

# Salento cretaceous fish in Italian museums and other scientific institutions

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### ABSTRACT

A temporary exhibition (21 Feb - 20 Jun 2014) at the MAUS (Museum of the Environment -University of the Salento) provided an opportunity to revise the collections of Cretaceous fossil fish found in Salento limestone belonging to various Italian Institutions. The investigation, which continued after the exhibition concluded, recorded 2466 items, distributed across 11 different locations. To date, less than 20 % of the items have been studied. However, from 1911 to 2015, 48 scientific articles and 1 catalogue were published, describing 42 species (including 39 new to Science), with the establishment of 32 new Genera, 9 new Families and 1 new Order. The exhibition at the MAUS was supported by the publication of a catalogue to disseminate knowledge of this aspect of the Salento limestone. Illustrations drawn for the exhibition were also used to produce the MAUS 2015 calendar, thus fulfilling the aim of presenting to the wider public the rich assemblage of Cretaceous fish from the Salento, mostly unknown and dispersed around Italy.

### Key words:

cretaceous, fossil fish, dispersed collection.

### RIASSUNTO

*Pesci fossili del cretaceo salentino nei musei e nelle istituzioni scientifiche italiane.*

*Una mostra temporanea (21 Feb - 20 Giu 2014) al Museo dell'Ambiente dell'Università del Salento (MAUS) ha rappresentato lo spunto per una ricognizione dei numerosi reperti sparsi tra le istituzioni museali italiane. La ricognizione ha riportato l'esistenza di 2466 reperti, da 11 differenti collocazioni. Dal 1911 ad oggi, meno del 20% di tali reperti è stata studiata, con la pubblicazione di 48 articoli scientifici e 1 catalogo. Tali studi hanno consentito la descrizione di 42 specie, di cui 39 nuove per la Scienza, e la istituzione di 32 Generi, 9 Famiglie, e 1 Ordine, nuovi per la Scienza. La mostra temporanea al MAUS è stata integrata con la realizzazione di un catalogo. Le illustrazioni adoperate per corredare la mostra e il catalogo sono state adoperate anche per la realizzazione del calendario MAUS 2015, con l'obbiettivo di diffondere la ricca collezione tra il grande pubblico.*

### Parole chiave:

*cretaceo, pesci fossili, collezione disgiunta.*

## INTRODUCTION

Upper Cretaceous limestone (65-80 million years ago) outcrops in many points of the Salento Peninsula (fig. 1). This limestone has been quarried for human building activities since ancient times. Fossils have been a by-product of this extraction, which has been executed without scientific supervision. As a consequence of this quarrying activity, scientists have known about the presence of fossils in the Salento

Cretaceous since the end of the 19<sup>th</sup> century, but only recently (the late 20<sup>th</sup> century) have they been taken into consideration in detailed scientific studies. The paleontological collection in the MAUS numbers about 1,000 items from the local Cretaceous, about 80% being fish. One of the present authors (L. Capasso, now Director of the University Museum in Chieti) inherited from his grandfather several natural curiosities, including a collection of 26 fish from the Upper Cretaceous of the Salento discovered at the



Fig. 1. Map of the Cretaceous surfaces in the Salento Peninsula.

beginning of the 20<sup>th</sup> century in Alessano del Capo. At the end of the 20<sup>th</sup> Century that collection was enriched with 29 specimens from Nardò. The "L. Capasso" public collection (55 specimens) is only a small assemblage of Cretaceous fish from the Salento when compared to the one now kept by the Civic Museum of Natural History of Verona. The 1500 specimens collected in Nardò quarries by L. Sorbini and G. Guidotti for the Museum of Verona in 1977 - 1984 today represent the largest and best studied collection of such fauna. The fish collection in the MAUS has about 800 specimens obtained from quarries in Nardò, Alessano, and Manduria, thanks to various collectors (A. Meleleo, R. Belvedere, among others). The collection held by the Municipality of Nardò (50 specimens) is entirely from the local district, while the specimens kept by the Civic Museum of Calimera (Lecce) are from Alessano. Also

from Salento Cretaceous (but with no information on the exact provenance) are the 7 specimens in the Natural History Museum of Calci (Pisa), the 34 specimens in the Civic Museum of Natural History in Milan, and the 14 specimens in the Palaeontology Section of the Centro Musei delle Scienze Naturali e Fisiche (CMSNF), University of Naples – Federico II. Lastly, on the basis of the literature, information was obtained about other individual specimens scattered around Italy but not found for the present overview: 1 - a single specimen in the Gabinetto di Storia Naturale of the Istituto Tecnico "O.G. Costa" in Lecce (IT Lecce),

2 - a single specimen in the private collection of Prof. G. De Giorgi (pc De Giorgi), also in Lecce (D'Erasmus, 1911; 1922).

