قســـــــم : علم الحيوان - كلية العلوم - جامعة أسيوط.
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دراسات على بعض الصفات المرستيكية لسمكتى الستس نيرس والستس باريمـــوز

عبد الحميد خليل ، عزت جرجس يواقيم ، امام عبد الغنى مكاوى

يتضمن هذا البحث دراسات على بعض الصفات المرستيكية لسمكتى الستس نيرس والستس باريموز فى منطقة أسيوط ومقارنة هذه الصفات المميزة للنوع الأول بمثيلتها لجماعات من نفس النوع فى منطقة أسوان ومن أهم نتائج هذا البحث.

١- فى سمكة الستس نيرس لا يوجد ارتباط بين الجنس والعدد الكلى للأسنان الخيشومية على القوس الخيشومى الأول الأيمن ،عدد القشور على الخط الجانبى ، عدد الأشعة الزعنفية لكل من الزعنفة الظهرية والصدرية والحوضية والشـــرجية.

٢- باستثناء عدد الأشعة الزعنفية الحوضية تختلف جماعات الستس نيرس فى منطقة أسيوط عـــــن جماعات نفس النوع فى أسوان من حيث الصفات المرستيكية التى درست الا أن هذا الاختـــلاف لا يرقى بأى من هذه الجماعات الى مستوى النويع ولذلك اعتبرت هذه الجماعات منعزلة جغرافيـا

٣- وجد أن جميع الصفات المرستيكية موضع البحث باستثناء عدد الأشعة الزعنفيـــة فى الزعنفـــة الصدرية ذات قيمة تصنيفية عالية ويمكن بواسطتها التفريق بين سمكتى الستس نيرس والستس باريموز

٤- قورنت نتائج هذا البحث بنتائج بولنجية (١٩٠٧) ووجد أن هناك بعض الاختلافـــات وقد نوقشت الأسباب المحتملة لهذه الاختلافات.

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STUDIES ON CERTAIN MERISTIC CHARACTERS OF TWO NILE CHARCOID FISHES ALESTES NURSE AND ALESTES BAREMOSE

(With 24 Tables)

By

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SUMMARY

In each of Assiut and Aswan samples of Alestes nurse, counts of the total gill rakers on the first right side gill arch, lateral line scales and fin rays of dorsal, pectoral pelvic and anal fins were not associated with sex. The results of meristic counts, except those of pelvic fin rays, revealed that Assiut and Aswan combined sex samples of A.nurse represented geographical races and not a subspecific status. Except for the dorsal fin ray count, the meristic counts considered were found to be helpful for the differentiation between A.nurse and A.baremose.

INTRODUCTION

Studies on the meristics of some fishes attracted the attention of many investigators including MATTA (1953), LAGLER et al, (1962), DU PLESSIS (1963), BOTROS et al. (1970), LACHNER and JENKINS (1971), BISHARA (1973) and QADRI (1974). GERY (1977) extensively reviewed the literature concerning the systematics of the African charcoid fishes, many of which were based on meristic studies. He mentioned some difficulties concerning the systematics of charcoids in general and Nile Alestes species in particular; many of such species are siblings, being differentiated only by minor characteristics. The present investigation gives an account on certain meristics of the Nile charcoid fishes, Alestes nurse and Alestes baremose.

MATERIAL and METHODS

The present study is based on the examination of random samples of Alestes nurse and Alestes baremose which were collected from the commercial catch from Assiut fish markets during the period May 1977-June 1979; also random samples of A.nurse were collected from Aswan fish markets during July and August 1978. Table (1) shows the number and total length range of the fishes examined for the meristic characters considered in the present investigation. Due to the rarity of A.baremose specimens during the period of collection, such specimens were investigated without consederation of sex.

Gill rakers on the external side of the first right side gill arch were counted. Also, the number of gill rakers on the external side of the horizontal and ascending branches of that gill arch was recorded.

The numbers of soft rays of the dorsal, pectoral, pelvic and anal fins were recorded. The last two closely set rays of both dorsal and anal fins were recorded as one.

