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Pseudophillipsia (*Carniphillipsia*) (Trilobite) from the Permian Jamal Formation, Isfahan, Iran

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Abstract

The aim of this study is to bridge a gap in the existence of Trilobites in the marine Permian successions of Iran by exploring a stratigraphic section of the Permian in Jamal Formation (Dizlu section). Based on comprehensive field studies and laboratory investigations three Trilobite specimens were identified in the study area including *Pseudophillipsia* (*Carniphillipsia*) *dizluensis* sp. nov., *Pseudophillipsia* (*Carniphillipsia*) *sagittalis and Pseudophillipsia* (*Carniphillipsia*) sp.. A new occurrence of trilobites collected from the Permian (Wordian) Jamal Formation at a section at Dizlu, Isfahan Province, Iran, is documented. They belong to a new species of *Pseudophillipsia* (*Carniphillipsia*), which is described herein, and can be attributed to the a group of species centered on *P*.(*C*). *paffenholzi* (Weber). It is based on 30 specimens from a single horizon, most of which are enrolled. Co-occurrence of *Pseudophillipsia* (*Carniphillipsia*) sp. A. and stenohalin groups such as brachiopods, bryozoans, and crinoids are indicating that this species were preferred shallow and carbonate environments. This is the first time that the existences of these specimens are reported in Dizlu section.

Keywords: Trilobite; *Pseudophillipsia* (*Carniphillipsia*); Biostratigraphy; Permian; Iran.

Introduction

Late Paleozoic trilobites have been found in a few locations in Iran. The trilobites reported herein are discovered and collected by Dr. M. Yazdi during the recent last decade from a new and richly fossiliferous location in Central Iran. They occur together with divers' fauna of conodonts, ostracod, gastropods, brachiopods and bryozoans (Upper Permian). The Central Iran Upper Permian succession named as the Jamal Formation, a thick (480m) siliciclastic- carbonate sequence. The trilobites are well preserved in full relief in thin-bedded limestone matrix.

Previews Works

Post-Devonian trilobites in Iran were studied by many authors [3, 1, 2, 4 &5]. Besides, [3] were described two new taxa, *Acropyge lanceolata and Iranaspidion sagittalis*, from Abadeh [Central Iran) which are attributed to Late Guadeloupian. After *Iranaspidion* had been it put in synonymy with *Pseudophillipsia* [2,3, &4]. *I. sagittalis* referred to as

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Pseudophillipsia (*Carniphillipsia*) *sagittalis* [3]. Feist et al. (according to [5]) were described one well-preserved specimen which collected from Chahriseh section (about 55km northeast of Isfahan). In addition, [6] were reported Permian trilobites (*Pseudophillipsia* sp.) in neighboring sections. The Wordian age (Murghabian) has been proposed for those trilobite bearing beds based on the bryozoan contents [6].Hahn [3] have reported three new species, namely *Acropyge weggeni*, *Acropyge*? sp. and *Iranaspidion* ? sp. From the Yush section (Central Alborz Mountains). Lerosey-Aubril [2] reviewed the Late Paleozoic Iranian and Armenian trilobites and recognized two new taxa including: *Persia praecox* and *Pseudophillipsia* (*s.l*) *parvizii*. Since that, several works conducted with regard to Permian Iran region; [13, 14, 15, 16, 17, 18, 19, 20, 21, 23 & 24].

In this paper, the trilobite fauna of the Dizlu section as a new trilobite locality are described. The Dizlu section is exposed at the north eastern flank of Lamar Mountain, nearly 60 km northeast of Isfahan [Fig. 1].

Geology Setting

Iran is divided into eight geological provinces. These provinces are (1) Zagros, (2) Sanandaj-Sirjan, (3) Urumieh-Dokhtar, (4) Central Iran, (5) Alborz, (6) Kopeh Dagh, (7) Lut, and (8) Makran accretionary prism. Each province has experienced distinct tectonic and sedimentary histories [7]. The Permian successions of Central Iran are subdivided into several formations based on lithological features. In Sanandaj-Sirjan belt, these strata are reported from three areas: Abadeh, Surmaq and, Shahreza areas.

The Abadeh – Shahreza region is well-known for their classic Permian- Triassic outcrops. Particularly, the Abadeh section is on the northern flank of the Hambast Mountain, about 60km SW of the Abadeh town. Likewise, the Shahreza section is located about 14km NE of the Shahreza town. This region was located in the southern part of the Sanandaj-Sirjan belt, as part of northern margin of the Neo-Tethyan Ocean [8]. In this region, the lithological subdivision of the Permian strata includes the Surmaq, the Abadeh, and the Hambast formations. The Hambast Formation is lithologically characterized by the alternation of shale and micritic grey limestone, followed by dark grey limestone beds of the Abadeh Formation. The succession was subdivided on the basis of conodonts biozons [9], representing the entire *Clarkia nleveni* and lowermost of the *C. Transcaucasia* zones belonging to Dzhulfian (Wuchiapingian). The upper part of the Hambast Formation is composed of thin-bedded grayish red nodular limestone with ammonoids, nautiloids, rare brachiopods, rugose corals, crinoid ossicles and fish-remains. The conodonts provided an age ranging from Late Dzhulfian- to Late Dorashamian based on *C. transcaucasia* to the *Merrilina aultima – Stepanovites? mostleri* zones [9]. The Shahreza section has been investigated in several studies for its facies and isotope geochemistry [9, 10, & 11]. Permian strata in Central Iran are known in several areas; Tabas (Bagh-e-Vang, Shesh Angosht, and Houze-Dorah sections), Kerman and Isfahan areas (Chahriseh and Bagher Abad sections). The Permian strata in Central Iran are known as the Jamal Formation. The Jamal Formation is Artinskian- Early Wuchiapingian in age based on its fossil contents (such as brachiopods, ammonoids, fusulinids and, conodonts). There are two stratigraphic sections of the Jamal Formation in Tabas region which are Bagh-e-Vang and Shesh Angosht sections. Bagh-e-Vang section is exposed nearly 50km north of Tabas town and the Shesh Angosht section is exposed about 4km east of the Bagh-e-Vang section. In both sections the Jamal Formation unconformeably overlies the Carboniferous sandstones of the Sardar Formation. The upper boundary of the Jamal Formation is conformable with the Lower Triassic Sorkh shale Formation [12].

