

A DORSAL FIN SPINE OF THE CHIMEROID FISH,  
*EDAPHODON* cf. *BUCKLANDI* (AGASSIZ)  
FROM THE EOCENE OF MOROCCO

By GÉRARD R. CASE and JACQUES HERMAN

UNE EPINE DORSALE DU CHIMÉROÏDE *EDAPHODON*  
cfr. *BUCKLANDI* (AGASSIZ) DANS L'YPRÉSIEN DU MAROC

Par GÉRARD R. CASE<sup>1</sup> et JACQUES HERMAN<sup>2</sup>

**ABSTRACT:** The recovery of a dorsal fin spine fragment in the Eocene deposits of Morocco adds additional information to the fossil fish fauna in these deposits. A mandibular dentition of the same genus has been described by Jacques HERMAN (1973).

The discovery of this dorsal fin spine confirms the sporadic incursion of Holocephalian Fishes in these deposits.

**RÉSUMÉ:** La découverte d'un fragment d'épine dorsale dans les dépôts éocènes du Maroc apporte une information complémentaire à la connaissance de la faune ichthyologique de ces formations. Une dent mandibulaire du même genre fut décrite par un des auteurs (J. HERMAN 1973).

La découverte de cette épine dorsale vient confirmer la présence sporadique d'Holocéphales dans ces régions.

### Introduction

The specimen herein described was recovered by Gerard R. CASE while he was investigating the fossiliferous deposits in the Oulad Abdoun basin of north-central Morocco. The recovery of the specimen was made in "Couche 1" (Yprésien) *in situ* at Tranchée R.E.I. (see Fig. 1) near Sidi-Daoui, Morocco. The date of recovery was August 17, 1972.

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Additional assistance in the field was rendered by Mohamed ben MAÂTI and Benmoussa MAJID of Khouribga. We would also like to especially thank Monsieur Pierre ZENARO of Martigues, France, for the valuable information and advice which enabled him (G. R. CASE) to make the trip to North Africa. Photographs in Plate 1 were prepared by Monsieur Paul MENUT of Marseille, France.

### Provisional assignment

*Edaphodon* cfr. *bucklandi* (AGASSIZ, L.) 1843

### Synonymy

1869 *Dipristis meirsii* MARSH-MARSH: Proc. Amer. Assoc. Adv. Sci., 1869, p. 230 (Spine only).

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(\*) Specimen will be in repository at the Institut Royal des Sciences Naturelles de Belgique, Bruxelles, Belgique.

partie inférieure  
de la CI (Yprésien)  
(lower part of  
Couche I-Eocene)

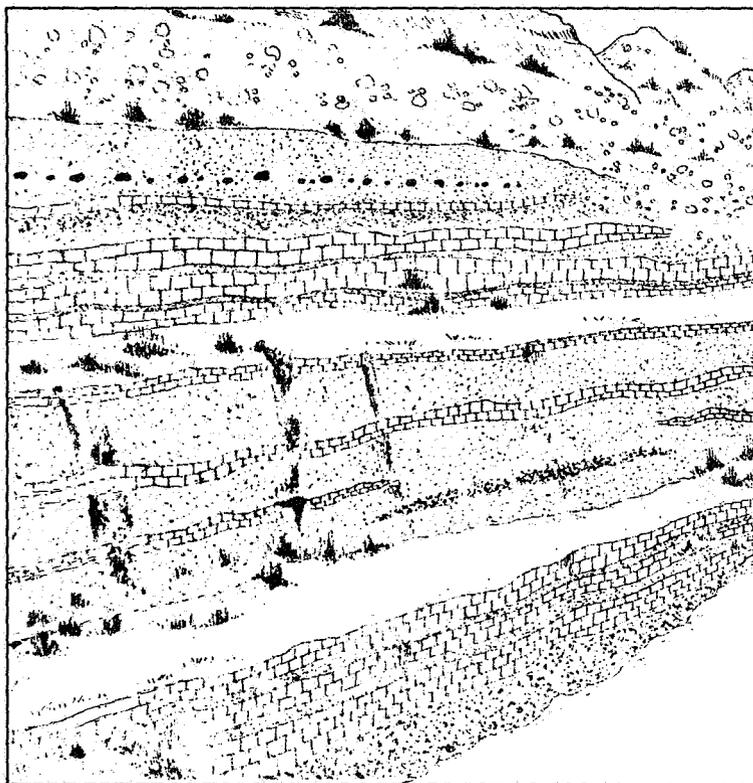


Fig. 1.

