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Review of the Subfamily Amblyopinae, with a Cryptic New Genus and Species Named *Pseudobrachyamblyopus odontamblyopsis* gen. *et* sp. nov. from Southeastern China

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Abstract: According to the research of the Amblyopinae of China, a new genus emerged with only one species. The characteristics of the neotypes are described in detail, with the key to distinguish of the key to distinguish the genus and species of Amblyopinae. The new genus could be distinguished according to the following characteristics, head covered with scales, belly scaleless, mouth sub-superior, latitudinally high tail, first two pterygiophores of the second dorsal fin not separated, medium vertebral counts, and other external and internal characteristics. The characteristics of the new genus *Pseudobrachyamblyopus* and the genus *Brachyamblyopus* were always blurred together, and they are clarified in this paper, too. The neotypes are inferred to live in seas only. It is conjectured that it couldn't live in freshwater, given that all the neotypes are found far apart from estuaries. In this paper, the taxonomy of the new genus is roughly discussed according to its macroscopic character, while more molecular biological evidence is needed to establish a clearer base of the new species in order to put it onto an accurate location in the taxonomic tree. Besides, a restock of the coloration of *Odontamblyopus lacepedii* is given according to the specimens from the China Seas and previous descriptions.

Keywords: *Pseudobrachyamblyopus odontamblyopsis*; Amblyopinae; Characteristic; Distinguish.

1. Introduction

Amblyopinae is a subfamily established by Günther in 1861. Now, including the new genus and the new species, there are 16 valid genera and 29 valid species belonging to this subfamily.

All of them live on the muddy base underwater, from fresh to sea, from shallow to deep, from temperate to tropical. All of them are not good at swimming. Besides, although they might have long teeth and a big mouth, they usually do not prey on large prey, but as decomposers, and inferior consumers, large organic fragments, algae and meiobenthos are usually their foods, let alone the species without long teeth and a big mouth. [1-5]

The first diminutive classification which is similar to the classification nowadays under Amblyopinae, between subfamily and genera, was established by Tchang. Accordingly, the tribe Trypauchenini was first set up by Tchang misleadingly to be a subfamily. Correspondingly, there is a tribe Gobioidini. [6] Albeit we could definitely ensure that the word two Latin words represent tribes but not subfamilies according to etymology, they are still relevant when they are referred to as tribes. Birdsong et al. in 1988 divided the tribe Gobioidini into 2 groups, respectively called "the 'Gobioides' Group" and "the 'Taenioides' Group" according to the derived fin element to vertebra ratio of 1:1 in "the 'Gobioides' Group", while that ratio of "the 'Taenioides' Group" is 2:1. Then, there are three units: "the 'Gobioides' Group", "the 'Taenioides' Group", and "the 'Trypauchen' Group". [7] Subsequently, other characters have been found to move the 'Gobioides' Group, comprising only one genus, Gobioides, to another subfamily, Gobionellinae, firstly by Harrison, in 1989. While, there might be a lack of evidence to form tribes, given that, afterward, there are two groups definitely established under Amblyopinae, which respectively are "the 'Taenioides' Group" and "the 'Trypauchen' Group", which are almost corresponded to the two tribes mentioned previously, that has been widely recognized nowadays. [5,8] The valid group under Amblyopinae are resectively *Trypauchen*, *Amblyotrypauchen*, *Ctenotrypauchen*, *Paratrypauchen*, *Trypauchenichthys*, *Caragobius*, *Karsten*, *Biendongella*, *Sovvityazius*, *Brachyamblyopus*, *Gymnoamblyopus*, *Odontamblyopus*, *Pseudotrypauchen*, *Trypauchenopsis*, *Taenioides*, and a new genus *Pseudobrachyamblyopus*, all of which have a long body, vestigial eyes, two coalesced pelvic fin, two continuous dorsal fin with only six spines in the first and soft rays only in the second. Genera *Biendongella*, *Sovvityazius*, *Brachyamblyopus*, *Gymnoamblyopus*, *Odontamblyopus*, *Pseudotrypauchen*, *Trypauchenopsis*, *Taenioides*, and a new genus *Pseudobrachyamblyopus* belong to "the 'Taenioides' Group"; *Trypauchen*, *Amblyotrypauchen*, *Ctenotrypauchen*, *Paratrypauchen*, *Trypauchenichthys*, *Caragobius*, and *Karsten* belong to "the 'Trypauchen' Group". According to the specific characteristics, "the 'Taenioides' Group" and "the 'Trypauchen' Group" could be distinguished by the following key. There is an interneural gap in "the 'Taenioides' Group" while there isn't an interneural gap in "the 'Trypauchen' Group", and 'interneural gap' means a space between two neural arches originate from vertebrae without any pterygiophores. Albeit there are other characteristics different between the species in "the 'Taenioides' Group" and "the 'Trypauchen' Group", they are not the decisive characteristics, and they might be reversed while other new species are found according to the more advanced research. [5-10]

2. Materials and Methods

All the specimens in the pictures are from trawls in the seas of China. There is only two neotypes collected, which is the holotype and the paratype. Therefore, all of the inner characteristics are from the picture under X-ray, given that it is better to leave a relatively complete specimen, though there are some skin abrasions. Using a 200mm scale for measuring the length; the unit is mm; the values are accurate to the nearest 0.1mm. Calculations are accurate to their significant decimals. Use magnifiers to observe the minute structures, such as teeth and nares. All the measurements, counts, and structures follow Murdy and Wu, including the total length measured from tip of mouth to tip of tail, caudal vertebral count meaning the quantity of the vertebrae after anus, a neural space without any pterygiophores nearly between the first dorsal fin and the second dorsal fin is called interneural gap. [3,5] Reference including paper and cyber material; articles and books. Keys to distinguish the genera and species are both summarized from reference and according to the ensuring of the author's own research.

- **Specimens for comparison and distinguishing**

Firsthand: "*Pseudobrachyamblyopus odontamblyopsis*, 134 mm TL, holotype, frozen, 118.18°E, 24.62°N, 10 m deep, 9 Sep. 2023, Hei / 10 Sep. 2023, Ba" "PRVT-Fr 00112"; "*Pseudobrachyamblyopus odontamblyopsis*, 88 mm TL, paratype, preserved in alcohol, Wanning, Sep. 2023, Zhang / 25 Oct. 2023, Ba" "PRVT-Pa 00106"; *Paratrypauchen microcephalus*, Huanghua, PRVT-Fr 00114; *Paratrypauchen microcephalus*, Huanghua, PRVT-Fr 00115; *Paratrypauchen microcephalus*, Huanghua, PRVT-Fr 00116; *Odontamblyopus lacepedii*, Huanghua, PRVT-Pa 00116; PRVT-Fr 00120; *Odontamblyopus lacepedii*, Huanghua, PRVT-Fr 00121; *Odontamblyopus lacepedii*, Huanghua, PRVT-Fr 00122; *Odontamblyopus lacepedii*, Huanghua, PRVT-Fr 00123; *Odontamblyopus lacepedii*, Huanghua, PRVT-Fr 00124; *Odontamblyopus lacepedii*, Huanghua, PRVT-Fr 00125; *Odontamblyopus lacepedii*, Huanghua, PRVT-Fr 00126; *Odontamblyopus lacepedii*, Huanghua, PRVT-Fr 00127; *Odontamblyopus lacepedii*, Huanghua, PRVT-Fr 00128; *Odontamblyopus lacepedii*, Qingdao, PRVT-Fr 00129; *Odontamblyopus lacepedii*, Qingdao, PRVT-Fr 00130; *Odontamblyopus lacepedii*, Zhoushan, PRVT-Fr 00131; *Odontamblyopus lacepedii*, Zhoushan, PRVT-Fr 00132; *Taenioides snyderi*, Ningde, 253 mm, PRVT-Fr 00134; *Trypauchen vagina*, Ningde, TL=202 mm PRVT-Fr 00135; *Trypauchen pelaeos*, Ningde, TL=198 mm PRVT-Fr 00136, *Brachyamblyopus brachysoma*, Wenzhou, PRVT-Fr 00140 (rotted); *Brachyamblyopus brachysoma*, Wenzhou, PRVT-Fr 00141 (rotted). *Amblyotrypauchen arctocephalus*, China, PRVT-Pa 00100.

