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Preliminary study of diet composition in the priaprium fish *Neostethus lankesteri* Regan, 1916 from estuary of Pranburi River, Thailand

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Abstract : The diet composition of the priaprium fish preliminary study were examined by using the gut contents analysis methods. Based on 90 specimens (SL 1.8-2.8 cm) collected from three stations in the Estuary of Pranburi River during March to May2015, various food items were observed from the gut content including diatom, algae, dinoflagellate, zooplankton, and miscellaneous. Phytoplankton such as diatom was the major contribution to the priaprium fish diet. The second most prey item that contributed to the diet composition were copepods which included harpacticoid, calanoid, and cyclopoid copepods. Based on the index of relative importance (IRI), centric-diatom was the most importance prey followed by unidentified copepod fragments and harpacticoid copepod respectively. The finding of diet compositions of this fish indicated that the priaprium fish in Estuary of Pranburi River is feeding on a variety of food items and they can be considered as an opportunistic or omnivorous feeding guild.
Keywords : gut content analysis, *Neostethus lankesteri*, Pranburi River, priapium fish

Introduction

Feeding ecology is important for understanding the functional role of the fish within the ecosystems. Not only does this knowledge helps understanding trophic interactions in aquatic food webs (Garvey *et al*., 1998 and Zanden *et al*., 2000) but it also helps in understanding resources partitioning in the ecosystem (Ross, 1986 and Guedes and Araujo, 2008).The study of fish feeding habits and the analysis of gut content has become a standard practice in understanding the trophic analysis in the ecosystem (Hyslop, 1980).

The priapium fish, *Neostethus lankesteri* Regan, 1916 belongs to the Family Phallotethidae. It has the distribution in the Southeast Asia; Indonesia, Malaysia, Singapore and Thailand (Myers, 1928 and Parenti, 1984). In Thailand, priapium fish are found in the Rivers and Estuaries. Pranburi River estuaries ecosystem was studies and evaluated by Paphavasit *et al*., (2014). In this they proposed the food web in the system. However, most of the links between species was based on the literature reviews. Fishes are known to have their diet shifts spatially and temporally (Specziar and Eros, 2014). Therefore, it is vital to conduct the gut content analysis of the organisms in the ecosystem to get a better resolution of the food web. Priapium fish was hypothesized as zooplankton and phytoplankton feeders. They were also hypothesized to play an important role in linking the primary producer and secondary consumer especially as a diet of commercial fishes such as *Herklotsichthys displionotus*. Therefore, we evaluated the gut content of *N. lankesteri* from the Pranburi River, Thailand to clarify the basal linkage area of the Pranburi River estuary food web.

Methodology

Sample collection

During March to May 2015, priapium fish (n = 90) were collected by larvae fish otter trawl from three stations (12°24'15.8" N, 099°58'25.6" E, 12°24'21.6" N, 099°58'37.1" E, 12°24'08.5" N, 099°59'00.2" E) in the Estuary of Pranburi River, Prachuap Khiri Khan Province. After collection, the fish was euthanized by a rapid cooling shock

(Wilson *et al.,* 2009). It was then fixed in Davidson's fixative to study the gut content in laboratory. The experimental protocol was approved by the Animal Care and Use Committee of Faculty of Science, Chulalongkorn University (Protocol Review No. 1523005).

Analysis of stomach content

In laboratory, 90 specimens were dissected. The intestine from each specimen was removed from the carcass and the length of intestine was measured. The intestine was then dissected to remove the gut content. The prey items were identified under guideline of Tomas (1997) and Boltovskoy (1999) under microscopy (Taghavi Motlagh *et al*., 2012).

After the identification process, the percentage by frequency of occurrence (%O), the percentage by number (%N) and the percentage by volume (%V), as described by Pinkas *et al*. (1971) and Hyslop (1980) were calculated. The index of relative importance (IRI) was used to describe the important of fish's diet and explain the feeding habit of fish (Hyslop, 1980 and Cortés, 1997).