The predorsal scales anterior to the dorsal fin, scales around the body (one scale anterior to the dorsal fin), scales around the caudal peduncel at its narrowest point and lateral line scales on the left side were counted. When some scales were lost, their pockets were counted.

The data of the meristic characters considered in the present investigation were subjected to analyses of variance and covariance and Chi-square test according to SIMPSON et al. (1960). The coefficient of difference (C.D.) for the meristic characters considered of Assiut and Aswan populations of A.nurse was calculated as prescribed by MAYR et al. (1953). According to them, C.D. values equal to 1.28 and higher are considered indicative of subsepecific status. At that value, 90% of the fish in each of the two populations being compared differ from one another.

RESULTS

Alestes nurse

Gill Raker Counts

The ranges, means and percentages of occurrence of total gill raker counts on the first right side gill arch of Assiut and Aswan male, female and combined sex samples are shown in Tables 2-5. The variation of the total gill raker counts of Assiut and Aswan combined sex samples according to the fish size is presented in Table 6. Such variation was found to be curvilinear (Table 7).

The total gill raker counts were not associated with sex in each of Assiut and Aswan samples (d.f.= 11; X^2= 15.855; P=0.20 - 0.10 and d.f.=9; X^2=3.937; p=0.98-0.90 respectively). A highly significant difference (d.f.=11; X^2=82.997; P/ 0.001) was found between the total gill raker counts of Assiut and Aswan combined sex samples. These results suggest the presence of isolated populations of A.nurse in Assiut and Aswan localities.

The percentage of occurrence of gill raker counts on the horizontal and ascending branches of the first right side gill arch of Assiut and Aswan combined sex samples is presented in Table 8. In such samples, the range of gill raker counts on those branches of the first right side gill arch varied according to the total gill raker count of that arch (Table 9).

The mean values of gill raker counts on the horizontal branch of the first right side gill arch of Assiut and Aswan combined sex samples revealed a highly significant difference (F=51.11; d.f.= 1,189; P/ 0.01).By contrast, the mean values of such counts on the ascending branch of that gill arch of those samples were insignificantly different (F=0.24; d.f.=1,189; P$\geq$0.05). Accordingly, the variation of the total gill raker counts of Assiut and Aswan combined sex samples was mainly due to the variation of the number of gill rakers on the horizontal branch; variation of the number of gill rakers on the ascending branch did not contribute, whatsoever, in this respect.

Scale Counts

The ranges, means and percentages of occurrence of lateral line scale counts of Assiut and Aswan male, female and combined sex samples are shown in Tables 2,3,10 and 11. The ranges, means and percentages of occurrence of counts of predorsal scales, scales around the body and scales around the caudal peduncel of Assiut combined sex samples are presented in Tables 12 and 13.

In each of Assiut and Aswan samples, the lateral line scale counts were not associated with sex (d.f. = 7; X^2=9.385; P=0.30-0.20 and d.f.= 8; X^2=11.381; P=0.20-0.10 respectively). A highly significant difference (d.f.= 9; X^2=418.334; P/ 0.001) was found between those counts of Assiut and Aswan combined sex samples. These results are tempting to subgest that Assiut and Aswan samples represented isolated populations.

Fin Ray Counts

The ranges means and percentages of occurrence of the dorsal, pectoral, pelvic and anal fin ray counts of Assiut and Aswan male, femal and combined sex samples are given in Tables 2,3,14,15,16 and 17.

In each of Assiut and Aswan samples, there was no association between sex and the dorsal, pectoral, pelvic and anal fin ray counts (For Assiut samples: d.f. =2, X^2=1.94, P=0.50-0.30; d.f.= 5, X^2=0.25, P$\geq$0.98; d.f. =3, X^2=2.67, P=0.50-0.30; d.f.=4, X^2=1.48, P=0.90-0.80 respectively. For Aswan samples: d.f.= 1, X^2=2.25, P = 0.20-0.10; d.f.= 4, X^2=0.76, P=0.98-0.90; d.f.= 2, X^2=0.92, P=0.70-0.50; d.f.=4, X^2=3.97; P=0.50-0.30 respectively). But for the pelvic fin ray count (d.f. = 3, X^2= 4.69, P= 0.20-0.10), the fin ray counts of Assiut combined sex samples were highly significantly different from those of Aswan ones (d.f. = 2, X^2= 19.65, P/ 0.001; d.f. = 5, X^2= 91.48, P/ 0.001; d.f.= 5, X^2= 63.64, P/ 0.001 for dorsal, pectoral and anal fin ray counts respectively). These results suggest that Assiut and Aswan samples represented isolated populations.

