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## Stomach Contents and Feeding Habits of *Diaramma pictum* and *Pomadasys argenteus* Family of Haemulidae from Coasts of Aden Governorate – Yemen

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**Abstract:** The feeding habits of two species fish, *D. pictum* and *P. argenteus* (Family: Haemulidae), were studied monthly from July 2021 to June 2022. Contents of 214 stomachs of *D. pictum* and 223 stomachs of *P. argenteus* were analyzed using Fullness index and percentage of occurrence. According to vacuity index for to species, the percentage were 45.3% and 44.4% respectively. The contents of the stomach were examined; it was found that the food of *D. pictum* consisted of crustaceans, fish, molluscs and sea grasses. The food to *P. argenteus* consists of crustaceans, molluscs and fish, where crustaceans constituted the main food for two species *D. pictum* and *P. argenteus* by 42.1% and 45.7% respectively. It was observed that the increased of longitudinal group followed increased percentage of fish increased as food and disappeared of the percentage of molluscs and sea grasses in *D. pictum*. In *P. argenteus* crustaceans dominated in the various longitudinal groups, while molluscs appeared from length of 25 cm and varied in their proportions in long group, likewise, fish appeared in a group of 32 cm in length and differed in their proportions in the large groups.

**Keywords:** Coasts of Aden, *D. pictum*, Frequency of occurrence, Fullness index, *P. argenteus*, Stomach contents

### 1. Introduction:

Fish wealth is of great economic importance to many countries of the world as it is an important protein source, as fish provides approximately 20% of protein consumption at the global level. People's food in different countries is rich in carbohydrates and poor in fats and proteins. That a large percentage of people did not get the necessary amount of protein, knowing that the minimum amount of protein required for each person is at least 60 grams per day [4]. The Yemeni regional waters are characterized by the great biodiversity in the marine environments and their unique marine organisms, where more than 600 species of fish and other marine life were found [2], and 153 families and 969 species of fish were recorded in Yemen, including cartilaginous fish on 11 families of Ray and batoidei fish 44 species and 18 families of sharks containing 68 species, and bony fish include 124 families and 857 species, and large numbers of them have been exposed to serious dangers due to the pressures of fisheries imposed [6]. The family

Haemulidae is one of the largest families of Percoidei and includes about 134 species in 19 genera widely distributed in the world [13]. The family's common name "grunt" is derived from the distinctive grating sound, which is produced when rubbing their upper and lower pharyngeal teeth during feeding, or display Territorial, or fear response and amplified by the air bladder Haemulids are also known as Sweetlips for having plump lips, which are highly distended in adults in many species [16], are of high economic value in the Red Sea and comprise two sub-groups: Haemulinae and Plectorhinchinae [17]. *Plectorhinchus* (Lacepède 1801) has 4–6 distinct pores in the chin, no central fossa, and 10–18 scales extending from the origin of the dorsal fin to the lateral line, while *Pomadasys* (Lacepède 1802) has 2 small pores in the chin followed by a fossa. Central with slit-like pores, and 4–6 scales extending from the origin of the dorsal fin to the lateral line [32] The genus *Plectorhinchus* includes 29 species [17], while *Pomadasys* includes 34 species [7] The species of *Plectorhinchus* are restricted to the Indo-Pacific region while

