

Macrobrachium spelaeus, a new species of stygobitic freshwater prawn from Thailand (Decapoda: Palaemonidae)

Yixiong Cai¹* & Chavalit Vidthayanon²

Abstract. A new species of stygobitic freshwater prawn, *Macrobrachium spelaeus* from Tham Phra Wang Daeng, Pitsanulok Province, in northern Thailand, is described and illustrated in detail. Morphological comparisons with allied epigean species *M. dienbienphuense* and known stygobitic congener *M. poeti* are given. The new species is characterised by its reduced eyes, smooth and slender second pereopods, hairy chelae and short carpus of second pereopods, and elongated telson.

Key words. New species, *Macrobrachium*, stygobitic, freshwater prawn, Thailand

INTRODUCTION

There are 25 species of freshwater prawns of the genus *Macrobrachium*, family Palaemonidae, previously known from Thailand (Cai et al., 2004). None of them are cave dweller although some specimens of *M. yui* were known to have been collected from subterranean environment (Naiyanetr pers. comm.). Examinations of a small collection from a cave, Tham Phra Wang Daeng of the Tham Phra Karst, in Klong Chompu, Thung Salaeng Luang National Park, reveals the presence of a stygobitic *Macrobrachium* species in Thailand which represents the first record of stygobitic *Macrobrachium* species in the mainland Southeast Asia. This collection site is in the Nan River sub-catchment of the Chao Phraya Basin. The basin includes several limestone caves which are associated by subterranean streams. Most of the area is covered with dry evergreen forest, with patches of limestone vegetation. The area has a large number of endemic taxa, being the only known habitat of three recently described cavefishes *Neolissocheilus subterraneus* (Cyprinidae), *Schistura deansmarti*, and *S. spiesi* (Nemacheilidae) (cf. Vidthayanon & Kottelat, 2003); a cavernicolous potamid crab *Thampramon tonvuthi* (cf. Ng & Vidthayanon, 2013); and a lizard *Cryptodactylusauro balteatus* (Gekkonidae) (cf. Sumontha et al., 2010). Much of the area remains unexplored and the endemic biodiversity is probably much higher than currently known. This limestone karst area meets the criteria established for a Ramsar Site

(International Important Wetland Site) and will be proposed as such soon (Ng & Vidthayanon, 2013).

The new species is described and illustrated in detail here. Type specimens are deposited in the Inland Fisheries Research and Development Bureau's Reference Collection, Thai Department of Fisheries (NIFI-SH) and Zoological Reference Collection of the Lee Kong Chian Natural History Museum, National University of Singapore (ZRC), and Oxford University Museum of Natural History (OUMNH). The abbreviation "cl" refers to the postorbital carapace length. The word "Tham" [ถ้ำ], used in the locality names, means "cave" in the Thai language.

TAXONOMY

Palaemonidae Rafinesque, 1815

Macrobrachium Bate, 1868

Macrobrachium spelaeus, new species

(Figs. 1–3)

Material examined. Holotype: male, cl 13.7 mm, (NIFI SH 00176), Tham Phra Wangdaeng, Baan Chompu southwest of Thung Salaeng Luang National Park, Pitsanulok Province, lower north Thailand, 100 m. from the cave entrance: 16.8379°N 100.877°E, 28 August 2002, coll. C. Vidthayanon. Paratypes: 1 male, cl 11.7mm (OUMNH.ZC.2016-01-022), 1 female, cl 11.9mm (ZRC 2016.0049), same locality as holotype.

Description. Rostrum (Fig. 1A, B) straight, reaching distal end of scaphocerite, rostral formula: 4-5+6-7/2-3. Teeth more widely spaced on anterior than postorbital region. Antennular peduncle about 0.4 times as long as carapace. Carapace smooth, inferior orbital margin moderately produced. Antennal spine sharp (Fig. 1D), situated slightly lower than inferior orbital angle, reaching slightly beyond

¹National Biodiversity Centre, National Parks Board, Singapore, 1 Cluny Road, Singapore 259569, Republic of Singapore; Email: cai_yixiong@nparks.gov.sg (*corresponding author)

²Environment Division, Mekong River Commission Secretariat, Fa Ngum Road, Ban Sithan Noua, Vientiane 01000, Lao People Democratic Republic; Email: chavalit@mremekong.org