Alestes baremose

Table 12 and Tables 18-22 summarize the ranges, means and percentages of occurrence of counts of the lateral line scales, predersal sclaes, scales around the body, scales around the caudal peduncle, total gill

rakers on the first right side gill arch, dorsal fin rays,pectoral fin rays, pelvic fin rays and anal fin rays.

DISCUSSION

There has been much debate concerning the reasons and interpretations of meristic variations in fishes. SCHMIDT (1930) mentioned that there are sensetive periods of development during which vertebral and fin ray counts are influenced by the environment. He came to the conclusion that the sensetive period of the number of fin rays occurs somewhat later than that governing vertebral count. LAGLER et al. (1962) reported that the rate of embryonic development has something to do with meristic elements such as vertebrae, rays of median fins and number of scale rows. QUAST (1964)was of the opinion that variations in the process of body segmentation during early ontogeny are probably the basic source of variation in meristics associated with body somites.

The temperature of water at the early developmental stages of some fish was found to affect their meristics. HUBBS (1926) suggested that increased meristic counts in fish representatives of northern hemisphere can be cuased by dissimilar effects of low temperature on the embryonic rates of growth and differentiation. He theorized that both rates are slowed by low temperatures, but differentiation is slowed more than growth with the result that the embryo is larger at the time that differentiation of meristic elements takes place. One may conclude that a large number of meristic elements results in organs of such an embryo, because of the greater amount of actual tissue space available when the meristic elements are formed. Such conclusion is in accord with the results arrived at by HUBBS and HUBBS (1945) who mentioned that meristic elements such as vertebrae, scales and fin rays are laid down at a relatively constant distance apart in absolute terms,and that the number of elements depends on the space available up to the time when development stops. LAGLER et al. (1962) found that Notemigonus crysoleucas, a North American minnow, has more meristic elements in the north than it does at the southern extent of its range near the Gulf of Mexico. They suggested that less energy is spent in general metabolism in northern latitudes where development proceeds at low temperature than in southern latitudes.Thus, in the north more of the nutritive material of the egg is made available for synthesis of meristic elements than in the south. BISHARA (1973) reported that the effect of temperature may explain the considerable wide range in the number of fin rays of Tilapia species in some Egyptian lakes. According to her, those fish species have extended spawning period which amounts to about 9 months, so some populations develop their early stages in the highest temperature of summer months, while others develop their early stages in a comparatively lower temperature during spring and autumn.

Many investigators tried to assess the relative contributions of genetic or environmental influences on meristic variations. HUBBS (1926)indicated that environmentally related clinal variation in meristic characters may reflect some degree of genetic differences. GORDON (1957) considered that many of the meristic traits that distinguish geographic races of fish are inherited, but that environmentally related clinal variation in meristic characters may reflect some degree of genetic differences. GORDON (1957) considered that many of the meristic traits that distinguish geographic races of fish are inherited, but that environmental conditions strongly influence the final expression. He considered that the variability of such traits may be due to genetic drift. BARLOW (1961) believed that regular changes in meristic counts such as occur in geographic clines may reflect adaptive changes of genetic nature and he reviewed evidence that there is sometimes a selective advantage in a species having a given number of meristic elements in a given environmental situation. Thus one may conclude that meristic variations of geographical races or isolates are based partly upon environmental modifications, the extent of which is partially controlled by the genotype in an adaptive manner.

In Assiut and Aswan combined sex samples of A.nurse, a curvilinear relationship between the number of gill rakers and fish length was revealed. BOTROS et al. (1970) reproted that the number of gill rakers of both Sardinella maderensis and Sardinella aurita collected from Alexandria increased with increase of fish length. Linear and curvilinear relationships between gill raker count and the length of certain Tilapia species of lake Manzalan were reported by BISHARA (1973).

