



## A NEW *ODONTORHYTIS* SPECIES (CHONDRICHTHYES) FROM THE MIDDLE EOCENE OF ELGEDIDA MINE, BAHARIYA OASIS, EGYPT

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### ABSTRACT

During a systematic examination of a chondrichthyan assemblage collected from the middle Eocene (probably Lutetian) glauconitic sandstone bed overlying the iron ore of ElGedida mine, in the Bahariya oasis, the authors came across a large number of minute teeth belonging to genus *Odontorhytis*. By comparing these teeth to the already known species *Odontorhytis pappenheimi* from the middle-late Eocene (Bartonian-Priabonian) of Egypt, it appeared that they differ from the latter species by a number of consistent characters, and must be assigned to a new species— *Odontorhytis bahariensis*.

**Keywords:** *Odontorhytis*, new species, Chondrichthyes, Eocene, Egypt

### INTRODUCTION

Genus *Odontorhytis* (type-species *Odontorhytis pappenheimi* Böhm, 1926) was initially created by Böhm (1926) as a member of the bony fishes (Class Actinopterygii, Family Lophiidae). We owe to Cappetta (1981) the first interpretation of this taxon as an authentic member of the elasmobranchs; its precise classification within this group remains, however, enigmatic to this day. According to Case & Cappetta (1990), *Odontorhytis pappenheimi* has long been known from the middle or late Eocene (Bartonian or Priabonian) of Egypt (Priem, 1905) but had been erroneously assigned by this author to an indeterminate teleost fish of the Order Perciformes. It was rediscovered and redescribed in detail by Case & Cappetta (1990) from the middle to late Eocene of the Fayum, in the Gehannam Formation and Qasr ElSagha Formation. In 2007, Strougo et al. reported, from the glauconitic sandstone overlying the iron ore at ElGedida mine (middle Eocene, probably Lutetian) of the Bahariya oasis, another species of *Odontorhytis* which seems to be more slender and less massive than *O. pappenheimi*. The species was left in open nomenclature by these authors awaiting further studies. Examination of newly collected material of this latter species from the same bed and locality from which it was first recorded leads us to conclude that it seems to represent a new species which we herein call *Odontorhytis bahariensis*.

### STRATIGRAPHICAL SETTING

The Bahariya oasis is a closed oval-shaped depression stretching NE-SW, situated in the central region of the Western Desert of Egypt, nearly 320 km to the southwest of Cairo between (lat. 27°48' - 28°30' N and long. 28°35' - 29°10' E) and has a surface area of 1,800 sq. km. The rock succession exposed in the depression and on its walls ranges from Cenomanian to Oligocene (Said, 1990). On the plateau, close to the wall that bounds the Bahariya depression from the northeast, lies the ElGedida mine, a small depression hosting an ironstone deposit. An interval of glauconitic sandstone, a few meters thick, truncates the top of the iron ore and includes near its base a phosphatic band from which Strougo et al. (2007) were able to retrieve a somewhat diverse assemblage dominated by teeth of batoids, sharks, and bony fishes, along with small internal molds of bivalves, gastropods and serpulids. Most of the teeth have not been identified to the species level pending a more comprehensive study. The list of the fauna recovered by Strougo et al. (2007) from the glauconitic sandstone horizon is as follows:

**Sharks:**

*“Carcharias” koerti* (Stromer, 1910)  
*Galeocerdo eaglesomei* White, 1955  
*“Galeorhinus” sp.*  
*Carcharhinus aff. frequens* Dames, 1883  
*Rhizoprionodon sp.*  
*Scyliorhinus sp.*  
*Chiloscyllium sp.1*  
*Chiloscyllium sp.2*  
*Hemiscyllium sp.*  
*Odontorhynchus sp.*

**Batoids:**

*Ouledia sp.*  
*Rhinobatos sp.*  
*Rhynchobatus sp.*  
*Pristis? sp.*  
*Dasyatis sp.1*  
*Dasyatis sp.2*  
*Dasyatis sp.3*  
*Coupatezia sp.*  
*Coupatezia? sp.*  
*Leidibatis jugosus*  
*Pseudaetobatus sp.*  
*Rhinoptera sp.*  
*Garabatis sp.*  
*Burnhamia sp.*  
*Archaeomanta sp.*

