



Ethnotaxonomical Study of Mole Crab (Crustacea:Hippoidea) on Coastal Community of Cilacap

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Abstract

Local wisdom is a cultural heritage that needs to be preserved. The Cilacap's coastal communities have traditional taxonomy knowledge that hasn't been informed, especially about mole crab. This study aimed to explore the ethnotaxonomy knowledge of sand crabs (Crustacea: Hippoidea) in Widarapayung coastal communities. The purposive snowball sampling was used for the method, followed by observation and semi-structured interviews with 30 respondents. Data were analyzed descriptively based on observations and interviews. The results showed that the coastal communities in Widarapayung tourist areas could be divided into five groups, namely catchers, collectors, processors, traders, and consumers. The catcher was able to recognize and describe three types of sand crabs based on the shape of the body and their catchment areas. Captured crabs had the local name of 'yutuk jambé' (*Emerita emeritus* Linnaeus 1767), the appellation was based on carapace shape that resembled the shape of areca fruit; 'Yutuk bathok' (*Hippa adactyla* Fabricius 1787), had the carapace shape resembling a coconut shell, and 'yutuk Kethék' (*Albunea symmysta* Linnaeus 1758), had ornaments on the carapace surface similar with a monkey face, there were dense setae on the edge of the carapace, spiny long antennas and aggressively pinch when captured. The knowledge and skills of sand crabs classification and local name entitlement acquired by the people were in accordance with the Berlin's model.

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INTRODUCTION

'Pantai Indah Widarapayung' is one of the coastal tourist locations in the Binangun District, Cilacap, that has flat beach topography. As a natural tourist site, the region is supported by adequate facilities, such as paved roads, kiosks, mosques, stalls tents, swimming pools and bathing places, shelters, substation view posts, parking areas, and local arts. Performing arts are usually held on holidays, school holidays, or when there are traditional ceremony practices and at certain times if needed. One of the eminent culinary potentials of Widarapayung is unique coastal food from Crustacean, such as mole crabs, which is called 'Yutuk' by the local people.

Besides the beautiful beaches, there are other conditions on Cilacap coast, that are interesting to be studied, are the local knowledge of the fisher communities on observing the environment. According to Johnson (1992), local knowledge is a set of knowledge that was created by a group of people through generations that lived together and in harmony with nature. The knowledge was developed in the local scope, adjusting to the circumstances and needs of the community. While Posey (1996), stated that traditional knowledge, which is an integrated system of beliefs and particular practices among different cultural groups. Meanwhile, according to Suryadarma (2008), human relations or community groups at certain ethnicities in accordance with the geographical characteristics in adjusting with biological objects, conceived as ethnobiology.

Those conditions, that occur in Cilacap coastal communities, are small parts of the general description/representation of Indonesian people/society, which have the local knowledge that is able to support its life sustainability. Even Daulay (2011) stated that the majority of indigenous people in Indonesia still depend on traditional knowledge as an integral part of their daily lives. They preserve the knowledge by transferring it through generations. They manage the means of ownership, the use and transfer of the knowledge in accordance with customary rules that they obey.

Knowledge of traditional biology or ethnobiology are applied in various forms by the researchers, who have diverse expertise and academic understanding, so it is not surprising that the recent ethnobiological studies are similar to the studies in traditional ecological knowledge (TEK) (Alves et al., 2011; Si, 2011; Si, 2016). Utilization of ethnobiological knowledge or traditional ecological knowledge (TEK) in the non-

industrial society is not only as an important part of the cultural heritage of a community, but also as an important resource for researchers involved in biology conservation activities in the last few decades (Ramstad et al., 2007; Ban et al., 2009).

According to Panchen (1992), one of the human's attempt to understand the environment, including other living things, is the classification that placed living things into groups, mainly based on physical similarities or differences. Thus, human/man is a living creature that is able to do two important activities in taxonomy, which are entitle and classify living things. In fact, according to Berlin (1992), taxonomy has long been known and practiced in human's life, probably as long as human's existence in the world.

