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RESEARCH ARTICLE

A new species of *Pareas* (Squamata: Pareidae) from southwestern Yunnan, China

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ABSTRACT. A new species of *Pareas* is described from Gengma County, Lincang City, Yunnan Province, China, based on morphological comparisons and phylogenetic analysis. The new species is phylogenetically closely related and morphologically similar to *P. nigriceps* and *P. tigerinus*. It can be distinguished from *P. nigriceps* and *P. tigerinus* and other congeners by a combination of the following characters: snout-vent length 352–472 mm in adults, tail length/snout-vent length 0.25–0.29, preoculars 1–2, subocular single, postocular single, one row of vertebral scales enlarged, 1–7 rows of dorsal scales keeled at mid-body, ventral scales 172–176, subcaudals 68–77, maxillary teeth 4–5, dorsal head solid black, 62–69 black bars on trunk, 27–33 black bars on tail, iris solid black.

KEYWORDS. Molecular, morphology, slug-eating snake, taxonomy.

INTRODUCTION

Pareas is a highly successful group of snakes. Although they are small, slow, and non-venomous, they have few predators because of their specialized feeding habits. Large populations of these snakes have occupied a vast area from Sundaland to northeastern India and southern China (You et al. 2015, Wang et al. 2020, Liu and Rao 2021, Vogel et al. 2021, Poyarkov et al. 2022). At present, *Pareas* contains a total of 31 species, of which 23 are distributed in China (Liu et al. 2024, Uetz et al. 2024). Within China, Yunnan Province has the highest species diversity of *Pareas*, including more than half of the described species in China (Liu et al. 2023b, 2024). However, due to the conservative morphology and insufficient investigation, the species diversity of this genus in Yunnan is still underestimated (Ding et al. 2020, Wang et al. 2020, Liu and Rao 2021, Guo 2023, Liu et al. 2023a, 2023b).

During our recent field work in southwestern Yunnan, China, snakes that superficially resembled *P. nigriceps* Guo & Deng, 2009 and *P. tigerinus* Liu, Zhang, Poyarkov, Hou, Wu, Rao, Nguyen & Vogel, 2023 were collected from Gengma County, Lincang City. Detailed morphological comparison and molecular analyses conducted on them showed that the specimens from Gengma County are distinct from *P. nigriceps* and *P. tigerinus* and other named species within the genus. Here we describe them as a new species of *Pareas*.

MATERIAL AND METHODS

Snakes were collected in the field at night. Specimens were preserved in 75% ethanol and deposited at Kunming Natural History Museum of Zoology, Kunming Institute of Zoology, Chinese Academy of Sciences (KIZ). Specimen collection was performed in accordance with the Wild Animals Protection Law of the People's Republic of China and the study was approved by the Ethics Committee of Kunming Institute of Zoology, Chinese Academy of Sciences (protocol code IACUC-OE-2024-10-001).

Measurements were taken using a measuring tape to the nearest 1 mm. Paired meristic characters are given as

left/right. The methodology of measurements and meristic counts followed Liu et al. (2023b): SVL, snout-vent length, from tip of snout to posterior margin of cloacal plate; TL, tail length, from posterior margin of cloacal plate to tip of tail; PrFBO, prefrontal bordering orbit; PreO, preoculars; PosO, postoculars; SubO, suboculars; SPOF, subocular-postocular fused; LoBO, loreal bordering orbit; ATem, anterior temporals; PTem, posterior temporals; SupL, supralabials; InfL, infralabials; Vs, ventrals; Prec, precloacal plate divided or undivided; Sc, subcaudals; DS, dorsal scale rows, counted at one head length behind head, at mid-body, and at one head length before vent, respectively; NED, number of enlarged dorsal scale rows at mid-body; NKD, number of keeled dorsal scale rows at mid-body; Max, maxillary teeth; VBTr, vertical dark bars on trunk; VBTa, vertical dark bars on tail.

Molecular data were generated for the newly collected specimens from Gengma County, Yunnan Province, China. All new sequences have been deposited in GenBank and other sequences used in the phylogenetic analysis were obtained from GenBank (Table 1).

Table 1. Samples used for molecular phylogenetic analysis in this study.

