New Parameter for Gonad Maturation and New Method for Identification of two Genera of Family Nemipteridae Red Sea

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Abstract
Identification of two genera of family nemipteridae, nemipterus and scolopisdisis in red sea, carried out usually morphologically only but in this study depend on anatomically. For the first time we discovered the presence of an accessory globiform kidney in Nemipterus japonicus. By complete the study on the other species, such (N. virgatus, N. zysron and N. mesoprion). The results indicated that the presence of an accessory globiform kidney in this four species. On the other hand, in Scolopsis ghanam (genus scolopisdisis), this accessory globiform kidney is not present. Therefore, this accessory globiform kidney is specific for genus nemipterus. Besides the above results, this family consists of a new methods used accessory globiform kidney as index to demonstrate spawning season in male of two common species of genus nemipterus N. japonicus and N. virgatus besides other reproductive items, such gonadosomatic index. This new index called kidnosomatic index (KSI) and used the following equation to calculate (KSI = accessory globiform kidney / gutted weight X 100). The both indices indicated that the spawning season of N. japonicus extend from June to early September but N. virgatus from September to December.

Keywords
Family Nemipteridae; Kidney; Fish Identification; KSI; Red Sea

1 Introduction
The Red Sea, an almost land-locked northern branch of the tropical Indian Ocean is one of the most remarkable repositories of biological diversity on the globe. The Red Sea ichthyofuna is quite well known compared to other parts of the tropical indo-pacific ocean. Khalaf and Disi (1997) recorded 1,280 fish species from this semi-enclosed northern extension of the Indian ocean. Sixteen nemipteridae species are recorded from the Red Sea. This family consists of the genera nemipterus, scolopisdisis and parascolopis (Randall, 1983). Fishes of family nemipteridae represent one of the most commercially important fish groups in the trawl fishery of the Gulf of Suez, Red Sea. Many authors studies nemiptrid species such as (Bakhsh, 1996; Rajkumar et al., 2003; Manojkumar, 2004; McIlwain et al, 2006; Kerdgar et al., 2009; Ramadan 2010, Joshi, 2010; Amine, 2012).

The present study was carried out with the aim of investigating the abundance of globiform kidney in the various fishes in family nemipteridae in Red Sea. After discovering the accessory globiform kidney by EL-Halfawy and Ramadan (2014) in N. japonicus used as a new method for identifications of the different species. Also, used this a new organ as a method in the reproductive index.

2 Materials and Methods
Random samples of family nemipteridae catch landed at the Attaka harbor during the fishing season from September 2010 to May 2011 were collected monthly. The samples were identified by FAO (1990), to differentiate between species (four nemipterus species N. japonicus, N. virgatus, N. zysron and N. mesoprion) and S. ghanam (genus Scolopisdisis).

Monthly length and weight were determined for the collected species for the two common species N. japonicus and N. virgatus. The fishes were dissected, then gonads and accessory globiform kidney were removed and weighted to the nearest gm. The monthly gonadosomatic index and kidnosomatic index were calculated as respectively as:

GSI = weight of gonad (g) / gutted weight of fish (g)×100
KSI = weight of accessory globiform kidney (g) / gutted weight of fish (g) × 100

3 Results and Discussion

Fishes of family nemipteridae representing one of the most commercially important groups in the trawl fishery of the Gulf of Suez, Red sea. Six nemipterid species, belonging to two genera were recorded in the Gulf of Suez (Breikaa, 1996). These are N. japonicus, N. bipunctatus, N. zysron, S. vosmeri, S. ghanam and S. taeniatus. The threadfin breams N. japonicus is the most abundant fish species in the nemipterid catch. It considered about 90% of nemipterid landing followed by the slender threadfin breams N. zysron that contributes about 7% of the landing while the other four species appear occasionally in the catch (El_Ganainy and Mehana, 2003).

In the present study, the species, which obtained from genus nemipterus was four species N. japonicus, N. virgatus, N. zysron and N. mesoprion (Figure 1), according to the FAO catalogue, 1990 (Morphologically). The first two species are common in catch while the other two species were collected in very few numbers. The only species, which obtained from genus Scolopisidsis was S. ghanam which found also in few number and not considered important in nemipteridae catch. Therefore, this study not agreement with the (Breikaa, 1996 in the presence of other species of family nemipteridae like N. bipunctatus, S. taeniatus and S. vosmeri in our region. Besides the morphological differences in the species by color filament and size (Figure 1). Our study differentiated between the two genera, which found in our region, by the presence or not of accessory globiform kidney (Figure 2A). This accessory globiform kidney embedded in the flesh at the beginning of caudal portion in four species of genus nemipterus. While in genus scolopisidsis (S. ghanam), which represented the region, this accessory globiform kidney not present. Therefore, the presence of accessory globiform kidney is specific for genus nemipterus and considered as a new method to differentiate between these two genera in Red Sea.