3 - a single specimen (holotype) in the collection of the Ufficio Geologico d'Italia in Rome (UGI) (D'Erasmus, 1911).

Of the whole assemblage, only 413 specimens have been analysed and determined, contributing to the publication of 48 articles and 1 catalogue from 1911 to 2015. These scientific publications described 42 species, 39 of which being new to Science, justifying the establishment of 32 new Genera, 9 new Families, and 1 new Order of organisms.

The exhibition hosted by the MAUS, supported with a financial contribution from the Italian Ministry for University and Research (MiUR), sought to bring together the heritage of Cretaceous Fish from the Salento, today scattered across various collections (table 1). The exhibition also sought to promote a kind of heritage that was practically unknown to the wider public.

## MATERIALS AND METHODS

Eight selected specimens, comprising two holotypes, from the Municipality of Nardò collection were exhibited in the MAUS together with 36 specimens (two holotypes) from the Lecce University collection from 21 February to 20 June 2014. The Civic Museum of Natural History in Verona gave permission to analyse its collection, which is still under study, and papers on this collection published from 1978 until 2015 were used as a source of drawings and information on the material. The University Museum of Chieti made available images

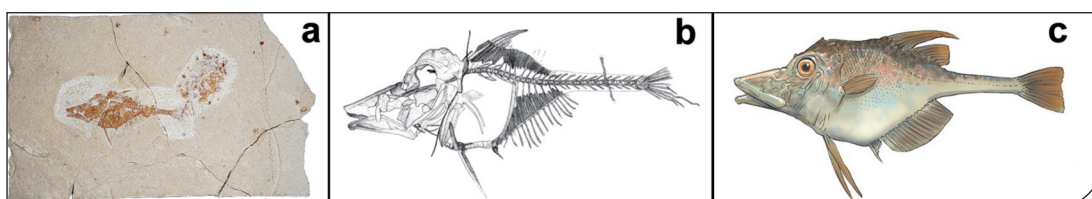


Fig. 2. Example of fossil (a), drawing (b), and hypothetical representation (c) of *Cretazeus rinaldii* described by Tyler et al. (2002). 6659 C, holotype, Municipality of Nardò. Hypothetical representation by A. Gennari.