In the present investigation, it was possible to differnetiate between Assiut and Aswan samples of A. nurse on the basis of gill raker counts of the first right side gill arch or its horizontal branch. MATTA(1953) considered the gill raker counts on the first right side gill arch of Merluccius merluccius to be of systematic value. EZZAT et al. (1976) compared the gill raker counts of the horizontal and ascending branches of the first right side gill arch of Merluccius merluccius with those reported by different authors and they concluded that gill raker counts were helpful to differentiate between different populations of the aforementioned species from different localities.

The meristics considered in the present investigation for A.nurse were not associated with sex in each of Assiut and Aswan samples. DURAND and LOUBENS (1972) found insignificant differences between sexes for anal ray counts of Alestes baremose. PAGE and BRAASCH (1976) stated that males of Etheostoma smithi had more dorsal fin rays than females.

The results of meristic counts considered in the present investigation, except those of pelvic fin rays, revealed that Assiut and Aswan combined sex samples of A.nurse represented isolated populations. However, the coefficient of difference (C.D.) between such counts of those samples did not attain the value of 1.28. Accordingly, samples of A.nurse from those localities did not represent a subspecific status; they could be only considered as geographical races or isolates.

Except for the dorsal fin ray count, the meristic characters considered in the present investigation were found to be helpful for the differentiation between A.nurse and A.baremose. By using some meristic characters, DU PLESSIS (1963), LACHNER and JENKINS (1971) and BISHARA (1973) were able to differentiate between Labeo species in the Transvaal, species of Necomis biguttatus group in the Arkansas River drainage and Tilapia species in lake Manzalah respectively. QADRI (1974) was able to clarify the status of Salvelinus marstoni, Salvelinus oquassa and Salvelinus aureolus in eastern North America by minor differences in some of their meristic characters. He concluded that the three forms are conspecific and should be synonymized as Salvelinus alpinus oquassa.

A comparison between the meristic characters of A.nurse and A.baremose considered in the present investigation with those reproted by BOULENGER (1907) revelaed some variations (Tables 23 and 24). Such variations may be due to the rarity of specimens examined by Boulenger, variations of environmental factors prevailing nowadays in the Nile as compared with those at the time of Boulenger, adaptive changes of genetic nature or all these factors.

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Table 1: The number and total length range of the fishes examined for certain meristic characters of *A. nurse* and *A. baremose*.

Items of study	*A. nurse*								*A. baremose*	
	Assiut				Aswan				Assiut combined sexes	
	Males		Females		Males		Females			
	No. of fish	T.L range in mm	No.of fish	T.L range in mm	No.of fish	T.L range in mm	No.of fish	T.L range in mm	No.of fish	T.L range in mm
Gill rakers	208	98-200	183	74-247	137	91-143	289	33-176	47	227-600
Dorsal fin rays	252	,,	227	,,	152	,,	341	,,	51	,,
Pectoral fin rays	249	,,	224	,,	152	,,	341	,,	52	,,
Pelvic fin rays	242	,,	224	,,	152	,,	334	,,	51	,,
Anal fin rays	254	,,	229	,,	152	,,	344	,,	51	,,
Lateral line scales	255	,,	240	,,	143	,,	314	,,	51	,,
Predorsal scales	14	(Combined sexes)							15	,,
Scales around the body	14	(Combined sexes)							15	,,
Caudal peduncle scales	14	(Combined sexes)							15	,,

Table 2: The ranges and means of different meristic characters of *A. nurse* (males and females) off Assiut and Aswan.

