BACK TO THE FUTURE: WHAT PALAEONTOLOGY TELLS ABOUT POSSIBLE EFFECT OF GLOBAL WARMING ON HABITATS AND ANIMAL COMMUNITIES

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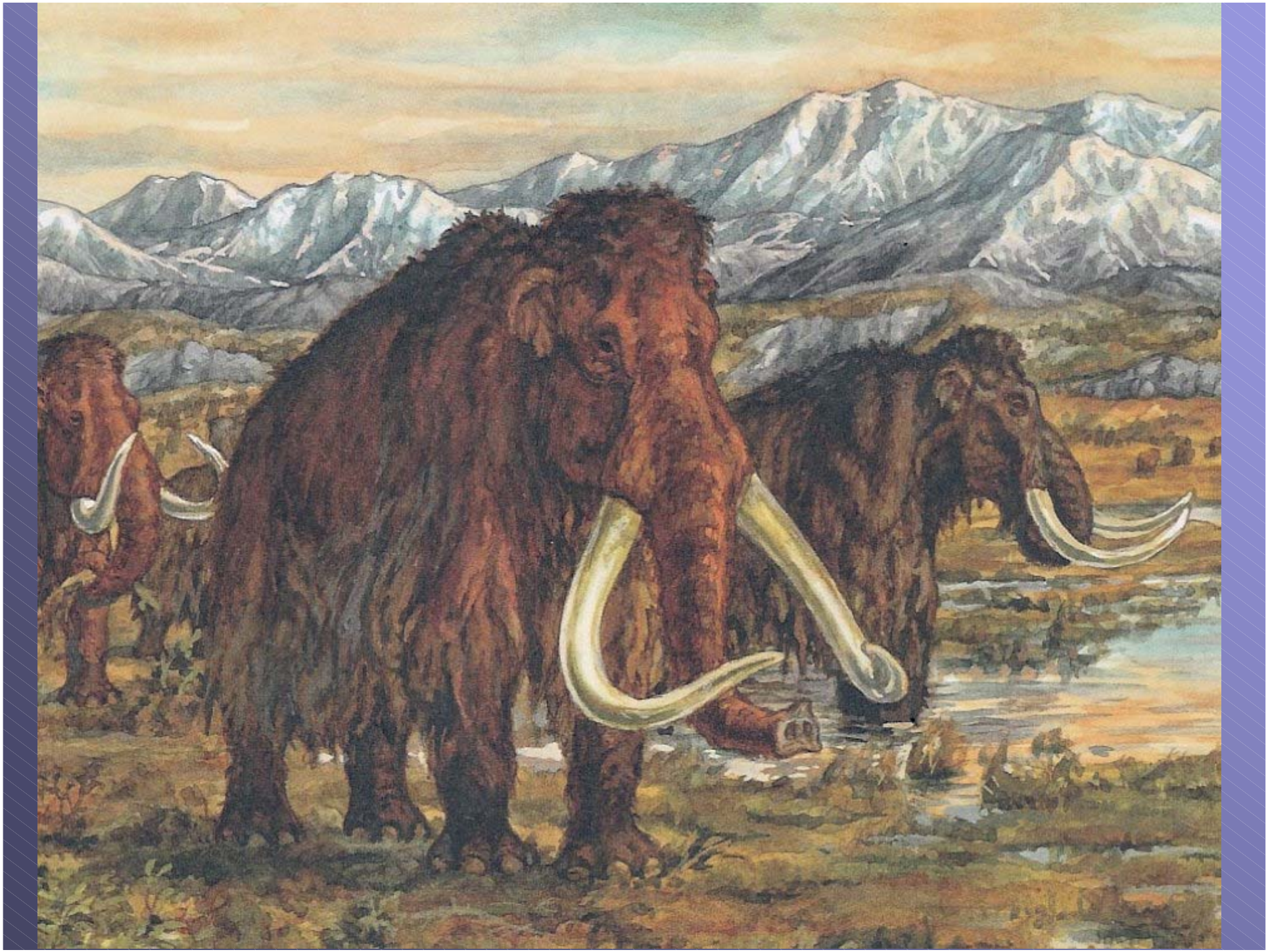
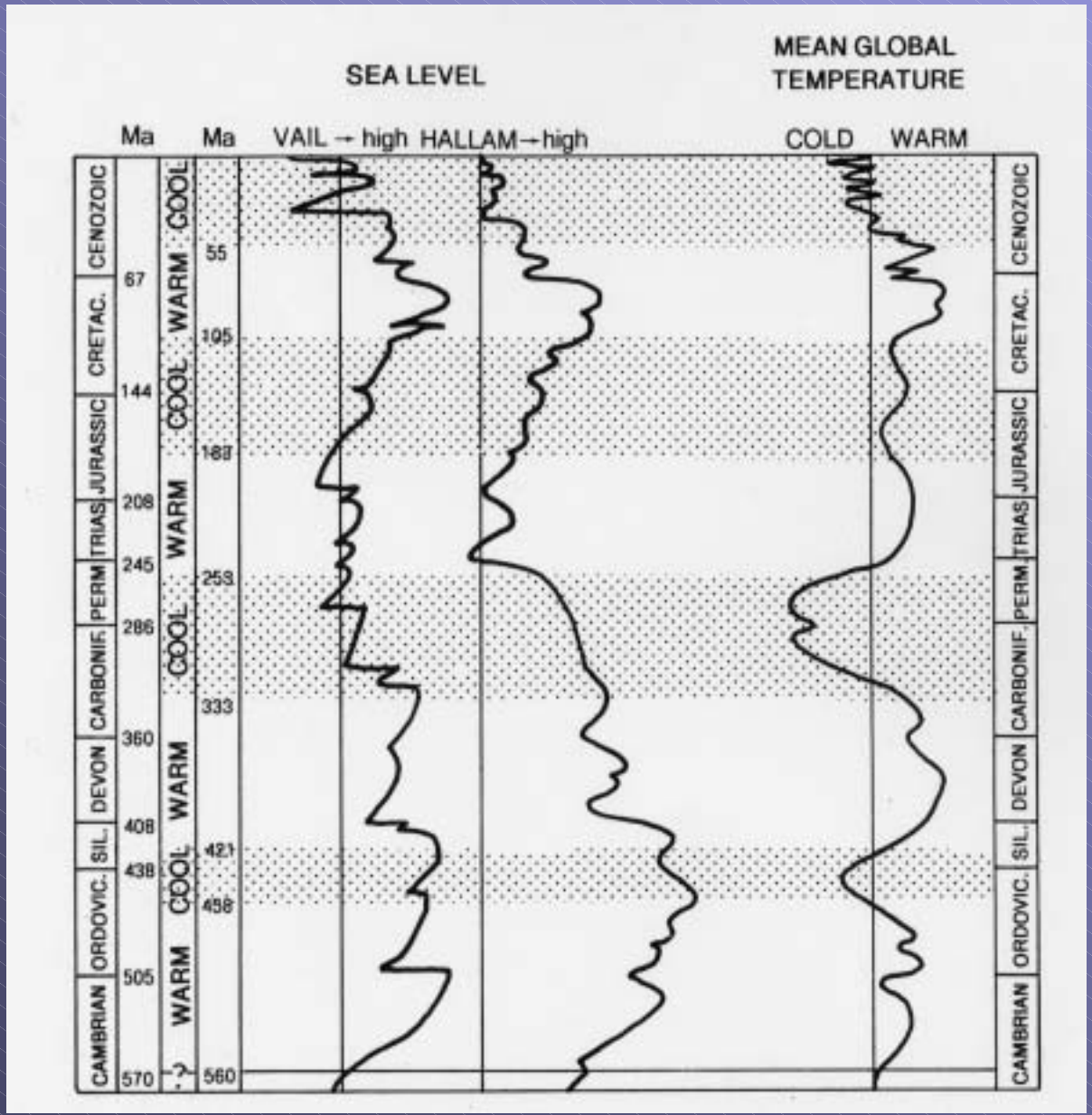
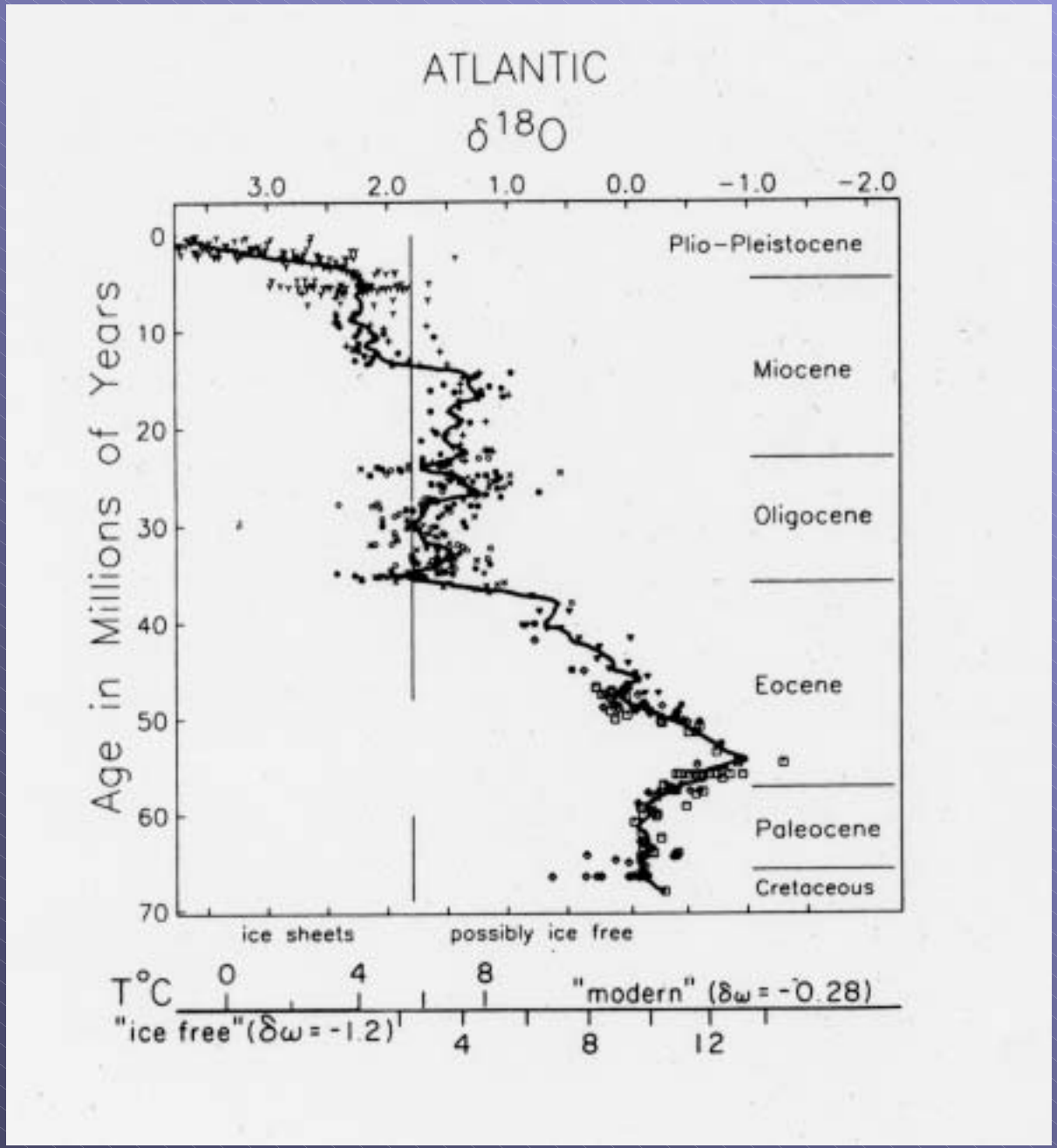