Secondhand: *Taenioides kentalleni*, sp. nov., USNM 365692, holotype, female, 198.2 mm SL, Ras Az Zawr, Saudi Arabia (image by S. Raredon); *Amblyotrypauchen arctocephalus*, 109 mm SL, Nha Trang Bay; *Bierdongella iljini* gen *et* sp.n., holotype, 66 mm SL, Van Phong Bay; *Bierdongella hemilissa* gen et sp. n., holotype, 46 mm SL, to the south of the AnambasIslands (Indonesia); *Caragobius urolepis*, 48 mm SL, Nha Trang Bay; *Paratrypauchen microcephalus*, 77 mm SL, Nha Trang Bay; *Sovvityazius acer* g. et sp. n., holotype, 46 mm SL, to the east of Samar Island (Philippines); *Trypauchen vagina*,95mm SL, Nyafu Lagoon, Nha Trang; *Trypauchenichthys larsonae*,137 mm SL, to the east of Samar Island (Philippines); *Odontamblyopus tenuis*, NSMT-P 57164, male, 107.9- mm SL; *Odontamblyopus lacepedii*, NSMT-P 47141, male, 147 mm SL; *Odontamblyopus tenuis*, NSMT-P 57164, male, 107.9 mm SL; *Odontamblyopus lacepedii*, NSMT-P 47141, 147 mm SL, 181mm TL, Ariake Sea, Kyushu, Japan; *Odontamblyopus roseus*, CAS 29747, 134mm SL, 171 mm TL, female, Cochin, India; *Odontamblyopus rubicundus*, USNM 302348, 114mm SL, 143mm TL, Bangladesh; Holotype of *Gymnoamblyopus novaeguineae*, WAM P.29823-001, female, 99.0 mm SL, Lower Fly River, Papua New Guinea (image by Sandra J. Raredon); *Pseudotrypauchen multiradiatus*, USNM 341061, 80.2 mm SL, Penang, Malaysia. Image by Sandra Raredon; Holotype of *Amblyopus brachysoma* (=*Brachyamblyopus brachysoma*) Bleeker, 1853 (RMNH 4670, 83.2 mm SL); *Trypauchenopsis intermedia*, out of NSMT-P31757, female, 41.9 mm SL; *Taenioides anguillaris*, BLIP 19910582, 130.1 mm SL; *Trypauchenopsis intermedia*, out of NSMT-P 63233, 58.5 mm SL; *Trypauchen vagina* from Mekong Delta, Vietnam (UMMZ 238875, 147.8 mm SL). Image by Walter J. Rainboth; *Trypauchen vagina* from Mekong drainage, mouth of Song Cua Dai, Vietnam (UMMZ 241627, 162.0 mm SL) (image by Sandra J. Raredon); *Amblyotrypauchen fraseri* (=*Amblyotrypauchen arctocephalus*) Hora, 1924: 160 (type locality, off the mouth of the Hugli River, India); *Trypauchenichthys larsonae* n. sp. (holotype) from the Northern Territory Australia (NTM S. 12491-005). Images by Sandra J. Raredon (USNM).; *Trypauchenichthys sumatrensis* from the Strait of Malacca (USNM 211295). Images by Sandra J. Raredon (USNM).; Lectotype (RMNH 4808) of *Trypauchenichthys typus* from Kalimantan, Indonesia. Images by Koos van Egmond (RMNH); *Brachyamblyopus brachysoma*, Zhanjiang, (photo by Chi Zhang), only otoliths preserved.

3. Results

3.1. Genera of Amblyopinae

3.1.1. Gen1. Sp1.

Provisional ***Pseudobrachyamblyopus odontamblyopsis*—New Genus and Species**

Holotype: *Pseudobrachyamblyopus odontamblyopsis* gen. *et* sp. nov.

Type locality: PRC, Fujian, Xiamen, Xiang'an, 118.31°E, 24.57°N, subtropical water, 10m under the surface, 9 September 2023. *Pseudobrachyamblyopus odontamblyopsis*.

Original label: "*Pseudobrachyamblyopus odontamblyopsis*, 134 mm TL, holotype, frozen, 118.31°E, 24.57°N, 10 m deep, 9 Sep. 2023, Hei / 10 Sep. 2023, Ba" "PRVT-Fr 00112".

Paratype: *Pseudobrachyamblyopus odontamblyopsis* gen. *et* sp. nov.

Type locality: PRC, Hainan, Wanning, subtropical water, September 2023. *Pseudobrachyamblyopus odontamblyopsis*.

Original label: "*Pseudobrachyamblyopus odontamblyopsis*, 88 mm TL, paratype, preserved in alcohol, Wanning, Sep. 2023, Zhang / 25 Oct. 2023, Ba" "PRVT-Pa 00106".

Etymology: "Pseud" derives from "Peudes", meaning "false", representing "resemblance"; "brachy" derives from "brachys", meaning "short"; "odont" derives from "odous", meaning teeth; "opsis" means "appeared". Besides, "ambly" derives from "amblys", meaning "soft"; "pus" derives from

"pous", meaning feet; "o" connects the words. "*Brachyamblyopus*" and "*Odontamblyopus*" are two genera from Amblyopinae.

Table 1. Each measurement of the neotypes (unit: mm)

Measurements	Holotype	Paratype
Standard length (SL)	97.6	64.2
Total length (TL)	133.7	87.8
Body depth (BD)	8.9	7.8
Body width	6.1	5.1
Length of base of pectoral fin	4.8	3.0
Length of base of dorsal fin	71.2	42.1
Length of base of anal fin	54.5	36.4
Length of base of caudal fin	5.0	2.9
Length of base of pelvic fin	1.3	1.0
Length of pectoral fin	10.0	8.9
Length of dorsal fin	9.6	7.7
Length of anal fin	7.7	5.0
Length of caudal fin	36.5	25.2
Length of pelvic fin	14.9	9.8
Snout length (SNL)	4.9	4.3
Eye diameter (ED)	0.4	0.3
Ocular distance	3.1	2.5
Head length (HL)	17.5	14.5
Trunk length	27.0	50.0
Caudal length (CL)	52.5	31.9
Mouth length (ML)	7.7	5.9

Explain: At least *Pseudobrachyamblyopus* is considered a new monotypic genus at present. Hence, the description of the new genus and the new species are provided together.