Pomadasys species are found worldwide in warm temperate and tropical coastal seas [12]. These fish are found in the warm and temperate tropical oceans of the Atlantic, Indian and Pacific Oceans. Most species are marine, inhabiting shallow waters of coral reefs, rocky bottoms, seagrass beds, sandy flats, and mud bottoms in coastal and estuarine waters, and some are found in brackish environments and sometimes found in fresh water [23]. Nocturnal fish that use coral reefs as shelter, usually congregate during the day and then disperse to feed at night in open sandy, muddy or grassy areas. Many Haemulid species are opportunistic feeders preying on a range of small benthic invertebrates and in some cases preying on small fish although their young. They may feed mostly on plankton [9], usually found singly or in small groups and forming large aggregations while spawning. Species of this family are also considered as good quality food fish and are widely consumed worldwide by coastal populations, especially in tropics and is caught by hand line, traps and trawls [8]. The feeding habits of fish are considered one of the important elements in the study of fish biology, as they show the feeding performance of the fish and the quality of its food, and the relationship of this food to the length, growth and weight of the fish and seasonal changes in the food menu, and knowing the food contents of fish is important because fish is an important element in the food chain in Ecosystems [20]. The availability of food affects the growth rate of fish, as small fish grow more quickly than large fish grow, as they spend their energy in the formation of bodily tissues only, while young fish are not limited to the formation of bodily tissues, but rather exceed that to the formation of reproductive tissues [1]. The feeding system in fish is also one of the important concerns in its life, as it devotes most of its time and energy in searching for food, and the basic function of the stomach is to store food, which is often large, and then transport it to the intestines, where digestion and absorption continue [5]. Analysis of fish stomach contents provides information on the feeding habits of fish species, which vary significantly with food availability, depth, season and land [24]. Studies of these two species in Yemeni regional waters in the environment of the Red Sea and Gulf of Aden are very rare and almost non-existent. Only the feeding study of *Pomadasys maculatus* was conducted in the Red Sea coasts near the Yemeni city of Hodeidah by [29]. The normal level of this study looked at the food ecology and biology of the species *Pomadasys argenteus*. The diet showed slight diversity and consisted mainly of crabs and, to a lesser extent, shrimp, bivalves and annelids [22]. Therefore, the importance of this study comes in identifying the feeding habits of the two species *D. pictum* and *P. argenteus* in the coasts of Aden and knowing the diversity in their food, feeding activity and changes in the food menu.

**2. Materials and Methods:**

**2.1 Study area:**

The study samples were collected from the coasts of the Gulf of Aden from a number of landing centers for fish, namely: the landing center in Sirah with coordinates (E 50° 2' 51.470, N 281° 41' 12° 46'), Al-Darba (12° 44' 33). 981" N, 44° 53' 9.649"E) and Ras Amran (12° 45' 15.505" N. 44° 43' 40.288"E) as in (Fig. 1).



**Figure 1.** A map showing the places where fish samples were collected

**2.2 Sample collection:**

214 samples from *Diagramma pictum* and 223 samples from *Pomadasys argenteus* were collected monthly during the period from July 2021 to June 2022. These were brought to the laboratory of Biology, Faculty of education, Aden University. The fish were classified according to the internationally approved classification keys [14 & 15]. They are Kept in crushed ice, and their weights were taken to the nearest (1gram) using a digital scale after being cleaned and dried, and the lengths were taken using a tape measure to the nearest (1 cm). The measured samples were divided into 9 longitudinal groups (18-23.9, 24-29.9, 30-35.9, 36-41.9, 42-47.9, 48-53.9, 54-59.9, 60-65.9, 66-71.9) cm for *Hades. D. pictum* f (18-21.4, 21.5-24.9, 25-28.4, 28.5-31.9, 32-35.4, 35.5-38.9, 39-42.4, 42.5-45.9, 46-49.4) cm for *P. argenteus*. Each fish was dissected and the digestive system was removed from the abdominal cavity, the equipment was isolated and preserved with formalin at a concentration of 10% to preserve its contents from disintegration until it was studied. The contents of the food were examined with a magnifying glass and under anatomical microscope with a power of 10X magnification. The food was analyzed using the points of appreciation and recurrence method [26]. assessment and frequency of occurrence method, which was developed by [20]. The results were statistically analyzed and the results were converted into percentages according to [18]. The empty equipment was determined and the Vacuity index was calculated using the equation [20]:

$$[\text{Stomach emptying index \%} = (\text{empty number of equipment}) / (\text{total number of equipment}) \times 100]$$

**3. Results:**

**3.1 Gastric emptying indicator:**

214 stomachs of *Diagramma pictum* were examined (90 females, 64 males, 60 combined females and males, of which 97 were empty stomachs with a rate of 45.3%, and the percentage of empty stomachs in males, females and the same sex was 17.3%, 16.4% and 11.7%. Respectively, the stomachs of 223 *Pomadasys argenteus* (116 females, 94 males, 13 combined females and males) were examined, of which 99 were empty stomachs, with a rate of 44.4%. The percentage of empty stomachs in males, females and the same sex was 22%, 16.6% and 5.8% respectively, as in (Fig. 2).