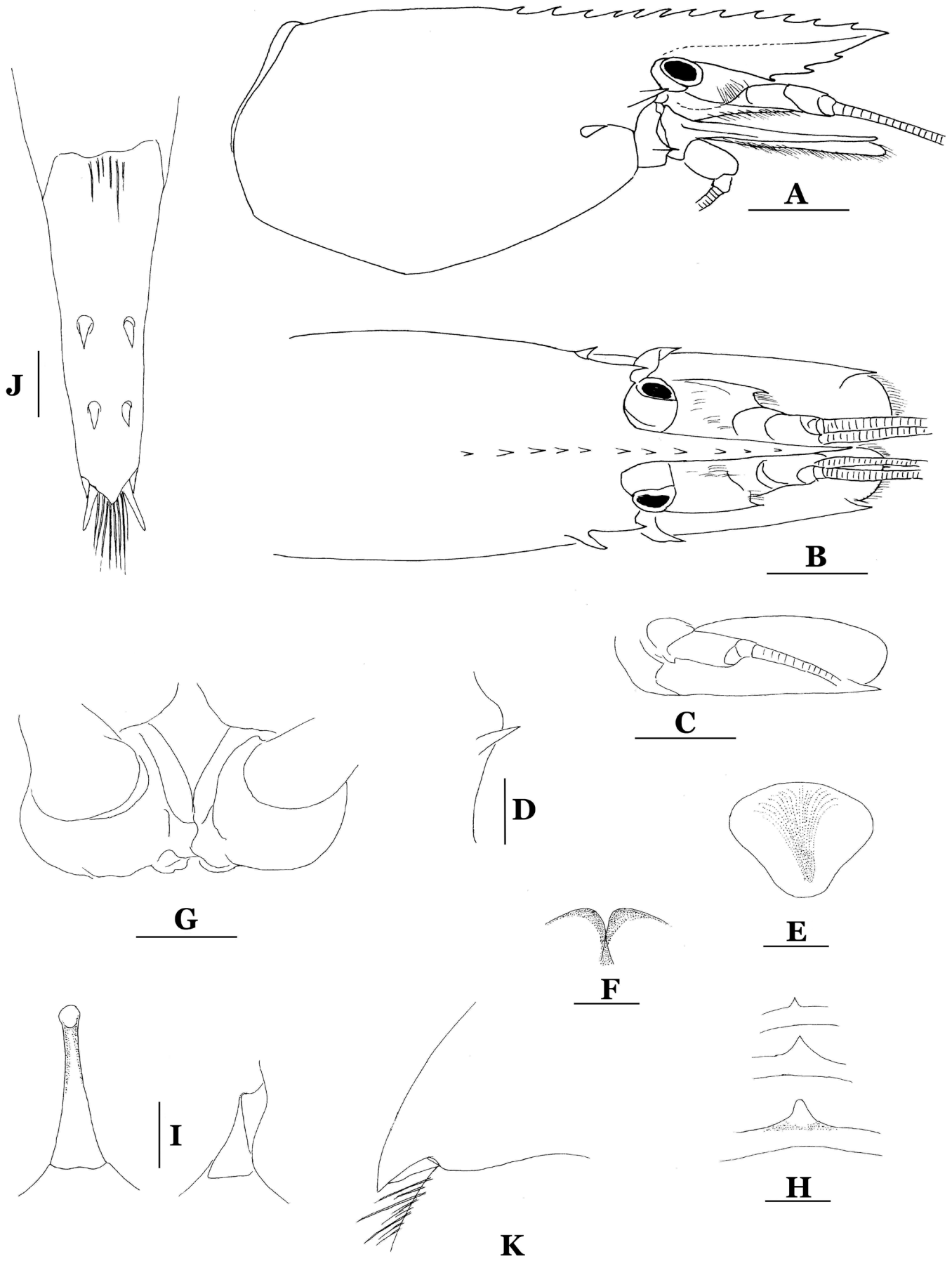


Fig. 1. *Macrobrachium spelaeus*, new species. A, B, cephalothorax; C, scaphocerite; D, antennal spine; E, epistome; F, fourth thoracic sternite; G, eighth thoracic sternum; H, 1st–3rd abdominal sterna with transverse ridge and median tooth; I, preanal carina; J, telson; K, uropodal diaeresis. Scale bars = 4 mm [A–C]; 1.5 mm [D]; 0.8 mm [E, H, I]; 1.2 mm [G, J]; 1.0 mm [F]; 0.5 mm [K] (holotype: male, cl 13.7 mm, NIFI SH 00176).

carapace margin. Hepatic spine smaller, situated behind and substantially below antennal spine. Branchiostegal suture running from base of hepatic spine to carapace margin.

