

## A COELODONTA ANTIQUITATIS PRAECURSOR (MAMMALIA, RHINOCEROTIDAE, ZONE 24) FROM THE LOWER AXIOS VALLEY DEPOSITS (GEPHYRA, MACEDONIA, N. GREECE)

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### A B S T R A C T

The subspecies Coelodonta antiquitatis praecursor GUERIN of the rissian (saalian) age (zone 24), has been found in the lower Axios valley. A complete articulated series of one left anterior limb (scapula, humerus, radius, ulna, carpus, metacarpus and one Ph I) was found in situ. Its morphological characteristics and dimensions compared with other species from the Pleistocene- Dicerorhinus mercki and Dicerorhinus hemitoechus- as well as with older species from the Pliocene, allow us to classify it as this subspecies, which is described for the first time in Greece.

### Σ Υ Ν Ο Ψ Η

Στην παρούσα εργασία περιγράφεται για πρώτη φορά στην Ελλάδα το υποείδος του ρινόκερου Coelodonta antiquitatis praecursor GUERIN, ηλικίας Riss (Saal, ζώνη 24). Μία πλήρης σειρά του αριστερού εμπρόσθιου άκρου- ωμοπλάτη, βραχίονας, κερκίδα, ωλένη, καρπικά, μετακαρπικά οστά και πρώτη φάλαγγα- βρέθηκαν "in situ" από τον αγρότη Δημήτριο Μαγκόπουλο, μέσα σε συνεκτικά κροκαλοπαγή, 500m ανατολικά της κοίτης του Αξιού ποταμού και κοντά στο χωριό Γέφυρα (25km δυτικά της Θεσσαλονίκης). Η σύγκριση με τις άλλες Πλειστοκαινικές μορφές Dicerorhinus mercki και Dicerorhinus hemitoechus- καθώς και με άλλες παλαιότερες, επέτρεψε να γίνει η συστηματική κατάταξη του ρινόκερου στο υποείδος αυτό.

### INTRODUCTION

The material was found "in situ" within cohesive conglomerates, 500m east of Axios river and close to the village of Gephyra (25km west of Thessaloniki) by the villager Dimitrios Magopoulos. The fossils are now placed in the collections of the Museum of Geology and Paleontology of Aristotle University of Thessaloniki.

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## GEOLOGICAL AND GEOMORPHOLOGICAL ELEMENTS OF THE AREA

The broader area belongs to the Axios Basin. The geomorphological elements indicate neotectonic effects and that the submerging parts of the trench-basin have been covered by Neogene and Quaternary sediments. These Neogene- Quaternary deposits contain the following formations: H o l o c e n e with alluvial deposits, marine, fluvial and brackish deposits, valley deposits, deposits from overflowing of the rivers Axios and Aliakmon etc.; P l e i s t o c e n e with three systems of terraces- lower, middle, upper- where a Paleoloxodon antiquus italicus has been found north-east of the village of Vathylakkos; The P l i o c e n e period was recorded in the area by the presence of Anancus arvernensis and Hipparion sp. (late Ruscinian-early Villanyan); U p p e r M i o c e n e - P l i o c e n e deposits are divided to N. Mesimvria (late Vallesian), Vathylakkos (late Vallesian-early Turolian) and Dytiko (late Turolian) formations. (Neotectonic Map of Greece (Thessaloniki Sheet, 1:100.000), in press), KOUFOS, 1980, KOUFOS & PAVLIDES, 1988, BONIS de, et al., 1973, 1985).