Species	Voucher	Locality	Accession	Sources
Pareas melanops sp. nov.	KIZ 2024092	Gengma, Yunnan, China	PQ699882	This study
Pareas melanops sp. nov.	KIZ 2024093	Gengma, Yunnan, China	PQ699883	This study
Pareas melanops sp. nov.	KIZ 2024094	Gengma, Yunnan, China	PQ699884	This study
Pareas melanops sp. nov.	KIZ 2024095	Gengma, Yunnan, China	PQ699885	This study
Pareas melanops sp. nov.	KIZ 2024096	Gengma, Yunnan, China	PQ699886	This study
Pareas abros	ZMMU R-16393	Song Thanh, Quang Nam, Vietnam	MZ712235	Poyarkov et al. (2022)
Pareas andersonii	CAS 235359	Natmataung, Chin, Myanmar	MT968772	Vogel et al. (2020)
Pareas atayal	NMNS 05594	Beiheng, Taoyuan, Taiwan	KJ642124	You et al. (2015)
Pareas baiseensis	ANU 000220008	Baise, Guangxi, China	OQ054328	Gong et al. (2023)
Pareas berdmorei	AUP 01573	Chiang Mai, Thailand	MZ712218	Poyarkov et al. (2022)
Pareas boulengeri	GP2923	Jiangkou, Guizhou, China	MK135090	Wang et al. (2020)
Pareas carinatus	KIZ 011972	Malaysia	MK135111	Wang et al. (2020)
Pareas chinensis	CIB 010140	Tianquan, Sichuan, China	JF827691	Guo et al. (2011)
Pareas dulongjiangensis	KIZ R201607	Gongshan, Yunnan, China	OQ718498	Liu et al. (2023a)
Pareas formosensis	NMNS 05637	Nantou, Taiwan	MW287060	Ding et al. (2020)
Pareas geminatus	DL2019072910	Jiangcheng, Yunnan, China	MW287067	Ding et al. (2020)
Pareas guanyinshanensis	KIZ 2023038	Yuanyang, Yunnan, China	PP215390	Liu et al. (2024)
Pareas hamptoni	YPX 18604	Kachin, Myanmar	MK135078	Wang et al. (2020)
Pareas iwasakii	NMNS 05655	Ishigaki, Okinawa, Japan	KJ642160	You et al. (2015)
Pareas kaduri	BNHS 3574	Lohit, Arunachal Pradesh, India	MW026190	Bhosale et al. (2020)
Pareas komaii	NMNS 05618	Lijia, Taitung, Taiwan	KJ642185	You et al. (2015)
Pareas kuznetsovorum	ZMMU R-16802	Song Hinh, Phu Yen, Vietnam	MZ712232	Poyarkov et al. (2022)
Pareas macularius	ZMMU R-16629	Ban Mauk, Sagaing, Myanmar	MT968771	Vogel et al. (2020)
Pareas margaritophorus	ZMMU NAP-09759	Suan Phueng, Ratchaburi, Thailand	MZ712217	Poyarkov et al. (2022)
Pareas modestus	MZMU 1293	Aizawl, Mizoram, India	MT968773	Vogel et al. (2020)
Pareas monticola	ZMMU R-16631	Ban Mauk, Sagaing, Myanmar	MW438296	Vogel et al. (2021)
Pareas niger	KIZ 059339	Kunming, Yunnan, China	MW436706	Liu and Rao (2021)
Pareas nigriceps	CHS656	Tengchong, Yunnan, China	MK201455	Li et al. (2020)
Pareas nuchalis	FK 2626	Belait, Brunei Darussalam, Brunei	MZ603794	Le et al. (2021)
Pareas stanleyi	HM 2007-S001	Guilin, Guangxi, China	JN230704	Guo et al. (2011)
Pareas temporalis	ZMMU R-13656	Cat Loc, Lam Dong, Vietnam	MZ712238	Le et al. (2021)
Pareas tigerinus	KIZ 20210703	Menghai, Yunnan, China	OP752143	Liu et al. (2023b)
Pareas tigerinus	KIZ 20210704	Menghai, Yunnan, China	OP752144	Liu et al. (2023b)
Pareas tigerinus	KIZ 20210705	Menghai, Yunnan, China	OP752145	Liu et al. (2023b)
Pareas victorianus	CAS 235254	Natmataung, Chin, Myanmar	MW438300	Vogel et al. (2021)
Pareas vindumi	CAS 248147	Lukpwi, Kachin, Myanmar	MW287080	Ding et al. (2020)
Pareas xuelinensis	KIZ XL1	Lancang, Yunnan, China	MW436709	Liu and Rao (2021)
Pareas yunnanensis	KIZ 2022033	Dali, Yunnan, China	OP752146	Liu et al. (2023b)
Aplopeltura boa	LSUHC 7248	Sepilok, Sabah, Malaysia	KC916746	Loredo et al. (2013)

Total genomic DNA was extracted from liver tissues. Fragments of the mitochondrial gene cytochrome b (cytb) were amplified and sequenced by Tsingke Biotechnology Co., Ltd. using primers L14910: 5'-GACCTGTGATMTGAAAAAC-CAYCGTTGT-3' and H16064: 5'-CTTTGGTTTACAAGAA-CAATGCTTTA-3' (Burbrink et al. 2000). Sequences were managed using SeqMan in Lasergene.v7.1 (Burland 2000).