Dizlu Section

The Dizlu section is located 60km northeast of Isfahan. This area constitutes part of the Central Iran zone and is confined to the east of the Sanandaj-Sirjan belt.

The oldest rock unites exposed in Dizlu region area series of dolomite, limestone, sandstone and sandy limestone dated as Devonian. Several faults have disrupted the rock sequences of the area, resulting in Paleozoic sediments being found adjacent to the Triassic deposits [22]. Permian succession in the Dizlu area is equivalent to the Jamal Formation (in Central Iran), Ruteh and Nesen formations (in Alborz and Kopeh Dagh), and Surmaq and Abadeh formations (in Sanandaj-Sirjan). In this section, the Permian strata (Jamal Formation) disconformably overlie on the Devonian deposits (the Bahram Formation). The upper boundary of the Jamal Formation is disconformable with the red bauxite and laterite of the Lower Triassic Sorkh Shale Formation. The base of the Jamal Formation in Dizlu section begins with grey sandstone and it is covered by grey to brown marly limestone. The middle part of the succession comprises thin bedded grey limestone with a few beds of sandy limestone, and sandstone, with gastropods, echinoids, brachiopods, bryozoan, conodonts, and ostracod. The upper part of the succession is composed of medium to thick bedded dark dolomite [Fig. 1-2].

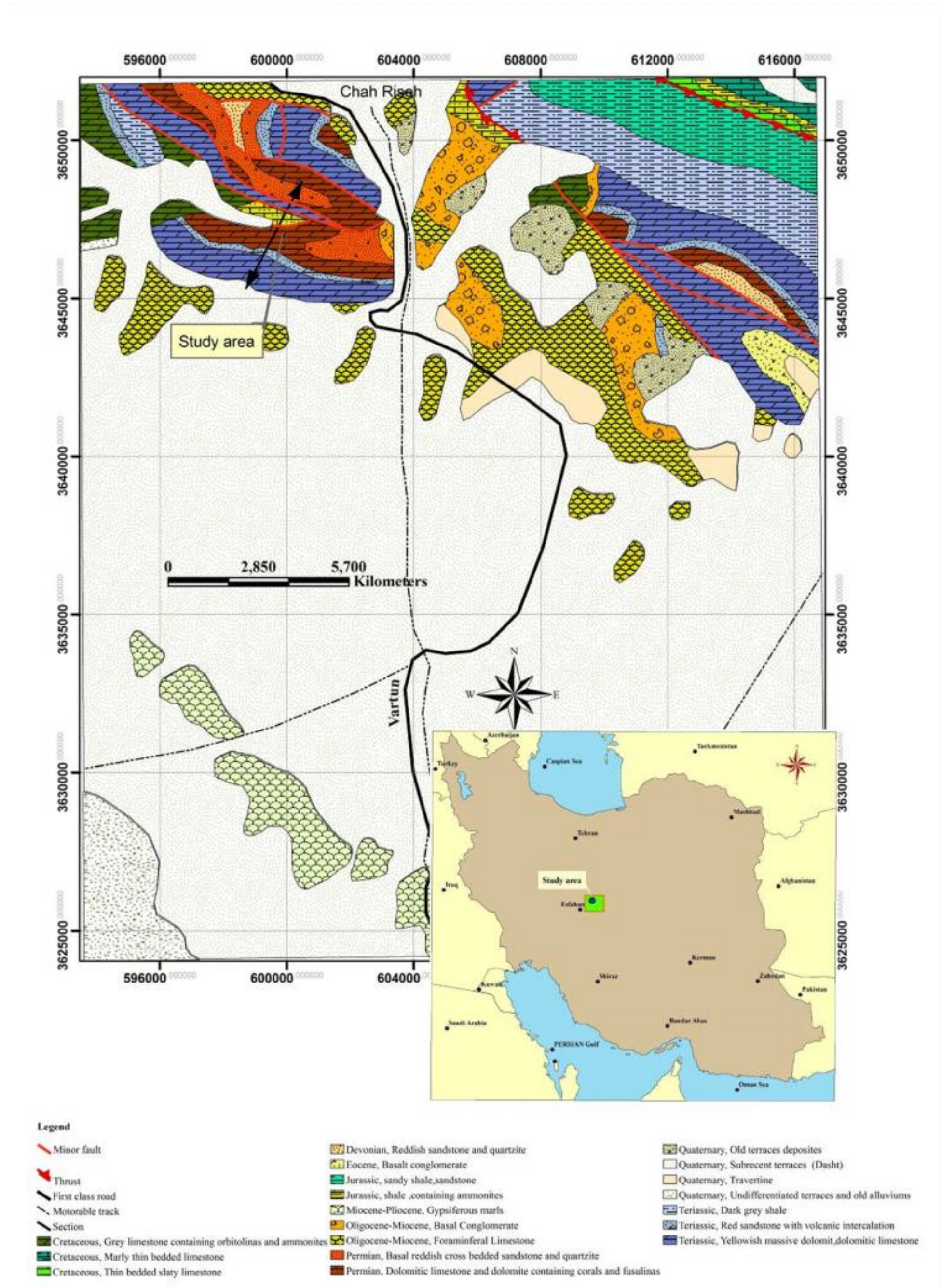

Figure 1. Geological map of northeast of Isfahan, showing the position of the Dizlu section.