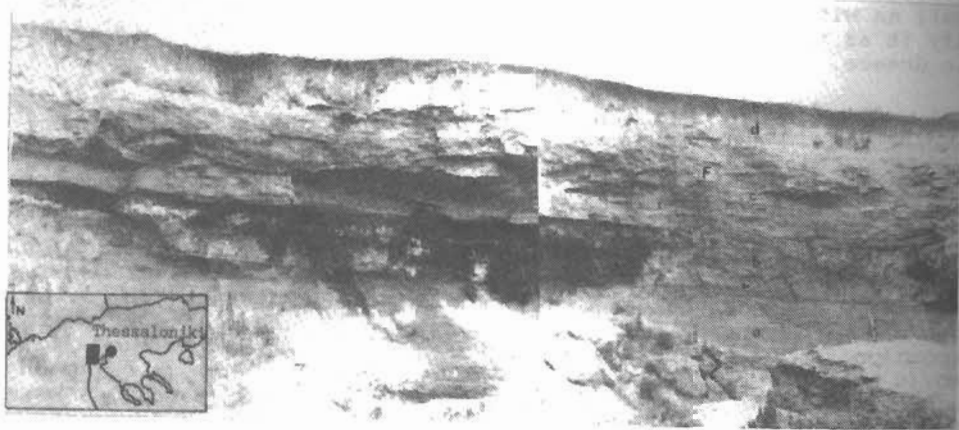


Photo 1: The sediments of the area, from which the fossils (F) have been collected, are of a great depth having a very slight inclination to the south and without tectonic events. In some places cross bedding structures and organic material was observed. a) Loose sands, conglomerates with argillaceous fans, b) the same, regarding the organic material, c) grey, cohesive, gradual conglomerates with abundant silica and mica and with calcareous and argillaceous material, in which the fossils have been found, d) loose conglomerates with sands and e) red covering beds.

φωτο. 1: Τα ιζήματα της περιοχής, όπου βρέθηκαν τα απολιθώματα (F), έχουν μεγάλο πάχος, μικρή κλίση προς Ν. και δεν παρουσιάζουν διατάραξη. Σε ορισμένα σημεία παρατηρήθηκαν διαστρωρωμένες στρώσεις και παρουσία οργανικής ύλης. α) Χαλαροί άμμοι, κροκαλοπαγή με αργιλικούς φακούς. β) τα ίδια στρώματα, με παρουσία οργανικής ύλης. γ) γκρι, συνεκτικά, διαβαθμισμένα κροκαλοπαγή, άφθονα σε χαλαζία και μαρμαρυγίες, με ασβεστίτη και αργιλική ύλη. δ) χαλαρά κροκαλοπαγή με άμμους και ε) επικάλυμμα ερυθροπύλων.

## METHODS

The system of the measurements of the bones and the comparison with the other species are mainly based on GUERINS' publication of 1980.

## TAXONOMY

Order: PERISSODACTYLA OWEN, 1848

Family: Rhinocerotidae OWEN, 1845

Genus: Coelodonta BRONN, 1831

Species: Coelodonta antiquitatis (BLUMENBACH, 1799)

Coelodonta antiquitatis praecursor GUERIN, 1980

## SYNONYMES

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## LOCALITY

Gephyra, Axios Valley, Macedonia, N.Greece

## HORIZON

Upper Pleistocene-zone 24 (Riss. Saal)

## MATERIAL

Os scapula fragm. G.A. 1 sin. os humerus G.A. 2 sin. os radius G.A. 3 sin. os ulna G.A. 4 sin. ossa carpalia G.A. 5 sin (in situ), ossa metacarpalia G.A. 6 sin (in situ), Ph I G.A. 7 sin (in situ), all of the same individus.

## DIAGNOSIS

Large size, more elongated but not as strong as the bones of the other subspecies Coelodonta antiquitatis antiquitatis.

## DESCRIPTION

From the scapula both the collum and the articulation are missing. The maximum anteroposterior diameter of the bone is approximately 330 mm.

The humerus is well preserved. In the proximal epiphysis, the caput humeri is rounded and well distinguished. The sulcus intertubercularis, on the anterior side, has an disproportionate U shape, without intermediate tuberculum. The crest, which joins the tuberositas deltoidea and the intermediate indentation of the head, is well marked. The fossa olecrani of distal epiphysis is wide and the gutter, which separates the epitrochlea from the posterior part of the trochlea, is well marked. The trochlea is wide and quite oblique. The anteroposterior crest of the anterior part of the distal epiphysis is pronounced.

The radius is also well preserved. The proximal part has the anterior bord of the external facet of the articulation for humerus (fig. 1) well retreated in comparison to the anterior bord of the internal facet. In the lateral extreme the angle is acute and the posterior bord concave. The anterior bord is not well preserved.