Sequences were aligned using ClustalW (Thompson et al. 1994) with default parameters. The best-fit substitution model GTR+F+I+G4 was chosen using the Akaike information criterion in ModelFinder (Kalyaanamoorthy et al. 2017). Bayesian inference was performed in MrBayes 3.2.6 (Ronquist et al. 2012) and the Markov chains were run for 5,000,000 generations and sampled every 100 generations. Maximum likelihood analysis was performed in RaxmlGUI 2.0 (Edler et al. 2021) and nodal support was estimated by 1,000 ultrafast bootstrap replicates. The genetic divergence (uncorrected p-distance) between species was calculated in MEGA 11 with the parameters Transitions + Transversions, Uniform rates and Pairwise deletion (Tamura et al. 2021).

Species delimitation was conducted using the method of Assemble Species by Automatic Partitioning (ASAP) and the substitution model of simple distance (p-distances). The lowest ASAP-score is considered the best partition according to Puillandre et al. (2021).

RESULTS

Bayesian inference and maximum likelihood analyses showed similar results: the newly collected specimens from Gengma County formed a distinct lineage, sister to *P. tigerinus*, with strong support (Fig. 1). The genetic divergence (uncorrected p-distance) between the lineage from Gengma County and *P. tigerinus* was 3.4%, the genetic divergence (uncorrected p-distance) between the lineage from Gengma County and *P. nigriceps* was 4.8% (Supplementary material Table S1).

The best partition (score = 1.5) revealed by the ASAP analysis assigned the sequences of the genus *Pareas* into 32 putative species, one of which comprises the sequences of the newly collected specimens from Gengma County and others correspond to the recognized species of the genus, respectively (Fig. 2).

TAXONOMY

Pareas melanops sp. nov.

Figs 3–6

https://zoobank.org/A8C5F112-61CF-4A48-A44A-BD64B1EEEC84

Diagnosis. Body size moderate (SVL 352–472 mm in adults), tail moderately long (TL/SVL 0.25–0.29), prefrontal bordering orbit, preoculars 1–2, subocular single, postocular single, subocular and postocular not fused, supralabials 7–8, infralabials seven, infralabial not fused with chin-shield, anterior temporal 1–3, posterior temporals 2–3, one row of vertebral scales slightly enlarged, 1–7 rows of dorsal scales keeled at mid-body, ventral scales 172–176, subcaudals 68–77, maxillary teeth 4–5, dorsal head solid black, dark nuchal band present, two large black spots on each side of head, 62–69 vertical black bars on each side of trunk, 27–33 vertical black bars on each side of tail, iris solid black.

Type Material. HOLOTYPE: KIZ 2024092, adult male, collected on 28 August 2024 by Shuo Liu from Mangdi Village, Hepai Township, Gengma County, Lincang City, Yunnan Province, China, 23°29'58"N, 99°18'45"E, 1,940 m elevation. PARATYPES: KIZ 2024093 and KIZ 2024095, two adult females, collected on 29 August 2024; KIZ 2024094, adult male, collected on 28 August 2024; and KIZ 2024096, juvenile, collected on 27 August 2024, all from the same locality as the holotype.

Description. Holotype: adult male, SVL = 472 mm, TL 135 = mm, TL/SVL = 0.29, TL/total length 0.22; body elongated; head distinct from neck; snout blunt, projecting beyond lower jaw; body laterally compressed, vertebral ridge feebly developed; rostral approximately as wide as high, nearly invisible from above; nasals undivided; internasals elongated, much wider than long; prefrontals triangular, bordering orbits; frontal shield-shaped, slightly longer than wide; parietals large, longer than wide, median suture slightly longer than frontal; supraoculars longer than wide; loreal 1/1, not bordering orbit; preocular 1/1; subocular 1/1, elongated crescent-shaped; postocular 1/1; anterior temporal 1/1, posterior temporals 2/2; supralabials 7/7, not bordering orbit; infralabials 7/7, anterior-most in contact with its opposite, first four in contact with anterior chin-shield, infralabial not fused with chin-shield; chin-shields three pairs, left one smaller than right one in first pair, left and right ones almost equal size in second and third pairs; ventral scales 172; cloaca plate undivided; subcaudals 71, paired; dorsal scales in 15 rows throughout, one row of vertebral scales slightly enlarged, seven rows of mid-dorsal scales slightly keeled at middle of body; maxillary teeth 4/4.

