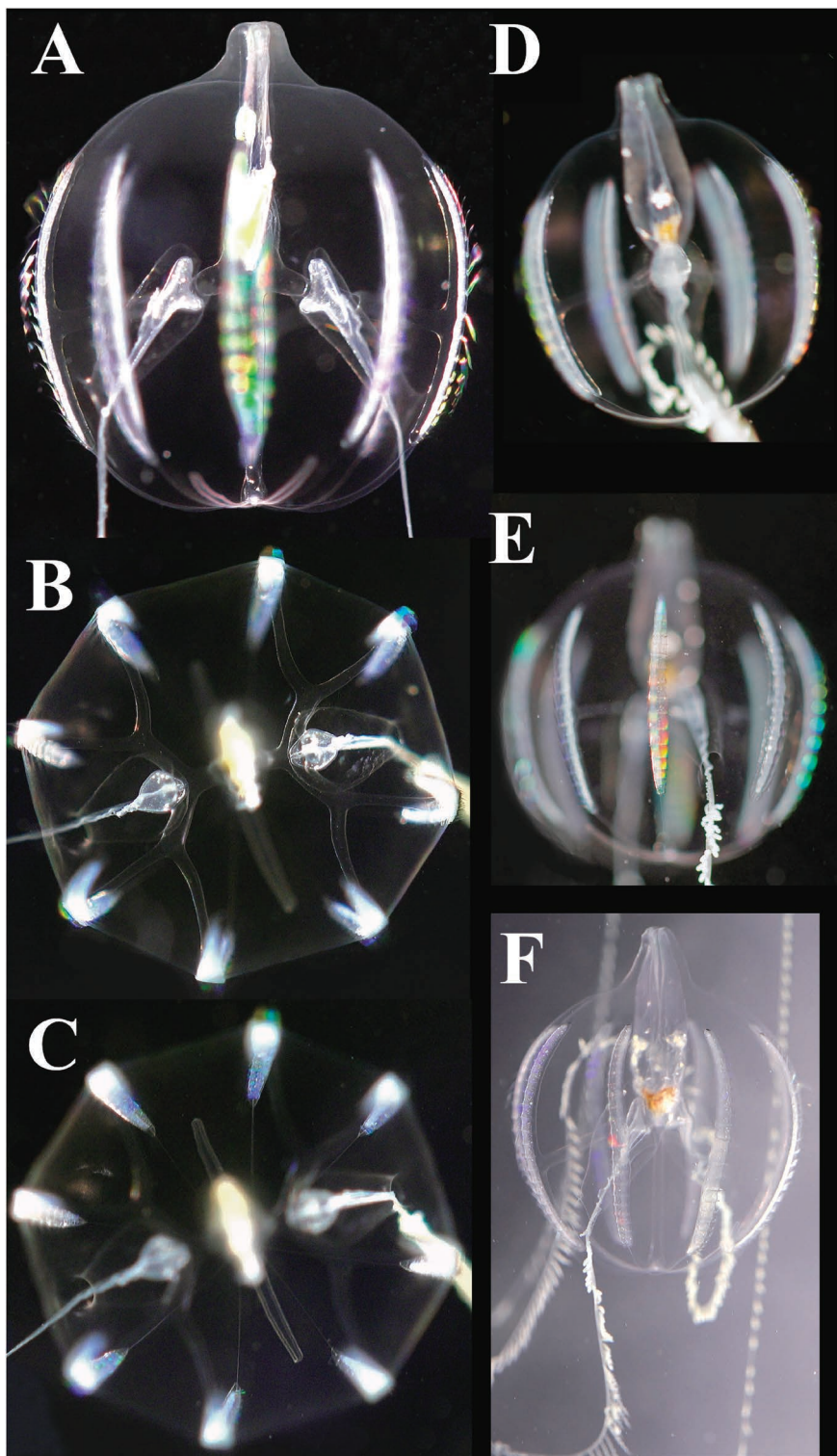


Fig. 1. Photographs of the specimens of *Pukia ohtsukai* sp. nov. collected in Nishino-omote Port, Tanegashima Island, Kagoshima Prefecture, Japan. A, lateral view in tentacular plane; B, aboral view focused on internal canal structure; C, aboral view focused on pole plate; D, lateral view in stomodeal plane; E, aboral-lateral view showing tentacle sheath opening; F, lateral view showing the yellow-brown pigmentation of the infundibulum, black pigment patches at the oral ends of the comb rows and both coiled and extended filamentous tentilla.

15mm total length (Ryo Minemizu, personal communication).

