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MORPHOLOGICAL CHARACTERISTICS FOR CLASSIFICATION OF GENUS *CYPRINUS* LINNAEUS, 1758 IN PHONG NHA - KE BANG NATIONAL PARK IN THE NORTH CENTRAL PART OF VIETNAM

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Analysis and identification of 56 specimens of genus *Cyprinus* Linnaeus, 1758 collected from Phong Nha - Ke Bang National Park in the North central part of Vietnam. We have determined four species: *Cyprinus carpio* Linnaeus, 1758; *Cyprinus hieni* Tu & Tuan, 2003; *Cyprinus melanes* (Mai, 1978); *Cyprinus quidatensis* Tu et al., 1999.

Keywords: *Cyprinus carpio, Cyprinus hieni, Cyprinus melanes, Cyprinus quidatensis, Phong Nha - Ke Bang National Park, classification, North Central Vietnam.*

CARACTERISTICILE MORFOLOGICE PENTRU CLASIFICAREA GENULUI *CYPRINUS* LINNAEUS, 1758 ÎN PARCUL NAȚIONAL PHONG NHA - KE BANG DIN PARTEA CENTRALĂ DE NORD A VIETNAMULUI

Au fost identificate și analizate 56 de exemplare din genul *Cyprinus* Linnaeus, 1758 colectate din Parcul Național Phong Nha - Ke Bang situat în Partea Centrală de Nord a Vietnamului. Dintre acestea am determinat patru specii: *Cyprinus carpio* Linnaeus, 1758; *Cyprinus hieni* Tu & Tuan, 2003; *Cyprinus melanes* (Mai, 1978) și *Cyprinus quidatensis* Tu et al., 1999.

Cuvinte-cheie*: Cyprinus carpio, Cyprinus hieni, Cyprinus melanes, Cyprinus quidatensis, Parcul Național Phong Nha - Ke Bang, clasificare, Partea Centrală de Nord a Vietnamului.*

Introduction

According to Kottelat, 2013 [1] genus *Cyprinus* Linnaeus, 1758 consists 16 species distributed in Southeast Asia as: *Cyprinus hieni* Tu & Tuan, 2003; *Cyprinus acutidorsalis* Chen & Hwang, in Wu, 1977; *Cyprinus barbatus* Chen & Hwang, in Wu, 1977; *Cyprinus carpio* Linnaeus, 1758; *Cyprinus chilia* Wu, Yang, Yue & Huang, 1963; *Cyprinus dai* (Nguyen & Doan, 1969); *Cyprinus daliensis* Chen & Hwang, in Wu, 1977; *Cyprinus exophthalmus* Mai, 1978; *Cyprinus hyperdorsalis* Nguyen, 1991; *Cyprinus intha* Annandale, 1918; *Cyprinus longipectoralis* Chen & Hwang, in Wu, 1977; *Cyprinus megalophthalmus* Wu, Yang, Yue & Huang, 1963; *Cyprinus melanes* (Mai, 1978); *Cyprinus multitaeniatus* Pellegrin & Chevey, 1936; *Cyprinus quidatensis Cyprinus quidatensis* Tu et al., 1999; *Cyprinus rubrofuscus* La Cepède, 1803. In this study, said that Vietnam we have 7 species: *Cyprinus hieni; Cyprinus dai; Cyprinus melanes; Cyprinus multitaeniatus; Cyprinus quidatensis; Cyprinus exophthalmus; Cyprinus hyperdorsalis.* In there *Cyprinus hieni* is probably a species inquirenda [1]. But according to research by Nguyen Van Hao and Ngo Si Van 2001, 2005 that Vietnam has 9 species: *Cyprinus hieni*; *Cyprinus dai*; *Cyprinus melanes*; *Cyprinus multitaeniatus*; *Cyprinus quidatensis*; *Cyprinus exophthalmus*; *Cyprinus hyperdorsalis*; *Cyprinus rubrofuscus*; *Cyprinus carpio* [2,3]. In there *Cyprinus carpio* species, Kottelat said that it is not distributed in Vietnam [1,4].

On the other hand, Phong Nha - Ke Bang National Park is considered as one of the four centres where Cyprinini originated [5,6]. The history of fish studies in Vietnam as well as fishes of the inland waters of Southeast Asia shows that genus *Cyprinus* is under debate about taxonomy. From that condition, we strengthen to research the project "Morphological characteristics for classification of genus *Cyprinus* Linnaeus, 1758 in Phong Nha - Ke Bang National Park in the North central part of Vietnam"

Material and methods

After anaesthesia, fishe were fixed either in 10% formaldehyde and later transferred into 4% formaldehyde for storage. All measurements and counts follow Kottelat (2007) [7], and additional documents of Nguyen Thai Tu, Ho Anh Tuan (2003) [5], Ho Anh Tuan (2016). Measurements were made point-to-point with digital callipers to the nearest 0.1 mm. Abbreviations: Headquarters of PN - KB NP, Headquarters of Phong Nha - Ke Bang National Park; BMVU, Biological Museum Vinh University, Vinh, Vietnam.