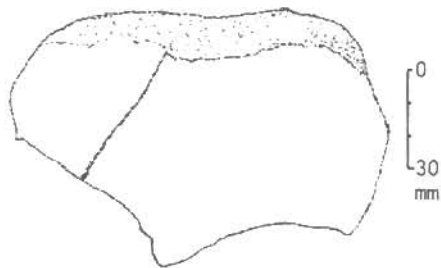


Fig. 1. Coelodonta antiquitatis praecursor (Axios); view of proximal articulation of radius.  
Σχ. 1. Κερκίδα: όψη της άνω αρθρωτικής επιφάνειας.

The insertion of the brachial biceps on the vertical axis of the epiphysis is large and quite deep. The distal posterior part of diaphysis is concave and the transversal gutter to the limit with the distal articulation high and profound.

The big part from the olecranon of the cubitus is missing. The proximal articulation is strongly oblique, with a net depression at the middle of its base.

The medial bord of the anterior face of scaphoid is rounded and strongly convex, with the maximal point of convexity on the distal part of the bone. The proximal bord is strongly concave and the medial side is higher than the lateral one. The proximal articulation surface is a very large, rounded triangle with the longest width at the middle of the surface.

The anterior side of the semilunar is an open V-shaped distal extreme. The proximal extreme is very large, with a cylindrical articulation of the radius, which forms a small angle with the narrow articular surface for the cubitus.

The anterolateral side of pyramidal is as large as high. The proximal part is trapezoid, lateral concave, with the lateral bord shorter than the medial bord.

The "raquette-form" pisiform has a distinct collum, with the posterior bord higher than the anterior bord.

The facet for trapezium on the medial side of trapezoid, forms a lobe, which extends to the proximal side and becomes pointed on the distal part.

The anterior face of the magnum has a pentagonal shape, with rounded distal bord. The extension of the bone is very strong to the medial side of the bone.

The anterior side of the unciform is large and higher to the lateral than the medial side. The distal bord is strongly convex, but the medial and proximal bord is angular.

The proximal articulation of Mc II is very large, concave with a rounded triangle shape and the most anterior point of it, is recessed in comparison with the the most anterior point of the epiphysis. The section of the diaphysis is of elliptic shape with a "carine" on the medial part of the posterior side. The distal part of the bone is disproportionate.

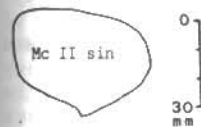


Fig. 2. Coelodonta antiquitatis praecursor (Axios); Medial section of diaphysis of Mc II.  
Σχ. 2. Mc II: Τομή στο μέσο της διαφύσεως.

The proximal articulation of Mc III is very large, strongly concave, with the lateral bord much higher than the medial bord. The section of the diaphysis is of elliptic shape, with a transversal diameter much larger than the anteroposterior one. The posterior bord is slightly concave but the distal part is rather symmetrical.

The proximal articulation of Mc IV is more or less an isosceles triangle, very large on the posterior side. The posterior bord forms an open-V, with the lateral branch corresponding to the facet for the Mc V. The section of the diaphysis is a rounded triangle. The distal part is disproportional.

The Mc V is a short bone and it has a pointed distal extreme.

The Ph I is a large and short bone.

## DISCUSSION

The presence of Coelodonta antiquitatis is referred in the Peloponnese (Megalopolis, MELENTIS, 1965) to be of rissian age. This was the first reference in Greece to the one of the southernmost hairy representative of the rhinoceros species. In northern Greece there is another reference to the same species in the Per-

dikas formation (KOUFOS & PAVLIDES, 1988) of the Middle-Upper Pleistocene and in the basin of Drama, of Würmian age (KOUFOS, 1981).