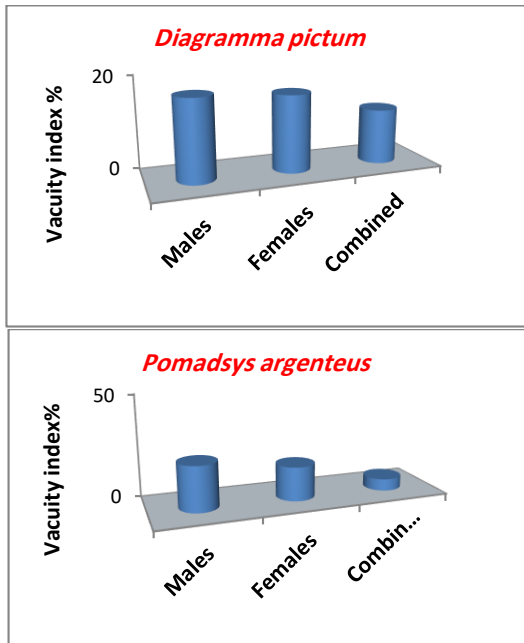


Figure 2. Gastric emptying index for the two species *D. pictum* and *P. argenteus* in the Gulf of Aden coasts.

As for the longitudinal groups, we noticed that the maximum value of the gastric emptying index was 30-35 cm in the two groups, with a rate of 61.2% for *D. pictum*, and we noted that with increasing the length of the fish, the value of the gastric emptying index decreased by 0% in the length group 66-71.9 cm. The maximum value of the gastric emptying index for *P. argenteus* was maximum in the longitudinal group from 18 cm to 21.4 cm by 100%. If the length of the fish increase, the gastric emptying index was 0 in the length group 42.5-49.4 cm as in (Fig. 3).

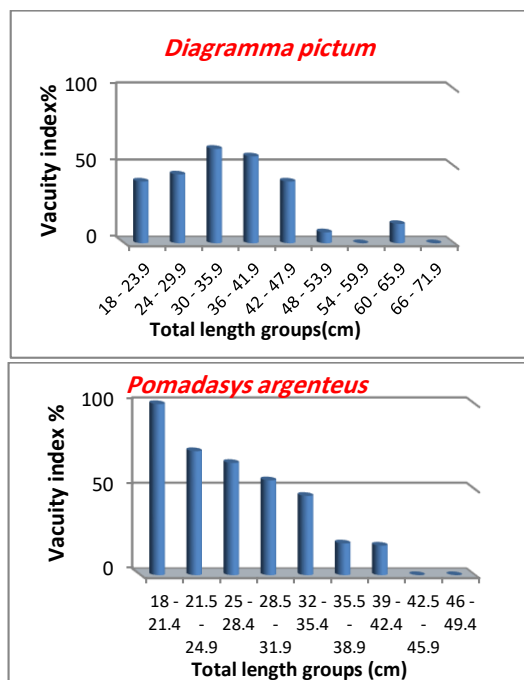


Figure 3: Gastric emptying index according to the longitudinal groups of the two species *D. pictum* and *P. argenteus* in the Gulf of Aden coasts

### 3.2 Annual nutritional composition:

It is clear from the study that the two species *D. pictum* and *P. argenteus* have a slight dietary diversity, as the diet of the hadas fish *D. pictum* mainly consists of four groups: (crustaceans, fish, molluscs and seaweed), and crustaceans occupied the first place in the food list With a percentage of 42.1%, it is represented by crabs, shrimps and shrimps, followed by fish with a percentage of 7.1%, then molluscs and seaweeds with a percentage of 5.1% and 4.7%, respectively. Most of the examined equipment also contained unknown digested materials and some sand. While the diet of *P. argenteus* fish consists of three food groups: (crustaceans, molluscs and parts of fish). The results of the study showed that crustaceans occupy the first place in the food list with a percentage of 45.7% represented by crabs, shrimps and shrimps, followed by molluscs with a percentage of 11.2% represented by bivalves and gastropods, then parts of fish with a percentage of 9%, and most of the stomachs of the fish examined contained non-digested materials Known and some sand as in (Fig. 4).