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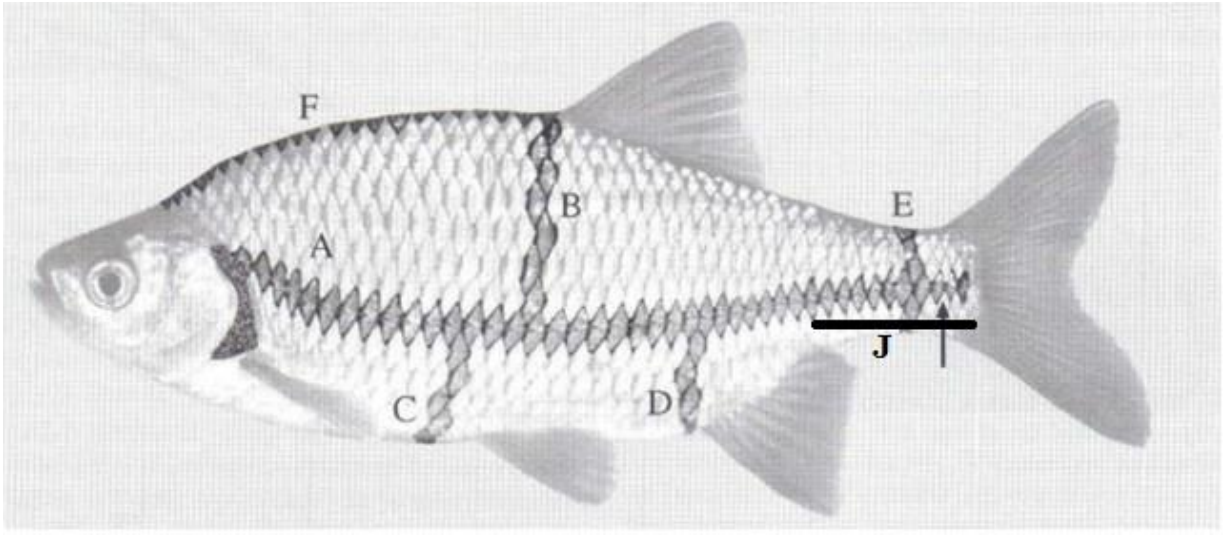


Fig.1. Illustration of principal scale counts.

A: Lateral line scale; B: Transverse scales between lateral line and origin of dorsal fin; C: Transverse scales between lateral line and origin of pelvic fin; D: Transverse scales between lateral line and origin of anal fin; E: Circumpeduncular scales; F: Predorsal scales; J: Last scale on body and first scale on caudal fin.

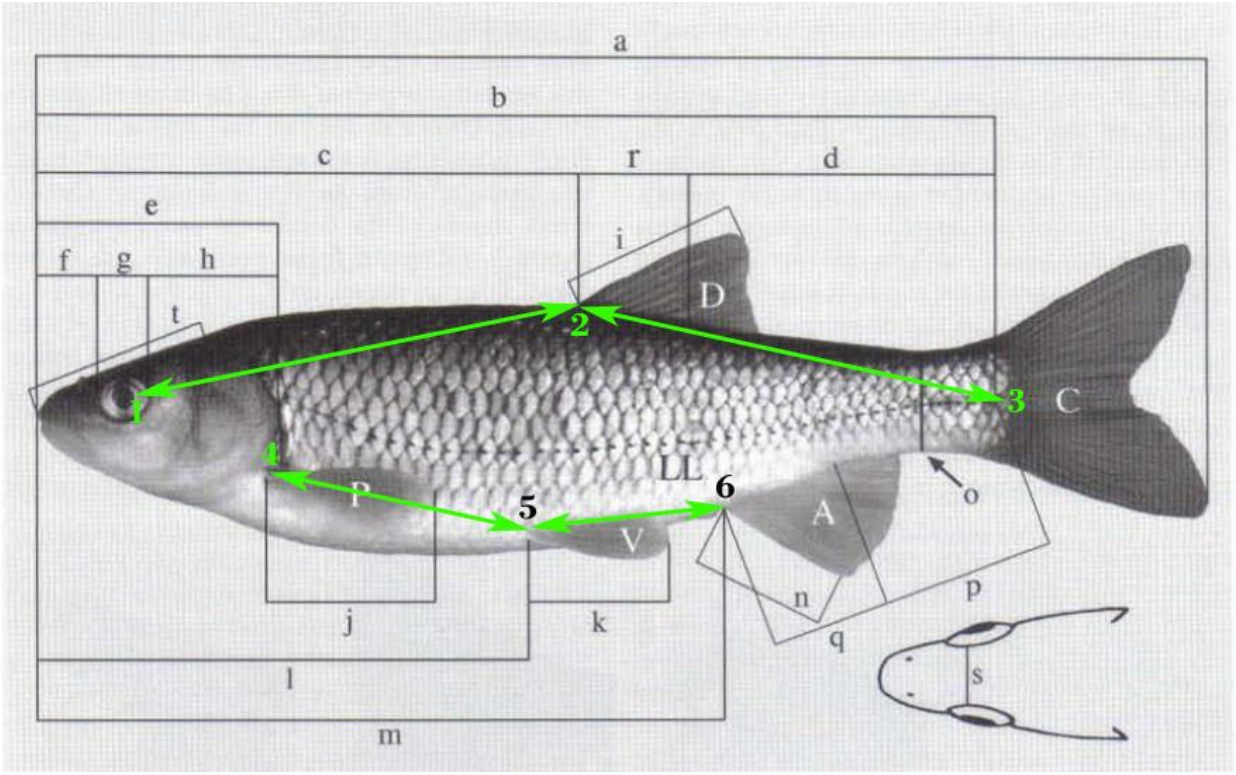


Fig.2. Fins, Lateral line and main measurements.

