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## **► To cite this version:**

Anisong Chitnarin, S. Crasquin, Marie-Béatrice Forel, Prachya Tepnarong. Ostracods (Crustacea) of the Early-Middle Permian (Cisarulian-Guadalupian) from Central Thailand (Indochina Block): Part II, Orders Podocopida, Platycopida and Myodocopida. *Geodiversitas*, 2017, 39 (4), pp.651 - 690. <10.5252/g2017n4a1>. <hal-02996109>

**HAL Id: hal-02996109**

**<https://hal.science/hal-02996109v1>**

Submitted on 20 Nov 2020

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# Ostracods (Crustacea) of the Early-Middle Permian (Cisarulian-Guadalupian) from Central Thailand (Indochina Block): Part II, Orders Podocopida, Platycopida and Myodocopida

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Published on 29 December 2017

[urn:lsid:zoobank.org:pub:DB464417-3EA1-4C4E-9C03-624C1627969C](https://doi.org/10.5252/g2017n4a1)

Chitnarin A., Crasquin S., Forel M.-B. & Tepnarong P. 2017. — Ostracods (Crustacea) of the Early-Middle Permian (Cisarulian-Guadalupian) from Central Thailand (Indochina Block): Part II, Orders Podocopida, Platycopida and Myodocopida. *Geodiversitas* 39 (4): 651-690. <https://doi.org/10.5252/g2017n4a1>

## ABSTRACT

In the present contribution, we report abundant Early to Middle Permian (Cisarulian-Guadalupian) marine ostracods of the Indochina block from Central Thailand. Twelve localities in the Loei, Phetchabun, and Nakhon Sawan-Lopburi areas were investigated and limestone samples were collected. Out of 135 samples collected, 82 yielded abundant and nicely preserved ostracods. In a first paper, 39 species of 20 genera belonging to Order Palaeocopida were already described. Here is the second part of the ostracod fauna description with 91 species of the orders Podocopida, Platycopida and Myodocopida. Fourteen species are new and described here: *Bairdia khaokanaensis* Chitnarin, n. sp., *Bairdia incisedorsa* Chitnarin, n. sp., *Bairdia fontainei* Chitnarin, n. sp., *Bairdia songthami* Chitnarin, n. sp., *Bairdia grotei* Chitnarin, n. sp., *Petasobairdia campbelli* Chitnarin, n. sp., *Fabalicypriis hathaithipae* Chitnarin, n. sp., *Silenites sureeae* Chitnarin, n. sp., *Acratia chongpani* Chitnarin, n. sp., *Acratia mongkoli* Chitnarin, n. sp., *Liuzhinia naramasei* Chitnarin, n. sp., *Baschkirina ruchae* Chitnarin, n. sp., *Baslerella wipanuuae* Chitnarin, n. sp., *Baslerella naresi* Chitnarin, n. sp. An analysis of the palaeogeographic affinities of the recovered ostracods shows close relationships with those found from South China Block on the Paleo-Tethys realm.

## KEY WORDS

Ostracods,  
Podocopida,  
Platycopida,  
Myodocopida,  
Early-Middle Permian,  
Thailand,  
Indochina Block,  
new synonyms,  
new species.

## RÉSUMÉ

*Ostracodes (Crustacea) du Permien moyen et supérieur (Cisarulien-Guadalupien) de Thaïlande centrale (Bloc d'Indochine): 2<sup>ème</sup> partie, ordres Podocopida, Platycopida et Myodocopida.*

Dans ce travail, nous documentons l'abondance des ostracodes marins d'âge Permien inférieur et moyen (Cisarulien-Guadalupien) du Bloc d'Indochine en Thaïlande centrale. Vingt localités situées dans les zones de Loei, Phetchabun et Nakhon Sawan-Lopburi ont été étudiées, et des échantillons de niveaux calcaires ont été prélevés. Parmi les 135 échantillons collectés, 82 ont fourni de nombreux ostracodes, bien préservés. Dans un précédent article, 39 espèces réparties dans 20 genres de l'ordre des Palaeocopida ont été décrites. Le présent travail constitue la seconde partie de cette recension de la faune d'ostracodes. 91 espèces des ordres Podocopida, Platycopida et Myodocopida sont décrites, dont quatorze nouvelles espèces : *Bairdia khaokanaensis* Chitnarin, n. sp., *Bairdia incisedorsa* Chitnarin, n. sp., *Bairdia fontainei* Chitnarin, n. sp., *Bairdia songthami* Chitnarin, n. sp., *Bairdia grotei* Chitnarin, n. sp., *Petasobairdia campbelli* Chitnarin, n. sp., *Fabalicypis hathaithipae* Chitnarin, n. sp., *Silenites sureae* Chitnarin, n. sp., *Acratia chongpani* Chitnarin, n. sp., *Acratia mongkoli* Chitnarin, n. sp., *Liuzhinia naramasei* Chitnarin, n. sp., *Baschkirina ruchae* Chitnarin, n. sp., *Basslerella wipanuue* Chitnarin, n. sp., *Basslerella naresi* Chitnarin, n. sp. Une analyse des affinités paléogéographiques des ostracodes découverts montre de fortes relations avec ceux du Bloc de Chine du Sud dans la Paléo-Téthys.

**MOTS CLÉS**  
Ostracodes,  
Podocopida,  
Platycopida,  
Myodocopida,  
Permien inférieur et  
moyen,  
Thaïlande,  
Bloc d'Indochine,  
synonymes nouveaux,  
espèces nouvelles.

## INTRODUCTION

This article is the second part of the research papers concerning the Early-Middle Permian ostracods discovered in central Thailand. The previous article was devoted to the Order Palaeocopida (Chitnarin *et al.* 2012); thus, this paper is focuses on three other orders, Podocopida, Platycopida and Myodocopida.

Permian palaeontology and micropalaeontology of Thailand (the mainland of Southeast Asia) has been investigated by many researchers (e.g. Dawson & Racey 1993; Pérez-Huerta *et al.* 2007; Metcalfe & Sone 2008; Sone *et al.* 2009; Burrett *et al.* 2014; Ketwetsuriya *et al.* 2016). The objectives were age calibration, palaeoecological reconstruction, palaeogeographic and palaeobiogeographic implications of this area. Ostracods (Crustacea) are accepted to be one of the most efficient palaeoecological index (e.g. Melnyk & Maddocks 1988; Crasquin-Soleau & Baud 1998; Crasquin-Soleau *et al.* 1999) though data on this group are rare in Thailand. So far, three papers have been published; one on the late Middle Permian (Chitnarin *et al.* 2008) and another one on Early-Middle Permian (Chitnarin *et al.* 2012; Burrett *et al.* 2014), both from central Thailand.

## GEOLOGICAL SETTING

Details of study areas and sections were described in Chitnarin *et al.* (2012, with references therein). Twelve localities were investigated in three areas namely the Loei, the Phetchabun and the Nakhon Sawan-Lopburi (Figs 1-2). All samples were collected from limestones of Nam Maholan, Pha Nok Khao and Tak Fa Formations (Saraburi Group) which range from early Early Permian to late Middle Permian (Asselian to Capitanian age; Table 1). Please note that the Takli section in Nakhon Sawan-Lopburi area indicated as Middle Permian in Chitnarin *et al.* (2012) is re-assigned to Early Permian (Artinskian) due to the recent discovery

of fusulinids (*Pamirina* sp. and *Pseudofusulina* sp.; M. Sone pers. comm. 2016).

## MATERIAL AND METHODS

135 limestone samples were collected and processed by hot acetolysis (Lethiers & Crasquin-Soleau 1988; Crasquin-Soleau *et al.* 2005); 82 yielded ostracods. 130 species have been recovered. The fauna belonging to Order Palaeocopida are published (Chitnarin *et al.* 2012). Therefore, Subclass Podocopa, Order Podocopida (Bairdiidae, Acratiidae, Sigilloidae, Geroiidae, Cytherideidae), Order Platycopida (Cavellinidae) and Subclass Myodocopa, Order Halocyprida (Polycopidae) in this article include 91 species belonging to 18 genera. Fourteen species are newly described. Due to the availability of specimens, many species are left in open nomenclature and are not listed in the systematic part except when needed. We nevertheless figured all the material to allow future studies and comparisons. All specimens are deposited in Suranaree University of Technology collections (numbers SUT-09-2xxx).

## ABBREVIATIONS

L	length;
H	height;
W	width;
AB	anterior border;
VB	ventral border;
PB	posterior border;
DB	dorsal border;
LV	left valve;
RV	right valve;
AVB	anteroventral border;
PVB	posteroventral border;
ADB	anterodorsal border;
PDB	posterodorsal border.

The classification used in this paper follows Horne *et al.* (2002) for the Quaternary and living forms and Moore (1961) and Becker (2002) for extinct ones. All the sections are located in Central Thailand.

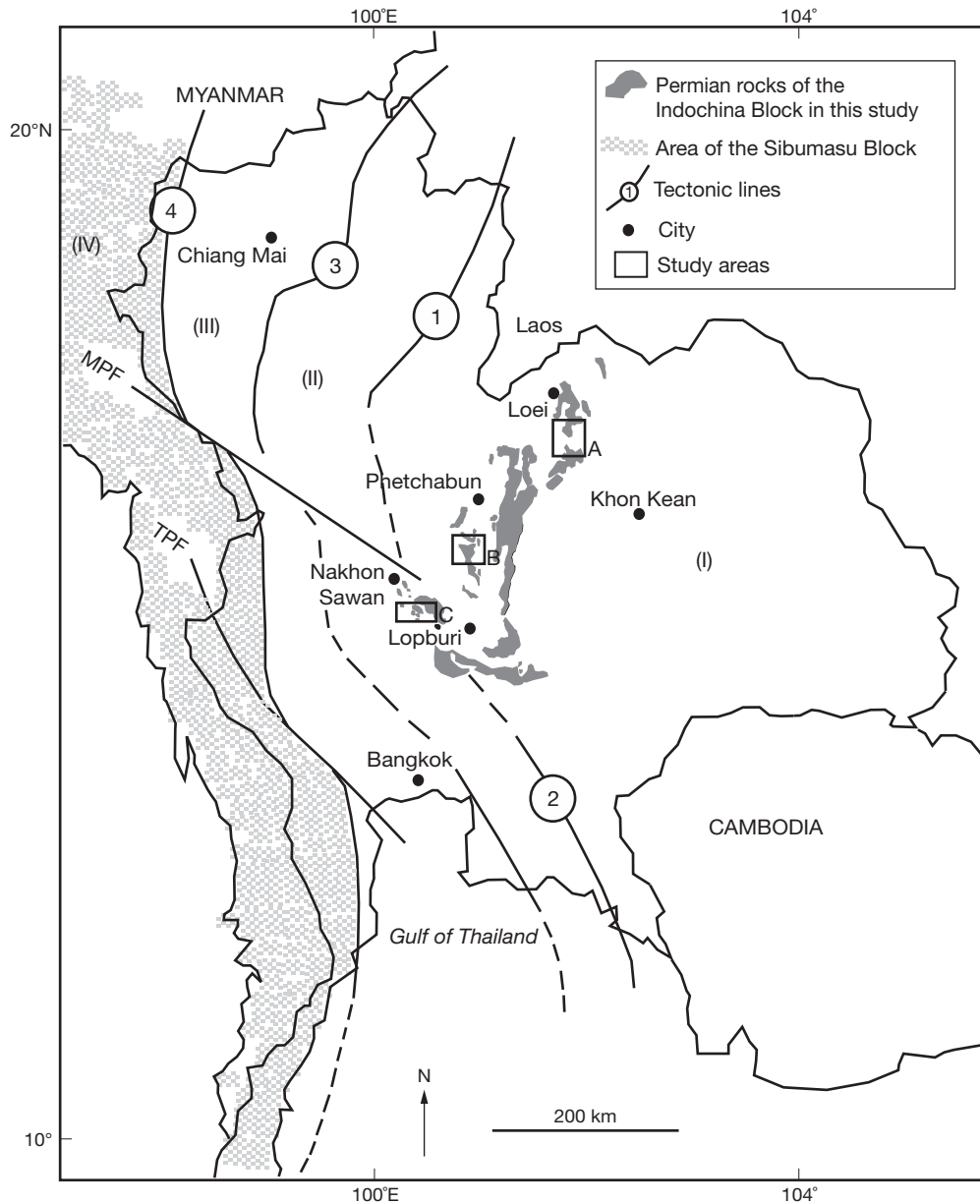


FIG. 1. — Geotectonic map of mainland Thailand, with distribution of Permian rocks of the Indochina block relevant to this study and the studied areas: **A**, Loei area; **B**, Phetchabun area; **C**, Nakhon Sawan-Lopburi area; **I**, Indochina block; **II**, Sukhothai zone; **III**, Intanon zone; **IV**, Sibumasu block; **MPF**, Mae Ping Fault; **TPF**, Three Pagodas Fault (Chitnarin *et al.* 2012).

## SYSTEMATIC PALAEOONTOLOGY

### *Bairdia khaokanaensis* Chitnarin, n. sp. (Figs 3A-D; 4)

Class OSTRACODA Latreille, 1802  
Subclass PODOCOPA Sars, 1866  
Order PODOCOPIDA Sars, 1866  
Suborder PODOCOPINA Sars, 1866  
Superfamily BAIRDIODEA Sars, 1888  
Family BAIRDIIDAE Sars, 1888

Genus *Bairdia* McCoy, 1844

TYPE SPECIES. — *Bairdia curta* McCoy, 1844, by subsequently designated by Ulrich & Bassler (1923: 320).

TYPE MATERIAL. — Holotype: one complete carapace (SUT-09-2226; Fig. 3A); paratypes: two complete carapaces (SUT-09-2223; Fig. 3B and SUT-09-2231; Fig. 3C).

MATERIAL EXAMINED. — One damaged and one complete carapaces.

DIAGNOSIS. — Species of *Bairdia* with long carapace, ventral outline broadly arched, AVB nearly vertical, AVB and PVB of both valves long and convex, VB slightly concave, short and convex DB.

ETYMOLOGY. — From the type locality, the Khao Kana section.



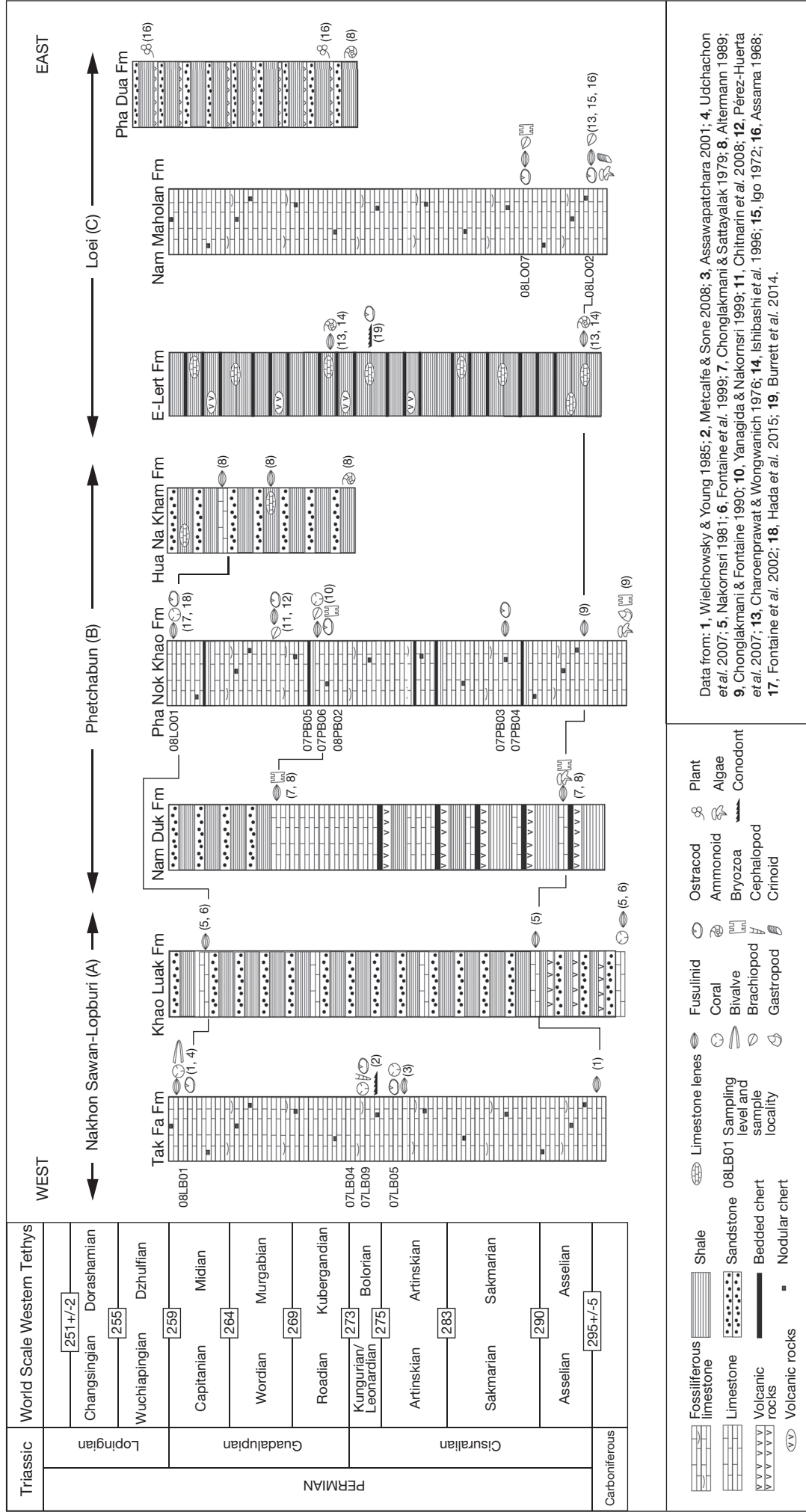


FIG. 2. — Lithostratigraphic columns of the studied formations (see Chitnarin et al. 2012 for details) and correlations of the Permian strata relevant to this study (modified from Chitnarin et al. 2012). **A**, **B** and **C** correspond to areas illustrated in Figure 1.

TABLE 1. — Information on studied sections (slightly modified from Chitnarin *et al.* 2012). Abbreviation: **Thick.**, thickness (in metres).

Area	Section number	Section name	Formation	Age	Geographic position	Provincial boundary	Thick.	Lithology	Limestone classification	Nb of samples & sample no.
Loei	08LO01	Khao Tham Yai	Pha Nok Khao	Capitanian	16°56'22"N, 101°23'37"E	Nam Nao district, Phetchabun	2	Dark gray, argillaceous limestone	wackestone-packstone	4 (08LO01-1 to 4)
	08LO02	Tham Nam Maholan	Nam Maholan	Asselian	17°06'23"N, 101°52'48"E	Wang Saphung district, Loei	40	light gray, micritic, limestones	wackestone-packstone	12 (08LO02-1 to 12)
	08LO07	Sak Chai Quarry	Pha Nok Khao	Asselian-Sakmarian	16°35'07"N, 101°52'38"E	Khon San district, Chaiyaphum	90	drak gray, argillaceous, limestones	wackestone-packstone	12 (08LO07-1 to 12)
Phetchabun	07PB03	Khao Kana	Pha Nok Khao	Asselian-Sakmarian	16°04'12"N, 101°54'20"E	Chon Dan district, Phetchabun	15	dark gray, micritic limestones	wackestone	7 (07PB03-1 to 7)
	07PB04	Nong Phai	Pha Nok Khao	Asselian-Sakmarian	16°01'06"N, 101°58'59"E	Nong Phai district, Phetchabun	30	gray-light to gray, micritic limestones	wackestone-packstone	7 (07PB04-1 to 7)
	07PB05	Ban Naen Sawan I	Tak Fa	Roadian?	15°54'11"N, 100°53'36"E	Bung Sam Phan district, Phetchabun	30	dark gray, argillaceous limestones	mudstone-wackestone	7 (07PB05-1 to 7)
	07PB06-07PB08	Ban Naen Sawan II	Tak Fa	Roadian?	15°55'08"N, 100°55'46"E	Bung Sam Phan district, Phetchabun	90	light gray, micritic-crystalline limestones	mudstone-wackestone	21 (07PB06-1 to 8), (07PB07-1 to 4), (07PB08-1 to 9)
	08PB01-08PB03	Phu Phra That	Tak Fa	Roadian?	15°58'22"N, 100°52'21"E	Chon Dan district, Phetchabun	70	dark gray-gray, micritic limestones	wackestone-packstone	19 (08PB02-1 to 13), (08PB03-1 to 6)
Nakhon Sawan-Lopburi	07LB04	Phu Lam Yai	Tak Fa	Kungurian?	15°20'21"N, 100°36'15"E	Tak Fa district, Nakhon Sawan	30	gray, micritic limestone	mudstone-wackestone	18 (07LB04-1 to 18)
	07LB05	Ta Kli	Tak Fa	Artinskian	15°19'05"N, 100°22'46"E	Ta Kli District, Nakhon Sawan	50	dark gray, argillaceous limestone	wackstone-packstone	20 (07LB05-1 to 5), (07LB05-A1 to A3, B1 to B3, D1 to D3)
	07LB09	Khao Phu Chongkho	Tak Fa	Kungurian?	15°22'45"N, 100°35'12"E	Tak Fa District, Nakhon Sawan	1	light gray, micritic limestone	wackstone-packstone	2 (07LB09-1 to 2)
	08LB01	Khao Somphot	Tak Fa	Capitanian	15°11'16"N, 101°31'10"E	Lam Sonthi District, Lopburi	15	dark gray, micritic, argillaceous limestones	wackstone-packstone	6 (08LB01-1 to 6)

DIMENSIONS. — H = 0.23-0.57 mm, L = 0.51-1.28 mm, H/L = 0.43-0.47, Holotype: H = 0.563 mm, L = 1.22 mm; Paratypes: H = 0.322, L = 0.726 (Fig. 4; both paratypes of the same size).

TYPE HORIZON. — Sample 07PB03-3, Khao Kana section, Pha Nok Khao Formation, Sakmarian, Early Permian.

TYPE LOCALITY. — Khao Kana section (16°04'12"N, 100°54'20"E), Phetchabun Province, Central Thailand.

OCCURRENCES. — Samples 07PB03-1, 07PB03-3 and 07PB03-5, Khao Kana section, Phetchabun Province, Pha Nok Khao Formation, Early Permian, Central Thailand.

#### DESCRIPTION

Carapace long; dorsal outline regularly arched; DB short (30% of L); ADB nearly straight, angle with DB is 150°;

AB round with moderate radius of curvature, maximum convexity located just below mid H; angle between AB and ADB is 150°; AVB long and convex; VB slightly concave; PVB long and convex; posteroventral region flattened; PB round with small radius of curvature, maximum convexity located below mid H; PDB nearly straight, angle with DB of 140°; LV slightly overlaps RV all around the carapace, except at AVB and PVB; maximum H located at mid L.

#### REMARKS

This species can be compared to *Bairdia subfusiformis* Hamilton, 1942 from the Guadalupian, Middle Permian of Texas (Hamilton 1942) in general outline, but it can be

TABLE 2. — Stratigraphic distribution of Early-Middle Permian ostracod species from Central Thailand (Indochina block). Dark blocks (■) refer to the species described in the present paper, white blocks (□) refer to the species previously described in Chitnarin *et al.* (2012).

Species	08LO02	08LO07	07PB03	07PB04	07LB05	07LB04	07LB09	08PB01-03	07PB05	07PB06-08	08LB01	08LO01
<i>Fabalicypis</i> sp. B	-	-	-	-	-	-	-	-	-	-	■	-
<i>Acratia</i> ? sp.	-	-	-	-	-	-	-	-	-	-	■	-
<i>Baschkirina</i> cf. <i>huzhouensis</i> Forel, 2010	-	-	-	-	-	-	-	-	-	-	■	-
<i>Microcheilinella</i> sp. B	-	-	-	-	-	-	-	-	-	-	■	-
BAIRDIIDAE indet. sp. A	-	-	-	-	-	-	-	-	-	-	■	-
BAIRDIIDAE indet. sp. B	-	-	-	-	-	-	-	-	-	-	■	-
<i>Knoxiella</i> sp. 2	-	-	-	-	-	-	-	-	-	-	□	-
<i>Bairdia</i> sp. B	-	-	-	-	-	-	-	-	-	■	-	-
<i>Bairdia</i> sp. C	-	-	-	-	-	-	-	-	-	■	-	-
<i>Bairdia</i> sp. L	-	-	-	-	-	-	-	-	-	■	-	-
<i>Petasobairdia</i> sp.	-	-	-	-	-	-	-	-	-	■	-	-
<i>Bairdiacypris</i> sp. C	-	-	-	-	-	-	-	-	-	■	-	-
<i>Microcheilinella</i> sp. C	-	-	-	-	-	-	-	-	-	■	-	-
<i>Microcheilinella shicheni</i> Crasquin, 2010	-	-	-	-	-	-	-	-	-	■	-	-
<i>Polycpe</i> sp. D	-	-	-	-	-	-	-	-	-	■	-	-
<i>Bairdia guangxiensis</i> Guan, 1978	-	-	-	-	-	-	-	-	-	■	-	-
<i>Bairdiacypris</i> sp. A	-	-	-	-	-	-	-	-	■	-	-	-
<i>Bairdia incisedorsa</i> Chitnarin, n. sp.	-	-	-	-	-	-	-	-	■	-	-	-
<i>Silenites</i> sp.	-	-	-	-	-	-	-	-	■	-	-	-
<i>Microcheilinella</i> sp. D	-	-	-	-	-	-	-	-	■	-	-	-
<i>Bairdiacypris deloi</i> Bradfield, 1935	-	-	-	-	-	-	-	-	■	-	-	-
? <i>Hollinella</i> (H.) sp.	-	-	-	-	-	-	-	□	-	-	-	-
<i>Shleesha</i> sp.	-	-	-	-	-	-	-	□	-	-	-	-
<i>Reviya subsompongensis</i> Chitnarin, 2008	-	-	-	-	-	-	-	□	-	-	-	-
<i>Bairdia</i> sp. D	-	-	-	-	-	-	■	-	-	-	-	-
<i>Bairdia</i> sp. M	-	-	-	-	-	-	■	-	-	-	-	-
<i>Bairdia</i> sp. I	-	-	-	-	-	■	-	-	-	-	-	-
<i>Fabalicypis</i> sp. C	-	-	-	-	-	■	-	-	-	-	-	-
<i>Bairdiacypris</i> sp. H	-	-	-	-	-	■	-	-	-	-	-	-
<i>Langdaia meesooki</i> Chitnarin, 2012	-	-	-	-	-	□	-	-	-	-	-	-
Paraparchitiidae sp.	-	-	-	-	-	□	-	-	-	-	-	-
<i>Geffenina mariebeatriceae</i> Chitnarin, 2012	-	-	-	-	-	□	-	-	-	-	-	-
<i>Kloedcytherella oertlii</i> Kozur, 1985	-	-	-	-	-	□	-	-	-	-	-	-
<i>Bairdia broutini</i> Crasquin, 2010	-	-	-	-	■	■	-	-	-	-	-	-
<i>Bairdia menardensis</i> Harlton, 1929	-	-	-	-	■	-	-	-	-	-	■	-
<i>Bairdia</i> cf. <i>zhongyingensis</i> Wang, 1978	-	-	-	-	■	-	-	-	-	-	-	-
<i>Bairdia altiaricus</i> Chen, 1958	-	-	-	-	■	-	-	-	-	-	-	-
<i>Bairdia</i> sp. F	-	-	-	-	■	-	-	-	-	-	-	-
<i>Bairdiacypris longirobusta</i> Chen, 1958	-	-	-	-	■	-	-	-	-	-	-	-
<i>Microcheilinella</i> sp. E	-	-	-	-	■	-	-	-	-	-	-	-
<i>Microcoelonella takliensis</i> Chitnarin, 2012	-	-	-	-	□	-	-	-	-	-	-	-
<i>Microcoelonella takfensis</i> Chitnarin, 2012	-	-	-	-	□	-	-	-	-	-	-	-
<i>Microcoelonella</i> ? sp.	-	-	-	-	□	-	-	-	-	-	-	-
<i>Knightina</i> ? sp.	-	-	-	-	□	-	-	-	-	-	-	-
<i>Shemonaella</i> sp. 2	-	-	-	-	□	-	-	-	-	-	-	-
<i>Samarella</i> sp. 3	-	-	-	-	□	-	-	-	-	-	-	-
<i>Samarella sonei</i>	-	-	-	-	□	-	-	-	-	-	-	-
<i>Eukloedenella</i> ? sp.	-	-	-	-	□	-	-	-	-	-	-	-
<i>Knoxiella</i> sp. 1	-	-	-	-	□	-	-	-	-	-	-	-
<i>Samarella</i> sp. 1	-	-	-	-	□	-	□	-	-	-	-	-
<i>Bairdiacypris</i> sp. B	-	-	-	-	■	■	-	-	-	-	■	-
<i>Bairdia</i> sp. H	-	-	-	-	■	-	-	-	■	-	-	-
<i>Petasobairdia campbelli</i> Chitnarin, n. sp.	-	-	-	-	■	-	-	-	■	-	-	-
<i>Petasobairdia subnantongensis</i> Chen, 1987	-	-	-	-	■	-	-	■	■	-	-	-
<i>Lobobairdia ventriconcava</i> (Chen, 1958)	-	-	-	■	-	-	-	■	■	■	-	-
<i>Bairdia urodeloformis</i> Chen, 1987	-	-	-	■	■	-	-	-	■	-	-	-
<i>Bairdia</i> cf. <i>fangnianqiao</i> Crasquin, 2010	-	-	-	■	■	-	-	-	-	-	■	-
<i>Bairdia</i> cf. <i>deweveri</i> Crasquin, 2010	-	-	-	■	■	-	-	-	-	-	-	-
<i>Bairdia</i> sp. A	-	-	-	■	■	-	-	-	-	-	-	-
<i>Bairdia fontainei</i> Chitnarin, n. sp.	-	-	-	■	■	-	-	-	■	-	-	-
<i>Bairdia pierrevalentini</i> Crasquin, 2010	-	-	-	■	-	-	-	-	-	-	-	-
<i>Bairdia</i> sp. G	-	-	-	■	-	-	-	-	-	-	-	-
<i>Microcheilinella</i> sp. F	-	-	-	■	-	-	-	-	-	-	-	-
<i>Microcheilinella</i> sp. A	-	-	-	■	-	-	-	-	-	-	-	-
<i>Samarella</i> sp. 2	-	-	-	□	-	-	□	-	-	-	-	-

TABLE 2. — Continuation.