Coloration of holotype in life. Dorsal surface of head solid black, a large black band on neck, dorsal surface of body and tail brown; lateral surface of head yellow with many dark brown spots, two large black spots on each side of head, one on lower rear region of eye, another above angle of mouth; lateral surface of body and tail brownish yellow,

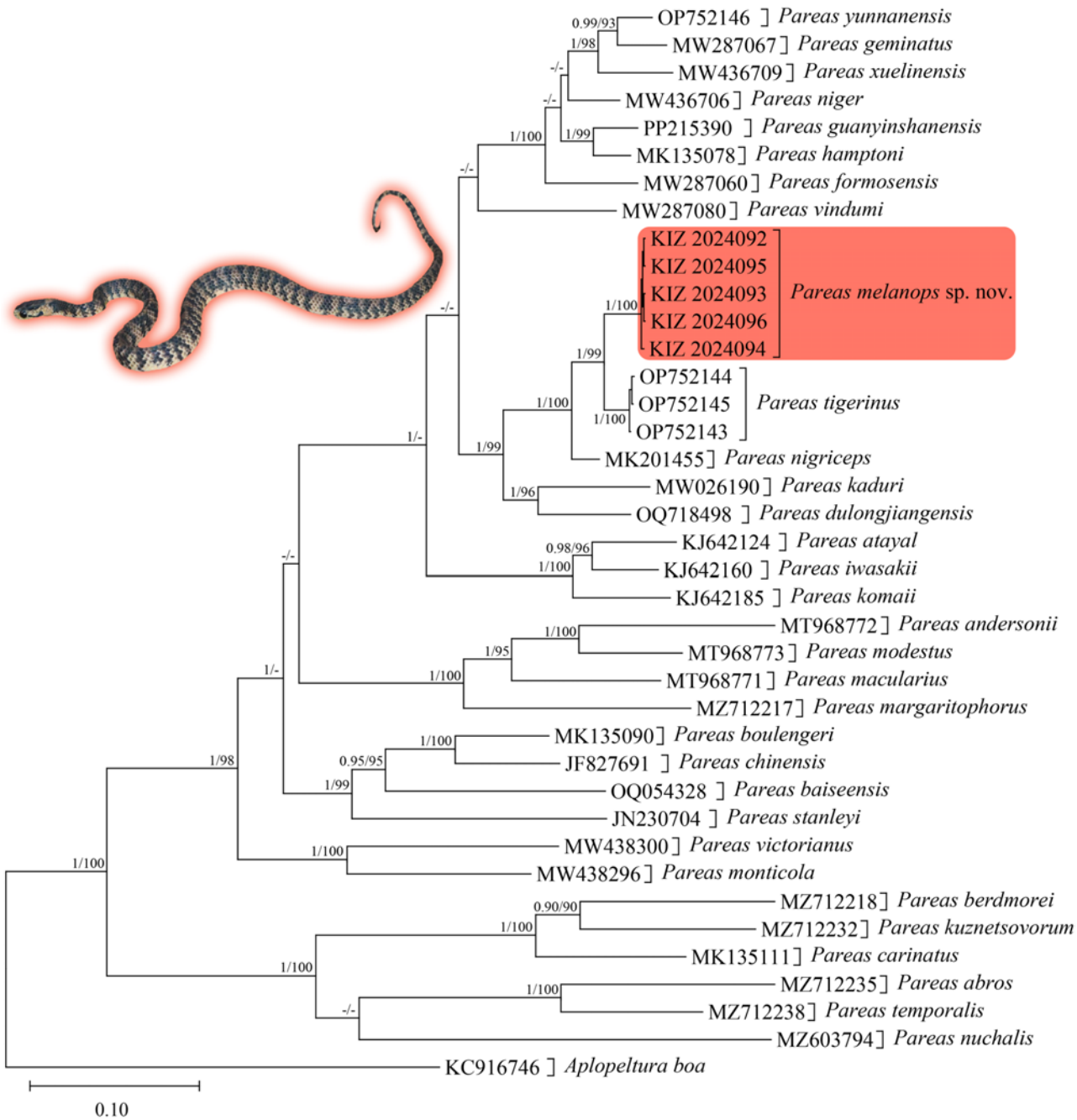

Figure 1. Bayesian phylogenetic inference phylogram of *Pareas* inferred from cytb gene sequences. Numbers before slashes indicate Bayesian posterior probabilities (values below 0.90 are not shown) and numbers after slashes indicate bootstrap support for maximum likelihood analyses (values below 90 are not shown).