A: Anal fin; C: Caudal fin; D: dorsal fin; P: pectoral fin; V: pelvic fin; LL: Lateral line; a: Total length; b: Stander length; c: Predorsal length; d: Postdorsal length; e: Lateral head length; f: Snout length; g: Eye diameter; h: Postorbita length; i: Length of dorsal fin; j:Length of pectoral fin; k: Length of pelvic fin; l: Pre-pelvic length; m: Preanal length; n: Length of anal fin; o: Depth of caudal peduncle; p: Length of caudal peduncle; q: Length of base anal fin; r: Length of base dorsal fin; s: Interorbital width; t: Dorsal head length; 1 to 2: Distance of eye to dorsal fin; 2 to 3: Distance of dorsal fin to hypural; 4 to 5: Distance of pectoral to pelvic; 5 to 6: Distance of pelvic to anal.

Species are classified by monographs: Ho Anh Tuan (2016) [8]; Mai Dinh Yen (1978) [9]; Nguyen Huu Duc, Mai Dinh Yen, (1994) [10]; Nguyen Thai Tu et al. (1999) [11]; Yue Peiqi et al. (2000) [12]. The scientific name is determined by Eschmeyer's Catalog of Fish [13].

We have carried out samplings (56 specimens) at 10 locations in Phong Nha - Ke Bang National Park in the North central part of Vietnam (Fig.3).

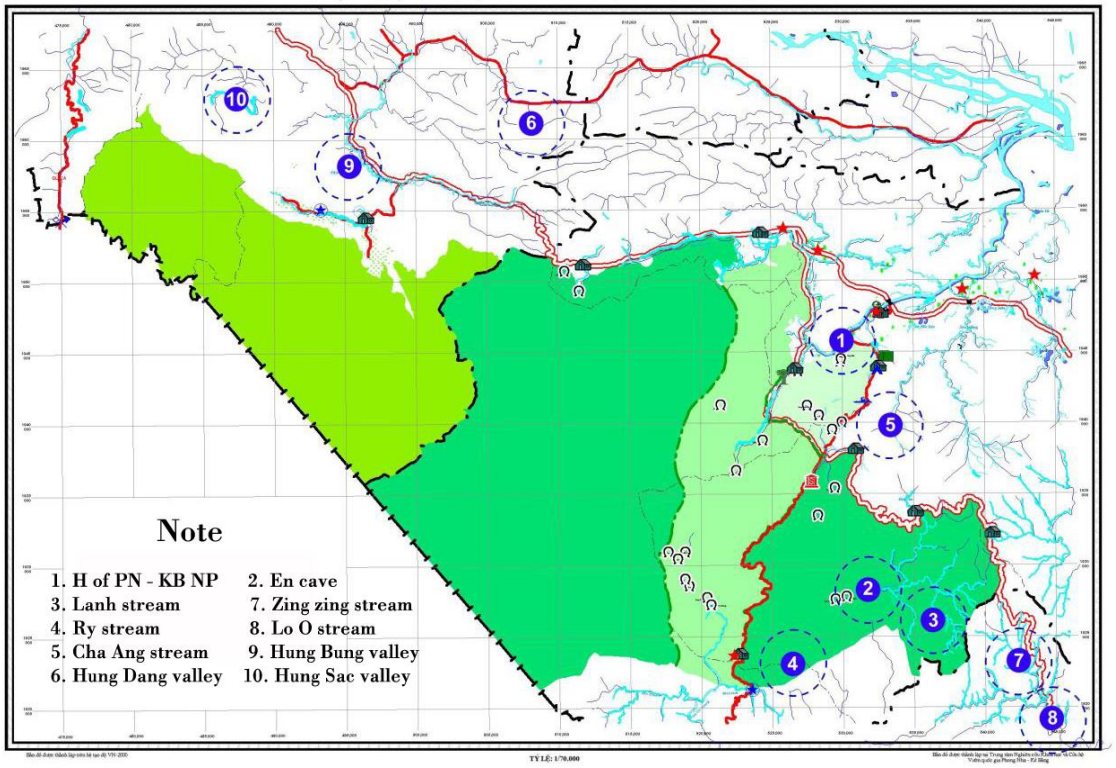


Fig.3. Sampling locations in the field.