Fourth thoracic sternite (Fig. 1F) without median process. Eighth thoracic sternum (Fig. 1G) with narrowly separated anterolateral lobes, without median process. Abdomen smooth (Fig. 3), glabrous, first to third pleurites broadly rounded, fourth and fifth pleurites feebly produced posteriorly, fourth pleurite sub-triangular, fifth pleurite sub-rectangular, sixth abdominal somite 1.5 times as long as fifth, with posteroventral angle feebly produced, subacute. Telson (Fig. 1J) moderate, stout, 3.0 times as long as wide, 1.6 times as long as sixth abdominal segment, with 2 pairs of dorsal spines, ending in a median projection, lateral spines of distal margin slightly larger than dorsal spines, intermediate spines well developed, with long plumose setae. First 3 abdominal sternites (Fig. 1H) with transverse ridge and a median tooth each, with first one very prominent, much more developed than the other two. Second one triangular in form. Third one much smaller, pointed. Inter-uropodal sclerite armed with well-developed preanal carina (Fig. 1I). Ocular stalk and cone reduced, 0.12 times of carapace length, facets present, pigment visible, anterior end only reaching middle of basal segment of antennular peduncle. Stylocerite pointed, reaching 0.8 times of second segment. Antenna with stout basicerite and prominent distoventral tooth. Carpocerite reaching to about 0.35 times of scaphocerite length. Scaphocerite (Fig. 1C) slender, 0.6 times as long as carapace, about 3.0 times as long as wide, with straight outer margin.

Epistome (Fig. 1E) bilobed by a shallow triangular depression. Mouth parts typical of the genus. Third maxilliped with robust endopod, ultimate segment reaching to anterior end of antennal peduncle; ultimate segment slightly shorter than penultimate segment; exopod short, with numerous plumose setae distally.

First pereopods (Fig. 2A) very slender, reaching beyond scaphocerite by entire chela and 0.2 carpus length, equal in length, similar in form, carpus 1.8 times as long as chela, chela with fingers slightly shorter than palm. Second pereopods (Fig. 2B, C) not sexually dimorphic; both cylindrical, similar in form, unequal in length. Both covered with tufts of velvety setae on fingers and distal half of palms. Major one with smooth or with indistinct spinules, subequal to body length, reaching beyond distal end of scaphocerite by both entire carpus and chela; merus as long as palm, both segments distinctly longer than palm but shorter than fingers; capus 0.65 times as long as palm; palm slightly inflated, fingers with no gap when closed, with a row of about 15 small teeth on each side of cutting edge. Third pereopods (Fig. 1D, E) slender, reaching beyond scaphocerite by entire dactylus, propodus 10 times as long as broad, 3.4 times as long as dactylus; dactylus 4.5 times as long as wide, terminating in an unguis. Fourth pereopods slender, slightly longer than third pereopods, similar in form. Fifth pereopods most slender, longest, reaching beyond scaphocerite by entire dactylus. Endopod of male first pleopod about 0.45 times as long as exopod, weakly broadened distally, slightly curved mesially.

Appendix masculina of male second pleopod longer than appendix interna, with spiniform setae on dorsal surface. Appendix interna of male second pleopod slender, reaching to 0.6 length of appendix masculina.

Uropodal diaeresis (Fig. 1K) with a movable spine, distinctly shorter than outer angle.

Colouration (live). Yellowish pale cephalothorax with pale yellow and brown visceral mass, rostrum translucent, eyes black, abdomen opaque with brownish hue dorsally. Hairs on chelae pale brown, antennae and appendages opaque.

Habitat. *Macrobrachium spelaesus* is known only from shallow (0.3–1 m depth) subterranean streams in the type locality, over 100 m from the cave entrance, at Tham Phra Wang Daeng of the Tham Phra Karst in Klong Chompu area of Thung Salaeng Luang National Park.

Etymology. The new species is named *spelaesus* (L., cave-dwelling), after its stygobitic habit.