Species	08LO02	08LO07	07PB03	07PB04	07LB05	07LB04	07LB09	08PB01-03	07PB05	07PB06-08	08LB01	08LO01
<i>Knightina</i> cf. <i>ultima</i> (Kozur, 1985)	-	-	-	□	□	-	-	-	-	□	-	-
<i>Shishaella</i> sp.	-	-	-	□	-	-	-	-	-	-	-	-
<i>Fabalicypis</i> sp. A	-	-	-	■	-	-	-	■	-	-	-	-
<i>Bairdiacypris</i> sp. E	-	-	■	-	-	-	-	-	■	-	-	-
<i>Cavellina</i> sp.	-	-	■	-	■	-	-	-	-	-	-	-
<i>Sulcella suprapermiana</i> Kozur, 1985	-	-	■	-	■	■	-	-	-	-	■	-
<i>Bairdia songthami</i> Chitnarin, n. sp.	-	-	■	-	■	-	-	-	■	-	-	-
<i>Bairdia</i> cf. <i>calida</i> Chen, 1958	-	-	■	-	-	-	-	-	■	-	-	-
<i>Bairdiacypris</i> sp. D	-	-	■	-	-	-	-	-	■	-	-	-
<i>Bairdia beedei</i> Ulrich & Bassler, 1906	-	-	■	■	-	-	-	-	-	-	-	-
<i>Cryptobairdia seminalis</i> (Knight, 1928)	-	-	■	■	-	-	-	-	-	-	-	-
<i>Bairdia</i> cf. <i>B.?</i> <i>miyangensis</i> Chen, 1982	-	-	■	-	-	-	-	-	-	-	-	-
<i>Bairdia khaokanaensis</i> Chitnarin, n. sp.	-	-	■	-	-	-	-	-	-	-	-	-
<i>Bairdia</i> cf. <i>bassoni</i> Crasquin, 2010	-	-	■	-	-	-	-	-	-	-	-	-
<i>Bairdiacypris</i> sp. G	-	-	■	-	-	-	-	-	-	-	-	-
<i>Kempfina</i> cf. <i>qinglaili</i> (Crasquin, 2008)	-	-	■	-	-	-	-	-	-	-	-	-
<i>Sulcella mesopermiana</i> Kozur, 1985	-	-	■	-	-	-	-	-	-	-	-	-
<i>Hollinella</i> (H.) <i>martensiformis</i> Crasquin, 2010	-	-	□	□	□	-	□	-	-	-	-	-
<i>Hollinella</i> (H.) <i>herrickana</i> (Girty, 1909)	-	-	□	-	-	-	-	-	-	-	-	-
<i>Hollinella</i> (H.) <i>herrickana?</i> (Girty, 1909)	-	-	□	-	-	-	-	-	-	-	-	-
<i>Kirkbya</i> sp. 1	-	-	□	-	-	-	-	-	-	-	-	-
<i>Kirkbya</i> sp. 2	-	-	□	-	-	-	-	-	-	-	-	-
<i>Sargentina chatarameei</i> Chitnarin, 2012	-	-	□	-	-	-	-	-	-	-	-	-
<i>Geffenina posterodorsospina</i> Chitnarin, 2012	-	-	□	-	-	-	-	-	-	-	-	-
<i>Geisina</i> sp.	-	-	□	-	-	-	-	-	-	-	-	-
<i>Bairdia</i> sp. K	-	■	-	-	-	-	-	■	-	-	-	-
<i>Fabalicypis hathaithipae</i> Chitnarin, n. sp.	-	■	-	■	■	■	-	-	-	-	-	-
<i>Microcheilinella</i> sp. G	-	■	-	■	-	-	-	-	-	-	-	-
<i>Luizhinia naramasei</i> Chitnarin, n. sp.	-	■	■	-	■	-	■	-	-	-	-	-
<i>Acratia chongpani</i> Chitnarin, n.sp.	-	■	■	-	■	-	-	-	-	-	■	-
<i>Cryptobairdia</i> sp.	-	■	■	■	■	-	-	-	■	-	-	-
<i>Acratia mongkoli</i> Chitnarin, n. sp.	-	■	■	■	-	-	-	■	-	-	■	-
<i>Basslerella wipanuuae</i> Chitnarin, n. sp.	-	■	■	■	■	■	■	-	■	-	-	-
<i>Bairdia</i> sp. J	-	■	-	-	-	-	-	-	-	-	-	-
? <i>Pseudacanthoscapha</i> sp.	-	■	-	-	-	-	-	-	-	-	-	-
<i>Polytylites</i> sp.	-	□	-	-	□	-	-	-	-	-	-	-
<i>Cyathus caperata</i> (Guan, 1978)	-	□	-	□	□	-	-	-	-	-	-	-
<i>Cyathus elliptica</i> Shi, 1987	-	□	-	□	□	-	-	-	-	-	-	-
<i>Samarella viscusforma</i> Chitnarin, 2012	-	□	-	□	-	-	-	-	-	-	-	-
<i>Kempfina</i> sp.	■	-	-	-	-	-	-	-	-	-	■	-
<i>Bairdia</i> cf. <i>urodeloformis</i> Chen, 1987	■	-	-	-	■	-	-	-	-	-	■	-
<i>Bairdia deducta deducta</i> Zalanyi, 1974	■	-	-	-	-	-	-	-	■	-	■	-
<i>Polycope</i> sp. A	■	-	-	■	■	-	-	-	-	-	■	-
<i>Silenites sureeae</i> Chitnarin, n. sp.	■	-	-	■	■	-	-	-	-	■	■	-
<i>Bairdia piscariformis</i> Chen, 1958	■	-	-	-	-	-	■	-	-	-	-	-
<i>Polycope</i> sp. C	■	-	-	■	-	-	■	-	-	-	-	-
<i>Bairdia deweveri</i> Crasquin, 2010	■	-	-	■	-	-	-	-	-	-	-	-
<i>Liuzhinia praeantalyaensis</i> Forel, 2010	■	-	-	-	-	-	-	-	-	-	-	-
<i>Baschkirina ruchae</i> Chitnarin, n. sp.	■	-	-	■	-	-	-	-	-	-	-	-
<i>Baschkirina</i> cf. <i>ballei</i> Crasquin, 2010	■	-	■	■	-	■	-	-	-	-	-	-
<i>Bairdia lungtanensis</i> Chen, 1958	■	-	■	-	■	-	-	-	-	-	-	-
<i>Basslerella tota</i> Chen & Bao, 1986	■	-	■	■	-	■	-	-	-	-	-	-
<i>Bairdia grotei</i> Chitnarin, n. sp.	■	■	-	■	■	■	■	-	-	-	-	-
<i>Bairdia trianguliformis</i> Chen, 1958	■	■	-	-	■	-	-	-	-	-	-	-
<i>Bairdia</i> sp. E	■	■	-	-	-	-	-	-	-	-	-	-
<i>Bairdiacypris</i> sp. F	■	■	-	-	-	-	-	-	-	-	-	-
<i>Bohlenatia</i> sp.	■	-	-	-	-	-	-	-	-	-	-	-
<i>Basslerella naresi</i> Chitnarin, n. sp.	■	-	-	-	-	-	-	-	-	-	-	-
<i>Polycope</i> sp.B	■	-	-	-	-	-	-	-	-	-	-	-
<i>Paraparchites chenshii</i> Crasquin, 2010	□	-	-	-	□	-	-	-	-	-	-	□
<i>Permoyoungiella</i> sp.	□	-	-	□	-	-	-	-	-	-	-	-
<i>Knightina</i> sp.	□	-	-	-	-	-	-	-	-	-	-	-
<i>Kirkbya</i> sp.	□	-	-	-	-	-	-	-	-	-	-	-
<i>Shemonaella</i> sp. 1	□	-	-	-	-	-	-	-	-	-	-	-
<i>Kloedenellidae</i> indet.	□	-	-	-	-	-	-	-	-	-	-	-



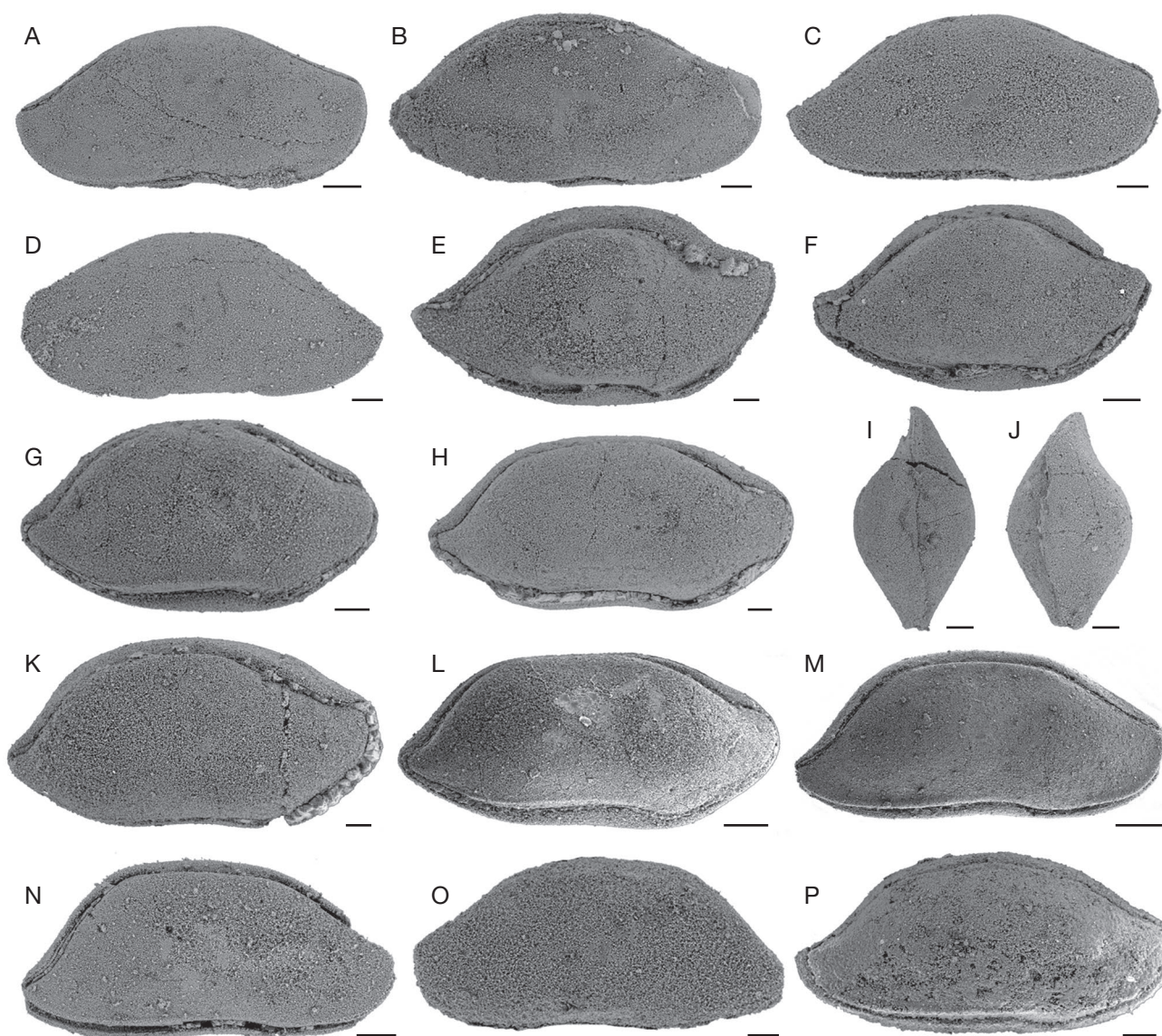


FIG. 3. — Ostracods from Indochina Block, Central Thailand. All specimens are stored at the Suranaree University of Technology Collections (Nakhon Ratchasima, Thailand), numbers SUT-09-xxxx. All the specimens are represented by complete carapaces. **A–D**, *Bairdia khaokanaensis* Chitnarin, n. sp.; **A**, holotype, right lateral view, SUT-09-2223, sample 07PB03-3; **B**, paratype, right lateral view, SUT-09-2226, sample 07PB03-3; **C**, paratype, right lateral view, SUT-09-2231, sample 07PB03-3; **D**, left lateral view, SUT-09-2232, sample 07PB03-5; **E, F, I, J**, *Bairdia incisedorsa* Chitnarin, n. sp.; **E**, holotype, right lateral view, SUT-09-2216, sample 07PB05-3; **F**, paratype, right lateral view, SUT-09-2215, sample 07PB05-3; **I**, paratype, dorsal view, SUT-09-2221, sample 07PB05-3; **J**, ventral view, paratype, SUT-09-2220, sample 07PB05-3. **G, H, K, L**, *Bairdia fontainei* Chitnarin, n. sp.; **G**, holotype, right lateral view, SUT-09-2187, sample 07LB05-3; **H**, paratype, right lateral view, SUT-09-2182, sample 07PB04-5; **K**, paratype, right lateral view, SUT-09-2183, sample 07PB05-3; **L**, right lateral view, SUT-09-2178, sample 07LB05-5; **M–P**, *Bairdia songthami* Chitnarin, n. sp.; **M**, holotype, right lateral view, SUT-09-2283, sample 07LB05-5; **N**, paratype, right lateral view, SUT-09-2278, sample 07PB05-4; **O**, paratype, left lateral view, SUT-09-2281, sample 07PB03-1; **P**, right lateral view, SUT-09-2284, sample 07LB05-A2. Scale bars: 100  $\mu$ m.

differentiated by its shorter and more convex DB, the longer and more convex AVB and PVB. *Bairdia khaokanaensis* Chitnarin, n. sp. can also be compared to *B. girtyi* Sohn, 1960 from the Early Permian of South China (Chen & Bao 1986: 115, pl. 2, figs 6, 7) in lateral outline but they can be differentiated by the longer and flat DB and the moderate overlapping at DB of the latter species. AVB and PVB of *B. khaokanaensis* Chitnarin, n. sp. are longer and more convex.

*Bairdia incisedorsa* Chitnarin, n. sp.  
(Figs 3E–F, I–J)

TYPE MATERIAL. — Holotype: one complete carapace (SUT-09-2216; Fig. 3E); paratype, one complete carapace (SUT-09-2215; Fig. 3F).

ETYMOLOGY. — From diagnosis character.

MATERIAL EXAMINED. — Five complete and three incomplete carapaces.

**DIMENSIONS.** —  $H = 0.46\text{--}0.50$  mm,  $L = 0.85\text{--}0.90$  mm,  $H/L = 0.54\text{--}0.55$ , Holotype:  $H = 0.501$  mm,  $L = 0.901$  mm; Paratype:  $H = 0.469$ ,  $L = 0.855$ .

**TYPE HORIZON.** — Sample 07PB05-3, Ban Naen Sawan I section, Tak Fa Formation, Roadian, Middle Permian.

**TYPE LOCALITY.** — Ban Naen Sawan I section ( $15^{\circ}54'11''\text{N}$ ,  $100^{\circ}53'36''\text{E}$ ), Phetchabun Province, Central Thailand.

**OCCURRENCES.** — Sample 07PB05-3, Ban Naen Sawan I section, Phetchabun Province, Tak Fa Formation, Middle Permian, Central Thailand.

**DIAGNOSIS.** — Species of *Bairdia* with robust carapace, strong overlap of LV over RV in dorsal region, hinge invaginated, AB with very small radius of curvature and maximum of convexity located very high, tapering PB with maximum of curvature located at mid H, slight overlap of LV on RV at AVB and PVB, dorsal view spindle-shaped.

#### DESCRIPTION

Carapace robust; dorsal outline broadly arched, DB of RV convex, DB of LV, hinge short and strongly invaginated; ADB short and concave; anterior end tapered and pointing upward, located above mid H; AVB long and slightly convex, angle between AVB and VB is  $120^{\circ}$ ; VB short, VB of RV concave, VB of LV slightly convex; PVB long and slightly convex, angle between PVB and VB is  $155^{\circ}$ ; PB tapering and located at mid H; PDB long and concave; anterior, posterior, anteroventral and posteroventral regions flattened laterally; maximum H located at mid L; surface smooth; LV larger and strongly overlaps RV at dorsal and ventral borders, slightly overlaps at AVB and PVB; in dorsal view, carapace spindle-shaped, with median part inflated and extremities strongly flattened.

#### REMARKS

*Bairdia incisedorsa* Chitnarin, n. sp. could be easily identifiable by its diagnostic characters. However, in lateral view, it is closed to *B. permiana* Hamilton, 1942 from the Guadalupian, Middle Permian of Texas (Hamilton 1942). The two species can be differentiated by dorsal characteristics and the lower H/L ratio of *B. incisedorsa* Chitnarin, n. sp. The present species can be compared with *B. subleguminoides* Chen, 1987 from the Late Permian of South China (Shi & Chen 1987) but the latter species is more elongated with longer anterior part and DB more convex at RV.

#### *Bairdia fontainei* Chitnarin, n. sp. (Figs 3G-H, K-L; 5)

*Bairdia* cf. *piscariformis* Chen in Chitnarin, Crasquin, Chonglakmani, Broutin, Grote & Thanee *et al.* 2008: 347, 349, fig. 6 (1-2). n. syn.

**TYPE MATERIAL.** — Holotype, one complete carapace (SUT-09-2187; Fig. 3G); paratypes, two complete carapaces (SUT-09-2182; Fig. 3H and SUT-09-2178; Fig. 3L).

**ETYMOLOGY.** — In honour of Dr Henry Fontaine, France.

**MATERIAL EXAMINED.** — Ten complete carapaces.

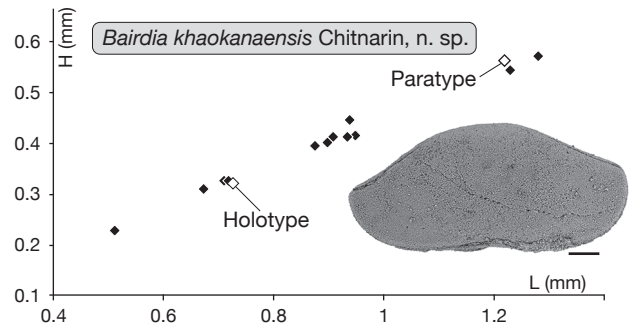


FIG. 4. — Height (H)-length (L) diagram of *Bairdia khaokanaensis* Chitnarin, n. sp. Scale bar: 100  $\mu\text{m}$ .

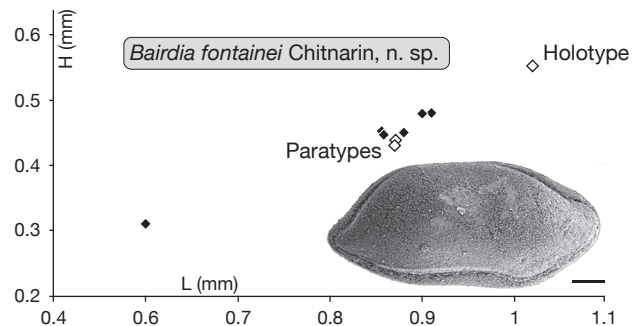


FIG. 5. — Height (H)-length (L) diagram of *Bairdia fontainei* Chitnarin, n. sp. Scale bar: 100  $\mu\text{m}$ .

**DIMENSIONS.** —  $H = 0.44\text{--}0.48$  mm,  $L = 0.87\text{--}0.92$  mm,  $H/L = 0.48\text{--}0.53$ , Holotype:  $H = 0.55$  mm,  $L = 1.02$  mm; Paratype (Fig. 3H):  $H = 0.43$ ,  $L = 0.87$ ; Paratype (Fig. 3L):  $H = 0.44$ ,  $L = 0.91$  (Fig. 5).

**TYPE HORIZON.** — Sample number 07LB05-5, Ta Kli section, Tak Fa Formation, Artinskian, Early Permian.

**TYPE LOCALITY.** — Ta Kli section ( $15^{\circ}19'05''\text{N}$ ,  $100^{\circ}22'46''\text{E}$ ), Nakhon Sawan Province, Central Thailand.

**OCCURRENCES.** — Sample 02TH46-07, Bung Sam Phan section, Tak Fa Formation, (Chitnarin *et al.* 2008), Phetchabun Province, Middle Permian, Central Thailand; sample 07LB05-05, Ta Kli section, Tak Fa Formation, Nakhon Sawan Province, Middle Permian, Central Thailand; sample 07PB05-3, Ban Naen Sawan I section, Phetchabun Province, Tak Fa Formation, Middle Permian, Central Thailand; samples 07PB04-2 and 07PB04-5, Nong Phai section, Pha Nok Khao Formation, Phetchabun Province, Early Permian, Central Thailand.

**DIAGNOSIS.** — Species of *Bairdia* with spindle-shape carapace and a ventral ridge along VB of RV, DB and VB nearly straight and of equal length, H maximum at mid-L, distinct overlap of LV on RV at ADB and PDB.

#### DESCRIPTION

Spindle shape carapace in lateral view; DB and VB nearly straight and of equal length; at RV, ADB straight and has an angle of  $150^{\circ}$  with DB, ADB of LV slightly convex; AB rounded with medium radius of curvature, maximum convexity located at mid H; AVB of both valves straight, angle between AVB and VB is  $150^{\circ}$ ; VB of RV slightly concave, VB of LV slightly concave to nearly straight; PVB of both valves straight, angle between PVB and VB is  $150^{\circ}$ ; PB tapering,



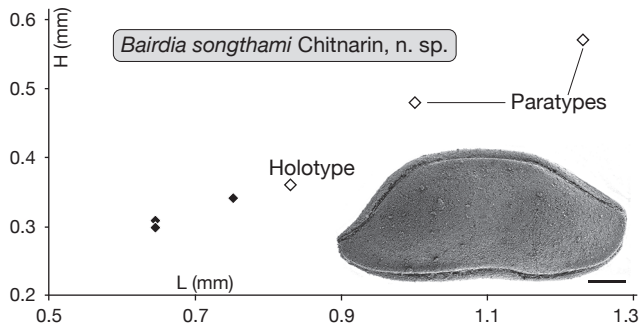


FIG. 6. — Height (H)-length (L) diagram of *Bairdia songthami* Chitnarin, n. sp. Scale bar: 100 µm.

maximum convexity located at mid H; PDB of both valves straight, angle between PDB and DB is about 135°; surface smooth; presence of a ventral ridge along VB of RV; greatest H in the median region; LV strongly overlaps RV at ADB, PDB and VB, slightly overlaps at both ends.

#### REMARKS

*Bairdia fontainei* Chitnarin, n. sp. includes the species identified as *B. cf. piscariformis* Chen, 1958 from the Middle Permian limestone in Phetchabun area (Chitnarin *et al.* 2008). However, it can be differentiated from *B. piscariformis* Chen, 1958 from the Early Permian of South China (Chen 1958: 245, pl. 4, figs 9-10) by the nearly straight DB and VB, the equal length of both valves, the straight AVB and PVB and the presence of ventral ridge on RV. *B. fontainei* Chitnarin, n. sp. is close to *B. guadalupiana* Hamilton, 1942 from the Middle Permian of Texas (Hamilton 1942) in general outline but the anterior part of the latter species is more rounded and with larger radius of curvature.

#### *Bairdia songthami* Chitnarin, n. sp. (Figs 3M-P; 6)

TYPE MATERIAL. — Holotype: one complete carapace (SUT-09-2283, Fig. 3M); paratypes: two complete carapaces (SUT-09-2278, Fig. 3N and SUT-09-2284, Fig. 3P).

ETYMOLOGY. — In honour of Dr Wichanet Songtham, Northeastern Institute of Petrified Wood and Mineral Resources, Nakhon Ratchasima Rajabhat University, Thailand.

MATERIAL EXAMINED. — Six complete carapaces.

DIMENSIONS. — H = 0.30-0.57 mm, L = 0.64-1.12 mm, H/L = 0.45-0.46, Holotype: H = 0.360 mm, L = 0.83 mm; Paratype (Fig. 3N): H = 0.47, L = 1.00; Paratype (Fig. 3P): H = 0.57 mm, L = 1.23 mm (Fig. 6).

TYPE HORIZON. — Sample 07LB05-2, Ta Kli section, Tak Fa Formation, Middle Permian.

TYPE LOCALITY. — Ta Kli section (15°19'05"N, 100°22'46"E), Nakhon Sawan Province, central Thailand.

OCCURRENCES. — Sample 07PB03-1, Khao Kana section, Pha Nok Khao Formation, Phetchabun Province, Early Permian; sample 07PB05-6, Ban Naen Sawan I section, Tak Fa Formation, Phetchabun

Province, Middle Permian; samples 07LB05-2 and 07LB05-A2, Ta Kli section, Tak Fa Formation, Nakhon Sawan Province, Middle Permian, Central Thailand.

DIAGNOSIS. — Species of *Bairdia* with flat carapace, DB nearly straight and long, AVB, VB, PVB flattened laterally and underlined by a ridge all along ventral part at RV.

#### DESCRIPTION

Carapace flat and subtrapezoid; dorsal outline broadly arched; DB of both valves long, straight, horizontal to slightly inclined to anterior; ADB long, angle between ADB and DB is 150°; angle between PDB and DB is 135°; AB rounded with medium radius of curvature, maximum convexity located below mid H; AVB convex; VB concave; PVB long and slightly convex; AVB, VB, PVB flattened and underlined by a fine ridge all along the ventral margin at RV; PB tapered, located at lower fourth of H; maximum of H located at mid L; surface smooth; LV larger than RV, and moderately overlaps RV all around the carapace, except at anterior and posterior ends; in dorsal view, carapace very thin.

#### REMARKS

*Bairdia songthami* Chitnarin, n. sp. can be compared to *B. girtyi* from the Early Permian of South China (Chen 1958); however, in the present Thai material, the maximum of convexity of AB and PB is located lower and DB is longer. *Bairdia songthami* Chitnarin, n. sp. differs from *B. fontainei* Chitnarin, n. sp. by its more convex AVB and PVB; here, AVB, VB and PVB are flattened laterally and the ventral margin is underlined by a ventral ridge.

#### *Bairdia grotei* Chitnarin, n. sp. (Figs 7A-F; 8)

*Bairdia* sp. 1 – Crasquin *et al.* 2010b: 25, pl. 1, fig. 23. **n. syn.**

TYPE MATERIAL. — Holotype: one complete carapace (SUT-09-2206, Fig. 7F); paratypes: two complete carapaces (SUT-09-2189, Fig. 7B and SUT-09-2195, Fig. 7E).

ETYMOLOGY. — In honour of Dr Paul J. Grote, Suranaree University of Technology, Thailand.

MATERIAL EXAMINED. — 11 complete carapaces.

DIMENSIONS. — H = 0.35-0.45 mm, L = 0.62-0.74 mm, H/L = 0.57-0.61, Holotype: H = 0.636 mm, L = 1.07 mm; Paratype (Fig. 7B): H = 0.45 mm, L = 0.706; Paratype (Fig. 7E): H = 0.45 mm, L = 0.74 mm (Fig. 8).

TYPE HORIZON. — Sample 07PB04-2, Nong Phai section, Pha Nok Khao Formation, Asselian-Sakmarian, Early Permian.

TYPE LOCALITY. — Nong Phai section (16°01'06"N, 100°58'59"E), Phetchabun Province, central Thailand.