approximately 64 vertical, billowing, black bars on each side of trunk and approximately 33 vertical, billowing, black bars on each side of tail, bars on different sides connected to each other on vertebrals; ventral surface of head light yellow, a few black spots on outer margin of ventral head; ventral surface of body light yellow with a few small black

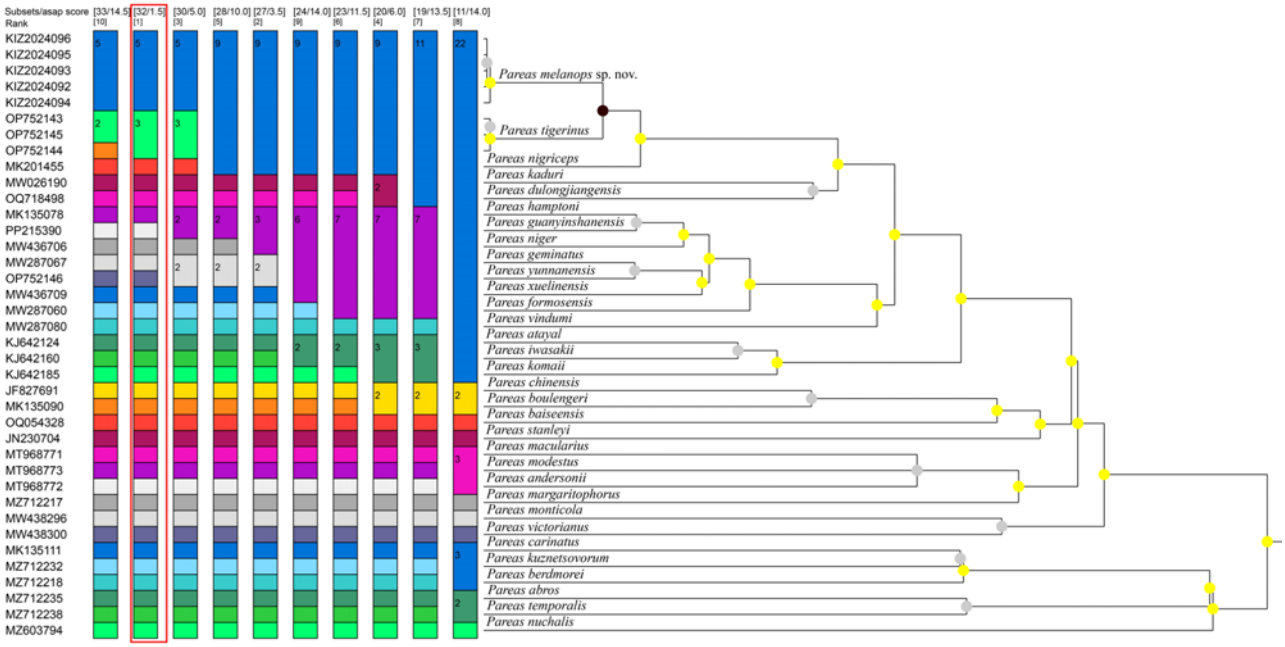

Figure 2. ASAP species delimitation in the genus *Pareas* based on cytb sequences. The best partition with the lowest score is highlighted with red frame.

spots; ventral surface of tail yellowish white with many black spots; iris solid black.

Variations. Morphometric and meristic data of the paratypes is similar to that of the holotype except that all paratypes are smaller than the holotype. The two female paratypes (KIZ 2024093 and KIZ 2024095) have two preoculars on each side, and the juvenile paratype (KIZ 2024096) has two preoculars on right side; the loreal borders the orbit in three paratypes (KIZ 2024093, KIZ 2024094, and KIZ 2024096); the male paratype (KIZ 2024094) has 3/2 anterior temporals and 3/3 posterior temporals; and the female paratype (KIZ 2024095) has five maxillary teeth on left side (Table 2). Concerning the coloration, the female paratype (KIZ 2024093) has a darker body while the other paratypes (KIZ 2024094–KIZ 2024096) have paler body than the holotype (Fig. 4).

