

AN IMPORTANT BRACHIOPODA SPECIES FROM THE VISEAN OF TURKEY:
WHIDBORNELLA CAPERATA (SOW.)

Ayça SALANCI

Mineral Research and Exploration Institute of Turkey

ABSTRACT. — The writer of the present paper has studied the fossils collected in 1966 by O. Kaya from Cebeciköy and Belgrad Forest of the İstanbul region (Fig. 1). Results obtained show that two of the specimens characterize *Whidbornella caperata* (Sow.) and that the stratigraphical level in which they were found is by far different from those known up-to-date.

In European literature reference is made to this specimen which was encountered in the transition zone between Upper Devonian and Lower Carboniferous strata as well as in the Etroeungt beds. In Turkey, however, this specimen was encountered for the first time in the above-mentioned locality in the upper levels of the Middle Visean and the middle levels of the Upper Visean.



Fig. 1. - Location map.

I. GENERAL STRATIQRAPHY

Carboniferous strata of the Istanbul area was studied by O. Kaya (1971), who established their age and rock units (Fig. 2). In the area of study the following formations (from bottom to top) are found: Büyükada, Baltalimam, Trakya and Cebeci formations and their related members.

The Büyükada formation consists of nodular limestones, while the overlying Baltalimanı formation is composed of lydites. Both units represent the beginning and the middle phases of Tournaisian, established on the basis of Trilobites and Radiolaria identified in these beds and the stratigraphic position of these beds.

The Acıbadem member constitutes a shale horizon, containing basal limestones, and is a part of the Trakya formation. A microfaunal complex characterizing the end of Tournaisian is observed in these beds. The Küçükköy member—which consists mainly of alternations of graywackes and shales—was deposited mostly at the beginning and in the middle of Viséan, as evidenced by the plant remains collected in this area.

The Çamurluhan member, on the other hand, represents an upper shaly section of the thick Trakya formation and contains limestones. On the basis of paleontological evidence and the overlying Cebeciköy limestones it may be assumed that this member was deposited during the upper Middle Viséan until the middle phase of the Upper Viséan.

Whidbornella caperata (Sow.) was found in the uppermost level of the Çamurluhan member in the Cebeciköy area as well as in Belgrad Forest, within the unit adjacent to the lenticular Cebeciköy limestones. The following fossils were identified by the author in these beds: *Delepineia comoides* (Sowerby), *Leptaena analoga* (Phillips), *Rhipidomella michelini* (L'Eveille), *Schizophoria resupinata* (Martin), *Derbyia* cf. *gigantea* Thomas, *Schuchertella* cf. *wexfordiensis* Smyth, *Schelwienella* cf. *crenistrina* (Phillips), *Chonetes* cf. *laguessianus* de Koninck, *Chonetes* cf. *tricornis* Semenev, *Eomarginifera* cf. *frechi* Paeckelmann, *Dictyoclostus* sp.

II. PALEONTOLOGY

Family : PRODUCTELLIDAE SCHUCHERT & Le VENE

Subfamily : PRODUCTELLINAE SCHUCHERT & Le VENE

Genus : Whidbornella REED

Whidbornella caperata (SOWERBY)

1840 — *Leptaena caperata* SOWERBY.

1841 — *Leptaena caperata* PHILLIPS.

1846-1865 — *Strophalosia productoides* DAVIDSON.

1913 — *Strophalosia productoides* PAECKELMANN.

1931 — *Productella caperata* PAECKELMANN.

1943 — *Whidbornella caperata* (SOWERBY) REED.