OCCURRENCES. — Jadar Block, NW Serbia, latest Permian. Samples 07PB04-2 and 07PB04-5, Nong Phai section, Pha Nok Khao Formation, Phetchabun Province, Early Permian, Central Thailand; samples 07LB05-A1, 07LB05-B2, 07LB05-D2, Ta Kli section, Nakhon Sawan Province, Middle Permian, Central Thailand; sample 07LB04-17, Phu Lam Yai section, Tak Fa Formation, Nakhon Sawan Province, Early Permian?, Central Thailand; sample 07LB09-1, Khao Phu Chongkho

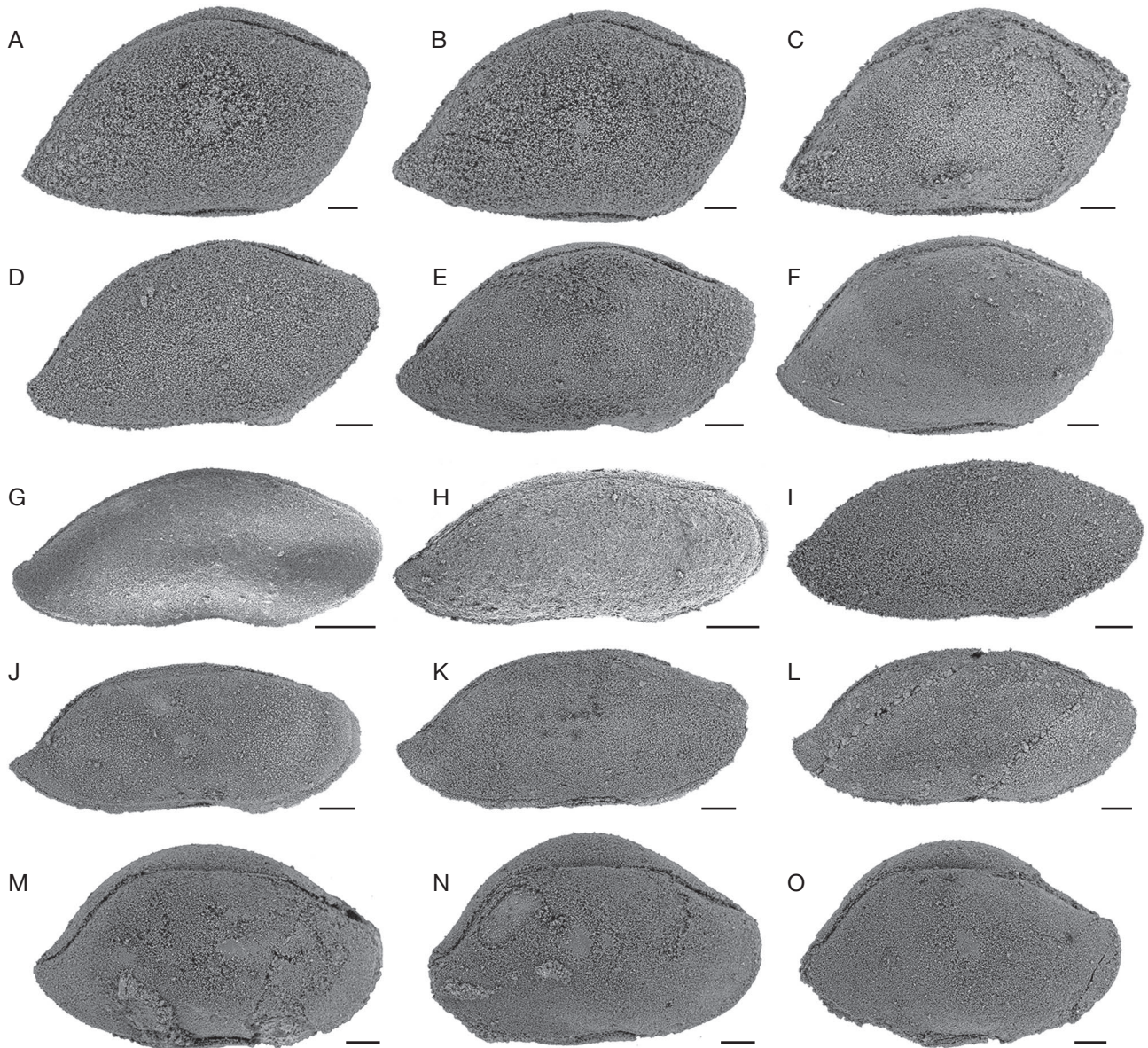


FIG. 7. — Ostracods from Indochina Block, Central Thailand. All specimens are stored at the Suranaree University of Technology Collections (Nakhon Ratchasima, Thailand) numbers SUT-09-xxxx. All the specimens are complete carapaces in right lateral view. **A-F**, *Bairdia grotei* Chitnarin, n. sp.; **A**, SUT-09-2188, sample 07PB04-2; **B**, paratype, SUT-09-2189, sample 07PB04-2; **C**, SUT-09-2192, sample 07LB05-B2; **D**, SUT-09-2203, sample 07PB04-2; **E**, paratype, SUT-09-2204, sample 08LO07-1; **F**, holotype, SUT-09-2206, sample 08LO02-11. **G-L**, *Bairdia* cf. *fangnianqiao*i Crasquin, 2010; **G**, SUT-09-2260, sample 07LB05-4; **H**, SUT-09-2263, sample 08LB01-1; **I**, SUT-09-2261, sample 07LB05-B3; **J**, SUT-09-2270, sample 07LB05-B3; **K**, SUT-09-2271, sample 07PB04-2; **L**, SUT-09-2279, sample 07PB04-2. **M-O**, *Bairdia* cf. *B.?* *mianyangensis* Chen, 1982; **M**, SUT-09-2254, sample 07PB03-3; **N**, SUT-09-2252, sample 07PB03-3; **O**, SUT-09-2250, sample 07PB03-3. Scale bars: 100  $\mu$ m.

section, Tak Fa Formation, Nakhon Sawan Province, Middle Permian, Central Thailand; sample 08LO02-11, Tham Nam Maholan section, Nam Maholan Formation, Loei Province, Early Permian, Northeastern Thailand; 08LO07-1, Sak Chai Quarry section, Nam Maholan Formation, Loei Province, Early Permian, Northeastern Thailand.

**DIAGNOSIS.** — Species of *Bairdia* which spindle shape, PB located at lower 30% of H, AB located at 75% of H, PDB long and parallel to AVB, H/L = 0.57-0.61.

#### DESCRIPTION

Carapace spindle-shaped; dorsal outline broadly arched, maximum of convexity of AB at upper 30% of H, of PB

below lower fourth of H; DB straight and slightly inclined backward (10°); ADB straight, angle with DB of 130°; AB rounded with medium radius of curvature, maximum convexity located above mid H; AVB long and nearly straight, angle between AVB and VB is 140°; VB straight at LV, slightly concave at RV; PVB long, slightly convex; PB rounded with small radius of curvature, maximum convexity located below lower fourth of H; PDB long and straight, parallel to AVB; angle between PDB and DB of 150°; LV slightly overlaps RV all around the carapace, overlap moderate at DB and ADB.



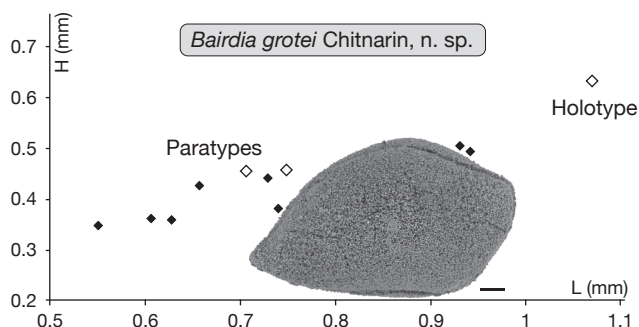


FIG. 8. — Height (H)-length (L) diagram of *Bairdia grotei* Chitnarin, n. sp. Scale bar: 100 µm.

#### REMARKS

*Bairdia grotei* Chitnarin, n. sp. can be compared to *B. gaeleae* Crasquin, 2010 from the latest Permian of Meishan, South China (Crasquin *et al.* 2010a) in lateral view; however here the AB has a smaller radius of curvature and ADB and DB are straighter.

#### *Bairdia* cf. *fangnianqiao*i Crasquin, 2010 (Fig. 7G-L)

*Bairdia* cf. *fangnianqiao*i Crasquin in Crasquin *et al.*, 2010a: 342, 344, fig. 9K-N.

MATERIAL EXAMINED. — 13 complete carapaces.

OCCURRENCES. — Sample 07PB04-2, Nong Phai section, Pha Nok Khao Formation, Phetchabun province, Early Permian, Central Thailand; samples 07LB05-3, 07LB05-4, 07LB05-B3, 07LB05-C1, Ta Kli section, Tak Fa Formation, Nakhon Sawan Province, Middle Permian, Central Thailand; sample 08LB01-1, Khao Som Phot section, Tak Fa Formation, Lopburi Province, Middle Permian, Central Thailand.

DIMENSIONS. — H = 0.20-0.60 mm, L = 0.60-1.07 mm, H/L = 0.36-0.43.

#### REMARKS

The specimens recovered are very similar to *Bairdia fangnianqiao*i Crasquin, 2010 from the latest Permian of Meishan section (Crasquin *et al.* 2010a) in lateral view but can be differentiated by a smaller H/L ratio and regularly arched dorsal outline at LV.

#### *Bairdia* cf. *mianyangensis* Chen, 1982 (Fig. 7M-O)

*Bairdia* cf. *mianyangensis* Chen, 1982: 123, pl. IV, figs 14-18.

MATERIAL EXAMINED. — Four complete and three incomplete carapaces.

OCCURRENCES. — Samples 07PB03-1 and 07PB03-3 Khao Kana section, Pha Nok Khao Formation, Phetchabun Province, Early Permian.

DIMENSIONS. — H = 0.47-0.64 mm, L = 0.61-1.11 mm, H/L = 0.57-0.58.

#### REMARKS

Chen (*in* Chen & Shi 1982: 123, pl. 4, figs 14-18) described a new species *Bairdia?* *mianyangensis* from the latest Permian of Mianyang, Hubei, South China. Their specimens are incomplete carapaces but such characters as unusual DB of RV inclined frontward with strong overlap at DB and flattened AVB and PVB can be distinguished. The specimens recovered here resemble *B.?* *mianyangensis* in lateral outline and the mentioned characters; however, our specimens are longer and the VB is less concave than those of *B.?* *mianyangensis*.

#### *Bairdia guangxiensis* Guan, 1978 (Fig. 9A-C)

*Bairdia guangxiensis* Guan in Guan *et al.*, 1978: 154, pl. 38, figs 3-4. — Chen & Shi 1982: 122, pl. 5, fig. 17. — Chen & Bao 1986: 114, pl. 3, figs 7-8. — Shi & Chen 1987: 31, pl. 3, figs 1-9; 2002: 67, pl. 5, figs 1-9, pl. 28, figs 1-2.

MATERIAL EXAMINED. — Two complete and 14 incomplete carapaces.

OCCURRENCES. — Wugang, Hunan Province, Early Permian (Guan *et al.* 1978); Nantong section, (Chen & Shi 1982); Well-Bao-1, Chihhsia Limestone, Jiangsu Province, Early Permian (Chen & Bao 1986); Meishan section, Changxing, Zhejiang, South China, latest Permian (Shi & Chen 1987); Matan and Pingding sections, Guangxi, South China, Late Permian (Shi & Chen 2002); samples 07PB06-3, 07PB07-4 and 07PB08-2, Ban Naen Sawan II section, Tak Fa Formation, Phetchabun Province, Middle Permian, Central Thailand.

DIMENSIONS. — H = 0.55-0.84 mm, L = 0.82-1.18 mm, H/L = 0.66-0.71.

#### REMARKS

*Bairdia guangxiensis* can be easily recognized by presence of ventral beak-like lateral inflations on both valves and flat ventral area. Small differences can be recognized among our specimens; for example, DB of LV is convex unlike the flat DB of those described from Late Permian of Guangxi (Shi & Chen 2002: pl. 5, figs 1 and 9), and are of medium size.

#### *Bairdia* cf. *bassoni* Crasquin, 2010 (Fig. 9E-F)

*Bairdia* cf. *bassoni* Crasquin, 2010: 340, fig. 7Y, Z, C'-F'.

MATERIAL EXAMINED. — Eight complete carapaces.

OCCURRENCES. — Sample 07PB03-3, Khao Kana section, Pha Nok Khao Formation, Phetchabun province, Early Permian, Central Thailand.

DIMENSIONS. — H = 0.364-0.529 mm, L = 0.617-0.930 mm, H/L = 0.56-0.58.

#### REMARKS

The specimens attributed to *Bairdia* cf. *bassoni* Crasquin, 2010 are characterized by regularly arched DB, maximal H located at mid L, and both ends compressed laterally; however, AB and PB are smaller than those of *B. bassoni* Crasquin, 2010

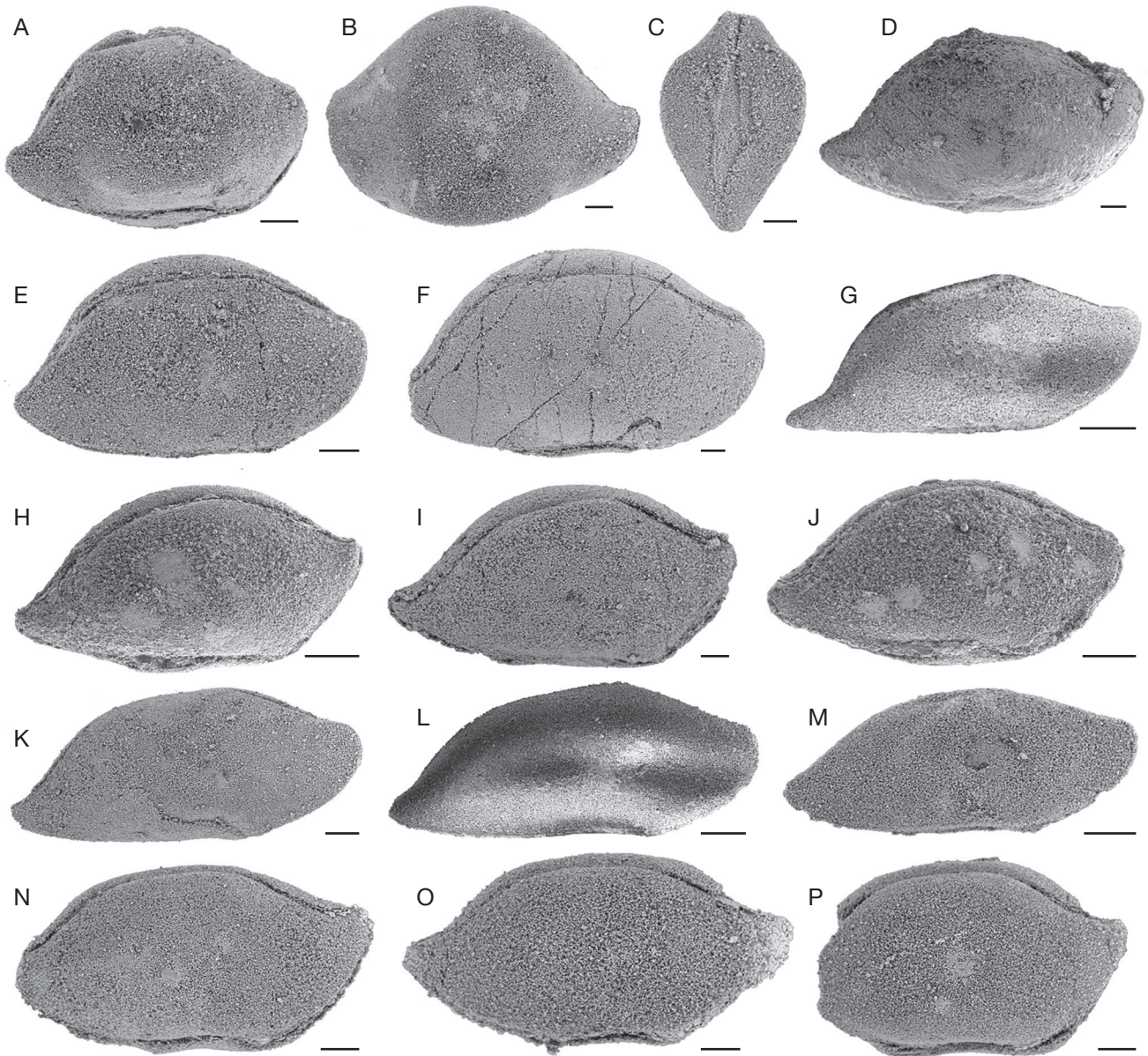


FIG. 9. — Ostracods from Indochina Block, Central Thailand. All specimens are stored at the Suranaree University of Technology Collections (Nakhon Ratchasima, Thailand) numbers SUT-09-xxxx. All the specimens are represented by complete carapaces. **A–C**, *Bairdia guangxiensis* Guan, 1978; **A**, right lateral view, SUT-09-2207, sample 07PB07-4; **B**, left lateral view, SUT-09-2208, sample 07PB06-3; **C**, ventral view, SUT-09-2213, sample 07PB07-3. **D**, *Bairdia cf. zhongyingensis* Wang, 1978 *sensu* Chen & Bao, 1986; right lateral view, SUT-09-2339, sample 07LB05-A2; **E**, **F**, *Bairdia bassoni* Crasquin, 2010; **E**, right lateral view, SUT-09-2117, sample 07PB03-3; **F**, right lateral view, SUT-09-2118, sample 07PB03-3; **G–J**, *Bairdia urodeloformis* Chen, 1987; **G**, right lateral view, SUT-09-2332, sample 08LB01-1; **H**, right lateral view, SUT-09-2325, sample 07LB05-5; **I**, right lateral view, SUT-09-2335, sample 08PB05-3; **J**, right lateral view, SUT-09-2338, sample 07LB05-5; **K–M**, *Bairdia cf. urodeloformis* Chen, 1987; **K**, right lateral view, SUT-09-2151, sample 07LB05-B2; **L**, right lateral view, SUT-09-2152, sample 07LB05-3; **M**, right lateral view, SUT-09-2156, sample 08LO02-2; **N–P**, *Bairdia* sp. A; **N**, right lateral view, SUT-09-2285, sample 07PB04-2; **O**, right lateral view, SUT-09-2291, sample 07PB04-2; **P**, right lateral view, SUT-09-2290, sample 07PB04-2. Scale bars: 100 µm.

(Crasquin *et al.* 2010a) from the latest Permian of Meishan section, Eastern China. The overlap at DB in our specimens is stronger.

*Bairdia urodeloformis* Chen, 1987  
(Fig. 9G–J)

*Bairdia urodeloformis* Chen in Shi & Chen, 1987: 40, pl. 4, figs 17–23. — Crasquin *et al.* 2010a: 348, figs 7G–N.

*Rectobairdia firmata* Chen in Chen & Shi, 1982: pl. 7, fig. 10 only.

*Bairdia macdonelli* Harlton, 1929b: 157, pl. 3, figs 7a, b. — Shi & Chen 1987: 35, pl. 1, figs 1–7, pl. 18, figs 1–4; 2002: 63, pl. 2, figs 1–4.

MATERIAL EXAMINED. — One incomplete and eight complete carapaces.

OCCURRENCES. — Meishan section, Zhejiang Province, latest Permian (Shi & Chen 1987; Crasquin *et al.* 2010a); Matan and Pingding sections, Guangxi, South China, Late Permian (Shi & Chen 2002); sample 07PB04-2, Nong Phai section, Pha Nok Khao



Formation, Phetchabun Province, central Thailand, Early Permian; samples 07LB05, 07LB05-A2, Ta Kli section, Tak Fa Formation, Nakhon Sawan province, Middle Permian, central Thailand; sample 07PB05-3, Ban Naen Sawan I section, Tak Fa Formation, Phetchabun Province, central Thailand, Middle Permian; .

DIMENSIONS. — H = 0.25-0.51 mm, L = 0.54-1.25 mm, H/L = 0.41-0.46.

#### REMARKS

Such characters as long carapace, broadly arched dorsal outline of LV, angulated dorsal outline of RV with small AB located very high and small PB located very low induce the attribution to *Bairdia urodeloformis* Chen, 1987 described from the latest Permian of South China (Shi & Chen 1987).

#### *Bairdia cf. urodeloformis* Chen, 1987 (Fig. 9K-M)

*Bairdia urodeloformis* Chen in Shi & Chen, 1987: 40, pl. 4, figs 17-23.

MATERIAL EXAMINED. — 12 complete carapaces.

OCCURRENCES. — Sample 08LO02-2, Tham Nam Maholan section, Nam Maholan Formation, Loei Province, northeastern Thailand, Early Permian; samples 07LB05-A1, 07LB05-B2 and 07LB05-B3, Ta Kli section, Tak Fa Formation, Nakhon Sawan Province, Central Thailand, Middle Permian; sample 08LB01-1, Khao Som Phot section, Tak Fa Formation, Lopburi Province, central Thailand, Middle Permian.

DIMENSIONS. — H = 0.22-0.45 mm, L = 0.63-1.05 mm, H/L = 0.34-0.43.

#### REMARKS

The specimens are related to *Bairdia urodeloformis* from the latest Permian of South China (see references above) by their long carapace, small AB with maximum of convexity located very high and small PB with maximum of convexity located very low. The differences are the longer carapace, the more convex PVB, and the overlap along dorsal border.

#### *Bairdia cf. calida* Chen, 1958 (Fig. 10A, B)

*Bairdia calida* Chen, 1958: 243, pl. IV, figs 9-15.

MATERIAL EXAMINED. — One complete and two incomplete carapaces.

OCCURRENCES. — Sample 07PB03-7, Khao Kana section, Pha Nok Khao Formation, Phetchabun province, Central Thailand, Early Permian; sample 07PB05-3, Ban Naen Sawan I section, Pha Nok Khao Formation, Phetchabun province, Central Thailand, Middle Permian.

DIMENSIONS. — H = 0.715-0.747 mm, L = 1.22-1.33 mm, H/L = 0.56-0.58.

#### REMARKS

The specimens are close to *Bairdia calida* Chen, 1958 from the Early Permian of Jiangsu Province, Eastern China (Chen 1958) which is characterized by a narrow ventral ridge on RV and the

dorsal ridge on LV. In our specimens, the ventral ridge on RV is observed; though, the dorsal ridge on LV is not recognized.

#### *Bairdia cf. zhongyingensis* Wang, 1978 (Fig. 9D)

*Bairdia zhongyingensis* Wang, 1978: 16, pl. III, fig. 2a-c.

MATERIAL EXAMINED. — One complete carapace.

OCCURRENCES. — Sample 07LB05-A2, Ta Kli section, Tak Fa Formation, Nakhon Sawan Province, central Thailand, Middle Permian.

DIMENSIONS. — H = 0.712 mm, L = 1.31 mm, H/L = 0.54.

#### REMARKS

The specimen resembles *Bairdia zhongyingensis* Wang, 1978 from the Late Permian of South China (Wang 1978) in lateral outline, especially for the small radius of curvature of AB, small radius of curvature of PB and concave VB; however, radius of curvature of AB of our specimen is larger and higher and the overlap of LV on RV is not clear.

#### *Bairdia beedei* Ulrich & Bassler, 1906 (Fig. 10C, D)

*Bairdia beedei* Ulrich & Bassler, 1906: 161, pl. XI, figs 19, 20. — Chen 1958: 249, pl. 5, figs 1-4.

MATERIAL EXAMINED. — Five complete carapaces.

OCCURRENCES. — Kwanshan and Lungtan sections, Jiangsu Province, Early Permian (Chen 1958); samples 07PB03-1, 07PB03-7, Khao Kana section, Pha Nok Khao Formation, Phetchabun Province, Early Permian; sample 07PB04-2, Nong Phai section, Pha Nok Khao Formation, Phetchabun Province, Central Thailand, Early Permian.

DIMENSIONS. — H = 0.49-0.86 mm, L = 0.82-1.13 mm, H/L = 0.54-0.57.

#### REMARKS

Our specimens have elongate, subfusiform carapace in lateral view with strong overlap of LV on RV at DB. DB of RV is steeply arched, DB of LV is straight and the VB is broadly convex. The carapaces of the studied specimens are longer than *Bairdia beedei* Ulrich & Bassler from Late Carboniferous of North America (Ulrich & Bassler 1906).

#### *Bairdia altiaricus* Chen, 1958 (Fig. 10E, F)

*Bairdia altiaricus* Chen, 1958: 223, pl. 3, figs 21-23, pl. 4, figs 11, 12. — Crasquin *et al.* 2008a: pl. 2, figs 5-6. — Yuan *et al.* 2009: pl. 1, fig. 17.

Non *Cryptobairdia altiarca* – Kozur 1985a: 231, table II, pl. 3, fig. 1.

*Cryptobairdia altiaricus* – Shi & Chen 2002: 69, pl. 7, figs 1-12.

MATERIAL EXAMINED. — One incomplete and eleven complete carapaces.

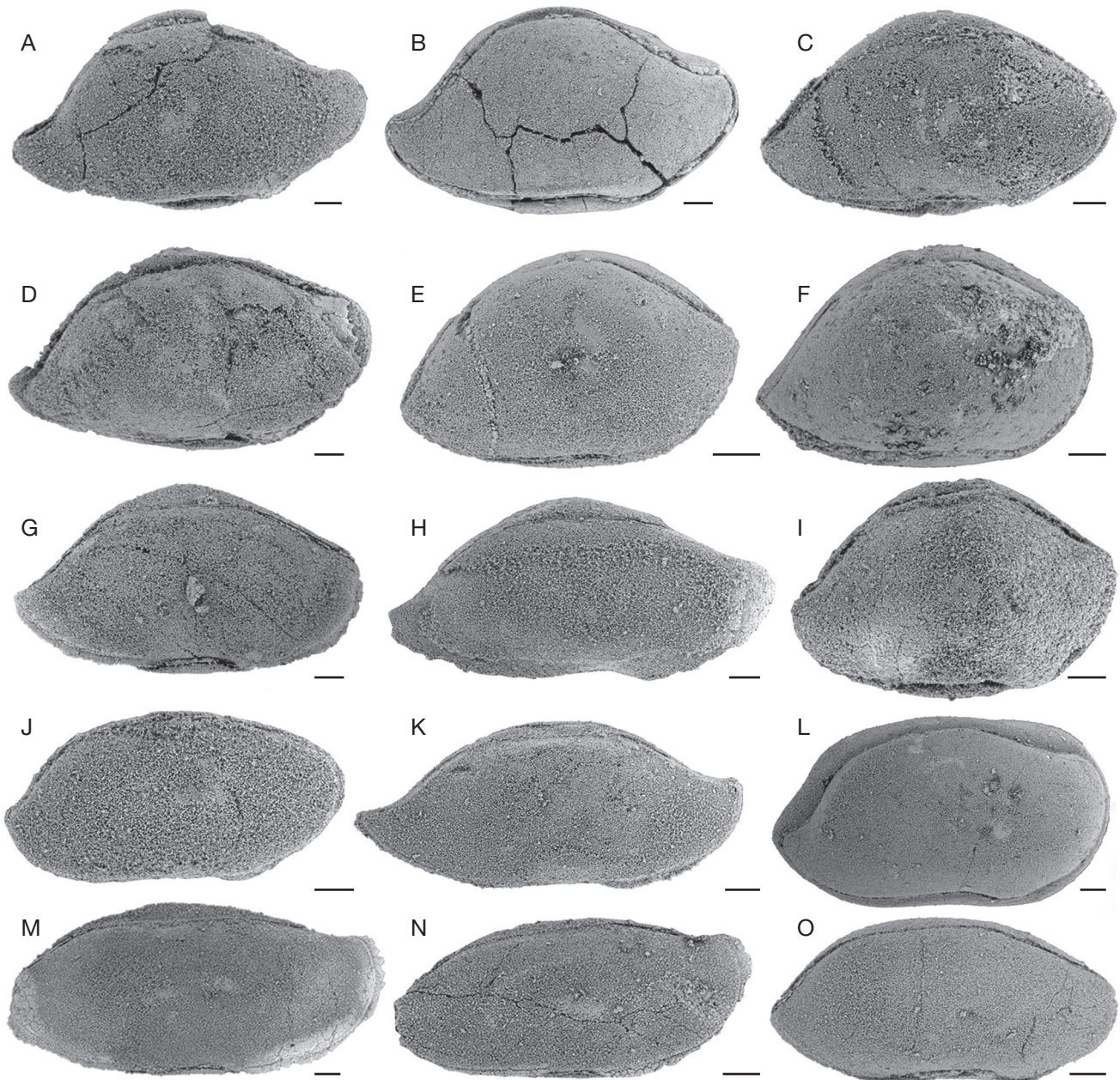


FIG. 10. — Ostracods from Indochina Block, Central Thailand. All specimens are stored at the Suranaree University of Technology Collections (Nakhon Ratchasima, Thailand) numbers SUT-09-xxxx. All the specimens are complete carapaces in right lateral view. **A, B**, *Bairdia* cf. *calida* Chen, 1958; **A**, SUT-09-2127, sample 07PB03-7; **B**, SUT-09-2128, sample 07PB25-3; **C, D**, *Bairdia beedei* Ulrich & Bassler, 1906; **C**, SUT-09-2685, sample 07PB03-3; **D**, SUT-09-2687, sample 07PB04-2; **E, F**, *Bairdia altiarus* Chen, 1958; **E**, SUT-09-2105, sample 07LB05-D2; **F**, SUT-09-2101, sample 07LB05-D3; **G, H**, *Bairdia trianguliformis* Chen, 1958; **G**, SUT-09-2318, sample 08LO07-10; **H**, SUT-09-2319, sample 08LO07-1; **I**, *Kempfina* cf. *qinglaili* (Crasquin, 2008), SUT-09-2533, sample 07PB03-7; **J**, *Bairdia* sp. D SUT-09-2300, sample 07LB09-2; **K**, *Bairdia* sp. E, SUT-09-2301, sample 08LO02-10; **L**, *Bairdia* sp. F, SUT-09-2311, sample 07LB05-5; **M, N**, *Bairdia* sp. G; **M**, SUT-09-2307, sample 07PB04-2; **N**, SUT-09-2306, sample 07PB04-2; **O**, *Bairdia* sp. H, SUT-09-2310, sample 07PB05-6. Scale bars: 100  $\mu$ m.