Distribution. This species is currently known only from Gengma County, Lincang City, Yunnan Province, China (Fig. 5).

Habitat. All specimens of the new species were found on bushes beside a stream at night, surrounded by secondary forests. Four other reptile species were found at the type locality of the new species, namely *Lycodon chapaensis* (Angel & Bourret, 1933), *Ovophis makazayazaya* (Takahashi, 1922), *Pseudoxenodon macrops* (Blyth, 1855), and *Trimeresurus* sp.

Table 2. Measurements (in mm) and scalation data of *Pareas melanops* sp. nov. For abbreviations, see Materials and Methods section. Paired meristic characters are given as left/right.

	KIZ2024092	KIZ2024093	KIZ2024094	KIZ2024095	KIZ2024096
	Holotype	Paratype	Paratype	Paratype	Paratype
	Male	Female	Male	Female	Juvenile
SVL	472	411	404	352	249
TL	135	107	119	92	62
PrFBO	Yes	Yes	Yes	Yes	Yes
PreO	1/1	2/2	1/1	2/2	1/2
PosO	1/1	1/1	1/1	1/1	1/1
SubO	1/1	1/1	1/1	1/1	1/1
SPOF	No	No	No	No	No
LoBO	No	Yes	Yes	No	Yes
ATem	1/1	1/1	3/2	1/1	1/1
PTem	2/2	2/2	3/3	2/2	2/2
SupL	7/7	7/7	7/7	7/7	7/8
InfL	7/7	7/7	7/7	7/7	7/7
Vs	172	175	174	175	176
Prec	Undivided	Undivided	Undivided	Undivided	Undivided
Sc	71	69	77	75	68
Ds	15–15–15	15–15–15	15–15–15	15–15–15	15–15–15
NED	1	1	1	1	1
NKD	7	1	1	5	5
Max	4/4	4/4	4/4	5/4	4/4
VBTr	64	63	69	62	68
VBTa	33	28	30	31	27

Figure 3. The holotype (KIZ 2024092) of *Pareas melanops* sp. nov. in life: (A) general view; (B) dorsal view of the head; (C) lateral view of the head.

Etymology. The specific epithet "*melanops*" is an adjective in the nominative case derived from the Ancient Greek "*melanos*" for "black" and "*ops*" for "eye", and is given in reference to the conspicuous uniform black iris coloration of the new species. We recommend "Black-eyed slug-eating snake" for the common English name and "黑眼钝头蛇" (Pinyin: heī yǎn dùn tóu shé) for the common Chinese name of the new species.

Comparisons. *Pareas melanops* sp. nov. can be easily distinguished from all other species of the genus except *P. andersonii* Boulenger, 1888, *P. macularius* Theobald, 1868, *P. margaritophorus* (Jan, 1866), *P. modestus* Theobald, 1868, *P. nigriceps*, and *P. tigerinus* by having solid black iris (vs. iris being yellow, orange, red, or brown). *Pareas melanops* sp. nov. can be further distinguished from all other species of the genus except *P. andersonii*, *P. dulongjiangensis* Liu, Yang, Rao, Guo & Rao, 2023, *P. kaduri* Bhosale, Phansalkar, Sawant, Gowande, Patel & Mirza, 2020, *P. macularius*, *P. margaritophorus*, *P. modestus*, *P. niger* (Pope, 1928), *P. nigriceps*, *P. stanleyi* (Boulenger, 1914), *P. tigerinus*, and *P. yunnanensis* (Vogt, 1922) by the solid black dorsal surface of the head (vs. dorsal surface of head being yellow, orange, red, or brown with no or some dark spots) (Boulenger 1900, 1905, Vogt 1922, Pope 1935, Zhao et al. 1998, Grossmann and Tillack 2003, Guo and Deng 2009, Guo et al.

Figure 4. The paratypes of *Pareas melanops* sp. nov. in life: (A) the female KIZ 2024093; (B) the male KIZ 2024094.

2011, Loredo et al. 2013, Vogel 2015, You et al. 2015, Hauser 2017, Yang et al. 2019, 2021, Bhosale et al. 2020, Ding et al. 2020, Vogel et al. 2020, 2021, Wang et al. 2020, Le et al. 2021, Liu and Rao 2021, David and Deuti 2022, Poyarkov et al. 2022, Gong et al. 2023, Liu et al. 2023a, 2023b, 2024).