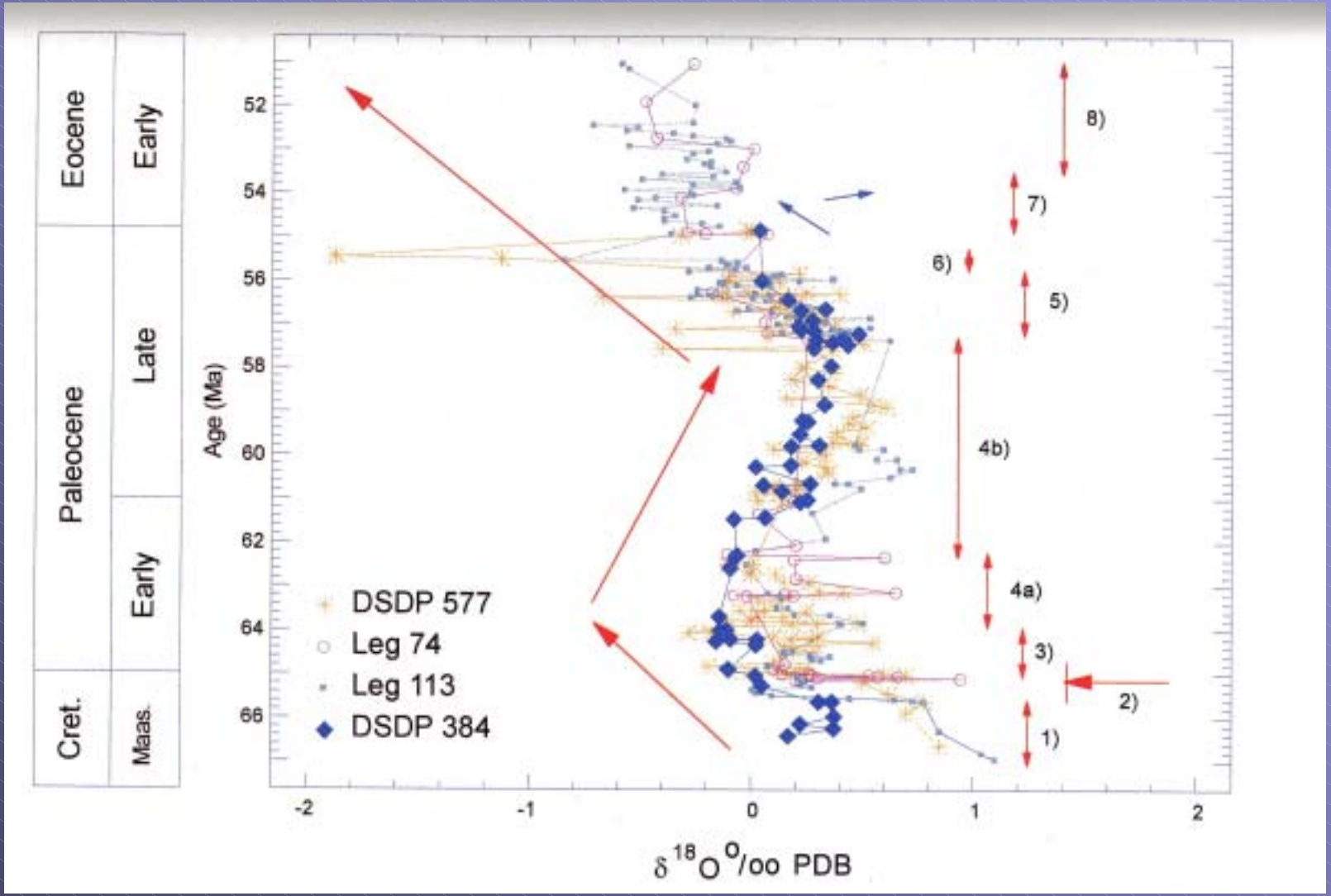


From Hallam, 1994

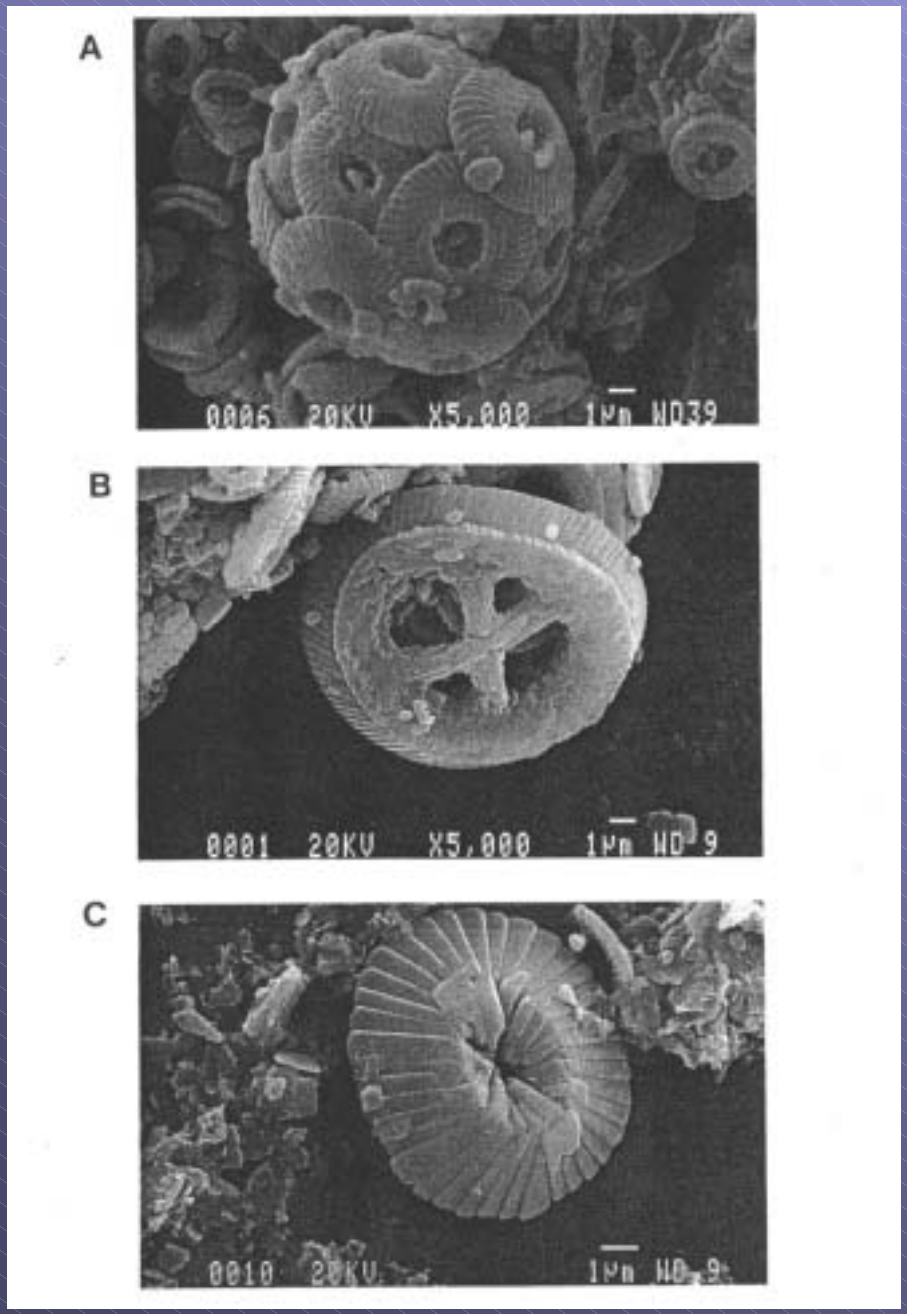


From Prothero, 1994

Comparative Benthic $\delta^{18}O$ from several Paleocene sites



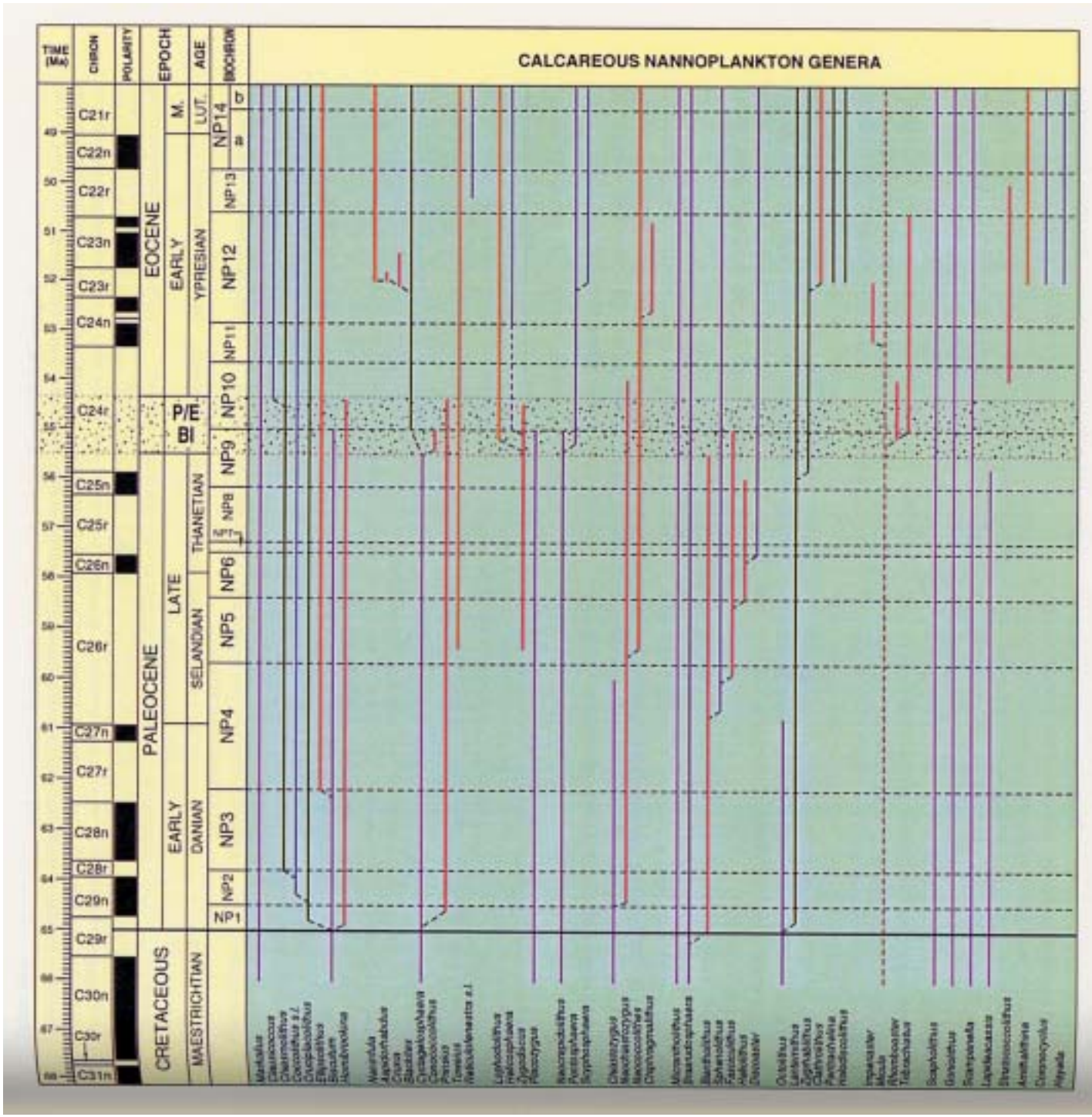
From Corfield & Norris, 1998



Calcareous Nannoplankton

Scale bar = 1μ

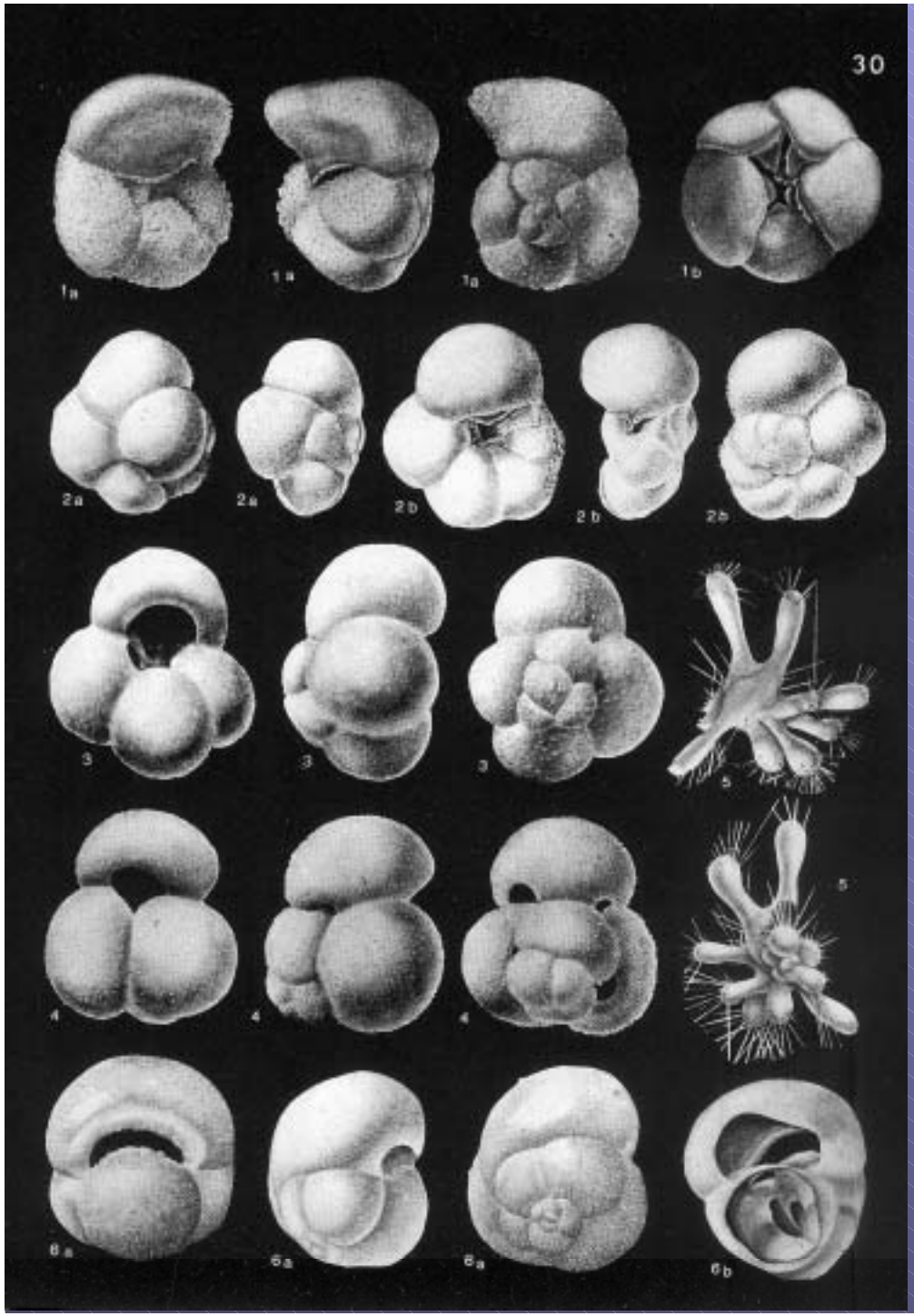
From Prothero, 1994



From Aubry, 1998

Evolutionary Steps	Genus		Evolutionary Event	
Earliest Paleocene diversification (65 to 63.8 Ma)	New Paleocene Genera:	*Biantholithus*	FAD	
		Prinsius	FAD	
		Hornnibrookina	FAD	
		Neochiastozygus	FAD	
		Lanternithus	FAD	
		Cruciplacolithus	FAD	
		Chiasmolithus	FAD	
		Ericsonia/Coccolithus	FAD	
Mid-Paleocene diversification (60.6 to 59.4 Ma)	Relictual genus:	*Chiastozygus*		LAD
	New Paleocene genera:	*Fasciculithus*	FAD	
		Zygodiscus	FAD	
		Toweius	FAD	
		Neococcolithes	FAD	
P/E BI turnover (55.5 to 54.37 Ma)	Relictual genera:	*Placozygus*		LAD
		Neocrepidolithus		LAD
		Cyclagelosphaera		LAD
		Biscutum		LAD
	New Paleocene genera:	*Biantholithus*		LAD
		Prinsius		LAD
		Hornibrookina		LAD
		Fasciculithus		LAD
		Zygodiscus		LAD
		Conococcolithus	FAD	LAD
		Rhomboaster	FAD	
		Tribrachiatus	FAD	
		Lophodolithus	FAD	
		Blackites	FAD	
		Pontosphaera	FAD	
		Helicosphaera	FAD	
		Clausicoccus	FAD	