This bicornal rhinoceros of grand or very grand size, with stumpy members, appears in the zone 24 (Riss, Saal, estimated chronology  $250-150 \times 10^3$  years ago, GUERIN, 1980) and endures until the end of the Pleistocene. The comparison has been made mainly between the other species of Pleistocene Dicerorhinus mercki and Dicerorhinus hemitoechus. The first one is of grand size and appears in zone 20 until the end of the Pleistocene. The second one has middle to grand size and appears to the beginning of zone 23 or to the end of zone 22 and endures until the end of the Upper Pleistocene. The presence of Dicerorhinus is referred, for first time in Greece, by MITZOPOULOS (1958) to be of Lower Pleistocene age, and especially the Dicerorhinus etruscus, in Aliakmon (Macedonia). Later, the Dicerorhinus sp. is referred by MARINOS (1964) in Agia Triada coast (Thessaloniki) to be of Upper Pleistocene age. In Petralona cave, FORTELIUS & POULIANOS (1979) refer the Dicerorhinus cf. hemitoechus and the typical form, of zone 25, the Dicerorhinus hemitoechus is referred by TSOUKALA (1989) to be of Eemian age.

The evolution of the genre Coelodonta corresponds to the ultimate stadium of Dicerorhininae, of Asiatic origin. GUERIN (1982b) refers to the evolutive tendencies, concerning stature, as follows: the long bones become slightly elongated and the metapods become slightly shortened with all bones becoming more stumpy. This tendency is well marked on the diagram of the dispersion of Mc III of Coelodonta antiquitatis antiquitatis from Jaurens (GUERIN, 1983, fig. 5) on which the rhinoceros from Axios valley has a much more elongated metacarpal and relatively short the proximal transversal diameter and in general has more primitive characteristics.

The conclusions derived from the comparisons between the various qualitative or morphological and quantitative characteristics, show that the rhinoceros from the Axios valley is classified as a Coelodonta antiquitatis praecursor with many characteristics of Dicerorhinus mercki. These characteristics, for example are, the morphology of the semilunar, the posterior projection of the proximal end of Mc II, as well as the presence of the "carine" in the middle of the diaphysis part of the bone, the elliptical section of the diaphysis and the slenderness of the anteroposterior diameter of the Mc III.

The ratio diagram comparing the humerus (fig. 3a) shows that there is similarity between the Axios rhinoceros and Coelodonta antiquitatis and that there is no similarity between the other Pleistocene rhinoceroses and the Plio-Villafranchian rhinoceroses. The ratio diagram comparing the humerus, the radius and the Mc III (fig. 3b) shows the relationship between the two subspecies of C. antiquitatis. The ratio diagram comparing some indices and the dimensions of carpal bones (fig. 4a, b) and metacarpal (fig. 5) shows the relationship between the Pleistocene rhinoceroses.

From a paleoecological view the preferential biotope of Coelodonta antiquitatis is steppic landscape with Compositaceae and Graminaceae. The temperature is very variable between a sub-

arctic climate and a Mediterranean forest. GUERIN (1980) comments that it is false to place this species among the "cool" species. as KÄHLKE (1977) places the Dicerorhinus mercki from the Taubach and TSOUKALA (1989) places the Dicerorhinus hemitoechus from the Petralona in a temperate humid climate of the Eemian age.



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TABLE OF MEASUREMENTS

*Coelodonta antiquitatis praecursor* GUERIN  
(Axios valley)

Humerus G.A. 2		Radius G.A. 3		Ulna G.A. 4	
1	L (430.0)	L	392.0	DTpr.ar.	98.5
2	DTpr. 187.5	DTpr.	112.5	DTdia.min.	(50.5)
3	DAPpr. (150.0)	DAPpr.	74.5	DAPdia.	(42.0)
4	DTdia.min. 77.7	DTdia.	65.4	DTdis.	40.2
5	DAPdia. 79.6	DAPdia.	41.2	DAPdis.	61.2
6	DTdis. 152.5	DTdis.	108.7		
7	DAPdis. 125.0	DAPdis.	69.5		
8	DTtub.delt. 160.7	DTd.ar.	89.3		
9		DAPd.ar.	56.5		

Ossa carpalia G.A. 5

	Scaphoid.	Lunat.	Triquet.	Pisiform	Trapez.	Magnum	Hamatum
L	95.5	76.0	46.3	66.3	50.2	105.0	Labs. 92.0
l	63.4	60.7	57.0	29.6	35.6	53.0	Lanat. 74.0
H	75.0	56.0	54.8	50.0	40.2	71.0	l 73.6
Lpr.ar.	60.4						H 66.6
lpr.ar.	60.0						
Ld.ar.	69.8						
ld.ar.	34.7						
Hant.		62.0					