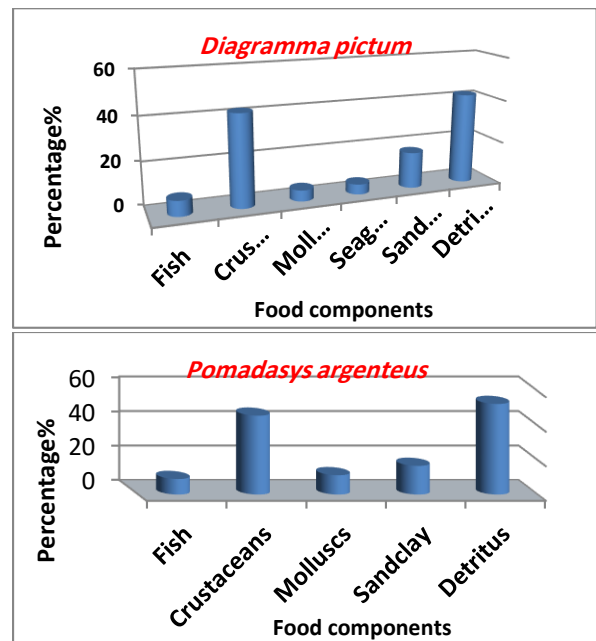


Figure 4. The annual nutritional composition of the two species *D. pictum* and *P. argenteus* in the coasts of the Gulf of Aden

### 3.3 Monthly changes in nutritional composition:

It is clear from (Tables -1, 2) that crustaceans are the main component as they appeared in most months of the year, while fish were found in different months of the year for the two species *D. pictum* and *P. argenteus*, while molluscs were found in July, August and September and disappeared In the rest of the months, while seaweed was limited to December, January and February for the type *D. pictum*, and molluscs appeared in some months of the year from July to December and the highest percentage was in December and August and then disappeared in the rest of the months for the type *P. argenteus*.

**Table 1.** Monthly changes in food components in 214 fish, *D. pictum*, from the Gulf of Aden during the study period

Months	No	food contents					
		Fishes	Crustaceans	Molluscs	Sea grasses	Sand clay	Detritus
July 2021	22	36.4	31.8	18.2	-	18.2	50
August 2021	20	20	60	15	-	20	45
September 2021	20	5	50	20	-	30	45
October 2021	20	-	40	-	-	15	40
November 2021	20	-	30	-	-	10	30
December 2021	12	-	16.7	-	66.7	66.7	66.7
January 2022	20	-	50	-	5	45	45
February 2022	12	-	-	-	8.3	-	-
March 2022	12	-	50	-	-	-	41.7
April 2022	20	5	55	-	-	-	50
May 2022	16	6.3	56.3	-	-	-	50
June 2022	20	-	45	-	-	-	35

Note: The results are expressed as a percentage, (-) This type of food was not recorded in this month

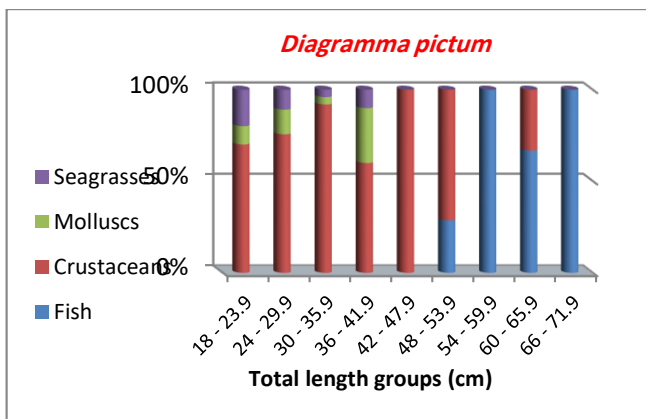
**Table 2.** Monthly changes in food components in 223 fish, *P. argenteus*, from the Gulf of Aden during the study period

Months	No	food contents				
		Fishes	Crustacean	Molluscs	Sand clay	Detritus
July 2021	20	30	50	20	50	80
August 2021	20	-	25	30	10	55
September 2021	20	40	70	25	30	90
October 2021	20	-	85	10	40	85
November 2021	20	-	85	10	45	85
December 2021	18	11.1	66.7	33.3	11.1	66.7
January 2022	20	10	10	-	-	20
February 2022	14	10	10	-	-	20
March 2022	21	-	4.8	-	-	-
April 2022	16	-	31.3	-	-	25
May 2022	12	-	58.3	-	-	50
June 2022	22	-	45.5	-	-	6.4

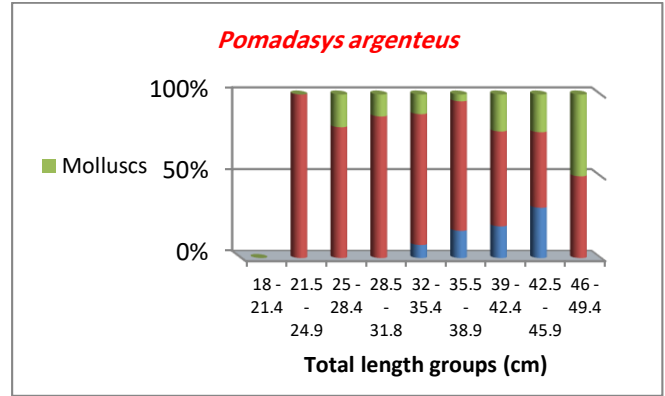
Note: The results are expressed as a percentage, (-) This type of food was not recorded in this month.

