THE REMAINS OF *STENEOFIBER JAEGERI* KAUP (RODENTIA, MAMMALIA) FOUND IN THE ÇANAKKALE REGION

Engin ÜNAY

Mineral Research and Exploration Institute of Turkey

INTRODUCTION

According to Malik and Nafiz (1933), the representatives of the genus *Steneofiber* had been first encountered and collected in the form of some fragmentary jaws and isolated teeth from the Sarmatian beds at Küçükçekmece-İstanbul.

The second time this genus was mentioned in the publication of Ozansoy, in 1973. During the successive investigations carried out by Ozansoy (1964, 1973) in the Çanakkale region, the representatives of this genus were found amongst various fossils encountered in Bayraktepe (Çanakkale).

The same author has classified the series of this region into several natural regimes and zones. As we learned from Ozansoy, the remains of *Steneofiber* were found in a level situated in between the following two zones: An underlying, *Anchitherium* and *Listriodon splendent* zone, on thop of which we have a Cetotherien biozone and Mactra layers. Together with these fossils we have *Proboscidien* gen. et sp. indet, *Hipparion* sp., *Diceros* sp., *Gazella* sp., *Antilope* gen. et sp. indet., *Samotherium* sp., *Palaeotragus* sp., *Dorcatherium* sp., *Sus* sp., Hyaenidae, Mustelidae, Melinae, *Phoca* sp., Cetotherien *(Cetotherium?),* Testudinidae, fishes, invertebrates.

In the study of 1973, the age of this biozone is indicated based on the following considerations: If it is accepted that the Pliocene started with the appearance of the *Hipparion,* then this zone is the Lower Pliocene. If, on the contrary, the Mactra-bearing upper layers are taken into account, then this zone is the uppermost Miocene.

According to Tekkaya (1973), this zone is the end of the Miocene and the beginning of Pliocene.

The representatives of *Steneofiber* found in Çanakkale were also examined by the author of the present paper and found to belong to *Steneofiber jaegeri* species.

These fossils are the subject of the present paper. The following detailed description is given below.

SYSTEMATIC STUDY

Order: RODENTIA BOWDICH, 1821

Family: CASTORIDAE GRAY, 1821

Genus: Steneofiber GEOFFROY, 1833

Syn.: Chalicomys KAUP, 1832

Steneofiber jaegeri KAUP, 1832

(Text-fig. 1 a,b,c; Tables 1, 2; Pl. I-III)

Material: One fragm. Mx. right and left, P^4-M^1 *in situ* (ÇMB. 6); One fragm. Md. left, P_4-M_3 *in situ* (ÇMB. 1); One fragm. Md. left, P_4-M_3 *in situ* (ÇMB. 5); One fragm. Md. right, I-M_3 *in situ* (ÇMB. 2); One fragm. Md. left, I-M_2 *in situ* (ÇMB. 3); One fragm. Md. left, I-M_2 *in situ* (ÇMB. 4).

Besides these, there are many isolated upper and lower molars and fragmentary incisors.

Fossil bed: The fossil layer consists of iron-oxide-bearing sands.

Description: Upper jaw: The processus palatinus well conserved up to the level of M^1. Palatine bone and premaxillar parts are missing.

I: The outside of isolated fragmentary incisor is somewhat convex and this side has thin enamel with fine parallel lines. It has a subtriangular cross section.

Cheek teeth: These teeth are arranged obliquely backwards and outwards. They are rather worn. On the occlusal surface of all the cheek teeth, there are four external anticlines, and between them three external synclines are observed.

P^4: The occlusal surface of P^4 is subtriangular. Hypostria extends to the middle of the crown. It has two external striae. Mesostria is longer than parastria. Paraflexus and hypoflexus are strong and opposing each other. On the right P^4, paraflexus transformed to parafossette by an increased wearing. Mesoflexus is strong and much longer than the others; it is twisted toward metaflexus.