**OCCURRENCES.** — Kwanshan and Lungtan sections, Chihhsia Limestone, Nanking Province, Early Permian (Chen 1958); Matan and Pingding sections, Guangxi, South China, Late Permian (Shi & Chen 2002); Lercara Formation, Sicily, Italy, Middle Triassic (Crasquin *et al.* 2008a); samples 07LB05-B1, 07LB05-C3, 07LB05-D2 and 07LB05-D3, Ta Kli section, Tak Fa Formation, Nakhon Sawan Province, Central Thailand, Middle Permian.

**DIMENSIONS.** — H = 0.47-0.896 mm, L = 0.74-1.30mm, H/L = 0.61-0.68.

#### REMARKS

The specimens recovered in this study can be easily assigned to *Bairdia altiarus* from the Early Permian of Eastern China (Chen 1958) by their lateral characters such as highly arched dorsal outline, AB with large radius of curvature, acuminate and slightly upturned PB. However, some carapaces are compressed and distorted. Generally, our specimens are smaller than the Chinese specimens.



*Bairdia trianguliformis* Chen, 1958  
(Fig. 10G-H)

*Bairdia trianguliformis* Chen, 1958: 244, pl. 6, figs 9-12. — Chen & Shi 1982: 121, pl. 4, figs 6-8. — Shi & Chen 2002: 66, pl. 4, figs 3-9.

MATERIAL EXAMINED. — Two complete and three incomplete carapaces.

OCCURRENCES. — Kwanshan and Lungtan sections, Jiangsu Province, Early Permian (Chen 1958); Nantong section, Jiangsu Province, latest Permian (Chen & Shi 1982); Matan and Pingding sections, Guangxi province, Late Permian (Shi & Chen 2002); sample 08LO02-9, Tham Nam Maholan section, Nam Maholan Formation, Loei province, Northeastern Thailand, Early Permian; samples 08LO07-1 and 08LO07-10, Sak Chai Quarry section, Pha Nok Khao Formation, Loei Province, Northeastern Thailand, Early Permian; samples 07LB05-B1 and 07LB05-C3, Ta Kli section, Tak Fa Formation, Nakhon Sawan province, Central Thailand, Early Permian.

DIMENSIONS. — H = 0.61-0.89 mm, L = 1.19-1.79 mm, H/L = 0.48-0.50.

REMARKS

*Bairdia trianguliformis* from the Early Permian of Eastern China (Chen 1958) can be recognized by the strong overlap of LV on RV in dorsal region that makes a triangular area in the central of DB. The carapace is long and thin. Posterior end is tapering.

*Bairdia deweveri* Crasquin, 2010  
(Fig. 12A-C)

*Bairdia deweveri* Crasquin *in* Crasquin, Forel, Feng, Yuan, Baudin & Collin *et al.* 2010a: 342, figs 7O-T.

*Bairdia cf. trianguliformis* Chen *in* Shi & Chen, 1987: 37, pl. 2, figs 1-8.

*Bairdia galei* Croneis & Thurman, 1939: 325, pl. 7, fig. 21. — Shi & Chen 1987: 37, pl. 1, figs 19-22. — Crasquin *et al.* 2008b: pl. 2, figs 11, 12.

MATERIAL EXAMINED. — Ten complete carapaces.

OCCURRENCES. — Bulla section, Dolomites, Italy, Bulla Member, Bellerophon Formation, Changxingian (Crasquin *et al.* 2008b); Meishan section, Changxing Formation, Baoqing and Meishan Members (Shi & Chen 1987); sample 08LO02-10, Tham Nam Maholan section, Nam Maholan Formation, Loei Province, northeastern Thailand, Early Permian; samples 07PB04-2 and 07PB04-5, Nong Phai section, Pha Nok Khao Formation, Phetchabun Province, central Thailand, Early Permian.

DIMENSIONS. — H = 0.280-0.594 mm, L = 0.532-1.150 mm, H/L = 0.48-0.52.

REMARKS

The specimens are attributed to *Bairdia deweveri* Crasquin, 2010 described from the Late Permian of Italy, and South China (see synonymy) due to the angular dorsal outline of both valves, and AB angular, pointing upward and located almost as high as DB. PB is tapering and located very low, nearly at VB.

*Bairdia cf. deweveri* Crasquin, 2010  
(Fig. 11A, B)

*Bairdia deweveri* Crasquin *in* Crasquin, Forel, Feng, Yuan, Baudin & Collin *et al.* 2010a: 342, figs 7O-T.

MATERIAL EXAMINED. — Nine incomplete carapaces.

OCCURRENCES. — Sample 07PB04-2, Nong Phai section, Pha Nok Khao Formation, Phetchabun Province, Early Permian; sample 07LB05-C2, Ta Kli section, Tak Fa Formation, Nakhon Sawan province, Central Thailand, Early Permian.

DIMENSIONS. — H = 0.40-0.55 mm, L = 0.77-0.99 mm, H/L = 0.48-0.54.

REMARKS

The present species can be compared to *Bairdia deweveri* Crasquin, 2010 from the latest Permian of Meishan section, South China (Crasquin *et al.* 2010a: 19, pl. 7, figs 15-20); however, AB of *B. deweveri* has smaller radius of curvature than in our specimens.

*Bairdia broutini* Crasquin, 2010  
(Fig. 11D-E)

*Bairdia broutini* Crasquin *in* Crasquin, Forel, Feng, Yuan, Baudin & Collin *et al.* 2010a: 340, 342, figs 9O-T.

*Rectobairdia tantilla* Kummerow, 1953: 52, pl. 5, figs 8a, b. — Shi & Chen 1987: 41, pl. 5, figs 3, 4, 7, 8 (?5, 6, 9, 10); 2002: 71, pl. 8, figs 5-7, pl. 9, figs 6-9.

MATERIAL EXAMINED. — Three complete and two incomplete carapaces.

OCCURRENCES. — Meishan section, South China, latest Permian (Crasquin *et al.* 2010a); sample 07LB05-2, Ta Kli section, Tak Fa Formation, Nakhon Sawan Province, Central Thailand, Early Permian; sample 07LB04-13, Phu Lam Yai section, Tak Fa Formation, Nakhon Sawan Province, Central Thailand, Early Permian.

DIMENSIONS. — H = 0.43-0.54 mm, L = 0.71-0.88 mm, H/L = 0.60-0.62.

*Bairdia pierrevalentini* Crasquin, 2010  
(Fig. 11G-H)

*Bairdia pierrevalentini* Crasquin *in* Crasquin, Forel, Feng, Yuan, Baudin & Collin *et al.* 2010a: 347, 348, figs 9A-D.

MATERIAL EXAMINED. — Two incomplete carapaces.

OCCURRENCES. — Meishan section, South China, latest Permian (Crasquin *et al.* 2010a); sample 07PB04-5, Nong Phai section, Pha Nok Khao Formation, Phetchabun Province, Central Thailand, Early Permian.

DIMENSIONS. — H = 0.45-0.46 mm, L = 0.74-0.77 mm, H/L = 0.58-0.62.

*Bairdia deducta deducta* Zálányi, 1974  
(Fig. 11J-L)

*Bairdia deducta deducta* Zálányi, 1974: 196, 197, pl. 12, fig. 1a-c. — Kozur 1985a: 62 (not illustrated). — Crasquin-Soleau & Baud 1998: pl. 8, figs 10-13, 16.

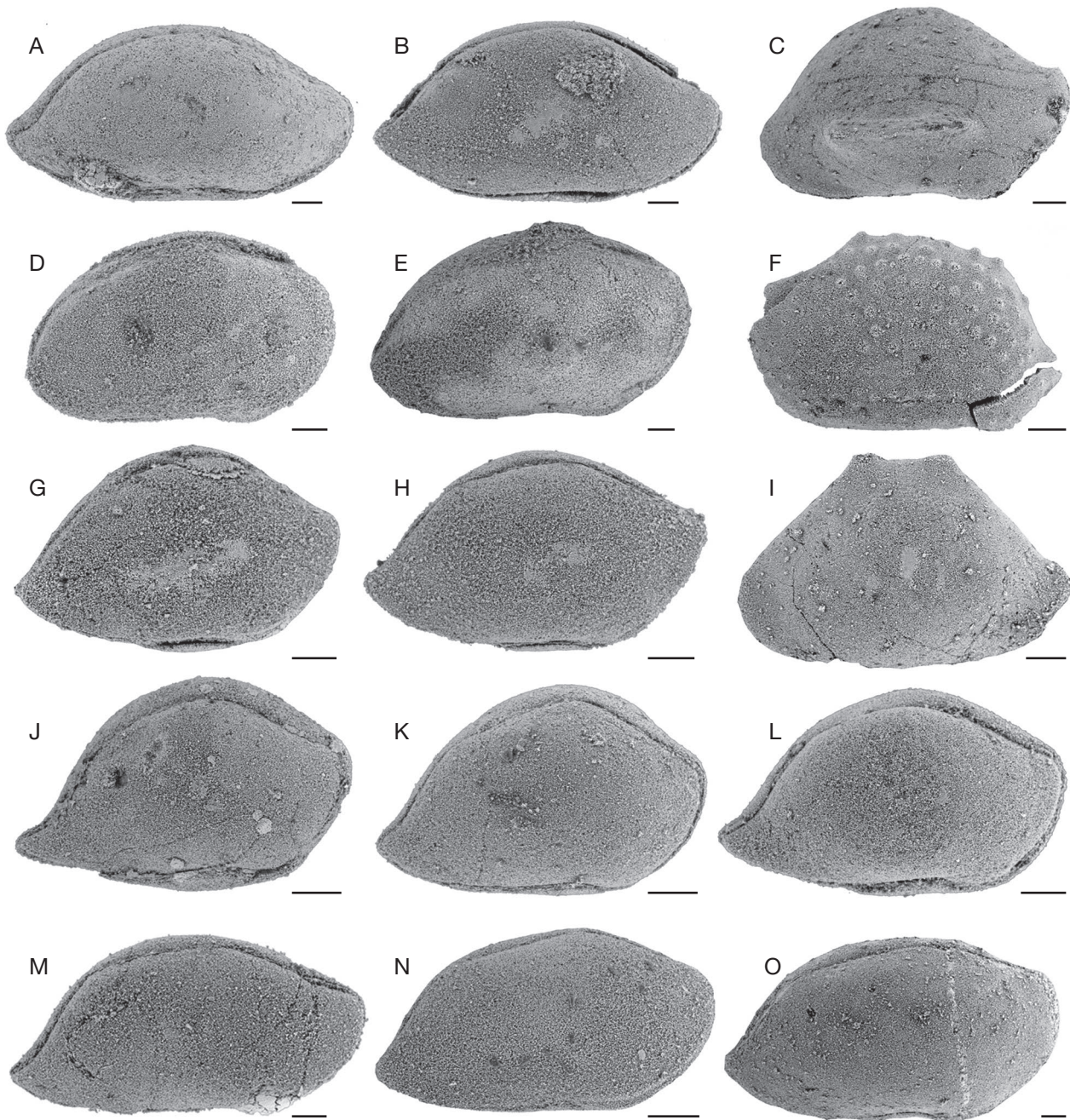


FIG. 11. — Ostracods from Indochina Block, Central Thailand. All specimens are stored at the Suranaree University of Technology Collections (Nakhon Ratchasima, Thailand) numbers SUT-09-xxxx. **A, B**, *Bairdia* cf. *deweveri* Crasquin, 2010; **A**, right lateral view of a complete carapace, SUT-09-2129, sample 07PB03-3; **B**, right lateral view of a complete carapace, SUT-09-2130, sample 07PB03-3; **C**, *Bairdia* sp. B, external view of a right valve, SUT-09-2295, sample 07PB08-2; **D, E**, *Bairdia broutini* Crasquin, 2010; **D**, right lateral view of a complete carapace, SUT-09-2112, sample 07LB05-2; **E**, right lateral view of a complete carapace, SUT-09-2116, sample 07LB04-13; **F**, *Bairdia* sp. C, left lateral view of a complete carapace, SUT-09-2296, sample 07PB06-5; **G, H**, *Bairdia pierrevalentini* Crasquin, 2010; **G**, right lateral view of a complete carapace, SUT-09-2256, sample 07PB04-5; **H**, right lateral view of a complete carapace, SUT-09-2257, sample 07PB04-5; **I**, *Petasobairdia* sp., left lateral view of a complete carapace, SUT-09-2577, sample 07PB08-3; **J-L**, *Bairdia deducta deducta* Zálányi, 1974 *sensu* Kozur 1985; **J**, right lateral view of a complete carapace, SUT-09-2172, sample 07PB05-2; **K**, right lateral view of a complete carapace, SUT-09-2177, sample 08LB01-6; **L**, right lateral view of a complete carapace, SUT-09-2176, sample 08LO02-9; **M-O**, *Bairdia lungtanensis* Chen, 1958; **M**, right lateral view of a complete carapace, SUT-09-2244, sample 07PB03-7; **N**, right lateral view of a complete carapace, SUT-09-2246, sample 08LO02-9; **O**, right lateral view of a complete carapace, SUT-09-2245, sample 08LO02-11. Scale bars: 100  $\mu$ m.

Not *Bairdia deducta* Zálányi, 1974: 196, 197, pl. 12, fig. 1a-c.

*Cryptobairdia deducta deducta* – Kozur 1985a: pl. 6, fig. 2.

MATERIAL EXAMINED. — Seven complete carapaces.

OCCURRENCES. — Nagyvisnyó Formation, Bükk Mountains, Hungary, Late Permian (Kozur 1985a); Episkopi Formation, late Middle-early Late Permian, Hydra Island, Greece (Crasquin-Soleau & Baud 1998); sample 08LO02-9, Tham Nam Maholan section, Nam Maholan Formation, Loei Province, northeast Thailand, Early Permian; sam-



ples 07PB05-2 and 07PB05-3, Ban Naen Sawan I section, Pha Nok Khao Formation, Phetchabun Province, central Thailand, Middle Permian; sample 08LB01-6, Khao Som Phot section, Tak Fa Formation, Lopburi Province, central Thailand, late Middle Permian.

DIMENSIONS. — H = 0.411-0.511 mm, L = 0.680-0.790 mm, H/L = 0.60-0.64.

*Bairdia lungtanensis* Chen, 1958  
(Fig. 11M-O)

*Bairdia lungtanensis* Chen, 1958: 224, 246, pl.4, Figs 1-8.

MATERIAL EXAMINED. — Five complete carapaces.

OCCURRENCES. — Lungtan section, Chihhsia Limestone, Nanking Province, Early Permian (Chen 1958); samples 08LO02-9 and 08LO02-11, Tham Nam Maholan section, Nam Maholan Formation, Loei province, northeastern Thailand, Early Permian; sample 07PB03-7, Khao Kana section, Pha Nok Khao Formation, Phetchabun province, central Thailand, Early Permian; sample 07LB05-1, Ta Kli section, Tak Fa Formation, Middle Permian, Nakhon Sawan province, Central Thailand.

DIMENSIONS. — H = 0.39-0.75 mm, L = 0.71-1.40 mm, H/L = 0.51-0.54.

REMARKS

The specimens recovered from central Thailand are of different sizes; the specimen shown in Fig. 11M is comparable with illustration of Chen (1958: fig. 1, pl. 4) but others are somewhat different that may suggest ontogenic morphological changes.

*Bairdia menardensis* Harlton, 1929  
(Fig. 12D-F)

*Bairdia menardensis* Harlton, 1929b: 158, pl. 8, figs 1a-d. — Chen 1958: 248, 249, pl. 3, figs 1-7, 13.

MATERIAL EXAMINED. — Ten complete carapaces.

OCCURRENCES. — Lungtan section, Nanking Province, Early Permian (Chen 1958); samples 07LB05-A3, 07LB05-B1, 07LB05-D3, Ta Kli section, Tak Fa Formation, Nakhon Sawan Province, central Thailand, Early Permian; sample 08LB01-6, Khao Som Phot section, Tak Fa Formation, Lopburi Province, central Thailand, Middle Permian.

DIMENSIONS. — H = 0.60-0.78 mm, L = 0.95-1.17 mm, H/L = 0.63.

REMARKS

Sohn (1960) considered *Bairdia menardensis* as a junior synonym of *B. grahamensis* Harlton, 1928. The figured specimens of *B. grahamensis* (Sohn 1960: 45, pl. 1, figs 9-10, 15, 16) are different from our specimens. However, the characters such as subrhomboidal carapace, highly arched DB, narrowly rounded AB and PB, and upturned PB agree well with characters of *Bairdia menardensis* described by Chen (1958) from the Early Permian of China. In the studied specimens, AVB is slightly convex and maximum of curvature of AB is located at or just above mid H.

*Bairdia piscariformis* Chen, 1958  
(Fig. 13K-L)

*Bairdia piscariformis* Chen, 1958: 245, pl. 4, figs 9, 10.

MATERIAL EXAMINED. — Four complete carapaces.

OCCURRENCES. — Lungtan section, Chihhsia Limestone, Nanking Province, Early Permian (Chen 1958); sample 08LO02-1, Tham Nam Maholan section, Nam Maholan Formation, Loei province, northeastern Thailand, Early Permian; sample 07LB09-2, Khao Phu Chongkho section, Tak Fa Formation, Phetchabun province, central Thailand, Middle Permian.

DIMENSIONS. — H = 0.39-0.63 mm, L = 0.79-1.30 mm, H/L = 0.48.

REMARKS

*Bairdia piscariformis*, from the Early Permian of China (Chen 1958) is characterized by a long carapace, broadly arched dorsal outline, rounded AB with medium radius of curvature, rounded PB with small radius of curvature, and straight ADB, DB, PDB at RV.

Genus *Lobobairdia* Kollmann, 1963

TYPE SPECIES. — *Lobobairdia salinaria* Kollmann, 1963 by original designation.

*Lobobairdia ventriconcava* (Chen, 1958)  
(Fig. 12G-I)

*Bairdia ventriconcava* Chen, 1958: 243, pl.3, figs 8-12

*Lobobairdia ventriconcava* – Chen & Bao 1986: 118, pl. 2, figs 1-4. — Shi & Chen 2002: 80, pl. 14, figs 1-4, 12-14.

MATERIAL EXAMINED. — Eight complete and four incomplete carapaces.

OCCURRENCES. — Jiangsu Province, Early Permian (Chen 1958; Chen & Bao 1986); Guangxi Province, South China, Late Permian (Shi & Chen 2002); sample 07PB04-2, Nong Phai section, Pha Nok Khao Formation, Phetchabun Province, central Thailand, Early Permian; samples 07PB05-2, 07PB07-1 and 07PB07-3, Ban Naen Sawan I and II sections, Tak Fa Formation, Phetchabun Province, central Thailand, Middle Permian; sample 08PB02-13, Phu Prathat section, Tak Fa Formation, Phetchabun Province, central Thailand, Middle Permian.

DIMENSIONS. — H = 0.48-0.61 mm, L = 0.76-0.92 mm, H/L = 0.63-0.66.

Genus *Petasobairdia* Chen, 1982

TYPE SPECIES. — *Petasobairdia bicornuta* Chen, 1982 by original designation.

*Petasobairdia subnantongensis* Chen, 1987  
(Fig. 15A-C)

*Petasobairdia subnantongensis* Chen in Shi & Chen, 1987: 47, pl. 8, figs 1-4, pl. 19, figs 8, 9. — Shi & Chen 2002: 75, pl. 14, figs 12-14. — Crasquin *et al.* 2010a: 350, figs 13F-H.

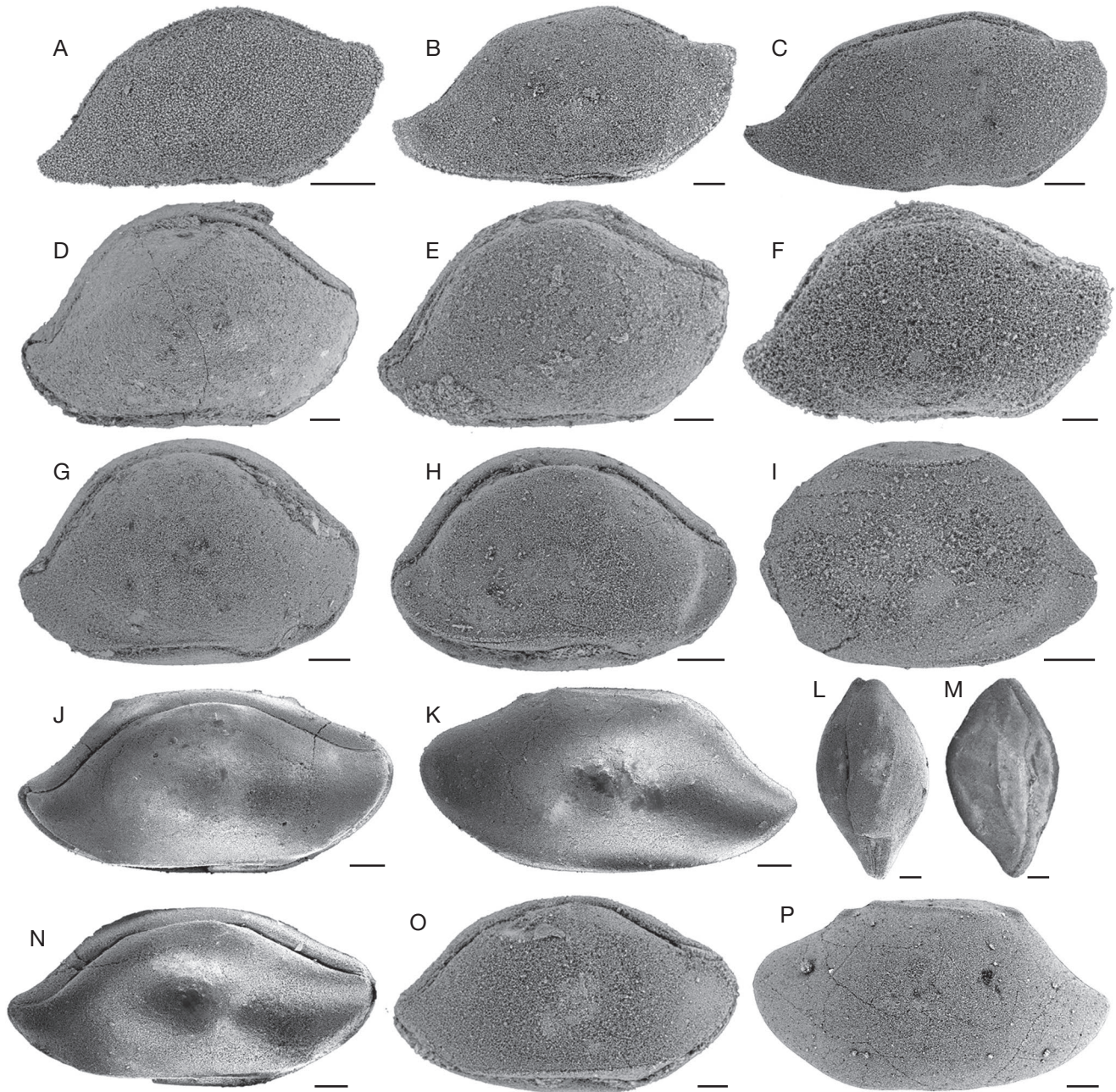


FIG. 12. — Ostracods from Indochina Block, Central Thailand. All specimens are stored at the Suranaree University of Technology Collections (Nakhon Ratchasima, Thailand) numbers SUT-09-xxxx. All the specimens are represented by complete carapaces. **A-C**, *Bairdia deweveri* Crasquin, 2010; **A**, right lateral view, SUT-09-2165, sample 07PB04-2; **B**, right lateral view, SUT-09-2161, sample 07PB04-2; **C**, right lateral view, SUT-09-2169, sample 08LO02-10; **D-F**, *Bairdia menardensis* Hariton *sensu* Chen (1958); **D**, right lateral view, SUT-09-2140, sample 07LB05-B1; **E**, right lateral view, SUT-09-2147, sample 07LB05-D3; **F**, right lateral view, SUT-09-2148, sample 08LB01-6; **G-I**, *Lobobairdia ventriconcava* (Chen, 1958); **G**, right lateral view, SUT-09-2539, sample 07PB05-2; **H**, right lateral view, SUT-09-2540, sample 07PB05-2; **I**, left lateral view, SUT-09-2541, sample 07PB07-3; **J-P**, *Petasobairdia campbelli* Chitnarin, n. sp.; **J**, holotype, right lateral view, SUT-09-2568, sample 07LB05-5; **K**, paratype, left lateral view, SUT-09-2571, sample 07LB05-5; **L**, dorsal view, SUT-09-2572, sample 07LB05-5; **M**, ventral view, SUT-09-2573, sample 07LB05-5; **N**, paratype, right lateral view, SUT-09-2570, sample 07LB05-5; **O**, left lateral view, SUT-09-2574, sample 07PB05-5; **P**, left lateral view, SUT-09-2575, sample 07PB05-5. Scale bars: 100 µm.

*Petasobairdia nantongensis* Chen in Chen & Shi, 1982: 130, pl. 6, figs 7-9 (non figs 1-6). — Crasquin *et al.* 2008b: pl. 4, figs 16, 17.

**MATERIAL EXAMINED.** — 23 complete and six incomplete carapaces.

**OCCURRENCES.** — Jiangsu Province, latest Permian (Chen & Shi 1982); Meishan section, Zhejiang Province, latest Permian (Shi & Chen 1987; Crasquin *et al.* 2010a); Guangxi Province, South China, Late Permian (Shi & Chen 2002); sample 07LB05-5, Ta Kli sec-

tion, Tak Fa Formation, Nakhon Sawan Province, central Thailand, Early Permian; samples 07PB05-2 and 07PB05-3, Ban Naen Sawan I section, Tak Fa Formation, Phetchabun Province, central Thailand, Middle Permian; sample 08PB03-3, Phu Pra that section, Tak Fa Formation, Phetchabun Province, central Thailand, Middle Permian.

**DIMENSIONS.** — H = 0.45-0.62 mm, L = 0.81-0.96 mm, H/L = 0.61-0.64.



*Petasobairdia campbelli* Chitnarin, n. sp.  
(Figs 12J-P; 17)

TYPE MATERIAL. — Holotype, one complete carapace (SUT-09-2568, Fig. 12F); paratypes, two complete carapaces (SUT-09-2570, Fig. 12N and SUT-09-2571, Fig. 12K).

ETYMOLOGY. — In honour of Dr Hamish Campbell, GNS, New Zealand.

MATERIAL EXAMINED. — Nine complete carapaces.

DIMENSIONS. — H = 0.51–0.69 mm, L = 1.07–1.29 mm, Holotype: H = 0.57 mm, L = 1.18 mm; Paratype (Fig. 12N): H = 0.51 mm, L = 1.07 mm; Paratype (Fig. 12K): H = 0.55 mm, L = 1.28 mm (Fig. 17).

TYPE HORIZON. — Sample 07LB05-5, Ta Kli section, Tak Fa Formation, Early Permian.

TYPE LOCALITY. — Ta Kli section (15°19'05"N, 100°22'46"E), Nakhon Sawan Province, central Thailand.

OCCURRENCES. — Sample 07LB05-5, Ta Kli section, Tak Fa Formation, Nakhon Sawan Province, central Thailand, Early Permian; sample 07PB05-5, Ban Naen Sawan I section, Tak Fa Formation, Phetchabun Province, central Thailand, Middle Permian.

DIAGNOSIS. — Species of *Petasobairdia* with a long carapace, DB of LV nearly horizontal with an horizontal dorsal ridge ended by small spines at both ends, DB of RV convex underlined by a simple ridge, maximum H located in median region, ventral ridge at both valves.

DESCRIPTION

Long, subfusiform carapace; dorsal outline angulated, DB of RV convex underlined by a simple ridge, DB of LV nearly horizontal, underlined by a straight dorsal ridge ended by spines at both ends; ADB of RV concave, ADB of LV slightly concave, angle between AD and DB is 160°; AB rounded with small radius of curvature, maximum convexity located above mid H; AVB slightly convex, angle between AVB and VB is 150°; VB straight with a faint ventral ridge both valves; PVB long, slightly convex, making an angle of 155° with VB; PB tapering, with maximum of convexity located below mid H; PDB slightly concave on LV, concave on RV, angle between PDB and DB is 135°; maximum H all along DB; strong overlap of LV on RV along dorsal outline; in dorsal view carapace biconvex flattened laterally.

REMARKS

*Petasobairdia campbelli* Chitnarin, n. sp. can be compared to *P. levicornuta* Chen, 2002 from the latest Permian of Guangxi in South China (Shi & Chen 2002: 75, pl. 16, figs 1–7, pl. 17, figs 1–6) by its small dorsal ridge on LV with a backward-pointing spine. However, our specimens differ from *P. levicornuta* by the angular dorsal outline, DB of LV horizontal and presence of small spines at both ends of the horizontal dorsal ridge on LV.

Genus *Cryptobairdia* Sohn, 1960

TYPE SPECIES. — *Bairdia ventricosa* Roth & Skinner, 1930 by original designation.

*Cryptobairdia seminalis* (Knight, 1928)  
(Fig. 15D–F)

*Bairdia seminalis* Knight, 1928: 320, pl. 43, fig. 2a–d. — Kellett 1934: 127, pl. 15, fig. 2a–c.

