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A STENONOID HORSE (EQUIDAE, MAMMALIA) FROM THE VILLAFRANCHIAN OF WESTERN MACEDONIA (GREECE)

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ABSTRACT

An equid sample from the Villafranchian of western Macedonia is studied.The material was found in the locality of "Dafnero 1" (DFN) , situated near the village of Dafnero, about 30 Km southwestern to Kozani. The DFN horse is described and compared with the villafranchian ones. The morphological characters of the studied equid are similar to those of *Equus stenonis*, while its dimensions suggest a large-sized form. The comparison with the various subspecies of *E. stenonis* indicates great similarities with the form from St-Vallier (France) and especially with the form from La Puebla (Spain). Thus the DFN equid is referred under the name *Equus stenonis* cf. *vireti*. Its close relations with that from La Puebla and St-Vallier suggest a middle Villafranchian age, MN 17.

INTRODUCTION

The studied equid material comes from a new Villafranchian locality found in western Macedonia during summer 1990 (KOUFOS *et al.*, 1991). The Villafranchian deposits of western Macedonia are known since the last century by some small collections and isolated specimens, collected from various sites (BRUNN, 1956). The equids, which were found are very few. Some metapodials of *Equus stenonis* from Neapolis are referred by Goreix in 1877, while some teeth of the same species were found near the village of Neapolis (BRUNN, 1956). Recently some material from the basin, of Neapolis was described by STEENSMA (1988); the horse is referred under the name *E. s.* cf. *senezensis*, and later it was transferred to the new subspecies *E. s. mygdoniensis* (KOUFOS, in press).

In central Macedonia *E. stenonis* is well known from the localities of Mygdonia basin (Fig. 1), where it was found in various sites and the new species *E. s. mygdoniensis* was described (KOUFOS, in press). *E. stenonis* is possibly present in Volax (eastern Macedonia) but no description or determination of the material (SICKENBERG, 1968). Villafranchian horses are also referred from various sites of Greece. The rests of a large horse have been found in the locality of Sesklon, Thessaly (SYMEONIDIS, in press), which has been dated to late Pliocene because of the presence of *Anancus arvernensis* (SYMEONIDIS & TATARIS 1982-83). In late Villaf-

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ranchian of the island of Kos *E. stenonis* is also present (KOTSAKIS *et al.*, 1980). Some horse remains are referred from the locality of Damatria (island of Rhodes) but no specific determination; the micromammalian fauna of this locality suggests a late Pliocene age (BRUIJN *et al.*, 1970). Two other stenonoid horses, under the names *E.* cf. *stenonis* and *E.* cf. *stehlini*, are referred from the late Villafranchian locality of Pyrgos in Peloponnesus (MEULEN *et al.*, 1986).

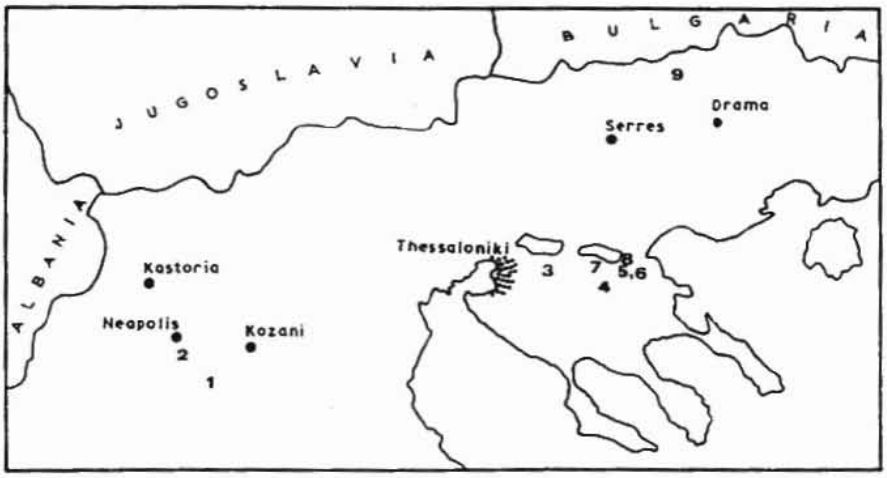

Fig. 1. *Sketch map of Macedonia indicated the known Villafranchian localities.* ***1.****"Dafnero 1", DFN;* ***2.*** *Libakkos;* ***3.****"Gerakarou 1", GER;* ***4.****"Riza 1", RIZ;* ***5.****"Krimni 1", KRI;* ***6.****"Krimni 2", KRM;* ***7.****"Ravin of Vulgarakis, RVL";* ***8.*** *Apollonia 1, API.;* ***9.*** *Volax.*

The studied material comes from the locality "Dafnero 1" DFN, situated in a ravine across Aliakmon river about 1 km SW to the village of Dafnero (Fig. 1). The locality is into a sedimentary sequence consisted of clastic deposits mainly sands, gravels, conglometates and clays with cross-bedding in some levels. The fossils are concentrated in a more argillaceous level (KOUFOS *et al.*, 1991). The material was collected during summer 1990 and 1991 and it is stored in the Museum of the Laboratory of Geology and Palaeontology, University of Thessaloniki. The equids of this collection from DFN will be studied in this article hoping to get more data about the age of the locality, as well as about the pleistocene horses of Greece. For the measurements we followed the system proposed by EISENMANN *et al.* (1988).

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DESCRIPTION AND COMPARISON OF THE MATERIAL

A piece of skull (DFN-112; Pl. I, Fig. 1), a complete maxilla (DFN-108; Pl. I, Fig. 2), a right upper toothrow (DFN-77; Pl. II, Fig 1) and some isolated upper cheek teeth are studied. The maxilla belongs to a young adult individual; P^2 and P^3 are completely unworn, while dP^1 is still existed in both toothrows and M^3 is just arising. The other toothrow (DFN-77) belongs to an aged individual, with worn teeth.