Remarks. *Macrobrachium spelaesus*, new species, represents the first stygobitic *Macrobrachium* species found in Thailand. With the existence of the tufts of velvety setae on the dactylus of second pereopods, short carpus in second pereopods, relatively short rostrum which does not exceed the end of the scaphocerite, *Macrobrachium spelaesus*, new species, should be referred to the *Macrobrachium pilimanus* species group (cf. Cai et al., 2004). To date, there are 15 species recognised in the *Macrobrachium pilimanus* group, namely *M. pilimanus* (De Man, 1879), *M. leptodactylus* (De Man, 1892), *M. hirsutimanus* (Tiwari, 1952), *M. dienbienphuense* Dang & Nguyen, 1972, *M. poeti* Holthuis, 1984, *M. eriocheirum* Dai, 1984, *M. ahkowi* Chong & Khoo, 1987 [= *M. johnsoni* Chong & Khoo, 1987], *M. gua* Chong, 1989, *M. forcipatum* Ng, 1995, *M. platycheles* Ou & Yeo, 1995, *M. pilosum* Cai & Dai, 1999, *M. amplimanus* Cai & Dai, 1999, *M. sirindhorn* Naiyanetr, 2001, *M. kelianense* Wowor & Short, 2007, and *M. empulipke* Wowor, 2010. With its reduced eyes, *M. spelaesus* could be easily separated by all the other members of the *M. pilimanus* group except *M. poeti*. *Macrobrachium poeti* was described from several caves in Gunung Sewu, Java, Indonesia. *Macrobrachium spelaesus* could be distinguished from *M. poeti* (cf. Holthuis, 1984) by having more teeth on the lower margin of the rostrum (2 or 3 vs. 1 in *M. poeti*); the shorter merus of the second pereopods (as long as palm vs. distinctly longer than palm in *M. poeti*); the larger number of teeth on the cutting edges of the fingers (15 vs. several in *M. poeti*), the slender propodus in third pereopods (3.4 times as long as dactylus vs. 3 times in *M. poeti*). Compared to epigeic species of the group, *M. spelaesus* morphologically resembles *M. dienbienphuense* Dang & Nguyen, 1972, a species originally described from northern Vietnam, but also reported from China, Laos, and Thailand (Cai et al., 2004; Hanamura et al., 2011), especially when taking into account of the form of second pereopods. Besides the eyes, *M. spelaesus* could be separated from *M. dienbienphuense* (cf. Dang & Nguyen, 1972; Cai et al. 2004, Hanamura et al. 2011) by the form of rostrum