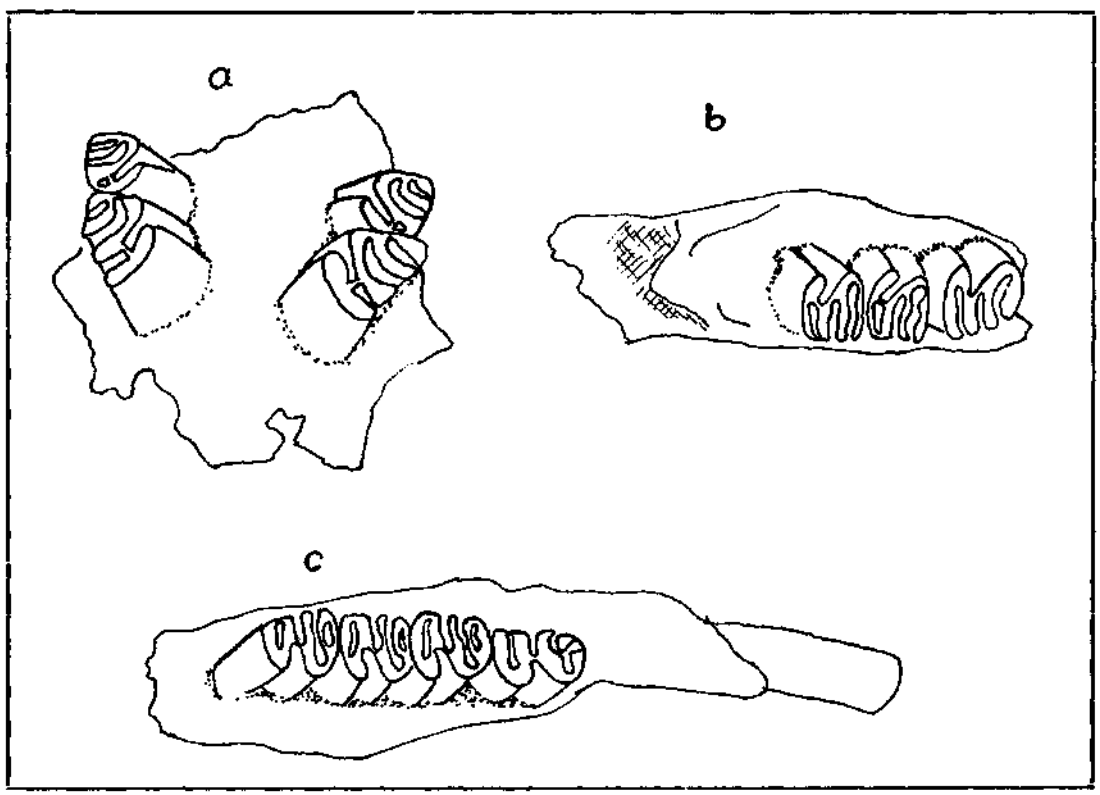

Fig. 1 - *Steneofiber jaegeri* KAUP. a). Fragment of upper jaw, P^4-M^1 *in situ* × 3/2 (ÇMB. 6). b). Fragment of lower jaw (left), P_4-M_2 *in situ* × 3/2 (ÇMB. 4). c) Fragment of lower jaw (right), P_4-M_3 *in situ* × 3/2. (ÇMB.2)

On the left P^4, this twist has an angular form. Two isolated teeth have subparafossettes which might disappear by increasing wearing. P^4 has two roots: one of them is broad (interior root) and the other is thick (exterior root).

M^1: The occlusal surface of M^1 is subsquare. It is rather worn and, on account of this, does not show any external striae. Hypostria extends to the middle of the crown. Hypoflexus is narrow and long. Parafossette is weak and opposing the hypoflexus. Mesofossette is long and twisted towards metafossette. Metafossette is longer and stronger than parafossette. This tooth has three roots: the first, broad one, is an interior root and the other two are thin roots situated opposite to it.

Lower jaw: The ramus mandibles of all specimens are broken; the corpus mandibles of two specimens are nearly complete. Foramen mentale is single and situated beneath and somewhat in front of P_4.

I: The outsides of the lower incisors are flat and have a thin enamel with fine longitudinal lines. They have subtriangular cross sections.

Cheek teeth: They are slightly inclined forward. Their dimensions decrease regularly from P_4 to M_3. The view of the synclines on the lower grinding teeth, as compared to those of the upper grinding teeth, are reversed.

P_4: This tooth is the largest one in the lower jaw. The occlusal surface of it is oval. Hypostrid extends to the base of the tooth. Generally, it has two internal strids (parastrid, mesostrid). Both strids extend to the middle of the crown. On some specimens paraflexid is forked. It has three roots: anterior and posterior roots are strong and thick, but the internal root, which is between the other two roots, is very thin.