**3.4 Dietary changes and their relationship to height:**

Figure (5) showed the relationship between food diversity and its relationship to the lengths of the fish *D. pictum*, as it was found that crustaceans are found in large quantities in groups of length 18-59.9 cm, which represent the most dominant food item in this group, while fish was the most important food item in fish The large ones, whose length ranges from 54-71.9 cm, and mollusks were found in the length groups from 18-41.9 cm, with a rate of 6.7% to 18.8%, and seaweeds were detected in small quantities in the length group 18-41.9 cm, with a rate of 1.5% to 13.3%. In figure (6) we note the relationship between food diversity and its relationship to the length of the fish *P. argenteus*. It was found that stomach fish with a length less than 20 cm, here empty, while crustaceans recorded the highest presence in most longitudinal groups, while mollusks were found in fish with a length greater than 25 cm, and fish represented as food for this species in large fish greater than 32 cm.



**Figure 5.** Percentage in nutrients and their relationship to the length group of *D. pictum* in the Gulf of Aden coasts



**Figure 6.** Percentage in nutrients and their relationship to the length group of *P. argenteus* in the Gulf of Aden coasts

**3.5 Nutrition intensity:**

The results showed that the highest value of feeding intensity of *D. pictum* was in December with a rate of 66.7%, and the lowest value for feeding intensity was in February 0%. While the highest value of feeding intensity of *P. argenteus* was in September by 70%, and the lowest value of feeding intensity in March was 0%, (Tables 3 and 4). There are samples of prey found inside the stomachs of *D. pictum* and *P. argenteus* during the study period shown in figure (7).

**Table 3.** Monthly variations in the intensity of food in the stomach of *D. pictum* from the Gulf of Aden during the study period