In the previous study in N. japonicus elucidated that, the accessory globiform kidney changed in size and weight by sex and maturation (Ealhalfawy and Ramadan, 2014). In male, this accessory globiform kidney was cleared and large in size and weight (Figure 2B and 2C), but in female N. japonicus very small and its weight nearly constant 0.02 g. This change of globiform kidney were found in all four species which included in this study from nemipterus but due to the small number which obtained from N. zysron and N. mesoprion not helped us to completed the reproductive studies. The present studies not conformed to results obtained from EL-Ganiny and Mehana, 2003 which mentioned that N. zysron represented 7% of nemipterid catch in Attaka harbor.

Therefore, this study included the two common species N. japonicus and N. virgatus which found in a large number and were present monthly during the fishing season, which extended from September to May in our region.

Gonadosomatic index (GSI) of N. japonicus and N. virgatus

The gonadosomatic index for two species studied began to decrease in September for N. japonicus for male and female (0.5 for male and 3.6 for female) (Figure 3 and 4). Gonadosomatic index of females was higher than that of male and follow nearly the same pattern for both sexes. The spawning season takes place from May to September. The results obtained confirmed with results obtained from EL-Halfawy (1995) and Ramadan (2010) on N. japonicus, which stated that, N. japonicus has a short spawning season that occur in summer season.

The monthly changed of GSI value of male and female N. virgatus were shown in Figure 5 and 6. The average values showed variations during the period from September 2004 to May 2005 recording that the maximum value in October for both male and female (0.5 for male and 3.8 for female) followed by a progressive decrease from November to March and slightly stability from March to May. So, the maturation may be starting in forbidden season of fishing and spawning season for N. virgatus may be extend from September to December.

Kidnosomatic index (KSI) in male N. japonicus and N. virgatus

From this study and the previous on N. japonicus and N. virgatus, the investigations showed that, this accessory globiform kidney variable with sex in female of both species nearly unchangeable but in male of both species changeable with maturation. So,
in this study, used the kidneysomatic index as a new method and indicator to maturation and spawning for male only.

KSI of male *N. japonicus*, recorded highest values during September 0.42 (Figure 7), then began to decrease during October to February and nearly increased and steady from March to May 0.25, 0.3 and 0.3 respectively. On the other hand, KSI for *N. virgatus* (Figure 8) revealed that the maximum value obtained in October 0.45 and gradually decreased occurred from November to February and slightly increase and case of stability from March to May. From the previous results, GSI and KSI of male's *N. japonicus* and *N. virgatus*, have the same manner. Both indices emphasize that spawning season extend during summer season for *N. japonicus* and from September to February for *N. Virgatus*.

Figure 1 Different species of family nemipteridae collected from Red Sea where species of genus nemipterus are: 1- *Nemipterus japonicus*. 2- *Nemipterus mesoprion*. 3- *Nemipterus virgatus*. 4- *Nemipterus zysron*. 5- *Scolopsis ghanam*.  
Note: There is one species of genus scolopisdis collected (*Scolopsis ghanam*).

**4 Conclusion and Recommendation**

From the present investigations we can concluded that:

4.1 There is a new method for identification the genus nemipterus of family nemipteridae from other genera of the same family, besides the morphological difference by the presence of accessory globiform kidney which specific for *Nemipterus sp.*, which collected from Red sea.

4.2 Using this new organ as a new indicator for maturation and spawning for male of *Nemipterus sp.* only than female.

The above-mentioned lead to encourage to put the following recommendations:

4.3 It must be studies the physiological of this accessory globiform kidney to know its relation to maturation of male only.

4.4 Complete the differentiation between the other genera of family nemipteridae by the presence of this accessory globiform kidney in different regions.
Figure 2 The New organ of Nemipterus japonicus and the connection with other organs


Figure 3 Monthly distribution of gonadosomatic index for *nicus* during the fishing season (Sep. 2004 to May 2005)

Figure 4 Monthly distribution of gonadosomatic index for female *Nemipterus japonicus* during the fishing season (Sep. 2004 to May 2005)
Figure 5 Monthly distribution of gonadosomatic index for male *Nemipterus virgatus* during the fishing season (Sep. 2004 to May 2005).

Figure 6 Monthly distribution of gonadosomatic index for female *Nemipterus virgatus* during the fishing season (Sep. 2004 to May 2005).

Figure 7 Monthly distribution of kidnosomatic index for male *Nemipterus japonicus* during the fishing season (Sep. 2004 to May 2005).

Figure 8 Monthly distribution of kidnosomatic index for male *Nemipterus virgatus* during the fishing season (Sep. 2004 to May 2005).

**Acknowledgment**

Praise to ALLAH, the lord of the universe, by whose grace this work has been completed. Our special thanks are appreciating to our colleagues, who helped us during the preparation of this work and for their supporting.

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