Results and discussion

1. *Cyprinus carpio* Linnaeus, 1758; See: Figure 4; Table 1

Material examined: 31 specimens (BMVU-1901; BMVU-1902; BMVU-1903; BMVU-1904; BMVU-1905; BMVU-1906; BMVU-1907; BMVU-1908; BMVU-1909; BMVU-1910; BMVU-1911; BMVU-1912; BMVU-1913; BMVU-1914; BMVU-1915; BMVU-1916; BMVU-1917; BMVU-1918; BMVU-1919; BMVU-1920; BMVU-1921; BMVU-1922; BMVU-1923; BMVU-1924; BMVU-1925; BMVU-1926; BMVU-1927; BMVU-1928; BMVU-1929; BMVU-1930; BMVU-1931.

Diagnosis

Distinguished from all other species of *Cyprinus* known from Vietnam a unique combination of characters, including features of body elongated and somewhat compressed. Lips thick. Two pairs of barbels at angle of mouth, shorter ones on the upper lip. Dorsal fin base long with 18 - 20 branched rays and a strong, toothed spine in front; dorsal fin outline concave anteriorly. Anal fin with 5½ soft rays; posterior edge of 3rd dorsal and anal fin spines with sharp spinules. Lateral line with 31 to 33 scales. Colour variable, wild carp are brownish-green on the back and upper sides, shading to golden yellow ventrally. The fins are dusky, ventrally with a reddish tinge. Golden carp are bred for ornamental purposes.

Meristics

Dorsal = III.18½ - 20½; Anal = III. 5½; Pelvic = 1.8; Pectoral = 1.13 - 15; Caudal = 10/9; Predorsal scales = 10 - 12; Circumpeduncular scales = 16; Last scale on body and first scale on caudal fin = 8; Lateral line $= 31\frac{5-6}{4-4}33$



Fig.4. *Cyprinus carpio* Linnaeus, 1758.

Morphometric

Stander length = 3.52 (3.38 - 3.74) Lateral head length = 4.29 (4.15 - 4.48) Dorsal head length = 2.86 (2.72 - 3.01) Body height at dorsal = 4.74 (4.39 - 5.10) Distance of pectoral to pelvic = 3.54 (3.28 - 3.85) Distance of pelvic to anal = 6.75 (5.82 - 7.34) Length of caudal peduncle = 7.31 (6.76 - 7.65) Depth of caudal peduncle = 2.14 (2.09 - 2.26) Predorsal length = 6.33 (5.30 - 7.20) Postdorsal length = 2.07 (2.00 - 2.18) Pre-pelvic length = 1.31 (1.28 - 1.34) Preanal length = 1.79 (1.74 - 1.84) Distance of dorsal fin to hypural = 2.77 (2.65 - 3.03) Distance of eye to dorsal fin.

Lateral head length = 1.22 (1.15 - 1.26) Dorsal head length = 5.37 (4.71 - 6.21) Eye diameter = 2.50 (2.35 - 2.75) Interorbital width = 2.49 (2.33 - 2.61) Snout length = 1.25 (1.16 - 1.29) Head height at nape = 1.70 (1.62 - 1.76) Head depth at nape = 2.37 (2.27 - 2.63) Postorbital length = 1.63 (1.50 - 1.86) Head height at eye = 1.94 (1.79 - 2.22) Head depth at eye.

Distance of pectoral to pelvic = 0.75 (0.69 - 0.81) Distance of pelvic to anal; Length of base dorsal fin = 3.64 (3.31 - 4.14) Length of base anal fin; Distance of eye to dorsal fin = 0.65 (0.61 - 0.68) Distance of dorsal fin to hypural; Interorbital width = 2.14 (1.85 - 2.42) Eye diameter; Length of caudal peduncle = 1.09 (0.98 - 1.17) Depth of caudal peduncle.

2. *Cyprinus hieni* Tu & Tuan, 2003 (See: Figure 5; Table 1)

Material examined

3 specimens **(**TSBCT-0301; BMVU-1932; BMVU-1933)

Diagnosis

It is distinguished from all other species of *Cyprinus* known from Vietnam a unique combination of characters, including features of lateral line with 25 to 26 scales, transverse scales between lateral line and origin of dorsal fin and transverse scales between lateral line and origin of pelvic fin with 2 scales, flaky fish scale. Colour: Lower half of body and fins are yellowish red.

Meristics

Dorsal = III. 20½; Anal = III. 5½; Pelvic = 1.8; Pectoral = 1.13 - 14; Caudal = 10/9; Predorsal scales = 10 - 13; Circumpeduncular scales = 8 - 9; Last scale on body and first scale on caudal fin = 6 - 7; Lateral line $.= 25\frac{2}{2-2}26$

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Fig.5. *Cyprinus hieni* Tu & Tuan, 2003.

Morphometric

Stander length = 3.56 (3.53 - 3.59) Lateral head length = 4.12 (3.89 - 4.34) Dorsal head length = 2.90 (2.74 - 3.06) Body height at dorsal = 4.33 (4.21 - 4.45) Distance of pectoral to pelvic = 3.56 (3.40 - 3.73) Distance of pelvic to anal = 6.49 (6.35 - 6.63) Length of caudal peduncle = 7.23 (7.08 - 7.39) Depth of caudal peduncle = 2.09 (2.02 - 2.16) Predorsal length = 6.20 (5.65 - 6.75) Postdorsal length = 2.09 (2.06 - 2.12) Pre-pelvic length = 1.28 (1.27 - 1.29) Preanal length = 1.83 (1.79 - 1.87) Distance of dorsal fin to hypural = 2.63 (2.56 - 2.69) Distance of eye to dorsal fin.