	Meristic characters	Males			Females		
		No. of fish	Count range	$\bar{X} \pm$ S.D.	No. of fish	Count range	$\bar{X} \pm$ S.D.
Assiut	Gill rakers	208	22 - 33	27.47 ± 2.96	183	22 - 33	28.32 ± 2.640
	L.L. scales	255	27 - 34	30.82 ± 1.25	240	27 - 34	30.83 ± 1.174
	Dorsal fin rays	252	9 - 11	10.03 ± 0.234	277	9 - 11	10.06 ± 0.259
	Pectoral fin rays	249	11 - 16	13.61 ± 0.953	224	11 - 16	13.63 ± 0.943
	Pelvic fin rays	242	8 - 11	10.08 ± 0.331	224	9 - 11	10.10 ± 0.346
	Anal fin rays	254	15 - 19	16.46 ± 0.709	229	15 - 18	16.49 ± 0.686
Aswan	Gill rakers	137	24 - 33	29.15 ± 2.140	289	24 - 33	29.21 ± 1.980
	L.L. scales	143	27 - 32	29.09 ± 0.870	314	25 - 33	28.96 ± 1.050
	Dorsal fin rays	152	10	10	341	10 - 11	10.02 ± 0.120
	Pectoral fin rays	152	12 - 15	13.96 ± 0.574	341	12 - 16	13.99 ± 0.589
	Pelvic fin rays	152	10 - 11	10.12 ± 0.324	334	9 - 11	10.14 ± 0.354
	Anal fin rays	152	14 - 18	16.12 ± 0.539	344	14 - 18	16.22 ± 0.597

Table 3: The ranges and means of certain meristic characters of A. nurse (combined sexes) off Assiut and Aswan.

Meristic characters	Assiut			Aswan		
	No.of fish	Count range	$\bar{X} \pm$ S.D.	No.of fish	Count range	$\bar{X} \pm$ S.D.
Total gill rakers	391	22 - 33	27.87±2.84	426	24 - 33	29.18±2.030
Gill rakers on the horizontal branch	52	14 - 20	16.85±1.195	139	15 - 20	18.04±0.962
Gill rakers on the ascending branch	52	9 - 15	12.59±1.512	139	10 - 14	12.5 ±0.981
L.L. scales	495	27 - 34	30.83±1.210	457	25 - 33	29 ±0.995
Dorsal fin rays	479	9 - 11	10.05±0.246	493	10 - 11	10.01±0.100
Pectoral fin rays	473	11 - 16	13.62±0.948	493	12 - 16	13.98±0.584
Pelvic fin rays	466	8 - 11	10.09±0.338	486	9 - 11	10.13±0.345
Anal fin rays	483	15 - 19	16.47±0.697	496	14 - 18	16.19±0.581

Table 4: The percentage of occurrence of the total gill raker counts on the first right side gill arch of A. nurse (males and females) off Assiut and Aswan.

No.of gill rakers	Assiut				Aswan			
	Males		Females		Males		Females	
	No.of fish	%	No.of fish	%	No. of fish	%	No.of fish	%
22	5	2.40	1	0.55	-	-	-	-
23	15	7.21	6	3.28	-	-	-	-
24	18	8.65	13	7.10	5	3.65	4	1.38
25	23	11.06	12	6.56	5	3.65	8	2.77
26	32	15.38	18	9.84	10	7.29	23	7.96
27	15	7.21	15	8.19	8	5.84	22	7.61
28	16	7.69	22	12.02	14	10.22	35	12.11
29	19	9.13	25	13.66	27	19.71	53	18.34
30	25	10.02	28	15.30	31	22.63	66	22.84
31	20	9.62	23	12.57	21	15.33	39	16.96
32	14	6.73	16	8.74	12	8.76	20	6.92
33	6	2.88	4	2.19	4	2.92	9	3.11

Table 5: The percentage of occurrence of the total gill raker counts on the first right side gill arch of A. nurse (combined sexes) off Assiut and Aswan.

Number of gill rakers	Assiut		Aswan	
	No. of fish	%	No. of fish	%
22	6	1.53	-	-
23	21	5.37	-	-
24	31	7.93	9	2.11
25	35	8.95	13	3.05
26	50	12.79	33	7.75
27	30	7.67	30	7.04
28	38	9.72	49	11.50
29	44	11.25	80	18.78
30	53	13.25	97	22.77
31	43	11.00	70	16.43
32	30	7.67	32	7.51
33	10	2.56	13	3.05

Table 6: Average number of gill rakers at 10 mm length group intervals of Assiut and Aswan combined sex samples of A. nurse.