Pareas melanops sp. nov. can also be easily distinguished from *P. andersonii*, *P. modestus*, *P. macularius*, and *P. margaritophorus* by having yellow or brownish yellow body background color (vs. body background color being grey, brownish grey, or black) (Hauser 2017, Vogel et al. 2020, David and Deuti 2022, Poyarkov et al. 2022).

Pareas melanops sp. nov. can be further distinguished from *P. dulongjiangensis* and *P. stanleyi* by preocular being present (vs. preocular being absent); from *P. kaduri* by 1–5 rows of dorsal scales being keeled at mid-body in females (vs. all dorsal scales being smooth in females) and having fewer maxillary teeth (4–5 vs. 6–7); from *P. niger* by having one subocular and one postocular (vs. subocular and postocular being fused) and fewer maxillary teeth (4–5 vs. 6–8); and from *P. yunnanensis* by having dark nuchal band (vs. not having dark nuchal band), distinct dark spots on each side of head (vs. having no or indistinct spots on each side of head), and more subcaudals (68–77 vs. 59–65) (Vogt 1922, Pope 1935, Bhosale et al. 2020, Liu et al. 2023a, 2023b).

Pareas melanops sp. nov. is phylogenetically closely related to and resembles *P. nigriceps* and *P. tigerinus*. However, it can be distinguished from the latter two species by having one subocular and one postocular (vs. subocular

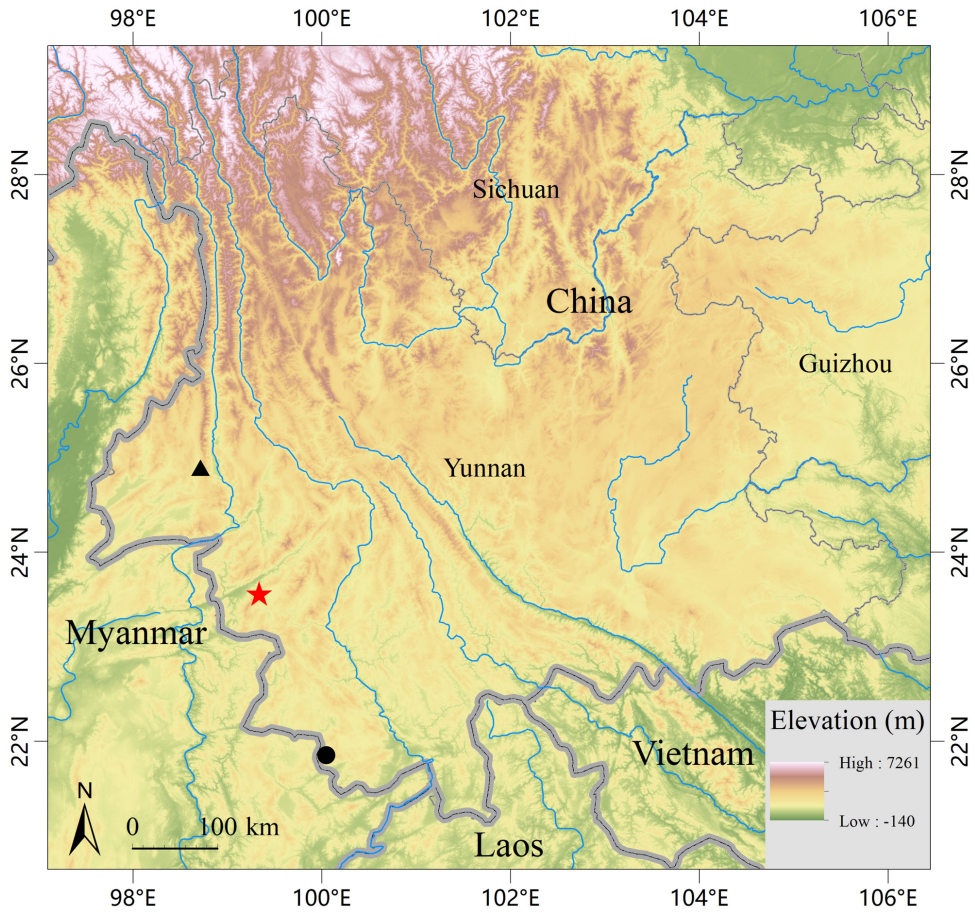

Figure 5. Map showing the type locality of *Pareas melanops* sp. nov. (red star) in Gengma County, Lincang City, the type locality of *P. tigerinus* (black dot) in Menghai County, Xishuangbanna Prefecture, and the type locality of *P. nigriceps* (black triangle) in Longling County, Baoshan City, Yunnan Province, China.