Lateral head length = 1.16 (1.08 - 1.23) Dorsal head length = 5.10 (4.94 - 5.26) Eye diameter = 2.26 (2.21 - 2.31) Interorbital width = 2.58 (2.33 - 2.83) Snout length = 1.13 (1.11 - 1.15) Head height at nape = 1.61 (1.61 - 1.62) Head depth at nape = 2.02 (1.95 - 2.08) Postorbital length = 1.61 (1.55 - 1.68) Head height at eye = 1.89(1.89 - 1.89) Head depth at eye

Distance of pectoral to pelvic = 0.82 (0.76 - 0.88) Distance of pelvic to anal; Length of base dorsal fin = 3.79 (3.52 - 4.05) Length of base anal fin; Distance of eye to dorsal fin = 0.70 (0.66 - 0.73) Distance of dorsal fin to hypural; Interorbital width = 2.26 (2.14 - 2.38) Eye diameter; Length of caudal peduncle = 1.12 (1.07 - 1.16) Depth of caudal peduncle.

Table 1

Morphometric data of *Cyprinus carpio* and *Cyprinus hieni*

% Stander length	*Cyprinus carpio*			*Cyprinus hieni*		
	Mean	Min	Max	Mean	Min	Max
Total length	126.61	124.57	129.47	127.79	126.65	128.93
Lateral head length	28.44	26.73	29.59	28.07	27.84	28.31
Dorsal head length	23.30	22.34	24.08	24.37	23.03	25.70
Predorsal length	46.72	44.26	47.83	47.89	46.36	49.43
Postdorsal length	15.95	13.89	18.87	16.26	14.82	17.70
Pre-pelvic length	48.34	45.80	50.00	47.87	47.15	48.60
Preanal length	76.08	74.79	78.41	78.00	77.54	78.45
Depth of caudal peduncle	13.70	13.06	14.80	13.83	13.54	14.12
Length of caudal peduncle	14.90	13.62	17.18	15.41	15.08	15.74
Distance of pectoral to pelvic	21.15	19.60	22.78	23.10	22.47	23.73
Distance of pelvic to anal	28.29	25.97	30.49	28.13	26.84	29.42
Distance of eye to dorsal fin	36.18	33.05	37.68	38.09	37.18	38.99
Distance of dorsal fin to hypural	55.90	54.29	57.36	54.69	53.37	56.01
Head height at nape	22.82	21.87	23.20	24.92	24.26	25.57
Head height at eye	17.53	15.72	18.28	17.42	16.86	17.97
Body height at dorsal	34.98	33.21	36.71	34.58	32.65	36.51

% Lateral head length						
Dorsal head length	81.99	79.18	87.05	86.85	81.35	92.35
Snout length	40.15	38.26	42.86	39.06	35.28	42.84
Eye diameter	18.83	16.10	21.22	19.62	19.01	20.22
Postorbita	42.38	37.96	44.09	49.63	48.02	51.24
Interorbital width	40.06	36.33	42.52	44.28	43.37	45.19
Head height at nape	80.32	77.55	86.50	88.75	87.16	90.34
Head depth at nape	58.73	56.71	61.71	62.05	61.85	62.25
Head height at eye	61.72	53.81	66.67	62.06	59.55	64.57
Head depth at eye	51.86	44.97	55.91	52.89	52.81	52.96
Body height at dorsal	123.05	118.64	128.52	123.14	117.28	128.99
Body depth at dorsal	64.95	53.02	72.79	63.90	63.60	64.20
% Depth of caudal peduncle						
Length of caudal peduncle	108.78	98.00	116.90	111.50	106.76	116.24
% Length of base anal fin						
Length of base dorsal fin	70.85	58.48	78.64	65.55	58.95	72.15
% Distance of pectoral to pelvic						
Distance of pelvic to anal	134.02	122.86	144.30	122.01	113.14	130.89
% Distance of eye to dorsal fin						
Distance of dorsal fin to hypural	154.76	147.44	164.27	143.76	136.87	150.65

3. *Cyprinus melanes* (Mai, 1978) See: Figure 6; Table 2

Material examined

14 specimens (BMVU-1934; BMVU-1935; BMVU-1936; BMVU-1937; BMVU-1938; BMVU-1939; BMVU-1940; BMVU-1941; BMVU-1942; BMVU-1943; BMVU-19344; BMVU-1945; BMVU-1946; BMVU-19347)

Diagnosis

Distinguished from all other species of the genus *Cyprinus* in Vietnam by the following combination of characters: Body depth at dorsal is very high 44.79 (41.64 - 47.20) % stander length; rostral barbel is very small, Depth of caudal peduncle is high 15.35 (14.46 - 16.05) % stander length; Postorbita is long 37.16 (35.50 - 39.44) % lateral head length; Length of base anal fin is long. This species grows slowly

Meristics

Dorsal = III. 17½; Anal = III. 5½; Pelvic = 1.8; Pectoral = 1.13 - 15; Caudal = 10/9; Predorsal scales = 11 - 13; Circumpeduncular scales = 16; Last scale on body and first scale on caudal fin = 8 - 9; Lateral line $.= 32\frac{6}{4-4}33$