Diagnosis: According to its scientific name, it's a new genus under Amblyopinae that has fused the characteristics of *Brachyamblyopus* and *Odontamblyopus*. The new species has such characteristics, has a slender and short body, short pectoral fins, long caudal fin, and dense teeth. It should be put in "the 'Taenioides' Groups" because there is an interneural gap.

Description: Body compressed, and head depressed. Tail high, no caudal peduncle. Heights of tail have a trend to decrease very slightly from anus to caudal fin base, which is reflected in the length of the base of caudal fin very long, more than one half of body height.

Basic proportion: SL/TL≈0.73; BD/SL: 0.09-0.12; SNL/SL: 0.050-0.067; HL/SL: 0.18-0.23; CL/SL: 0.496-0.538; ML/SL: 0.079-0.092.

Cycloid scales present on body except belly, and appear from neck to posterior half part dorsal surface of head, extending to the opercle, where some diminutive scales even appear on the boundary between opercle and gill membrane, which are hard to observe without amplifiers; the arrangement of the scales on head are different between the different specimens of the same species; no scales on the fins and the bases of the fins except caudal fin. The scales' mean sizes decrease from posterior to anterior, from far greater than eyes to nearly equal to eyes, while the scales on opercle particularly dwindled, much smaller than eye. Lateral line on body absent.

Mouth sub-superior, large and comparatively vertical, which slightly forward from bottom to top. Rictus under eye. Tongue short; base wide; tip not free, but connected with lower jaw by membrane. Isthmus slightly widened, with some longitudinal shallow pleats, not connected with gill membrane. Black eye rudimentary, not distinct, covered by skin, on the bottom of a pit. No cirri on the head. Frontal crest smooth. No sensory pores or canals on head; sensory papillae sparsely scattered in front of the opercle. Anterior naris immediately above and near the upper jaw, short tapering tube-liked. Posterior naris in front of eye; larger than eye; margin budged. No palatine nor vomerine teeth; teeth on both jaws arranged in 2 rows, along the outer margin of jaws; all the teeth neither fang-liked nor canine-liked, which like broken glass sticks, transparent and rough on the top. Although all the teeth small and thin, all of the teeth on the first outermost rows on both jaws obviously lengthened and especially dense; though they squarely point towards each other, mouth could almost completely close, given the staggered tips. Except the first outermost rows, all the teeth small. Teeth countless in both jaws.

Fin formula: D. VI—29~31; A. I—28~32; V. I—5; P. vi~vii11ii; C. i14i;

Figure 1. head of the holotype of *Pseudobrachyamblyopus odontamblyopsis*. Teeth on the outermost rows of both jaws enlarged; scales on opercle expanded to gill membrane.

Holotype: D. VI—31; A. I—32; V. I—5; P. vii11ii; C. i14i;
Paratype: D. VI—29; A. I—28; V. I—5; P. vi11ii; C. i14i.

Figure 2. View of the spinous dorsal fin of the holotype of *Pseudobrachyamblyopus odontamblyopsis* gen. *et* sp. nov.. Head is on the left. First soft ray is broken.

Dorsal fin long, high in the spinous part and low in the soft part; base long and narrow; membrane thin and flimsy; first dorsal fin possesses six spines only, the sixth spine is the longest; all of the spines elongated like silk, but fully connected by membrane; second dorsal fin possesses 29-31

soft rays only, though the first soft ray spinous and branched, others are soft, segmented and bifurcated, and the third soft ray is the longest; lengths of soft rays have a trend to decrease; total elements 35-37; as a whole, the sixth spine is also the longest, gap between the last spine and the first soft ray is longest. Anal fin begins before the mid-point of the full length, immediately behind anus, and far behind dorsal-fin origin; first element is a spine, which is the shortest element; then come 28-32 segmented and branched soft rays, first soft ray longest; lengths of soft rays have a trend to decrease; total elements 29-33. There is respectively one small flexible branch begins at the bottom of the second dorsal soft ray and the first anal soft ray. Two pelvic fins fused into a sucker, whose first element is a spine, which is the shortest element; then are the five branched soft rays, second soft ray longest; total elements 6 on each side; lengths of elements have a trend to increase then decrease. Pectoral fin round and slightly pointed; soft rays only; first branched soft ray is the longest; first 6-7 soft rays not branched, last two too; 11 in the centre branched; tip of the upper unbranched rays free; tip behind dorsal-fin origin, base before dorsal-fin origin; lengths of soft rays have a trend to increase then decrease; total elements 20 on each side. Caudal fin very long pointed; connected with dorsal fin and anal fin; first and last segmented and unbranched; 14 in the centre branched and segmented; branched soft rays thicker than unbranched soft rays; lengths of soft rays have a trend to increase then decrease; eighth is longest; total elements 16.

The first two pterygiophores of the second dorsal fin are in the same interneural space after the interneural gap. Vertebral count 25; precaudal vertebrae 9, caudal vertebrae 16.

Coloration:

Fresh: most of the skin light pink, darker around the fin bases, scales transparent, the colour under scales crimson to brown. Fin membranes transparent; all of the median fins' elements light brown except transparent tips; all the paired fins' elements transparent.

Just frozen: most of the skin red, crimson irregularly appears. Fin membranes transparent; all of the median fins' elements brown; all the paired fins' elements transparent.

Well frozen: completely light pink with tiny dark dots on the dorsal skin.

Preserved in alcohol: completely pale with tiny dark dots on the dorsal skin.

Distribution: Neotypes are collected from Xiang'an, at a depth of approximately 10 m, far away from estuaries, while another in a base of Wanning. According to the non-documented hearsay, it might be distributed from Huanghai Sea to Singapore.

Figure 3. Lateral view of "*Pseudobrachyamblyopus odontamblyopsis*, 134 mm TL, holotype, frozen, 118.31°E, 24.57°N, 10 m deep, 9 Sep. 2023, Hei / 10 Sep. 2023, Ba" "PRVT-Fr 00112", the fresh holotype of *Pseudobrachyamblyopus odontamblyopsis* gen. *et* sp. nov. (alive).

Comparison It could be distinguished from *Odontamblyopus* by a great deal of branched pectoral fin rays (more than one half of pectoral-fin rays branched vs. nearly all of pectoral-fin rays unbranched), and a great deal of pectoral-fin rays connected by membranes (only first six pectoral-fin rays free vs. nearly all of the pectoral-fin rays free). It could be distinguished from *Brachyamblyopus* by longer body (ML/SL: 0.078-0.092 vs. ML/SL: 0.048-0.07; HL/SL: 0.18-0.23 vs. HL/ SL≈0.13); longer teeth on outermost row (teeth on outermost row enlarged vs. nearly all the teeth not exposed); head covered with scales (opercle and preopercle covered with scales vs. head naked); pectoral fin with free elements (tip of first 6-7 pectoral-fin ray free vs. all the pectoral-fin rays connected by membrane); precaudal vertebral count lesser (precaudal vertebral count 9 vs. precaudal vertebral count 10-14); tip of tongue not free (tip of tongue free vs. tip of tongue connected with lower jaw by membrane). [4,11]

Figure 4. The lateral view of "*Pseudobrachyamblyopus odontamblyopsis*, 88 mm TL, paratype, preserved in alcohol, Wanning, Sep. 2023, Zhang / 25 Oct. 2023, Ba" "PRVT-Pa 00106".