CHRONOSTRATIGRAPHY				LITHOSTRATIGRAPHY	Lithology	Thickness (m)	Fauna and flora		
System	Stage	Sub-stage	Zone						
CARBONIFEROUS	NAMURIAN			Uskumruköy fm.	Subgraywacke Graywacke, schist	> 100	(Coal)		
				Değirmendere fm.	Alternation of dolomite, limestone, limestone-schist	~234	Rhynchonellacea Endothyra		
				Çiftalan fm.	Subarkose Subgraywacke	> 114	Plant remnants		
	DINANTIAN	VISEAN	III		Gümüşdere fm.	Diabase Graywacke, shale, subarkosic conglomerate	~500	(Coal)	
					Kaftaltepe unit	Lydite, silicified schist	19	<i>Diplocalamites jongmansi</i> , <i>Lepidophloios</i> sp., <i>Sphenopteridium rigidum</i> , <i>S. cf. furcillatum</i>	
				D ₁ Z	Cebeciköy lms.	Limestone, dolomite, chert, calc-schist	160	<i>Neospirifer</i> sp., <i>Mediocris</i> sp., <i>Endothyra prisca</i> , <i>E. circumplicata</i> , <i>E. bowmani</i> , <i>Eostaffella mosquensis</i> , <i>E. parastruvei</i> , <i>Pseudoendothyra tataena</i> , <i>Pornata</i> , <i>Endothyranopsis compressus</i> , <i>Earlandia elegans</i> , <i>E. minima</i> , <i>Tetrataxis angusta</i>	
				S ₂ Z	Çamurluhan member *	Schist, fluxoturbidite, graywacke, quartz, conglomerate	708	<i>Delepinea comoides</i> , <i>Leptaena analoga</i> , <i>Derbyia</i> cf. <i>gigantea</i> , <i>Eomarginifera</i> sp., <i>Schizophoria resupinata</i> , <i>Rhipidomella michelini</i>	
			II		Trakya fm.	Schist, graywacke, fluxoturbidite	~1000	<i>Lepidostrobus brownii</i> , <i>Lepidodendron losseni</i> , <i>L. acuminatum</i> , <i>Sublepidodendron elongatus</i> , <i>S. fasciatum</i> , <i>Asterocalamites</i> , <i>Lepidodendropsis</i> , <i>Artisia</i> , <i>Pericyclus</i>	
					Küçükköy unit	Calc-schist, mudstone, calcareous graywacke	86	<i>Endothyra</i> aff. <i>admiranda</i> , <i>E. kartzevae</i> , <i>E. costifera</i>	
			I	Fominskoye Z.	Acıbadem beds	Heybeliada limestone	Limestone	~50	<i>Endothyra perfida</i> , ? <i>E. glomiformis</i> , <i>E. prokirgisana</i> , <i>E. barzassiensis</i> , <i>E. similis</i> , <i>Plectogyra cuneisepta</i> , <i>P. antiqua</i> , <i>P. apposita</i> <i>Orbiculoidea tornacensis</i> , <i>O. davreuxiana</i>
					Baltımanı fm.		Lydite, silicified schist	31	<i>Liobole</i> sp., <i>Liobolina</i> sp.
					Küçükyalı unit		Graywacke in the form of filling in the grooves	> 11	<i>Merocanites</i> sp. ex. aff. <i>applanatus</i> <i>Ammonellipticus</i> sp.
					Büyükada fm.		Limestone-schist alternations (nodular structure)	> 52	<i>Trimercephalus mastophthalmus</i>
			DEVONIAN	FAMENNIAN	Cheiloceras Z.	Ayineburnu unit			

* Member where *Whidbornella caperata* (Sowerby) was found.

Fig. 2 - Columnar section (adapted from O. Kaya, 1969)

PALEONTOLOGICAL DESCRIPTION

Both of the specimens studied are dorsal valves. Although their contours are very faint, they appear to be sub-elliptical. The hinge-line is straight and, although the number of lobes is not clear, trace of a cardinal tubercle is found. The convexity of the shell varies greatly in different specimens, it is either very strongly convex or geniculated towards the frontal portion of the valve. The shell is very wrinkled and shows numerous traces of spines and tubercles. These wrinkles, including ears, form regular concentric rows towards the anterior part of the shell. Spinose tubercles, however, follow a characteristic radial pattern.

As previously mentioned, the two dorsal valves of our specimens differ from each other in respect to their margins, convexity and dimensions.

The dimensions of the specimen shown on Plate I, fig. 1, are smaller, the margins are quite distinct, sub-elliptical and there is a slight convexity in the middle of the shell towards the beak. Shell is characterized by very distinct concentric wrinkles and spines which form a radial pattern. These regular concentric wrinkles are very apparent in the area around the ears. In the convex area near the beak the structure is porous.

Our specimen, on the basis of its margins and shell structure, closely resembles *Productella caperata* var. *radiata* Paeckelmann, 1931. The form given in Plate I, fig. 2, on the other hand, differs from the form in fig. 1 in respect to its margins, dimensions and convexity; however, the two forms resemble each other on the basis of shell structure and cardinal protuberances. The marginal contour of this form is indistinct and rather irregular. The hinge-line, which is straight, is shorter than the width of the shell. Towards the anterior part of the valve it is geniculated and convex. The structure of the shell is wrinkled, and the ornamentation of this shell, in comparison to other forms, is larger and shows wider concentric lines. Spines are quite large and follow a regular radial pattern. These ornaments, are very fine and closely spaced towards the hinge-line and the beak area, while in the anterior part of the shell they are larger and more widely spaced.

Both of the specimens studied should be classified as two separate varieties on the basis of the differences observed. However, the author of the present paper could not establish the subspecies since the material available was limited and the collecting of more specimens would create considerable problems, such as those experienced in the past years.

STRATIGRAPHICAL DISTRIBUTION OF THE SPECIES

The first typical species was collected from North Devon (England) and was described by Sowerby as *Leptaena caperata* Sowerby (1840, plate 53, fig. 4). The stratigraphical level of this species was determined to be Upper Devonian. In the same year, Murchison described a specimen, collected from Frasnian limestones in the Bas-Boulonnais area, as *Strophalosia productoides* Murchison, 1840. This form also occurs in the lower levels of the Upper Devonian in Bergisches Land. The form described as *Productella caperata* var. *radiata* Paeckelmann, 1931, was collected from Etroeungt strata (that is the beginning of Lower Carboniferous) of Germany. The Whidborne collection of fossils, on the other hand, consists of forms found in the Pilton beds in England, among which three specimens were studied and described as varieties by Reed who gave them the following names (Reed, 1943, p. 69): *Whidbornella caperata* (Sowerby), *Whidbornella membrancea* and *Whidbornella productoides* Reed.

