



VARIABILITY OF THE SENONIAN SPECIES *OSCILLOPHA DICHOTOMA* (BAYLE, 1849)

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Received December 12, 2002

Accepted January 20, 2003

Abstract. Revision of the collection of Upper Cretaceous molluscs of northern Africa included the study of Senonian oyster *Oscillopha dichotoma*. The high number of individuals permitted to discuss variability and stratigraphic range of this species. Hereat, forms showing a number of differences in their morphology and having a different distribution were defined. They represent a new taxonomic unit, which will be featured in a separate study.

■ Upper Cretaceous, Senonian, Santonian, Mollusca, Bivalvia, Ostreacea, *Oscillopha dichotoma*, variability, North Africa, Libya.

The author gathered a large collection of fossil evertebrates during his extensive mapping activities in central Libya. This collection is now housed in the Palaeontological Department of the National Museum in Prague. The dominant element of its faunal content is a variety of different species of Senonian oysters. These oysters are exceptional in their high number and, in many cases, also perfect state of preservation. This fact permitted a detailed study of some species. One of them was *Oscillopha dichotoma* (BAYLE, 1849), (syn. *Ostrea dichotoma*, *Lopha dichotoma*, *Alectryonia dichotoma*). The large set of specimens collected, containing both left and right valves of this species, permitted the study of its morphological variability. The set also included individuals hitherto equally attributed to *Oscillopha dichotoma* which, however, showed differences from this species in a number of morphological features and its distribution, as revealed by the detailed study. Besides the overall shape of the shell, its size, sculpture, contrasting structure of the umbonal region and the muscle imprint position, these individuals also differ in their stratigraphic range and distribution. Individuals from this part of the set will be treated separately and the forms tentatively referred to as *Oscillopha* sp. will be described as new taxonomic units.

Oscillopha dichotoma (BAYLE, 1849)

Material: 126 individual, isolated valves; 3 complete shells with the two valves joined.

Diagnosis: Shell of lophid type, medium large to large (max. height 163 mm), almost equivalve, markedly inequilateral, strikingly thick-walled, massive, elongated dorso-ventrally. Shell broadest at lower one-third of its height. Right valve not functioning as a lid, as is usual in most oyster species, but equally massive and thick-walled as left valve. Umbonal cavity very shallow even in adult specimens. Very small size of the space containing soft body of a live individual sharply contrasting with the size and especially massive appearance of shell. Anterior shell margin only weakly uplifted, posterior shell margin flat. Commissures of left and right valves bearing dentition, tightly fitting into each other when shell is closed. Teeth of the dentition decreasing in size towards umbonal region of shell. Umbo

Table 1. Measurements (in mm) of right valves of species *Oscillopha dichotoma* (BAYLE, 1849).

Inv. No.	T 2167	T 2169	T 2170	T 2175	T 2176	T 2179	T 2182	T 2183	T 2184	T 2185	T 2187
height	123.0	131.3	133.5	130.7	115.2	122.8	127.0	107.9	111.8	91.9	65.1
length	94.7	92.8	107.1	68.1	64.2	82.6	90.9	73.9	90.0	52.3	49.9
index	1.29	1.41	1.24	1.91	1.79	1.48	1.39	1.46	1.24	1.75	1.30

Table 2. Measurements (in mm) of left valves of species *Oscillopha dichotoma* (BAYLE, 1849).

Inv. No.	T 2168	T 2171	T 2172	T 2173	T 2174	T 2177	T 2178	T 2194	T 2197	T 2201	T 2205
height	130.0	107.1	113.1	130.0	107.3	159.3	138.8	99.3	96.7	162.9	86.1
length	99.1	79.5	75.4	83.0	62.5	107.8	99.9	55.4	59.2	83.0	68.0
index	1.31	1.34	1.50	1.56	1.71	1.47	1.38	1.79	1.63	1.96	1.26

straight, ligamental area of medium height, relatively long. Muscle imprint large, markedly deep, located near posterior shell margin. Its shape teardrop-like, crescent-like in outline, typically ostreoid. Sculpture of outer shell surface represented by acute, dichotomously branched radial ribs, often extending into prominent spinal protuberances and spines. Shells attached to substrate with umbonal region of left valve. Attachment area medium to rather small, not reaching beyond upper third of left valve. Character of original sculpture on the area of shell attachment to substrate not distinct. No chomata.

Variation: Morphological variability of shells of the species *Oscillopha dichotoma* is not too high, compared to other species of the suborder *Ostreina*. Shell morphologies differ especially in the length: width ratio. Extreme values of indexes of this ratio were 1.24 and 1.91 in right valves and 1.26 and 1.96 in left valves (Tab. 1-3). The average value of this index is 1.50. Shells retain their characteristic morphology for the whole period of ontogenetic development. Relatively stable is the position of the adductor muscle imprint, which is always prominent, large, deep and typical reniform.