**Bivalve molluscs:**

*Calorhadia? sp.*  
*Calorhadia? nilotica* Strougo, 1976  
*Mesosaccula? gizehensis* (Cuvillier, 1935)  
*Cucullaea aff. sheikhfadli* Strougo, 1985  
*«Striarca (Rectangularca)» sp.*  
*Cossmannella aff. sheikhfadli* Strougo, 1985  
*Caryocorbula sp.*  
*Martesia sp.*

## Age of the fauna

There is general belief that the iron ore deposit of ElGedida is equivalent to the lower Eocene limestones, commonly called the Naqb Formation, capping the walls of the Bahariya depression from the north (Said & Issawi, 1965; Basta & Amer, 1969; El-Sharkawi et al., 1989; El Aref & Lotfi, 1989; Helba et al., 2001). As concerns the overlying glauconitic horizon, it has been generally correlated with the ElHamra Formation (Bartonian to Priabonian) of Said & Issawi (1965), and assigned different ages, ranging from Lutetian to Priabonian, with little evidence though, as discussed by Strougo et al. (2007). According to these latter authors, some elements of the fossil assemblage identified by them from the glauconitic horizon show strong affinities to exclusively Lutetian fossils described from the Nile Valley and west central Sinai (e.g., *Cucullaea sheikhfadli* and *Cossmannella sheikhfadli*) or to typically Lutetian fossils recorded from other parts of the world (e.g., “*Carcharias*” *koerti* and *Galeocerdo eaglesomei*). They declared that future work may show that the glauconitic sandstone of the ElGedida mine is probably older than the ElHamra Formation.

## SYSTEMATIC PALEONTOLOGY

The teeth described in this study belong to the collection of Amin Strougo deposited in the Geological Museum of the University of Ain Shams. They have been collected from a phosphatic band intercalated in the lower part of the glauconitic sandstone that overlies the iron ore deposit of El Gedida Mine, Bahariya oasis, that very horizon from which Strougo et al. (2007) collected and described their elasmobranch fauna.

**Abbreviations.** *ASUGM*: Ain Shams University Geological Museum; *rh*: root height; *th*: tooth height.

### Neoselachii incertae ordinis

#### Genus *Odontorhytis* Böhm, 1926

#### *Odontorhytis bahariensis* Salame & Asan n. sp.

(Plate 1, Fig. 1-18)

2007 *Odontorhytis* sp.: Strougo, Cappetta & Elnahas, p. 88, pl. 1, fig. 4a-c.

2010 *Odontorhytis pappenheimi*: Murray et al., p. 667, fig. 1A, B.

2011 *Odontorhytis pappenheimi*: Underwood et al., p. 55 and 57, fig. 5/Z, AA.

**Etymology.** From the Bahariya oasis, in the Western Desert of Egypt.

**Material.** Strougo's collection (ASUGM 0816; 0817). More than one hundred teeth.

**Type Locality.** ElGedida iron mine, Bahariya oasis, Egypt.

**Type Horizon.** Glauconitic sandstone overlying the iron ore deposit. Middle Eocene (probably Lutetian).

## Salame and Asan

Sample ID	rh	th	rh/th
ASUGM 0816/1	2.48	4.60	0.54
ASUGM 0816/2	2.67	4.85	0.55
ASUGM 0816/3	1.96	4.85	0.40
ASUGM 0816/4	1.91	5.13	0.37
ASUGM 0816/5	3.13	6.55	0.48
ASUGM 0816/6	1.96	4.18	0.47
ASUGM 0816/7	1.75	3.98	0.44
ASUGM 0816/8	2.45	4.70	0.52
ASUGM 0816/9	2.07	5.54	0.37
ASUGM 0817/1	3.24	6.54	0.49
ASUGM 0817/2	2.59	4.88	0.53
ASUGM 0817/3	2.72	5.96	0.46
ASUGM 0817/4	2.97	5.99	0.49
ASUGM 0817/5	2.16	4.36	0.49
ASUGM 0817/6	1.96	3.82	0.51
ASUGM 0817/7	1.28	2.99	0.43
ASUGM 0817/8	2.27	5.27	0.43
ASUGM 0817/9	2.84	5.08	0.56
ASUGM 0817/10	2.41	4.73	0.51
ASUGM 0817/11	2.21	4.55	0.48
ASUGM 0817/12	2.00	4.10	0.49
ASUGM 0817/13	1.69	3.15	0.54

