

## IDENTIFICATION OF CYPRINODONTIFORMES FISHES FROM AL-HAMMAR MARSH, SOUTH OF IRAQ

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### ABSTRACT

The species of Cyprinodontiformes fishes from Al-Hammar marsh, south of Iraq were described. Cyprinodontiformes in Iraq include two families, Cyprinodontidae and Poeciliidae. The results showed availability two species for first family, *Aphanius dispar* and *A. mento* and two species of second family, *Gambusia holbrooki* and *Poecilia latipinna*.

*Key words:* Identification, Cyprinodontiformes fishes, south of Iraq.

### Introduction

The Order of Cyprinodontiformes fishes including two important families Cyprinodontidae and Poeciliidae. The killifish (Cyprinodontidae) are small fishes found in fresh, brackish and sea water, there are 9 genera and about 105 species found in tropical to warm temperate climates almost world-wide (Coad, 2010). Poeciliids are found in fresh and brackish water from the eastern United States south through the Caribbean to northeastern Argentina and in Africa, some species of Poeciliidae introduced to many countries, there are about 37 genera with 304 species (Nilson, 2006).

*Aphanius* species have low population sizes or small areas of occurrence, and considered endangered due to drainage, land-use, and pollution around their native habitats, moreover, the artificially introduced mosquito fish (*Gambusia*) may compete with *Aphanius*, and many native *Aphanius* populations are seriously threatened by *Gambusia* (Reichenbacher and Kamrani, 2009).

Wildekamp *et al.* (1999) described species and subspecies of genus *Aphanius* Nardo, 1827 in Turkey, depended on morphology, sexual dimorphism, coloration and distribution. Reichenbacher and Kamrani (2009) focuses on the otoliths of the endangered *Aphanius ginaonis* in southern Iran. Life history of the sail fin molly *Poecilia latipinna* was studied (Felley and Daniels, 1992). A review of the biology of *Gambusia affinis* and *G. holbrooki* were showed by (Pyke, 2005). This study has been realized to determine the fish species of Order: Cyprinodontiformes in Al-Hammar marsh, south of Iraq.

### Material and Methods

A total of 100 samples examined in this study were collected from Al-Hammar marsh, south of Iraq (Figure, 1) by seine net during the period from June to October 2010. six meristic and nineteen morphometric characteristics for samples were measured, depending on Hubbs and Lagler (1958).

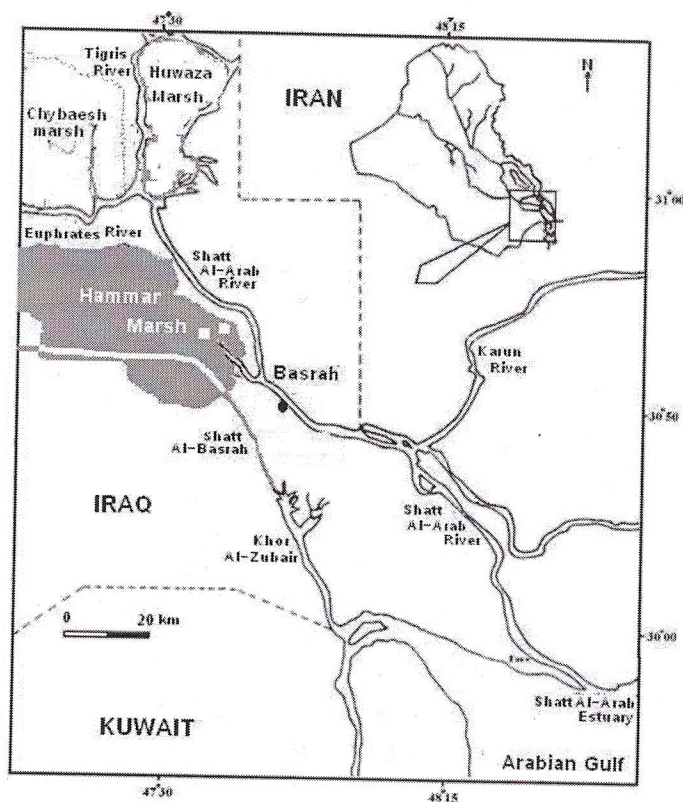


Figure (1) Sampling station in Al-Hammar marsh, south of Iraq

**Results**

Taxonomic section

Order: Cyprinodontiformes

Family: Cyprinodontidae

1- *Aphanius dispar* (Ruppell, 1829)

2- *A. mento* (Heckel, 1843)

