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## DOGGER BELEMNITE FAUNA OF THE VILLÁNY MOUNTAINS

by

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### Introduction

The belemnite material studied here comes from the classical Callovian ammonite-rich bed of the Villány Mountains and from its underlying Bathonian strata, mostly from the *Templom-hill* and from immediately West of the *Somsich-hill* localities. Previously K. HOFMANN, T. SZONTÁGH, L. LÓCZY JR., Gy. RAKUSZ, and G. KOPEK collected belemnites in this region. In 1959 under the direction of J. FÜLÖP a thorough, layer-by-layer collection was carried out. We got the collected material of the Hungarian Geological Institute and completed it with our own collection in 1967.

The main part of the several hundred specimens is fragmentary, thus cannot be determined. The nearly 100 determinable specimens come from the Callovian ammonite-rich bed and can be referred to 10 species.

### History

The earliest contributor who has mentioned belemnites from the Dogger rocks of the Villány Mountains was O. LENZ (1872). K. HOFMANN determined 5 belemnite species from the rich material collected by himself in 1874. His results were published later by M. PÁLFY (1901) in a short faunal list. The species determined by HOFMANN are:

*Belemnites Württembergicus* OPP.

*Belemnites Gillieronii* MAY.

*Belemnites Argovianus* MAY.

*Belemnites hastatus* BLAINV.

*Belemnites Calloviensis* OPP.

This faunal list was later published without any change by L. LÓCZY JR. (1912). In his monograph (L. LÓCZY JR., 1915) on the Callovian ammonites of

the Villány Mountains he did not deal with the associated fauna—because of the different character of his work—and published only the previously known data on the belemnites.

### Paleoecological and biostratigraphical observations

The Bathonian and Callovian of the Middle Jurassic are represented by a sequence of a maximum 10 m in thickness. At the *Templom-hill* locality of Villány this consists, in its lower (and greater) part, of Bathonian conglomerates, calcareous sandstones and sandy-bituminous limestones, while the upper part—approx. 40 cm thick—is represented by the Callovian ammonite-rich bed. On *Somsich-hill*, the other locality of belemnites, the Callovian ammonite-rich bed can be found in 40 cm thickness, too.

Belemnites can be collected from both the Bathonian sandy limestones and the ammonite-rich bed. The belemnite fauna of the two formations are, however, strikingly different. In the sandy-bituminous limestones of the Bathonian only the stocky forms of the subfamily *Passaloteuthinae* occur, in contrast with the slender, fusiform rostra of the subfamily *Belemnopsinae* yielded by the Callovian ammonite-rich bed exclusively. The lack of the representatives of the subfamily *Passaloteuthinae* can be interpreted by the geographic differentiations of the belemnite faunas during the earliest Callovian. On the other hand, the absence of forms belonging to the subfamily *Belemnopsinae* in the material from the Bathonian limestones shows a sharp ecological change undoubtedly. It is detectable from the other faunal elements and from the lithological characters (A. VÖRÖS, 1968). The evaluation of the belemnite faunas stressed the supposition that the Bathonian, slightly bituminous sandy limestone was deposited in a relatively closed, quiet sea environment, while the Callovian ammonite-rich bed was formed in the agitated waters of an open, but shallow-water sea.

The biostratigraphical observations on the belemnites of the Callovian ammonite-rich bed also indicate strongly agitated waters. The specimens frequently were embedded as fragments, and rostra fossilized together with phragmocones are scarce in the relatively rich fauna. Despite the good preservation no proostracum can be encountered. The rostra are often scrubbed and eroded, such traces being frequent on the stromatolitic coated specimens.

According to P. SZABÓ (1957) and E. VADÁSZ (1960) the belemnite rostra are oriented in SE–NW direction on the bedding planes. On the *Templom-hill*, in the big quarry several sq. m of the ammonite-rich bed are well exposed, but recent measurement did not prove definitely any orientation.