The skull is long and not high. The nasal cavity is deep; the distance from the posterior end of the nasal cavity to the most anterior point of the orbit is strong (168.3 mm) and simila

to that from St.-Vallier (167); measurements from the illustrations of VIRET (1954). This distance is clearly smaller in *E. s. senezensis* (156) (measurements from the illustrations of EISENMANN, 1980), and *E. s. mygdoniensis* (151.6) from Macedonia (KOUFOS, in press). The suture of the nasal bones forms a groove along the sagittal plane, a character which is typical for *Equus stenonis* (AZZAROLI 1968, DE GIULI, 1972). The hind margin of the nasal cavity is situated above the middle of P^3, as well as in the other subspecies of *E. stenonis*. The orbit is rounded-elliptical and it is placed well behind the last molar. The index **Orbital diameter x 100 / antero-posterior orbital diameter** is 71.6 for the DFN skull, versus 92.7 for *E. s. vireti* from St.-Vallier, 89.8 for *E. s.* cf. *vireti* from Puebla, 89.5 for *E. s. senezensis* from Senèze and 87.2 for *E. s. mygdoniensis* from Macedonia (KOUFOS, in press). These values indicate a more elliptical shape for the orbit of the DFN horse. The zygomatic arch runs parallel to the sagittal plane of the skull as in *E. stenonis* from Valdarno. The temporal fossa is larger than in *E. s. mygdoniensis* and seems to be more similar with that of the horses from Olivola and Puebla. The linea temporalis is strongly curved like in *E. s. vireti* and *E. s.* cf. *vireti* , while in the other subspecies of *E. stenonis* is less curved. The facial crest is well developed and its anterior border is situated above the middle of M^1.The muzzle is long and wide. The palate is relatively elongated and narrow. The breadth between dP^1 is 60 mm and between P^4 74 mm. The choanae seems to be large and wide. The length of the toothrows is: P^2-M^3=180-194 mm; P^2-P^4=99-106 mm; M^1-M^3 =86-92 mm. dP^1 is present in both toothrows of the maxilla DFN-108; it is large and narrow with a length of 16.7-17.5 mm and a breadth of 8.8-9.0 mm. The index **LP^2-P^4 x 100 / LP^2-M^3** is 54.8 (54.6-55) for DFN, versus 54.45 for Puebla (EISENMANN ,1980), 55.2 for St.-Vallier and 57.2 for Senèze (PRATT, 1968) and 54.75 for Macedonia (KOUFOS ,in press). On the other hand the index **LP^2-P^4 x 100 / LM^1-M^3** is 115.6 for DFN, versus 118 for Puebla, 121 for St.-Vallier, 118.6 for Macedonia and 127.5 for Senèze.

The fossettes of the upper cheek teeth are closed in all teeth except those of the little worn teeth. The enamel in their borders is moderately plicated. In the little worn teeth, such as M^1 of DFN-108 and some isolated teeth, the plication is rich but in the worn teeth of DFN-77 and DFN-112 the plis are few. However the mean value of the plication number in the worn premolars is 6.0 plis. In the molars the mean plication number is 6.4. The protocone is short relatively to the length of the tooth especially in the premolars. In the premolars the protocone is oval-shaped, while in the molars is elongated and narrow, having a triangular shape. The short protocone is characteristic for *E. stenonis* (AZZAROLI, 1986) and in that feature the DFN horse is similar with this species. The pli caballin is simple and present in all teeth except of the very worn M^1 of DFN-77. The hypocone is elliptical-rounded, lingually protruding and with a deep distal hypoconal groove. In the worn P^2 of DFN-112 the hypocone is isolated like an islet. The lingual protrusion of the hypocone is referred as a character of *E. stenonis* (AZZAROLI, 1986) and in that feature the DFN horse is similar with this species. The mesostyle is strong and strongly projected labially. The teeth are hypsodont; the hypsodonty index **L at 10 mm above the root x 100 / Height** is 37,7-38,5 for the unworn P^3, and 30.2-30.6 for the little worn M^2 of DFN-108.

The available material of the lower teeth belongs to aged individuals and the teeth are enough worn. The length of the toothrows is: P_2-M_3=184 mm; P_2-P_3=95 mm; M_1-M_3=87,5-88,5 mm. The parastylid of the lower cheek teeth is moderately developed reaching the mesial middle of the metaconid. It is closed from all sides and in this feature is similar with the "stenonine" type (EISENMANN, 1981; fig. 3). The metaconid is rounded, the metastylid oval and the entoconid quandrangular-elliptical. The lingual borders of the metaconid and metastylid are convex, a character referred for the "stenonine" type (EISENMANN, 1981). The preflexid is simple while the postflexid has wavy borders and it is longer in the premolars than in the molars. The linguaflexid is deep and V-shaped like in the "stenonine" type (EISENMANN, 1981; AZZAROLI, 1987). The ectoflexid is narrow and shallow in the premolars reaching the distolabial corner of the preflexid, while in the molars is deeper reaching sometimes the linguaflexid. The pli caballinid is absent in all the studied teeth but because of the advanced attrition it was probably totally worn and dissappeared. Nevertheless in M_2 of both studied mandibles there is a trace of a pli caballinid.