TAXON	NUM. ITEMS	HOLO-TYPE	SITE	COLLOCATION
<i>Apuliadercetus tyleri</i> Taverne 2006	22	*	Nardò	MCSN Verona
	2			CLC Chieti
<i>Apulichthys gayeti</i> Taverne 1997	4	*	Nardò	MCSN Verona
	6		Alessano	MAUS Lecce
	9			CLC Chieti
<i>Arizaichthys adriaticus</i> Taverne 2009	1	*	Nardò	MCSN Verona
<i>Aspesaichthys cavaensis</i> Taverne 2004	2	*	Nardò	MCSN Verona
<i>Bannikovperca apula</i> Taverne 2010	1	*	Nardò	MCSN Verona
	2		Nardò	CLC Chieti
<i>Belonostomus marquesbritoii</i> Taverne, Capasso 2012	1		Nardò	MCSN Verona
	1	*	Alessano	CLC Chieti
	1			MAUS Lecce
<i>Capassoichthys alfonsoi</i> Taverne 2015	2	*	Oria-Manduria	MAUS Lecce
<i>Caudadercetus bannikovi</i> Taverne 2006	3	*	Nardò	MCSN Verona
<i>Chanoides chardonii</i> Taverne 2005	21	*	Nardò	MCSN Verona
	5		Alessano	MAUS Lecce
	6			CLC Chieti
<i>"Chanos" sanctibernardini</i>	1	**	Alessano	CLC Chieti
<i>Chanos</i> sp.	1		Nardò	MCSN Verona
<i>Coelodus</i> sp.	1		Campi 5.	PC De Giorgi Lecce
	2		Nardò	CMSNF Naples
	1		Monteroni-Copertino	IT Lecce
<i>Cretatriacanthus guidottii</i> Tyler, Sorbini 1996	1	*	Nardò	MCSN Verona
<i>Cretazeus rinaldii</i> Tyler Bronzi Ghiandoni 2000	5	*	Nardò	Munic. Nardò
<i>Gasteroramphosus zuppichinii</i> Sorbini 1981	1	*	Nardò	MCSN Verona
<i>Halec bassani</i> D'Erasmus 1911	1	*	Acquarica del C.	CMSNF Naples
<i>Italoclupea nolfi</i> Taverne 2007	88	*	Nardò	MCSN Verona
	2			CLC Chieti
<i>Johnsonperca annavaccarii</i> Taverne 2010	2	*	Nardò	MCSN Verona
<i>Lebonichthys nardoensis</i> Taverne, Capasso 2012	1	*	Nardò	CLC Chieti
<i>Lecceclupea ehiravaensis</i> Taverne 2011	6	*	Nardò	MCSN Verona
	5		Alessano	CLC Chieti
<i>Leccedercetus longirostris</i> Taverne 2008	1	*	Nardò	MCSN Verona
	1			CLC Chieti
<i>Lecceichthys wautyi</i> Taverne 1998	1	*	Nardò	MCSN Verona
<i>Lissoberyx pugliensis</i> Taverne 2003	2	*	Nardò	MCSN Verona
<i>Nardoclupea grandei</i> Taverne 2002	102	*	Nardò	MCSN Verona
	1			CLC Chieti
<i>Nardodercetus vandewallei</i> Taverne 2005	8	*	Nardò	MCSN Verona
	2			CLC Chieti
<i>Nardoechelys robinsi</i> Taverne 2002	5	*	Nardò	MCSN Verona
	2		Nardò	CLC Chieti
<i>Nardoelops nybelini</i> Taverne, Capasso 2012	7	*	Nardò	MCSN Verona
<i>Nardoichthys francisci</i> Sorbini, Bannikov 1991	1	*	Nardò	MCSN Verona
<i>Nardopiscis cavini</i> Taverne 2008	2	*	Nardò	MCSN Verona
<i>Nardorex zorzini</i> Taverne 2004	4	*	Nardò	MCSN Verona
	1			CLC Chieti
<i>Nardovelifer altipinnis</i> Sorbini C., Sorbini L. 1999	2	*	Nardò	MCSN Verona
<i>Ophidercetus italiensis</i> Taverne 2005	8	*	Nardò	MCSN Verona
	1			CLC Chieti
<i>Portoselvaggioclupea whiteheadi</i> Taverne 2007	1	*	Nardò	MCSN Verona
<i>Pseudopycnodus nardoensis</i> Taverne 1997	5	*	Nardò	MCSN Verona
	7		Alessano	CLC Chieti
	1		Nardò	CLC Chieti
	9		Alessano	MAUS Lecce
<i>Pugliaclupea nolardi</i> Taverne 2004	3	*	Nardò	MCSN Verona
<i>Sardinioides frigoae</i> Taverne 2008	1	*	Nardò	MCSN Verona
<i>Saurodon elongatus</i> Taverne, Bronzi 1999	1	*	Nardò	Mun. Nardò
	14		Nardò	MCSN Verona
<i>Scombroclupea macrophthalma</i> D'Erasmus 1911	1	*	Nardò	UGI Rome
<i>Sorbinicharax verraesi</i> Taverne 2003	3	*	Nardò	MCSN Verona
<i>Sorbininardus apuliensis</i> Taverne 1999	1	*	Nardò	MCSN Verona
<i>Tethybatis selachoides</i> de Carvalho 2004	4		Nardò	MCSN Verona
	1	*	Nardò	MAUS Lecce
<i>Zorzinperca weverberghi</i> Taverne 2010	3	*	Nardò	MCSN Verona
	1			CLC Chieti

**Table 1.** List of fish species (in alphabetic order) described from the upper Cretaceous limestone of the Salento Peninsula. Asterisks (\*) indicate the holotype. Site (third column) indicates the locality where the fossils were found. Double asterisks (\*\*) indicate a "nomen nudum", appearing on the catalogue (Belmonte, 2014) but with no description of the species. It is a Chanidae but not of the genus *Chanos*.

of its most relevant specimens. Following the closure of the exhibition and publication of the show catalogue, other photographic material was received from the University of Naples and the Civic Museum of Calimera (LE).

Specimens exhibited in the MAUS show were selected on the basis of their scientific importance, completeness and size (in that order). The items were arranged in four different thecae, with appropriate spotlights and reinforced glass. The exhibition was complemented by an arrangement of other Cretaceous fauna (fish not from the Salento, but also Ammonites and Rudistes) and flora (a broad collection of tree branches and leaves found in Salento limestone).