*Cryptobairdia seminalis* – Sohn 1960: 51. — Chen & Shi 1982: 126, pl. 7, fig. 1–4.

MATERIAL EXAMINED. — Eight complete and two incomplete carapaces.

OCCURRENCES. — Henrietta Formation, Missouri, Middle to Late Pennsylvanian (Knight 1928); Des Moines series and Neva Formation, Kansas, Early Pennsylvanian to Early Permian (Kellett 1934); Nantong section, Jiangsu Province, latest Permian (Chen & Shi 1982); samples 07PB03-5 and 07PB03-7, Khao Kana section, Pha Nok Khao Formation, Phetchabun Province, central Thailand, Early Permian; sample 07PB04-2, Nong Phai section, Pha Nok Khao Formation, Phetchabun Province, central Thailand, Early Permian.

DIMENSIONS. — H = 0.31–0.59 mm, L = 0.43–0.84 mm, H/L = 0.70–0.72.

*Cryptobairdia* sp.  
(Figs 15G; 16G–I)

MATERIAL EXAMINED. — Four complete and three incomplete carapaces

OCCURRENCES. — Samples 08LO07-1 and 08LO07-10, Sak Chai Quarry section, Pha Nok Khao Formation, Chaiyaphum Province, northeastern Thailand, Early Permian; sample 07LB05-2, Ta Kli section, Tak Fa Formation, Nakhon Sawan Province, central Thailand, Early Permian; samples 07PB03-1, 07PB03-7 Khao Kana section, Pha Nok Khao Formation, Phetchabun province, central Thailand, Early Permian; sample 07PB05-6, Ban Naen Sawan I section, Tak Fa Formation, Phetchabun province, central Thailand, Middle Permian.

DIMENSIONS. — H = 0.30–0.75 mm, L = 0.57–1.11 mm, H/L = 0.61–0.64.

REMARKS

The specimens can be compared to *Cryptobairdia seminalis* (Knight, 1928) (see above) by the subelliptical outline and the wide AB; however, some differences are recognized such as the longer ADB of the former species and position of maximal H which is at mid L for the former species and in front of mid L for the latter species.

Genus *Bairdiacypris* Bradfield, 1935

TYPE SPECIES. — *Bairdiacypris deloi* Bradfield, 1935 by original designation.

*Bairdiacypris longirobusta* Chen, 1958  
(Fig. 15M)

*Bairdiacypris longirobusta* Chen, 1958: 255, pl. 7, figs 1–3. — Chen & Shi 1982: 136, pl. 10, figs 12–18. — Shi & Chen 1987: pl. 12, figs 21, 22; 2002: pl. 21, figs 4–7.

MATERIAL EXAMINED. — One complete carapace.

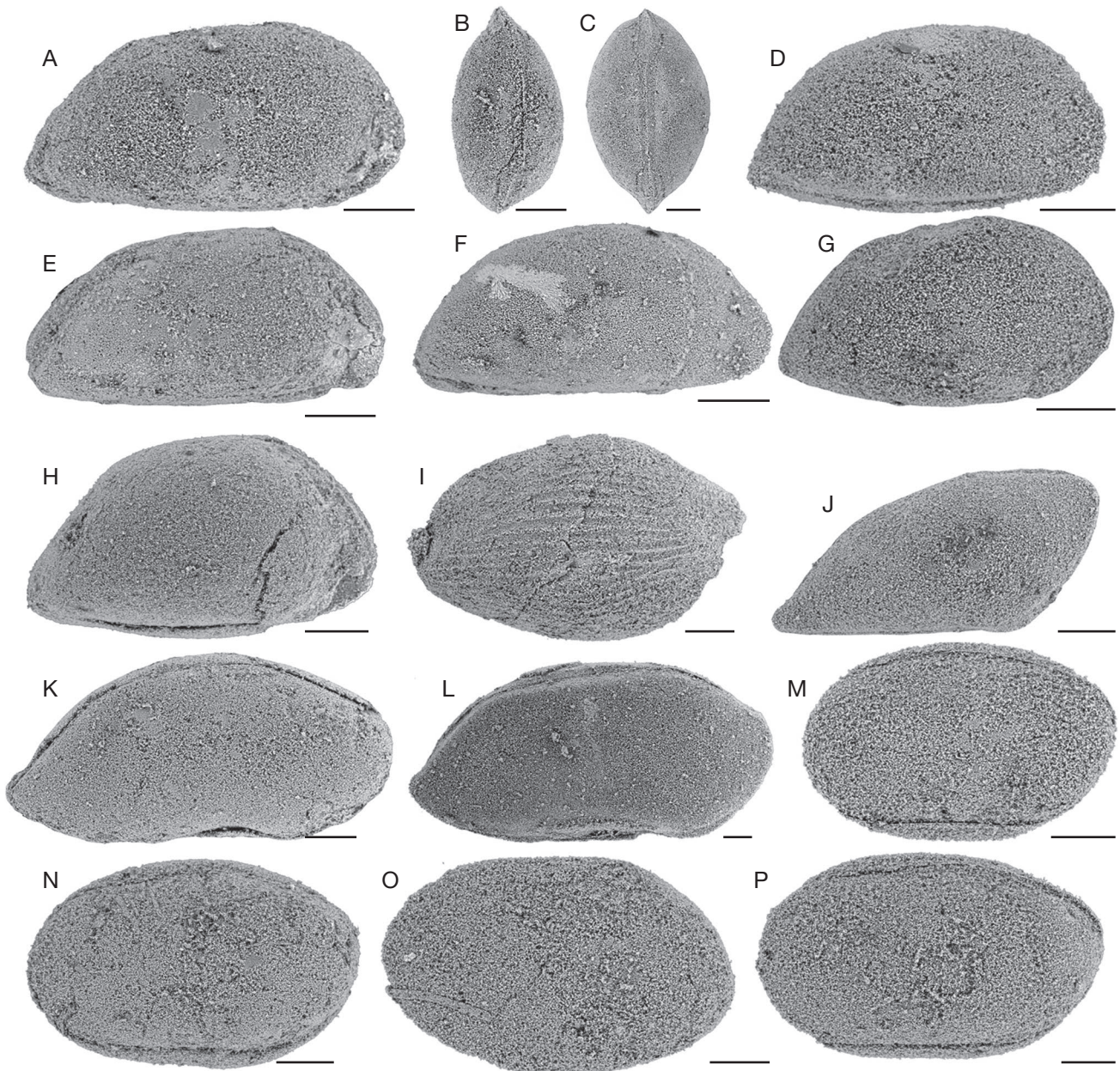


FIG. 13. — Ostracods from Indochina Block, Central Thailand. All specimens are stored at the Suranaree University of Technology Collections (Nakhon Ratchasima, Thailand) numbers SUT-09-xxxx. All the specimens are represented by complete carapaces. **A-H**, *Liuzhinia naramasei* Chitnarin, n. sp.; **A**, holotype, right lateral view, SUT-09-2071, sample 07LB09-1; **B**, dorsal view, SUT-09-2070, sample 07LB09-1; **C**, ventral view, SUT-09-2081, sample 07LB05-A2; **D**, right lateral view, SUT-09-2080, sample 07LB05-A2; **E**, paratype, right lateral view, SUT-09-2076, sample 07PB03-5; **F**, right lateral view, SUT-09-2086, sample 07LB05-B2; **G**, right lateral view, SUT-09-2095, sample 07LB09-2; **H**, paratype, right lateral view, SUT-09-20742074, sample 08L01-1; **I**, *?Pseudocanthoscapha* sp., right lateral view, SUT-09-2647, sample 08L007-2; **J**, *Bohlenatia* sp., right lateral view, SUT-09-2491, sample 08L002-1; **K, L**, *Bairdia piscariformis* Chen, 1958; **K**, right lateral view, SUT-09-2299, sample 07LB09-1; **L**, right lateral view, SUT-09-2298, sample 08L002-1; **M-P**, *Cavellina* sp.; **M**, right lateral view, SUT-09-2494, sample 07PB03-3; **N**, right lateral view, SUT-09-2493, sample 07PB03-3; **O**, left lateral view, SUT-09-2506, sample 07PB03-3; **P**, right lateral view, SUT-09-2495, sample 07PB03-3. Scale bars: 100 µm.

**OCCURRENCES.** — Kwanshan and Lungtan sections, Chihshia Limestone, Nanking Province, Early Permian (Chen 1958); Nantong section, Jiangsu Province, latest Permian (Chen & Shi 1982); Meishan section, Zhejiang Province, latest Permian (Shi & Chen 1987); Matan and Pingding sections, Guangxi, South China, latest Permian (Shi & Chen 2002); sample 07LB05-5, Ta Kli section, Tak Fa Formation, Nakhon Sawan Province, central Thailand, Early Permian.

**DIMENSIONS.** — H = 0.58 mm, L = 1.36 mm, H/L = 0.42.

*Bairdiacypris deloi* Bradfield, 1935  
(Fig. 16B)

*Bairdiacypris deloi* Bradfield, 1935: 93, pl. 7, figs 8a, b, 9a, b. — Cooper 1946: 53, pl. 4, figs 22, 23. — Cordell 1952: 95, pl. 19, figs 19, 20. — Sohn 1960: 58, pl. 2, fig. 29; pl. 3 figs 1-5. — Ishizaki 1964: 154, pl. 16, fig. 12. — Lethiers *et al.* 1989: pl. 2, fig. 9. — Crasquin-Soleau & Baud 1998: pl. 3, fig. 15.

**MATERIAL EXAMINED.** — One complete carapace.



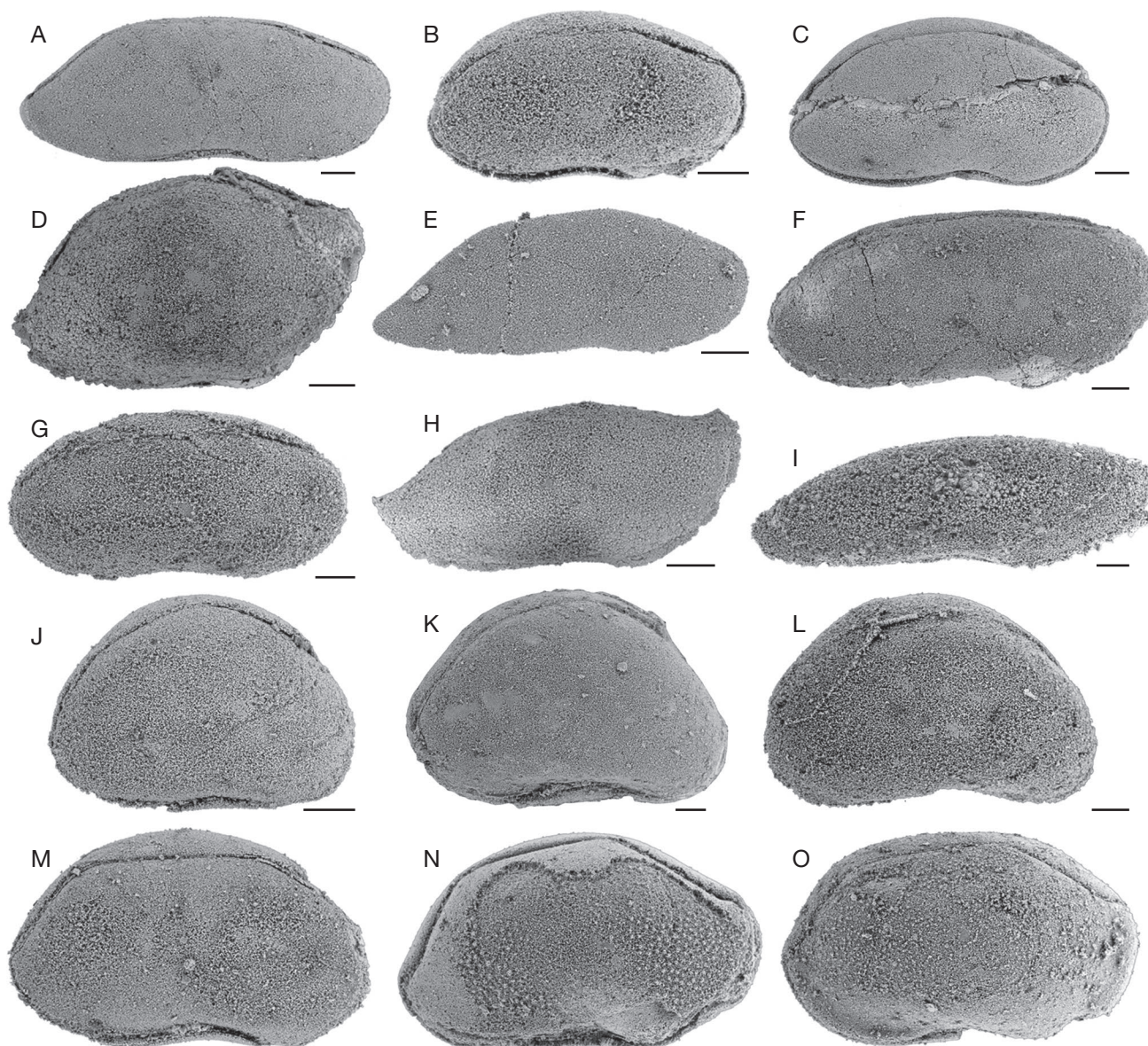


FIG. 14. — Ostracods from the limestones of the Indochina Block, Central Thailand. All specimens are stored at the Suranaree University of Technology Collections (Nakhon Ratchasima, Thailand) numbers SUT-09-xxxx. All the specimens are complete carapaces in right lateral view. **A**, *Bairdiacypris* sp. A, SUT-09-2340, sample 07PB05-3. **B**, *Bairdiacypris* sp. B; **B**, SUT-09-2341, sample 08LB01-2; **C**, SUT-09-2351, sample 07LB04-4; **D**, *Bairdia* sp. I, SUT-09-2314, sample 07LB04-13; **E**, *Bairdiacypris* sp. C, SUT-09-2352, sample 07PB08-3; **F**, *Fabalitypris* sp. A, SUT-09-2525, sample 08PB01-2; **G**, *Fabalitypris* sp. B, SUT-09-2526, sample 08LB01-3; **H**, *Bairdia* sp. J, SUT-09-2315, sample 08LO07-10; **I**, *Bairdiidae* indet. sp. A, SUT-09-2492, sample 08LB01-6; **J-L**, *Silenites sureeae* Chitnarin, n. sp.; **J**, paratype, SUT-09-2648, sample 07PB04-5; **K**, holotype, SUT-09-2650, sample 07LB05-D3; **L**, SUT-09-2661, sample 08LO02-10; **M**, *Silenites* sp., SUT-09-2647, sample 07PB05-5; **N, O**, *Kempfina* sp.; **N**, SUT-09-2534, sample 08LB01-2; **O**, SUT-09-2536, sample 08LO01-4. Scale bars: 100  $\mu$ m.

OCCURRENCES. — Pennsylvanian of Western USA (Bradfield 1935; Cooper 1946; Cordell 1952; Sohn 1960); Middle Permian of north-east Japan, (Ishizaki 1964); Middle Permian of Tunisia (Lethiers *et al.* 1989); Late Permian of Hydra Island, Greece, (Crasquin-Soleau & Baud 1998); sample 07PB05-6, Ban Naen Sawan I section, Tak Fa Formation, Phetchabun Province, central Thailand, Middle Permian.

DIMENSIONS. — H = 0.49 mm, L = 1.09, H/L = 0.45.

#### Genus *Fabalitypris* Cooper, 1946

TYPE SPECIES. — *Fabalitypris wileyensis* Cooper, 1946 by original designation.

#### *Fabalitypris bathaithipae* Chitnarin, n. sp. (Figs 16C-F; 18)

TYPE MATERIAL. — Holotype, one complete carapace (SUT-09-2341, Fig. 16C); paratypes, two complete carapaces (SUT-09-2348, Fig. 16D and SUT-09-2349, Fig. 16E).

ETYMOLOGY. — In honour of Assistant Professor Dr Hathaithip Tassanapak, Department of Biology, Mahasarakham University, Thailand.

MATERIAL EXAMINED. — Twenty complete carapaces.



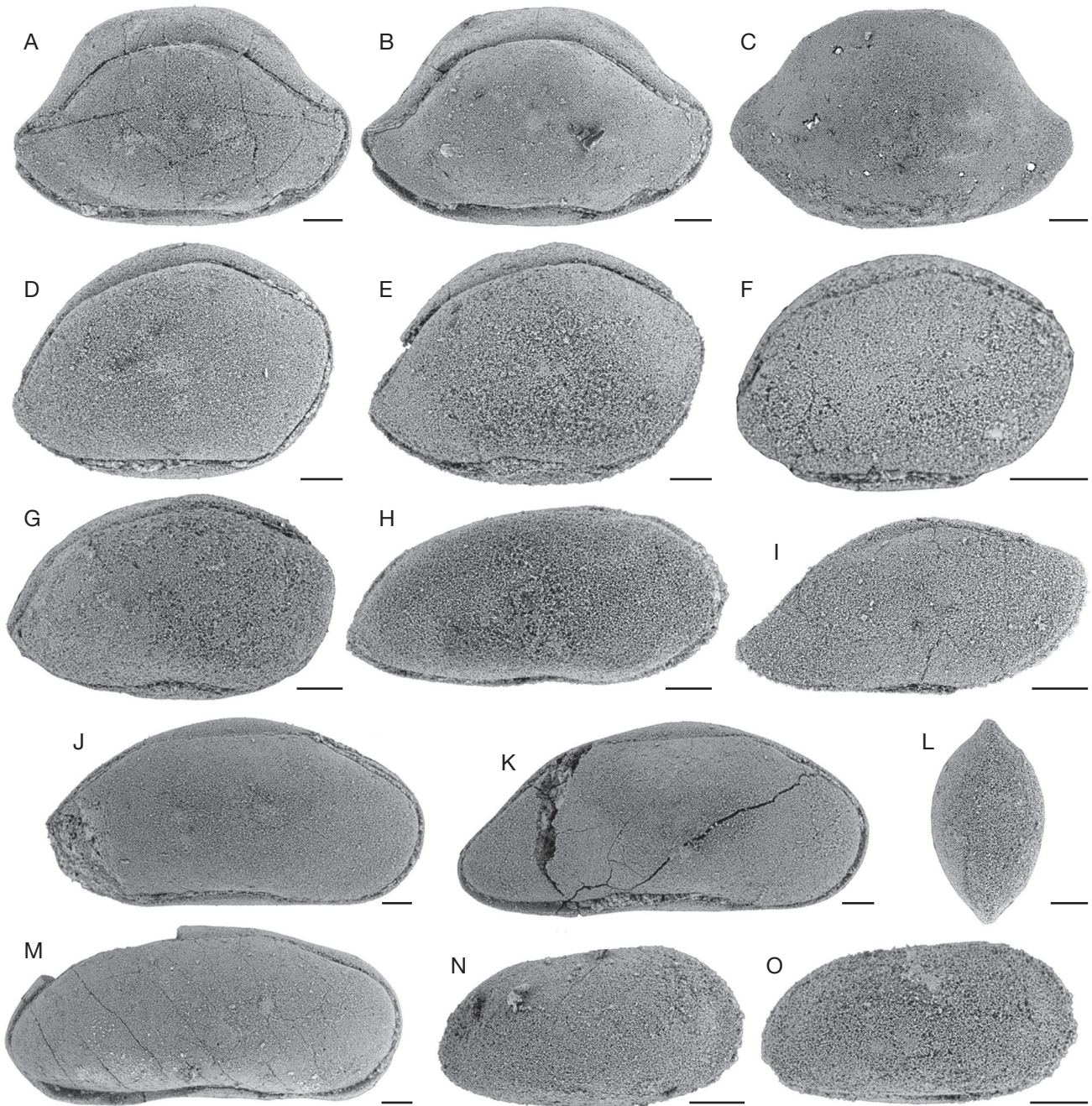


FIG. 15. — Ostracods from Indochina Block, Central Thailand. All specimens are stored at the Suranaree University of Technology Collections (Nakhon Ratchasima, Thailand) numbers SUT-09-xxxx. All the specimens are represented by complete carapaces. **A–C**, *Petasobairdia subnantongensis* Chen, 1987; **A**, right lateral view, SUT-09-2578, sample 07PB05-2; **B**, right lateral view, SUT-09-2583, sample 07PB05-3; **C**, left lateral view, SUT-09-2581, sample 07PB05-2. **D–F**, *Cryptobairdia seminalis* (Knight) *sensu* Shi & Chen, 1982; **D**, right lateral view, SUT-09-2507, sample 07PB04-2; **E**, right lateral view, SUT-09-2508, sample 07PB04-2; **F**, right lateral view, SUT-09-2511, sample 07LB05-5. **G**, *Cryptobairdia* sp., right lateral view, SUT-09-2515, sample 07PB03-17. **H**, *Fabalicypis* sp. C, right lateral view, SUT-09-2527, sample 07LB07-17. **I**, *Bairdia* sp. K, right lateral view, SUT-09-2317, sample 08LO07-8. **J, K**, *Bairdiacypris* sp. D; **J**, right lateral view, SUT-09-2355, sample 07PB05-3; **K**, right lateral view, SUT-09-2353, sample 07PB05-3. **L, N, O**, *Liuzhinia praeantalyaensis* Forel, 2010; **L**, dorsal view, SUT-09-2099, sample 08LO02-5; **N**, right lateral view, SUT-09-2100, sample 08LO02-5; **O**, right lateral view, SUT-09-2099, sample 08LO02-5. **M**, *Bairdiacypris longirobusta* Chen, 1958, right lateral view, SUT-09-2361, sample 07LB05-5. Scale bars: 100  $\mu$ m.

**DIMENSIONS.** — H = 0.31–0.46 mm, L = 0.66–1.02 mm, H/L = 0.41–0.45, Holotype: H = 0.40 mm, L = 0.96 mm; Paratype (Fig. 16D): H = 0.42 mm, L = 0.92 mm; Paratype (Fig. 16E): H = 0.41 mm, L = 0.89 mm (Fig. 18).

**TYPE HORIZON.** — Sample 07PB04-2, Nong Phai section, Pha Nok Khao Formation, Asselian-Sakmarian, Early Permian.

**TYPE LOCALITY.** — Nong Phai section (16°01'06"N, 100°58'59"E), Pha Nok Khao Formation, Phetchabun Province, central Thailand.

**OCCURRENCES.** — Sample 07PB04-2, Nong Phai section, Pha Nok Khao Formation, Phetchabun province, central Thailand, Early Permian; sample 07LO07-8, Sak Chai Quarry section, Pha Nok Khao Formation, Chaiyaphum Province, northeastern Thailand, Early Permian; sample 07LB05-5, Ta Kli section, Tak Fa Formation,



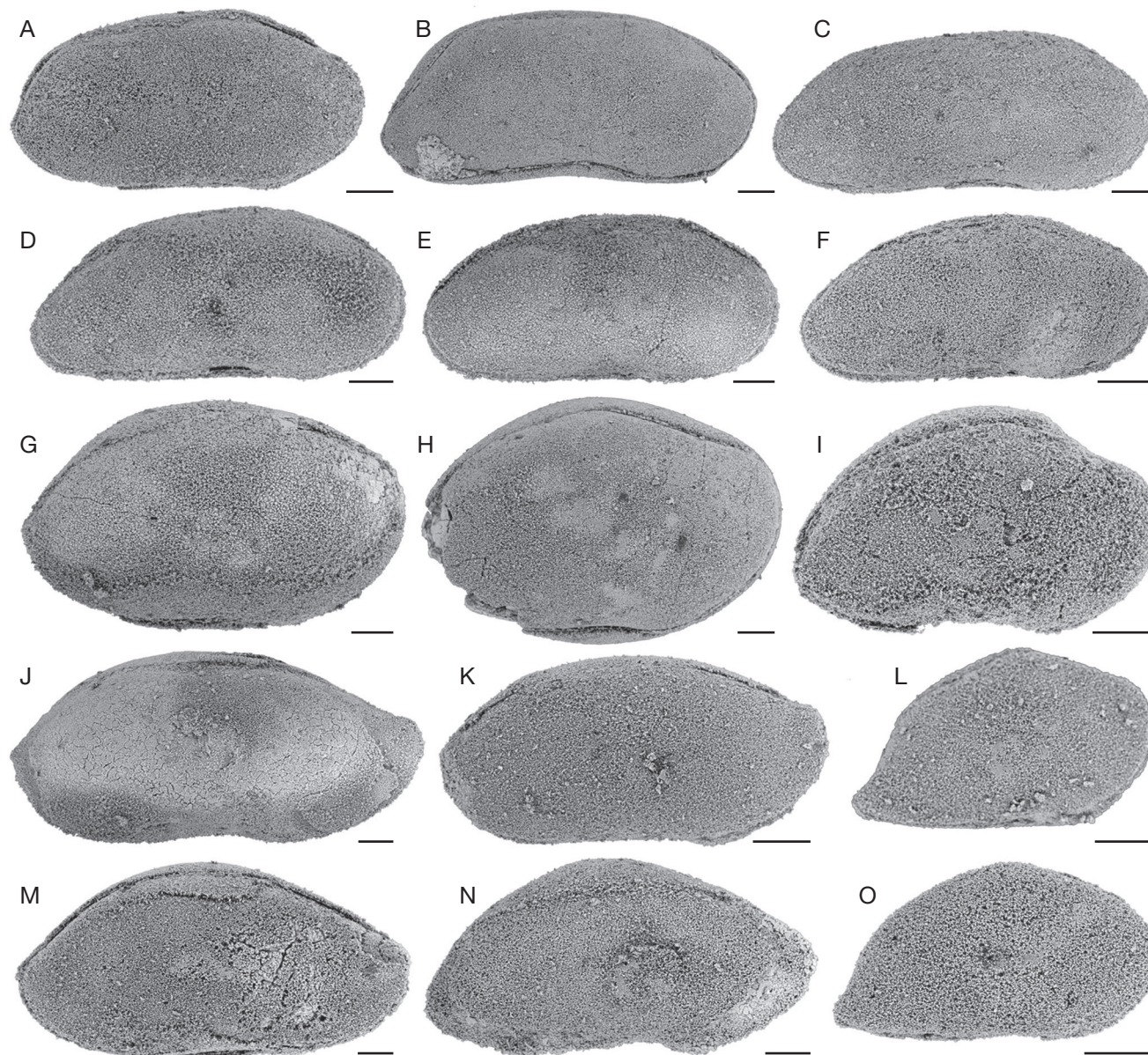


FIG. 16. — Ostracods from the limestones of the Indochina Block, Central Thailand. All specimens are stored at the Suranaree University of Technology Collections (Nakhon Ratchasima, Thailand) numbers SUT-09-xxxx. All specimens are complete carapaces in right lateral view. **A**, *Bairdiacypris* sp. E, SUT-09-2357, sample 07PB03-1; **B**, *Bairdiacypris deloi* Bradfield, 1935, SUT-09-2360, sample 07PB05-6; **C-F**, *Fabaliocypris hathaithipae* Chitnarin, n. sp.; **C**, holotype, SUT-09-2341, sample 07PB04-2; **D**, paratype, SUT-09-2348, sample 07PB04-2; **E**, paratype, SUT-09-2349, sample 07PB04-2; **F**, SUT-09-2235, sample 08LO07-8; **G-I**, *Cryptobairdia* sp., **G**, SUT-09-2364, sample 08LO07-1; **H**, SUT-09-2362, sample 07P05-6; **I**, SUT-09-2363, sample 07P03-1; **J, K**, *Bairdiacypris* sp. F; **J**, SUT-09-2366, sample 08LO07-2; **K**, SUT-09-2367, sample 08LO02-11; **L**, *Bairdia* sp. L, SUT-09-2369, sample 07PB08-2; **M**, *Bairdiacypris* sp. G, SUT-09-2370, sample 07PB03-7; **N**, *Bairdiacypris* sp. H, SUT-09-2372, sample 07LB04-13; **O**, *Bairdia* sp. M, SUT-09-2373, sample 07LB09-2. Scale bars: 100  $\mu$ m.

Nakhon Sawan Province, central Thailand, Early Permian; sample 07LB04-13, Phu Lam Yai section, Tak Fa Formation, Nakhon Sawan Province, central Thailand, Early Permian.

**DIAGNOSIS.** — Species of *Bairdiacypris* with maximum of convexity of AB and PB located just below mid H, angles of ADB and PDB with DB are of  $140^\circ$ , angles of ADB and PDB with DB are of  $160^\circ$ , maximum H located in front of mid L.

#### DESCRIPTION

Carapace long, subelliptical; dorsal outline broadly arched; DB straight, inclined rearward with an angle of  $10^\circ$ ; ADB short, straight and angle with DB is  $140^\circ$ ; AB rounded with medium

radius of curvature, maximum convexity located below mid H (at 40–45%); AVB short and slightly convex; VB slightly concave, angle of AVB and VB is  $160^\circ$ ; PVB slightly convex; PB round with medium radius of curvature, slightly smaller than AB, maximum convexity located at lower 30% of H; PDB short, straight, angle with DB is  $140^\circ$ , maximum H located in front of mid L, at anterior third of L; surface smooth.