The postcranial material contains metapodials, astragali and first pha[illegible]es (Pl. II, Figs
The metacarpals are robust; the slenderness index (**Distal articular [illegible] 100 / Height**

21.6 in DFN versus 22.2 in *E. s. vireti* (St. Vallier), 20.6 in *E. s.* cf. *vireti* (La Puebla), 20.7 in *E. s. senezensis* (Senèze) and 17.9-18.6 in *E. s. mygdoniensis* (Mygdonia basin, Macedonia, Greece). In the studied metacarpals there is no fusion of the lateral metapodials with Mc III, the proximal articular facet has short anteroposterior diameter and the bone is flattened, the distal width at tubercules is larger than that in the articular facet, the suprarticular fossae in the anterior face are sharp while in the posterior face have varied depth fade out upwards and the sagittal crest is not very high. All these features characterizes *E. stenonis* (GROMOVA, 1949; DE GIULI, 1972).

Six more or less complete astragali are known from DFN. They have large dimensions and also stenonoid characters. The higher than 100 index **Height x 100 / Breadth** (measurements according DE GIULI, 1972) characterizes *E. stenonis* (GROMOVA, 1949). In the material of Olivola and Matassino (Italy) there is a great overlapping in this index but the mean value for *E. stenonis* from these localities is 101.5 versus 96.3 for *E. caballus* (DE GIULI, 1972, tab. 9). This index is higher than 100 in all specimens of DFN and varies between 102.8-108 (mean 105.5) indicating a stenonoid horse. The facets for navicular and cuboid are distinguished by a sharp crest. This crest is sharper in *E. stenonis* than in *E. caballus* (DE GIULI 1972). The obliquity of the facet for cuboid is greater in *E. stenonis* than in *E. caballus* (GROMOVA, 1949). This facet is very oblique in the DFN horse indicating also similarities with *E. stenonis*. Moreover GROMOVA (1949) used the relative position of the internal and external condyles to distinguish *E. stenonis;* enough later because of the great variability, this character was considered not valid (DE GIULI, 1972). The morphological characters of the DFN astragali fit with those of *E. stenonis* indicating great similarity with this species.

The metapodials are robust; the slenderness index **(Distal articular breadth x 100 / Height)** varies between 21.3 and 21.8 (mean 21.6) for Mc_{III} and between 17.6 and 18.4 (mean 18.0) for Mt_{III}. This index is 22.6-19.3 for *E. s. vireti* (St.-Vallier) respectively, 20.6-17.7 for *E. s.* cf. *vireti* (Puebla) respectively, 17.4-20.7 for *E. s. senezensis* (Senèze) respectively and 18.7-16 for *E. s. mygdoniensis* (Macedonia) respectively (data from EISENMANN, 1979 and KOUFOS, in press) The metatarsals relatively to the metacarpals are less elongated in stenonoid than in caballoid horses. In the populations of *E. caballus* the index **Height Mc_{III} x 100 / Height Mt_{III}** is 82 (DE GIULI, 1972), while it is 87.8 in *E. s. vireti* (St-Vallier), 86.5 in *E. s.* cf. *vireti* (La Puebla), 87.7 in *E. s. senezensis* (Senèze), 86.5 in *E. s. stenonis* (Olivola), (data from EISENMANN, 1979 and DE GIULI, 1972) and 87.5-89 in *E. s. mygdoniensis* (Mygdonia basin) (KOUFOS, in press). In the DFN horse this index is 84.2 at mean, indicating similarities with stenonoid horses. In the posterior surface of the distal end in Mt_{III} there are two fossae separated by a slight crest. This feature is referred for the stenonoid horses (DE GIULI, 1972).

The available first phalanges are short and robust. The first phalanx of the stenonoid horses is distinguished from that of caballoids by the length of trigonum phalangis or "V-scar" (DE GIULI, 1972). The trigonum phalangis is longer in *E. caballus* than in *E. stenonis*. The index **Max length of trig. phalangis x 100 / Height** is 60-63 for *E. s. stenonis* (Olivola), 56.6-62.1 for *E. s.* cf. *vireti* (La Puebla) and 70-74 for *E. caballus* (data from DE GIULI, 1972 and EISENMANN & DE GIULI, 1974). In the DFN phalanges this index is 59.3 and according to this value they are very close to the stenonoid horses.

DISCUSSION

The morphological characters of the DFN horse are very similar to those for *E. stenonis* and thus no doubt that it belongs to this species. Nevertheless several subspecies of *E. stenonis* have been described from Europe (DE GIULI, 1972; PRAT, 1968; ALBERDI & RUIZ-BUSTOS, 1985; BOEUF, 1986; KOUFOS, in press). A comparison of the DFN horse with the various subspecies of *E. stenonis* is important for finding its relations with the others, giving a subspecific determination and dating the locality. The metrical comparison of the available teeth material from the DFN horse did not give any valuable differences between the different subspecies. The only observed difference is between the DFN and *E. s. mygdoniensis* which has smaller Mc_{III} than the DFN equid. The absence of size differences between DFN and the various subspecies of *E. stenonis* is possibly due to the few and worn teeth of DFN, to the great overlapping between the teeth of the various subspecies and to the wearing stages of the teeth.

The teeth of *E. s. granatensis* (Venta Micena) are highly plicated with 4-21 plis in the fossettes