Ossa metacarpalia G.A. 6

	Mc II	Mc III	Mc IV	Mc V
1	L 185.5	213.8	164.4	DTmax. 31.5
2	DTpr. 52.5	70.7	56.8	DAPmax. 30.0
3	DTpr.ar. 43.0	-	-	Lmax. 44.0
4	DAPpr. 47.0	55.4	49.2	
5	DTdia. 40.0	63.0	42.8	
6	DAPdia. 28.0	25.8	27.0	
7	DTdis. 50.0	71.8	54.0	
8	DTd.ar. 48.5	56.9	50.0	
9	DAPdis. 47.0	51.5	47.0	

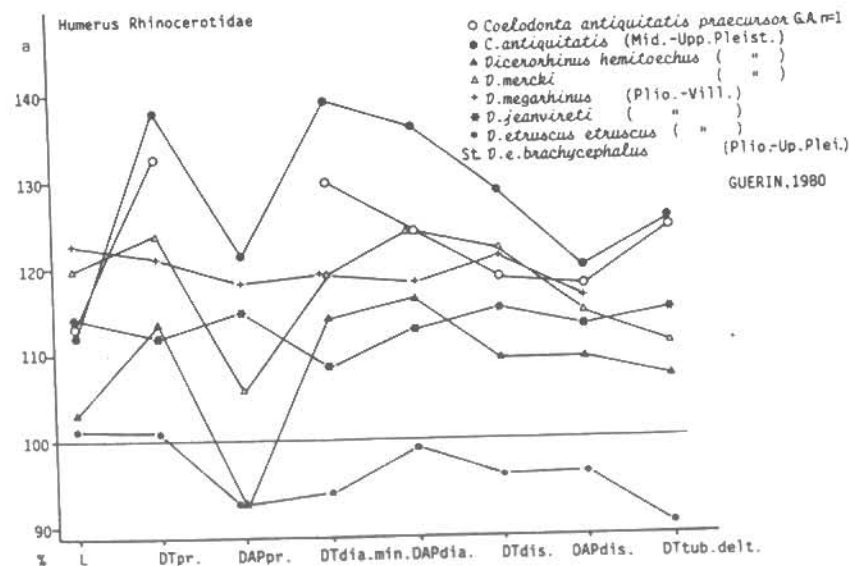
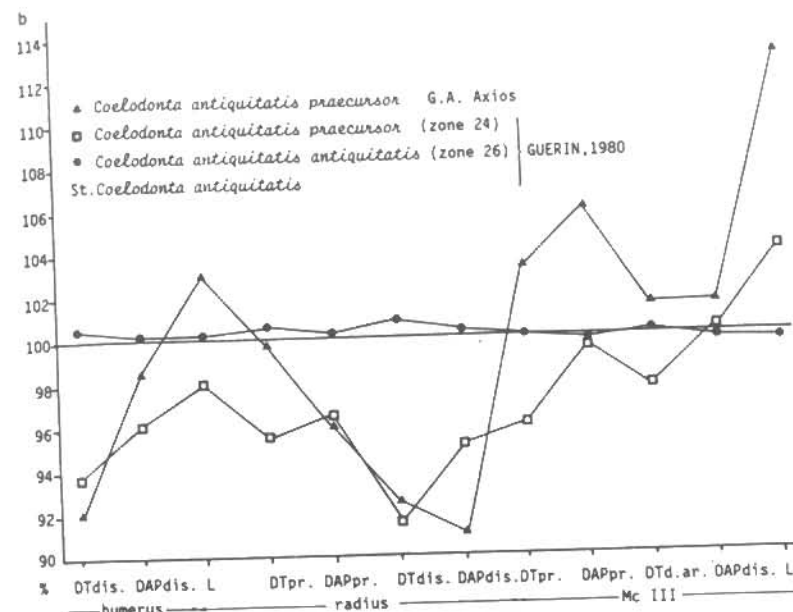


Fig. 3. Ratio diagram comparing: a) the dimensions of humerus of Pleistocenic and Pliocenic rhinoceros and b) the dimensions of humerus, radius and Mc III of *Coelodonta*.