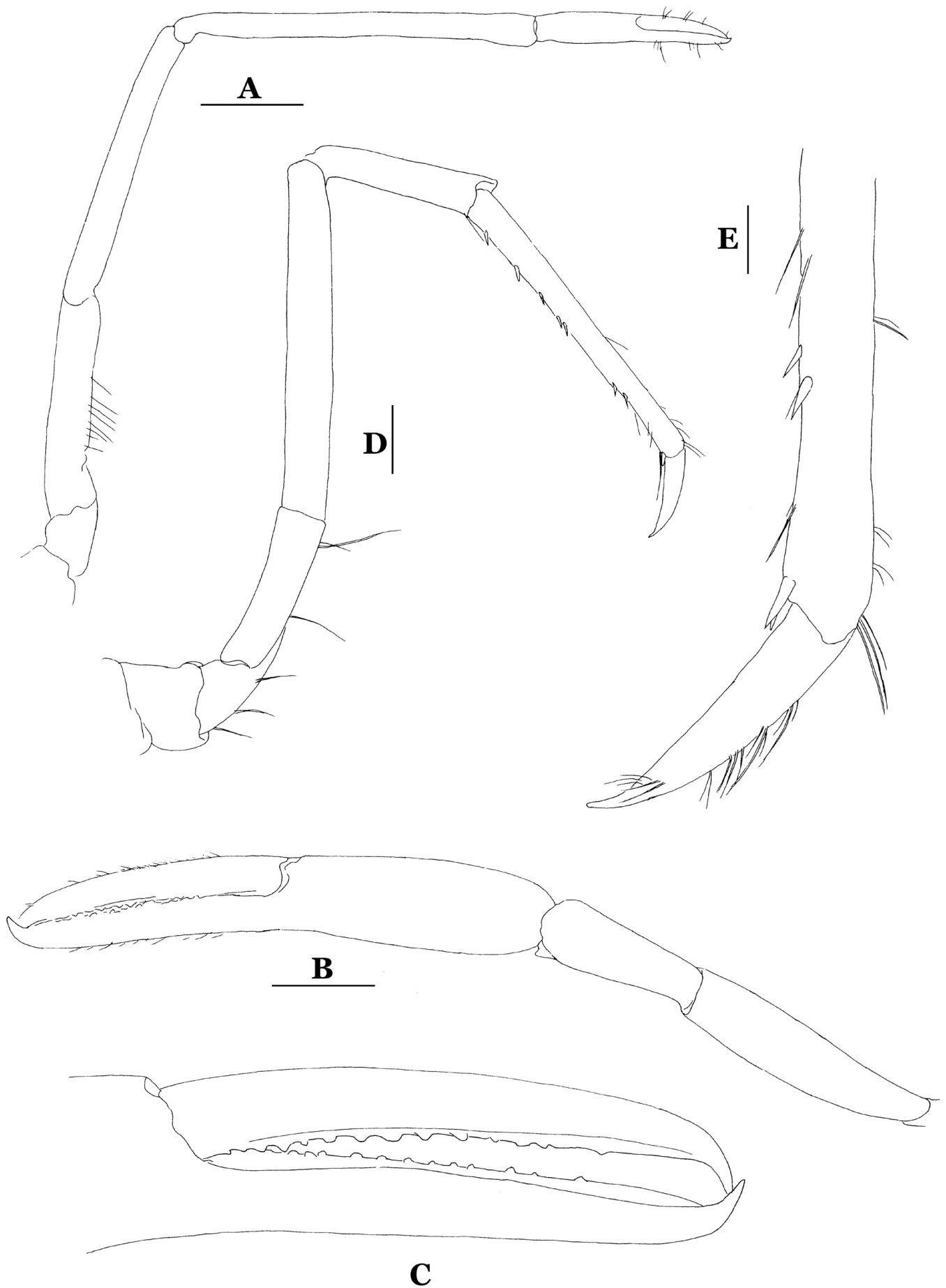


Fig. 2. *Macrobrachium spelaeus*, new species. A, first pereiopods; B, C, second pereiopods; D, E, third pereiopods, Scale bars = 2 mm [A, C]; 4 mm [B]; 1.5 mm [D]; 0.5 mm [E] (holotype: male, cl 13.7 mm, NIFI SH 00176).