One area of biological study, associated with local knowledge in identifying and classifying living things, is ethnotaxonomy. Studies of ethnotaxonomy aim to investigate how living organisms are identified, entitled and classified, as well as trying to understand how people categorize (included in the ethnosemantic domain) and organize, based on natural elements (ethnotaxonomy structure domain) (Hunn, 1982; Hays, 1983; Brown, 1985, Berlin, 1992; Loss et al., 2014).

Some studies have been also conducted ethnotaxonomy (Mourão et al., 2006; Saiki et al., 2009; Osawaru & Eholor, 2010; Patil, 2010; Previero et al., 2013; Loss et al., 2014; Franco et al., 2015) which generally aims to find out how the people of the region in identifying, classifying and giving names to the animals and plants as well as the base used in naming. While Docio et al., (2013) stated, studies like this can help in conservation strategies, as well as in other areas of science offering memes, places where organisms live, ecological interactions, and how they are used for cultural or medicinal purposes.

Given information about ethnotaxonomy knowledge of sand crabs on the fisher communities on the coast of Cilacap, particularly in the Binangun District still limited, research has been conducted that aims to 1) explore and describe the local knowledge (of the Widarapayung coastal communities) managed by Widarapayung coastal communities, especially practical knowledge of sand crabs (Hippoidea:Crustacea) traditional taxonomy; 2) identify the model of traditional taxonomic knowledge that has lasted all the time; and 3) determine the number of sand crabs species that have been caught by the people in the Widarapayung coastal region.

The information obtained hopefully can be reconstructed and disseminated to educate

other coastal communities, and can be contributed to constructive thought in enriching the learning materials of animal taxonomy, especially ethnozoology.

The results of this study have been disseminated in the 'Forum Nasional Pemuliaan dan Konservasi Sumberdaya Ikan Ke-V', which was organized by the Research Institute for Plant Breeding and Conservation of Fish Resources in cooperation with the Faculty of Fisheries and Marine UNPAD, on October 20th, 2015 in Bandung.

METHODS

Research Location and Time

The research was conducted at the Pantai Indah Widarapayung tourist area, in the Binangun District, Cilacap, Central Java province. The location was determined based on the biological resources, in the form of mole crabs (Yutuk) and cultural potential of the local communities in identifying, classifying, and entitling the biota. Research implementation took place from May to August 2015.

Research Material

The research materials were the people who lived in the coastal area of Binangun District, Cilacap, the mole crabs that were caught by the fishermen, and alcohol 70%. The tools that were used for data collection include: questionnaire paper/sheets, stationery, 'sodo' nets, shoes, plastic buckets, camcorders, digital cameras, paper labels, graph paper, collection bottle, as well as Hippoidea identification guide by Haig (1974); Boyko & Harvey (1999); Boyko (2002); Poore (2004) and Hsueh (2015)

Data Collection

This qualitative study used survey method with ethnographic study approach. Sampling was done by purposive snowball sampling technique, followed by observation and semi-structured interviews. According to Rudito & Famiola (2011), local knowledge could be detected with qualitative data networking technique by participation observation. (for detecting local knowledge can be made using a data networking techniques qualitatively by observation of participation.)

Purposive snowball sampling was applied in this study due to the absence of initial data on local knowledge of the local communities about sand crabs. Respondents were determined by setting the key informants, which was based on daily activities on sand/mole crabs utilization.

Types of collected data have consisted of primary data and secondary data. Primary data was obtained by observation and informants interviews of 30 people, consist of: 18 traditional fishermen (4 fishermen and 14 'penyodo'), 2 collectors ('jurgagan'/masters), 4 processors, 9 sellers and 7 customers ; with the age of over than 20 years old. Meanwhile, secondary data was obtained from related agencies, research reports, literature, and scientific papers/works.