#### REMARKS

*Fabaliocypris hathaithipae* Chitnarin, n. sp. can be compared to *Fabaliocypris elliptica* Chen, 1958 from the Early Permian of Jiangsu Province, Eastern China (Chen 1958: 256, pl. VII,



figs 7-9) in lateral outline. *Fabalicypsis elliptica* is distinct from the present new species by a more convex AVB and lower position of maximum of convexity of PB and maximum H located anteriorly at 30% of L. Furthermore, the long carapace, straight DB, developed PDB slope exhibited by *F. elliptica* are rather indicative of the genus *Bairdiacypris*, a revision of this species will be necessary.

### Genus *Silenites* Coryell & Booth, 1933

TYPE SPECIES. — *Silenites silenites* Coryell & Booth, 1933 by original designation.

#### *Silenites sureeae* Chitnarin, n. sp. (Figs 14J-L; 19)

TYPE MATERIAL. — Holotype, one complete carapace (SUT-09-2650, Fig. 14K); paratypes, two complete carapaces (SUT-09-2648, Fig. 14J and SUT-09-2661, Fig. 14L);

ETYMOLOGY. — In honour of Dr Suree Teerarungsikul, Department of Mineral Resources, Thailand.

MATERIAL EXAMINED. — One incomplete and 13 complete carapaces.

DIMENSIONS. — H = 0.42–0.58 mm, L = 0.60–0.90 mm, H/L = 0.62–0.70, Holotype: H = 0.73 mm, L = 1.08 mm; Paratype (Fig. 14J): H = 0.42 mm, L = 0.60 mm; Paratype (Fig. 14L): H = 0.58 mm, L = 0.90 mm. (Fig. 19).

TYPE HORIZON. — Sample 07LB05-D3, Ta Kli section, Tak Fa Formation, Nakhon Sawan Province, central Thailand, Early Permian.

TYPE LOCALITY. — Nong Phai section (16°01'06"N, 100°58'59"E), Pha Nok Khao Formation, Phetchabun Province, central Thailand.

OCCURRENCES. — Samples 08LO02-5 and 08LO02-10, Nam Maholan section, Nam Maholan Formation, Loei Province, northeast Thailand, Early Permian; sample 07PB04-5, Nong Phai section, Pha Nok Khao Formation, Phetchabun Province, central Thailand, Early Permian; samples 07LB05-D2 and 07LB05-D3, Ta Kli section, Tak Fa Formation, Nakhon Sawan Province, Early Permian; sample 07PB08-3, Ban Nuan Sawan II section, Tak Fa Formation, Phetchabun Province, central Thailand, Middle Permian; samples 08LB01-3 and 08LB01-6, Khao Som Phot section, Tak Fa Formation, Lopburi Province, Middle Permian.

DIAGNOSIS. — Species of *Silenites* with rounded subtriangular carapace, highly arched dorsal outline, short and straight DB of RV, H max is located at mid L, AB and PB of the same size.

#### DESCRIPTION

Carapace subtriangular; dorsal outline highly arched; DB short, convex at LV, straight at RV which inclined at 15–25° rearward; ADB long and slightly convex, AB with large radius of curvature, maximum convexity located at lower fourth of H; AVB short and convex; VB concave; PVB short and convex; PB round with large radius of curvature, maximum convexity located at lower fourth of H; maximum of curvature of AB and PB located at the same level; greatest H located at mid L; surface smooth; LV larger and overlapping RV at DB.

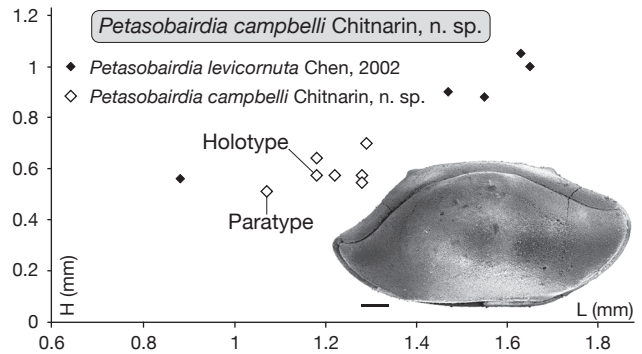


FIG. 17. — Height (H)-length (L) diagram of *Petasobairdia campbelli* Chitnarin, n. sp. Scale bar: 100 µm.

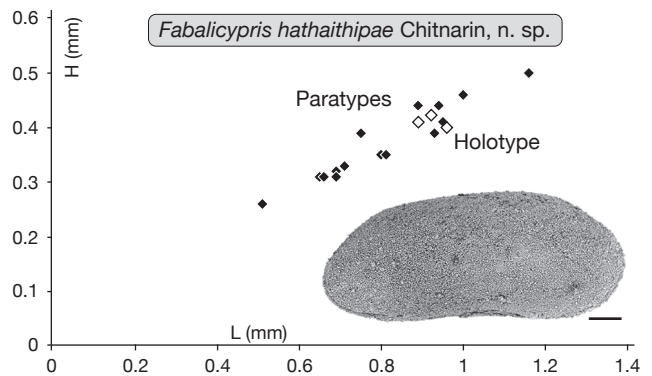


FIG. 18. — Height (H)-length (L) diagram of *Fabalicypsis hathaithipae* Chitnarin, n. sp. Scale bar: 100 µm.

#### REMARKS

*Silenites sureeae* Chitnarin, n. sp. looks similar to three species from the Early Permian of Jiangsu Province, Eastern China (Chen & Bao 1986): 1) *Silenites testatus* Chen, 1958 (*in* Chen & Bao 1986: 125, pl. 2, figs 10, 11) but differs in having more rounded DB and maximum H located at mid L; 2) *S. cf. marginiferus* (Geis, 1932) *sensu* Chen & Bao (1986: 125, 126, pl. 2, fig. 12) but can be differentiated by the straight DB on RV of *S. sureeae*; and 3) *S. unicus* Chen & Bao, 1986 (Chen & Bao 1986: 126, pl. 2, figs 13, 14) but it lacks a crest on posteroventral region of RV.

### Family ACRATIIDAE Gründel, 1962

#### Genus *Acratia* Delo, 1930

TYPE SPECIES. — *Acratia typica* Delo, 1930 by original designation.

#### *Acratia chongpani* Chitnarin, n. sp. (Figs 21A-G; 22)

*Acratina gusevae* Kozur, 1985b: 104, pl. 20, fig. 1. — Crasquin-Soleau & Baud 1998: pl. 3, fig. 1. n. syn.

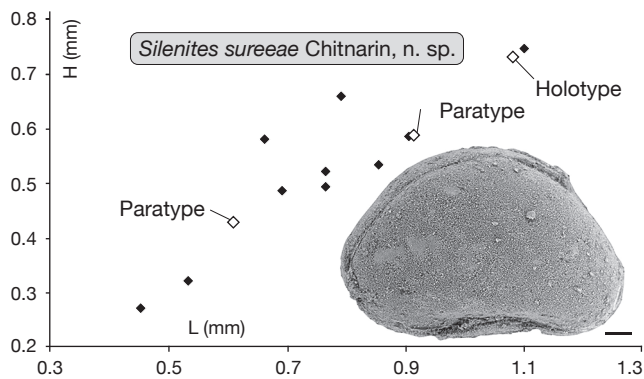


FIG. 19. — Height (H)-length (L) diagram of *Silenites sureeae* Chitnarin, n. sp. Scale bar: 100 µm.

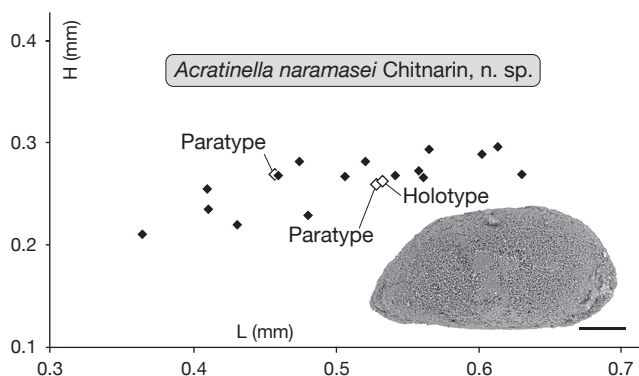


FIG. 20. — Height (H)-length (L) diagram of *Acratinella naramasei* Chitnarin, n. sp. Scale bar: 100 µm.

**TYPE MATERIAL.** — Holotype, one complete carapace (SUT-09-2006, Fig. 21A); paratypes, two complete carapaces (SUT-09-2001, Fig. 21E and SUT-09-2013, Fig. 21F).

**ETYMOLOGY.** — In honour of Dr Chongpan Chonglakmani, Thailand.

**MATERIAL EXAMINED.** — 51 complete carapaces.

**DIMENSIONS.** —  $H = 0.25\text{--}0.51$  mm,  $L = 0.66\text{--}1.18$  mm,  $H/L = 0.43\text{--}0.53$ , Holotype:  $H = 0.73$  mm,  $L = 1.08$  mm; Paratype (Fig. 21F):  $H = 0.42$  mm,  $L = 0.60$  mm; Paratype (Fig. 21E):  $H = 0.58$  mm,  $L = 0.90$  mm (Fig. 22).

**TYPE HORIZON.** — Sample 07LB05-6, Ta Kli section, Tak Fa Formation, Early Permian.

**TYPE LOCALITY.** — Ta Kli section ( $15^{\circ}19'05''\text{N}$ ,  $100^{\circ}22'46''\text{E}$ ), Tak Fa Formation, Nakhon Sawan Province, central Thailand.

**OCCURRENCES.** — Hydra Island, Greece, late Middle Permian (Crasquin-Soleau & Baud 1998); sample 08LO07-3, Sak Chai section, Pha Nok Khao Formation, Chiyaphum Province, northeast Thailand, Early Permian; samples 07PB03-2, 07PB03-3 and 07PB03-5, Khao Kana section, Pha Nok Khao Formation, Phetchabun Province, central Thailand, Early Permian; sample 07LB05-6, Ta Kli section, Tak Fa Formation, Nakhon Sawan Province, central Thailand, Early Permian; sample 08LB01-1, Khao Som Phot section, Tak Fa Formation, Lopburi Province, central Thailand, Middle Permian.

**DIAGNOSIS.** — Species of *Acratia* with a laterally flattened, long, hook-like AB, pointing downward, and located at lower 30% of H, angle between AVB and VB is  $150^{\circ}$  and PB is located at ventral level.

## DESCRIPTION

Carapace long and large; dorsal outline broadly arched; DB slightly convex on LV, straight on RV which gently inclined rearward at  $15\text{--}20^{\circ}$ ; ADB convex and with an angle of  $140^{\circ}$  with DB; PDB convex and with an angle of  $140^{\circ}$  with DB; AB of a hook-like shape, maximum convexity located at lower third of H, AB flattened laterally; AVB long and making an angle of  $150^{\circ}$  with VB; VB straight to slightly concave; ventral area flat; PVB short in extension of VB; PB bluntly round and located at VB; maximum H located in front of mid L; surface smooth; LV larger and overlapping RV at ADB and PDB; carapace subfusiform in dorsal view.

## REMARKS

*Acratia chongpani* Chitnarin, n. sp. can be compared to *A. praetypica* Posner, 1951 from the Early Carboniferous of Moscow Basin, Russia (Posner 1951: 98, pl. 21, fig. 9) in lateral outline. Differences occur at VB which is blunt in *A. chongpani* but raised upward in *A. praetypica*, and at the angle between AVB and VB which is of  $150^{\circ}$  in the former species but of  $140^{\circ}$  in the latter. *Acratina gusevae* Kozur sensu Crasquin-Soleau & Baud 1998 is included to *A. chongpani* Chitnarin, n. sp. due to the smaller AVB and the shorter PVB than those in *Acratina gusevae* Kozur, 1985.

## *Acratia mongkoli* Chitnarin, n. sp. (Figs 21J–M; 23)

*Bairdia galei* – Crasquin-Soleau & Baud 1998: pl. 3, fig. 18 (*nec* Cro-neis & Thurman 1939: 325, pl. 7, fig. 21).

**TYPE MATERIAL.** — Holotype, one complete carapace (SUT-09-2058, Fig. 21K); paratypes, two complete carapaces (SUT-09-2063, Fig. 21L and SUT-09-2062, Fig. 21M).

**ETYMOLOGY.** — In honour of Assistant Professor Dr Mongkol Udchachon, Mahasarakham University, Thailand.

**MATERIAL EXAMINED.** — Ten complete carapaces.

**DIMENSIONS.** —  $H = 0.29\text{--}0.54$  mm,  $L = 0.56\text{--}1.01$  mm,  $H/L = 0.50\text{--}0.53$ , Holotype:  $H = 0.38$  mm,  $L = 0.79$  mm; Paratype (Fig. 21M):  $H = 0.38$  mm,  $L = 0.77$  mm; Paratype (Fig. 21L):  $H = 0.30$  mm,  $L = 0.66$  mm (Fig. 23).

**TYPE HORIZON.** — Sample 07PB04-2, Nong Phai section, Pha Nok Khao Formation, Asselian-Sakmarian, Early Permian.

**TYPE LOCALITY.** — Nong Phai section ( $16^{\circ}01'06''\text{N}$ ,  $100^{\circ}58'59''\text{E}$ ), Pha Nok Khao Formation, Phetchabun Province, central Thailand.

**OCCURRENCES.** — Early Permian of Hydra Island, Greece (Crasquin-Soleau & Baud 1998); sample 08LO07-2, Sak Chai quarry section, Pha Nok Khao Formation, Chaiyaphum Province, northeast Thailand, Early Permian; sample 07PB03-3, Khao Kana section, Pha Nok Khao Formation, Phetchabun Province, central Thailand, Early Permian; sample 07PB04-2, Nong Phai section, Pha Nok Khao Formation, Phetchabun Province, central Thailand, Early Permian; sample 08PB02-12, Phu Phra That section, Tak Fa Formation, Phetchabun Province, central Thailand, Middle Permian; sample 08LB01-1, Khao Som Phot section, Tak Fa Formation, Lopburi Province, central Thailand, Middle Permian.



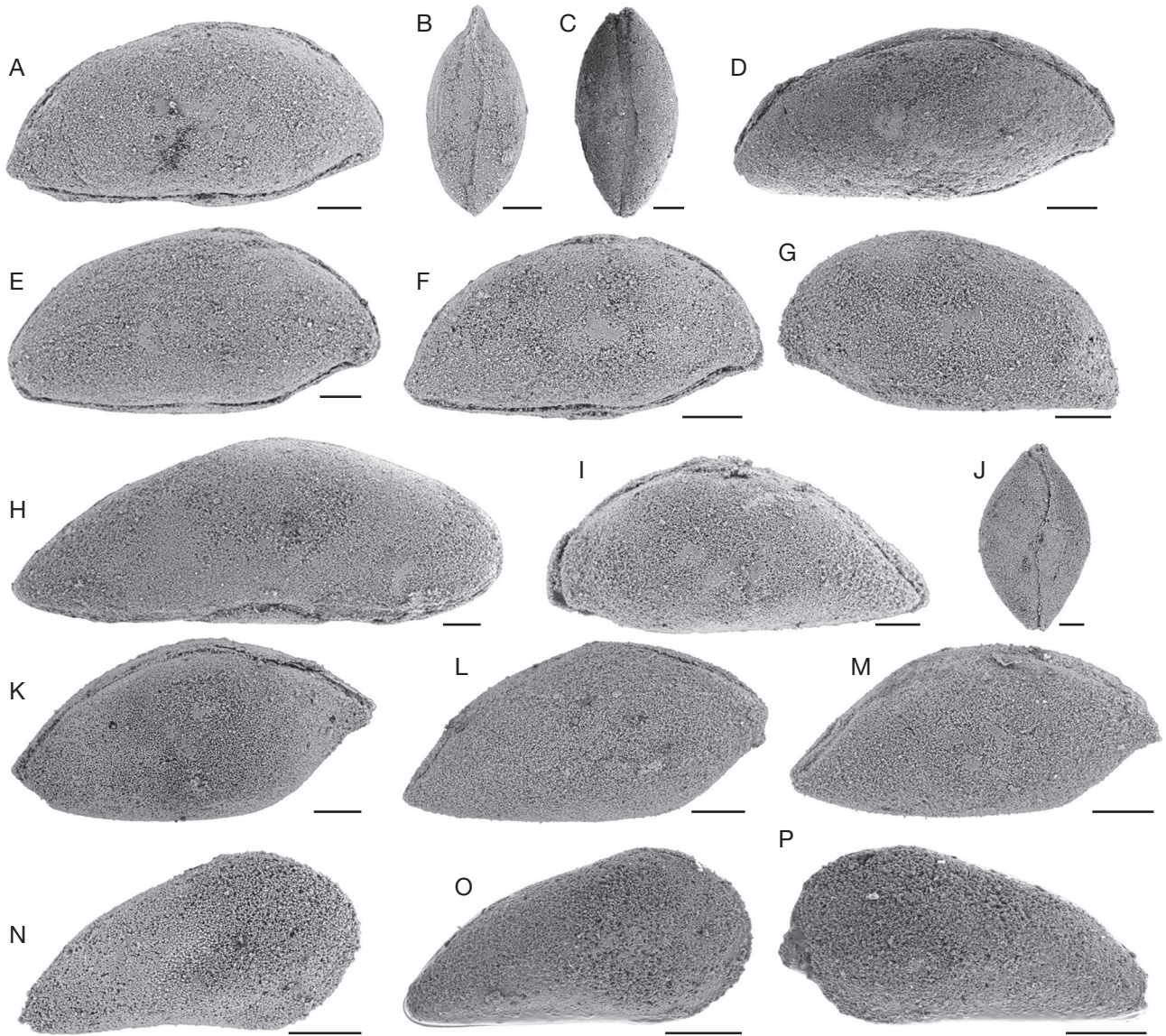


FIG. 21. — Ostracods from the limestones of the Indochina Block, Central Thailand. All specimens are stored at the Suranaree University of Technology Collections (Nakhon Ratchasima, Thailand) numbers SUT-09-xxxx. All the specimens are represented by complete carapaces. **A–G**, *Acratia chongpani* Chitnarin, n. sp.: **A**, holotype, right lateral view, SUT-09-2006, sample 07PB03-3; **B**, dorsal view, SUT-09-2018, sample 07PB03-5; **C**, ventral view, SUT-09-2042, sample 07PB03-2; **D**, right lateral view, SUT-09-2036, sample 07PB03-2; **E**, paratype, right lateral view, SUT-09-2001, sample 07PB03-5; **F**, paratype, right lateral view, SUT-09-2013, sample 07PB03-5; **G**, left lateral view, SUT-09-2020, sample 07PB03-3; **H**, *Bairdiidae* indet. sp. B, right lateral view, SUT-09-2567, sample 08LB01-2; **I**, *Acratia* sp., left lateral view, SUT-09-2055, sample 08LB01-3; **J–M**, *Acratia mongkoli* Chitnarin, n. sp.: **J**, ventral view, SUT-09-2067, sample 07PB04-2; **K**, holotype, right lateral view, SUT-09-2058, sample 07PB04-2; **L**, paratype, right lateral view, SUT-09-2063, sample 07LB09-1; **M**, paratype, right lateral view, SUT-09-2062, sample 07LB09-1; **N–P**, *Baschkirina* cf. *huzhouensis* Forel, 2010; **N**, left lateral view, SUT-09-2531, sample 08LB01-1; **O**, left lateral view, SUT-09-2528, sample 08LB01-1; **P**, right lateral view, SUT-09-2530, sample 08LB01-1. Scale bars: 100  $\mu$ m.

**DIAGNOSIS.** — Species of *Acratia* with diamond shape carapace, with laterally flattened and tapering AB, AB points horizontally, AVB makes an angle of  $140^\circ$  with VB, PVB make an angle of  $170^\circ$  with VB, PB tapering.

#### DESCRIPTION

Carapace with diamond shape in lateral view; dorsal outline broadly arched at LV, angulated at RV; DB of RV inclined at  $30^\circ$  rearward; ADB with an angle of  $140^\circ$  with DB; AB tapering and flattened, pointing horizontally, with maximum of curvature located above mid H; AVB long and straight, making an angle of  $140^\circ$  with VB; VB straight; ventral area

flattened; PVB short, angle of PVB and VB is  $170^\circ$ ; PB tapering with maximum of curvature located very low; greatest H located at mid L; surface smooth; LV larger and overlapping RV at DB; carapace fusiform in dorsal view.

#### REMARKS

*Acratia mongkoli* Chitnarin, n. sp. can be distinguished from *A. chongpani* Chitnarin, n. sp. (see above) by the smaller radius of curvature of AB, the tapering PB, and the angle between AVB and VB. It can be compared with *A. subfusiformis* Wang, 1978 from the Late Permian of South China (Crasquin *et al.* 2010a: figs 23I–L), however, the AB of the present species is



more tapering. It can be compared to *A. pulchra* Posner, 1951 from the Early Carboniferous of Moscow Basin, Russia (Posner 1951: 98, pl. 21, fig. 8) by the small radius of curvature of AB and PB but is differentiated by the position of AB and the angle between AVB and VB. Noteworthy, the specimens documented from the Early Permian of Greece by Crasquin-Soleau & Baud (1988) have been attributed to the *Bairdia galei* Croneis & Thurman, 1939 *sensu* Chen & Bao (1986). However, *Bairdia galei* is not mentioned neither figured by Chen & Bao (1986).

*Acratia?* sp.  
(Fig. 21I)

MATERIAL EXAMINED. — Two complete carapaces.

OCCURRENCES. — Samples 08LB01-1 and 08LB01-3, Khao Som Phot section, Tak Fa Formation, Lopburi Province, central Thailand, Middle Permian.

DIMENSIONS. — H = 0.39–0.40 mm, L = 0.83–0.85 mm, H/L = 0.46.

REMARKS

*Acratia?* sp. is characterized by an unusual reverse overlap of RV over LV. The inversion of overlap was observed by Zazzali *et al.* (2015: fig. 15C, D) on specimens from Guadalupian–Lopingian boundary of South China. The overlapping of RV over LV can be recognized as a distinct character of the genus *Macrocypris* Brady, 1867 (Moore 1961: Q207, fig. 146 1a–1b); however, the studied specimen is assigned here, with doubt, to *Acratia* due to the presence of acratian beak at AB.

Genus *Liuzhinia* Zheng, 1976

TYPE SPECIES. — *Liuzhinia subovata* Zheng, 1976 by original designation.

*Liuzhinia praeantalyaensis* Forel, 2010  
(Fig. 15L, N, O)

*Liuzhinia praeantalyaensis* Forel in Crasquin, Forel, Feng, Yuan, Baudin & Collin, 2010a: 253–255, fig. 23Z–B’.

MATERIAL EXAMINED. — Three complete carapaces.

OCCURRENCES. — Kongtongshan section, Fujian Province, China, Late Permian (Yi 2004); Meishan section, Zhejiang Province, South China, Late Permian (Crasquin *et al.* 2010a); sample 08LO02-5, Tham Nam Maholan section, Nam Maholan Formation, Loei Province, northeast Thailand, Early Permian.

DIMENSIONS. — H = 0.29–0.30 mm, L = 0.59–0.59 mm, H/L = 0.50–0.51

*Liuzhinia naramasei* Chitnarin, n. sp.  
(Figs 13A–H; 20)

TYPE MATERIAL. — Holotype, one complete carapace (SUT-09-2071, Fig. 13A); paratypes, two complete carapaces (SUT-09-2076, Fig. 13E and SUT-09-2074, Fig. 13H).

ETYMOLOGY. — In honour of Mr Naramase Teerarungsigul, Department of Mineral Resources, Thailand.

MATERIAL EXAMINED. — 29 complete carapaces.

DIMENSIONS. — H = 0.26–0.44 mm, L = 0.52–0.56 mm, H/L = 0.50–0.58, Holotype: H = 0.26 mm, L = 0.53 mm; Paratype (Fig. 13E): H = 0.26 mm, L = 0.528 mm; Paratype (Fig. 13H): H = 0.27 mm, L = 0.63 mm (Fig. 20)

TYPE HORIZON. — Sample 07LB09-1, Khao Phu Chong Kho section, Tak Fa Formation, Kungurian, Early Permian.

TYPE LOCALITY. — Khao Phu Chong Kho section (15°22’45”N, 100°35’12”E) Tak Fa Formation, Lopburi Province, central Thailand.

OCCURRENCES. — Sample 07PB03-5, Khao Kana section, Pha Nok Khao Formation, Phetchabun Province, central Thailand, Early Permian; sample 08LO07-1, Sak Chai Quarry, Pha Nok Khao Formation, central Thailand, Early Permian; sample 07LB09-2, Khao Phu Chongko section, Tak Fa Formation, Nakhon Sawan Province, central Thailand, Early Permian; samples 07LB05-B1 and 07LB05-B2, Ta Kli section, Tak Fa Formation, Nakhon Sawan Province, central Thailand, Early Permian.

DIAGNOSIS. — Species of *Liuzhinia* with a subtrapezoidal carapace, ADB and PDB straight, AB rounded and laterally flattened, maximum convexity located below mid H, PB acuminate and with maximum of curvature located at VB, ventral area flat.

DESCRIPTION

Carapace small, subtrapezoid; dorsal outline broadly arched; DB straight and gently inclined to posterior; ADB and PDB straight; AB rounded with medium radius of curvature, maximum convexity located below mid H; AVB short and slightly convex; VB straight; AB and AVB laterally flattened; PVB short; PB acuminate and located at VB level; greatest H located anteriorly at one-fourth of length; dorsal outline subfusiform; surface smooth; LV larger and overlap RV all around the carapace.

REMARKS

The new species differs from *Liuzhinia antalyaensis* Crasquin-Soleau, 2004 described from the Late Permian–Early Triassic interval of Turkey (Antalya Nappes; Crasquin-Soleau *et al.* 2004) by having a smaller PB and max H located in front of mid L. It can be compared with *L. praeantalyaensis* from the latest Permian of Meishan section, Zhejiang Province, South China (Crasquin *et al.* 2010a) by having AB located below mid H and the smaller PB but the carapace of *L. naramasei* Chitnarin, n. sp. is thicker in dorsal view.

Genus *Baschkirina* Rozdestvenskaja, 1959

TYPE SPECIES. — *Baschkirina memorabilis* Rozdestvenskaja, 1959 by original designation.

*Baschkirina ruchae* Chitnarin, n. sp.  
(Figs 24A–D; 25)

TYPE MATERIAL. — Holotype, one complete carapace (SUT-09-2375, Fig. 24A); paratypes, two complete carapaces (SUT-09-2374, Fig. 24C and SUT-09-2380, Fig. 24D).

ETYMOLOGY. — In honour to Mrs Rucha Ingavat-Helmkce.

MATERIAL EXAMINED. — 17 complete carapaces.

DIMENSIONS. —  $H = 0.35\text{--}0.51$  mm,  $L = 0.55\text{--}0.73$  mm,  $H/L = 0.64\text{--}0.69$ , Holotype:  $H = 0.51$  mm,  $L = 0.74$  mm; Paratype (Fig. 24C):  $H = 0.39$  mm,  $L = 0.59$  mm; Paratype (Fig. 24D):  $H = 0.53$  mm,  $L = 0.82$  mm (Fig. 25).

TYPE HORIZON. — Sample 08LO02-2, Nam Maholan section, Nam Maholan Formation, Loei Province, Early Permian.

TYPE LOCALITY. — Sample 08LO02-2, Nam Maholan section ( $17^{\circ}06'23''\text{N}$ ,  $101^{\circ}52'48''\text{E}$ ), Nam Maholan Formation, Loei Province, Early Permian.

OCCURRENCES. — Sample 08LO02-2, Nam Maholan section, Nam Maholan Formation, Loei Province, northeast Thailand, Early Permian; sample 07PB04-5, Nong Phai section, Pha Nok Khao Formation, Phetchabun Province, central Thailand, Early Permian.

DIAGNOSIS. — Species of *Baschkirina* with subtriangular carapace, highly arched dorsal outline, and AB laterally compressed with maximum convexity located below mid H, flanks subparallel in dorsal view.

#### DESCRIPTION

Carapace subtriangular; dorsal outline highly arched; DB straight and inclined at  $30^{\circ}$  rearward; ADB long, straight to slightly convex, with an angle of  $120^{\circ}$  with DB; PDB inclined sharply, making angle of  $150^{\circ}$  with DB; AB rounded with medium radius of curvature, maximum convexity located below mid H, and flattened laterally; AVB short; VB straight; PVB short; PB small, sub-spinose and located at or just above ventral level; LV slightly overlaps RV all around the carapace; greatest H located at mid L; in dorsal view, carapace thick, flanks subparallel and AB laterally compressed.

#### REMARKS

*Baschkirina ruchae* Chitnarin, n. sp. can be compared with *B. buekkensis* Kozur, 1985 from the Pennsylvanian of French Pyrénées and Bükk Mts, Hungary (Kozur 1985b: 90–91, pl. 22, fig. 1); however, *B. buekkensis* is characterized by a smaller H, a longer DB and the position of maximum H in front of mid L. It can be differentiated from *B. shii* Kozur, 1985 from the Wuchiapingian of Bükk Mts, Hungary (Kozur 1985a: 92, pl. 22, fig. 4) by an AB with smaller radius of curvature and strongly compressed laterally.

#### *Baschkirina* cf. *ballei* Crasquin, 2010 (Fig. 24I–L)

*Baschkirina ballei* Crasquin in Crasquin, Forel, Feng, Yuan, Baudin & Collin, 2010a: 358, fig. 23R–W.