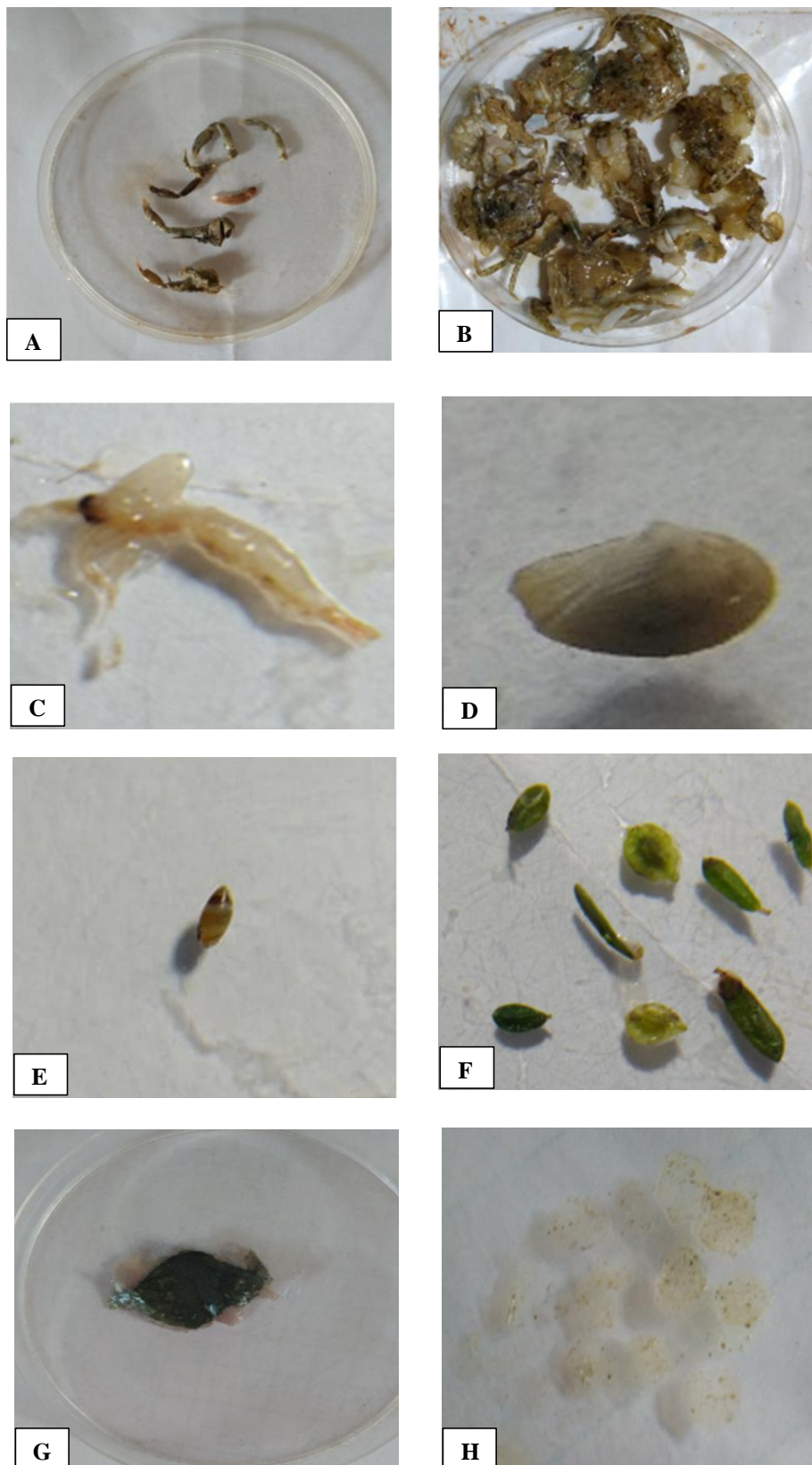
Months	No	Intensity of food in the stomach							
		Empty	Trace	1/4	%	1/2	3/4	Full	%
July 2021	22	6	3	3	54.5	2	4	4	45.5
August 2021	20	7	5	1	65	-	4	3	35
September 2021	20	9	2	1	60	2	5	1	40
October 2021	20	11	2	2	75	2	3	-	25
November 2021	20	14	2	-	80	-	4	-	20
December 2021	12	2	2	-	33.3	-	8	-	66.7
January 2022	20	9	1	1	55	4	3	2	45
February 2022	12	11	1	-	100	-	-	-	0
March 2022	12	6	1	2	75	-	3	-	25
April 2022	20	8	2	5	75	-	5	-	25
May 2022	16	6	2	-	50	-	7	1	50
June 2022	20	8	3	2	65	-	5	2	35
Mean					65.7				34.4

Note: The results are expressed as a percentage, (-) This type of food was not recorded in this month.

**Table 4.** Monthly variations in the intensity of food in the stomach of *P. argenteus* from the Gulf of Aden during the study period

Months	No	Intensity of food in the stomach							
		Empty	Trace	1/4	%	1/2	3/4	Full	%
July 2021	20	4	2	3	45	2	5	4	55
August 2021	20	9	3	-	60	2	4	2	40
September 2021	20	2	-	4	30	8	6	-	70
October 2021	20	3	2	7	60	-	8	-	40
November 2021	20	3	4	4	55	2	7	-	45
December 2021	18	6	2	1	50	4	5	-	50
January 2022	20	16	1	-	85	-	1	2	15
February 2022	14	10	-	-	71.4	-	2	2	28.6
March 2022	21	20	1	-	100	-	-	-	0
April 2022	16	11	1	2	87.5	-	2	-	12.5
May 2022	12	5	1	2	66.7	-	4	-	33.3
June 2022	22	10	5	2	77.3	-	5	-	22.7
Mean					65.7				34.3

Note: The results are expressed as a percentage, (-) This type of food was not recorded in this month



**Figure 7.** Show samples of prey found inside the stomachs of *D. pictum* and *P. argenteus* during the study period. A- Scissors for types of crabs are short swimming belly. B- Parts of crabs are semi-digested. C- shrimp. D- bivalve shell (molluscs). E- a shell for the gastropods. F- Weeds and seaweeds. G - Parts of muscles and H- scales of fish