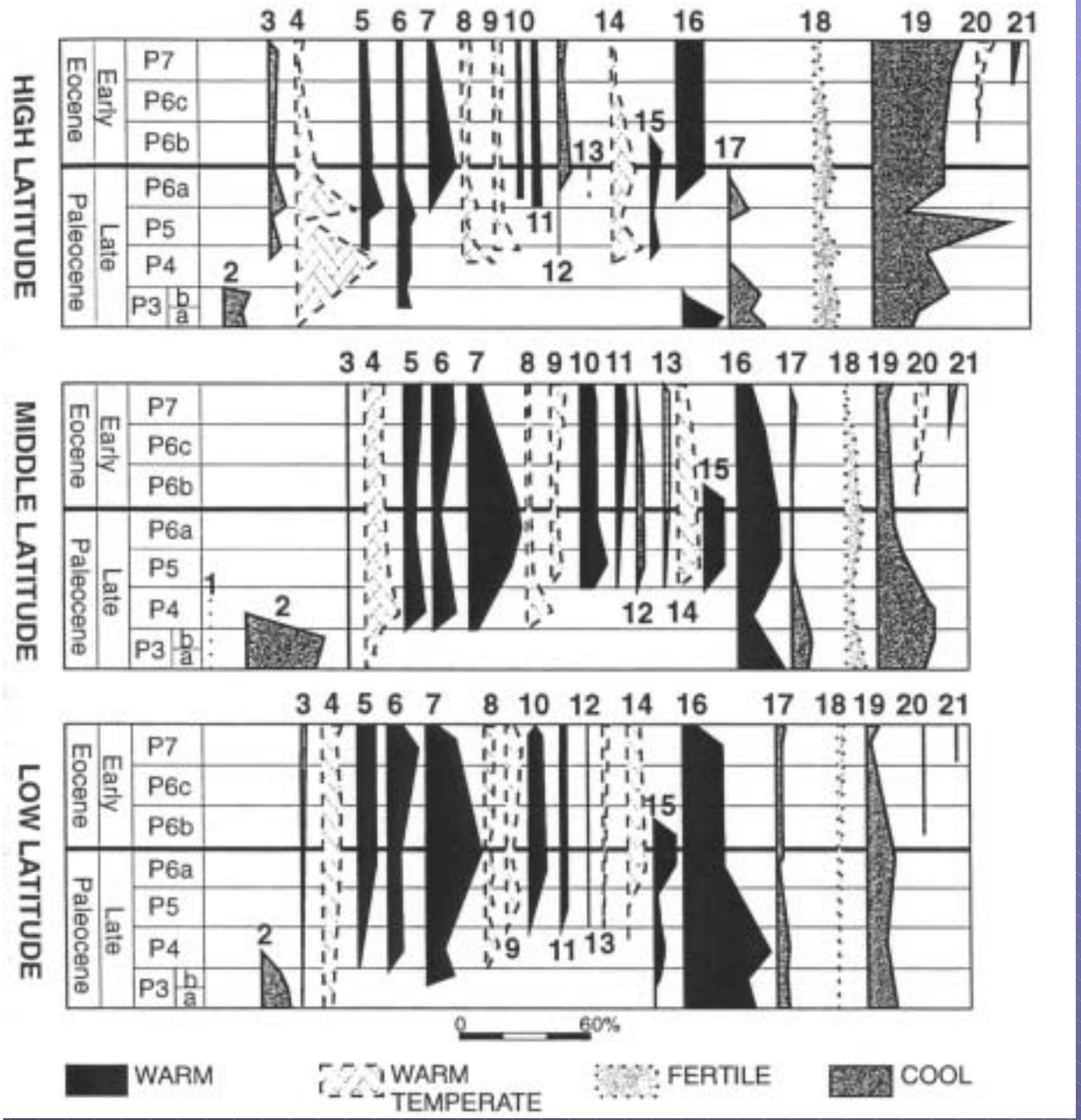
From Aubry, 1998



Planktonic foraminifera of superfamily Globigerinoidea

Dimensions from x 45 to x 94

From Sampò, 1989

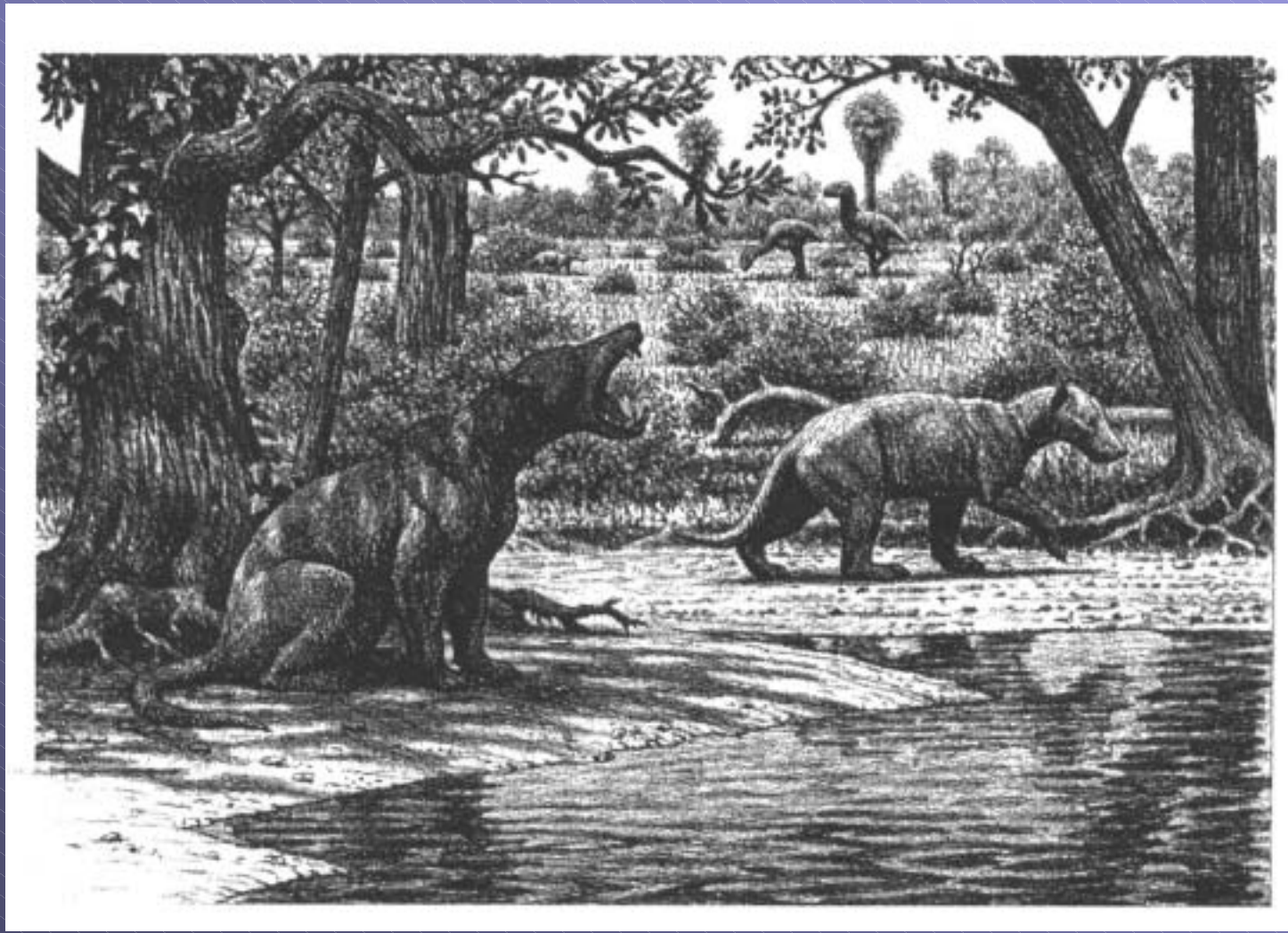


Abundances of planktonic foraminiferal groups and genera

From Boersma, Silva & Hallock, 1998