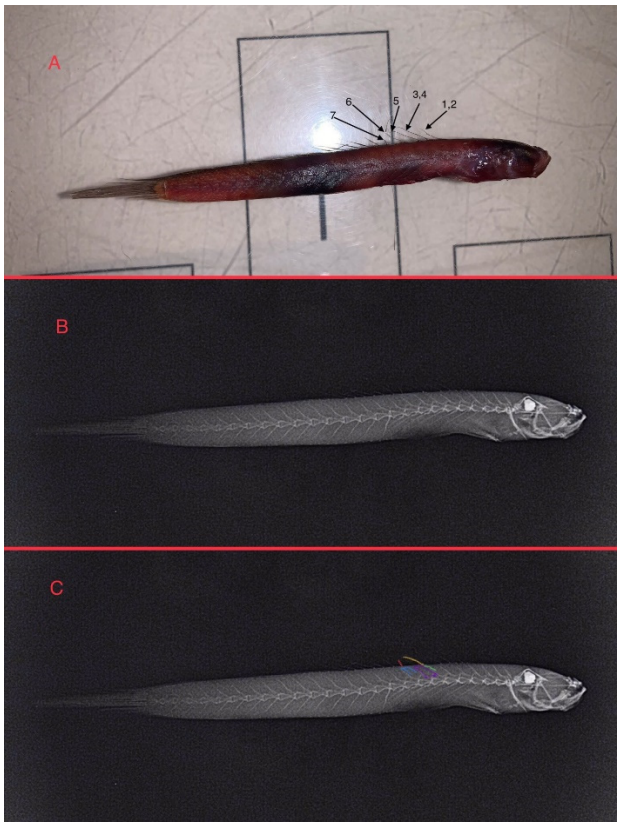

Figure 5. lateral view of the preserved holotype of *Pseudobrachyamblyopus odontamblyopsis* gen. *et* sp. nov. A. on the plane of X-ray machine, number of dorsal fin elements pointed out; B. under X-ray; C. marked structure: yellow: last spine, green: last first dorsal-fin pterygiophores, purple: profile of interneural gap, red: first soft ray, blue: first two second dorsal-fin pterygiophores.

3.1.2. Gen2. Sp2.

Provisional ***Brachyamblyopus***

Figure 6. A lateral view of *Brachyamblyopus brachysoma*, Zhanjiang, (photo by Chi Zhang), only otoliths preserved.

This genus comprises only one species, which is *Brachyamblyopus brachysoma*. This species usually distributed in muddy bottoms under brackish and fresh water or mud flats near the Western Pacific Ocean, and it usually stay in deep holes bored by themselves.

Body long, slightly compressed. Head cylinder, snout especially rounded. Dorsal and ventral margin of body straight. Lateral line absent. Head scaleless; first scale before dorsal fin, body except belly covered with scale. No sensory pores or canals on head, while sensory papillae present on head. Eye black, rudimentary, covered by skin; ocular distance great; area between two eyes budged. Anterior naris is short tapering tube. Posterior naris not tubular, margin budged; size substantially equal to eye. Mouth sub-superior; incline forward from bottom to top; rictus under eye. Almost no teeth in mouth, only several spinule-liked teeth exposed. Tip of tongue free. Gill opening small, slit-liked; extend from lateral position to ventral position. No opercular pouch. Isthmus wide, connected with gill membrane. Pseudobranches developed. Two dorsal fins connected; first dorsal fin origins above the pectoral fin, between the base and the tip; with 6 spines; only 30-34 soft rays in the second dorsal fin. Anal fin possesses 1 spine followed by 28-33 soft rays. Dorsal fin and anal fin connected with the caudal fin. Pectoral fins short; round-margined; with 18 soft rays, some of which branched; base shorter than gill opening; located in the range of gill opening. Two pelvic fins fused into a rounded sucker; the first element is a spine, 5 soft rays following. Caudal fin comparatively short, substantially equal to head length; possesses 12 soft rays only. Mouth length about 0.48% to 0.7% of standard length; head length about 13% of standard length. Total vertebral count 28-30; 11-14 precaudal vertebrae, 16 caudal vertebrae. First two pterygiophores of the second dorsal fin situated in one interneural space. Two anal-fin pterygiophores anterior to the first hemal spine. Three ribs on the first precaudal vertebra. [4,5,11]

- **Discussion of Doubts**

Figure 7. Head of *Brachyamblyopus brachysoma*, Zhanjiang, (photo by Chi Zhang), only otoliths preserved, which could see that all the teeth are nearly not exposed.

I have never seen the entity of the holotype and paratypes of *Brachyamblyopus brachysoma*, and I haven't got any molecular evidence. *Brachyamblyopus* is also a very rare genus. Hence, I couldn't ascertain whether I have chosen the correct species to be the new species, and whether I've chosen the wrong species oppositely to be each other, or even none of the both species are *Brachyamblyopus brachysoma*. There are 3 main characters originally described definitely to be the core of distinguishing the mentioned monotypic genus *Brachyamblyopus*, which are whether head scaleless, whether body elongated, and whether teeth in mouth distinct [5,7,8]. *Pseudobrachyamblyopus* could also be distinguished from *Brachyamblyopus* by these, too. As the original description, in *Brachyamblyopus*, head scaleless, body very elongated, teeth on the outermost row in both jaws enlarged. However, in all the specimens I collected, there are two types which could be distinguished easily. All of the 3 specimens in the type I identified to be *Brachyamblyopus* have scaleless head, HL/SL≈0.13, ML/SL: 0.055-0.065, but nearly all the teeth not exposed, which represent that there are 2 out of 3 cores corresponded to the original description of *Brachyamblyopus*, and only 1 not corresponded; besides, there are also many other characters which had been described as *Brachyamblyopus* ambiguously in origin also corresponded. Conversely, the 2 specimens I identified to be *Pseudobrachyamblyopus* has head with scales, HL/SL:0.18-0.23, ML/SL: 0.078-0.092, but teeth on the outermost row in both jaws enlarged, which represent that there is 1 out of 3 cores corresponded to the original description of *Brachyamblyopus*, and 2 of them not corresponded; besides, not a single character which had been described as *Brachyamblyopus* ambiguously in origin corresponded. Thus, whether the species I identified to be *Brachyamblyopus brachysoma* and *Pseudobrachyamblyopus odontamblyopus* are new species from different genera is still remains in opacity, but that they are seemed to be two different types is undoubtfully clear. As mentioned, I could only distinguish the two types in those plausible ways. The clarified introductions of the genera *Brachyamblyopus* and *Pseudobrachyamblyopus* in this paper are based on the characters aforementioned. While in any case, the characteristic defined previously which caudal fin is shorter than head length is seemed to be a mis-presentation given the broken caudal fin.

In conclusion, I couldn't identify very surely which one of the two types is belonged to *Brachyamblyopus* and which one is belonged to *Pseudobrachyamblyopus*, yet in my opinion, they should be different species which should be put in different genera given their appearance. Besides, their characteristics are definitely not blurred together. Thus, if I've done it reversely, the description of *Pseudobrachyamblyopus* in this article could be directly used for *Brachyamblyopus*.