Family: Poeciliidae

1- *Gambusia holbrooki* Girard, 1859

2- *Poecilia latipinna* (Lesueur, 1821)

Key of Cyprinodontiformes :

- 1-a: Anal fin in males enlarged as a copulatory organ, body slender ..... Poeciliidae
- 1-b: Anal fin in males normal, body robust ..... Cyprinodontidae

Key of Cyprinodontidae:

- 1-a: Males with lemon-yellow pectoral, pelvic and anal fins and with two broad curved dark bars on caudal fin, females with thin flank bars ..... *Aphanius dispar*
- 1-b: Males without lemon-yellow fins, without broad bars on the caudal fin, females without flank bars
- 2-a: Males with blue-black to black body with iridescent blue-white to silvery spots, females with small flank spots and without caudal peduncle spot ..... *A. mento*

Key of Poeciliidae:

- 1-a: Dorsal fin rays 7-8, dorsal fin not enlarged .... *Gambusia holbrooki*
- 1-b: Dorsal fin rays 10 or more, dorsal fin sail-like in mature males..... *Poecilia latipinna*

***Aphanius dispar* (Ruppell, 1829)**

Table (1) show the morphometric characters of *Aphanius dispar*, total length ranged from 37 to 45 mm, body depth ranged from 30.77 to 34.05% in standard length, head length 31.89 – 37.41% and eye diameter 10.58 – 13.37%. Males are brown-grey, grey with iridescent blue-white flank spots and white and brown to light orange or light blue, The flank over the pectoral fin has blue spots, the dorsal fin is spotted light blue on a bright orange background and is barred, Pectoral, anal and pelvic fins are lemon-yellow. The caudal fin has 2-3 dark and light blue alternating bars, the last bar being yellow. Lateral line scales ranged 24-29. Total dorsal fin rays 9-10, total anal fin rays 10-11, pectoral rays 12-14, and pelvic rays 7. Gill rakers 10-13 (table, 2) . Males have longer fins than females and are more brightly colored. The dorsal fin is twice as long in the male and reaches the caudal fin when appressed. When expanded it is widely flared and distinctive as is the enlarged anal fin.

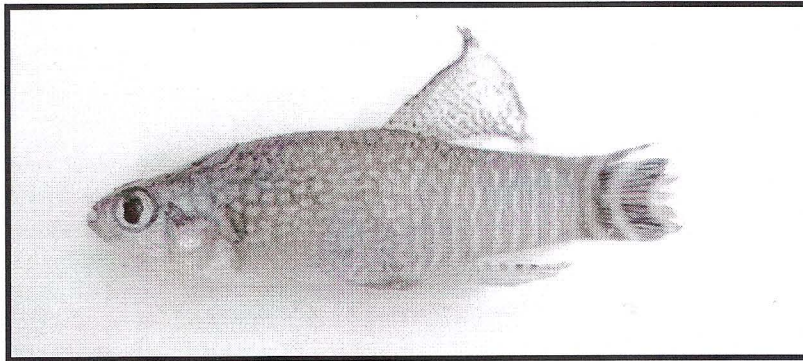


Figure (2). General body shape of *A. dispar* (male).

Table (1). Morphometric characters of *Aphanius dispar*.

Morphometric characters	Range	Mean	SD
Total length (mm)	37 – 45	41.83	2.92
Standard length (mm)	29 – 36	33.33	2.50
Body depth % in SL	30.77 – 34.05	32.68	1.70
Body width % in SL	20.94 – 21.11	21.05	0.09
Head length % in SL	31.89 – 37.41	34.69	2.76
Head depth % in SL	20.51 – 25.76	23.40	2.66
Snout length % in SL	8.79 – 12.11	9.93	1.88
Eye diameter % in SL	10.58 – 13.37	11.66	1.49
Interorbital distance % in SL	7.71 -8.88	8.32	0.58
Predorsal length % in SL	62.58 – 69.61	66.03	3.51
Postdorsal length % in SL	26.64 – 33.44	30.09	3.40
Dorsal fin length % in SL	15.11 – 16.48	15.59	0.76
Dorsal fin height % in SL	17.61 – 25.31	20.99	3.93
Anal fin length % in SL	10.0 – 14.55	11.61	2.54
Anal fin height % in SL	16.32 – 26.34	21.55	5.02
Pectoral fin length % in SL	22.51 – 24.27	23.11	1.00
Pelvic fin length % in SL	15.03 – 15.32	15.21	0.15
Caudal peduncle length % in SL	23.91 – 26.75	25.15	1.45
Caudal peduncle depth % in SL	18.17 – 19.89	19.09	0.86