Length group (mm)	Assiut			Aswan		
	No.of fish	Average number of gill rakers	Standard deviation	No.of fish	Average number of gill rakers	Standard deviation
90	-	-	-	13	26.77	2.315
100	4	23.72	2.062	29	28.45	2.114
110	11	25.36	2.838	94	29.40	2.049
120	18	24.67	1.029	170	29.30	1.817
130	43	25.88	2.402	78	29.60	2.072
140	62	27.84	2.776	30	28.67	2.123
150	81	28.85	2.569	6	30.17	1.329
160	71	28.90	2.641	3	28.00	1.732
170	40	28.00	2.727	3	27.33	1.155
180	30	28.30	2.437	-	-	-
190	15	27.60	2.613	-	-	-
200	5	29.00	2.121	-	-	-
210	6	29.67	2.503	-	-	-
220	5	29.00	2.000	-	-	-

Table 7: Analysis of variance of total gill raker counts on the first right side gill arch of A. nurse off Assiut and Aswan to show the correlation between those counts and the fish length.

	Assiut	Aswan
S_1^2	6.518	3.877
S_2^2	34.147	18.262
F	5.238	4.710
$d.f_1$, $d.f_2$	378,11	417,7

S_1^2 = Within-groups mean square.

S_2^2 = Deviation from linearity mean square.

Table 8: The percentage of occurrence of the gill raker counts on the horizontal and ascending branches of the first right side gill arch of A. nurse (combined sexes)off Assiut and Aswan.

Horizontal branch					Ascending branch				
	Assiut		Aswan			Assiut		Aswan	
No.of gill rakers	No.of fish	%	No.of fish	%	No.of gill rakers	No.of fish	%	No.of fish	%
14	1	1.92	-	-	9	1	1.92	-	-
15	5	9.62	1	0.72	10	4	7.69	1	0.72
16	14	26.92	7	5.04	11	7	13.46	23	16.55
17	18	34.62	27	19.42	12	12	23.08	43	30.93
18	10	19.23	61	43.88	13	13	25.00	49	35.25
19	3	5.77	36	25.00	14	9	17.31	23	16.55
20	1	1.92	7	5.04	15	6	11.54	-	-

Table 9: The variation of the range of gill raker counts on the horizontal and ascending branches of the first right side gill arch with the variation of the total gill raker counts on that arch in A. nurse off Assiut and Aswan.

No.of gill rakers	Assiut			Aswan		
	No.of fish	Range on ascending branch	Range on horizontal branch	No.of fish	Range on ascending branch	Range on horizontal branch
25	2	10	15			
26	3	10-12	14-16			
27	3	9-12	15-18			
28	8	10-13	15-18	6	10-13	15-18
29	8	12-13	16-17	20	11-13	16-18
30	11	11-14	16-19	43	11-14	16-19
31	9	11-15	16-20	40	11-14	17-20
32	7	13-15	17-19	21	12-14	18-20
33	1	15	18	9	12-14	19-20
Total range	52	9-15	14-20	139	10-14	15-20

Table 10: The percentage of occurrence of lateral line scale counts of A. nurse (males and females) off Assiut and Aswan.

Number of lateral line scales	Assiut				Aswan			
	Males		Females		Males		Females	
	No.of fish	%	No.of fish	%	No.of fish	%	No.of fish	%
25	-	-	-	-	-	-	1	0.32
26	-	-	-	-	-	-	1	0.32
27	1	0.39	2	0.83	1	0.7	11	3.50
28	5	1.96	4	1.67	34	23.78	101	32.17
29	32	12.55	17	7.08	67	46.85	107	34.07
30	61	23.92	73	30.42	33	23.08	72	22.93
31	84	32.94	74	30.83	7	4.89	19	6.05
32	49	19.22	56	23.34	1	0.70	1	0.32
33	20	7.84	11	4.58	-	-	1	0.32
34	3	1.18	3	1.25	-	-	-	-

Table 11: The percentage of occurrence of lateral line scale counts of A. nurse (combined sexes) off Assiut and Aswan.