3.1.3. *Trypauchen*

A genus with two species, which are respectively *Trypauchen vagina* and *Trypauchen pelaeos*. The species are founded from the seas or estuaries of Northern Eastern Indian Ocean and Western Pacific Ocean. *Trypauchen vagina* is such wide distributed, while *Trypauchen pelaeos* only distributed in tropical seas and estuaries of Western Pacific. [5]

Trypauchen has the following characters. Pectoral fins small; tip pointed; lower posterior margin slightly emarginate forward and upward; fully connected by membranes. Pelvic fin small and round. All the skin of body, including belly covered with scales; head naked. Total dorsal-fin elements 45–58; first dorsal fin with 5 or 6 spines; all second dorsal-fin rays soft and branched; dorsal-fin base long and broadly. Caudal fin connected with dorsal fin and anal fin. Opercular pouch very distinct, connect with gill. First two pterygiophores of the second dorsal fin in the same interneural space. Two or three rows of canines in the upper and lower jaws, and all teeth caninoid. The teeth of the outermost row especially enlarged. No palatine or vomerine teeth. Tongue thick; tip round and free. Lips with shallow wrinkles. Isthmus wide, connected with branchial membranes.

Eyes rudimentary. Anterior nares small tube-liked, posterior nares large, in front of and immediately near the eyes. [1-5,12]

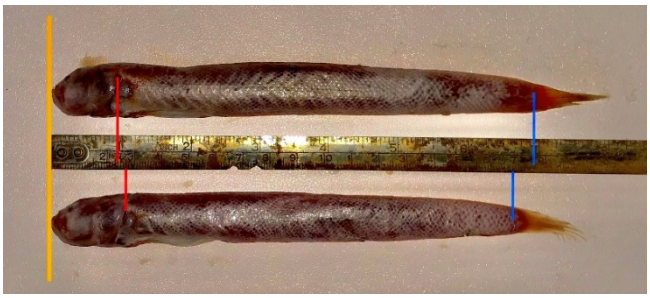

Figure 8. Lateral view of juxtaposed 2 species of *Trypauchen*. *Trypauchen vagina*, Ningde, TL=202 mm PRVT-Fr 00135, the upper; *Trypauchen pelaeos*, Ningde, TL=198 mm PRVT-Fr 00136, the lower. Scale for calculating HL/SL to distinguish. Yellow line: anterior tip of head and scale; red line: posterior tip of head; blue line: posterior tip of caudal fin base.

3.1.4. *Amblyotrypauchen*

Amblyotrypauchen is a monotypic genus comprising only one species, *Amblyotrypauchen arctocepalus*. They live in muddy bottoms of the seas Eastern Indian Ocean, from 10m to 200m under the surface, and usually in deep seas. [5]

Total 29 vertebrae; 10 precaudal vertebrae, 19 caudal vertebrae. Body is quite elongated and especially compressed. Dorsal and ventral edges almost straight. The rear of pelvic fin emarginate. The head is tall and short. A frontal crest on median line of head. Snout is short and blunt. Eyes completely degenerated, while the pit evolved for eye is still present dorsally and frontally on the head. Anterior naris and posterior naris, separated but close to each other; the anterior naris has a short tube adjacent to the upper lip; the posterior naris is small, circular, with a budged edge, located directly in front of the eyes. Mouth small, terminal; mandible slightly longer than maxilla. Tongue free, with a slightly circular front end. Gill hole is large and lateral. Teeth are small and sharp, with several rows of teeth in both jaws; without canine teeth; arranged in narrow rows; some outer most teeth enlarged; exposed outside the mouth when closed; no teeth on vomer, palate, and tongue. Opercular pouch distinct. Scales cover all the skin of body except chest and pectoral fin base; become larger when they come to posterior area; cover head except snout, especially clear on the opercle and preopercle. Total 29 vertebrae; 10 precaudal vertebrae, 19 caudal vertebrae. [1-5,12,13]

Figure 9. Lateral view of *Amblyotrypauchen arctocephalus*, China, PRVT-Pa 00100.

3.1.5. *Ctenotrypauchen*

Ctenotrypauchen is a monotypic genus. The species under this genus is *Ctenotrypauchen chinensis*. *Ctenotrypauchen chinensis* usually stay in the holes bored by themselves in tropical, subtropical, and warm temperate seas, especially the deep muddy bottoms near the estuaries, at a depth of about 50m-100m. They are found in Western Pacific Ocean. [5]

Body very compressed and shortened. Body covered with cycloid scales; neck and head naked. Dorsal and ventral edges almost straight. Pectoral fins small; lower posterior margin emarginate forward and upward; fully connected by membranes. Dorsal fin origin above pectoral fin, between base and tip. Rear margin of pelvic fin slightly emarginate; pelvic fin comprises one spine and 3-5 soft rays. Head also very compressed. Sensory papillae diminutive but distinct. The median line of the dorsal margin of head with a serrated frontal crest. Lips thin and slightly crooked. A great deal of teeth of the outermost several rows enlarged. No vomerine, palatine teeth. Anterior naris tubular, posterior naris slit-liked. Tip of tongue separated from mouth. Gill membranes connected with isthmus. Opercular pouch tiny but distinct. Eyes rudimentary but comparatively large; almost as large as opercular pouch. Pseudobranches possessed but not developed. [1-5,12,14]

3.1.6. *Paratrypauchen*

The only species under genus *Paratrypauchen* is *Paratrypauchen microcephalus*. It is known from Western Indian Ocean to Western Pacific Ocean from cold temperate area to tropical area, generally in muddy estuaries. [5] The northmost record might remain in Bohai Sea or Northern Huanghai Sea of China. [4,5]

Figure 10. Lateral view of the fresh *Paratrypauchen microcephalus*, Huanghua, PRVT-Fr 00115 (alive).

Scales cover body except belly, neck and head. Body long, cylinder, slightly compressed. Head more cylinder than body. Total dorsal-fin elements 50-60; first dorsal fin comprises 6 spines; second dorsal fin comprises 44-54 branched soft rays; two dorsal fins connected with membrane. Anal fin comprises soft rays only; only first ray unbranched, others branched; total elements 41-49; origins under the soft dorsal fin. Height of anal fin approximately equal to height of second dorsal fin. Pectoral-fin small; with branched soft rays only; total elements 12-20; lower posterior margin emarginate forward and upward; fully connected by membranes. First element of pelvic fin is a spine, then followed by 3-5 soft rays; two pelvic fins connected to be a sucker with emarginate rear margin. Caudal fin pointed, with 16-18 soft rays. Caudal fin connected with dorsal fin and anal fin. Anus slightly in front of the anal fin, under the soft dorsal fin. No crest on dorsal side of head. Eyes very rudimentary and small. Anterior naris tubular, posterior naris slit-liked. The anterior tip of mandible protrudes exceed the front edge of maxilla; mouth oblique, sub-superior. Two or three rows of teeth in both jaws; some teeth in the outermost row slightly enlarged like canine. No vomerine or palatine teeth. Tip of tongue separated from mouth; tongue without teeth. Gill membranes connected with isthmus. Genital papilla in males protruded; genital papilla in males blunt, divided into 2 segments. Head without sensory pores, but with sensory papillae, which is distinct in fresh specimen, especially when alive. Opercular pouch larger than eye; distinct, darker than peripheral skin; elliptic, of which the major axis is longitudinal. Pseudobranches possessed but not developed. Last pterygiophore of first dorsal fin shares one interneural space with the first pterygiophore of the second dorsal fin. Vertebral count 35-38. Three pterygiophores in front of the first hemal spine. Body pink to red when fresh; pale after preserved. [1-5,12]