Class: Chondrichthyes  
Subclass: Holocephali  
Order: Chimaerae  
Suborder: Chimaeroidei  
Family: Chimaeridae  
Genus: *Edaphodon* BUCKLAND W. 1838

*Edaphodon* BUCKLAND, Proc. Geol. Soc., London, II, 1838, p. 687

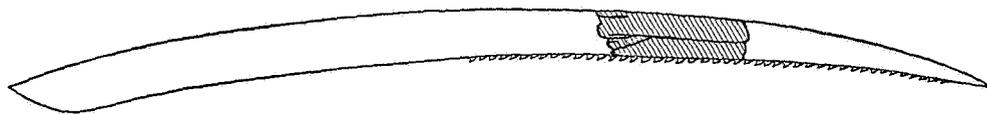


Fig. 2.

*Material*

A fragment [pre-anterior (mesial section) - see Fig. 2] of a chimeroid dorsal fin spine (\*).

couverte) at Sidi-Daoui (Oued-Zem) in the Oulad Abdoun basin, Kingdom of Morocco, North Africa.

*Gisement*

Yprésien — Couche 1, *in situ*. Locality: Tranchée R.E.I., O.C.P. open pit mines (dé-

*Description*

The specimen represents a section of the mesial part of a large dorsal fin spine (see

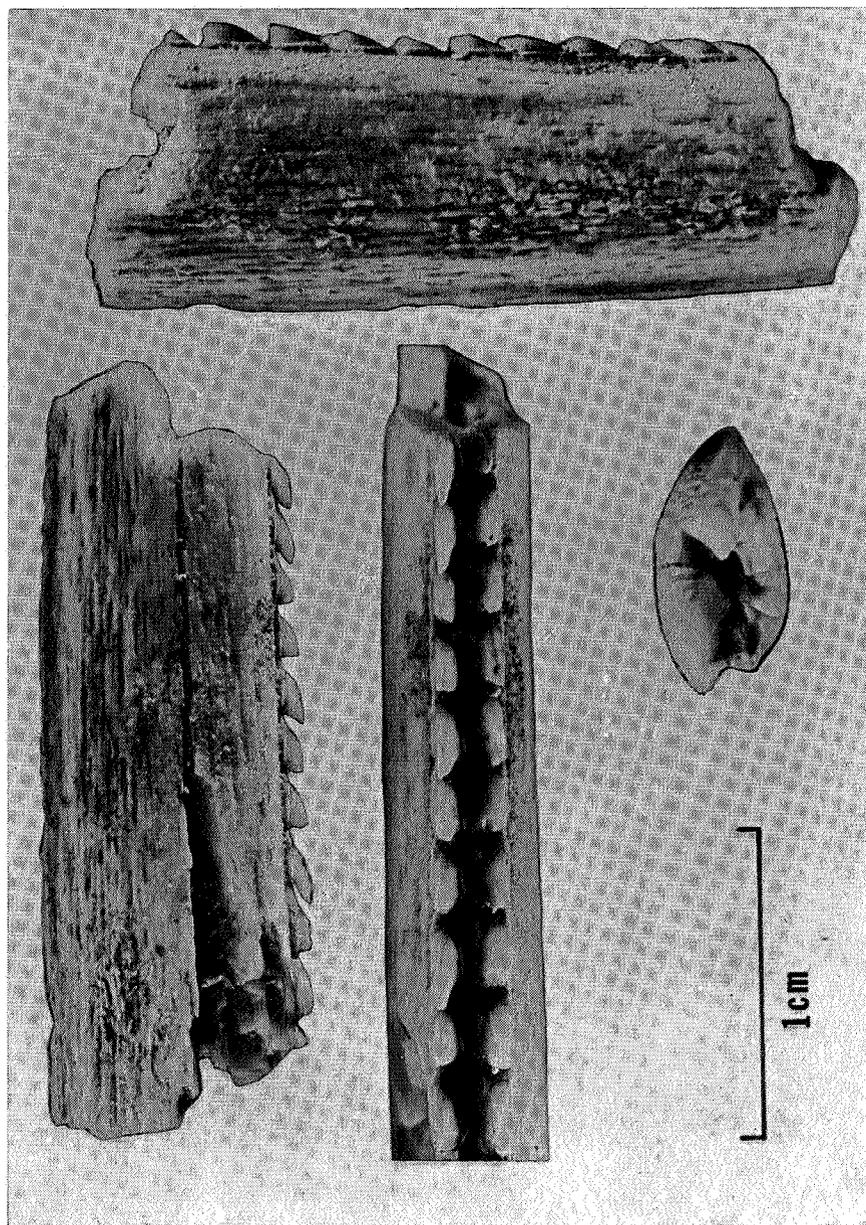


Plate 1. Various views of the Moroccan dorsal fin spine fragment.

Fig. 2 and Plate 1), and has two parallel rows of denticles (hook-like in appearance) directed posteriorly towards the base of the spine. The specimen is definitely a chimeroid dorsal fin spine section.