This research was conducted in a natural situation (natural setting) and the collected data was qualitative and was analyzed descriptively based on the observation and interviews. Data collection stages referred to Rudito and Famiola (2013) with modification, in order to explore the local knowledge about the traditional taxonomy of mole/sand crabs. The steps were as follows: 1) data collection by participation observation, by recognizing symbols or terms used and developed in the community about the kinds of animals, in general, and mole/sand crabs, in particular; 2) data collection on existing and developing belief in community life, especially related to the natural environment; 3) identification of all tools used by individuals as members of the community in needs fulfillment, both in terms of economy, social and cultural; 4) inventory and record of the usefulness, benefits, and function of the materials in the environment; 5) identification of the individuals ability in the community, the capability, and technology in natural resources management ; 6) identification of the communication means in the community with all the forms, terms, and functions of the signs occurred within the community; 7) detection and inventory of all social institutions within the community; 8) record and description of the technology knowledge uses and the ways to embody such knowledge; 9) note and description of the traditional taxonomy practical knowledge acquisition of the coastal communities in Binangun District, Cilacap, which include: how to recognize Yutuk crab habitat in the coastal areas, how to identify the location of capture, how to catch, tools that were used to capture; and how to entitle.

Data Analysis

The obtained data were analyzed thoroughly by the inductive approach based on observation, interviews, and secondary data to compile a descriptive abstraction with the stages of data reduction, data presentation, and conclusion withdrawal.

RESULTS AND DISCUSSION

Binangun district is located in the coastal area that covers six villages, namely: Pagubugan, Pagubugan Kulon, Sidaurip, Widarapayung Wetan, Sidayu and Widarapayung Kulon (Figure 1). The total area of Pagubugan village is 2,66 Km², Pagubugan Kulon is 3,44 Km², Sidaurip is 4.60 Km², Widarapayung Wetan is 4.48 Km², Sidayu is 2,28 Km² and Widarapayung Kulon is 3.12 Km². The total population of each village is shown in Figure 2, while the number of people who earn their living as fishermen is presented in Figure 3.

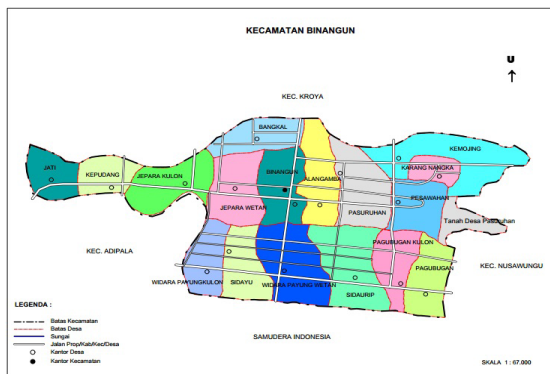


Figure 1. Map of Binangun District, Cilacap (Bappeda Cilacap, 2014)

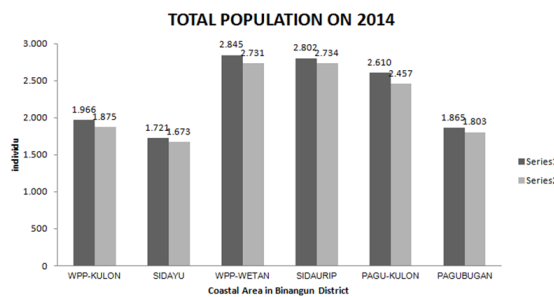


Figure 2. The Number of Total Population

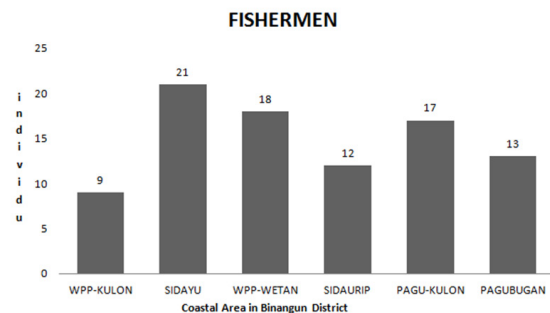


Figure 3. The Number of Fishermen

Associated with knowledge acquisition of traditional taxonomic or ethnotaxonomy of mole crabs, information obtained from the results

of preliminary observations that villagers in the Binangun district, who earn their living as fishermen, had been specialized naturally based on the life demands and needs. Fishermen in the Pagubugan, Pagubugan Kulon, and Sidaurip villages were mostly specialized as fish fishers, while from the Widarapayung Wetan, Widarapayung Kulon, Sidayu villages were more specialized as crab catchers, and were referred as ‘tukang sodo’. The appellation was based on the tool used to catch crabs, which were sodo nets.