Materials and Methods

The Jamal Formation layers were investigated and their fossils content sampled systematically in the Dizlu section. The normal procedure of sampling was done to collect all possible identifiable fossils on the lithological log. Only the *in situ* fossils were collected from the study strata. The materials collected from this locality are more than 30 trilobite specimens. The collected trilobites are stored in the Department of Geology, University of Isfahan under acronym EUIC.

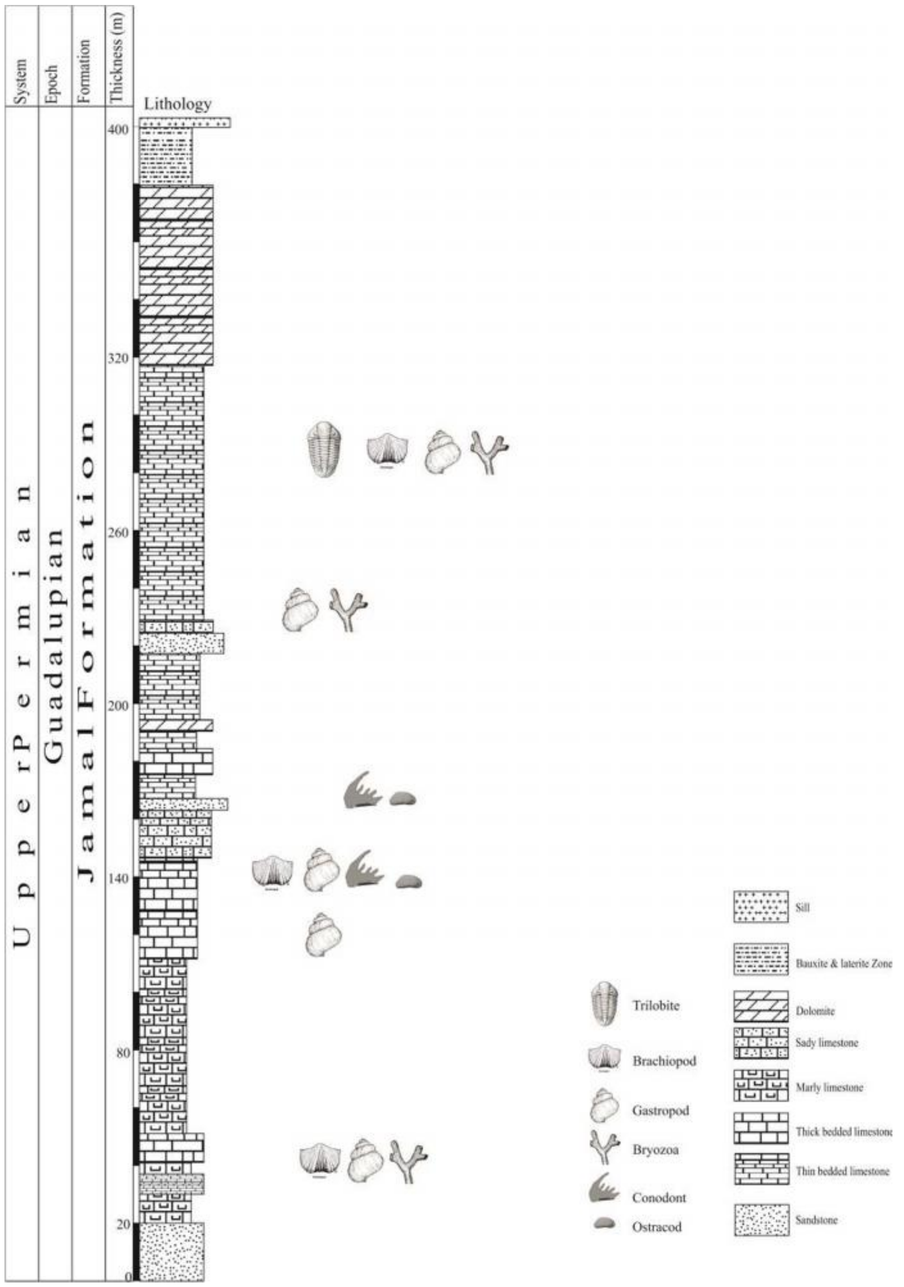

Figure 2. Lithological details of the Jamal Formation in the Dizlu section, northeast of Isfahan; the position of the sampled fossils is highlighted.

The examined and figured material was processed from marl limestone using a vibro tool. The specimens were coated with ammonium chloride to enhance the contrast before being photographed using ring-light illumination. In most cases, additional highlight from the NW quadrant was used. Photographs were taken using a Nikon D90 digital camera with a 105mm objective lens. A part from the digital sharpening, deepening of contrast, and blackening of the background of the photographs has generally not been retouched.

Results and Discussion

Systematic Paleontology

Terminology, morphological terms and abbreviations used herein follow those defined in part O of the Treatise on Invertebrate Paleontology. Main glabellar lobe designates that part of the glabella in front of the preoccipital, while anterior glabellar furrows refers to glabellar furrows S2to S4. The specimens discussed herein are deposited in the Isfahan University, Iran [EUIC].

Order PROETIDA Fortey& Owens 1975

Family PHILLIPSIIDAE Oehlert 1886

Subfamily DITOMOPYGINAE Hupé 1953

Genus *Pseudophillipsia* Gemmellaro 1892

Subgenus *Pseudophillipsia (Carniphillipsia)* Hahn &Brauckmann 1975.

Type Species. Pseudophillipsia ogivalis Gauri 1965, from the Lower Kasimovian (Pennsylvanian) of the Zoellner Ridge near Waidegger-Alm, Carnic Alps, Austria.

Pseudophillipsia (*Carniphillipsia*) *dizluensis* sp. nov.

Plate 1, [a-j] and Figure 3 [a-d].