The exhibition was presented to the public at an event in February 2014, which was followed by a conference for the presentation of the catalogue in June 2014 (Belmonte, 2014). The catalogue was published as a supplementary edition of the local Journal "Thalassia Salentina", vol. 36, suppl. 2014, and was made available online (<http://sibaese.unisalento.it/index.php/thalassiasal/issue/view/1261>) to enhance its dissemination. The catalogue was the context where most of the described specimens are brought together, regardless of their actual hosting institutions. The catalogue also contains the best specimens still under study (indicated as undetermined species). Hand-drawn reconstructions of many species provided the wider public with a morphological interpretation of fossil remains that were sometimes difficult to understand (fig. 2). Selected drawings were used in the MAUS calendar for 2015, further enhancing the persistence of Cretaceous fish from the Salento in the public imagination.

## RESULTS AND DISCUSSION

A total of 413 fish specimens from the Cretaceous limestone of the Salento have been studied since 1911. These specimens have been arranged into 42 different species, including 39 that are new to Science, grouped into 32 new Genera, 9 new Families, and 1 new Order of organisms. The



Fig. 3. The first described Cretaceous fish holotype from the Salento: *Halec bassani* D'Erasmus 1911 (CMSNF Naples collection, n. 681).

assemblage is second in importance only to the well-known marine Upper Cretaceous Lebanese deposits, which number more than 300 species, including 150 new to Science (Gayet et al., 2012).

The first species described was *Halec bassani* D'Erasmus (1911), based on material obtained by the Author in 1884 (fig. 3). The most common species of fauna in the whole collection are the rather large *Nardoclupea grandei* (fig. 4) and the small *Italoclupea nolfi*, both Clupeidae, which together account for about 45% of the identified specimens. The largest specimen of this ichthyofauna belongs to the collection of the Civic Museum of Calimera (originally found in Alessano, P159A and B), with a length of more than 100 cm. The specimen is here tentatively attributed to the genus *Belonostomus* (fig. 5). Only five species (not the two most abundant) were common to both sites (Nardò, Alessano) of the Salento Cretaceous fauna. This could be due to the fact that the two sites are not perfectly contemporaneous, or it could be due to ecological differences between two diverse habitats. In any case, the fossil fauna of the Salento Cretaceous appears rich and diversified (many specimens are still

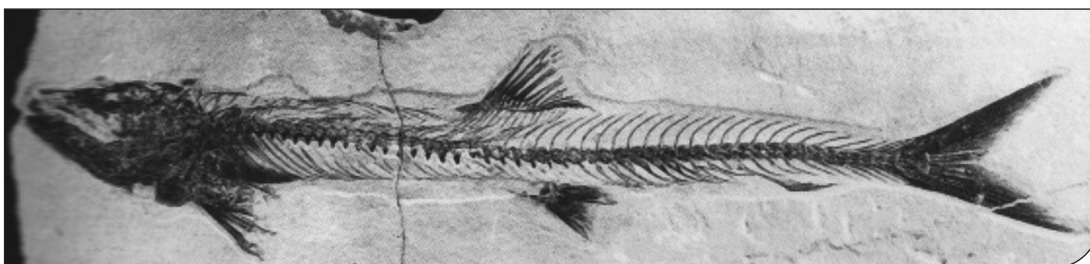


Fig. 4. The commonest species among the Cretaceous fauna of the Salento: *Nardoclupea grandei* described by Taverne (2002). (MCSN Verona, holotype, Na 250).

under study), and the species description is still far from complete.

Holotypes of Salento Cretaceous fish are conserved in the Museo Civico in Verona (31), the Museo Universitario in Chieti (2), the Municipality of Nardò (2), the Museo dell'Ambiente MAUS in Lecce (2), Naples University Museum (1) and the Italian Geological Institute in Rome (1) (table 1). The exhibition at the MAUS stimulated further studies, with the identification of 10 specimens from the MAUS collection as already described species. It also prompted the study of another eight specimens, of which six (four from the MAUS and two from Nardò Municipality) are possibly new to Science. The initial results of the study of this material yielded the recent publication of Taverne (2015) with the description of the new species and genus *Capassoichthys alfonsoi*, a member of the Ichthyodectidae family.

