



New Kungurian Brachiopods from Khao Khok, Central Thailand (Indochina Block): A Revised Early–Middle Permian Problem in the Tak Fa Limestone Revisited

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ABSTRACT

Khao Khok is located about 50 km north of Khok Samrong and represents the largest limestone massif in the area. It consists of a well-bedded, fine-grained calcareous sequence, mapped as part of the Tak Fa Limestone which is in general considered to be dominantly a Middle Permian unit. It belongs to the Khao Khwang Platform of the western Indochina Block. Nevertheless, the earlier 2008 find of conodonts from Khao Khok showed an unexpected occurrence of older, Kungurian strata. The said conodont species, *Sweetognathus subsymmetricus* and *Pseudosweetognathus costatus*, were originally thought to be early Kungurian in age, but today this is better referred to as a later Kungurian. This find brought questions about whether 1) the basal Tak Fa Limestone extends down to the late Early Permian, or 2) there is a separate Early Permian unit beneath the area (recalling the Khao Kad Formation near Saraburi). Here, we report a new brachiopod suite from the same Khao Khok fossil beds, together with rare fusulines. The three brachiopod species, *Liraplecta* n. sp., *Schuchertella* n. sp., and *Acosarina* cf. *kanmerai* Yanagida & Nakornsri, are present. *Liraplecta* is found in SE Asia for the first time: it is a rare, large dictyoclostine productoid genus known mostly from the Kungurian of Tarim and eastern Tibet, and now from the Indochina Block. *Schuchertella* n. sp. is distinct from another Thai representative, *Schuchertella cooperi* Grant from the basal Ratburi Limestone, in having a wider hinge outline. The Khao Khok brachiopods appear to be of warm-water Tethys in affinity. The co-occurring fusulines *Minojapanella*, *Pseudodoliolina*, and *Codonofusiella* are common members in the Kubergandian–Murgabian (that is, Middle Permian in the Tethys standard) limestones: this is now correlated to the late Kungurian of the international standard. Thus, there is a concordance to find both Kubergandian–Murgabian fusulinoids and late Kungurian conodonts/brachiopods together. On balance, a late Kungurian age is suggested for the Khao Khok fossil beds. The Ratburi ‘mammoth’ brachiopod fauna of the West Malaya Block (not Sibumasu) is also coeval, late Kungurian in age, but no affinity is tangible. Note that the fusuline-based Tethyan stratigraphic standard that we have traditionally used for the Early–Middle Permian carbonates of SE Asia now needs to be closely correlated (converted) to the up-to-date international standard.

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