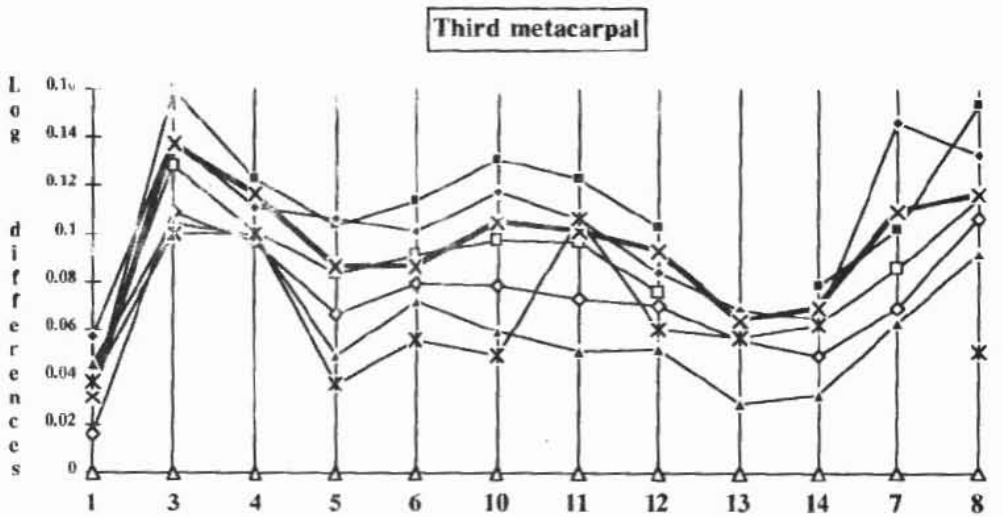

Fig. 2. Logarithmic ratio diagram comparing the third metacarpals of the DFN equid with the various subspecies of E. stenonis
×=DFN *(n=1-3),* ▲ =E. s. mygdoniensis, *GER (n=11-13),* ■ =E. s. vireti, *St-Vallier (n=27-50),* □ = E. s. *cf.* vireti, *La Puebla (n=24-59),* ◇ =E. s. senezensis, *Senèze (n=13-18),* ◆ =E.s. stenonis, *Olivola (n=4-5),* △ =*standard,* E. h. onager, *(n=16). For the measurements see Table II.*

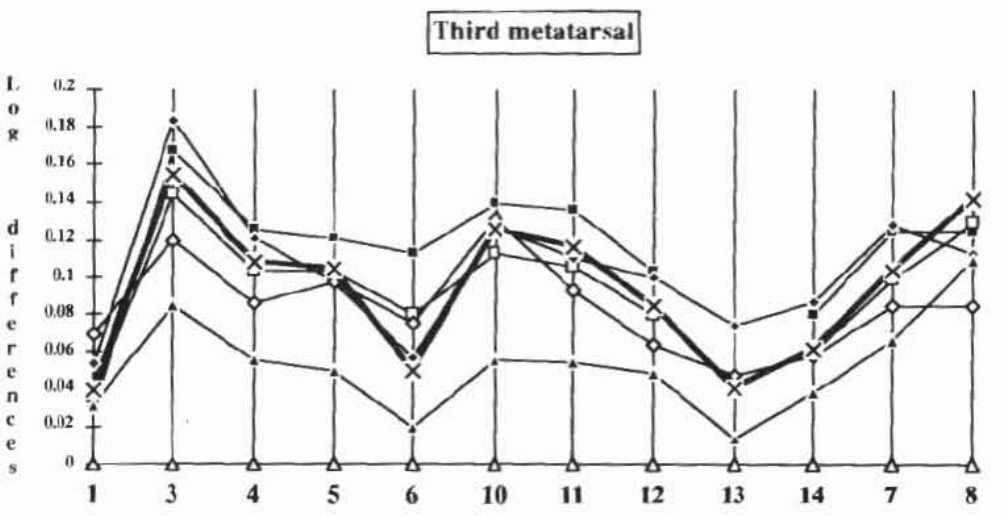

Fig.3. - Logarithmic ratio diagram comparing the third metatarsals of the DFN equid with the various subspecies of E. stenonis.
×=DFN *(n=2-4),* ▲ =E. s. mygdoniensis, *GER (n=12-18),* ■ =E. s. vireti, *St-Vallier (n=51-80),* □ =E. s. *cf.*vireti, *La Puebla (n=42-80),* ◇ =E. s. senezensis, *Senèze (n=12-19),*◆=E. s. stenonis, *Olivola, (n=8-9),*△=*standard,* E. h. onager,*(n=14-16). For the measurements see Table III.*

(MARIN, 1987) and it is well distinguished from the DFN horse with 5-6 plis. The presence of the pli cabalin is another character which can distinguish the various subspecies of *E. stenonis* (EISENMANN, 1980). The presence of the pli caballin is constant in *E. s. vireti* from St. Vallier (100%), almost constant in *E. s.* cf. *vireti* from La Puebla (100% except M^1 where it is absent) and in *E. s. senezensis* is not always present (50-55% in premolars and 30-40% in the molars). In the DFN horse the frequency of the presence of pli caballin is 84% in the premolars and 100% in the molars except M^1; these frequencies indicate a similarity of theDFN horse with that of St-Vallier and La Puebla. Our efforts to see if some other indices or morphological characters of the teeth, used by various authors for the subspecific dinstinction of *E. stenonis*, can be applied to the DFN teeth were unsuccessful. This is probably due to the small number of the available teeth from DFN, which are very worn or unworn. The protocone index of the DFN horse is small, indicating a short protocone. It is also similar to that of *E. s.* cf. *vireti* from Puebla and smaller than that of *E. s. vireti* from St.-Vallier. The index **protocone index of M^3 x 100 / protocone index of P^2** is 243 for DFN, versus 201 for *E. s. senezensis* (Senèze), 207 for *E. s. vireti* (St.-Vallier) and 226 for *E. s.* cf. *vireti*. On the other hand the index **protocone index of M^1x100/ protocone index of P^4** for DFN is closer to "*vireti*" form than to "*senezensis*": the mean value of this index is 97.5 for DFN, versus 102.5-103.5 for the "*vireti*" forms and 119 for the "*senezensis*" forms.