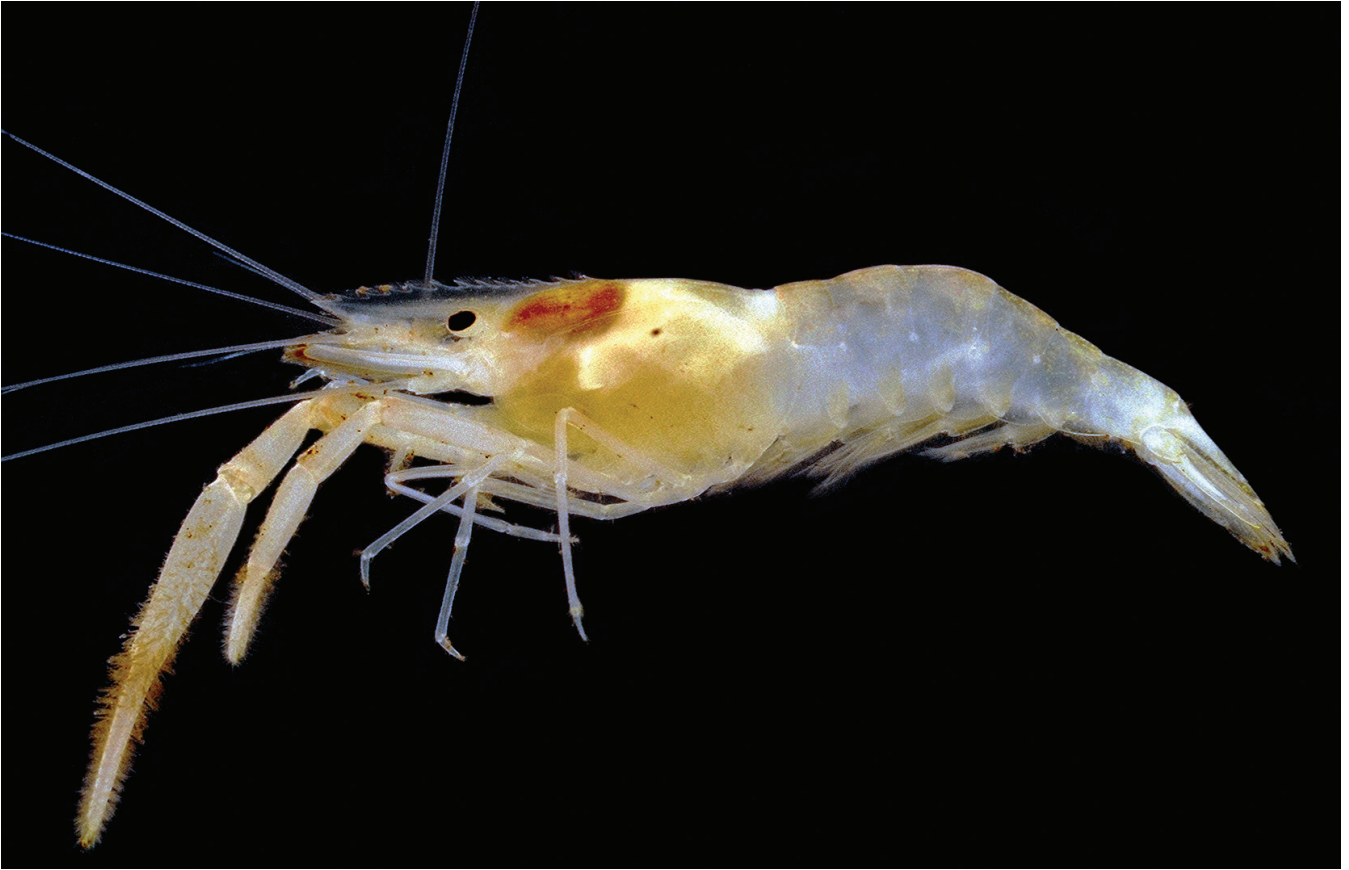


Fig. 3. Colour photograph of *Macrobrachium spelaeus*, new species (paratype, male, cl 11.7mm, OUMNH.ZC.2016-01-022)

(straight vs. convex); shorter major second pereiopods in male specimens (as long as body length vs. distinctly longer in *M. dienbienphuense*) less setae/pubescence in second pereiopods (see fig. 3 vs. fig. 3 in Dang & Nguyen 1972); fewer number of teeth on the cutting edges of the fingers (15 vs. 18–32 in *M. dienbienphuense*).

Comparative specimens examined. *Macrobrachium dienbienphuense*: 10 males, cl 9.0–11.0 mm, 5 ovigerous females, cl 6.7–8.3 mm, eggs 1.3×1.0 mm (ZRC 2000.2693), Central Thailand, Lop Buri Province, Chai Badan, coll. Y. Cai, 20 June 1998; 9 males, cl 10.2–11.7 mm, North-east Thailand, Phibun, Mangsahan, Ubon Rachathani Mae Nam Moon, Mangsahan afternoon market, coll. Y. Cai et al., 16 June 1998.

ACKNOWLEDGEMENTS

The authors thank staff and officers at Thung Salaeng Luang National Park for their kind help. The second author also thanks the community of Baan Klong Chompu Village for assistance in the inventories and surveys in the type locality. We are also grateful to Peter K. L. Ng who facilitated in study of the specimens kept in ZRC, and to Daisy Wowor and Sammy De Grave for feedback to improve the manuscript.

LITERATURE CITED

- Bate CS (1868) On a new genus, with four new species of freshwater prawns. Proceedings of the Scientific Meetings of the Zoological Society of London, 1868: 363–368, pls. 30, 31.
- Cai Y & Dai AY (1999) Freshwater shrimps (Crustacea: Decapoda: Caridea) from the Xishuangbanna region of Yunnan Province, southern China. *Hydrobiologia*, 400: 211–241.
- Cai Y, Naiyanetr P & Ng PKL (2004) The freshwater prawns of the genus *Macrobrachium* Bate, 1868, of Thailand (Crustacea: Decapoda: Palaemonidae). *Journal of Natural History*, 38: 581–649.
- Chong SSC (1989) A new species of freshwater prawn, *Macrobrachium gua* sp. nov. (Decapoda, Caridea, Palaemonidae) from Sabah, East Malaysia, Borneo. *Crustaceana*, 56(1): 31–38.
- Chong SSC & Khoo HW (1987a) A new species of freshwater prawn, *Macrobrachium johnsoni* spec. nov. (Decapoda: Caridea: Palaemonidae) from Peninsular Malaysia, and a description of its first zoea. *Zoologische Mededelingen, Leiden*, 61(25): 359–370.
- Chong SSC & Khoo HW (1987b) *Macrobrachium ahkowi* nom. nov., replacement name for *Macrobrachium johnsoni* Chong & Khoo, 1987, preoccupied by *Macrobrachium johnsoni* Ravindranath, 1979 (Decapoda: Caridea: Palaemonidae). *Zoologische Mededelingen, Leiden*, 61(37): 561–562.
- Dai AY (1984) A preliminary study on the freshwater prawn genus *Macrobrachium* of China (Decapoda: Caridea). *Acta Zootaxonomica Sinica*, 9(3): 244–252. [In Chinese with English summary].
- Dang NT & Nguyen HY (1972) Dan lieu ve tom nuoc ngot giong *Macrobrachium* Bate (Palaemonidae) o cac thuy vuc vung nui mien bac Viet Nam (Faunistic study of freshwater prawn genus *Macrobrachium* Bate from mountainous region of North Vietnam). *Tap san Sinh Vat-Dai Hoc*, 10(1–4): 1–6. [In Vietnamese with French summary].