Holotypus (paratypes). Complete enrolled specimen, [pl. 1 [a-e], [EUIC 13282].

Etymology: the specific epithet *dizluensis* refers to the sample location that is Dizlu village.

Locus Typicus: Dizlu section, about 60 km northeast of Isfahan, Iran [Fig. 1].

Stratum Typicum: Marly limestones, upper part of the Jamal Formation, Wordian (Guadeloupian) [Fig. 2].

Material, locality and horizon: Complete enrolled holotype specimen [pl. 1 [a-e], [EUIC 13282], Complete enrolled specimen [pl. 1 [a-e], [EUIC 13283], large and well- preserved Complete specimen [pl. 1 [j], [EUIC 13284]; all from a dark-grey sandy wakestone with gastropods, brachiopods, bryozoan (fenestellids), crinoids, ostracods and rear trilobites; Jamal Formation, Wordian.

Diagnosis. one species of *Pseudophillipsia (Carniphillipsia)* displayed the following characteristics: Cephalon of semi-circular out line, anterior border convex and narrow (sag.) in lateral view lateral margin is narrow but increasing backward (posterior), glabella convex and expand forward, glabellar furrows (S2-S4) are narrow and inflated posteriorly. So very convex forwards, So furrows deep and separated by sharp furrow with L1.Occipital ring is narrow and long (tr.); palpebral lobe convex and narrow (tr.) eyes are very convex and eye ring narrow. Preglabellar field is very narrow. Genal spin is short, pygidium with 13+/-1 axial ring and 10 pleural ribs

Description: Cephalon of strongly parabolic outline. Occipital ring high posteriorly and sloping forwards with sharp farrow; glabella moderately convex, higher than occipital ring posteriorly, increasingly sloping forwards. The widest part of glabella is across frontal lobe, this being about7 mm glabellar length, including occipital ring. Although the frontal glabellar profile is rounded across the midline, the anterolateral corner is slightly angulate where the axial furrows end, so that the overall shape of the composite anterior glabellar lobe is somewhat wedge shaped. Pygidium is triangular in outline [pl. 1 [j, g]. Pleural field representing about a third of the width (tr.) of the pygidium anteriorly and composed of 10, possibly 11 ribs; pleural furrows particularly deep, broad; in thorax axis is long, reaching border furrow; 20–22 axial rings which form two rows subdividing the axis into a wide (tr.) median lobe and two narrow lateral lobes; Border narrow anteriorly, slightly widening posteriorly. Axial rings and pleural ribs are particularly prominent.

Comparison: differs from *P. sagittalis* in its more distant cephalic border marked by a border furrow that continues around the anterior of the glabella, its smaller eyes which are distinctly less than half as long as the glabella. *P. dizluensis* differs from *P. sagittalis*, *P. armenia* and P. *paffenholzi* in its lesser number of Pygidial segments, and probably also in its much shorter

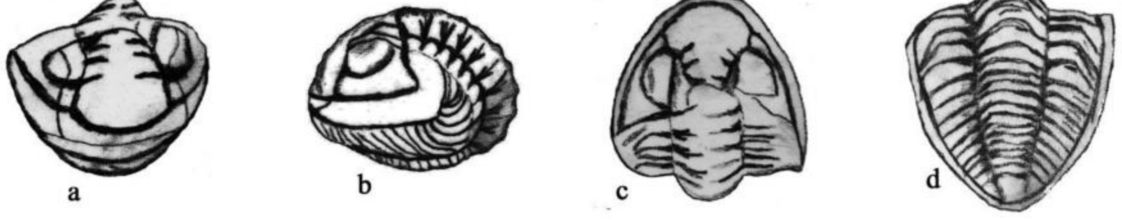

Figure 3. *Pseudophillipsia (Carniphillipsia) dizluensis* sp. nov. Reconstruction of (a), Cephalon in frontal view, (b), right lateral view, (c), cephalo-thorax in dorsal view, (d), thoraco-pygidium in dorsal view.

genal spine. The spins are broken from all of the available specimens, but the shape of libergena and the posteriorly directed course of the posterior border furrow are similar to those of *P. armenia*.

Table1 summarized the characteristics that displayed by *Pseudophillipsia* (*Carniphillipsia***)** *dizluensis* sp. nov.to distinguish this species from other species of *Pseudophillipsia***.**

Table 1. Summarized the characteristics that displayed by *Pseudophillipsia (Carniphillipsia) dizluensis* sp. nov. to distinguish this species from other species of *Pseudophillipsia*.