M_1: The occlusal surface of M_1 is subsquare. Hypostrid extends to the base of the tooth. There are proparafossetids on the specimens ÇMB. 2, ÇMB. 3, ÇMB. 5.

M_2: The occlusal surface of M_2 is subsquare. Except for the specimen ÇMB. 4, there is a proparafossetid on all M_2 of the other specimens. Hypostrid extends to the base of the tooth.

M_3: It is smaller than the other teeth. On the specimen CMB. 2, there is a proparafossetid. On the specimen ÇMB. 1 metaflexid is forked.

COMPARISON

The lengths of the lower cheek teeth of *Steneofiber jaegeri* from Upper Miocene of Eppelsheim and Cerdagne are 31 mm, and the tooth from Soblay is 29 mm in length (Deperet, 1887). Measurements of the teeth of the Çanakkale specimens are given in Tables 1 and 2. As we see from these tables, our specimens are smaller than the specimens mentioned above, while the length of the cheek teeth of the specimen from Kapfnach is 26.5 mm (Schlosser, 1885). This measurement corresponds to the length of the Çanakkale specimens. The P^4 of the upper jaw of a fossil collected by Melentis (1966) from the Serrae lignite beds in Greece, likewise differs from our specimen, the fossil described by Melentis being smaller in dimensions than our specimen. The average dimensions for this species were determined and they are mentioned in some papers (i. e. Ginsburg, 1971). As can be seen, the individuals from other regions mentioned above differ greatly from these measurements.

Amongst the representatives of Castoridae the structures of molars and premolars are very similar. Thus, they have not shown any great modification since the beginning of the Miocene. Differences are seen only in the size of the cross-sections and in the gradually advancing hypsodonty. The variations of the enamel patterns have not increased.

Table - 1

Dimensions of the upper teeth*

		ÇMB. 6	
		Right	*Left*
Length	P^4	8.5	8.2
Breadth	P^4	7.1	7.0
Height	P^4	7.2	7.3
Length	M^1	5.3	5.3
Breadth	M^1	6.3	6.1
Height	M^1	6.4	6.8
P^4 - M^1 Length		13.6	13.4

* Measurements of heights are given from the inner side.

Table - 2

Dimensions of the lower teeth*

		ÇMB.1	*ÇMB.2*	*ÇMB.3*	*ÇMB.4*	*ÇMB.5*
Breadth	I_2	—	5.8	6.1	6.5	—
Length	P_4	8.2	8.8	9.5	8.0	—
Breadth	P_4	6.8	6.0	7.3	6.7	—
Height	P_4	6.7	6.9	—	—	—
Length	M_1	6.2	6.6	6.6	6.2	6.3
Breadth	M_1	6.9	6.2	6.8	6.5	5.4
Height	M_1	3.6	3.3	3.4	2.5	3.9
Length	M_2	6.2	6.0	6.2	6.0	6.3
Breadth	M_2	6.7	6.2	6.7	6.4	5.7
Height	M_2	3.1	2.6	2.8	2.4	3.5
Length	M_3	5.9	6.3	—	—	6.3
Breadth	M_3	6.0	6.0	—	—	5.2
Height	M_3	5.5	3.0	—	—	3.4
Length P_4 - M_3		26.5	27.4	—	—	?
Length P_4 - M_2		—	—	22.4	20.1	—
Length M_1 - M_3		—	—	—	—	19.0

* Measurements of heights are given from th einner side.

Hünermann (1966) figures sections taken from recent beaver's premolars, which shows how the enamel structure varied in the grinding surfaces. The variations have been observed also on the teeth of fossil Castoridae. According to Hünermann, the size of the synclines and the presence of the enamel folds on the synclines can not be a criterion for the determination of genus and species.

In some of the Çanakkale fossils, especially on the lower premolars, paraflexus shows enamel folds which are absent on some other specimens. Based on the results obtained by Hünermann, we accept this kind of variations as individual features.

Besides, in the Çanakkale specimens, the number of the synclines, the contours of the grinding surfaces, the hypsodonty of the teeth, the triangular shape of the upper P^4 and the presence of two internal strids on the lower P_4 completely correspond to the characteristics of *Steneofiber jaegeri*, while other specimens of *Steneofiber* have only a single internal strid.

Moreover, Seeman (1939) mentioned that — as a characteristic of *Steneofiber jaegeri* — the mesoflexus on the upper cheek teeth of this species extends further towards the hypoflexus, instead of ending opposite to it, as it is on the lower cheek teeth. On ÇMB.6 specimen this property is clearly seen.