Number of lateral line scales	Assiut		Aswan	
	No. of fish	%	No.of fish	%
25	-	-	1	0.22
26	-	-	1	0.22
27	3	0.61	12	2.63
28	9	1.82	135	29.54
29	49	9.89	174	38.07
30	134	27.07	105	22.98
31	158	31.92	26	5.69
32	105	21.21	2	0.43
33	31	6.26	1	0.22
34	6	1.21	-	-

Table 12: The ranges and means of certain meristic characters of combined sex samples of A. nurse and A. baremose off Assiut.

Meristic characters	A. nurse			A. baremose		
	No.of fish	Count range	$\bar{X} \pm$ S.D.	No.of fish	Count range	$\bar{X} \pm$ S.D.
Total gill rakers	391	22 - 33	27.87±2.840	47	34 - 58	48.70± 5.319
L.L. scales	495	27 - 34	30.83±1.210	51	44 - 49	47.43± 1.237
Predorsal scales	14	12 - 14	13.43±0.646	15	19 - 21	20.33± 0.816
Scales around body	14	19 - 21	19.79±0.699	15	22 - 27	25.40± 1.120
Scales around C.P.	14	10 - 11	10.5 ±0.519	15	13 - 14	13.80± 0.414
Dorsal fin rays	479	9 - 11	10.05±0.246	51	9 - 11	10.09± 0.458
Pectoral fin rays	473	11 - 16	13.62±0.948	52	10 - 15	12.58± 0.894
Pelvic fin rays	466	8 - 11	10.09±0.338	51	9 - 11	9.71± 0.610
Anal fin rays	483	15 - 19	16.47±0.697	51	23 - 31	27.84± 1.804

Table 13: The percentage of occurrence of counts of predorsal scales, scales around the body and scales around the caudal peduncle of A. nurse (combined sexes) off Assiut.

Predorsal scales			Scales around body			Scales around caudal peduncle		
Counts	No.of fish	%	Counts	No.of fish	%	Counts	No.of fish	%
12	1	7.14	19	5	35.71	10	7	50
13	6	42.86	20	7	50	11	7	50
14	7	50	21	2	14.29			

Table 14: The percentage of occurrence of dorsal fin ray counts of Assiut and Aswan male, female and combined sex samples of A. nurse.

Fin ray counts	Assiut						Aswan					
	♂		♀		Combined		♂		♀		Combined	
	No.of fish	%	No.of fish	%	No.of fish	%	No.of fish	%	No.of fish	%	No.of fish	%
9	3	1.19	1	0.44	4	0.83	-	-	-	-	-	-
10	238	94.44	211	92.95	449	93.74	152	100	336	98.53	488	98.99
11	11	4.37	15	6.61	26	5.43	-	-	5	1.47	5	1.01

Table 15: The percentage of occurrence of pectoral fin ray counts of Assiut and Aswan male, female and combined sex samples of A. nurse.

Fin ray counts	Assiut						Aswan					
	♂		♀		Combined		♂		♀		Combined	
	No.of fish	%	No.of fish	%	No.of fish	%	No.of fish	%	No.of fish	%	No.of fish	%
11	4	1.61	4	1.79	8	1.69	-	-	-	-	-	-
12	30	12.05	24	10.71	54	11.42	1	0.66	3	0.88	4	0.81
13	65	26.10	59	26.34	124	26.22	25	16.45	51	14.96	76	15.42
14	113	45.38	104	46.43	217	45.88	105	69.07	235	68.91	340	68.97
15	35	14.06	31	13.84	66	13.95	21	13.82	51	14.96	72	14.60
16	2	0.80	2	0.88	4	0.84	-	-	1	0.29	1	0.20

Table 16: The percentage of occurrence of pelvic fin ray counts of Assiut and Aswan male, female and combined sex samples of A. nurse.

Fin ray counts	Assiut						Aswan					
	♂		♀		Combined		♂		♀		Combined	
	No.of fish	%	No.of fish	%	No.of fish	%	No.of fish	%	No.of fish	%	No.of fish	%
8	1	0.41	-	-	1	0.21	-	-	-	-	-	-
9	1	0.41	3	1.34	4	0.86	-	-	1	0.3	1	0.21
10	217	89.67	195	87.05	412	88.41	134	88.16	286	85.63	420	86.42
11	23	9.51	26	11.61	49	10.52	18	11.84	47	14.07	65	13.37

Table 17: The percentage of occurrence of anal fin ray counts of Assiut and Aswan male, female and combined sex samples of A. nurse.