Diagnosis. *Pukia* with perradial canals; without tentacular canals; with no bilateral diverticula beneath comb plates; with 19–21 comb plates per comb row; with black pigment

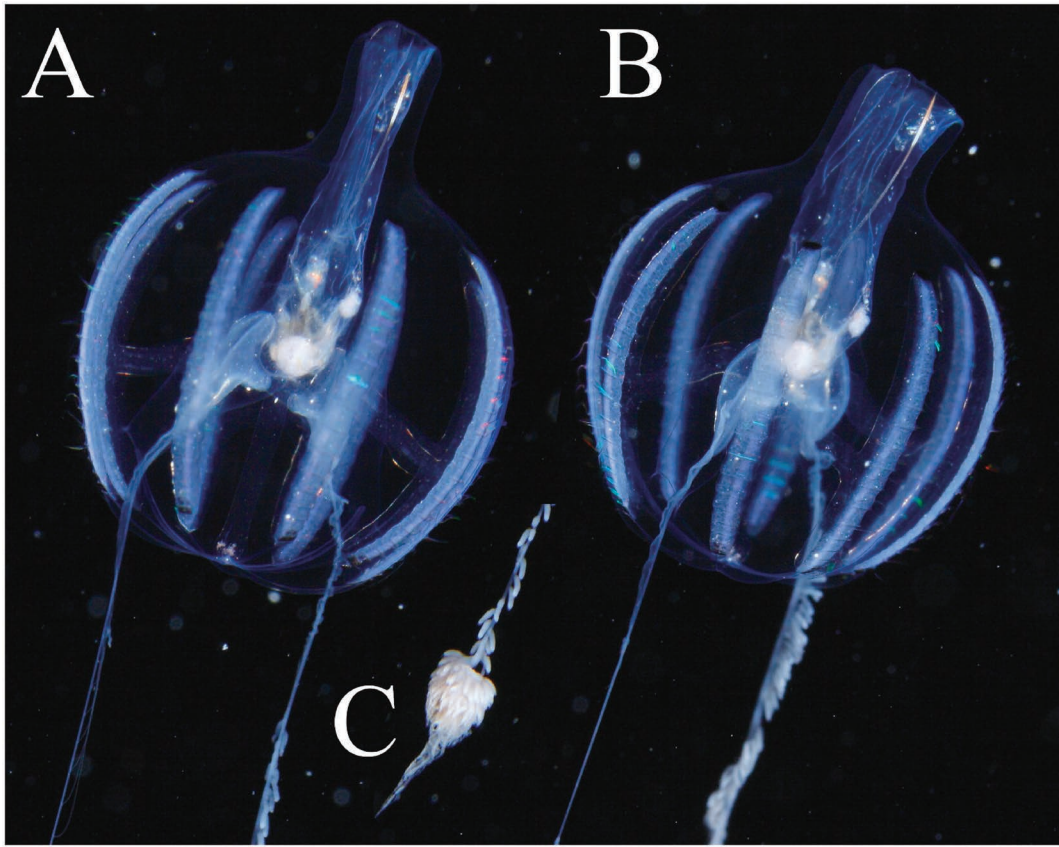


Fig. 2. In situ photographs of *Pukia ohtsukai* sp. nov. at 5 m depth off Maeda Cape, main Island of Okinawa, Japan. Total length: approximately 15 mm. A, adradial lateral view showing black pigment patches at aboral ends of comb rows; B, adradial lateral view showing black pigment patches at oral ends of comb rows; C, close-up of terminus of a tentacle showing the coiled nature and sausage-shaped morphology of the retracted tentilla.

patches at oral ends of comb rows and around statocyst; with pole plate extending only to aboral tips of comb rows in holotype.