Given that ‘tukang sodo’ generally came from the Widarapayung Wetan, Sidayu and Widarapayung Kulon villages, most of the interviewed respondents were chosen from those three villages. In addition, due to the place of processed crab market was also centralized in Widarapayung coastal tourist areas, interviews were also conducted with visitors to those areas.

Based on the data and information obtained during the research, it was known that the fisher communities in Widarapayung tourist areas (Widarapayung Wetan, Sidayu and Widarapayung Kulon villages) could be divided into five groups, related to the knowledge of mole/sand crabs, namely, catchers, collectors, processors, traders and consumers. Each group had different traditional taxonomic knowledge. Most of the crab-catcher groups had quite well knowledge of the traditional taxonomic, while the other groups mostly knew the utilization only.

Catchers were generally able to identify, classify and entitle the captured mole/sand crab. Catcher groups had been able to recognize and describe three types of mole crabs based on the shape of the body and their catchment areas. It showed that the Cilacap coastal communities, especially ‘tukang’ sodo, had mastered ethnobiology.

The local knowledge of human populations about the natural world has been addressed through ethnobiological studies, especially concerning resources usages and their management (Souza & Begossi, 2007). Several criteria, such as morphology, ecology, behavior, symbolic, utility and salience, have been used by local communities to classify plants and animals (Souza & Begossi, 2007; Forth, 2010).

Some ethnobiology principles of classification and nomenclature aimed to identify cognitive similarities among societies. Thus, ethnobiology was important as the basis to determine the ethnic classification criteria (morphology, ecology, ethology, etc.), in order to develop classification system in the taxonomy of certain communities (Berlin et al., 1973; Berlin 1992; Loss et al.,

2014). There was a classification in ethnobiology could be a good indicator of the society processes, behaviors and cognitive languages (Loss et al., 2014).

Additionally, with simple language, Cilacap coastal communities had also been able to apply the nomenclature in entitling the mole/sand crabs. Entitlement was done based on the form and completeness (accessories) of his body. Based on observations of the respondent's ability and knowledge in recognizing, classifying and entitling mole/sand crabs, obtained information of three species of Hippoidea crab in the local area. The crabs were locally entitled/called as 'Yutuk Jambe', 'Yutuk Bathok' and 'Yutuk Kethek'. Descriptions of each type of crab were as follows.

Yutuk Jambe

It had oval shape body with the high convex surface, gray, black and sometimes very black body shell, There were few spines/thorns on one end of its body and limbs on the other end, which were used for walking and swimming (Figure 4). Adult female crab usually had eggs that were attached to the limbs and was sometimes visible from the dorsal of the body. Eggs color were light to dark yellow. This type of crab was mostly caught than the other two types, by direct catch from the sea, or could be obtained by digging the sand on the beach. The appellation of 'jambe' was because of the similarity of its body with areca fruit (Figure 4). Identification and verification showed that 'yutuk jambe' scientific name was *E. emeritus*, L 1767). Morphological characters of *E. emeritus* found on the coast of Cilacap in accordance with the description of Boyko (2000), Haye et al., (2002), Israel et al., (2006); Kazmi & Siddiqui (2006) and Hsueh (2015)

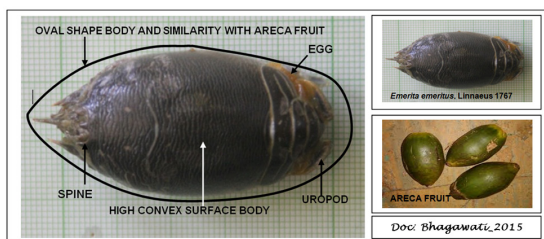


Figure 4. Yutuk Jambe Mole Crab (*E. emeritus*, L 1767)