Arctocyon primaevus of Cernay, France

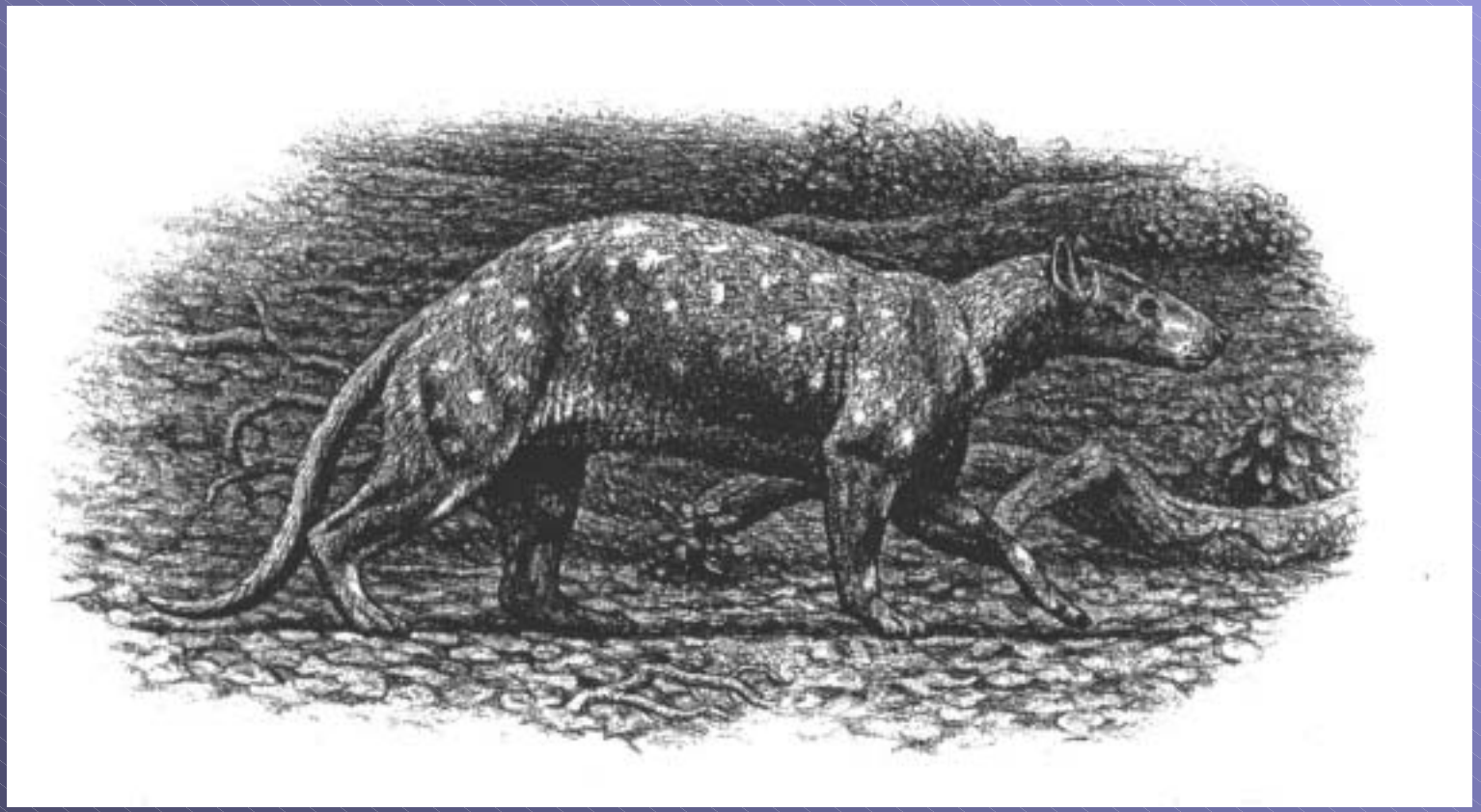
Shoulder height 45 cm



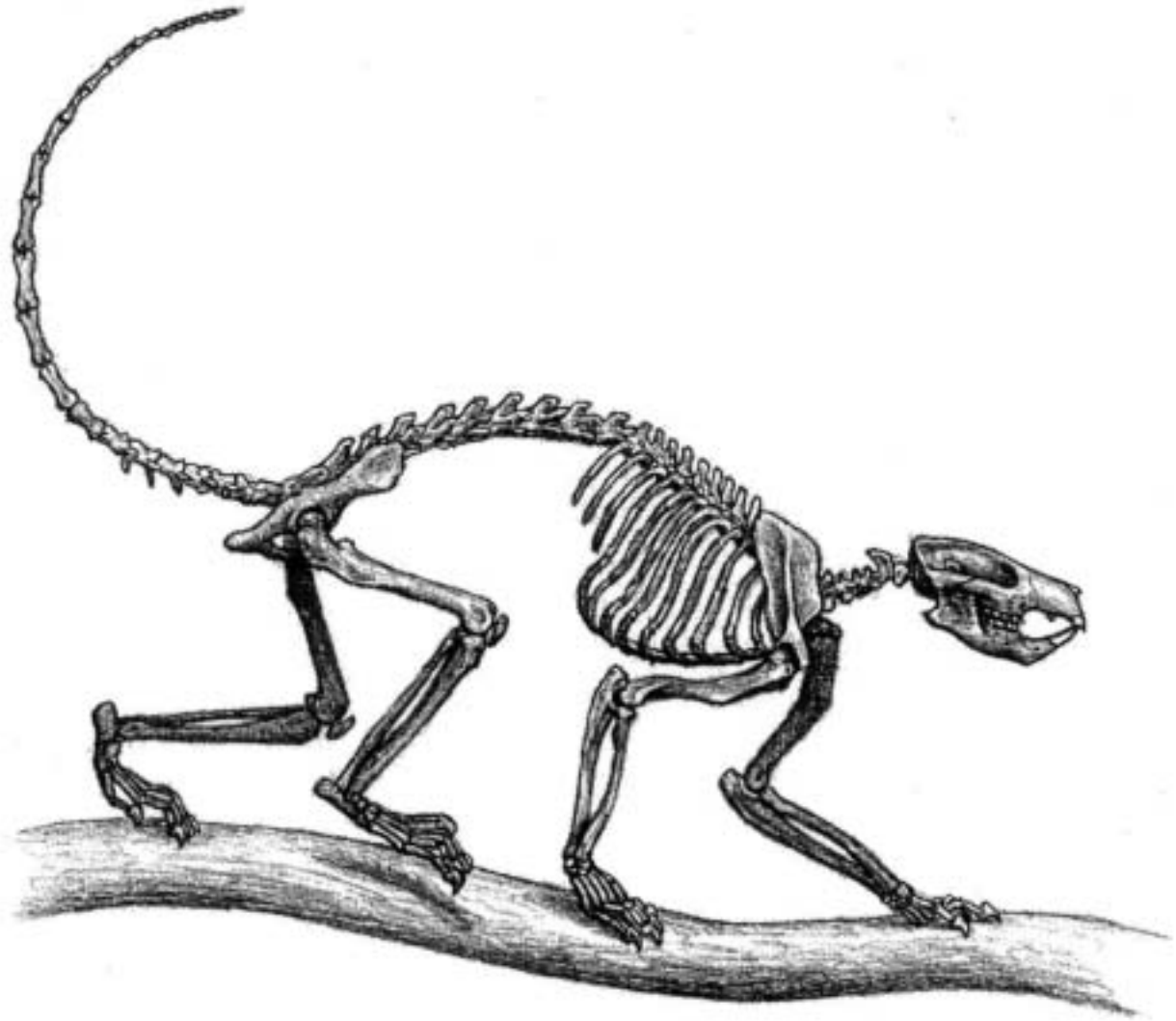
From Agustí & Antón, 2002

Pleuroaspidotherium aumonieri of
Cernay, France

Shoulder height 23 cm



From Agustí & Antón, 2002