Taxa	Anterior margin of cranidium	Cranidial anterior border	Posterior glabella	Main glabellar lobe	L1	Median preoccipital Lobe	Occipital ring	Palpebral lobes	Genal spine	Librigenal border	Pygidial axial rings	Author/year
Acropygelenceola ta	----	shorter (sag.)	parallel-sided	----	lower	lower	----	----	----	----	more	Kobayashi& Hamada 1984
P.(s.l.) armenica	more forwardly convex	shorter (sag.)	parallel-sided	anteriorly narrow (tr.)	----	----	convex	wider (tr.)	----	----	more	Weber 1944
P. (c.) sagittalis	more forwardly convex	shorter (sag.)	parallel-sided	extending farther forward	lower	larger (sag.)	markedly	wider (tr.)	----	----	more	Kobayashi& Hamada 1978
P.(s.l.) caucasica	----	----	parallel-sided	narrower (tr.)	----	shorter(tr.)	----	----	----	----	loss	Weber 1944
P.(s.l.) parvizii	----	----	----	----	----	----	----	----	----	----	more	Aubril 2012
P. (c.) paffenholzi	more forwardly convex	shorter (sag.)	parallel-sided	anterior glabellar furrows visible smooth	lower	larger (sag.)	longer (sag.) no node	----	wider base	mach high	more	Weber 1944
P. (c.) kemerensis	more forwardly convex	shorter (sag.)	parallel-sided	anterior glabellar furrows visible smooth	lower	shorter(tr.)	longer (sag.)	wider (tr.)	----	----	more	Aubril 2009
P. (c.) reggorcakaensis	----	shorter (sag.)	----	anteriorly narrow (tr.) posteriorly wider(tr.)	narrower (tr.)	lower	longer (sag.)	----	----	----	----	Qian, 1981
P. (c.) sp. From Iran	----	----	----	more forwardly convex , narrower (tr.) posteriorly	----	----	longer (sag.) more convex backwards	----	----	----	----	Stepanov et al. (1969
P. (c.) sp. From USA	----	----	----	anterior glabellar furrows visible smooth	----	----	convex forwards so	more anteriorly located	----	----	----	Hahn &Brauckmann 1975
P. (c.) praepermica	----	----	----	----	----	larger (sag.)	----	----	----	----	----	Weber 1933
P. (c.) huishuiensis	more forwardly convex	shorter (sag.)	----	more forwardly convex	----	shorter (sag.)	longer (sag.) more convex backwards	----	----	----	----	Yin 1978
P. (c.) chongqingensis	more forwardly convex	----	narrower (tr.)	narrower (tr.)	lower narrower (tr.)	wider (tr.) shorter (sag.)	longer (sag.)	----	wider base	----	----	Lu 1974
P. (c.) steatopyga	----	----	----	----	----	lower	less convex backwards	----	----	----	----	Goldring 1957

P. (c.) pyrifrmis	----	shorter (sag.)	----	more forwardly convex wider posteriorly (tr.)	more inflated	more inflated	----	----	----	----	----	Qian 1977
P. (c.) intermedia	more forwardly convex	----	parallel-sided	anteriorly narrow (tr.) extending farther forward	----	----	longer (sag.)	----	----	----	----	Kobayashi and Hamada 1980
P. (c.) javornikensis	more forwardly convex	----	parallel-sided	anteriorly narrow (tr.) extending farther forward	----	----	----	wider (tr.)	wider base	----	----	Hahn & Hahn 1977
P. (c.) cooperationis	more forwardly convex	----	----	anteriorly narrow (tr.) more forwardly convex	lower longer (exs.)	shorter (sag.) lower	longer (sag.)	----	----	----	----	Haas et al. 1980
P. (c.) mengshanensis	more forwardly convex	----	parallel-sided	anteriorly narrow (tr.) extending farther forward	----	----	----	wider (tr.)	wider base	----	----	Lin 1982
P. (c.) liparoides	----	----	parallel-sided	anteriorly narrow (tr.) posteriorly wider(tr.) more inflated	----	wider (tr.)	----	wider (tr.)	wider base	mach high	----	Hahn & Hahn, 1977
P. (c.) lipara	more forwardly convex	----	parallel-sided	anteriorly narrow (tr.) more forwardly convex	lower	shorter (sag.) lower	longer (sag.) no node	----	----	----	----	Goldring 1957
P. (c.) rakoveci	more forwardly convex	----	parallel-sided	anteriorly narrow (tr.) lacks median posterior sukcus	----	wider (tr.) shorter (sag.)	markedly shorter (exs.) abaxially	----	----	----	----	Gauri 1965
P. (c.) schoeningi	----	----	parallel-sided	----	----	larger (sag.)	longer (sag.) markedly shorter (exs.) abaxially	wider (tr.)	----	----	more	Zhang 1982
P. (c.) loricata	----	shorter (sag.)	----	anteriorly narrow (tr.) more forwardly convex higher posteriorly	lower	lower	shorter (sag.) less convex backwards	----	wider base	----	less	Haas et al. 1980

Pseudophillipsia (*Carniphillipsia*) *sagittalis* (Kobayashi & Hamada, 1978)

Plate 2, [a-l] and Plate 3, [g, h, j-l]

1978 *Iranaspidion sagittalis Kobayashi*& Hamada, pp. 157-60, figs 1-3.

1981 *Iranaspidion sagittalis[15]*, p. 223.

1981 *Iranaspidion sagittalis Kobayashi*& Hamada, p. 56, pl. 1, figs 1-3.

1982 *Iranaspidion sagittalis[16]*; Owens, p. 29.

1984 *Iranaspidion sagittalis[17]*, pp. 68-9, text-fig. 5k, pl. 14, figs 1-3.

2003 *Iranaspidion sagittalis Kobayashi*& Hamada;[18], p. 382.

2009 *Pseudophillipsia* (Carniphillipsia) sagittalis (Kobayashi & Hamada); Lerosey- Aubril& Angiolini, p.438.

2012 *Pseudophillipsia* (Carniphillipsia) sagittalis (Kobayashi & Hamada); Lerosey- Aubril, p.1033, fig. 4, k, n.

Material, locality and horizon: Complete enrolled specimen [EUIC 13285-6], pl. 2, [a-l], a large and well- preserved pygidium [EUIC 13291], pl. 3, [h] and a small, partially broken pygidium [EUIC 13291], pl. 3, [g]; both from a dark-grey sandy wakestone with gastropods, brachiopods, bryozoan (fenestellids], crinoids, ostracods and rear trilobites; Jamal

