**77. A Late Permian Trilobite from Yamaguchi Prefecture
with a Note on the Contemporaneous
Trilobites in Eurasia^{*)}**

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A trilobite collected by Hideo Ishida in the Tsunemori formation at Hinaga, Omine town, Mine city, Yamaguchi Prefecture is an imperfect internal cast of a pygidium. Nevertheless it is particularly interesting as it indicates a new late Permian trilobite horizon in the non-calcareous facies in West Japan.

The formation consists mainly of black mudstone and frequent alternation of fine sandstone and shale in addition to small limestone lenses. Its lower part ranges from the *Parafusulina ambigua* zone to the *Colania douvillei* zone and its upper part from the *Lepidolina multiseptata shiraiwensis* zone to a little higher horizon. Therefore the upper part from which the specimen was collected belongs to the Kuma series and the trilobite is early Upper Permian in age.

Except for an imperfect Permo-Carboniferous griffithid pygidium from Minno, Osaka Prefecture, all other Permian trilobites from Southwest Japan were obtained from limestones. The latest species in Japan is *Pseudophillipsia* (*Nodiphillipsia*) *hanaokensis* Kobayashi and Hamada, 1984 from the *Richelina changhsingensis* zone at the top of the Akasaka limestone, Gifu Prefecture. Therefore this is really an exceptional occurrence of a trilobite in clastic facies in West Japan.

This pygidium in Fig. 1 is ovate or roundly subtriangular, a little broader than long and well inflated; its lateral margins gently arcuate and meeting each other to form round posterior margin; axial lobe about one-fourth as wide as pygidium, longiconic, strongly convex, high up above pleural fields, composed of 9 to 10 rings besides a small terminal piece; axial furrow well developed; pleural lobe arching down from the furrow to lateral border and divided into 7 or 8 ribs by broad but shallow pleural furrows; marginal border narrow and depressed.

A small part of the lateral border is preserved on the left side of the pygidium. The left pleural lobe is so strongly compressed laterally that the lobe is elevated much higher than the other lobe. A narrow ridge appears to cross the pleural ribs and furrows rectangularly in the left pleural lobe, but it may be a secondary product, as it cannot be recognized in the right pleural lobe.

Now 22 species in 11 genera of the Permian trilobites are known from Japan (Kobayashi and Hamada, 1984b), but none is comparable to this pygidium.

As summarized already in 1984, the late Permian i.e. Tatarian or Dzhulfian trilobites possibly including some late Middle Permian ones are reported from Tunisia, Yugoslavia, Caucasus, Armenia, Iran, Pakistan, Himalaya, China (Xizang, Sichuan, Guizhou, Guangdong), Japan, Primoria, USSR (Grant, 1966; Lu, 1974; Hahn and Hahn, 1981; Hahn *et al.* 1984; Qian, 1977, 1981; Termier et Termier, 1974; Weber, 1944; Yin, 1978; Zhou, 1977) and probably from Laos (Mansuy,

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1913). They belong to eight genera in two families including a few doubtful generic references as follows:

Brachimetopidae

Cheiropyge (*Cheiropyge* & *Suturikephalion*)

Phillipsidae

Griffithidinae

Neoproetus (?)

Kathwaia

Ditomopyginae

Ditomopyge

Pseudophillipsia (*Pseudophillipsia* & *Nodiphillipsia*)

Anisopyge (?)

Acropyge

Iranaspidion

These trilobites as a whole reveal the finale stage of the trilobite evolution in the Tethyan sea. *Iranaspidion*, *Acropyge* and *Cheiropyge* (*Suturikephalion*) are characteristic of the Asian fauna in the oriental province of the Tethyan realm. They are all highly specialized. *Iranaspidion sagittalis* is a unique trilobite having a sagittal incision in posterior of the main lobe and binodose basal lobes in the glabella; *Acropyge lanceolata* has a mucronate pygidium with a distinct post-axial ridge; facial sutures recur in *Brachymetopus* (*Suturikephalion*) in North Japan and Jiangxi, East China (Lin Tian-Rui, 1982). In the above stated *Pseudophillipsia* (*Nodiphillipsis*) *hanokensis* the lateral lobes turn out circular nodes and lateral furrows are completely effaced in the glabella.

Fig. 1. "*Phillipsia*" aff. *middlemissi* Diener. $\times 4.5$.