3.1.7. *Trypauchenichthys*

There are 3 species under the genus *Trypauchenichthys*,

they are respectively *Trypauchenichthys larsonae*, *Trypauchenichthys sumatrensis*, *Trypauchenichthys typus*. They distributed near the coasts of Indo-Pacific Ocean. *Trypauchenichthys larsonae* distributed from Northern Territory of Australia to South China Sea of Philippines. *Trypauchenichthys sumatrensis* is found in the India. *Trypauchenichthys typus* with specimens known only from the type locality in Southeast Asia and South Asia. [5,9,15]

This genus could be distinguished easily by pelvic fins separate, without a connecting membrane. First dorsal fin comprises six spines only; second dorsal fin with soft rays only; first soft ray of dorsal fin slightly spinous, branched nor not; all of other dorsal fin rays branched. Pelvic-fin rays I, 2-4; lateral soft rays much longer than median ones. Caudal fin tapering with 17 rays. Head and body compressed. Cycloid scales smaller in the front of body than rear. There are 2-3 rows of teeth; outermost teeth larger and more rounded; no palatine or vomerine teeth present. Mouth terminal, small and oblique; rictus short, overlapped by skin on mouth; gill opening moderate, extending from an approximate horizontal with pectoral-fin origin to ventral side of head, making the isthmus narrow. Opercular pouch distinct. [5,9,15]

3.1.8. *Caragobius*

Caragobius comprises two species, *Caragobius rubristriatus* and *Caragobius urolepis*. The range of the distribution is Western Pacific, while *Caragobius rubristriatus* is found in southern region, and *Caragobius urolepis* is found in northern region. They usually perch in estuaries and freshwaters. [1,5,9,11]

Body cylinder, slightly deep; head slightly depressed. Pelvic fins enlarged and rounded. Pectoral fins enlarged; tip rounded. Caudal fin connected with dorsal fin and anal fin. No scales on head; no scales anterior to dorsal fin origin. Opercular pouch not appears in surface. Eyes very diminutive and rudimentary; covered with skin; hard to distinct. Mouth large, sub-superior. Several tiny canine teeth, all other teeth small but pointed. No vomerine or palatine teeth. Tongue thick, thin and free, without any dentition. Anterior naris above the upper jaw; posterior naris located on the anterior margin of eyes. They have 3-7 anal-fin pterygiophores anterior to first hemal spine. Precaudal vertebral count 9-11. Last pterygiophore of first dorsal fin shares one interneural space with the first pterygiophore of the second dorsal fin. Rear margin of pectoral fins rounded. [1,5,9,11]

3.1.9. *Karsten*

A monotypic genus with a species named *Karsten totoyensis*. It is collected from shallow to very deep seas with sandy or muddy bottoms in Western Pacific Ocean; the depth of its habitat could exceed 1000 m under surface. [5,16]

Body and head slightly compressed. Two dorsal fins continuous; total elements 46-51; first dorsal fin comprises 6 spines; second dorsal fin with 40-45 soft rays only; first soft ray fin branched. Total anal fin elements 40-44; with soft rays only. Fibrous tissues present at base of dorsal fin and anal fin; anal-fin height sub-equal to second dorsal-fin height; both dorsal fin and anal fin joined with the caudal fin. Pectoral with 14-16 unbranched segmented soft rays; crescent. First element of pelvic fin is a spine, then following 5 soft rays; frenum present; two pelvic fins connected by a membrane to be a sucker, slightly emarginate posteriorly. Caudal fin with 17 segmented soft rays; first ray and last ray unbranched, whereas others all branched. First scale behind the anterior 60% of body. Frontal crest distinct but not serrated. Eye completely degenerated. No sensory pores on head, while sensory pits present. Mouth oblique. Conical teeth not fang-liked; dentition slightly irregular; approximately two rows in each jaw; outer teeth longer than inner ones, while some even larger and longer pointed, which protrude out of mouth. No palatine or vomerine teeth. Tongue thick and rounded. Opercular pouch not present. [5,16]

3.1.10. *Biendongella*

A genus with 2 species, they are respectively *Biendongella iljini*, and *Biendongella hemilissa*. They are only known from South China Sea. [9]

Body slightly elongated, but comparatively short, not eel-like. First dorsal fin connected with second dorsal fin by membrane; total elements 32; 6 elements in first dorsal fin are all spines; second dorsal with only 26 soft rays. Anal fin comprises, 24-27 rays. Pectoral fin with 19-21 branched soft rays; all elements completely connected by membranes; all soft rays tapers from base to tip. Gape nearly horizontal and slightly inclined. Teeth on both jaws compiled in two rows. No frontal crest, barbels, and sensory pore or canals on head. Two pelvic fins fully fused into a circular sucker; longer than pectoral fin. Eyes rudimentary but distinct. Anterior naris tubular, above and near the upper edge of mouth; posterior naris substantially at the same horizontal level of eye. Interneural gap between spinous dorsal fin and soft dorsal fin present, before the first and second pterygiophores of the second dorsal fin which are separated by a neural spine. Total vertebral count 26; 10 precaudal vertebrae, 16 caudal vertebrae. Scales, cycloid, well developed. [9,17]

3.1.11. *Sovvityazius*

A monotypic genus with only one species, called *Sovvityazius acer*. They are only known from South China Sea. [9]

Body compressed and elongated; thin, but not eel-like. Head depressed. Scales cycloid and large; cover the rear margin of the dorsal side of head, neck, and body, including belly; neck naked, except the dorsal surface covered by scales; pectoral fin base naked. Two dorsal fins continuous; first dorsal fin with 6 spines; second dorsal fin with 40-42 soft rays. Anal fin comprises 38-40 soft rays. Pectoral fin with 17-20 soft rays, all of which are totally connected by membrane; most of the rays branched. Two pelvic fins fused into a circular sucker, first element is a spine, then following 5 soft rays. The length of pelvic fins substantially equal to pectoral fins. Gape almost horizontal, upper-jaw tip slightly anterior to lower-jaw tip. Teeth on both jaws arranged in one row, uniform-sized, small and piercing. Interorbital gap flattened. Eyes rudimentary, covered by skin, but exceptionally well developed and giant contrast to other species under Amblyopinae, possessing all the normal structures. No frontal crest, barbels. No sensory pore or canals on head, but with papillae. Anterior naris located immediately above and near the upper edge of the mouth; long tubular; tube tapering; exceed the lower margin of the maxilla. Posterior naris is a small pore, with slightly bulged margins, located before eye; obviously smaller than eye. There is an interneural gap between spinous dorsal fin and soft dorsal fin; two first pterygiophores of the second dorsal fin separated by a neural spine. Total vertebral count 29; 10 precaudal vertebrae, 19 caudal vertebrae. [9,17]

3.1.12. *Gymnoamblyopus*

There is only one species under this monotypic genus, which is named *Gymnoamblyopus novaeguineae*. It was only found in the freshwater river, the Lower Fly River, far away

from the estuary. [5,18]