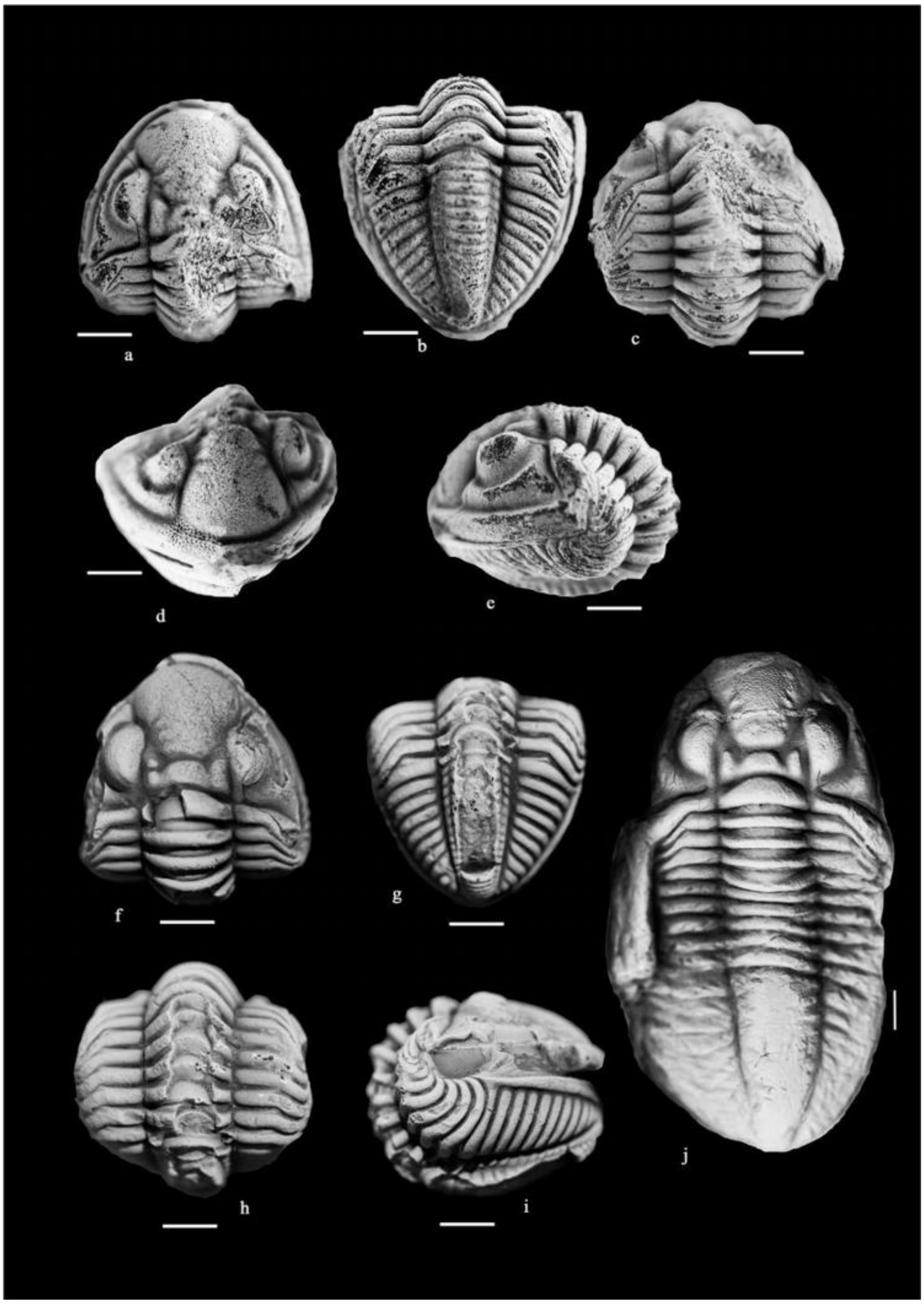

Plate 1. *Pseudophillipsia (Carniphillipsia) dizluensis* sp. nov. , (a-e) (EUIC 13282), (a), holotypecephalo-thorax in dorsal view, (b), thoraco-pygidium in dorsal view, (c), thorax (d), Cephalon frontal view, (e), left lateral view. (f-i) *Pseudophillipsia (Carniphillipsia) dizluensis* sp. nov. (EUIC 13283), (f), cephalo-thorax in dorsal view, (g), pygidium in dorsal view, (h), thorax in dorsal view, (i), right lateral view, (j), *Pseudophillipsia (Carniphillipsia) dizluensis* sp. nov. (EUIC 13284), dorsal view. Scale bar =3 mm.

Formation, Wordian.

Diagnosis. Two species of *Pseudophillipsia (Carniphillipsia),* displaying the following characteristics: Cephalon of semi-circular out line glabella short (sag.) and parallel-sided all along; anterior border convex backward cranidium particularly fornicated; frontal lobe inflated, short (sag.), covered with coarse tubercles along postero-lateral margin, and