- De Man JG (1879) On some species of the genus *Palaemon* Fabr. with descriptions of two new forms. Notes from the Leyden Museum, 1(41): 165–184.
- De Man JG (1892) Decapoden des Indischen Archipels. In: Weber M, Zoologische Ergebnisse einer Reise in Niederländische Ost-Indien, 2: 265–527, pls. 15–29.
- Hanamura Y, Imai H, Lasasimma O, Souliyamath P & Sayaka I (2011) Freshwater prawns of the genus *Macrobrachium* Bate, 1868 (Crustacea, Decapoda, Palaemonidae) from Laos. Zootaxa, 3025: 1–37.
- Holthuis LB (1984) Freshwater prawns (Crustacea Decapoda: Natantia) from subterranean waters of the Gunung Sewu area, Central Java, Indonesia. Zoologische Mededelingen, Leiden, 58(9): 141–148.
- Naiyanetr P (2001) *Macrobrachium sirindhorn* n. sp., a new freshwater prawn from northern Thailand (Decapoda, Caridea, Palaemonidae). Crustaceana, 74(7): 609–616.
- Ng PKL (1995) Freshwater decapod crustaceans (Potamidae, Palaemonidae) of Temengor Forest Reserve, Hulu Perak, Malaysia. Malayan Naturalist Journal, 48: 249–257.
- Ng PKL & Vidthayanon C (2013) *Thampramon tonvuthi*, a new genus and new species of cavernicolous crab (Crustacea: Decapoda: Brachyura: Potamidae) from Thailand. Zootaxa, 3652(2): 265–276.
- Ou ACT & Yeo DCJ (1995) A new species of freshwater prawn, *Macrobrachium platycheles* (Decapoda: Caridea: Palaemonidae) from Singapore and Peninsular Malaysia. Raffles Bulletin of Zoology, 43(2): 299–308.
- Rafinesque CS (1815) Analyse de la Nature ou Tableau de l'Univers et des Corps organisés. Palermo, 224 pp.
- Sumontha M, Panitwong N & Deekin G (2010) *Cyrtodactylus auribalteatus* (Squamata: Gekkonidae), a new cave-dwelling gecko from Phitsanulok Province, Thailand. Zootaxa, 2370: 53–64.
- Tiwari KK (1952) Diagnosis of new species and subspecies of the genus *Palaemon* Fabricius (Crustacea: Decapoda). Annals and Magazine of Natural History, (12)5: 27–32.
- Vidthayanon C & Kottelat M (2003) Three new species of fishes from Tham Phra Wang Daeng and Tham Phra Sai Ngam caves in northern Thailand (Teleostei: Cyprinidae and Balitoridae). Ichthyological Exploration of Freshwaters, 14 (2): 193–208.
- Wowor D (2010) *Macrobrachium empulipke*, a new freshwater prawn species (Decapoda, Palaemonidae) from Indonesia. In: Franses CHJM, De Grave S & Ng PKL (eds.) Studies on Malacostraca: Lipke Bijdeley Holthuis Memorial Volume, Crustaceana Monographs, 14: 715–726.
- Wowor D & Short JW (2007) The new freshwater prawns of the genus *Macrobrachium* Bate, 1868 (Crustacea: Decapoda: Palaemonidae) from the Kelian River, East Kalimantan, Indonesia. Raffles Bulletin of Zoology, 55(1): 77–87.