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Chaetognath grasping spines from the Devonian of Poland: their structure and geochemistry

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Previously unidentified small (up to 1.3 mm in length), gently curved hollow spines composed of calcium phosphate and derived from the upper Famennian (Devonian) of the Holy Cross Mountains in central Poland are described. They are similar to the type species of *Phakelodus*, but show some distinct morphological differences, therefore, have been included into *Phakeloides polonicus* gen. et sp. nov. The studied specimens of that species show relatively massive mineral structure characterized by significant porosity with well-preserved major structural features. The outer layer of the spines is, in contrary, fragmentarily preserved, and exposes distinct mosaic-like ornamentation of the surface of the middle layer, which consists of obliquely arranged, shallow furrows. Geochemical analyses of the Devonian *Phakeloides polonicus* gen. et sp. nov. spines have revealed the presence of a weaker mineralized structure, compared to conodont apatite, composed of a diagenetic phosphate phase. It is characterized by moderate cathodoluminescence intensity, elevated concentrations of iron and sulphur as well as decreased concentrations of strontium, calcium, and phosphorus. The “Orsten” type, early diagenetic phosphatization of the outer layer of the spines is not observed in studied specimens of *Phakeloides polonicus* gen. et sp. nov., contrary to the previously investigated Furongian (Cambrian) material. This points to the low rate of diagenetic phosphatization, which was likely enabled by very slow sedimentation and long residence time of the spines close to sediment-water interface at varying redox conditions and significant flux of phosphate ions.

Key words: Conodonta, Protoconodonta, Chaetognatha, elemental ratios, microstructure, phosphatized spines, Devonian, Holy Cross Mountains, Poland.

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