Table (2). Meristic characters of *Aphanius dispar*

Meristic characters	Range	Mean	SD
Lateral Line	24 – 29	26.66	2.51
Dorsal fin rays	9 – 10	9.2	0.44
Anal fin rays	10 – 11	10.16	0.40
Pectoral fin rays	12 – 14	13	1.0
Pelvic fin rays	7 – 7	7	0
Gill rakers	10 – 13	11.33	1.52

***Aphanius mento* (Heckel, 1843)**

Total length ranged from 35 to 48 mm, body depth ranged from 31.16 to 35.82% in standard length, head length 34.03 – 36.86% and eye diameter 11.17 – 12.20% (table, 3). Males are a dark blue-black to dark brown or almost black with iridescent blue-white to silvery spots regularly-arranged on the fins as curved lines, and irregularly on the body, Male color fades in low light conditions and in winter males have silvery flanks with a dark brown back. Spots are silvery-blue on the upper flank and are not as numerous as in the spawning male. Females are grey-brown or grey-white to silvery with large golden blotches or silvery to blue spots and dark dots. Lateral line scales ranged 26-28. Total dorsal fin rays 12-14, total anal fin rays 11-14, pectoral rays 13-15, and pelvic rays 5-6, total gill rakers 8-9 (table ,4).

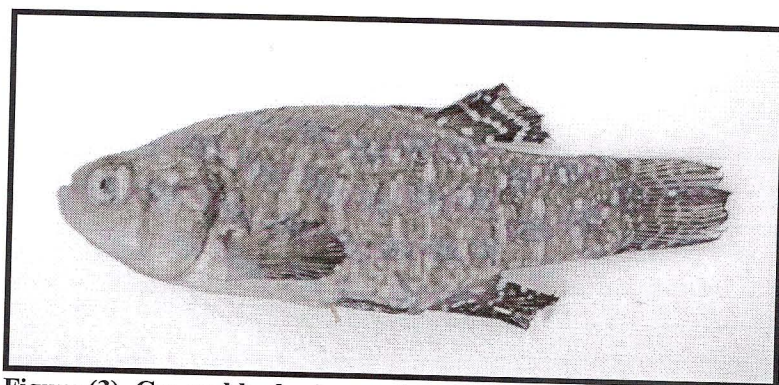


Figure (3). General body shape of *A. mento* (male).

Table (3). Morphometric characters of *Aphanius mento*.

Morphometric characters	Range	Mean	SD
Total length (mm)	35 – 48	39.9	4.48
Standard length (mm)	29 – 40	32.5	3.80
Body depth % in SL	31.16 – 35.82	33.91	2.44
Body width % in SL	14.06 – 17.48	16.30	1.94
Head length % in SL	34.03 – 36.86	35.10	1.53
Head depth % in SL	26.62 – 29.0	27.91	1.20
Snout length % in SL	10.27 – 12.25	11.36	1.00
Eye diameter % in SL	11.17 – 12.20	11.79	0.54
Interorbital distance % in SL	7.23 – 9.12	8.47	1.07
Predorsal length % in SL	59.54 – 63.43	61.25	1.98

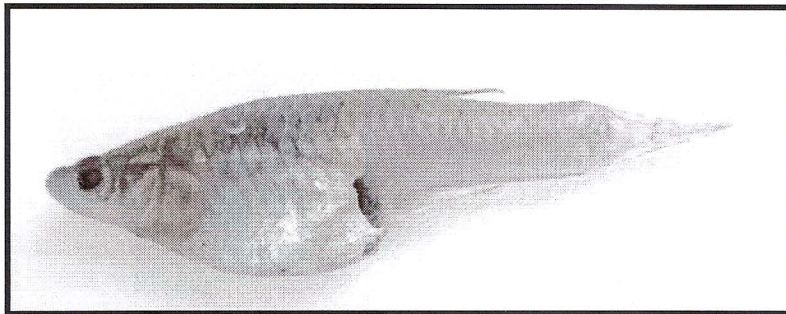
Postdorsal length % in SL	23.8 – 30.65	27.49	3.45
Dorsal fin length % in SL	20.19 – 21.66	20.90	0.73
Dorsal fin height % in SL	18.83 – 24.93	22.23	3.10
Anal fin length % in SL	15.61 – 19.60	17.11	2.16
Anal fin height % in SL	17.54 – 23.58	20.18	3.08
Pectoral fin length % in SL	20.62 – 23.66	22.39	1.58
Pelvic fin length % in SL	13.43 – 16.89	15.56	1.86
Caudal peduncle length % in SL	23.90 – 28.67	26.25	2.38
Caudal peduncle depth % in SL	17.76 – 20.51	19.32	1.41

Table (4). Meristic characters of *Aphanius mento*.