The comparison of the postcranial remains especially that of the metapodials is more indicable about the subspecific determination of the DFN horse. The distinction of the Mc III of *E. s. senezensis* and *E. s. mygdoniensis* from those of the DFN horse, by their smaller size, is clear in Fig. 2. The DFN Mc_{III} is into the area of the large-sized *E. stenonis* and very close to those from Olivola and La Puebla while it is slightly smaller than that of St. Vallier (Fig. 2). Although the Olivola metacarpals are slightly longer and more robust than those of DFN. The line for DFN metacarpals in Fig. 2 is very close to that from La Puebla. Thus the proportions of the DFN metacarpals indicate a horse similar to that from the locality of La Puebla. The DFN metatarsals compared with those of the other subspecies of *E. stenonis* indicate again similarities with those from Olivola and La Puebla and especially with the second sample (Fig. 3). The Senèze metatarsals are close to the DFN but they are more elongated and slenderer. There is also a clear difference in the size of the proximal articulation surface which is smaller than that of the DFN (measurements 7, 8 in Fig. 3). The subspecies of Macedonia *E. s.*

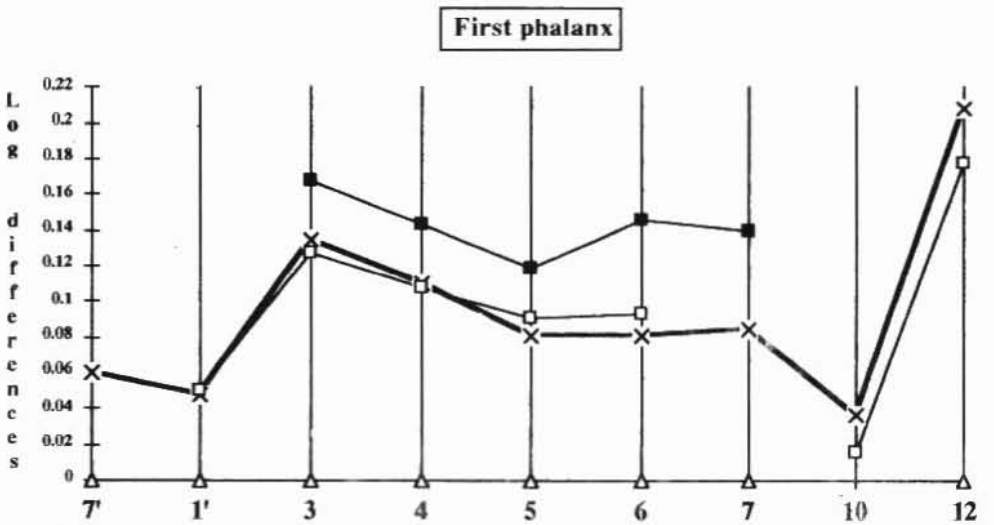

Fig. 4. Logarithmic ratio diagram comparing the posterior first phalanges of the DFN equid with the various subspecies of E. stenonis.
× =DFN *(n=1-3)*, ■ =E.s. vireti, *St-Vallier (n=15)*, □ = E. s. *cf.* vireti, *La Puebla (n=9)*; for abbreviations and measurements see Tab V; ***7'***=*Maximal length of trigonum phalangis,* ***1'***=*Greatest length.*

mygdoniensis is clearly distinguished by its smaller size (Fig. 3). The St. Vallier horse seems to have more robust metapodials than those of DFN (Fig. 3). The Olivola metatarsals are somewhat longer and more robust than those of DFN, while the last ones seem to be very close with the material from La Puebla (Fig. 3).

The comparison of the first phalanges from DFN shows that they belong to the posterior leg. After that they compared with the posterior phalanges from St. Vallier and La Puebla (Fig. 4). The DFN first phalanges fit very well with those from la Puebla while they are slightly smaller than those from St. Vallier. Thus again from the comparison of the phalanges the DFN horse seems to be closer to that from La Puebla.

As it was referred above the DFN equid has all the morphological characters of *E. stenonis* and must belong to one of the subspecies referred to this horse. The comparison with the european material of *E. stenonis* indicates that:

- the DFN horse belongs to the large-sized forms of *E. stenonis*, and
- the DFN horse is close to the horse from La Puebla and St-Vallier.

The St-Vallier equid is referred under the name *E. stenonis vireti* PRAT, 1968,while that from La Puebla is considerred similar but not the same and it is referred as *E. stenonis* cf. *vireti* (EISENMANN, 1979, 1980, 1981). The similarity of the available DFN material with that from La Puebla allows us to consider the DFN horse similar to *E. s. vireti* and to refer it as *E. s.* cf. *vireti*, waiting for more and better material which will allow us to have better morphological and dimensional comparisons.

BIOSTRATIGRAPHY

The detailed study of the equid material from DFN has provided some new data about the age of the DFN fauna. A preliminary idea about the age of the DFN locality has been excluded from the first collected material. The species determined in the first collection from DFN are: *Nyctereutes megamastoides, Vulpes alopecoides, Chasmaporthetes lunensis, Equus stenonis, Macedonitherium martinii* and *Gallogoral meneghinii* (KOUFOS *et al.*, 1991).

The DFN faunal composition is similar to those of St-Vallier,La Puebla,Volax and Olivola.The presence of the carnivores *Nyctereutes megamastoides,Chasmaporthetes lunensis* and *Vulpes alopecoides* together in the DFN fauna indicates a middle Villafranchian age. On the other hand *Macedonitherium* appears in Volax (middle-late Villafranchian) with *Nyctereutes*, and *Gazellospira*, while in the late Villafranchian locality of Libakos it appears with *Canis*. The few material (a hemimandible, two metatarsals, some isolated teeth) of the DFN equid, in the first collection, showed similarities with Olivola and especially with St-Vallier. Thus a middle (St. Vallier) to late (Olivola) Villafranchian age for the DFN fauna was given (KOUFOS *et al.*, 1991).