The proparafossetid seen in some of the Çanakkale specimens exists also on the P^4 of the specimen from Estevar described by Deperet and Rerolle (1884) and on the M_1, M_2, M_3 of the specimen from Soblay described by Deperet (1887).

Judging from the description and illustrations of *Steneofiber* sp. fossils from the Sarmatian beds of Küçükçekmece, given by Malik and Nafiz (1933), these fossils can be representatives of *Steneofiber jaegeri.*

Many authors accept that it is difficult to differentiate morphologically the Burdigalian, Vindobonian and Pontian species of *Steneofiber*. However, according to Crusafont Pairo and Villalta (1948), *Steneofiber castorinus* and *Steneofiber depereti* have smaller premolars than *Steneofiber jaegeri* species. In *Steneofiber jaegeri*, the lower P_4 is more developed and the hypsodonty is more advanced.

In 1966 Hünermann included the three species, formerly named by Kaup as *Chelodus typus*, *Palaeomys castoroides* and *Chalicomys jaegeri,* under one species *Chalicomys jaegeri,* since no differentiating properties were observed on their teeth.

Crusafont Pairo and Villalta (1948) differentiated *Palaeomys castoroides* from *Steneofiber jaegeri,* beacause of the following properties: teeth are hypsodont, hypostria extends to the base of the crown, the upper cheek teeth are S-shaped.

In 1934, Young grouped three fossils, pre viouslydescribed as *Chalicomys anderssoni* (Schlosser, 1924) from Pontian of Ertempte in Mongolia, *Chalicomys broili* (Teilhard de Chardin & Young, 1931) and *Castor zdanskyi* (Young, 1927) from Pontian of Paote, in a new genus, which he named *Sinocastor* and described it as follows: «size large, masseteric fossa present, advanced hypsodonty, etc.». *Sinocastor broili* is the closest to the Çanakkale specimens because of the characters of the occlusal surface on its cheek teeth; moreover, its hypoflexus and paraflexus oppose each other, while in *Sinocastor anderssoni,* except P^4, they are not opposing. The size of *Sinocustor zdanskyi* is large (P_4 - M3 40 mm long).

CONCLUSION

For the first time the presence of *Steneofiber jaegeri* in Turkey is established. Accordingly, the known horizontal distribution of this, species from Spain to Greece is further extended.

Steneofiber jaegeri, which is a species of the Vindobonian and Pontian of Europe, is found closest to Turkey in the Upper Vindobonian of Greece (Melentis, 1966). It is hard to give an age to this zone in Bayraktepe, depending on *Steneofiber jaegeri* alone. The study of the other fauna of this zone is yet incomplete. However, considering the overlying Mactra layers, observed in this zone, and comparing these beds with the layers containing similar fossils in the surrounding areas (i.e. Küçükçekmece, İstanbul), a Sarmatian age can be given to this biozone. Nevertheless, a more detailed study of the entire fauna observed in this area is necessary in order to be more positive in determining the true age of the layer representing the Bayraktepe zone.

Manuscript received August 23, 1974

BIBLIOGRAPHY

CRUSAFONT PAIRO, M. & VILLALTA, J. F. (1948): Los Castores Fosiles de Espana. *Bol. del Inst, Geol. y Min. de Espana,* t. 61, Madrid.

DEPERET, Ch. & REROLLE, L. (1884): Note sur la geologie et sur les Mammiferes fossiles du bassin lacustre Miocene superieur de la Cerdagne. *Bull. Soc. Geol. France,* 3. serie, t. 13, Paris.

———(1887): Recherches sur la succession des faunes de Vertebres miocenes de la Vallee du Rhone. *Arch. Mus. Hist. Nat. Lyon,* t. 4, Lyon.

GINSBURG, M. L. (1971): Sur l'evolution des Steneofiber (Mammalia, Rodentia) en France. C. *R. Acad. Sci.,* t. 272, Paris.

HÜNERMANN, K. A. (1966): Der Bau des Biber-Pramolaren und seine Verwendbarkeit fur die Systematik der Castoridae (Rodentia, Mammalia). *Neues Jahrb. Geol. Paldontol., Abh.,* Vol. 125, Nr. 1-3.

MALİK, A. & NAFİZ, H. (1933): Küçükçekmece fosil fıkralı hayvanlar mecmuası. *İstanbul Üniv. Jeoloji Ens. Yayını,* no. 8, İstanbul.