Results and Discussion

The food items of the priapium fish was classified into five groups: diatoms (centric diatom and pennate diatom), algae (*Merismopedia* sp.), dinoflagellate (*Noctiluca* sp.), zooplankton (copepod fragments, harpacticoid copepod, nematode, mollusk larvae and foraminifera), and low frequency of occurrence miscellaneous items (clalanoid copepod, arrow worm, cirripedia larvae, insect fragments, zoea of crab, nauplius, cyclopoid copepod, shirmp larvae fragments, polychaete larvae, tintinid, and larvacean) (Table 1). Interestingly, the main diet of *N. lankesteri* in this study was phytoplankton which was different from copepods that was found in the gut content of the same species from streams of the Sungei Buloh Mangal, Singapore (Mok and Munro, 1991). Omnivore fishes are less abundance in number when compared to carnivour fishes. Most of previous literatures suggested that Priapium fishes are carnivour. For example, *Gulaphallus mirabilis* (Villadolid and Manacop, 1934) and *Phenacostethus smithi* (Munro and Mok, 1990) feed mainly on insects.

In present study, centric diatoms were found the maximum percentage of occurrence (%O) in all specimens (90 individuals). Based on percentage of the index of relative importance (%IRI), all three stations dominated centric diatom (>50%) followed by copepod fragments and harpacticoid copepod respectively. The result of the present study shows presence of diatom in the gut content which could be explained accidental prey theory (Valenzuela *et al*., 1995). The area which the priapium fishes were collected had diatom in high concentration during the fish collection. Therefore, a large amount of diatom could be ingested when the fish feeds on copepods which were their intentional prey. To clarify these hypotheses, the study of characteristic of gill raker, relationship of gut length and body length, and histological study of digestive tract of *N. lankesteri* would be conducted in the future study. Another possible explanation could be that *N. lankesteri* were omnivore and they intended to feed to on diatom as their top prey item. However, more studies are needed on the digestive tract and enzymatic reaction of the digestive system.

Conclusion

Overall of our study, the preliminary finding of diet composition in the priaprium fish from Estuary of Pranburi River, Thailand exhibited this fish might be feeding on a variety of food items and they can be considered as an opportunistic or omnivorous feeding guild.

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Table 1: Food composition found in the gut contents of *N. lankesteri* from Pranburi Estuary, Thailand. (n = 90 individuals)

		Station 1				Station 2				Station 3			
		%N	%O	%V	**%IRI**	%N	%O	%V	**%IRI**	%N	%O	%V	**%IRI**
Diatom	Centric diatom	85.1	100	27.9	51.9	97.5	100	75.5	90.2	93.2	100	69.1	86.6
	Pennate diatom	8.7	46.4	0.2	0.2	0.1	30.8	0.01	0.002	4.9	84.2	0.8	0.3
Algae	*Merismopedia* sp.	0.1	14.3	0.003	0.002	0.01	3.8	0.001	0.0001	0.1	15.8	0.01	0.003
Dinoflagellate	*Noctiluca* sp.	0.9	75	0.8	1.04	0.8	57.7	1.5	0.95	0.04	5.3	0.1	0.01
Zooplankton	Copepod fragments	2.0	64.3	17.4	20.2	0.6	46.2	12.6	6.9	0.6	73.7	11.1	10.1
	Harpacticoid copepod	0.7	50	18.7	16.9	0.1	23.1	4.3	1.2	0.1	26.3	4.9	1.6
	Nematode	0.1	25	7.4	3.4	0.01	7.7	2.5	0.2				
	Mollusk larvae	1.7	39.3	3.2	2.3	0.3	19.2	1.3	0.3	0.3	15.8	1.4	0.3
	Foraminifera	0.1	21.4	4.1	1.6	0.0	7.7	1.1	0.1	0.02	5.3	1.3	0.1
Miscellaneous		0.4	100	20.3	2.6	0.6	69.2	1.3	0.2	0.5	89.5	11.3	1.01

Note: %O, the percentage of frequency of occurrence; %N, the percentage of number of individual; %V, the percentage of volume; %IRI, the percentage of index of relative importance.