The collection of more equid material and the detailed study of it in the present article gave more data about the age of the DFN fauna. The morphological and metrical comparison of the DFN horse showed that it is very close to that from La Puebla. The equid of La Puebla is considered the same as that of St-Vallier and S. Giacomo (Italy) referred as *E. s. vireti* characterizing the St -Vallier Unit, middle Villafranchian (BONADONNA & ALBERDI, 1987). According to AZZAROLI *et al.* (1988) La Puebla is referable to the St-Vallier Unit (middle Villafranchian ,2.0 m.y.), while Olivola is slightly younger representing the oldest faunal unit of late Villafranchian. The St-VallierFaunal Unit is referred to MN 17 (middle Villafranchian, late Pliocene) with an absolute age of 2.0 m.y. (MASINI & TORRE, 1990). Based to the similarities of the DFN equid with La Puebla and St-Vallier ones and to the above mentioned data a middle Villafranchian age is possible for the DFN locality. More precisely the DFN fauna belongs to the St-Vallier Faunal Unit with an absolute age of about 2.0 m.y.

The morphological characters of the DFN horse can provide some data about the paleoenvironment. The metapodials of this horse, especially the metatarsals, are more elongated than those of *E. s. vireti* from St.-Vallier and close to *E. s.* cf. *vireti* from Puebla. The index **Breadth of diaphysis x 100 / Maximal length** is 15.7 for the metacarpals and 13.2 for the metatarsals of the DFN horse, versus 16.3 and 13.9 for *E. s. vireti* and 14.9, 12.9 respectivelly, for *E. s.* cf. *vireti*..On the other hand the plication number of the teeth has a mean value 6.4 for the molars and 6.0 for the premolars. The assosiation of these two factors (robusticity and plication of the premolars) indicates that the DFN horse is very close to the recent african forms *E. burchelli*, *E. mauritanicus* and especially *E. zebra*, characterized the african savanna

(EISENMANN, 1985). The values of the DFN horse are not very high, like in *E. s. vireti* and *E. s.* cf. *vireti* but they are into the ranges of the african group (EISENMANN, 1985). The hypsodonty and the avalaible number of the plis of the DFN horse show also an arid environment (GROMOVA, 1949), not very different from that of St.-Vallier. The detailed study of the rest material, as well as the continued excavations and the collection of more material will provide us more data for the age and the enviroment.

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TABLES OF MEASUREMENTS

Mes	n	X	min	max	Mes	n	X	min	max
P 2/					**P/2**				
Lo	6	41.46	40.3	43.3	Lo	2	36.30	35.9	36.7
Bo	6	27.00	26.3	27.5	Bo ant.	2	11.25	11.0	11.5
Lp	4	6.75	6.4	7.0	Bo post.	2	15.05	15.0	15.1
Bp	4	5.17	4.6	5.6	Lprfl	2	7.30	6.0	8.6
P 3,4/					Lptfl	2	15.00	14.4	15.6
Lo	7	30.72	27.6	33.1	**P /3,4**				
Bo	7	28.43	27.2	29.6	Lo	6	30.20	28.6	31.6
Lp	5	7.58	7.1	8.9	Bo ant.	6	17.13	16.3	18.3
Bp	5	5.04	4.8	5.3	Bo post.	6	16.30	15.0	18.3
M 1,2/					Lprfl	6	8.76	8.5	9.0
Lo	9	28.30	25.6	30.5	Lptfl	6	12.50	10.4	15.0
Bo	9	25.50	23.0	28.0	**M /1,2**				
Lp	9	10.01	8.8	12.2	Lo	6	27.16	26.0	28.0
Bp	9	4.41	3.5	5.0	Bo ant.	6	15.10	14.2	16.3
M 3/					Bo post.	6	13.43	13.1	13.8
Lo	4	28.12	27.2	30.3	Lprfl	5	7.34	6.2	8.4
Bo	3	23.26	22.2	25.0	Lptfl	5	10.78	10.6	11.0
Lp	3	11.16	10.1	12.0.	**M /3**				
Bp	3	4.23	3.9	4.5	Lo	3	32.50	31.7	33.5
					Bo ant.	3	13.23	12.9	13.8
					Bo post.	3	11.60	11.2	12.0
					Lprfl	3	7.66	6.5	8.4
					Lptfl	3	9.46	9.3	9.8

TABLE I. Dimensions of the upper and lower cheek teeth of the DFN equid.
***Lo**=occlusal length, **Bo**=oclusal breadth, **Lp**=protocone length, **Bp**=protocone breadth, **ant.**=anterior, **post.**=posterior, **Lprfl**=preflexid length, **Lptfl**=postflexid length. **n**=number of measured specimens, **x**=mean value, **min**=minimum observed value, **max**=maximum observed value*

Mes	n	X	min	max
1	3	228.07	226.5	229.7
2	3	216.60	211.9	219.9
3	5	35.53	34.0	36.8
4	5	27.58	26.8	28.3
5	4	52.65	51.7	54.5
6	3	33.05	32.6	33.5
7	4	43.97	43.5	44.8
8	4	16.08	15.1	17.7
9	0	0.00	0.0	0.0
10	5	49.26	48.3	50.1
11	5	48.55	46.6	50.2
12	4	36.40	35.8	37.2
13	5	27.90	27.0	29.6
14	5	30.38	30.0	31.0

Mes	n	X	min	max
1	3	271.00	270.0	273.0
2	3	262.00	259.0	266.0
3	4	35.80	34.5	37.4
4	4	32.50	31.5	33.5
5	3	51.53	51.0	52.5
6	4	39.25	37.5	40.0
7	3	46.00	43.8	47.8
8	4	12.15	10.2	13.0
9	4	8.63	8.0	9.5
10	2	51.05	50.6	51.5
11	2	49.00	48.5	49.5
12	2	36.65	36.0	37.3
13	2	26.00	25.5	26.5
14	3	30.23	29.5	31.5