### Paleogeographic aspects of the belemnite fauna

The paleogeographic distribution of the belemnite genera in the Jurassic and Cretaceous is outlined. It is known from detailed studies of G. R. STEVENS (1963, 1965) that starting from the Callovian 3 large belemnite faunal realms existed i.e. the Boreal, Mediterranean and Indo-Pacific

provinces. Most striking is the fact that the representatives of the subfamilies *Passaloteuthinae* and *Cylindroteuthinae* which occurred together with the *Hibolites* and *Belemnopsis* genera in the Bajocian and Bathonian, in the Callovian are present only in the Boreal region. In Villány, forms belonging to the subfamily *Passaloteuthinae* are frequent in the underlying rocks of the Callovian ammonite-rich bed. On the contrary, in the ammonite-rich bed only the *Belemnopsis* and *Hibolites* genera are present, associated with *Hastites* and *Rhopaloteuthis* spp. This coincides well with the picture formed by the isolated belemnite faunal realms.

The distribution of some species was studied by H. PUGACZEWSKA (1961). It is clear from the previous literature (M. LISSAJOUS, 1925) that the *Hibolites hastatus* (BLAINV.), the most common species of the Callovian belemnite fauna of Villány has an extremely widespread distribution within the Mediterranean region. The distribution of *Belemnopsis subhastatus* (ZIETEN) and *Rhopaloteuthis sauvanaus* (D'ORB.) is similar. Some forms are known from the European Mediterranean region: *Hastites privatensis* (MAYER), *Belemnopsis fusiformis* (PARK.), *Belemnopsis lutesulcatus* (D'ORB.), *Hibolites semihastatus* (BLAINV.) and *Rhopaloteuthis gillieronii* (MAYER). The distribution of *Hibolites girardoti* (LORIOLE) seems to be restricted, but the records of this form from Switzerland, Poland and Hungary indicate a more extended occurrence. The same holds perhaps true of the *Belemnopsis semiarcuatus* PUGACZEWSKA, described from Poland, on the basis of the poorly preserved specimens of Villány.

### Chronological evaluation

The chronological value of belemnites in comparison to ammonites has no real importance. A fauna including many species, however, is suitable for information on age relation.

The rare and poorly preserved ammonites did not permit the exact age-determination of the underlying rocks of the ammonite-rich bed. According to the literature (A. KASZAP, 1959) only a single specimen of *Oxycerites* cf. *aspidoides* was collected from the underlying beds. Although the rich brachiopod fauna of this limestone will enable a more precise age-determination in the future, there are evidences of the Bathonian age on the basis of belemnites.

The belemnites of the underlying limestones are very poorly preserved and can be hardly removed from the matrix. Although neither specific, nor generic determination is possible, these forms can be undoubtedly assigned to the subfamily *Passaloteuthinae*. As it was mentioned above, in the Mediterranean region the representatives of this subfamily possibly do not occur higher than the topmost Bathonian because of the separated belemnite faunal realms.

These facts and the single reference to *Oxycerites* cf. *aspidoides* allow to date the underlying limestones as Bathonian.

The chronological data of the 10 species derived from the ammonite-rich bed are tabulated mainly on data M. LISSAJOUS (1925) and H. PUGACZEWSKA (1961).

	BATHONIAN	CALLOVIAN			OXFORDIAN
		LOWER	MIDDLE	UPPER	
<i>Hastites privatensis</i>		+	+	+	+
<i>Belemnopsis fusiformis</i>	+				
<i>B. latesulcatus</i>	+	+	+	+	+
<i>B. subhastatus</i>	+	+	+	+	
<i>B. semiarquatus</i>			?	+	?
<i>Hibolites hastatus</i>	+	+	+	+	+
<i>H. semihastatus</i>	+	+	+	+	+
<i>H. girardoti</i>	+	+	+	+	+
<i>Rhopaloteuthis savanaus</i>				+	+
<i>R. gillieronii</i>	+	+	+	+	

7 of the species reach their abundance in the Callovian. The *Rhopaloteuthis savanaus* occurs frequently in the Oxfordian but W. WAAGEN (1875) and H. PUGACZEWSKA (1961) recorded this form from the upper Callovian, too. The *Belemnopsis semiarquatus* was described from the upper Callovian by H. PUGACZEWSKA (1961), its further stratigraphic range is not cleared up to now. The presence of *Belemnopsis fusiformis* known so far from the Bajocian and Bathonian is very interesting but it cannot influence the conclusion drawn on the basis of 9 other species, i.e. that the belemnite fauna of the ammonite-rich bed, all in all, indicates a Callovian age.

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