As mentioned before, our specimen was collected from Cebeciköy and Belgrad Forest in the İstanbul region and shows a wide distribution starting from Middle Visean up to the middle part of the Upper Visean.

III. CONCLUSION

According to Paeckelmann (1925-1938), whose studies on the geology of the İstanbul region are still considered of great importance, the Çamurluhan member observed in the vicinity of Cebeciköy represents the end of Devonian, while the formations of the Belgrad Forest area are of Middle Devonian. Yalçınlar (1951) was first to attribute the Cebeciköy limestones to Visean; he described the adjacent formations as continental Permo-Carboniferous. Kaya (1972) assigned to the Çamurluhan member the age ranging between the upper level of the Middle Visean and the middle of the Upper Visean.

On the basis of these studies, it may be assumed that the age of *Whidbornella caperata* (Sowerby), which is widespread within the Çamurluhan member, as observed in the outcrops of the Belgrad Forest and in the vicinity of Cebeciköy, corresponds to the age given to this member—i.e. between the upper level of the Middle Visean and the middle of the Upper Visean.

This assumption is also supported by the fossils encountered in association with the above-described specimens as well as by other fossils collected from the upper and lower horizons, as seen in the columnar section.

ACKNOWLEDGEMENTS

The writer of the present paper is indebted to Dr. O. Kaya for his invaluable assistance and kindness in lending his collection. Thanks are also due to C. Öztömür, who guided and helped the writer during her studies. I am grateful also to A. Oral, Dr. O. Tekeli and Ö. Yazlak for their contributions to the present study.

Translated by: Filiz E. DİKMEN

Manuscript received March 28, 1974

BIBLIOGRAPHY

- DAVIDSON, Th. (1864-1865): A monograph of British Devonian Brachiopoda, part VI, p. 97, pl. 19, fig. 13, London.
- KAYA, O. (1969): Karbon bei İstanbul. *N. Jb. Geol. Palaont. Mh.*, H. 3, S. 160-173.
- (1971): Biostratigraphy of the Visean Cebeciköy Limestone near İstanbul, Turkey, *fourn. Foraminiferal Research*, v. 1, no. 2, p. 77-81.
- MOORE, R.C. (1965): Treatise on Invertebrate Paleontology, (H), *Brachiopoda*, t. 2, p. 467.
- PAECKELMANN, W. (1913): Das Oberdevon des Bergischen Landes.
- (1931): Die Brachiopoden des Deutschen Unterkarbons. Bd. 2.
- PHILLIPS, J. (1841): Paleozoic fossils.
- REED, F.R.C. (1943): Notes on certain Upper Devonian Brachiopods figured by Whidborne. *Geol. Mag.*, vol. 80, no. 2.
- SOWERBY (1840): *Trans. Geol. Soc. of London*, vol. 2, ser. 5, t. 53.

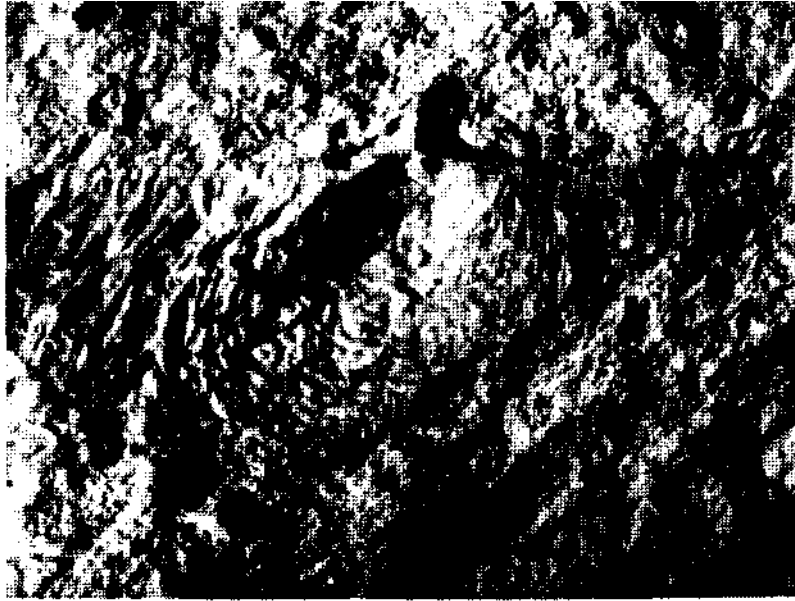


Fig. 1 - *Whidbornella caperata* (Sowerby)
Dorsal valve. Magn. 1×8
Locality: Belgrad Forest, Cebeciköy.



Fig. 2 - *Whidbornella caperata* (Sowerby)
Dorsal valve. Magn. 1×1.7
Locality: Belgrad Forest, Cebeciköy.