Yutuk Bathok

Yutuk Bathok had rounded shell shape with the convex surface, gray, black and dark black color. Barbels were short, the shortest among the two other species. The first limb was long, cylindrical, and clearly visible since it

wasn't protected by the shell (Figure 5). The appellation of 'bathok' was because the body shape resembled an upside-down coconut shell (Figure 5). The identification and verification of the 'yutuk bathok' obtained information of the crab's scientific name, that was *H. adactyla* Fabricius 1787. Morphological characters of *H. adactyla* F 1787 found on the coast of Cilacap in accordance with the description of Bauchau & Passelecq-Gérin (1987); Ingole et al., (1998), Boyko (2000), Kazmi & Siddiqui (2006) and Ardika et al.,(2015)

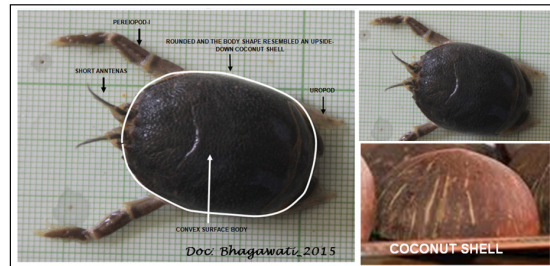


Figure 5. Yutuk Bathok Mole Crab (*H. adactyla* F 1787)

Yutuk Kethek

This type of crab had quite a different shape than the other two types. The body was a square shape with a flat surface and there were ornaments of painting like an ape or monkey face, which had the flat nose and narrow nose-tip (Figure 6). Another characteristic were limbs that were not protected by the shell and there were dense setae on the edge of the shell and limbs, so that were similar to the whiskers on the monkey cheeks. It had a pair of flat-shaped, almost half circle eye stalks, under the antennas, the shape of the eye stalks looked like a crest on the monkey head. On those bases, the type of crab was called 'Kethek', which was the appellation of monkey in the Javanese language.

Yutuk Kethek had very long antennas, that were the longest among the two other types of crab and there were also tiny barbels with the pointed end on the antennas. The morphological characteristics of the crab's shell, supported by the existence of long antennas, were similar to the character of 'Sun Go Kong, King of the monkey', one of the characters in Chinese legend (Figure 7). It also seemed to be another reason of this crab's appellation.

The identification and verification of the Yutuk Kethek obtained information of the crab's scientific name, that was *A. symmysta* L 1758. It had an aggressive nature of pinching when captured. Morphological characters of *A. symmysta* L 1758 found on the coast of Cilacap in accordance

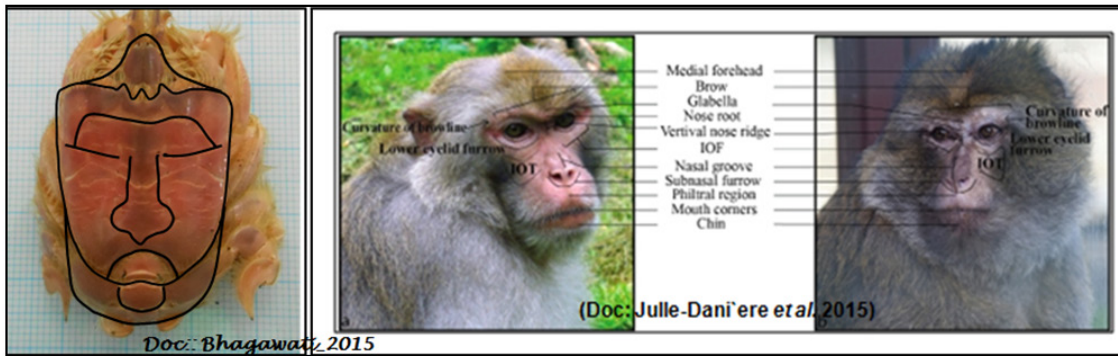


Figure 6. The Shell Surface Of The Crab Yutuk ‘Kethek (*A. symmysta* Linnaeus 1758) similar to the monkey Face

with the description of Boyko (2002); Kazmi & Siddiqui (2006); Boyko & Harvey (2009) and Mashar et al., (2015)