MATERIAL EXAMINED. — 35 complete carapaces.

DIMENSIONS. —  $H = 0.23\text{--}0.42$  mm,  $L = 0.32\text{--}0.64$  mm,  $H/L = 0.65\text{--}0.75$ .

OCCURRENCES. — Samples 08LO02-1, 08LO02-2 and 08LO02-10, Tham Nam Maholan section, Nam Maholan Formation, Loei Province, northeastern Thailand, Early Permian; sample 07LB04-8, Phu

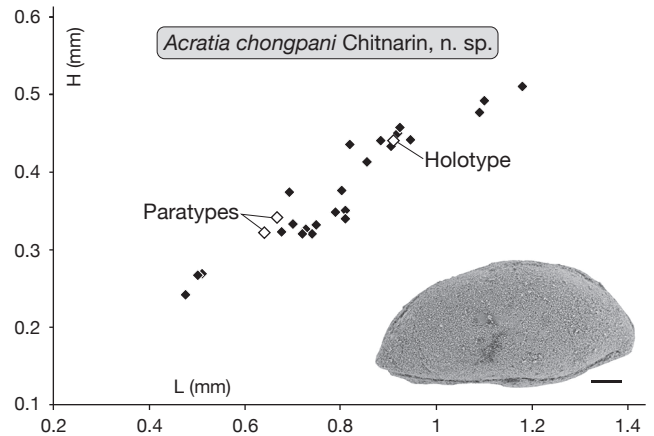


FIG. 22. — Height (H)-length (L) diagram of *Acratia chongpani* Chitnarin, n. sp. Scale bar: 100 µm.

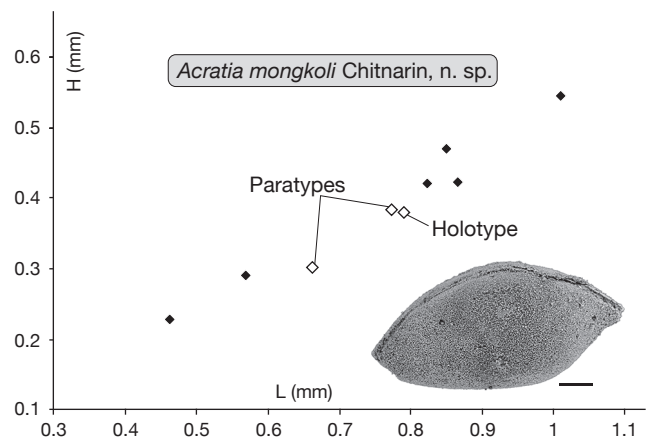


FIG. 23. — Height (H)-length (L) diagram of *Acratia mongkoli* Chitnarin, n. sp. Scale bar: 100 µm.

Lam Yai section, Tak Fa Formation, Nakhon Sawan Province, central Thailand, Early Permian; sample 07PB03-3, Khao Kana section, Pha Nok Khao Formation, Phetchabun Province, central Thailand, Early Permian; sample 07PB04-5, Nong Phai section, Pha Nok Khao Formation, Phetchabun Province, central Thailand, Early Permian.

#### REMARKS

The studied specimens look similar to *Baschkirina ballei* Crasquin, 2010 from latest Permian of Meishan section, South China (Crasquin *et al.* 2010a: 358, figs 23R–W). *Baschkirina ballei* have longer PDB and less compressed AB.

#### *Baschkirina* cf. *huzhouensis* Forel, 2010 (Fig. 21N–P)

*Baschkirina huzhouensis* Forel in Crasquin, Forel, Feng, Yuan, Baudin & Collin, 2010a: 359, fig. 23E–H.

MATERIAL EXAMINED. — Five complete carapaces.

OCCURRENCES. — Sample 08LB01-1, Khao Som Phot section, Tak Fa Formation, Lopburi Province, central Thailand, Middle Permian.

DIMENSIONS. —  $H = 0.23\text{--}0.26$  mm,  $L = 0.45\text{--}0.49$  mm,  $H/L = 0.50\text{--}0.52$ .



# REMARKS

Our specimens are similar to *B. huzhouensis* Forel, 2010 from the latest Permian of Meishan section, South China (Crasquin *et al.* 2010a: 359, fig. 23E-H) in having long carapace with straight DB and PDB. However, AB of *B. cf. huzhouensis* is less compressed and located above mid H, but AB is located at mid H in our specimens.

## Genus *Bohlenatia* Gründel, 1962

TYPE SPECIES. — *Acratia inornata* Cordell, 1952 by subsequent designation of Gründel (1962: 88).

### *Bohlenatia* sp. (Fig. 13J)

MATERIAL EXAMINED. — One complete carapace.

OCCURRENCES. — Sample 08LO02-1, Tham Nam Maholan section, Nam Maholan Formation, Loei Province, northeast Thailand, Early Permian.

DIMENSIONS. — H = 0.268 mm, L = 0.586 mm, H/L = 0.49.

# REMARKS

The studied specimen has an AB with very small radius of curvature and pointing upward, straight VB. It resembles *Bohlenatia bukkensis* Kozur, 1985 (Kozur 1985a: 86, pl. 18, fig. 7) in lateral outline. However here, the posterior dorsal point is located more ventrally than in *B. bukkensis* and the PDB is steeper than in *B. bukkensis*. Note here PDB and AVB are parallel.

## Suborder SIGILLIOCOPINA Martens, 1992 Superfamily SIGILLIOIDEA Mandelstam, 1960 Family MICROCHEILINELLIDAE Gram, 1975

### Genus *Microcheilinella* Geis, 1933

TYPE SPECIES. — *Microcheilus distortus* Geis, 1932 by original designation.

### *Microcheilinella shicheni* Crasquin, 2010 (Fig. 26R-S)

*Microcheilinella shicheni* Crasquin in Crasquin, Forel, Feng, Yuan, Baudin & Collin, 2010a: 31, fig. 22H, K, L, Q.

*Microcheilinella subreniformis* Chen, 1958: 253, pl. 2, figs 7-11, 24-29. — Chen & Shi 1982: 141, pl. 12, figs 1-6. — Shi & Chen 1987: 61, pl. 14, fig. 14-22; 2002: 93, pl. 25, figs 15-18.

MATERIAL EXAMINED. — One complete carapace and one broken carapace.

OCCURRENCES. — Late Permian of Guangxi Province (Shi & Chen 2002), of Meishan section, Zhejiang Province (Shi & Chen 1987 and Crasquin *et al.* 2010a); Sample 07PB08-2, Ban Naen Sawan II section, Pha Nok Khao Formation, Phetchabun Province, central Thailand, Middle Permian.

DIMENSIONS. — H = 0.24 mm, L = 0.56 mm, H/L = 0.42

## Suborder CYTHEROCOPINA Baird, 1850 Superfamily CYTHEROIDEA Baird, 1850 Family CYTHERIDEIDAE Sars, 1925

### Genus *Basslerella* Kellett, 1935

TYPE SPECIES. — *Basslerella crassa* Kellett, 1935 by original designation.

### *Basslerella wipanuae* Chitnarin, n. sp. (Figs 27A-E; 28)

TYPE MATERIAL. — Holotype, complete carapace (SUT-09-2429, Fig. 27A); paratypes, two complete carapaces (SUT-09-2430; Fig. 27B and SUT-09-2421; Fig. 27D).

ETYMOLOGY. — In honour of Dr Wipanu Rukmai, Northeastern Research Institute of Petrified Wood and Mineral Resources, Nakhon Ratchasima Rajabhat University, Nakhon Ratchasima, Thailand.

MATERIAL EXAMINED. — 60 complete carapaces.

DIMENSIONS. — H = 0.28-0.36 mm, L = 0.36-0.48 mm, H/L = 0.70-0.80, Holotype: H = 0.31 mm, L = 0.44mm; Paratype (Fig. 27B): H = 0.35, L = 0.48 mm; Paratype (Fig. 27D): H = 0.34 mm, L = 0.43 mm (Fig. 28).

TYPE HORIZON. — Sample 07PB03-5, Khao Kana section, Pha Nok Khao Formation, Sakmorian, Early Permian.

TYPE LOCALITY. — Sample number 07PB03-5, Khao Kana section (16°04'12"N, 100°54'20"E), Pha Nok Khao Formation, Phetchabun province, central Thailand.

OCCURRENCES. — Sample 08LO07-10, Sak Chai Quarry section, Pha Nok Khao Formation, Chaiphum Province, northeastern Thailand, Early Permian; samples 07PB03-1, 07PB03-5, Khao Kana section, Pha Nok Khao Formation, Phetchabun Province, central Thailand, Early Permian; samples 07PB04-2, 07PB04-5, 07PB04-7, Nong Phai section, Pha Nok Khao Formation, Phetchabun Province, central Thailand, Early Permian; sample 07PB05-5, Ban Naen Sawan I section, Tak Fa Formation, Phetchabun Province, central Thailand, Middle Permian; sample 07LB04-8, Phu Lam Yai section, Tak Fa Formation, Nakhon Sawan province, central Thailand, Early Permian; sample 07LB05-5, Ta Kli section, Tak Fa Formation, Nakhon Sawan province, central Thailand, Early Permian; samples 07LB09-1, 07LB09-2, Khao Phu Chong Kho locality, Tak Fa Formation, Nakhon Sawan province, central Thailand, Early Permian.

DIAGNOSIS. — Species of *Basslerella* with triangular carapace, AB and PB round with nearly the same small radius of curvature, H max at mid L, faint striation with digital print aspect oriented from AD to PV on carapace surface.

# DESCRIPTION

Carapace small, subtriangular; dorsal outline highly arched; DB short; ADB convex, forming in angle of 130° with DB; AB rounded with large radius of curvature, maximum convexity located at lower third of H; AVB short and convex; VB slightly convex; ventral laterally inflated; PVB short and convex; PB rounded with smaller radius of curvature, maximum convexity located ventrally, at lower fourth of H; PDB short; greatest H located at mid L; faint striation with digital print aspect developed on the surface oriented from AD to



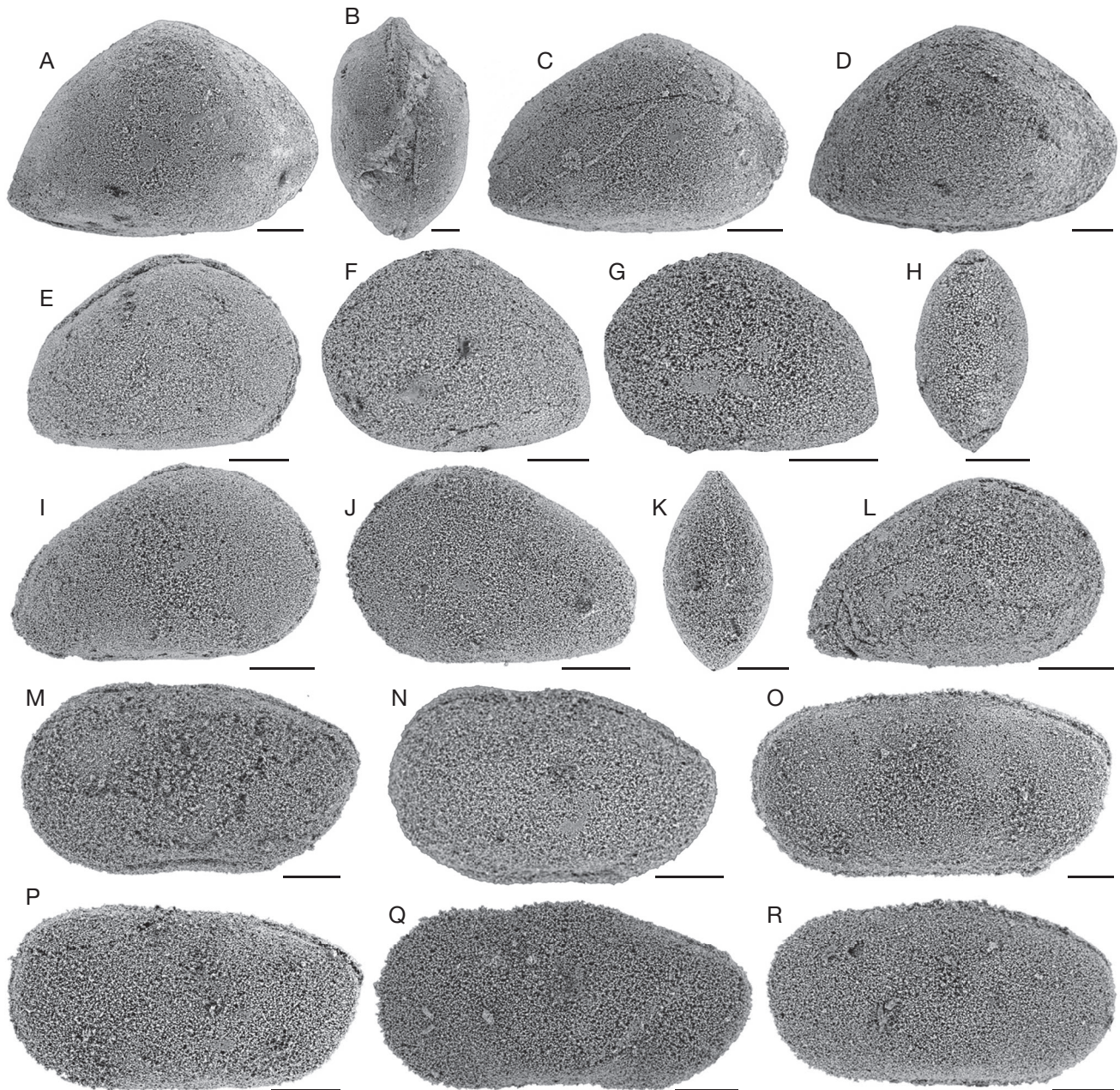


FIG. 24. — Ostracods from the limestones of the Indochina Block, Central Thailand. All specimens are stored at the Suranaree University of Technology Collections (Nakhon Ratchasima, Thailand) numbers SUT-09-xxxx. All the specimens are represented by complete carapaces. **A–D**, *Baschkirina ruchae* Chitnarin, n. sp.; **A**, holotype, right lateral view, SUT-09-2375, sample 08LO02-2; **B**, dorsal view, SUT-09-2376, sample 08LO02-2; **C**, paratype, right lateral view, SUT-09-2374, sample 08LO02-2; **D**, paratype, right lateral view, SUT-09-2380, sample 08LO02-5; **E–H**, *Basslerella tota* Chen and Bao, 1986; **E**, right lateral view, SUT-09-2389, sample 07PB04-5; **F**, left lateral view, SUT-09-2387, sample 07LB04-8; **G**, left lateral view, SUT-09-2383, sample 07LB04-8; **H**, dorsal view, SUT-09-2385, sample 07LB04-8; **I–L**, *Baschkirina* cf. *ballei* Crasquin, 2010; **I**, right lateral view, SUT-09-2410, sample 08LO02-2; **J**, left lateral view, SUT-09-2414, sample 08LO02-2; **K**, dorsal view, SUT-09-2412, sample 08LO02-2; **L**, right lateral view, SUT-09-2405, sample 07PB04-5; **M, N**, *Sulcella suprapermiana* Kozur, 1985; **M**, right lateral view, SUT-09-2662, sample 07PB03-1; **N**, right lateral view, SUT-09-2664, sample 07PB03-3; **O–R**, *Sulcella mesopermiana* Kozur, 1985; **O**, right lateral view, SUT-09-2665, sample 08LB01-1; **P**, right lateral view, SUT-09-2666, sample 08LB01-1; **Q**, right lateral view, SUT-09-2676, sample 07PB03-1; **R**, right lateral view, SUT-09-2682, sample 07PB03-1. Scale bars: 100  $\mu$ m.

PV; in dorsal view, carapace biconvex with maximum thickness at mid length; LV larger and slightly overlapping RV all around the carapace.

#### REMARKS

*Basslerella wipanuuae* Chitnarin, n. sp. is characterized by its diagnosis characters. The ornamentation is different

from the reticulation of *B. reticulata* Shi, 1987 from the latest Permian of Meishan section, Zhejiang Province, East China (Shi & Chen 1987: 55, pl. 17, figs 7-12). The more elliptical form of *B. wipanuuae* is similar to *B. annesophieae* Crasquin, 2010 (Crasquin *et al.* 2010a: 362-363, fig. 20N-V), but PDB of *B. wipanuuae* is more rounded than in *B. annesophieae*.



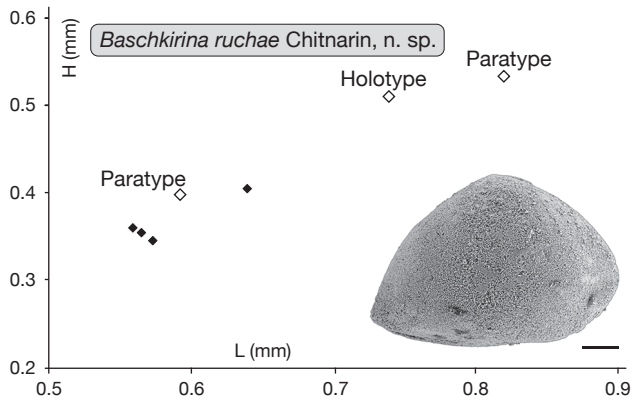


FIG. 25. — Height (H)-length (L) diagram of *Baschkirina ruchae* Chitnarin, n. sp. Scale bar: 100 µm.

*Basslerella naresi* Chitnarin, n. sp.  
(Figs 27F-J; 29)

TYPE MATERIAL. — Holotype, one complete carapace (SUT-09-2463, Fig. 27G); paratypes, two complete carapaces (SUT-09-2486, Fig. 27F and SUT-09-2477, Fig. 27J).

ETYMOLOGY. — In honour of Mr Nares Sattayalak, PTTER, Thailand.

MATERIAL EXAMINED. — 21 complete carapaces.

DIMENSIONS. — H = 0.20-0.56 mm, L = 0.30-0.83 mm, H/L = 0.64-0.74, Holotype: H = 0.50 mm, L = 0.77 mm; Paratype (Fig. 27F): H = 0.40, L = 0.61 mm; Paratype (Fig. 27J): H = 0.42 mm, L = 0.67 mm (Fig. 29).

TYPE HORIZON. — Sample number 08LO02-2, Tham Nam Maholan section, Nam Maholan Formation, Asselian, Early Permian.

TYPE LOCALITY. — Sample 08LO02-2, Tham Nam Maholan section (17° 06' 23"N, 101° 52' 48"E), Nam Maholan Formation, Loei province, northeastern Thailand.

OCCURRENCES. — Samples 08LO02-1, 08LO02-2, Tham Nam Maholan section, Nam Maholan Formation, Loei province, north-eastern Thailand, Early Permian; samples 07LB05-B1, 07LB05-B2, 07LB05-A2, 07LB05-5, Ta Kli section, Tak Fa Formation, Nakhon Sawan province, central Thailand, Early Permian.

DIAGNOSIS. — Species of *Basslerella* with long carapace, straight and long DB, AB and PB maximum of curvature located below mid H, and very wide and flat ventral area, dorsal view with water drop aspect.

DESCRIPTION

Carapace long, subelliptical; dorsal outline broadly arched; DB straight, inclined at 30° rearward; ADB slightly convex; PDB short, forming an angle of 135° with DB; AB rounded with large radius of curvature, maximum convexity located, at lower third of H; AVB short and convex; VB straight; ventral area flat; PVB short and convex; PB blunt, located just above VB; greatest H located at just in front of mid L; surface smooth; LV larger and slightly overlaps RV all around the carapace; carapace with water drop aspect in dorsal view, maximum thickness in the posterior part.

REMARKS

*Basslerella naresi* Chitnarin, n. sp. can be recognized very easily by its very wide and flat ventral area. Larger specimens have the wider and thicker posterior part and ADB rounded. *B. naresi* Chitnarin, n. sp. can be differentiated from *B. annesophieae* from the latest Permian of Meishan section, Eastern China (Crasquin *et al.* 2010a: 362, 363, figs 20N-V) by the smaller radius of curvature of AB and the longer carapace.

*Basslerella tota* Chen & Bao, 1986  
(Fig. 24E-H)

*Basslerella tota* Chen & Bao, 1986: 123, pl. 1, figs 31, 32, pl. 4 figs 7, 8. — Crasquin-Soleau *et al.* 2004: 288, pl. 4, figs 9, 10. — Yi 2004: pl. 2, fig. 20. — Crasquin *et al.* 2008b: pl. 5, figs 17, 18. — Forel 2012: 22, fig. 14O-Q.

MATERIAL EXAMINED. — 35 complete carapaces.

DIMENSIONS. — H = 0.23-0.42 mm, L = 0.32-0.64 mm, H/L = 0.71-0.74.

OCCURRENCES. — Jiangsu Province, Early Permian (Chen & Bao 1986); Hydra Island, Greece, late Middle Permian (Crasquin-Soleau & Baud 1998); Western Taurus, Turkey, Late Permian (Crasquin-Soleau *et al.* 2004); Meishan section, East China, latest Permian (Crasquin *et al.* 2010a); Fujian province, South China, Late Permian (Yi 2004); Dajiang section, Guizhou Province, South China, Late Permian (Forel 2012); samples 08LO02-1, 08LO02-2 and 08LO02-10, Tham Nam Maholan section, Nam Maholan Formation, Loei Province, north-eastern Thailand, Early Permian; sample 07LB04-8, Phu Lam Yai section, Tak Fa Formation, Nakhon Sawan Province, central Thailand, Early Permian; sample 07PB03-3, Khao Kana section, Pha Nok Khao Formation, Phetchabun Province, central Thailand, Early Permian; sample 07PB04-5, Nong Phai section, Pha Nok Khao Formation, Phetchabun Province, central Thailand, Early Permian.

Order PLATYCOPIDA Sars, 1866  
Suborder PLATYCOPINA Sars, 1866  
Superfamily CAVELLINOIDEA Egorov, 1950  
Family CAVELLINIDAE Egorov, 1950

Genus *Cavellina* Coryell, 1928

TYPE SPECIES. — *Cavellina pulchella* Coryell, 1928 by original designation.

*Cavellina* sp.  
(Fig. 13M-P)

MATERIAL EXAMINED. — 12 complete carapaces.

OCCURRENCES. — Samples 07PB03-1, 07PB03-3, Khao Kana section, Pha Nok Khao Formation, Phetchabun Province, central Thailand, Early Permian; samples 07LB05-A3, 07LB05-A2, Ta Kli section, Tak Fa Formation, Nakhon Sawan province, central Thailand, Early Permian.

DIMENSIONS. — H = 0.31-0.41 mm, L = 0.49-0.68 mm

REMARKS

*Cavellina* sp. has subelliptical carapace, broadly arched dorsal outline, round AB and PB, and strong overlap of LV on RV at DB and VB.

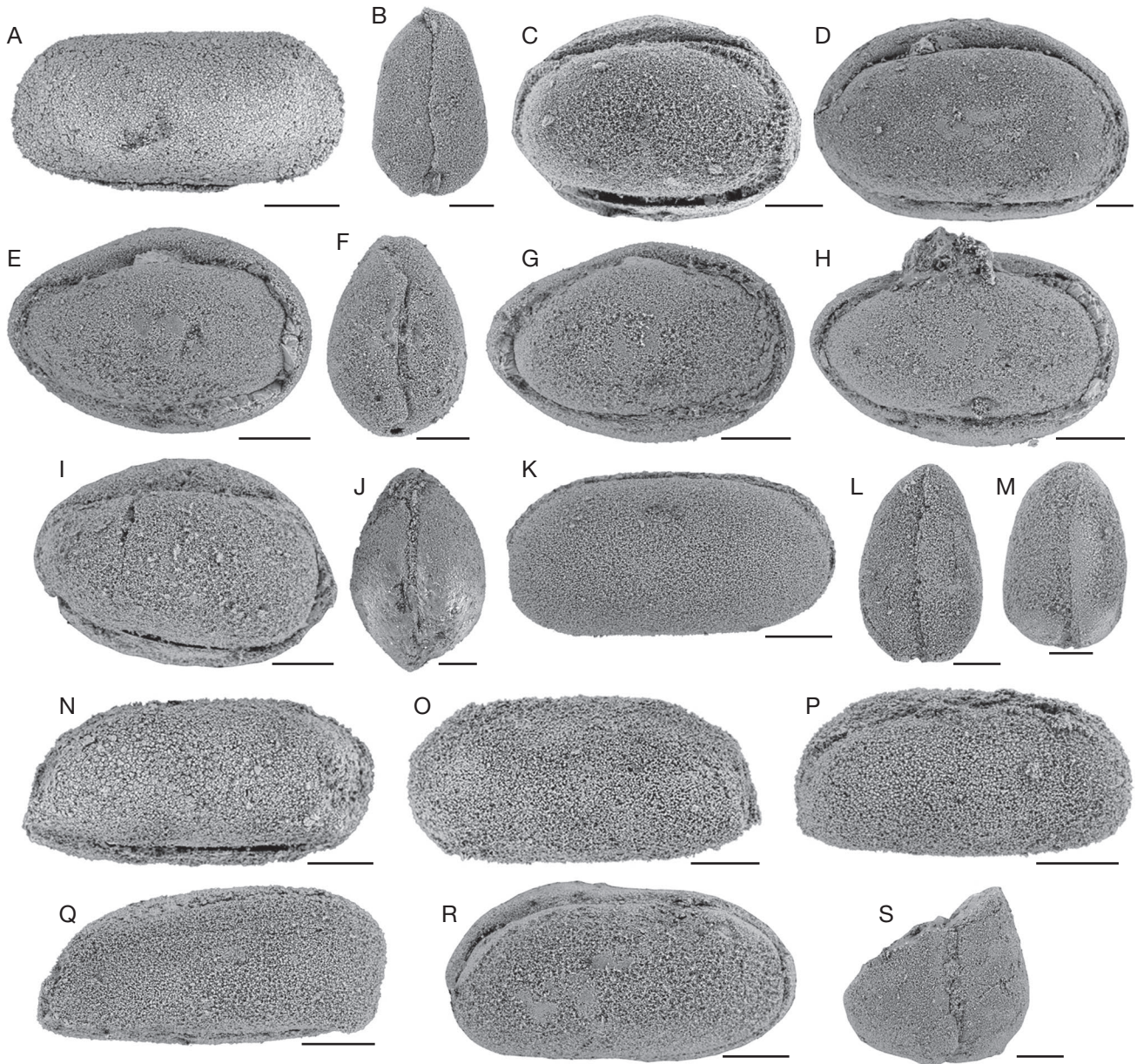


FIG. 26. — Ostracods from the limestones of the Indochina Block, Central Thailand. All specimens are stored at the Suranaree University of Technology Collections (Nakhon Ratchasima, Thailand) numbers SUT-09-xxxx. All the specimens, except **S** which is broken, are represented by complete carapaces. **A, B**, *Microcheilinella* sp. A; **A**, right lateral view, SUT-09-2547, sample 07PB04-2; **B**, ventral view, SUT-09-2548, sample 07PB04-2; **C**, *Microcheilinella* sp. B, right lateral view, SUT-09-2549, sample 08LB01-2; **D**, *Microcheilinella* sp. C, right lateral view, SUT-09-2550, sample 07PB08-3; **E-H**, *Microcheilinella* sp. D; **E**, right lateral view, SUT-09-2551, sample 07PB05-2; **F**, dorsal view, SUT-09-2554, sample 07PB05-2; **G**, right lateral view, SUT-09-2552, sample 07PB05-2; **H**, right lateral view, SUT-09-2553, sample 07PB05-2; **I, J**, *Microcheilinella* sp. E; **I**, right lateral view, SUT-09-2555, sample 07LB05-B1; **J**, dorsal view, SUT-09-2556, sample 07LB05-B1; **K, L**, *Microcheilinella* sp. F; **K**, right lateral view, SUT-09-2559, sample 07PB04-2; **L**, ventral view, SUT-09-2560, sample 07PB04-2; **M-Q**, *Microcheilinella* sp. G, 2010; **M**, ventral view, SUT-09-2564, sample 08LO07-1; **N**, right lateral view, SUT-09-2561, sample 07PB04-2; **O**, left lateral view, SUT-09-2562, sample 07PB04-2; **P**, right lateral view, SUT-09-2563, sample 08LO07-1; **Q**, right lateral view, SUT-09-2565, sample 07PB04-2; **R, S**, *Microcheilinella shicheni* Crasquin, 2010; **R**, right lateral view, SUT-09-2566, sample 08PB02-13; **L**, ventral view, SUT-09-2567, sample 08PB02-13. Scale bars: 100 µm.

#### Genus *Sulcella* Coryell & Sample, 1932

TYPE SPECIES. — *Sulcella sulcata* Coryell & Sample, 1932 by original designation.

#### *Sulcella mesopermiana* Kozur, 1985 (Fig. 24O-R)

*Sulcella mesopermiana* Kozur, 1985b: 22, pl. 5, figs 3, 4. — Crasquin-Soleau & Baud 1998: pl. 3, figs 3, 5, 6, 9. — ?Zazzali *et al.* 2015: 306, fig. 17A.

MATERIAL EXAMINED. — 43 complete carapaces.