Meristic characters	Range	Mean	SD
Lateral Line	26 – 28	27	0.89
Dorsal fin rays	12 – 14	13.5	0.83
Anal fin rays	11 – 14	12.5	1.04
Pectoral fin rays	13 – 15	14	1.41
Pelvic fin rays	5 – 6	5.75	0.50
Gill rakers	8 – 9	8.5	0.57

***Gambusia holbrooki* Girard, 1859**

Total length ranged from 32 to 37 mm, body depth ranged from 30.78 to 35.26% in standard length, head length 28.15 – 30.43% and eye diameter 10.15 – 10.92% (table, 5). Males are translucent grey to light olive with a blue, green or purplish sheen on the sides. The back is olive-brown to yellowish-brown and the belly silvery or yellowish. Males are easily recognized by the anal fin rays 3-5 being specially modified into an elongate gonopodium for fertilization. Dorsal fin with 8 rays, anal fin with 11-12 rays, pectoral fin with 12 rays and pelvic rays 5. Gill rakers 14 (table ,6) .

Figure (4). General body shape of *G. holbrooki* (female).

**Table (5). Morphometric characters of *Gambusia holbrooki*.**

Morphometric characters	Range	Mean	SD
Total length (mm)	32 – 37	35.33	2.88
Standard length (mm)	26 – 28	26.66	1.15
Body depth % in SL	30.78 – 35.26	32.55	2.38
Body width % in SL	22.42 – 25.03	23.38	1.43
Head length % in SL	28.15 – 30.34	29.10	1.12
Head depth % in SL	19.28 – 23.19	21.09	1.97
Snout length % in SL	6.92 – 9.15	8.07	1.11
Eye diameter % in SL	10.15 – 10.92	10.54	0.38
Interorbital distance % in SL	6.15 – 6.96	6.56	0.40
Predorsal length % in SL	69.14 – 76.03	72.31	3.47
Postdorsal length % in SL	27.67 – 36.65	30.97	4.93
Dorsal fin length % in SL	4.8 – 12.92	9.72	4.32
Dorsal fin height % in SL	20.19 – 21.30	20.80	0.56
Anal fin length % in SL	11.71 – 14.65	13.12	1.47
Anal fin height % in SL	15.53 – 25.38	19.48	5.20
Pectoral fin length % in SL	23.92 – 30.03	26.77	3.07
Pelvic fin length % in SL	14.46 – 14.53	14.49	0.04
Caudal peduncle length % in SL	36.21 – 39.57	38.13	1.73
Caudal peduncle depth % in SL	15.19 – 17.30	15.96	1.16

**Table (6). Meristic characters of *Gambusia holbrooki*.**

Meristic characters	Range	Mean	SD
Dorsal fin rays	8 – 8	8	0
Anal fin rays	11 – 12	11.75	0.50
Pectoral fin rays	12 -12	12	0
Pelvic fin rays	5 – 5	5	0
Gill rakers	14 – 14	14	0

***Poecilia latipinna* (Lesueur, 1821)**

Table (7) show the morphometric characters of *Poecilia latipinna*, total length ranged from 33 to 101 mm, body depth ranged from 36.05 to 41.43% in standard length, head length 17.72 – 27.93% and eye diameter 7.09 – 9.25%. These fishes are further characterized by a single dorsal fin, a squared off or rounded caudal fin, and an anal fin in males modified into a copulatory organ, called a gonopodium. Both sexes of *P. latipinna* have rows of dark spots along each scale row, but are otherwise dimorphic,

the dorsal fin in males is long and sail-like, with an orange edge, a series of black bars toward the outer half, and dark lines and spots near the base. The caudal fin is orange and blue with dark lines and spots, and the upper body is blue. Females lack bright coloration, most markings, and the elongated dorsal fin. Dorsal fin with 14-16 rays, anal fin with 8 rays, pectoral fin with 11-14 rays and pelvic rays 5-6. Gill rakers 27-28 (table ,8).