TABLE II. Dimensions of the third metacarpal of the DFN equid.
***1.** Maximal length,**2.** Internal length, **3.** Breadth of the diaphysis (in the middle), **4.** DAP idem at the same level, **5.** Proximal articular breadth, **6.** Proximal articular DAP, **7.** Maximal diameter for the arcular facet for os magnum, **8.** Diameter of the facet for os hamatum,**9.** Idem for Mc IV , **10.** Distal maximal supraarticular breadth, **11.**. Distal maximal articular breadth, **12.** Distal maximal DAP of the keel, **13.** Distal minimal DAP of the lateral condyle, **14.** Distal maximal DAP of the medial condyle.*

TABLE III. Dimensions of the third metatarsals of the DFN equid.
*Measurements like those of the Mc III except **8.** Maximal diameter of the articular facet for cuboid and **9.** Idem for cuneiform II.*

Mes	n	X	min	max
1	5	62.54	60.5	63.7
2	6	62.75	59.0	64.6
3	6	29.37	28.0	30.7
4	6	63.00	61.8	64.0
5	6	51.48	48.3	54.3
6	5	34.52	32.7	36.1
7	5	50.70	48.0	55.0

Mes	n	X	min	max
1	3	78.50	76.7	81.5
2	3	71.50	68.6	75.7
3	3	33.10	31.7	34.1
4	2	54.65	54.0	55.3
5	2	37.25	36.8	37.7
6	3	42.20	41.0	43.3
7	3	40.47	39.8	41.2
8	3	23.37	21.5	24.5
9	3	38.13	35.5	41.5
10	2	56.55	56.3	56.8
11	2	58.91	58.4	59.4
12	2	19.55	18.8	20.3
13	1	22.50	22.5	22.5

TABLE IV. Dimensions of the astragalus of the DFN equid.
***1.** Maximal length, **2.** Maximal diameter of the medial condyle, **3.** Breadth of the trochlea, **4.** Maximal breadth, **5.** Distal articular breadth, **6.** Distal articular depth, **7.** Maximal medial depth.*

TABLE V. Dimensions of the first phalanx of the DFN equid.
***1.** Maximal length, **2.**Anterior length, **3.** Minimal breadth, **4.** Proximal breadth, **5.**Proximal depth, **6.**Distal breadth at tuberosities, **7.** Distal articulAr breadth, **8.**Distal articular depth, **9.** Minimal length of trigonum phalangis, **10.** Medial supratuberosital length, **11.** Lateral supratuberosital length, **12.** Medial infratuberosital length, **13.** Lateral infratuberosital length.*

PLATE I

Equus stenonis cf. *vireti*, Dafnero, Macedonia, Greece.

Fig. 1. Skull, DFN-112, right lateral view.

Fig.2. Maxilla with both toothrows, DFN-108, occlusal view.

PLATE II

Equus stenonis cf. *vireti*, Dafnero, Macedonia, Greece.

Fig. 1. Right upper toothrow, DFN-77, occlusal view.

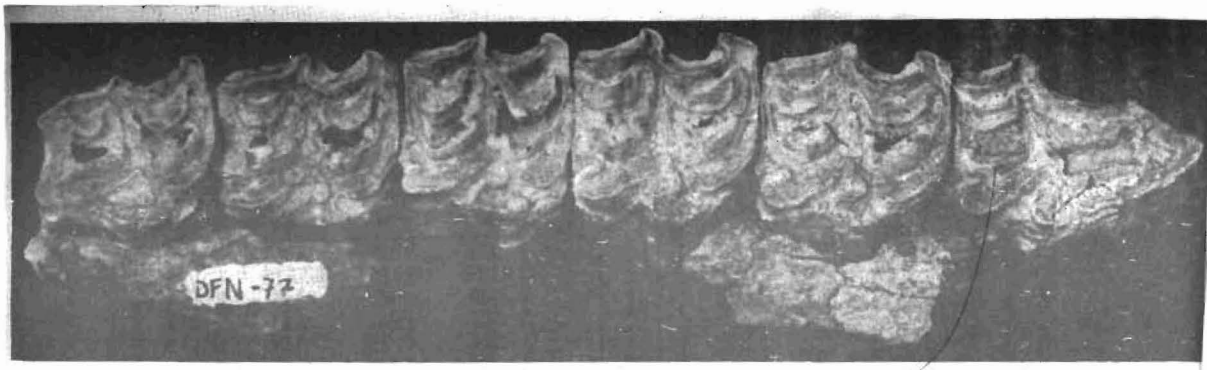
Fig. 2. Left lower toothrow, DFN-62, occlusal view.

Fig. 3. Third metacarpals, DFN-113, 114.

Fig.4. Third metatarsals, DFN-30, 29.

Fig. 5. Astragali, DFN-35, 90.

Fig. 6. First phalanx of the third digit, DFN-46.



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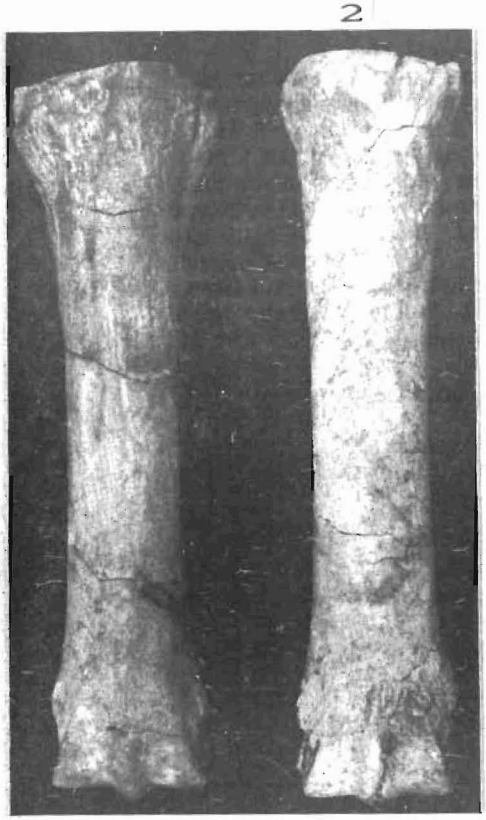