Body elongated and slightly compressed, head compressed. Head and body scaleless. No barbels on the chin. Total dorsal-fin elements 33; first dorsal fin connected with second dorsal fin; first dorsal fin comprises six spines only; all of the soft rays of second dorsal fin segmented and branched. Anal fin comprises 26 soft rays only, all of which segmented and branched. Height of second dorsal fin approximately equal to height of anal fin; membrane of dorsal and anal fins thick and rubbery. Caudal fin slightly longer than head; connected with dorsal fin and caudal fin. Pectoral fin with 16 rays, posterior margin rounded; all pectoral-fin rays segmented and most are branched. Pelvic fin begins with 1 spine, which is followed by 5 soft rays; two pelvic fins fused into a sucker; posterior margin rounded. Mouth almost vertical. There are substantially 2 rows of teeth, while the two rows turn into 3 to 4 rows; teeth on outermost row of both jaws enlarged, while the teeth on the lower jaw are longer than the teeth on upper jaw; no caninoid teeth internal to symphysis of lower jaw. Outer-row teeth larger than inner row(s); outer row teeth of lower jaw longer than those; no palatine or vomerine teeth present; when mouth closed, outermost teeth interlock. Lips succulent, especially at rictus. Eye, covered by skin; rudimentary, but distinct. Anterior naris on the tip of the flap overhanging upper jaw; posterior naris anterior and lateral to, eye. Sensory canals and pores absent on head. Sensory papillae on head difficult to discern, except the papillae on mandible distinct. No raised dermal folds or ridges on head. Total vertebrae 16; precaudal vertebrae 10, caudal vertebrae 16. There is an interneural gap between the first dorsal fin and the second dorsal fin; only one anal-fin pterygiophore anterior to first hemal spine. [5,18]

3.1.13. *Odontamblyopus*

Genus *Odontamblyopus* comprises 5 species, *Odontamblyopus tenuis*, *Odontamblyopus rebecca*, *Odontamblyopus roseus*, *Odontamblyopus rubicundus*, and *Odontamblyopus lacepedii*, distributed from the western India to northern China and Japan; usually in the muddy bottoms under brackish waters and freshwaters. They might could breathe in moist air momentarily while it's at the low tide. *Odontamblyopus tenuis* is known near or in Northern Indian Ocean; *Odontamblyopus rebecca* is known from the region near or in East China Sea to South China Sea; *Odontamblyopus roseus* is known in western India; *Odontamblyopus rubicundus* is known from Bay of Bengal; *Odontamblyopus lacepedii* is known in Northern West Pacific Ocean. [5,19-21]

Almost all of the pectoral-fin rays free and unbranched; ventral elements branched seldomly; total elements 20-65. First element of pelvic fin is a spine, followed by 5 soft rays; two pelvic fins fused into a rounded sucker. Two dorsal fins connected; first dorsal fin with 6 spines only; second dorsal fin with soft rays only; total elements 40-54. Anal fin base long; first element is a spine; 31-44 soft rays follow then. First and last elements of caudal fin unbranched, whereas others are all branched. Caudal fin connected with dorsal fin and anal fin. Teeth arranged in 2-3 rows; teeth on outermost row of both jaws fang-like, base wide, and much larger than teeth on inner rows. Eye rudimentary; a black spot under skin. Cycloid scales small, embedded under the skin of head and body; sizes become greater and greater from anterior region of body to posterior region of body, from smaller than eye to substantially larger than eye. An interneural gap distributed between first dorsal fin and second dorsal fin. [5,19-21]

- Coloration of *Odontamblyopus lacepedii*

According to the previous description, the most convincing version of the description of the coloration of *Odontamblyopus lacepedii*, is that this species has a bluish-gray skin; blackish-red caudal fin, blood-red anal and pelvic fins, and ventral fins, and all the fins without chocolate-brown-coloured margin in preserved condition, which are slightly inaccurate. It is found that all of the descriptions are not wrong, while they are just not comprehensive enough. According to the specimens collected in China Sea, the coloration of this species in China emerges to complement the previous coloration records. The colours of the skin include red, pink, lavender, white, grey, very light blue, and reddish brown, while the it might be pure or gradually changed in the colours aforementioned, and there might be black porphyritic patterns on the upper part of its skin. Membranes covered the fin base have the same colour to the skin. Paired fins brown, red or pale. Median fins remain the same colours with skin, all of which have a darkened margin whose colour includes crimson, black, chocolate-brown, dark grey, and it might be pure or gradually changed in the colours aforementioned, too. The darkened margin in dorsal fin is usually sharper but thinner than anal fin, and both of them extend to caudal fin and then expanded. Besides, the darkened margins are usually clearer when it comes to posterior regions. Colours of different parts could be collocated freely to form mash-ups. Colours are likely to become more and more crimson along with the temperature of their habitat become higher and higher. Colours after preserved pale. The darkened margins might be even more apparent in preserved condition in alcohol, while when the darkened margin is crimson or brown, and especially when the colour of skin is red or reddish brown, the darkened margin in preserved condition in alcohol is really impalpable.

Figure 11. Lateral view of *Odontamblyopus lacepedii*. A. *Odontamblyopus lacepedii*, Huanghua, PRVT-Fr 00123, frozen; B. *Odontamblyopus lacepedii*, Huanghua, PRVT-Pa 00116, preserved in alcohol.

3.1.14. *Pseudotrypauchen*

A monotypic genus with only one species, named *Pseudotrypauchen multiradiatus*, distributed in the hydrographic net near the Indian Ocean and Western Pacific Ocean. Live in the tropical demersal base under fresh or brackish waters. [5,22]

Long pointed pectoral fins almost completely free from membranes; much longer than pelvic fins; nearly all of them not branched. Mouth large, terminal; oblique, more horizontal than vertical; short and rounded teeth in the outermost row-like dentition in both jaws. Caudal fin connected with dorsal fin and anal fin. First dorsal fin with 6 spines; second dorsal fin possesses soft rays only; first soft ray of second dorsal fin

unbranched and spinous, and all others are branched. First two pterygiophores of the second dorsal fin separated by a neural spine. Pelvic fin rounded. Cycloid scales very large, far larger than eyes, cover almost all the head and body. Opercular pouch not presented. Body deep, body depth more than 12% of standard length. Total vertebral count 27; 10 precaudal vertebrae, 17 caudal vertebrae [5,22].

3.1.15. *Trypauchenopsis*

Trypauchenopsis intermedia is the only species under the genus. This species has a very broad distribution in the estuaries from South Africa to South China Sea. [5,23,24]

Body and head long and cylinder; body slightly compressed; head slightly depressed. Scales completely absent on skin. Two dorsal fins connected; first dorsal fin with 6-7 spines; second dorsal fin with 28-35 soft rays. Anal fin with no spines. Caudal fin connected with dorsal fin and anal fin. Eye rudimentary. Head covered with barbels. Anterior naris short tubular, open immediately above mouth; posterior naris elliptic, located adjacent anterolaterally to eye. Gape wide; mouth terminal, slightly lean forward from rictus to tip; rictus under eye; expanded into large fold. Tongue thick; tip rounded, free from of mouth. Gill opening narrow, extending only the length of pectoral fin base or slightly more ventrally. Teeth in the first outermost rows of both jaws enlarged and not protrude beyond lips. No palatine or vomerine teeth. No sensory canals and pores absent on head, but head with barbel-liked sensory papillae. One interneural gap presented between first dorsal fin and second dorsal fin. [5,23,24]