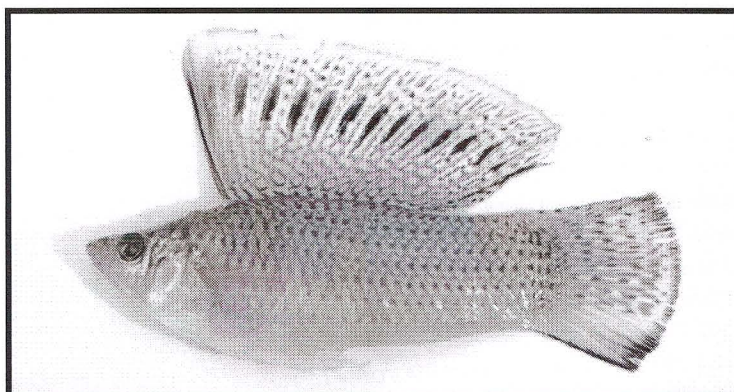


Figure (5). General body shape of *P. latipinna* (male).

Table (7). Morphometric characters of *Poecilia latipinna*.

Morphometric characters	Range	Mean	SD
Total length (mm)	33 – 101	61	20.10
Standard length (mm)	25 – 81	47.7	16.67
Body depth % in SL	36.05 – 41.43	38.17	2.86
Body width % in SL	16.19 – 17.76	17.13	0.83
Head length % in SL	17.72 – 27.93	27.81	0.10
Head depth % in SL	23.23 – 24.90	23.92	0.86
Snout length % in SL	9.75 – 11.04	10.25	0.69
Eye diameter % in SL	7.09 – 9.25	8.23	1.08
Interorbital distance % in SL	9.90 – 12.66	11.28	1.38
Predorsal length % in SL	29.88 – 41.86	35.04	6.15
Postdorsal length % in SL	28.71 – 32.50	30.05	2.12
Dorsal fin length % in SL	28.65 – 44.90	38.99	8.98
Dorsal fin height % in SL	18.65 – 48.63	33.83	14.99
Anal fin length % in SL	5.70 – 7.76	6.83	1.04
Anal fin height % in SL	11.85 – 21.04	17.92	5.26
Pectoral fin length % in SL	25.37 – 29.50	27.54	2.07
Pelvic fin length % in SL	11.06 – 21.25	16.89	5.25
Caudal peduncle length % in SL	40.60 – 51.95	47.16	5.87
Caudal peduncle depth % in SL	21.72 – 27.68	25.46	3.25

Table (8). Meristic characters of *Poecilia latipinna*.

Meristic characters	Range	Mean	SD
Dorsal fin rays	14 – 16	15.4	0.89
Anal fin rays	8 – 8	8	0
Pectoral fin rays	11 – 14	12.33	1.52
Pelvic fin rays	5 – 6	5.8	0.44
Gill rakers	27 – 28	27.66	0.57

## Discussion

*Aphanius* species in Iraq show sexual dimorphism in pigmentation that can be used to identify and separate them, morphometric and meristic characters overlap and are only useful in multivariate space (Coad, 2009). *Gambusia holbrooki* and *G. affinis* are considered together because these two fish species are very closely related, similar in appearance, similar in biology and often confused (Pyke, 2005), *G. holbrooki* has 8 dorsal and 11 anal total fin rays while *G. affinis* has 7 dorsal and 10 anal total fin rays (Walters and Freeman, 2000). The variation among males in size primarily of *Poecilia latipinna* results from allelic variation of a single locus on the male sex chromosome that determines the timing of sexual maturation, large males have different mating patterns than small males, and generally different demographic patterns, this has proven to be an interesting system to examine the balance between sexual selection and viability selection (Felley and Daniels, 1992).

Khalaf (1961) described two species of Cyprinodontidae in Iraq *A. dispar* and *A. cypris*, the second species maybe synonym of *A. mento*, while Mahdi and George (1969) recorded three species of Cyprinodontidae *A. dispar*, *A. cypris* and *A. sophiae* (Heckel 1849), and one species of Poeciliidae *G. affinis*, they may mean *G. holbrooki*. Three species of Cyprinodontidae were recorded in Shatt Al-Arab river in Basrah city southern of Iraq, *A. dispar*, *A. sophiae* and *Aphanius* sp. , and one species of Poeciliidae *G. affinis* (Al-Nasiri and Hoda, 1975). Al-Daham (1977) agree with Mahdi and George (1969) he showed availability three species of Cyprinodontidae and one species of Poeciliidae in Iraq. A new species of Cyprinodontidae *A. mesopotamicus* from southern Mesopotamia in Iraq and Iran were described (Coad, 2009) but we didn't found it. The results agreed with Coad (2010). The taxon *A. sophiae* has been widely used as the name of toothcarps in various basins in southern Iran and Iraq, and even the Middle East generally. However, this species is restricted to the endorheic Kor River basin north of the city of Shiraz in Fars Province, Iran (Coad 1996).

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