#### 4. Discussion:

Haemulidae represent one of the families of fish with high economic value in the Red Sea. They are bottom feeding, carnivorous, and use coral reefs as shelter, usually congregating during the day and then dispersing to feed at night [27]. When comparing the gastric emptying index of the two species *D. pictum* and *P. argenteus* with other species of the same family, the value was 45.3% and 44.4% for the two species, respectively. The percentage of the gastric emptying index in the studied samples was much higher than that reported in the Red Sea coasts near Al-Hodeidah, where only three empty stomachs were found at a rate of 2.1% [29], may be due to the lack of samples that were studied in the coasts near Al-Hodeidah, as they amounted to 140 samples, in addition to the absence of samples in the summer. In the northern Arabian Gulf, the index of stomach emptying for the type *P. kaakan* was 63.45% [34], and this value is greater than the value in the study samples in the coasts of the Gulf of Aden. The percentage of empty stomach varies according to habitat, season, time of day, and size [22]. The environmental conditions surrounding the samples in terms of nutrients, temperature and salinity [3], and this indicates that the environmental medium in the study area is rich in nutrients and that this type of fish has an active feeding pattern. The gastric emptying index in the common sex was 11.7%, the females 16.4% and the males 17.3% for the species *D. pictum*. The gastric emptying index in the females was 16.6%, the males 22% and the common sex 5.8% for the species *P. argenteus*. This indicates that the young fish that did not reach the stage of adulthood were more active, as their growth is faster than the adult fish, as they spend their energy in the formation of bodily tissues [1], while [29] confirmed that the small fish feed actively and more frequently than the fish. Large, and the ratio of the gastric emptying index differs between males and females, and this is due to gender preferences in foraging sites [30]. [22] showed that *P. argenteus* is more active during the night, the percentage of empty stomach increased significantly during the day with a higher percentage of full stomach at night. The demand for the amount of food and the ability to acquire it increases with the increase in the growth and development of fish [19], and in this study we note that the greater the size of the fish, the lower the stomach emptying index, and this is consistent with the results of [29] that the stomach fullness index increases with the increase in the size of the fish. [22] also found in New Caledonia that the proportion of food-containing stomachs increases with the increase in the size of the fish. The results of analyzing the food content of *D. pictum* showed that there is a slight diversity in the diet of this species, as it consists of crustaceans, fish, molluscs and seaweed, and this is consistent with what was found [33] that the diet of *D. pictum* consists of benthic invertebrates and fish. The diet of *P. argenteus* consists of only three food groups, which are crustaceans, molluscs and fish. In a biological study of this type of fish in New Caledonia, the diet showed little diversity and consisted mainly of crustaceans (crabs, shrimps), molluscs (gastropods, antelopes). bivalves), echinoderms (mainly hedgehogs), ringworms and fish [22], and it was found that this species feeds mainly on benthic invertebrates such as shrimp and bivalves, and to a small

degree on polychaetes in Australia [31], and feeds on crabs in Caledonia new [21], this fish species is carnivorous and prefers various benthic invertebrates and in some cases small fish, although its young feed on plankton [10].

This study concluded that the monthly differences in the diet of Hades *D. pictum* found that crustaceans had the highest value in August 60%, while crustaceans disappeared in February and had the lowest value in December 16.7%, and molluscs found from July to September were The highest value was in September 20% and the lowest value in August was 18.2%. Fish formed in different months of the year and disappeared in others. The highest value was in July, 36.4%, and the lowest value in September and April was 5%, while seaweed appeared in December. January and February had the highest rate in December, 66.7%, and the lowest value in January, 5%. As for the monthly differences in the diet of *P. argenteus*, crustaceans were found in all months with the highest value in October and November by 85% and the lowest value in March by 4.8%. Molluscs were found from July to December with the highest value in December 33.3% and the lowest in October and November. 10%, for fish found in different months, the highest value was in September 40% and the lowest in January and February by 10%. These results are consistent with what was found in New Caledonia in that molluscs were found mostly from July to September and most of them were bivalves, as well That annelids were not observed in the diet of the two studied species probably because annelids are found on soft bottoms where they are small and rarely found [22]. In particular, crustaceans are the main component of the diet in any longitudinal group, which indicates that this type of fish has a preference for this prey item. The proportion of crustaceans in the diet increases slightly among larger fish. This is probably due to the increased activity of crabs. during the night and the ability of large fish to catch crabs (larger mouth and faster swimming) [22 & 28]. Molluscs come in second place in the group of small to medium length as in the type *D. pictum* Most molluscs are bivalves [31], and in the third place are fish, and a very small amount of seaweed was found in the Hades food in addition to some sand and digested materials, the materials dominated Digestible and sandy loams are on the food spectrum throughout the year. This could be related to the bottom feeding habits in shallow coastal areas. The difference in diet according to the longitudinal groups was less clear, as some of the examined equipment contained one food item while others contained more than one food item, for *D. pictum* The type of fish in the groups is less than 48 cm, and in the type *P. argenteus*, no molluscs were found in the diet of fish in the group of length less than 24 cm, and no fish were found in the diet of fish less than 38 cm, while crustaceans appeared in Fish in different longitudinal groups of the two studied species. These results agree with what [22] concluded in a study of the biology and trophic ecology of *P. argenteus* in New Caledonia. In general, fish of this type focus on crustaceans and molluscs because they contain protein important for their growth [11]. Salman et al. confirmed that this type of fish has a narrow food spectrum where it prefers crustaceans and molluscs as the main food items with a small amount of seaweed and algae, which puts this species in the category of selective feeders [29]. As a common phenomenon