Scheleton of
Plesiadapis tricuspidens
of Cernay, France

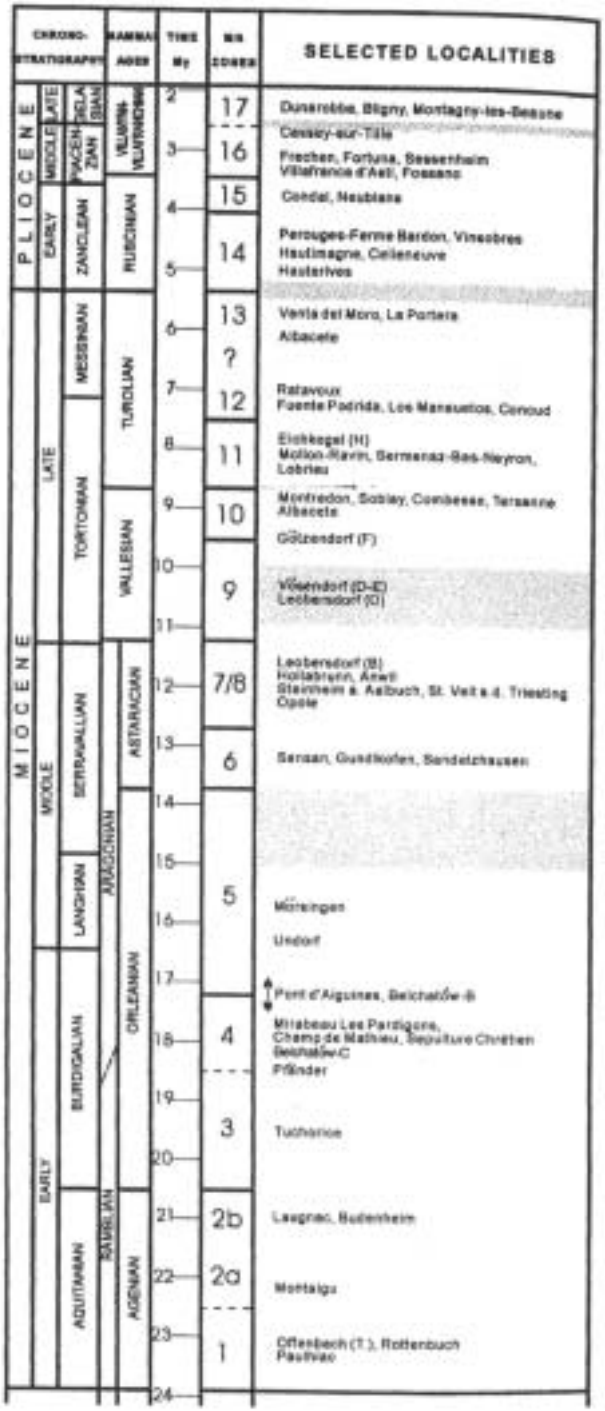
Shoulder height 25 cm

From Agustí & Antón, 2002

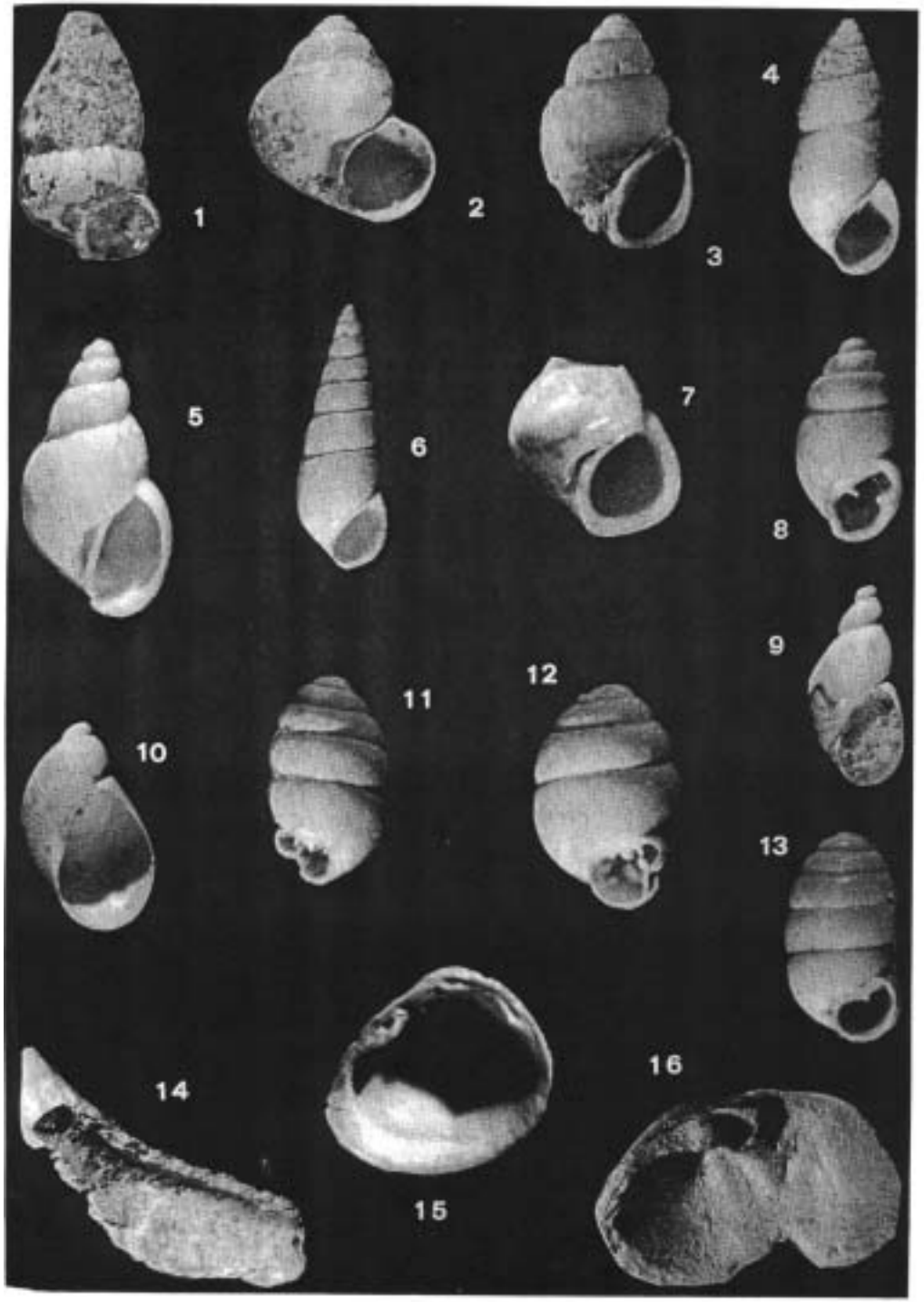
Early Eocene forest site of La Boixedat, Spain

(*Agerinia*, *Phenacodus*, *Lophiodon* and *Proviverrra*)

