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Aptychi of the Boreal and Subboreal Middle Jurassic - Early Cretaceous ammonites: new records and review of published data

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Aptychi of Jurassic and Cretaceous ammonites are well-known from Mediterranean and Submediterranean areas. They were characterized by relatively thick calcite valves, while aptychi from Boreal and Subboreal sites remain relatively scarce. Siliciclastics typical for high-latitudes more likely preserve the thin organic layer of calcitic aptychi and of aptychi lacking a calcite layer. In the last decades, aptychi were discovered in some Boreal and Subboreal ammonite groups such as Bathonian-Callovian cardioceratids (Mitta 2006; Keupp & Mitta 2013), kosmoceratids (Schweigert 2000; Rogov 2004; Keupp & Mitta 2013), and Callovian proplanulitins (Rogov & Gulyaev 2001). Rare records of dorsoplanitid (Oates 1974) and simbirskitid (Engeser & Keupp 2002) aptychi are also known. In spite of the different evolutionary history of the high-latitude ammonite groups, they all have aptychi of a very similar type (praestriaptychi), which are characterized by a thin smooth calcite layer, which differ mainly in outline and relative width of the valves. Only the latest kosmoceratids show small tubercles in the outer surface of their *Kosmogranulaptychus*. New aptychi records support a similarity of nearly all high-latitude aptychi. Praestriaptychi were discovered in the early virgatitids (*Sarmatisphinctes*) and some dorsoplanitids (*Dorsoplanites*, *Laugeites*). Remarkably, the first record of an aulacostephanid aptychus should also be considered as *Praestriaptychus*. Numerous aptychi of Late Volgian craspeditids were found since 2011 (Mironenko, in press). Some *Praestriaptychus* were discovered inside the body chambers of *Kachpurites* and aptychi possibly associated with *Craspedites* are also known now. Ryazanian and Valanginian co-occurrences of aptychi with Boreal ammonites still remain unknown. In addition to *Simbirskites* (Engeser & Keupp 2002), a well-preserved *Praestriaptychus* has been found in the body chamber of a *Speetoniceras* megaconch. Aptychi of Aptian ammonites are common in the Lower Aptian shales of the Volga river, but they were not studied yet; information on their structure is based mainly on the investigation of thin sections (Doguzhaeva & Mutvei 1990, 1991). Recently collected material of *Sinzovia* aptychi may be assigned to *Lamellaptychus* (see also Thomson 1972). Surprisingly, aptychi of *Deshayesites* (Mikhailova & Bogdanova 1999) can also be considered as *Praestriaptychus*. We found that aptychi of Middle Jurassic to Lower Cretaceous Boreal and Subboreal ammonoids are characterized by a set of common features and could be considered mainly within the *Praestriaptychus* irrespective to the evolutionary history of ammonoid taxa. In addition to the aptychi occurrences mentioned above an interesting example of differences in aptychus type between macro- and microconch lineages has been recognized. As suggested by Trauth (1934), *Laevilamellaptychus* associated with *Sutneria* [m] differ from the *Laevaptychus* of their macroconchiate counterpart *Aspidoceras* s.l. *Laevaptychus* records are well-known from pre-Kimmeridgian macroconchs *Euaspidoceras*, while aptychi of the corresponding microconch *Mirosphinctes* remains unknown. Our discovery of *in situ* aptychi within the body chambers of Late Oxfordian *Mirosphinctes* indicates that they should be included in the same paragenus as the aptychi of *Sutneria*.

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