3.1.16. *Taenioides*

The genus *Taenioides* currently comprises 5 valid species which are *Taenioides kentalleni*, *Taenioides purpurascens*, *Taenioides gracilis*, *Taenioides anguillaris* and *Taenioides snyderi*. They distributed in the tropical and sub-tropical estuaries of eastern Africa to southern Australia to eastern Asia. *Taenioides kentalleni* is found along the coast from Northwestern Indian Ocean to Northwestern Pacific Ocean; *Taenioides purpurascens* is from southeastern Australia; *Taenioides gracilis* is found along the coast from Western Indian Ocean to Western Pacific Ocean; *Taenioides anguillaris* is found in the coast from Northeast Indian Ocean to Western Pacific Ocean; *Taenioides snyderi* is only known from Southern Japan. [4,5,25-29]

Dorsal fin with a long base; total elements 41-72; first dorsal fin with spine only and second dorsal fin with soft rays only. Anal fin origin immediately posterior to anus; total elements 34-63. Dorsal fin and anal fin connected with caudal fin. Total pectoral fin elements 15-21; pectoral fin with branched rays; posterior margin of pectoral fin rounded. Two pelvic fins fused into a rounded sucker. No sensory canals or sensory pores present on head; sensory papillae presented on head, some of which on the lower jaw specialized into barbels. Some of the teeth in the first outermost rows of the both jaws slightly enlarged. Eye rudimentary. Skin completely scaleless. Total vertebral counts 27-45. One interneural gap present between first dorsal fin and second dorsal fin. [4,5,25-29]

Figure 12. Lateral view of *Taenioides snyderi*, Ningde, 253 mm, PRVT-Fr 00134.

3.2. External Keys to Distinguish the Definitely Valid Genera and Species:

The individuals before adult should be distinguished according to molecular evidence, while the adults could be distinguished as below.

1(14) All the skin without scales
2(3) Head without barbels (*Gymnoamblyopus*) ..... *Gymnoamblyopus novaeguineae*
3(2) Head with barbels
4(5) Skull covered with barbels (*Trypauchenopsis*) ..... *Trypauchenopsis intermedia*
5(4) Skull not covered with barbels (*Taenioides*)
6(7) Total dorsal- fin elements more than 69 ..... *Taenioides kentalleni*
7(6) Total dorsal-fin elements less than 69
8(9) Total dorsal-fin elements less than 45 ..... *Taenioides purpurascens*
9(8) Total dorsal-fin elements more than 45
10(11) Total barbels count on the ventral surface of head 7 ..... *Taenioides gracilis*
11(10) Total barbels count on the ventral surface of head 6
12(13) Total dorsal-fin elements less than 50 ..... *Taenioides anguillaris*
13(12) Total dorsal-fin elements 50 or more ..... *Taenioides snyderi*
14(1) Some skin covered with scales
15(26) Most of pectoral-fin rays free from membrane after median point of pectoral fin
16(17) Body depth more than 12% of standard length (*Pseudotrypauchen*) ..... *Pseudotrypauchen multiradiatus*
17(16) Body depth less than 12% of standard length (*Odontamblyopus*)
18(21) Pectoral-fin rays more than 38
19(20) Chin covered with barbels ..... *Odontamblyopus tenuis*
20(19) Chin without barbels ..... *Odontamblyopus rebecca*
21(18) Pectoral-fin rays less than 38
22(23) Margin of dorsal fin not darkened ..... *Odontamblyopus roseus*
23(22) Margin of dorsal fin partially or completely darkened
24(25) Standard length less than 80% of total length ..... *Odontamblyopus rubicundus*
25(24) Standard length more than 80% of total length ..... *Odontamblyopus lacepedii*
26(15) Most of pectoral-fin rays totally connected by membrane
27(44) Posterior margin of pelvic fin rounded
28(41) Opercular pouch invisible on the surface
29(32) Total dorsal-fin elements 32(*Biendongella*)

30(31) No predorsal scales ..... *Biendongella hemilissa*
31(30) Predorsal scales present ..... *Biendongella iljini*
32(29) Total dorsal-fin elements more than 32
33(36) No predorsal scales (*Caragobius*)
34(35) No scales below spinous dorsal fin ..... *Caragobius urolepis*
35(34) Scales present below spinous dorsal fin ..... *Caragobius rubristriatus*
36(33) Predorsal scales present
37(38) Tip of anterior-naris tube exceed lower margin of maxilla (*Sovvityazius*) ..... *Sovvityazius acer*
38(37) Anterior-naris tube not exceed lower margin of maxilla
39(40) Head with no scales (*Brachyamblyopus*) ..... *Brachyamblyopus brachysoma*
40(39) Head with scales (*Pseudobrachyamblyopus*) ..... *Pseudobrachyamblyopus odontamblyopsis*
41(28) Opercular pouch visible on the surface (*Trypauchen*)
42(43) Head length less than 18% of standard length ..... *Trypauchen vagina*
43(42) Head length 18% of standard length or more ..... *Trypauchen pelaeos*
44(27) Posterior margin of pelvic fin emarginate
45(46) Opercular pouch invisible on the surface (*Karsten*) ..... *Karsten totoyensis*
46(45) Opercular pouch visible on the surface
47(48) Head covered with some scales (*Amblyotrypauchen*) ..... *Amblyotrypauchen arctocephalus*
48(47) Head with no scales
49(54) Pelvic fins separated (*Trypauchenichthys*)
50(51) Frontal crest smooth ..... *Trypauchenichthys sumatrensis*
51(50) Frontal crest serrated
52(53) Abdomen scaleless ..... *Trypauchenichthys typus*
53(52) Abdomen covered with scales ..... *Trypauchenichthys larsonae*
54(49) Pelvic fins connected with membrane
55(56) Abdomen scaleless (*Paratrypauchen*) ..... *Paratrypauchen microcephalus*
56(55) Abdomen covered with scales (*Ctenotrypauchen*) ..... *Ctenotrypauchen chinensis*

4. Prospect

There is only a neotype collected from a sea, and another one is unknown accurately. Thus, more specimens also need for determining the environment and location of their habitat. Besides, the new genus and species are only established given its physical characteristics, and the arrangements of the skeletons of more species also need to be tested and recorded. As mentioned above, whether they are correct is also necessary to be discussed afterwards. Thus, molecular evidence is needed to demonstrate the relationship of the two types. This also requests more specimens.

According to the research of Amblyopinae, more new species and characteristics appear. The debate about who the distributions of scales help us to distinguish the species in "the 'Trypauchen' Group" is still ongoing; the distribution of the genius *Caragobius* is also being explored; research is also underway on the validation of some species of the genus *Taenioides*, such as *Taenioides buchanani*, *Taenioides caniscapulus*, *Taenioides cirratus*, *Taenioides eruptionis*, *Taenioides esquivel*, *Taenioides limicola*, *Taenioides mordax*, *Taenioides nigrimarginatus* [28,29]. Geographically isolated populations among them need specific research, especially the species appearing in Oceania and Eastern Asia, for instance, *Paratrypauchen microcephalus*, *Taenioides anguillaris*, and so on. In addition, in genetic research on the population of *Odontamblyopus lacepedii* along the coast of China, it was found that two groups under this species that were previously considered *Odontamblyopus lacepedi* have significant genetic differences but almost no apparent differences. Both groups are currently considered *Odontamblyopus lacepedii*, but further research is needed to determine their status [21].

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