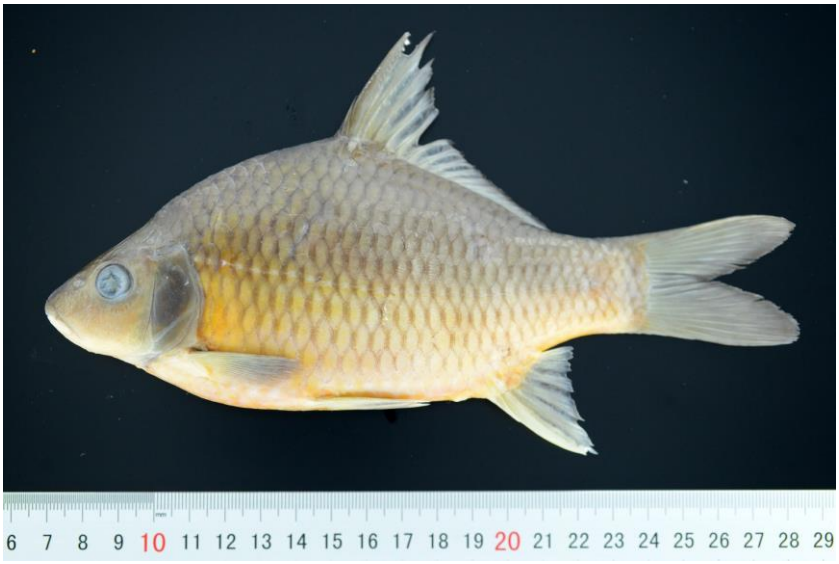


Fig.6. *Cyprinus melanes* (Mai, 1978).

Morphometric

Stander length = 3.59 (3.33 - 3.85) Lateral head length = 4.10 (3.92 - 4.38) Dorsal head length = 2.24 (2.12 - 2.40) Body height at dorsal = 4.61 (4.32 - 4.96) Distance of pectoral to pelvic = 3.45 (3.31 - 3.61) Distance of pelvic to anal = 6.95 (6.53 - 7.33) Length of caudal peduncle = 6.52 (6.23 - 6.92) Depth of caudal peduncle = 1.90 (1.79 - 2.09) Predorsal length = 6.08 (5.64 - 7.16) Postdorsal length = 2.19 (2.04 - 2.29) Pre-pelvic length = 1.34 (1.30 - 1.39) Preanal length = 1.83 (1.77 - 1.90) Distance of dorsal fin to hypural = 2.34 (2.18 - 2.49) Distance of eye to dorsal fin.

Lateral head length = 1.14 (1.10 - 1.18) Dorsal head length = 4.40 (4.00 - 4.68) Eye diameter = 2.48 (2.32 - 2.76) Interorbital width = 2.41 (2.30 - 2.69) Snout length = 1.15 (1.10 - 1.22) Head height at nape = 1.67 (1.54 - 1.76) Head depth at nape = 2.69 (2.54 - 2.82) Postorbital length = 1.48 (1.36 - 1.57) Head height at eye = 1.85 (1.69 - 2.03) Head depth at eye.

Distance of pectoral to pelvic = 0.75 (0.67 - 0.82) Distance of pelvic to anal; Length of base dorsal fin = 2.88 (2.63 - 3.12) Length of base anal fin; Distance of eye to dorsal fin = 0.78 (0.71 - 0.87) Distance of dorsal fin to hypural; Interorbital width = 1.77 (1.59 - 1.91) Eye diameter; Length of caudal peduncle = 0.94 (0.85 - 1.06) Depth of caudal peduncle.

4. *Cyprinus quidatensis* Tu et al., 1999 (See: Figure 7; Table 2)

Material examined

8 specimens (BMVU-1948; BMVU-1949; BMVU-1950; BMVU-1951; BMVU-1952; BMVU-1953; BMVU-1954; BMVU-1955)

Diagnosis

Distinguished from all other species of the genus in Vietnam by the following combination of characters: This species is only distributed in Hung Sac valley of Thuong Hoa commune; dorsal fin, caudal fin, anal fin and pectoral fin are light black; Length of base dorsal fin is short

Meristics

Dorsal = III. 16 - 19; Anal = III. 5½; Pelvic = 1.8; Pectoral = 1.13 - 14; Caudal = 10/9; Predorsal scales = 15 - 16; Circumpeduncular scales = 15 - 16; Last scale on body and first scale on caudal fin = 8 - 9; Lateral line .$= 35\frac{6-7}{4-5}36$