and postocular being fused into one crescent-shaped scale). In addition, *Pareas melanops* sp. nov. can be distinguished from *P. nigriceps* by having fewer maxillary teeth (4–5 vs. 6–7) and more vertical black bars on tail (27–33 vs. 18); *Pareas melanops* sp. nov. can be distinguished from *P. tigerinus* by having more ventral scales (172–176 vs. 160–171), more subcaudals (68–77 vs. 62–64), more vertical black bars on trunk (63–69 vs. 53–61), and more vertical black bars on tail (27–33 vs. 22–24) (Liu et al. 2023b, Guo and Deng 2009, Yang et al. 2019) (Table 3).

DISCUSSION

The type-locality of *Pareas melanops* sp. nov., is located close to Yunnan Nangunhe National Nature Reserve. The type locality area is greatly affected by human activities, where many crops and fruit trees are planted. This will undoubtedly have some adverse effects on the population of this species at the site. However, this species is also distributed within Yunnan Nangunhe National Nature Reserve, as documented by a juvenile found in the nature reserve by the forest rangers (Fig. 6). The nature reserve contains large areas of original forests and is legally protected, and therefore, we suspect that this species may not be endangered.

The two larger individuals in the type series of the new species have a darker body, while the smaller individuals have a paler body. The juvenile found by locals in the nature reserve has a much paler body. We speculate that the color of the body of this species may gradually darken with age. Due to the limited sample size our description is based on, further field surveys are needed to verify this hypothesis.

Figure 6. A juvenile *Pareas melanops* sp. nov. from Yunnan Nangunhe National Nature Reserve.

Table 3. Comparisons of morphometric and meristic data for *Pareas melanops* sp. nov., *P. tigerinus*, and *P. nigriceps*. Measurements in mm, data for *P. tigerinus* from Liu et al. (2023b), data for *P. nigriceps* from Guo and Deng (2009) and Yang et al. (2019).

	Pareas melanops sp. nov. (n=5)	*Pareas tigerinus* (n=3)	*Pareas nigriceps* (n=3)
SVL (in adults)	352–472	392–434	396–525.9
TL/SVL	0.25–0.29	0.25–0.26	0.25–0.32
PrFBO	Yes	Yes	Yes or No
PreO	1–2	1	1
PosO	1	Fused	Fused
SubO	1	Fused	Fused
SPOF	No	Yes	Yes
LoBO	Yes or No	No	No
ATem	1–3	1	1
PTem	2–3	1–2	2–3
SupL	7–8	7	7
InfL	7	8	7
Vs	172–176	160–171	175–184
Sc	68–77	62–64	73–76
Ds	15–15–15	15–15–15	15–15–15
NED	1	1	1
NKD	1–7	3–5	5–9
Max	4–5	4–5	6–7
VBTr	63–69	53–61	60–66
VBTa	27–33	22–24	18

At the type locality of *Pareas tigerinus* in Menghai County, Xishuangbanna Prefecture, *P. xuelinensis* and *P. tigerinus* coexist at an altitude of approximately 1,920 m. We have also found *P. xuelinensis* in the area near the type locality of *Pareas melanops* sp. nov. in Gengma County, Lincang City. However, *P. xuelinensis* does not coexist with *Pareas melanops* sp. nov. Specimens of *Pareas melanops* sp. nov. were found at altitudes above 1,900 m, while specimens of *P. xuelinensis* were all found at altitudes below 1,800 m in Gengma County. Since the altitudes of the type localities of *Pareas melanops* sp. nov. and *P. tigerinus* are similar, the reason why *P. xuelinensis* and *P. tigerinus* coexist in Menghai County, whereas *P. xuelinensis* and *Pareas melanops* sp. nov. do not coexist in Gengma County, is unknown. More observation and research on the physiology and ecology of these species are needed to unravel these unsolved mysteries.

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Competing Interests

The authors have declared that no competing interests exist.

Data Availability

All data generated and/or analyzed are included in this article.

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Supplementary material 1

Supplementary Table S1. Genetic divergence (uncorrected p-distance, %) amongst the members of *Pareas* calculated from cytb gene sequences.

Authors: S. Liu, Z. Li, T. Yang, D. Rao.

Data type: database.

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