The outer surface of the spine is devoid of striations. A single row of very fine denticles exist along the dorsal keel, although these denticles are worn down to a point where they are not evident unless viewed under a microscope.

*The measurements for the specimen are as follows*

The greatest length of the spine fragment .....	2.7 cm
The greatest width of the spine fragment, including the "hook" denticles .....	1.0 cm
Cross-section of the spine fragment	0.5 mm

#### *Discussion*

In most formations where fossil chimeroid remains are found, the majority of specimens recovered are dentitions or fragments (the vomerine, the palatal and the mandibular elements), while the rarest occurrences are the dorsal fin spines. Complete skeletons or partial skeletons of chimeroid fishes are extremely rare, but, when found, usually contain traces of both the dentition and other hard parts such as cephalic hooks, tenacula and dorsal fin spines. This is particularly true in the case of the newly discovered Iniopterygia, a new order of Chondrichthyan fishes (pseudo-chimeroids) recovered from the Illinois basin and parts of the Western basin located in the midwestern United States. The age of these early "holocephalians" is Pennsylvanian (Carboniferous) and a large monograph describing these specimens (5 genera and 7 species) is currently in press (ZANGERL and CASE, 1973). Briefly, the iniopterygians are not true chimeroids, but rather possibly represent a "sister group" sensu HENNIG (1966) which have forked from a common ancestral stock<sup>1)</sup>. Complete skeletal material of both chime-

roids, in particular, *Ischyodus avitus* H. v. MEYER, (K.A. von ZITTEL, 1932, Fig. 153) and the new order of iniopterygians: (*Iniopteryx rushloui*, *I. tedwhitei*, *Promexyele peyeri*, *P. bairdi*, *Sibyrhynchus denisoni*, *Iniopera richardsoni* and *Inioxyele whitei*), show dentition, tenacula, in some cases — cephalic hooks, and dorsal fin spine elements in association (although it must be mentioned here that in the iniopterygians-no dorsal fin spines exist, rather, complicated paired pectoral fin spine elements unknown to chimeriformes). In such skeletal material, the spine and dentition can be attributed to the same species. In unconsolidated sediments (marls, sands, and clays) where the cartilaginous skeletons of both chimeroids and sharks are displaced, the usual traces for such animals are the isolated dentitions and assorted hard parts such as the dorsal fin spines. It is not always possible therefore to attribute a dentition and a spine found in a given sediment to the same individual animal. Temporary designations must be made, until complete skeletons can be found which verify the relationships of such specimens.

In the case of dorsal fin spines of chimeroids, there is very little variety from species to species. A dorsal fin spine generally has the same characteristics for all genera and species. It has always been a problem to assign these ichthyoduroolites to a definite genus or species in unconsolidated marls, sands or clays. The problem of identification even to class or order is best illustrated by the experiences of COPE and FOWLER when an isolated dorsal fin spine was recovered in the Cretaceous greensands of New Jersey (FOWLER, 1911). The opinion of these authors on this particular dorsal fin spine varied from an assignment to a pycnodontid fish or to a plectognath fish, with the possibility of its also being a chimeroid as well. Later HUSSAKOF (1912) and WOODWARD (1911) made a definite commitment towards the chimeroids for their ichthyoduroolites. They assigned them to the genus, *Edaphodon*.

Illustrations of chimeroid dorsal fin spines exist in many publications (BIGELOW and SCHROEDER, 1953), (CASE, 1967, 1973), LE-

(1) Quotation from the section on comparative anatomical and phylogenetic significances of the Iniopterygia. (In Zangerl & Case, In press).

RICHE, 1906) etc. Their name designations are most always as follows: *Edaphodon* sp.

Dorsal fin spine fragments recovered by Mr. CASE in the Upper Cretaceous (Maestrichtien) Navesink Formation of New Jersey, U.S.A., are provisionally assigned to the genus and species: *Ischyodus thurmanni* PICTET et CAMPICHE. The senior author currently has in

press a paper on this very subject. He has found no remarkable or outstanding differences between the Navesink *Ischyodus* dorsal fin spines compared with those of the *Edaphodon* specimens from the Late Cretaceous (Hornerstown Formation) or those recovered from the Paleocene or Eocene deposits in the U.S.A.

#### EXPLANATIONS FOR FIGURES AND PLATE:

Fig. 1. Schematic view of Tranchée R.E.I., Sidi-Daoui, Morocco. View shows Couche 1 near the top. (Courtesy of Bureau des Plans of l'O.C.P., Service Geologie, Khouribga, Maroc.)

Fig. 2. Drawing of a typical chimeroid dorsal fin spine. Shaded portion is actual portion of Moroccan spine fragment.

Plate 1. Various views of the Moroccan dorsal fin spine fragment.

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