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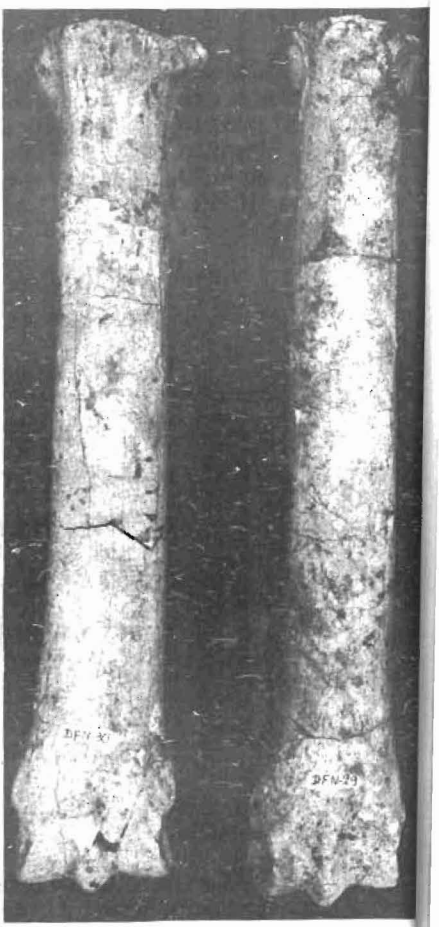

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PLATE II

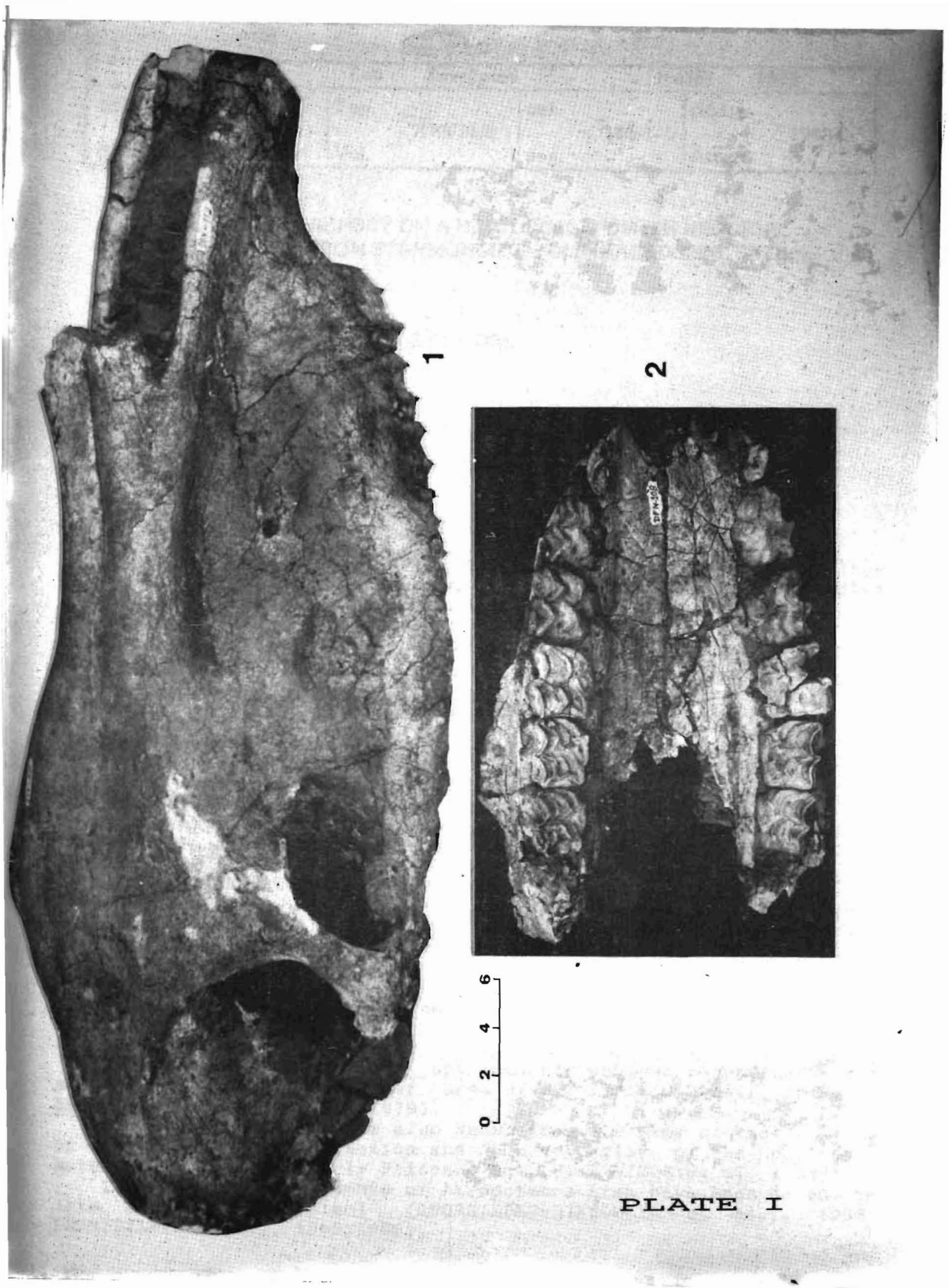

PLATE I