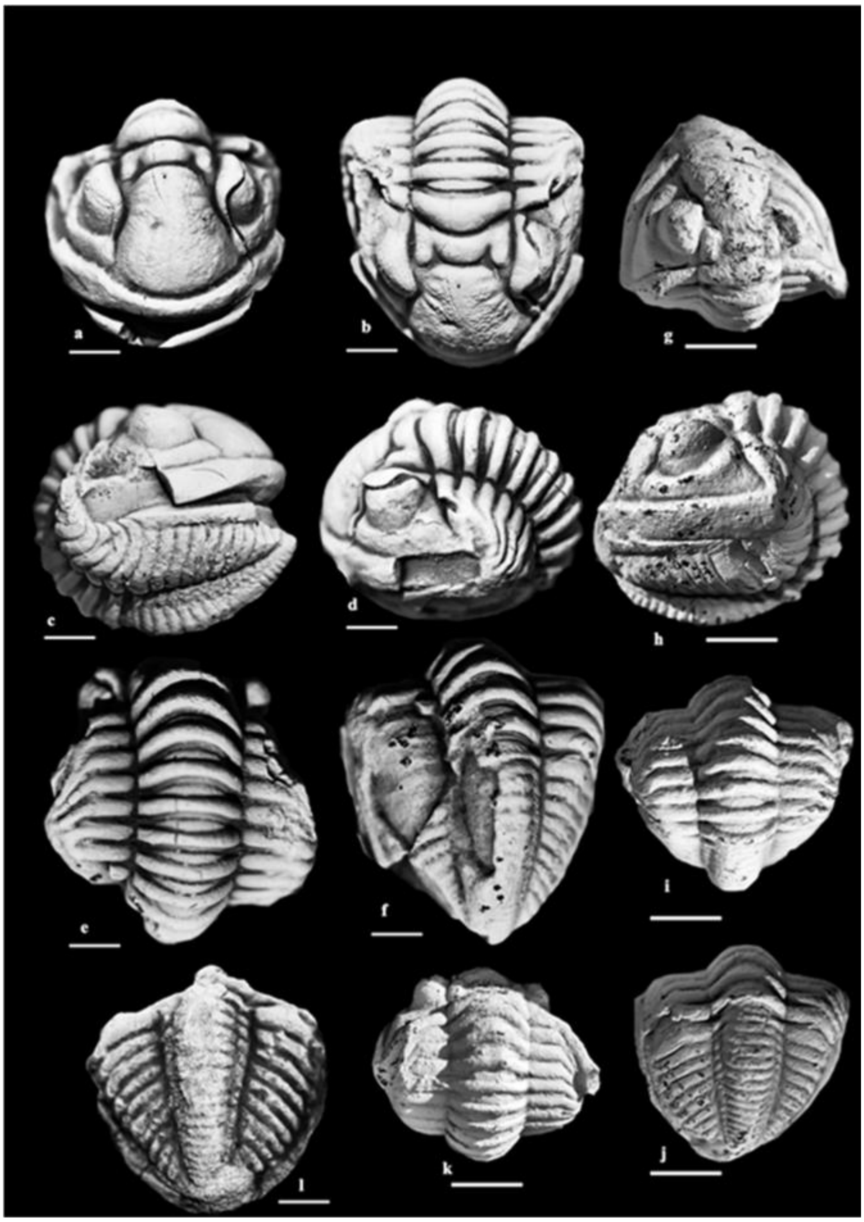

Plate 2. (a-f), *Pseudophillipsia (Carniphillipsia) sagittalis* (Kobayashi & Hamada), (EUIC 13285), (a), Cephalon frontal view, (b), cephalo-thorax in dorsal view, (c), right lateral view, (d), cephalo-thorax in left lateral view, (e), thorax in dorsal view, (f), thoraco-pygidium in dorsal view. (g-k), *P. (C.) sagittalis,* (EUIC 13286), (g), Cephalon in dorsal view, (h), cephalo-thorax in left lateral view, (i), thorax in dorsal view, (j), thoraco-pygidium in dorsal view, (k), thorax in lateral view. (l), *P. (C.) sagittalis,* (EUIC 13287), pygidium in dorsal view. Scale bar =3 mm.

bearing weak sagittal furrow postero-medially; median occipital lobe trapezoid; Pygidium of roughly semi-circular outline, with 11 pleural ribs.

Description. Cephalon of semi-circular out line cranidium elongate, glabella convex, elongate (sag.) and narrow (tr.) the widestpart of glabella is carouse frontal lobe (LA), this being about 9 mm glabellar length. Occipital ring high convex; anterior margin narrow (sag.) ; Eye ridge and palpebral lobe narrow (tr.) fixgenal area narrow (tr.) S1 defining trapezoid and narrow (tr.) occipital lobe long (exs.) eye very sharped and long (exs.). Pygidium of roughly semi-circular outline [pl. 2, [g-h]. Axis particularly long, overhanging the border posteriorly and delimited laterally by straight axial furrows evenly converging backwards; 17 discernable axial rings which laterally corresponding to