Remarks and relations: Senonian species *Oscillopha dichotoma* (BAYLE, 1849) was originally described in combination with the genus *Ostrea*. It was reported in connection with the genus *Alectryonia* (= *Lopha*) by Pervinquierè (1912). It was attributed to the newly established genus *Oscillopha* by Malchus (1990), the author of this new taxon. Still disputable is the distinction between the genus *Oscillopha* and other lophid taxa (*Actinostreon*, *Lopha*, *Rastellum*) as well as the nomenclatural validity and the justification of these taxa themselves (Záruba, 1996). In its massive shell structure, its overall appearance, the position and size of the muscle imprint, *O. dichotoma* resembles the European species *Rastellum diluvianum* (LINNAEUS) (syn. *Ostrea diluviana* LINNAEUS) from the Cenomanian and Lower Turonian of the Bohemian Cretaceous Basin. The differences lie particularly in the size of shells, in the size of the attachment area of the left valve, in the curvature of the umbonal region of the valves, in the style of the toothed part of the commissure, in the height of the anterior shell margin and stratigraphic range of the two species. While the European species *R. diluvianum* does not cross the Middle Turonian, the northern African species *Oscillopha dichotoma* appears in the Santonian, Campanian and ?Maastrichtian. The occurrences of this species from southern Asia have also been reported from the uppermost Cretaceous.

Compared to the species *Rastellum diluvianum*, shells of the species *Oscillopha dichotoma* reach larger size and are clearly more massive to thick-walled. The area with which the left valve is attached to the substrate is smaller and does not reach beyond the upper third of the left valve outer surface. Shells were cemented to the substrate with only a very small part of

Table 3. Measurements (in mm) of shells of species *Oscillopha dichotoma* (BAYLE, 1849).

Inv. No.	T 2210	T 2211	T 2212
height	120.6	78.5	73.2
length	69.3	56.0	48.4
thickness	59.7	31.6	42.9

the umbo; therefore, the umbonal region of the shell is generally straight (in *R. diluvianum*, the whole umbo is slightly curved towards the posterior shell margin, which is caused by the character of attachment). Ligamental area is longer and higher. Anterior shell margin is low to flat, as opposed to the markedly uplifted margin in *R. diluvianum*. Dentition of the commissure is less prominent. Spinal processes and spines are usually absent in *R. rastellum*.

Distribution and stratigraphic range: The species *Oscillopha dichotoma* was first described from the Santonian of M'zab-el-Messai, south of Batna in Algeria (Bayle, 1849). Coquand (1869) described this species from several sites in northern Algeria and western Libya, which are also Santonian in age. Abbas (1962) reported this species from the Santonian of northern Egypt (Abu Roach, NW of Cairo). The herein treated material comes from central Libya, from the northern part of the Hammadah al Hamra Plateau. It was collected by the present author during geological survey in the territory of map sheets Al Qaryat al Gharbiyah, Al Qaryat ash Sharqiyah, Shawá and Ghadámes (scale 1:250,000). In the above mentioned region, the species *Oscillopha dichotoma* is fairly abundant in the deposits of Upper Campanian and it occasionally ranges up to the Maastrichtian. The finds reported from the Santonian should be revised because they most probably represent a different species (subspecies?) of the genus *Oscillopha*. Final revisions of the biostratigraphic and taxonomic position of these finds will be treated in a separate study.

Mode of life: The contrast between the size of the soft animal body and the massive appearance of its protective shell, the extreme thickness of both valves, their dentition in peripheral areas and the massive character of the muscle imprint evidence that these bivalves dwelled at high-energy sites of widely exposed rocky coasts. In the environment with perpetual movement of water masses, the massive, thick-walled shells provided the necessary protection against crushing by rolling pebbles. Toothed commissure of both valves prevented the valves of a closed shell from movement against to each other. The size of the muscle imprint evidences a strong adductor muscle, which held the valves together.

ACKNOWLEDGEMENTS

The research was supported by the Ministry of Culture of the Czech Republic – project No. RK99P03OMG031, “Revision and scientific study of collection of postpalaeozoic molluscs of northern Africa in the collections of the National Museum in Prague”. I am grateful to Dr. Jiří Adamovič (Institute of Geology, Acad. Sci., Czech Rep., Prague) for translating the manuscript.