Σχ. 3. Συγκριτικό διάγραμμα: α) των μετρήσεων των βραχιόνων πλειοκαινικών και πλιόκαινων ρινόκερων και β) των μετρήσεων του βραχίονα, της κερκίδας και του μετακαρπικού Mc III του *Coelodonta*.

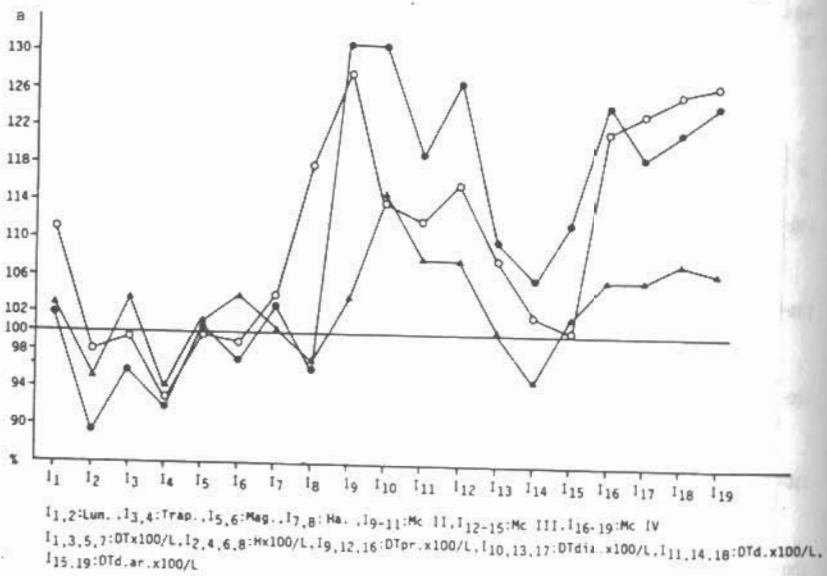
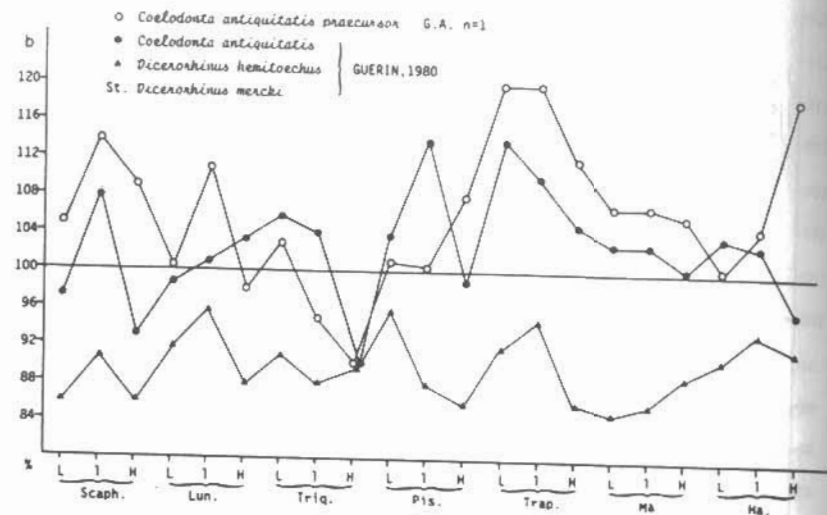


Fig.4. Ratio diagram comparing: a) some indices of carpal and metacarpal bones and b) the dimensions of the carpal bones of the pleistocenic rhinoceros.

Σχ. 4. Συγκριτικό διάγραμμα: α) ορισμένων δεικτών των καρπικών και των μετακαρπικών οστών και β) των μετρήσεων των καρπικών οστών των πλειστοκαινικών ρινόκερων.