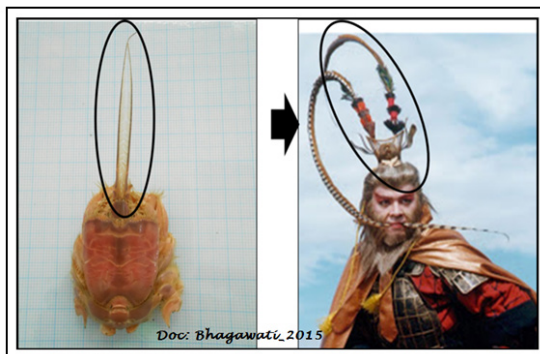


Figure 7. The antennae of Yutuk Kethek ‘ (*A. symmysta* 1758)

Some living things that we knew might have more than one local names, and those names could be vary in one region to another, including the entitlement of this Yutuk crabs. According to Mursyidin (2007), sand crabs common name were Mole Crab, Sand Crab, and the local name was very diverse, which were ‘Yutuk’ (Cilacap, Kebumen), ‘undur-undur laut’ (Yogyakarta), and sand crabs.

Viewed from the basic nomenclature and the appellation, it was known that for generations, the coastal communities in the Binangun District had conducted grouping (classification), had inquired (identification), and were able to describe (description) and entitle the crabs they caught on the sea and the beach. Albuquerque et al. (2014) stated that humans had an innate capacity to categorize and classify based on certain characteristics. Attributes that were seen on organisms had been widely used as the basis to develop many classification systems, however, taxonomy was the only one that was used to study biodiversity.

According to Adisoemarto (2008), the

taxonomy of living things was the theory and practice of describing and entitling living things and categorizing them based on the relationship. It was also explained that the word of taxonomy came from the combination of the Greek words, namely *tassein* (grouping) and *nomos* (law, rule, or science) so that taxonomy was a rule to categorize or to classify.

The coastal communities in Binangun District coastal areas, in a simple way, had been able to classify Yutuk crabs, even in the entitlement, had also implemented the rules of binomial nomenclature, although using the local name. Binomial nomenclature was a very important method of the entitlement and classification of living things, that had been agreed internationally, which entitled living species by two words, the genus and species names.

In the relation of Yutuk crab entitlement, the local communities inadvertently had already had the ability to entitling living things with two words, even in the second word pointed the specific feature of the species and could be used as a basis that distinguished the three types of crab. However, the entitlement of the front name, which was in line with the genus name, people couldn’t explain the origin, since the name of ‘Yutuk’ had been around for a long time.

Traditional knowledge of fisher communities had cognitive models served as the framework that had certain behavior patterns embodied consistently to the faced stimulants and challenges. Thus, a traditional knowledge passed down (for generations) from generation to generation was a set of rules, structure values, beliefs, strategies, and instructions that were models of knowledge came from experience and used by humans who possess it to deal and adapt with their environment (Soekanto, 2000).

Based on the way of categorizing and entitling the Yutuk crabs, it could be said that the

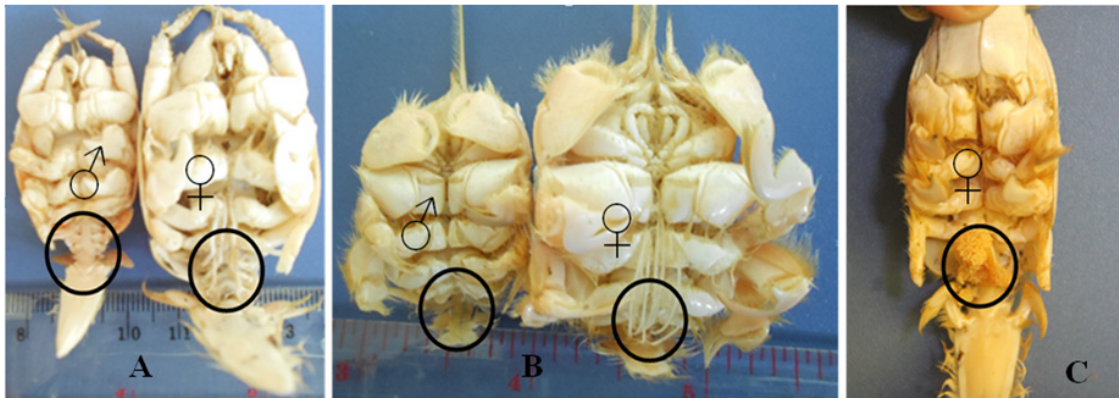


Figure 8. *H. adactyla* (Fabricius 1787) (A) ; *A. symmysta* (Linnaeus, 1758) (B); *E. emeritus* (Linnaeus, 1767) (C)