Description. Holotype—Body: approximately 6 mm in diameter, 7 mm long including mouth-lips, spherical (Fig. 1A, D–F), highly transparent, with the oral end wider than the indented aboral end; octagonal to circular in cross-section (Fig. 1B–C); of fairly rigid gelatinous consistency. Mouth: permanently protruding. Comb rows: 8, of equal length, two-thirds of body length excluding the protruding mouth-lips, extending aborally to tips of polar plate. Comb rows: Equal in length, with 19–21 plates per row, comb plate width equal to inter-comb plate distance, comb plate length 1.3–1.4 times inter-comb plate distance, black pigment patches present at oral ends of comb rows just past the tips of the meridional canals, no other pigmentation on comb rows or plates (Fig. 1F). Meridional canals: broad, without bilateral diverticula beneath each comb plate, with traces of gonadal material (simultaneous hermaphrodite). Internal canal branching structure: typically pleurobrachiid with perradial, interrational, and adradial canals 16%, 30%, and 54%, respectively, of the total canal length from the infundibulum to the meridional canals (Fig. 1B);

Adradial canals joining meridionals at their centre (i.e. approximately the 10th comb plate); Paragastric canals simple, reaching lips. Stomodaeum: broad, extending halfway to aboral pole, digestive villi of infundibulum pigmented yellow-brown. Infundibular canal: long, narrow, slightly conical, tapering toward statocyst. Statocyst: deeply embedded within the aboral indentation of the body, with black pigment patches scattered around it, with long ciliated furrows joining it to comb rows, without a ciliary ring or aboral papillae. Polar plate: very elongated, with two opposing narrow, straight-sided wings extending to level of aboral tips of comb rows. Tentacle bulbs: crescentic, situated just less than one quarter of distance to body wall, curled around junction of interrational canals at aboral end of stomodaeum (Fig. 1C–D), bulb length approximately 15% of body length excluding the protruding mouth-lips. Tentacles: emitting from midline of tentacle bulbs, with numerous filamentous tentilla, coilable when agitated, tinged slightly yellow. Tentacle sheaths: voluminous along entire length, dilated proximally more than distally when relaxed, running obliquely from mid-line to body wall, opening between fifth and seventh comb plate from aboral end of comb rows when relaxed (Fig. 1E) but able to be dilated distally such that tentacles can be deployed aboral

to the aboral ends of the comb rows (Fig. 1F), especially when swimming rapidly. Additional material—Black pigment patches present at both the aboral (Fig. 2A) and oral ends (Fig. 2B) of the comb rows. Number of comb plates and point where adradial canals joins meridionals same as with holotype. The pole plate seems to be relatively longer but this cannot be verified based on the single photo where the pole plate is in focus (Fig. 2A). Coiled tentillae sausage-shaped (Fig. 2C) rather than lightbulb-shaped as in *Euplokamis*.

Distribution. At present only from Tanegashima Island and the west coast of the main island of Okinawa but presumably occurs anywhere under the influence of the warm Kuroshio Current.

Etymology. The specific name is in honour of Professor Susumu Ohtsuka of Hiroshima University, who invited the author and was Chief Scientist of the cruise of the T/V *ToyoshioMaru*, Hiroshima University, during which the present material was collected.