## ACKNOWLEDGMENTS

The Authors thank the MiUR and the Soprintendenza BB CC MiBAC for their financial support and permission for the exhibition, the Civic Museum of Natural History in Verona (Giuseppe Minciotti -

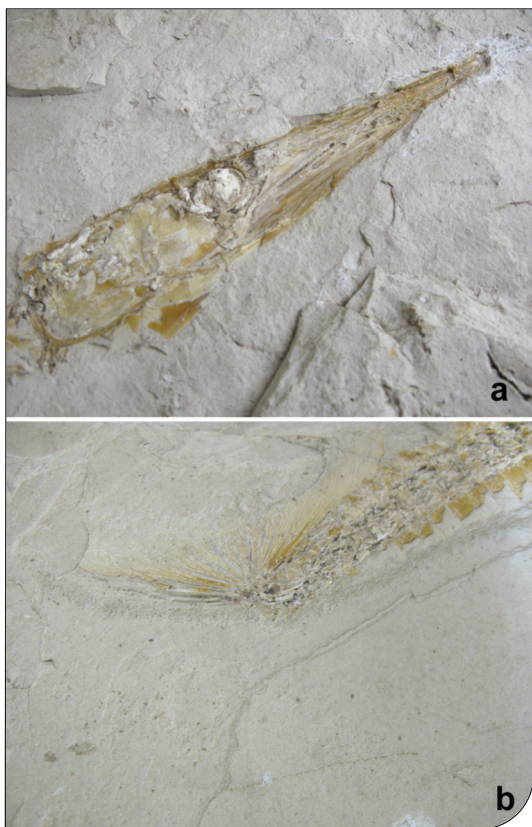


Fig. 5. The largest specimen among the Cretaceous fish of the Salento: P159A/B (Civic Museum of Natural History, Calimera-Lecce). It is still awaiting study, but it appears to be a *Belonostomus*, probably *B. marquesbritoi* (see Taverne and Capasso, 2012) a member of the Aspidorhynchidae family. (a) head; (b) caudal fin.

Roberto Zorzin) for permission to view the Verona collection, the Natural History Museum - University of Pisa (Giovanni Bianucci) for information on seven specimens, the Municipality of Nardò (Carlo Falangone, Mino Natalizio) for providing access to six specimens, the Civic Museum of Natural History in Milan (Cristiano Dal Sasso) for locating 34 specimens in their collection, the mayor and Municipality of Alessano for their sponsorship of the exhibition, AGILEX-CETMA and Sara Invitto (University of the Salento) for the 2015 calendar, Alberto Gennari for the drawings, Maria Carmela Del Re (Centro Musei delle Scienze Naturali e Fisiche - Palaeontology Section, "Federico II" University of Naples) for information and photographs of specimens in the Naples collection, and Antonio Durante and Luigi Tomasi (Civic Museum of Natural History in Calimera - Le) for access to two specimens in the CNHM collection.

## REFERENCES

- BELMONTE G. (ed.) 2014. *Il mare nella pietra*. Grifo publ., Lecce, 70 pp.
- D'ERASMO G., 1911. Sopra alcuni avanzi di pesci cretacei della provincia di Lecce. *Atti della Reale Accademia delle Scienze Fisiche e Matematiche di Napoli, serie II, vol. 15*: 1-7.
- D'ERASMO G., 1922. Contributo alla ittiologia dell'Italia meridionale. *Memorie della Reale Accademia delle Scienze Fisiche e Naturali di Napoli, Nuova Serie, 11*: 1-28.
- GAYET M., ABI SAAD P., GAUDANT O., 2012. *Les Fossiles du Liban. Mémoires du temps*. Des Iris publ., 200 pp.
- TAVERNE L., 2002. Les poissons crétacés de Nardò. 12°. *Nardoclupea grandei* gen. et sp. nov. (Teleostei, Clupeiformes, Dussumieriinae). *Bollettino del Museo Civico di Storia Naturale di Verona, Geologia Paleontologia Preistoria, 26*: 3-23.
- TAVERNE L., 2015. Les poissons crétacés de Nardò. 38°. *Capassoichthys alfonsoi* Gen. et Sp. Nov. (Teleostei, Ichthyodectidae). *Bollettino del Museo Civico di Storia Naturale di Verona, Geologia Paleontologia Preistoria, 39*: 35-46.
- TAVERNE L., CAPASSO L., 2012. Les poissons crétacés de Nardò. 35°. Compléments à l'étude des halécostomes *Belonostomus* (Aspidorhynchiformes) et *Pseudopycnodus* (Pycnodontiformes). *Bollettino del Museo Civico di Storia Naturale di Verona, Geologia Paleontologia Preistoria, 36*: 25-44.
- TYLER J. C., BRONZI P., GHIANDONI A., 2000. The Cretaceous fishes of Nardò. 11°. A new genus and species of Zeiformes, *Cretazeus rimaldii*, the earliest record for the order. *Bollettino del Museo Civico di Storia Naturale di Verona, Geologia Paleontologia Preistoria, 24*: 11-28.

Submitted: July 5th, 2016 - Accepted: October 17th, 2016  
Published: December 16th, 2016