All measurements are in millimeter

**Description.** This species has a homodont dentition. The teeth are relatively small (slightly less than 7 mm in total height), lingually directed, symmetrical and somewhat compressed mesio-distally with high, slender, narrow, pointed cusp which is markedly convex transversely in lingual view and concave in labial view. In some teeth the apex is recurved labially. The lingual face is devoid of a cutting edge except on its apical part which has a distinct barb. The labial face bears a salient, blade-like, cutting edge which extends

from the apex down to approximately two-third of the crown; beyond that point the basal part of the crown is bluntly rounded. The enamel of the lingual face is marked by faint, long vertical striations which may extend to the apex and are bounded on the mesial and distal sides by a more salient, sharp ridge reminiscent of a cutting edge; beyond these ridges, the labial face bears shorter and more crowded striations that are restricted to the basal part of the cusp. The root is high (root height/total tooth height = 0.37-0.55), strongly oblique, lingually directed, narrow mesio-distally, significantly narrower in its basal portion, with subcordiform to subpyriform outline. The profile of its basal face is distinctly concave, symmetrically divided into two parts by a narrow but deep furrow extending all the way from the crown-root junction to the base of the tooth; this furrow is not visible from the labial side. The labial face of the root is very much reduced in comparison to the lingual face.

**Remarks.** The teeth described above are in every respect identical to the Bahariya specimens discussed and illustrated by Strougo et al. (2007). They differ from *Odontorhynchis pappenheimi* in being less massive, and in that their crown is relatively higher and the cutting edge of the labial face does not extend to the basal edge of the cusp, as is the case in *O. pappenheimi*. It is likely then that the teeth figured by Underwood et al. (2011) from the Qasr ElSagha Formation of Wadi Hitan should be placed in our species. Adnet et al. (2010) recorded from the middle-late Eocene of Morocco teeth of an *Odontorhynchis* species which they considered could be different from typical *O. pappenheimi* «in having a more slender cusp and less massive root». These are some of the characters we discussed above that distinguish our species from *O. pappenheimi*. Teeth of a probable *O. pappenheimi* have also been reported by Adnet et al. (2011) from the late Eocene Qasr ElSagha Formation of the northern plateau of the Bahariya oasis (*O. aff. pappenheimi*); these are, however, twice as large as the usual size of the species (15 mm in total height); their precise specific allocation must await further studies.

**Geographic and stratigraphic distribution.** Genus *Odontorhynchis* is widely distributed in the Eocene of Africa, from Namibia, in the southern part of the continent, through Mali and Nigeria in the west central and western parts to Morocco and Egypt in the north (Böhm 1926; Cappetta 1981, 1987; Tabuce et al. 2005; Strougo et al. 2007; Murray et al. 2010; Adnet et al. 2011; Underwood et al. 2011. It would possibly occur also in the late Eocene of Pakistan (Case & West 1991).

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**EXPLANATION OF PLATE**

*Odontorhynchus bahariensis* Salame & Asan n. sp.

(1-3): Labial, lateral, and lingual views; (4-6): Labial, lateral, and lingual views of another specimen; (7-9): Labial, lateral, and lingual views of another specimen; (10-12): Labial, lateral, and lingual views of another specimen; (13-15): Labial, lateral, and lingual views of another specimen, Holotype; (16-18): Labial, lateral, and lingual views of another specimen. Strougo's collection, ASUGM 0817; glauconitic sandstone of the ElGedida mine; middle Eocene (probably Lutetian).

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نوع *Odontorhynchus* (الأسماك الغضروفية) جديد من الإيوسين الأوسط بمنجم الجديدة، الواحات البحرية، مصر

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#### الخلاصة

أثناء دراسة تصنيفية لبعض البقايا المتحجرة للأسماك الغضروفية من الإيوسين الأوسط (علي الأرجح Lutetian) لطبقة الجليوكونيت الرملية التي تقع فوق خام الحديد بمنجم الجديدة بالواحات البحرية، إتضح وجود عدد كبير من الأسنان صغيرة الحجم تنتمي إلي جنس *Odontorhynchus*. من خلال مقارنتها بالنوع *O. pappenheimi* المعروف في فترة الإيوسين الأوسط والمتأخر بمصر، إتضح إنها تختلف عن النوع الأخير بمجموعة من الصفات المحددة و المميزة لذلك وجب تعيين نوع جديد لها- *Odontorhynchus bahariensis*.