fish, food change is associated with changing fish length and differing nutritional requirements, however, change in feeding habits is a practice that has been implemented to enable the species as a whole to assimilate a variety of foods [25]. The study showed that the intensity of feeding for the two species *D. pictum* and *P. argenteus* indicates a high rate of feeding activity for fish with empty stomachs, leftovers and a quarter full of food by 65.7% of the total samples, while individuals with half full stomachs, and three quarters full stomachs represented 34.4% of the total stomach of the analyzed individuals, however, the food density varied greatly from one month to the next, and the percentage of fullness of the stomach with food for the two species *D. pictum* and *P. argenteus* recorded its highest values in December 66.7% and September 70%, respectively.

### 5. Conclusion:

In the present study, live specimens of fish (*D. pictum* and *P. argenteus*) were collected from the coasts of the Gulf of Aden (the landing center in Sirah). The results can be summarized in the following items:

1. The percentage of empty stomachs of *D. pictum* in males and females and the same sex was 17.3%, and 16.4% respectively. The percentage of empty stomachs of *P. argenteus* in males and females were 22%, 16.6%, and 5.8% respectively.
2. The diet of *D. pictum* mainly consists of four groups: (crustaceans, fish, molluscs and seaweed). The diet of *P. argenteus* fish consists of three food groups: (crustaceans, molluscs, and parts of fish).
3. The highest value of feeding intensity of the two species *D. pictum* and *P. argenteus* recorded their highest values in December 66.7% and September at 70%, respectively.

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## محتويات المعدة والعادات الغذائية لسمكة الهداس *Diagramma pictum* وسمكة الناغم *Pomadasys argenteus* عائلة *Haemulidae* في سواحل محافظة عدن – اليمن

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**الملخص:** تم دراسة العادات الغذائية لنوعين من الأسماك، سمكة الهداس *D. pictum* وسمكة الناغم *P. argenteus* من عائلة هيمليدا، خلال الفترة من يوليو 2021م إلى يونيو 2022م، والمجمعة شهرياً من سواحل خليج عدن، تمت دراسة وتحليل 214 معدة من سمكة الهداس *D. pictum* و 223 معدة من سمكة الناغم *P. argenteus* باستخدام دليل الامتلاء والنسبة المئوية للتواجد، حسب مؤشر فراغ المعدة للنوعين فكانت النسبة 45.3% و 44.4% على التوالي، فُحصت محتويات المعدة وجد أن غذاء سمكة الهداس يتكون من القشريات، الأسماك، الرخويات والأعشاب البحرية، ويتكون غذاء سمكة الناغم من القشريات، الرخويات والأسماك. حيث شكلت القشريات الغذاء الرئيسي للنوعين *D. pictum* و *P. argenteus* بنسبة 42.1% و 45.7% على التوالي. لوحظ وجود زيادة في الطول اتبعها زيادة في نسبة الأسماك كغذاء، واختفت نسبة الرخويات والأعشاب البحرية لهذا النوع من السمك. في سمك الناغم *P. argenteus* فقد سيطرت القشريات على مختلف المجموعات الطولية، أما الرخويات فقد ظهرت من طول 25 سم وتفاوتت في نسبها في المجموعات الكبيرة، كذلك الأسماك ظهرت في مجموعة الطول 32 سم واختلفت في نسبها في المجموعات الكبيرة .

**كلمات المفتاحية:** محتويات المعدة، سمكة الهداس، سمكة الناغم، شواطئ عدن.