Remarks. The case could be made that the present material is referable to immature individuals of *P. falcata*, especially since this species has already been reported from Japan (Minemizu et al. 2015). In the photograph of the *P. falcata* morphotype closest to the present material (Fig. 1E in Gershwin et al. 2010), the adradial canals meet the subtentacular meridional canals between the 14th and 15th comb plate from the aboral end of the subtentacular comb rows and there seem to be around 30 comb plates. The spacing between comb plates is around the same as their width, as with the present material. Although no patches of black pigment are visible at the oral ends of the meridional canals, some other ctenophore species (e.g. *Bolinopsis infundibulum* (O. F. Müller, 1776)) can have morphotypes either with or without patches of black pigmentation oral of the comb rows (personal observations), the reason for which remains unclear.

Comb plate numbers per row necessarily increase with growth and it may also be that pigmentation could change with growth. In the list of non-type material, Gershwin et al. (2010) list animals from Western Australia that were “small, pointy, with rows half body length”. This is the only record in the considerable list of material where the comb rows are suggested to cover anything less than the entire length of the body, even though many immature individuals are also listed. That the animals were “pointy” also raises the doubt that they might not, in fact, belong to the species in question. Furthermore, *P. falcata* was reported to lack perradial canals (Gershwin et al. 2010). In immature “cydipiids” the perradial canals can be very hard to observe and delineate from the interradial canals (personal observations). However, even though the individuals in the present material were much smaller than the *P. falcata* holotype that was described as lacking perradial canals,

these canals were quite prominent and easy to distinguish (Fig. 1B). The length of the polar plate in the present material is also considerably shorter than that in *P. falcata* (Fig. 1C). No mention is made of the existence, or lack thereof, of tentacular canals in *P. falcata*, but the aspect of the bulbs might suggest that they also lack in that species.

It is possible that the present species may turn out to be a synonym of *P. falcata*, but until a more thorough description on further fresh material is made of *P. falcata* from the type locality it is deemed wise to erect the species *P. ohtsukai* to contain it. The only character in the present material that might justify placing this genus in its own family, rather than in the Pleurobrachiidae, was the absence of tentacular canals, which presumably is why the tentacle bulbs curve around the junction of the interradial canals in order to absorb nutrients more readily. Rather than transfer this genus into the Pleurobrachiidae, which could well turn out to be a polyphyletic grouping, it was elected to retain the family Pukiidae, at least until a genetic analysis can be carried out.

Discussion

Descriptions of ctenophores, especially of higher taxa such as genera and families, often lack enough detail to clearly delineate and describe further species within these taxa (personal observations). For example, although black pigment spots were present at the bases of the filiform tentilla of *Pleurobrachia pileus* (Müller, 1776) captured and investigated by the present author off Plymouth on 27 June 2007, the presence of such pigment spots has never been reported in the literature, to the author’s knowledge. In fact, the species diagnosis at the time of “globosus, costis octo, cirrisque duobus ciliatis”, could refer to almost any globular cydippid ctenophore, although “cirrisque duobus ciliatis” suggests at least that the animal had tentilla on its tentacles. There is of course no record of its pigmentation in the original description and it is quite likely that the animal we now refer to as *P. pileus* is not actually the one that was originally described as such (personal observations). The present case borderlines upon this phenomenon with several characters of the *Pukia* species probably actually being present in both (e.g. lack of tentacular canals and the probable presence of perradial canals) and some characters probably, but not yet unequivocally, different (e.g. the black patches of pigment). To an extent this is probably unavoidable as the numerous redescriptions of recently described species attest (Pugh & Baxter 2014, Lindsay et al. in press). Some characters present in relaxed live or recently deceased animals can also be somewhat plastic in the active animals, as with the point of exit of the tentacles observed in the present species or with the highly extensible mouth of *Lampea pancerina* (Chun, 1879). Although not always possible, it is always best to examine live material, take copious numbers of photographs and video, and to deposit not only the physical organic material but also

the images recording it in its fresh state into a professionally managed repository, as has been done with imagery from the present study.

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