MELENTIS, J. K. (1966): Studien über fossile Vertebraten Griechenlands. *Ann. Geol. Pays Helleniques,* 1. serie, t. 17, Athenes.

OZANSOY, F. (1964): Fauni-zon bilimleri ışığında Çanakkale çevresi Neojen strarigrafisi ve Neojen paleocografyasında bölgede tabii rejimler problemi: karasal-denizel-somatr ve karasal. *A.Ü.D.T.C.F. Antropoloji Derg.,* c. 1, s. 2, Ankara.

———(1973): Les caracteristiques fauniques du Neogene des Dardanelles. *A.Ü.D.T.C.F. Antropoloji Derg.,* sayı 6, Ankara.

SCHLOSSER, M. (1885): Die Nager des europaischen Tertiars. *Palaontographica,* Bd. 31, Stuttgart.

———(1924): Tertiary vertebrates from Mongolia. *Pal. Sinica,* vol. 1, fasc. 1, Peking.

SEEMAN, I. (1939): Die Insektenfresser, Fledermause und Nager aus der obermiocanen Braunkohle von Vienhausen bei Regensburg. *Palaontographica,* Bd. 89, Abt. A., Stuttgart.

SIMPSON, G. G. (1945): The principles of classification and a classification of Mammals. *Bull. Amer. Mus. Nat. Hist.,* vol. 85, New York.

TEILHARD de CHARDIN, P. & YOUNG, C. C. (1931): Fossil mammals from the late Cenozoic of Northern China. *Pal. Sinica,* ser. C, vol. 9, fasc. 1, Peking.

TEKKAYA, İ. (1973): Çanakkale güneydoğusundaki Bayraktepe omurgalı faunası hakkında ön rapor. *M.T.A. Derg.,* no, 81, Ankara.

YOUNG, C. C. (1927): Fossile Nagetiere aus Nord-China. *Pal. Sinica,* ser, C. vol. 5, fasc. 3, Peking.

———(1934): On the Insectivora, Chiroptera, Rodentia and Primates other than Sinantropus from Locality 1 at Choukoutien. *Pal. Sinica,* ser. C, vol. 8, fas. 3, Peking.

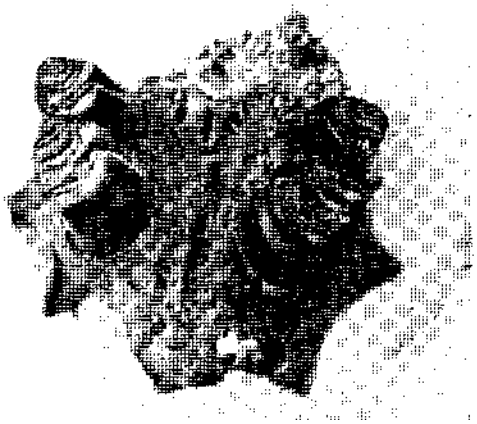

Fig. 1 - *Steneofiber jaegeri* Kaup, fragment of maxilla, P^4-M^1, *in situ*, occlusal view, ÇMB.6. × 3/2.

Fig. 2 - *Steneofiber jaegeri* Kaup, fragment of upper incisor (left), a view from left, ÇMB.7 × 3/2.

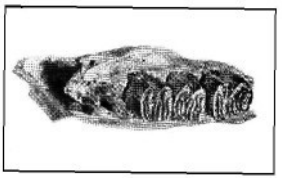

Fig. 1 - *Steneofiber jaegeri* Kaup, fragment of mandibula (left), P_4-M_2, *in situ*, occlusal view, ÇMB.4, × 3/2.

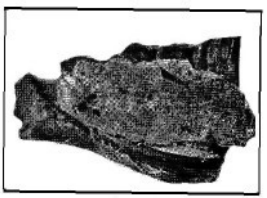

Fig. 1a - *Steneofiber jaegeri* Kaup, fragment of mandibula (left), P_4-M_2, *in situ*, a view from inside, ÇMB.4, × 3/2.

Fig. 1 - *Steneofiber jaegeri* Kaup, fragment of mandibula (right), P_4-M_3, *in situ*, occlusal view, ÇMB.2, × 3/2.

Fig. 1.a - *Steneofiber jaegeri* Kaup, fragment of mandibula (right), P_4-M_3, *in situ*, a view from inside, ÇMB.42. × 3/2