Cilacap coastal communities unknowingly had applied the Berlin model. According to Si (2016), the Berlin model tried to describe not only the way people categorized living organisms but also the problems on the nomenclature of the categorizing resulted.

Categorization was only done partially to the plants and animals in an area entitled by the people who lived in that area. Categorization was primarily done based on the observation of the morphological similarities and differences and behavior. Taxa were inclusively grouped into hierarchical structures (taxonomies). Taxa in six ranks or levels were comparable to the range of biological classification. Sixth ranks or levels was the kingdom, life forms, among taxa, generic, specific and varieties. In the ethnobiological traditional classification system, each taxon rank systematically showed a number of relative similarities and biological contents. Some members of the generic taxa and subgeneric were considered as a prototype. Most of the traditional grouping were closely related with the scientific taxa content. This was especially applied for taxa at generic ranks (Si, 2016).

Nomenclature assembly in traditional taxonomy, within among taxa and kingdom were often not entitled (confidential/protected), even some taxa life forms also might be concealed. In addition, there were two types of names, namely primary and secondary. The main name (primary) could be simple words (dog) or complex words while the complex secondary name contained the name of the higher taxon (gum). The complex main name could be derived from productive/natural traits (catfish), or unproductive traits (silverfish). The secondary name was a series of contrast names. The genus name was

taken from the life forms and among taxa were labeled with the primary name, while subgenus taxa were labeled with the secondary name. Subgenus taxon was entitled the primary name if it was the prototype of the genus, or it was for the cultivation benefit, while the entitlement of commercial name was based on the organisms characteristics that had been generally known (Si, 2016).

Besides obtaining the information about traditional taxonomic knowledge that had been acquired by people of Widarapayung coastal areas, also gaining the facts that most people could not distinguish the sex of mole crabs if the female crab wasn't spawning. Therefore, during the study, aside from conducted observations and interviews, discussions and information exchange with the local people were also carried out, especially the study of the Yutuk crab gender identification based on morphological characteristics (Figure 8).

Male and female crabs can be distinguished by their morphological characters, the male crabs have genital papilla, located at the base of a pair pereopod the fifth exopodite, located in the thorax, and have no pleopod contained in the abdominal segment. While the female crabs have pleopod, contained in the abdominal segments (Haye et al., 2002; Tudge et al., 2012).

The ethnotaxonomic system of an indigenous community is an interjunction between its language and traditional knowledge. Both language and traditional knowledge are required to generate lexemes that are the building blocks of any classification system (Franco et al., 2015). Therefore, the vitality status of the community's indigenous language and traditional knowledge is reflected in its ethnotaxonomic system.

CONCLUSION

The coastal communities of the Binangun District had traditional taxonomic knowledge (ethnotaxonomy) of the sand crabs, which included the stage of character recognition (identification) based on the character and visible trait similarities and differences; were capable to classify (grouping) the crabs into three types based on visible body characteristic (morphology) and to entitle (nomenclature) each type based on the shape and specific character.

The knowledge and skill of sand crabs categorization and entitlement that had been acquired by the coastal fisher communities in Cilacap were in accordance with Berlin's categorization model and nomenclature.

There were three different types of sand crabs captured and had the local name of 'yutuk jambe' (*E. emeritus* L 1767) and the appellation was based on the carapace shape that resembled a jambe fruit (nut); 'Yutuk bathok' (*H. adactyla* F 1787) which had carapace shape resembling a coconut shell; and 'yutuk Kethek' (*A. symmysta* 1758), which had ornaments on the carapace surface similar with a monkey face, there were dense setae on the edge of the carapace, spiny long antennae and aggressively pinched when captured.

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