Fin ray counts	Assiut						Aswan					
	♂		♀		Combined		♂		♀		Combined	
	No.of fish	%	No.of fish	%	No.of fish	%	No.of fish	%	No.of fish	%	No.of fish	%
14	-	-	-	-	-	-	1	0.66	3	0.87	4	0.81
15	13	5.12	9	3.93	22	4.55	9	5.92	12	3.49	21	4.23
16	130	51.18	115	50.22	245	50.72	115	75.66	248	72.09	363	73.19
17	94	37.01	89	38.86	183	37.89	25	16.45	70	2o.35	95	19.15
18	16	6.30	16	6.99	32	6.63	2	1.31	11	3.20	13	2.62
19	1	0.39	-	-	1	0.21	-	-	-	-	-	-

Table 18 : The percentage of occurrence of lateral line scale counts of A. baremose off Assiut.

Number of lateral line scales	44	45	46	47	48	49	Total
Number of fish examined	1	4	5	12	20	9	51
%	1.96	7.84	9.8	23.53	39.22	17.65	

Table 19: The percentage of occurrence of counts of predorsal scales, scales around the body and scales around caudal peduncle of A. baremose off Assiut.

Predorsal scales			Scales around the body			Scales around caudal peduncle		
Counts	No.of fish	%	Counts	No.of fish	%	Counts	No.of fish	%
19	3	20	22	1	6.67	13	3	20
20	4	26.67	25	6	40	14	12	80
21	8	53.33	26	7	46.66			
			27	1	6.67			

Table 20: The percentage of occurrence of total gill raker counts on the first right side gill arch of A. baremose off Assiut.

Number of gill rakers	34	37	40	43	45	46	47	48	49
Number of fish examined	2	1	1	2	3	5	5	3	2
%	4.26	2.13	2.13	4.26	6.38	10.64	10.64	6.38	4.26

Number of gill rakers	50	51	52	53	54	55	57	58	Total
Number of fish examined	3	3	5	5	2	3	1	1	47
%	6.38	6.38	10.64	10.64	4.26	6.38	2.13	2.13	

Table 21: The percentage of occurrence of dorsal , pectoral and pelvic fin ray counts of A. baremose off Assiut.

Fin	Number of rays	No.of fish	%
Dorsal fin	9	3	5.88
	10	40	78.43
	11	8	15.69
Pectoral fin	10	1	1.92
	12	17	32.70
	13	24	46.15
	14	8	15.38
	15	2	3.85
Pelvic fin	9	19	37.26
	10	28	57.90
	11	4	7.84

Table 22: The percentage of occurrence of anal fin ray counts of A. baremose off Assiut.

Number of rays	No. of fish	%
23	2	3.92
24	1	1.96
25	3	5.90
26	1	1.96
27	11	21.57
28	16	31.37
29	9	17.64
30	5	9.80
31	3	5.88

Table 23 : Comparison of some meristic characters of A. nurse recorded in the present work with similar data recorded by Boulenger (1907).

Meristic characters	Count range		
	Assiut fish 1978 - 1979	Aswan fish 1978	Boulenger 1907
Gill rakers on the horizontal branch	14-20	15-20	16-20
L.L. scales	27-34	25-33	26-33
Dorsal fin rays	I-III 7-9	II-III 7-9	II 7-8
Pectoral fin rays	I-II 10-15	I-II 11-15	-
Pelvic fin rays	I-II 6-9	II 7-9	-
Anal fin rays	I-III 13-16	I-III 12-16	III 11-15

Table 24: Comparison of some meristic characters of A. baremose recorded in the present work with similar data recorded by Boulenger (1907).

Meristic characters	Count range	
	Assiut fish 1978 - 1979	Boulenger (1907)
Gill rakers on the horizontal branch	20-37	30-38
L.L. scales	44-49	45-50
Dorsal fin rays	I-III 8-9	II+8
Pectoral fin rays	I 9-14	-
Pelvic fin rays	I-III 8-9	-
Anal fin rays	I-III 21-28	III 22-27