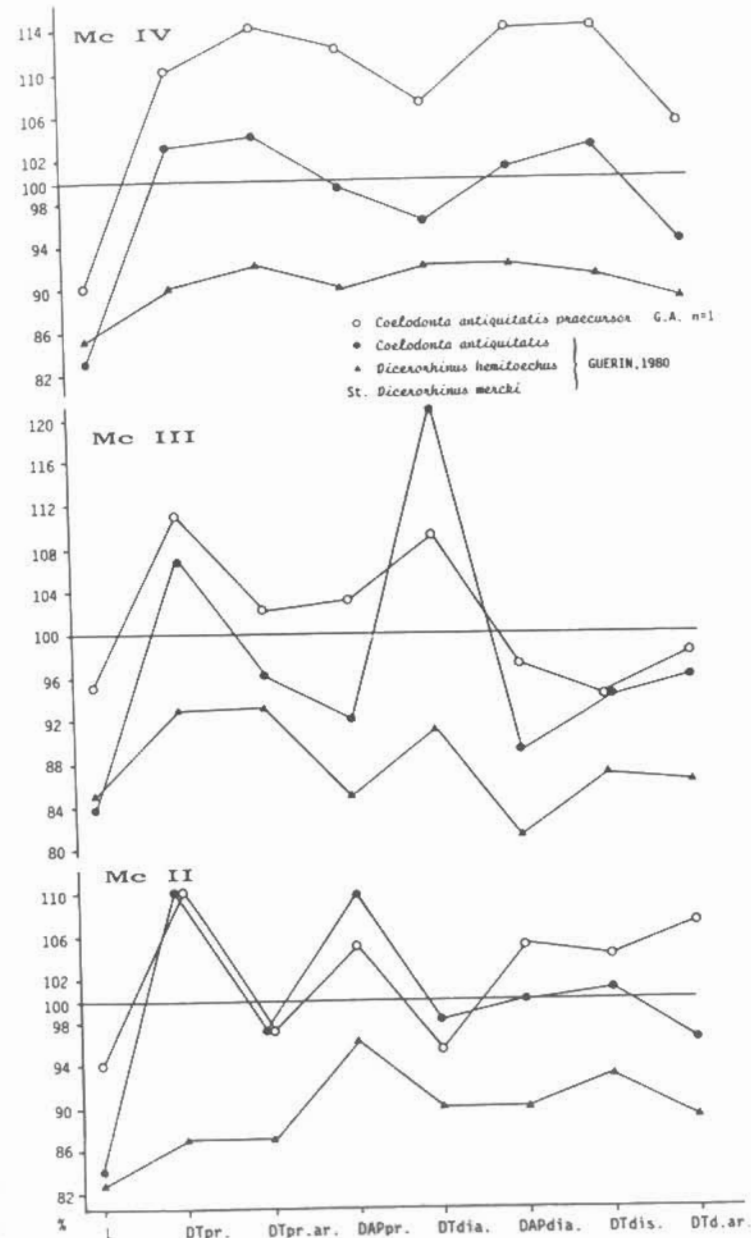


Fig. 5. Ratio diagrams comparing the metacarpal bones of Pleistocenic rhinoceros.

Σχ. 5. Συγκριτικό διάγραμμα μετρήσεων των μεταποδίων των πλειστοκαινικών ρινόκερων.

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- NEOTECTONIC MAP OF GREECE (Thessaloniki Sheet 1:100.000) (in press).



Σελοδοικία αντίχειράτος πραιολευκή GUERIN (Αξίος): a) Ossa carpalia G.A. 5 sin, Ossa metacarpalia Mc II-V, G.A. 6 sin and Ph I G.A. 7 sin (in situ), b) Radius G.A. 3 sin, c) Ulna G.A. 4 sin, d) Humerus G.A. 2 sin. All the bones from the same individual. a-c) anterior, d) posterior view.  
 Σελοδοικία αντίχειράτος πραιολευκή GUERIN (Αξίος): a) Καρπικά οστά G.A. 5 sin, μετακαρπικά οστά Mc II-V, G.A. 6 sin και πρώτη φάλαγγ G.A. 7 (σε θέση), b) Κερκίδα G.A. 3 sin, c) Οβλήνη G.A. 4 sin και d) Βραχιόνας G.A. 2 sin. Όλα τα οστά ανήκουν στο ίδιο άτομο. a-c) εμπρόσθια, d) οπίσθια όψη.