Among the Permian trilobites of Eurasia the Tsunemori trilobite agrees best with *Phillipsia middlemissi* Diener, 1897 in the general outline and strong vaulting of the pygidium, proportional breadth of the axis to the pleural lobes and the possession of about ten axial rings and seven or eight pleural ribs, although the outline of the pygidium looks somewhat more rounded in that species. Gen. et sp. ind. II (cf. *Phill. middlemissi* Dien.) described by Weber (1944) from the Permian of the western slope of the Urals resembles Diener's species as well as this Japanese form in outline and segmentation of the pygidium, but the Uralian form is evidently different, as its axial rings carry large tubercles.

Diener's species was referred to *Ditomopyge* by Sarkar (1967), but to *Neoproetus* (?) by G. and H. Hahn (1970) who suggested its late Permian age. The authors consider also that Diener's and this pygidium belong probably to

Neoproetus or any other related genus, although their exact identification cannot be made without knowing other parts of their carapaces.

Finally the authors record here their best thanks to Prof. T. Kimura of the Tokyo Gakugei University and Messrs. G. Naito, H. Ishida and F. Takahashi for the privilege of studying this interesting trilobite. Through their kindness this specimen is added to the collection of the University Museum, University of Tokyo.

References

- Diener, C. (1879): The Permo-Carboniferous Fauna of Chitchun, no.1. Palaeontol. Indica, ser. 15, 1(3), 105 pp., 13 pls.
- Fujii, A., and Mikami, T. (1970): Tsunemori formation—its relation with the Akiyoshi limestone. J. Geol. Soc. Japan, 76(11), 545–557.
- Grant, R. E. (1966): Late Permian trilobites from the Salt Range, West Pakistan. Palaeontology, 9(1), 64–73, pl. 13.
- Hahn, G., and Hahn, R. (1970): Trilobitae Carbonici et Permici, II. Fossilium Catalogus, pars 119, 164–331.
- (1981): Ueber *Acropyge* (Trilobitae, Ober-Perm). Senckenberg. Leth., 61 (3/6), 217–225.
- Hahn, G., Hahn, R., and Romavš, A. (1970): Perm-Trilobiten aus Slowenien, NW-Jugoslaviën. *ibid.*, 51(4), 331–333. Taf. 1.
- Kobayashi, T., and Hamada, T. (1979): Two new Upper Permian trilobites from Central Iran. Proc. Japan Acad., 54B, 157–162.
- (1984a): The Middle and Upper Permian trilobites from the Akasaka limestone in Gifu Prefecture, West Japan. *ibid.*, 60B, 1–4.
- (1984b): Permian trilobites of Japan in comparison with Asian, Pacific and other faunas. Palaeont. Soc. Japan, Sp. Pap., no. 26, 92 pp., 14 pls.
- Lin Tian-Rui, Zhong Quan-Zong, and Ju Tian-Rui (1982): Trilobita, p. 326–329. Nanjing Inst. Geol. and Min. Resources: Palaeontological Atlas of East China (2), Late Palaeozoic, 495 pp., 157 pls.
- Lu Yen-Hao (1974): Permian Trilobita, p. 586–596. Nanjing Geol. Inst. Geol. Palaeont., Acad. Sinica: Handbook of Stratigraphy and Palaeontology of Southwest China. 454 pp., 202 pls., annex tables.
- Mansuy, H. (1913): Nouvelle contribution à la paléontologie de l'Indochine. Mém. Serv. géol. l'Indochine, 3(5), 1–40, 5 pls.
- Qian Yuyuan (1977): Upper Permian trilobites from Qinglong and Anshun of Guizhou. Acta Palaeont. Sinica, 15(2), 279–286, 1 pl.
- (1981): Some late Palaeozoic trilobites from Xizang, 335–339, 1 pl. Comprehensive Scientific Research Party of Xizang Plateau, Acad. Sinica: Palaeontology of Xizang, Fasc. 3, 354 pp.
- Sarkar, S. S. (1968): Revision of Indian trilobites. Rec. Geol. Surv. India, 95(2), 525–528.
- Termier, H., et Termier, G. (1974): *Phillipsia azzouzi* nov. sp. trilobite Griffithidae permien du Dijibél Tebaga (Tunisia). Geobios, 7(3), 257–265.
- Weber, Y. (1944): Trilobites of the Carboniferous and Permian systems of U.S.S.R. Fasc. 2. Permian Trilobites. Monogr. Paleontol. USSR, 71(2), 1–30, pls. 1–2.
- Yin Gong-Zheng (1978): Trilobita, pp. 586–596. Geol. Inst. Hubei, etc.: Palaeontological Atlas of Central South China, Guizhou Fasc. (2), Carboniferous-Quaternary Periods, 638 pp., 165 pls.