OCCURRENCES. — Bükk Mountains, Hungary, Middle and Late Permian (Kozur 1985b); Hydra Island, Greece, Early to Late Permian (Crasquin-Soleau & Baud 1998); ?Chaotian section, Sichuan, South China, earliest Late Permian (Zazzali *et al.* 2015); samples 07PB03-1, 07PB03-3, Khao Kana section, Pha Nok Khao Formation, Phetchabun Province, central Thailand, Early Permian.

DIMENSIONS. — H = 0.30-0.47 mm, L = 0.51-0.64 mm.



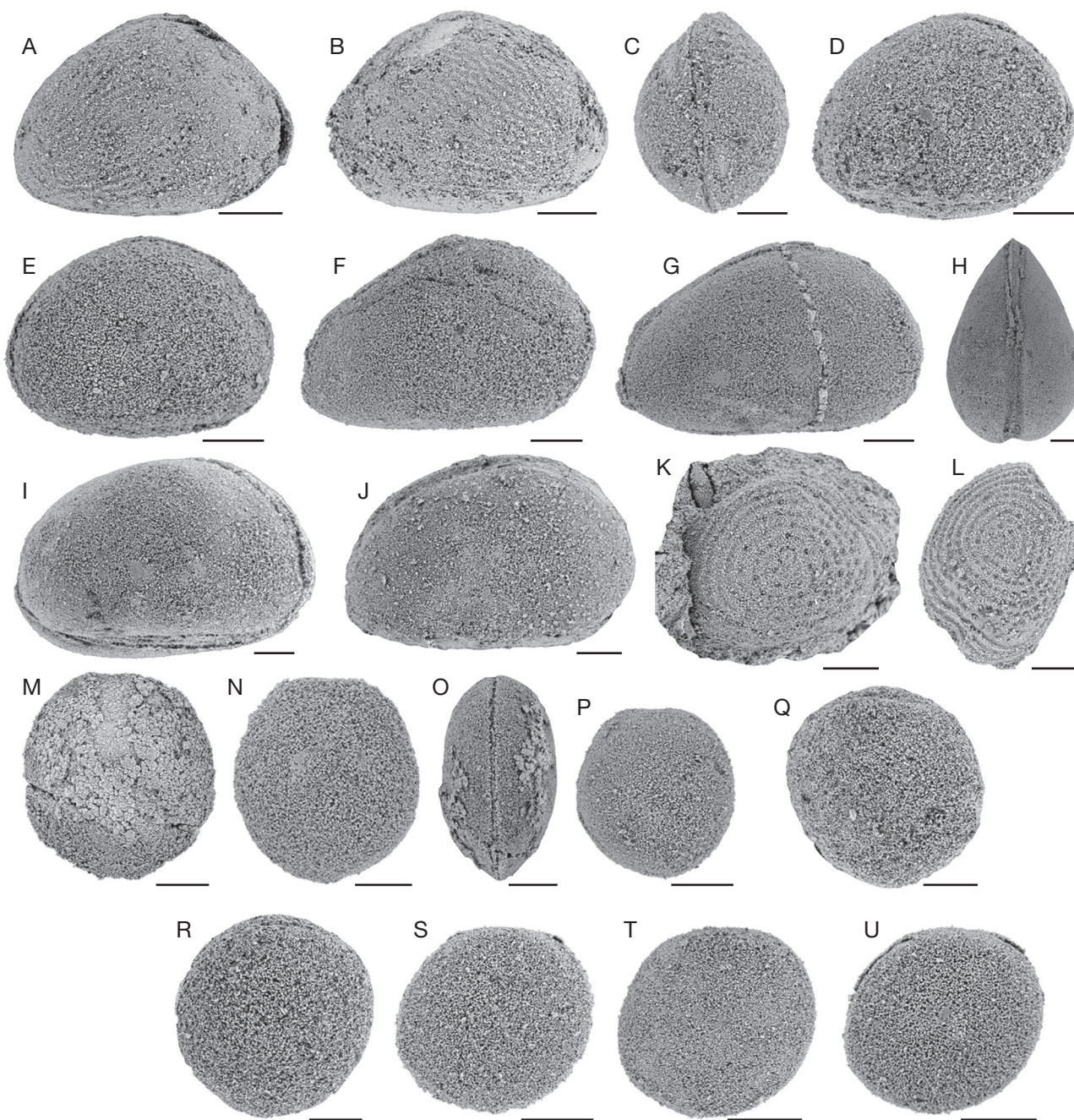


FIG. 27. — Ostracods from the limestones of the Indochina Block, Central Thailand. All specimens are stored at the Suranaree University of Technology Collections (Nakhon Ratchasima, Thailand) numbers SUT-09-xxxx. All the specimens, except K and L, are represented by complete carapaces. **A–E**, *Basslerella wipanucae* Chitnarin, n. sp.; **A**, holotype, right lateral view, SUT-09-2429, sample 07PB03-5; **B**, paratype, left lateral view, SUT-09-2429, sample 07PB03-5; **C**, ventral view, SUT-09-2426, sample 07PB04-2; **D**, paratype, right lateral view, SUT-09-2421, sample 07PB03-5; **E**, right lateral view, SUT-09-2425, sample 07PB04-2. **F–J**, *Basslerella naresi* Chitnarin, n. sp.; **F**, left lateral view, SUT-09-2486, sample 08LO02-1; **G**, holotype, left lateral view, SUT-09-2463, sample 08LO02-2; **H**, ventral view, SUT-09-2462, sample 08LO02-2; **I**, left lateral view, SUT-09-2461, sample 08LO02-2; **J**, left lateral view, SUT-09-2477, sample 07LB05-A2. **K, L**, *Polycope* sp.; **K**, SUT-09-2604, sample 07PB06-5; **L**, SUT-09-2606, sample 07PB06-5. **M–P**, *Polycope* sp.A; **M**, left lateral view, SUT-09-2610, sample 07PB04-2; **N**, left lateral view, SUT-09-2621, sample 08LO02-2; **O**, anterior view, SUT-09-2615, sample 07PB04-2; **P**, left lateral view, SUT-09-2627, sample 07LB05-B2. **Q, R**, *Polycope* sp. B; **Q**, left lateral view, SUT-09-2628, sample 08LO02-5; **R**, left lateral view, SUT-09-2630, sample 08LO02-5. **S–U**, *Polycope* sp.C; **S**, left lateral view, SUT-09-2644, sample 07LB09-1; **T**, left lateral view, SUT-09-2643, sample 07LB09-1; **U**, left lateral view, SUT-09-2642, sample 07LB09-1. Scale bars: 100 µm.

*Sulcella suprapermiana* Kozur, 1985  
(Fig. 24M, N)

*Sulcella suprapermiana* Kozur, 1985b: 22, pl. 5, figs 3-4. — Crasquin-Soleau & Baud 1998: pl.4, figs 1-3. — Crasquin-Soleau *et al.* 1999: pl. 4, fig. 15. — Crasquin *et al.* 2008a: 255, pl. 6, fig. 1-2. — Zazzali *et al.* 2015: 306, fig. 17B, C.

MATERIAL EXAMINED. — Six complete carapaces.

OCCURRENCES. — Bükk Mountains, Hungary, Middle and Late Permian (Kozur 1985b); Hydra Island, Greece, Early to Late Permian (Crasquin-Soleau & Baud 1998); Khuff Formation, Sultanate of Oman, Middle Permian (Crasquin-Soleau *et al.* 1999); Bulla section, northern Italy, Late Permian (Crasquin *et al.* 2008a);

Chaotian section, Sichuan, South China, earliest Late Permian (Zazzali *et al.* 2015); samples 07PB03-1, 07PB03-3, 07PB03-5, Khao Kana section, Pha Nok Khao Formation, Phetchabun Province, central Thailand, Early Permian; samples 07LB04-8, 07LB04-12, 07LB04-13, 07LB04-17, Phu Lam Yai section, Tak Fa Formation, Nakhon Sawan province, central Thailand, late Early Permian; sample 07LB05-C3, Ta Kli section, Tak Fa Formation, Nakhon Sawan province, central Thailand, Early Permian; sample 08LB01-1, Khao Som Phot section, Tak Fa Formation, Lopburi Province, central Thailand, Middle Permian.

DIMENSIONS. — H = 0.27–0.50 mm, L = 0.48–0.89 mm, H/L = 0.50–0.56.

Subclass MYODOCOPA Sars, 1866  
Order HALOCYPRIDA Dana, 1853  
Suborder CLADOCOPINA Sars, 1866  
Family POLYCOPIDAE Sars, 1866

Genus *Polycope* Sars, 1866

TYPE SPECIES. — *Polycope orbicularis* Sars, 1866 by original designation.

*Polycope* sp. A  
(Fig. 27M–P)

MATERIAL EXAMINED. — Seven complete carapaces.

OCCURRENCES. — Samples 08LO02-1, 08LO02-2, Tham Nam Maholan section, Nam Maholan Formation, Loei province, northeastern Thailand, Early Permian; sample 07PB04-2, Nong Phai section, Pha Nok Khao Formation, Phetchabun Province, central Thailand, Early Permian; sample 07LB05-B2, Ta Kli section, Tak Fa Formation, Nakhon Sawan province, central Thailand, Early Permian; sample 08LB01-1, Khao Som Phot section, Tak Fa Formation, Lopburi Province, central Thailand, Middle Permian.

DIMENSIONS. — H = 0.28–0.45 mm, L = 0.26–0.40 mm, H/L = 1.07–1.6.

#### REMARKS

*Polycope* sp. A is characterized by high and suboval carapace with straight DB.

*Polycope* sp. B  
(Fig. 27Q–R)

MATERIAL EXAMINED. — Three complete carapaces.

OCCURRENCES. — Sample 08LO02-5, Tham Nam Maholan section, Nam Maholan Formation, Loei province, northeastern Thailand, Early Permian.

DIMENSION. — H = 0.39–0.40 mm, L = 0.39–0.40 mm, H/L = 1.00.

#### REMARKS

*Polycope* sp. B is subequivalved and has subcircular carapace. DB is convex on both valves with an incised dorsum and H/L ratio is of 1.00.

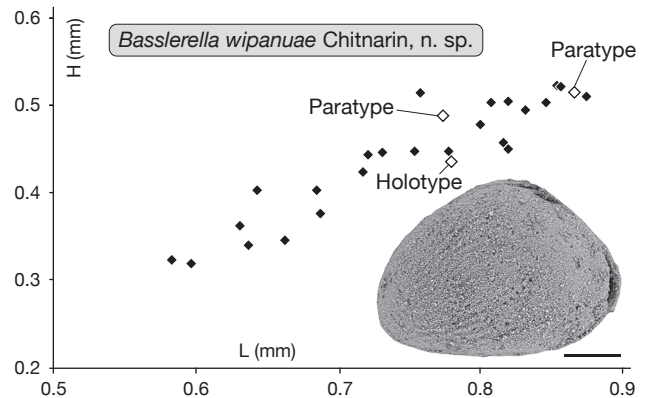


FIG. 28. — Height (H)-length (L) diagram of *Basslerella wipanuae* Chitnarin, n. sp. Scale bar: 100  $\mu$ m.

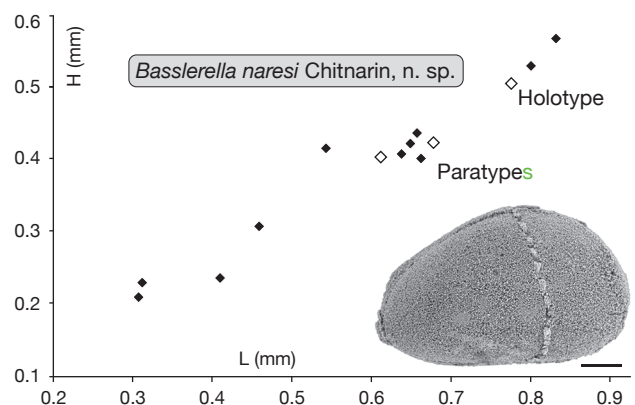


FIG. 29. — Height (H)-length (L) diagram of *Basslerella naresi* Chitnarin, n. sp. Scale bar: 100  $\mu$ m.

*Polycope* sp. C  
(Fig. 27S–U)

MATERIAL EXAMINED. — Six complete carapaces.

OCCURRENCES. — Samples 08LO02-6, 08LO02-10 Tham Nam Maholan section, Nam Maholan Formation, Loei province, northeastern Thailand, Early Permian; samples 07PB04-2, 07PB04-5, Nong Phai section, Pha Nok Khao Formation, Phetchabun Province, central Thailand, Early Permian; sample 07LB09-1, Khao Phu Chongkho locality, Tak Fa Formation, Nakhon Sawan province, central Thailand, late Early Permian.

DIMENSIONS. — H = 0.25–0.48 mm, L = 0.27–0.54 mm, H/L = 0.88–0.96.

#### REMARKS

*Polycope* sp. C has subcircular carapace and straight DB. *Polycope* sp. C differs from *P.* sp. A by the less H/L ratio, and from *P.* sp. B by straight DB and absence of the incised dorsum.

*Polycope* sp. D  
(Fig. 27K–L)

MATERIAL EXAMINED. — Three incomplete carapaces.



TABLE 3. — Relationships between the Early to Middle Permian ostracods from Indochina block of central Thailand and other known Permian localities. Column abbreviations: **1**, Bradfield 1935, Cooper 1946, Cordell 1952, Western USA, upper Carboniferous; **2**, Knight 1928, Missouri, USA, upper Carboniferous; **3**, Kellett 1934, Kansas, USA, upper Carboniferous to lower Permian; **4**, Chen 1958, Nanking, Eastern China, lower Permian; **5**, Guan *et al.* 1978, Hunan, South China, lower Permian; **6**, Chen & Bao 1986, Jiangsu, Eastern China, lower Permian; **7**, Kozur 1985a, Bükk Mts, Hungary, upper Permian; **8**, Crasquin *et al.* 1999, Sultanate Oman, middle Permian; **9**, Crasquin-Soleau & Baud 1998, Hydra Island, Greece, upper Permian; **10**, Ishizaki 1964, Miyagi, Northeast Japan, middle Permian; **11**, Lethiers *et al.* 1989, Jebel Tebaga, Tunisia, middle Permian; **12**, Chen & Shi 1982, Jiangsu, China, upper Permian; **13**, Shi & Chen 1987, Zhejiang, Eastern China, upper Permian; **14**, Shi & Chen 2002, Guanxi, South China, upper Permian; **15**, Crasquin-Soleau *et al.* 2007, Tibet, China, upper Permian; **16**, Crasquin *et al.* 2008b, Alps, Italy, Permian-Triassic; **17**, Crasquin *et al.* 2010b, Vardar, NW Serbia, upper Permian; **18**, Crasquin *et al.* 2010a, Zhejiang, Eastern China, upper Permian; **19**, Forel 2012, Guizhou, South China, upper Permian; **20**, Zazzali *et al.* 2015, Sichuan, South China, upper Permian. Other abbreviations: **SI**, Simpson Index; **na**, data not available.

Age of the studied sections	Palaeobioogeographic relationships of Early and Middle Permian ostracods from Indochina block	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
middle Permian	<i>Microcheilinella shicheni</i> Crasquin, 2010	–	–	–	■	■	–	–	–	–	–	–	–	■	–	–	–	–	■	–	–
	<i>Bairdia guangxiensis</i> Guan, 1978	–	–	–	–	■	■	–	–	–	–	–	■	■	■	–	–	–	–	–	–
	<i>Bairdiacypris deloi</i> Bradfield, 1935	–	–	–	–	–	–	–	–	■	■	■	–	–	–	–	–	–	–	–	–
lower Permian	<i>Samarella viscusforma</i> Chitnarin, 2012	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	■
	<i>Liuzhinia praeantalyensis</i> Forel, 2010	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	■	–
	<i>Bairdia pierrevalentini</i> Crasquin, 2010	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	■	–	–
	<i>Bairdia deweveri</i> Crasquin, 2010	–	–	–	–	–	–	–	–	–	–	–	–	–	–	■	■	■	–	–	–
	<i>Hollinella</i> (H.) <i>martensiformis</i> Crasquin, 2010	–	–	–	–	–	–	–	–	–	–	–	–	–	–	■	–	–	–	–	■
	<i>Cyathus elliptica</i> Shi, 1987	–	–	–	–	–	–	–	–	–	–	–	–	■	–	–	–	–	■	–	–
	<i>Bairdia broutini</i> Crasquin, 2010	–	–	–	–	–	–	–	–	–	–	–	–	■	■	–	–	–	■	–	–
	<i>Bairdia urodeloformis</i> Chen, 1987	–	–	–	–	–	–	–	–	–	–	–	–	■	■	–	–	–	■	–	–
	<i>Paraparchites chenshui</i> Crasquin, 2010	–	–	–	–	–	–	–	–	–	–	–	■	■	■	–	–	–	■	–	–
	<i>Petasobairdia subnantongensis</i> Chen, 1987	–	–	–	–	–	–	–	–	–	–	–	■	■	■	–	–	–	■	–	–
	<i>Acratia chongpani</i> Chitnarin, n. sp.	–	–	–	–	–	–	–	–	■	–	–	–	–	–	–	–	–	–	–	■
	<i>Acratia mongkoli</i> Chitnarin, n. sp.	–	–	–	–	–	–	–	–	■	–	–	–	–	–	–	–	–	–	–	–
	<i>Hollinella</i> (H.) <i>herrickana</i> (Girty, 1909)	–	–	–	–	–	–	–	■	–	–	■	–	–	–	–	–	–	–	–	–
	<i>Sulcella mesopermiana</i> Kozur, 1985	–	–	–	–	–	–	■	■	–	–	–	–	–	–	–	–	–	–	–	–
	<i>Sulcella suprapermiana</i> Kozur, 1985	–	–	–	–	–	–	■	■	–	–	–	–	–	–	–	■	■	–	–	–
	<i>Bairdia deducta deducta</i> Zalanyi, 1974	–	–	–	–	–	–	■	–	–	–	–	–	–	–	–	–	–	–	–	–
	<i>sensu</i> Kozur (1985a)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	<i>Cyathus caperata</i> (Guan, 1978)	–	–	–	–	–	■	–	–	–	–	–	–	■	–	–	–	–	■	–	–
	<i>Bairdia menardensis</i> Harlton, 1929	–	–	–	■	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	<i>sensu</i> Chen (1958)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	<i>Bairdia altiaricus</i> Chen, 1958	–	–	–	■	–	–	–	–	–	–	–	–	–	■	–	■	–	–	–	–
	<i>Lobobairdia ventriconcava</i> (Chen, 1958)	–	–	–	■	–	■	–	–	–	–	–	–	–	■	–	–	–	–	–	–
	<i>Bairdia beedei</i> Ulrich & Bassler, 1906	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	<i>sensu</i> Chen (1958)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	<i>Bairdia piscariformis</i> Chen, 1958	–	–	–	■	–	–	–	–	–	–	–	–	■	–	–	–	–	■	–	–
	<i>Bairdia lungtanensis</i> Chen, 1958	–	–	–	■	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	<i>Basslerella tota</i> Chen & Bao, 1986	–	–	–	■	–	■	–	–	■	–	–	–	–	–	■	–	–	–	■	–
	<i>Bairdia piscariformis</i> Chen, 1958	–	–	–	■	–	–	–	–	–	–	–	–	■	–	–	–	–	■	–	–
	<i>Bairdia trianguliformis</i> Chen, 1958	–	–	–	■	–	–	–	–	–	–	–	–	■	■	–	–	–	–	–	–
	<i>Bairdiacypris longirobusta</i> Chen, 1958	–	–	–	■	–	–	–	–	–	–	–	–	■	■	–	–	–	–	–	–
	<i>Cryptobairdia seminalis</i> (Knight, 1928)	–	■	■	–	–	–	–	–	–	–	–	–	■	–	–	–	–	–	–	–
	<i>Bairdiacypris deloi</i> Bradfield, 1935	■	–	–	–	–	–	–	–	■	■	■	–	–	–	–	–	–	–	–	–
Number of species in the area where they are less: n1		na	na	23	29	na	63	130	35	66	22	14	60	87	94	53	62	38	98	112	130
number of common species: C		1	1	1	11	2	4	2	2	4	1	2	8	9	9	2	3	2	11	1	3
SI = C/n1		na	na	0.04	0.38	na	0.06	0.02	0.06	0.06	0.05	0.14	0.13	0.10	0.10	0.04	0.05	0.05	0.11	0.01	0.02

OCCURRENCES. — Sample 07PB06-5, Ban Naen Sawan II section, Tak Fa Formation, Phetchabun Province, central Thailand, Middle Permian.

#### REMARKS

*Polycope* sp. D is attributed to the genus *Polycope* because of its subcircular carapace with fine ornamentation on carapace surface.

#### PALAEOBIOGEOGRAPHIC RELATIONS

Of the 130 ostracods species reported from the Early and Middle Permian of the studied localities (this work; Chitna-

rin *et al.* 2012), 31 have previously been documented from other localities such as South China (Chen 1958; Guan *et al.* 1978; Chen & Shi 1982; Chen & Bao 1986; Shi & Chen 1987; Shi & Chen 2002; Crasquin *et al.* 2010a; Forel 2012; Zazzali *et al.* 2015), Hungary (Kozur 1985b), Greece (Crasquin-Soleau & Baud 1998), Italy (Crasquin *et al.* 2008a), Oman (Crasquin-Soleau *et al.* 1999), Tunisia (Lethiers *et al.* 1989), Japan (Ishizaki 1964), Tibet (Crasquin-Soleau *et al.* 2007), Serbia (Crasquin *et al.* 2010b), as shown in Table 3. These areas were located within the Palaeo-Tethys during the Early to Late Permian interval (Scotese & Langford 1995; Crasquin-Soleau *et al.* 2001; Fig. 30). The encountered genera are quite well known from the Permian shallow platforms (Pe-

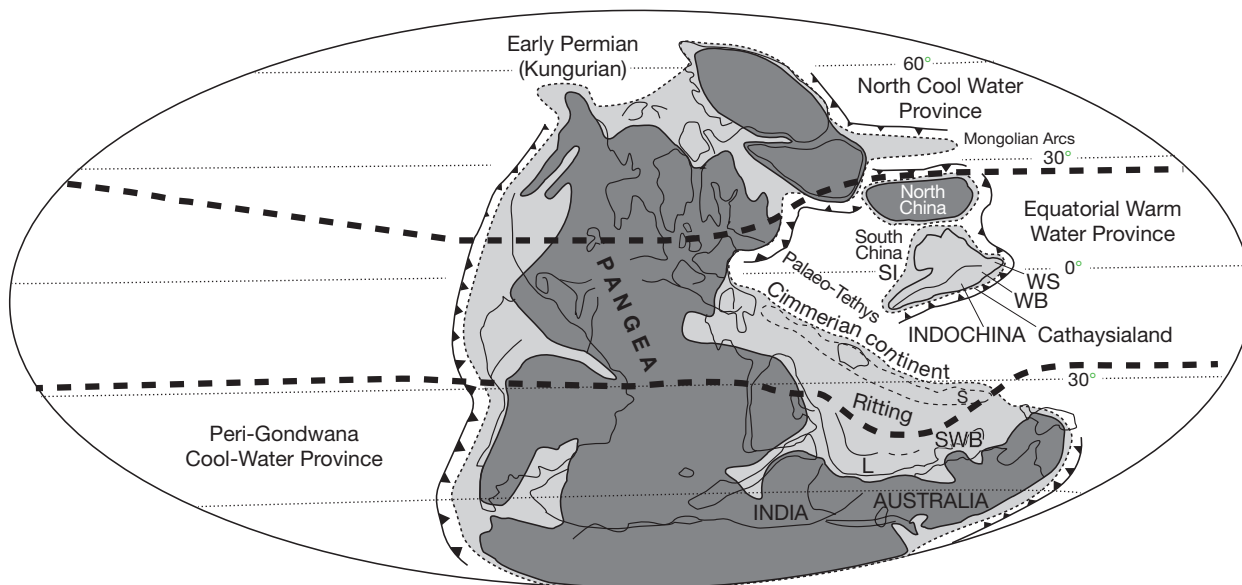


FIG. 30. — Palaeogeographic reconstructions of the Tethyan region with localities of Indochina, Pangea, and Sibumasu (Western Cimmerian Continent) for Late Early Permian (Kungurian) after Metcalfe (2011).

terson & Kaesler 1980; Costanzo & Kaesler 1987; Melnyk & Maddocks 1988; Crasquin-Soleau *et al.* 1999). Outside the Palaeo-Tethys, *Bairdiacypris deloi* and *Cryptobairdia seminalis* are known from Late Carboniferous to Early Permian of the United States of America (Knight 1928; Kellett 1934; Bradfield 1935; Cooper 1946; Sohn 1960).

The Simpson Index (SI) is adopted here as a provincialism index, which can be calculated by the following equation:  $SI = C/n_1$ , where C is number of common species between two localities and  $n_1$  is the number of species in the area of lower diversity. The calculated indices are shown in Table 3. As a whole, Thai ostracods have close relationships with the studies of Early Permian in Eastern China (Chen 1958) as illustrated with the highest SI value (0.38). Relationships are recorded during the Middle to Late Permian with Tunisia, South China, and Eastern China (Lethiers *et al.* 1989; Chen & Shi 1982; Shi & Chen 1987; Shi & Chen 2002; Crasquin *et al.* 2010a). The relationships with USA is low. Thus, the Indochina and South China blocks were very closed to each other since the Early to Late Permian (Fig. 30).

Most of the studied sections in Thailand are assigned to the Early Permian; therefore, 80% of the recovered species are recognized from Early Permian onward. In the literature, Chen (1958), Guan *et al.* (1978) and Chen & Bao (1986) provide information on the Early Permian ostracods, while others provide information regarding the Middle to Late Permian. These informations are summarized in the Table 3 where the ostracod species (2<sup>nd</sup> and 3<sup>rd</sup> columns) are grouped by age: numbers 1-3 are of Middle Permian age and numbers 4 to 32 refer to Early Permian data. The columns 4 to 6 correspond to species occurrences of Late Carboniferous to Early Permian age from USA; the column 7 to 9 correlate to Early Permian age in the literature; the column 10 to 23 gather Middle to Late Permian occurrences from the literatures.

The oldest known of the studied ostracods is *Bairdiacypris deloi* which was reported for the first time from the Late Carboniferous of Western USA; it was later reported from the Middle Permian strata of Greece, Japan and Tunisia. It is also found here in the Middle Permian limestone of the Tak Fa Formation (sample 07PB05-6). *Cryptobairdia seminalis* the Late Carboniferous to Early Permian fauna of USA is recovered from Early Permian of the Tak Fa Formation (samples 07PB03-5, 07PB03-7, 07PB04-2), and from Latest Permian of Jiangsu province in China. The presence of these fauna shows connection between Panthlassa Ocean and Palaeo-Tethys at least during the Early Permian (Fig. 30).

Twenty-seven species which originated on the Western shelf of Indochina block during the Early Permian (number 4 to 30 in 2<sup>nd</sup> and 3<sup>rd</sup> columns) later dispersed to other parts of the Palaeo-Tethys in the Middle to Late Permian. For example, *Bairdia trianguliformis* Chen, 1958 known from the early Early Permian (Asselian) of the Nam Maholan Formation in Loei province and the Tak Fa Formation (Artinskian) in Nakhon Sawan province, later occurs in the latest Permian of Guangxi, South China (Chen 1958). *Samarella viscusforma* Chitnarin, 2012 recovered from the Early Permian strata of the present analysis was found in the latest Permian strata of Sichuan Province, South China (Zazzali *et al.* 2015). *Sulcella mesopermiana* Kozur, 1985, *S. suprapermiana* Kozur, 1985 and *Bairdia deducta deducta* Zalani, 1974 *sensu* Kozur (1985a) which have been reported from the Middle to Late Permian of Hungary, Oman, Greece, Italy and Serbia (Kozur 1985a, b; Crasquin-Soleau & Baud 1998; Crasquin-Soleau *et al.* 1999; Crasquin *et al.* 2008b; Crasquin *et al.* 2010b), are recovered from the Early Permian of Thailand. This confirms the connection between Eastern (Thailand-Indochina block) and Western rims of the Palaeo-Tethys. On another hand, two species *Microcheilinella shicheni* Crasquin, 2010



and *Bairdia guangxiensis* Guan, 1978 reported from the Early Permian of Eastern China (Chen 1958; Guan *et al.* 1978) are recovered from the Middle Permian strata here. This also shows the relationship between Indochina and South China Blocks during the Early Permian.

## CONCLUSIONS

The Early to Middle Permian ostracods have been recovered from limestones collected from 12 sections of central Thailand (the Indochina Block). At least, 130 species have been identified. We presented an earlier article focusing on Order Palaeocopida (Chitnarin *et al.* 2012) where 39 species were reported, eight were newly described. We publish here Podocopida, Platycopida and Myodocopida. There are 91 species described in this article, 14 are newly described. These ostracods represent the shallow to slightly deep condition on the carbonate platform of the Indochina Block. They have close relationships to South China from the Early to Late Permian.

## Acknowledgements

This research was funded by grant fund under the program Strategic Scholarships for Frontier Research Network for the PhD Program Thai Doctoral degree from the Office of the Higher Education Commission, Thailand (The CHEPhD-THA Scholarship) and French Embassy in Thailand. The authors are very grateful to Dr Ewa Olempska (Instytut Paleobiologii PAN, Warsaw, Poland) and to two anonymous reviewers for the accurate examination and review of the manuscript.

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Submitted on 28 November 2016;  
accepted on 14 June 2017;  
published on 29 December 2017.