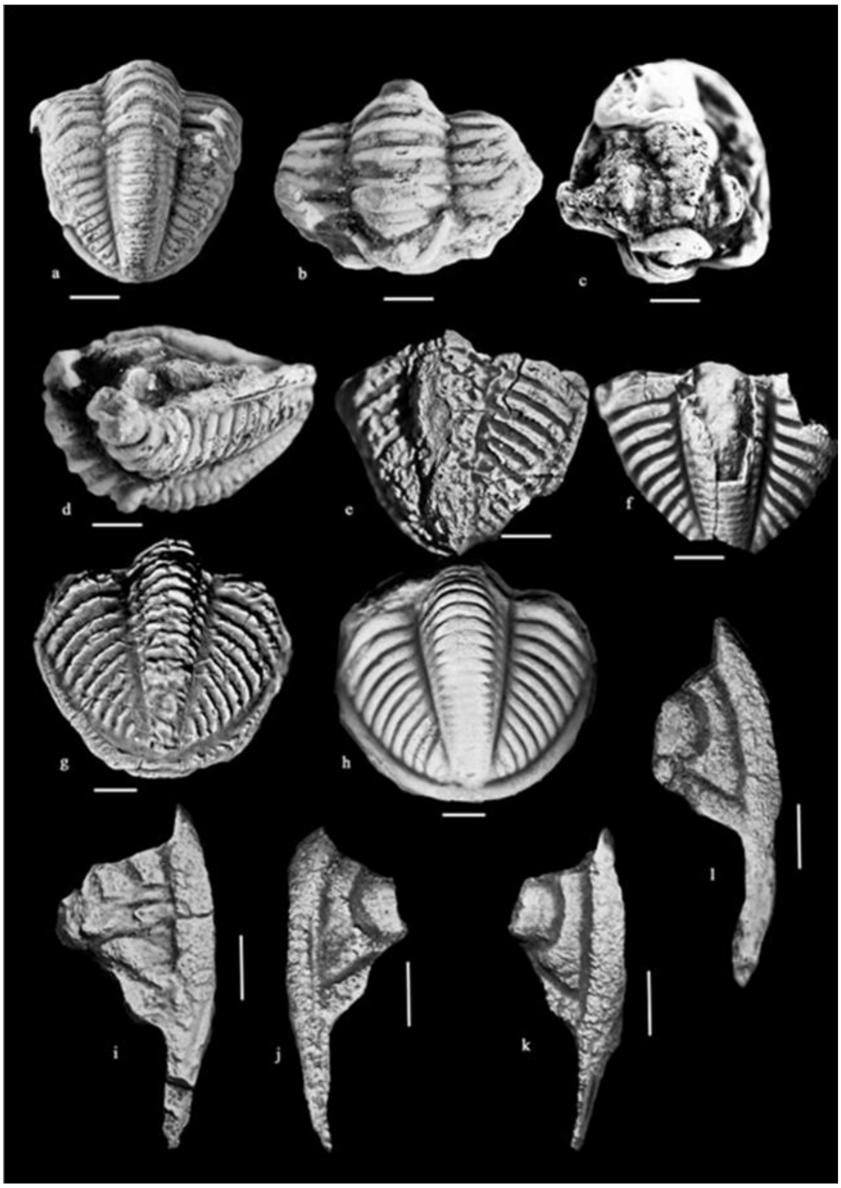

Plate 3. (a-d), *Pseudophillipsia (Carniphillipsia)* sp. (EUIC 13288), (a), thoraco-pygidium in dorsal view, (b), thorax in dorsal view, (c), Cephalon in dorsal view, (d), thoraco-pygidium in left lateral view. (e), *Pseudophillipsia (Carniphillipsia)* sp. (EUIC 13289), pygidium in dorsal view. (f), *Pseudophillipsia (Carniphillipsia)* sp. (EUIC 13290), pygidium in dorsal view. (g), *Pseudophillipsia (Carniphillipsia) sagittalis*, (EUIC 13291), pygidium in dorsal view. (h), *Pseudophillipsia (Carniphillipsia) sagittalis*, (EUIC 13292), pygidium in dorsal view. (i), *Pseudophillipsia (Carniphillipsia)* sp. (EUIC 13293), free cheek, showing genal spine. (j-l), *Pseudophillipsia (Carniphillipsia) sagittalis*, (EUIC 13294-6), free cheek, showing genal spine. Scale bar =3 mm.

the six posterior most pleural ribs, pleural furrows deep but narrow, posterior part of axis strongly flexed downwards.

Pseudophillipsia (Carniphillipsia) sp.

Plate 3, [a-d, e, f, i]

2000 *Pseudophillipsia (Carniphillipsia)* sp.; Feist et al. in Mistian et al., p. 99, pl. 8, figs. 2,3.

2009 *Pseudophillipsia (Carniphillipsia)* sp.; Lerosey-Aubril& Angiolini, p. 433, Table 1.

2012 *Pseudophillipsia (Carniphillipsia)* sp.; Lerosey-Aubril, figs. 6i, j, l, n, and o.

Material .locality and horizon. Strongly weathered complete enrolled specimen [EUIC 13288; pl.3 [a-d]].

Diagnosis. Cephalon with distinct border, slightly raised to form short flange; shallow border furrow continuing around anterior of cranidium; genal spines short; pygidium with 17 axial segments.

Description. Carapace essentially smooth, weak striations on cephalic border and underside of pygidial border and by transverse row of low sagittally elongate tubercules on crest of each axial ring of thorax and pygidium. Cephalon represents a parabolic outline. Glabella long; dorsal furrows broad and rather shallow, associated with deep fossulae opposite the mid-distance between β and γ abaxially; median occipital lobe rectangular, wide (tr.) but rather short (exs. and sag.); S1 broad and deep near axial furrow, splitting in to shallow anterior and posterior branches rear wards; occipital ring with strength posterior margin; L1 ovoid, long (exs.), rather narrow (tr.) and inflated; main glabellar lobe somewhat eroded postero-sagittally, and bearing three short and shallow anterior glabellar furrows (S2-S4).

Thorax composed of nine segments. Dorsal furrows gently converging backwards and delimiting a wide (tr.) axial lobe. Axial ring wide (sag. and exs.) and composed of a post annulus of even width all along (sag. and exs.). Only the posteriormost segment can be studied entirely, although most characters seem common to the others. Pleura furrow apparently restricted to vicinity of fulcrum. In lateral view [pl.3 [a-d], axis and pleura of similar heights. In posterior view, axis rather high; pleura strongly flexed downwards, abaxial to fulcrum.

Pygidium apparently of strongly parabolic outline [pl.3 [e-f], subdivided into axial projection that receives the outer portion of the two posteriormost thoracic pleurae; 12 pleural ribs defined by broad and deep pleura furrows that interpleural furrows discernible. Axis delimited by deep axial furrows, subdivided into a median part and two abaxial parts, by two rows of muscle scars, and possibly bearing a faint sagittal sulcus posteriorly; 20 axial rings delimited by rather deep axial furrows that are straight medially but backwardly curved abaxial to muscle scars.

Discussion. *Pseudophillipsia (Carniphillipsia)* sp. A morphologically closed to *Pseudophillipsia (Carniphillipsia) paffenholzi*, *P*. (*C.*) *chongyingensis* and P. (*C.*) *sagittalis.* In addition to the characters common in the four species, exhibiting a narrow (sag.) anterior border furrow, 12 flat pleural ribs and a pygidial pleural field. Although, the parallel-sided portion of its glabella is longer compared with that of the *P*. (*s.l.*) *armenica*, *P*. (*s.l.*) *caucasica*, *P*. (*C.*) *javornikensis* and *P*. (*C.*) *lipacoides* its median preoccipital lobe is rectangular instead of trapezoid and it has fewer axial rings. Like *P*. (*C.*) *chongyingensis*, it also differs from *P*. (*C.*) *paffenholzi* in having a straight posterior margin of the occipital ring, a medially strongly forwardly curved SO.

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