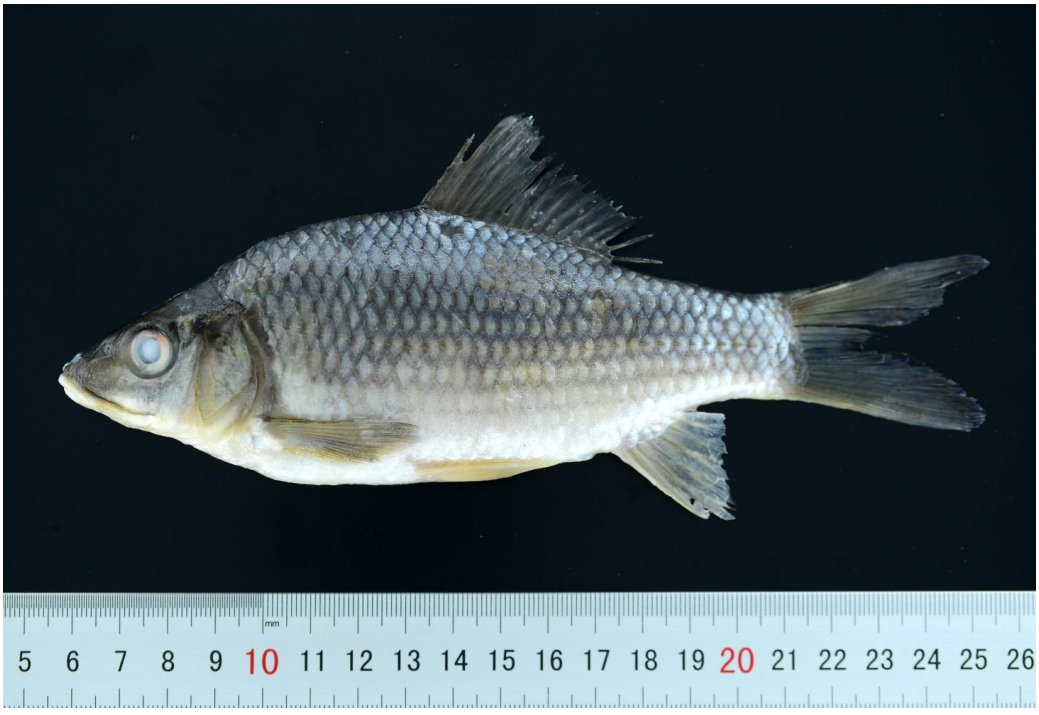


Fig.7. *Cyprinus quidatensis* Tu et al., 1999.

Morphometric

Stander length = 3.58 (3.51 - 3.70) Lateral head length = 4.23 (4.05 - 4.43) Dorsal head length = 2.86 (2.73 - 2.95) Body height at dorsal = 4.65 (4.26 - 5.11) Distance of pectoral to pelvic = 3.41 (3.18 - 3.56) Distance of pelvic to anal = 6.85 (6.49 - 7.39) Length of caudal peduncle = 7.02 (6.75 - 7.21) Depth of caudal peduncle = 2.02 (1.95 - 2.08) Predorsal length = 5.03 (3.96 - 5.70) Postdorsal length = 2.04 (1.94 - 2.12) Pre-pelvic length = 1.31(1.28 - 1.33) Preanal length = 1.80 (1.78 - 1.83) Distance of dorsal fin to hypural = 2.67 (2.62 - 2.71) Distance of eye to dorsal fin.

Lateral head length = 1.18 (1.16 - 1.20) Dorsal head length = 4.45 (4.31 - 4.56) Eye diameter = 2.47 (2.43 - 2.54) Interorbital width = 2.59 (2.49 - 2.66) Snout length = 1.22 (1.19 - 1.28) Head height at nape = 1.70 (1.65 - 1.74) Head depth at nape = 2.26 (2.12 - 2.36) Postorbital length = 1.70 (1.68 - 1.74) Head height at eye = 2.09 (2.03 - 2.13) Head depth at eye.

Distance of pectoral to pelvic = 0.74 (0.62 - 0.81) Distance of pelvic to anal; Length of base dorsal fin = 3.10 (2.35 - 3.53) Length of base anal fin; Distance of eye to dorsal fin = 0.67 (0.66 - 0.68) Distance of dorsal fin to hypural; Interorbital width = 1.80 (1.77 - 1.83) Eye diameter; Length of caudal peduncle = 1.03 (0.98 - 1.06) Depth of caudal peduncle.