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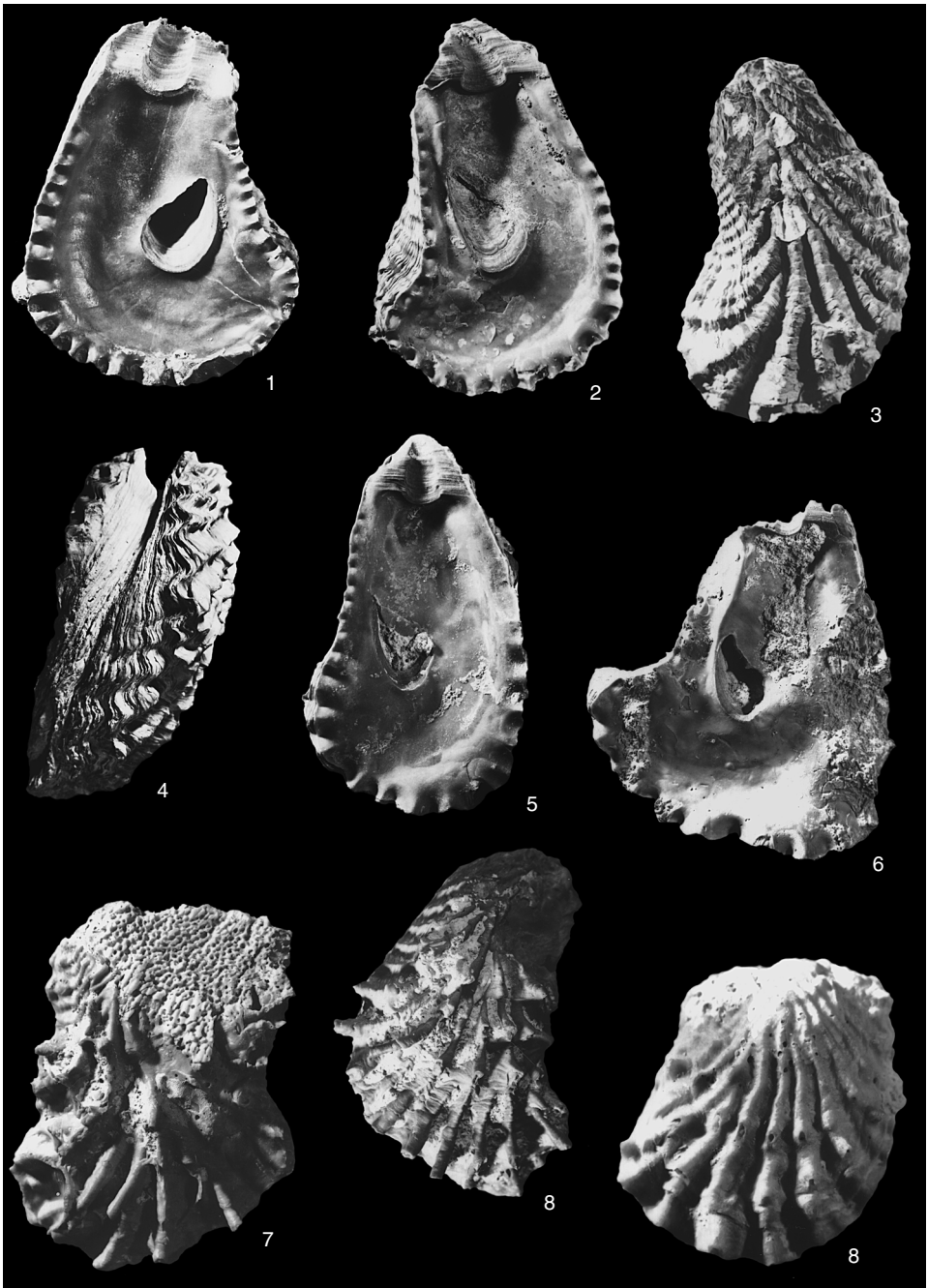


Plate I. *Oscillopsa dichotoma* (BAYLE, 1849), Upper Cretaceous, Senonian, Upper Campanian, Hammadah al Hamra, Al Qaryat al Gharbiyah, Libya.

(1) Inv. No. T 2167; RV, int., $\times 0.4$; (2) Inv. No. T 2172; LV, int., $\times 0.4$; (3) Inv. No. T 2218; RV, ext., $\times 0.5$; (4) Inv. No. T 2210; ext., both valves, ant. views, $\times 0.4$; (5) Inv. No. T 2174; LV, int., $\times 0.4$; (6) Inv. No. T 2204; LV, int., $\times 0.4$; (7) Inv. No. T 2199; LV, ext., attachment area, $\times 0.6$; (8) Inv. No. T 2197; LV, ext., hyote spines arising from radial ribs, $\times 0.4$; (9) Inv. No. T 2238; RV, ext., juv. sp., $\times 1.5$.