Table 2

Morphometric data of *Cyprinus melanes* and *Cyprinus quidatensis*

% Stander length	*Cyprinus melanes*			*Cyprinus quidatensis*		
	Mean	Min	Max	Mean	Min	Max
Total length	130.83	127.72	135.23	128.41	127.08	129.15
Lateral head length	27.93	25.95	30.04	27.92	27.03	28.52
Dorsal head length	24.40	22.82	25.53	23.70	22.57	24.67
Predorsal length	52.74	47.75	55.95	49.47	47.99	51.33
Postdorsal length	16.54	13.96	17.74	20.39	17.53	25.27
Pre-pelvic length	45.67	43.66	48.94	49.04	47.15	51.50
Preanal length	74.58	71.95	77.15	76.31	75.33	77.94
Depth of caudal peduncle	15.35	14.46	16.05	14.26	13.88	14.81
Length of caudal peduncle	14.42	13.64	15.32	14.63	13.54	15.41
Distance of pectoral to pelvic	21.75	20.14	23.12	21.64	19.58	23.46
Distance of pelvic to anal	29.00	27.73	30.18	29.43	28.06	31.43
Distance of eye to dorsal fin	42.91	40.19	45.84	37.44	36.90	38.23
Distance of dorsal fin to hypural	54.80	52.64	56.49	55.59	54.79	56.15
Head height at nape	24.29	23.46	25.22	22.83	22.02	24.07
Head height at eye	18.89	17.90	20.93	16.38	16.10	16.62
Body height at dorsal	44.79	41.64	47.20	35.03	33.94	36.57
% Lateral head length						
Dorsal head length	87.40	84.98	91.22	84.84	83.51	86.48
Snout length	41.54	37.19	43.52	38.66	37.57	40.09
Eye diameter	22.78	21.37	25.00	22.48	21.91	23.20
Postorbita	37.16	35.50	39.44	44.28	42.35	47.14
Interorbital width	40.35	36.26	43.06	40.47	39.39	41.13
Head height at nape	87.09	81.69	91.22	81.76	78.07	84.38
Head depth at nape	59.99	56.88	64.81	58.74	57.58	60.49
Head height at eye	67.67	63.62	73.31	58.69	57.58	59.57
Head depth at eye	54.38	49.29	59.20	47.81	46.88	49.24
Body height at dorsal	160.53	152.11	173.38	125.47	122.60	128.21
Body depth at dorsal	60.85	57.55	65.28	59.41	58.51	60.30
% Depth of caudal peduncle						
Length of caudal peduncle	94.10	85.00	105.99	102.57	97.53	106.13
% Length of base anal fin						
Length of base dorsal fin	84.15	76.70	93.53	75.19	67.48	79.87
% Distance of pectoral to pelvic						
Distance of pelvic to anal	133.65	121.66	149.80	137.19	122.82	160.49
% Distance of eye to dorsal fin						
Distance of dorsal fin to hypural	128.16	115.54	140.57	148.50	146.05	150.98

Conclusion

The results of morphological analysis in our study suggest that Carp species found in Phong Nha -Ke Bang National Park is *Cyprinus carpio* Linnaeus, 1758 rather than *Cyprinus rubrofuscus* La Cepède, 1803. Among four species, say that *Cyprinus carpio* Linnaeus, 1758; *Cyprinus hieni* Tu & Tuan, 2003; *Cyprinus melanes* (Mai, 1978); *Cyprinus quidatensis* Tu et al., 1999, have been found in study area there are two species (*Cyprinus hieni, Cyprinus quidatensis*) only found in PNKB but not in other areas.

References:

1. KOTTELAT, M. The fishes of the inland waters of Southeast Asia: a catalogue and core bibliography of the fishes known to occur in freshwaters, mangroves and estuaries. In: *The Raffles Bulletin of Zoology*, 2013, no.27, p.93 -96. ISBN 978-2-8399-1344-7
2. NGUYEN VAN HAO. *Freshwater fishes of Vietnam.* Hanoi: Agriculture Publishing House, 2005, vol.2, vol.3, p.681.
3. NGUYEN VAN HAO, NGO SY VAN. *Freshwater fishes of Vietnam. Family Cyprinidae*. Hanoi: Agriculture Publishing House, 2001, vol.1, p.585-598.
4. KOTTELAT, M. *Freshwater fishes of northern Vietnam*. A preliminary check-list of the fishes known or expected to occur in northern Vietnam with comments on systematics and nomenclature. In: *The World Bank*, 2001, p.21-22.
5. NGUYEN THAI TU, HO ANH TUAN. *Phong Nha - Ke Bang is of one genesis center of Cyprinini*. Problems of basic research in life sciences. Hanoi: Science and Technics publishing house, 2003, p.1129-1133.
6. NGUYEN THAI TU, HO ANH TUAN *Conservation of unique and valuable fish diversity in Phong Nha - Ke Bang limestone mountains*. Science workshop proceedings Dong Hoi. Patrimonio Mundial. World heritage patrimoine mondial. Department of Science and Technology in Quang Binh province. July 2008.
7. KOTTELAT, M., FREYHOF, J. *Handbook of European Freshwater Fishes*. Delémont: Imprimerie du Démocrate SA, 2007, p.15-19.
8. HO ANH TUAN. *Ichthyofauna of the Gianh river basin from Vietnam*: Thesis of a Doctor in Biology. Moldova State University, 2016. 195 p.
9. MAI DINH YEN. *Identification of freshwater fishes of northern Vietnam*. Hanoi: Science & Technics Publishing House, 1978, p.22-35.
10. NGUYEN HUU DUC, MAI DINH YEN. Description of a new fish species of center of Vietnam. In: *Journal of Biology*, 1994, vol.16, no.1, p.20-21.
11. NGUYEN THAI TU, LE VIET THANG, LE THI BINH, NGUYEN XUAN KHOA. *Genus Cyprinus Linnaeus, 1758 and a new species Cyprinus quidatensis formed by way of geographic isolation*. Hanoi: Hanoi National University, 1999, p.8-15.
12. YUE PEIQI et al. *Fauna Sinica Osteichthyes Cypriniformes III*. Science Press Beijing China, 2000, p.399-425.
13. http://researcharchive.calacademy.org/research/ichthyology/catalog/fishcatmain.asp

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