From Agustí & Antón, 2002



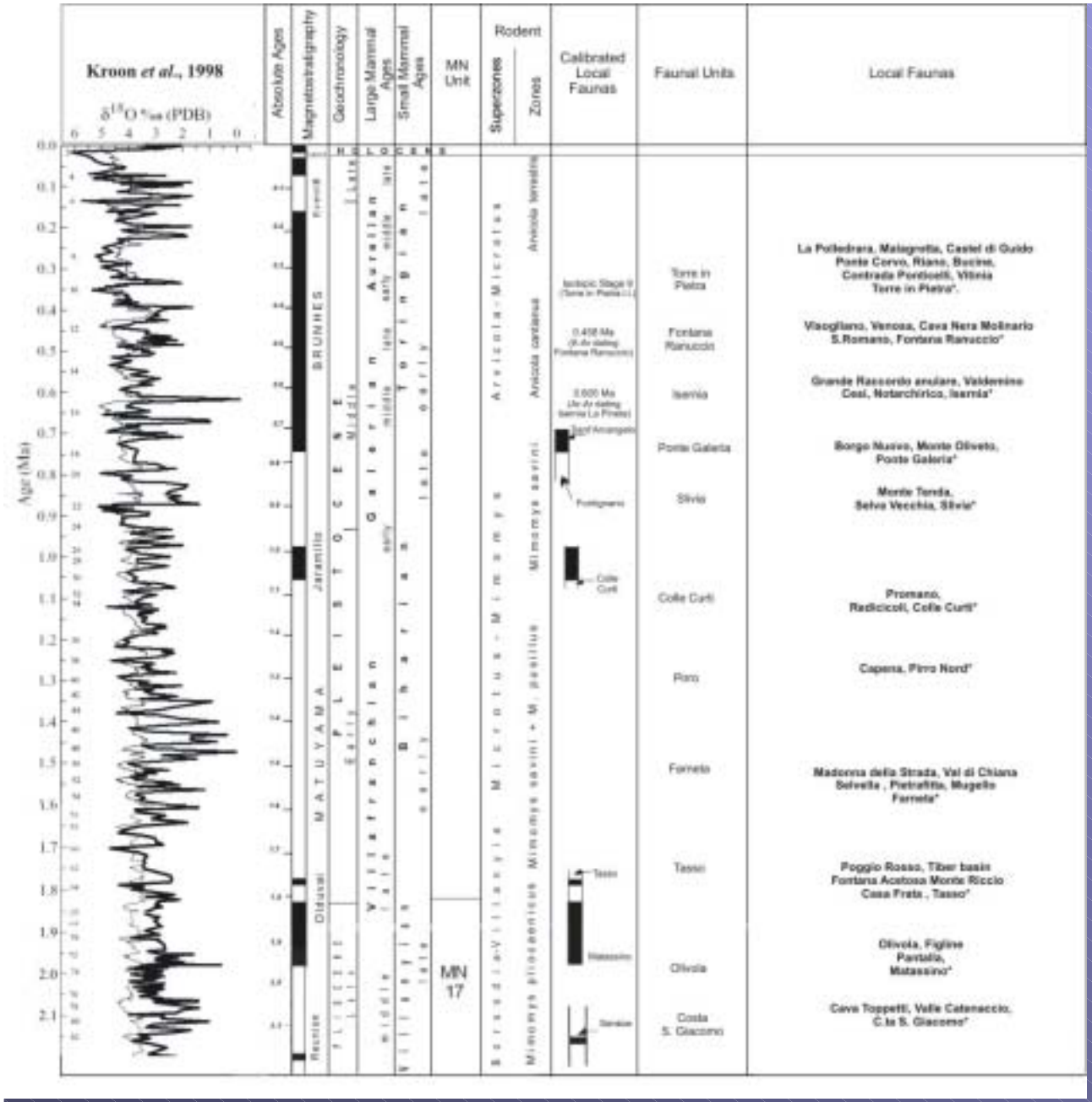
From Esu, 1999



Non-marine Villafranchian molluscs of Mugello basin, Italy

Dimensions from x 1.6 to x 23.4

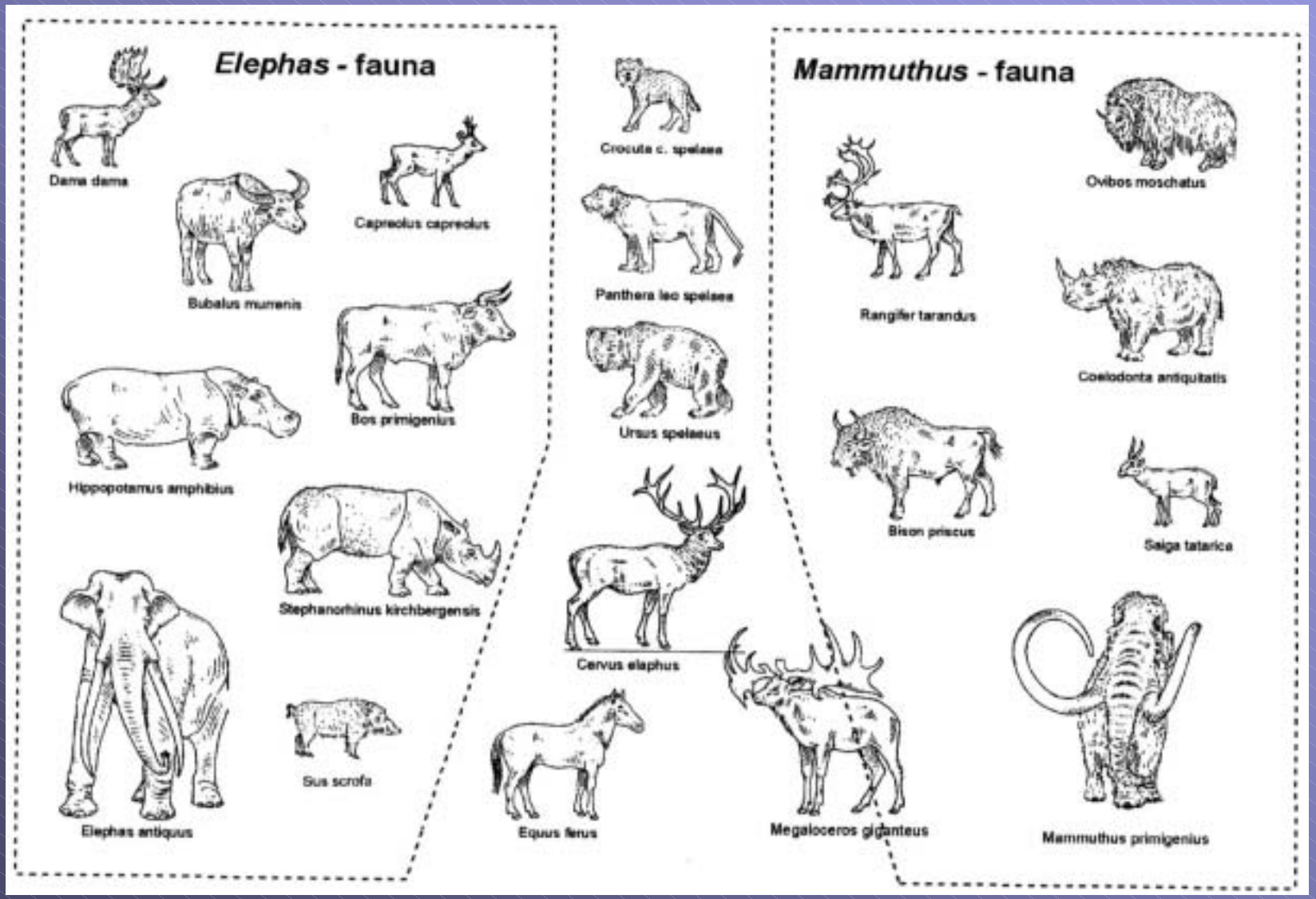
From Benvenuti, Esu, Geraci & Ghetti, 1998



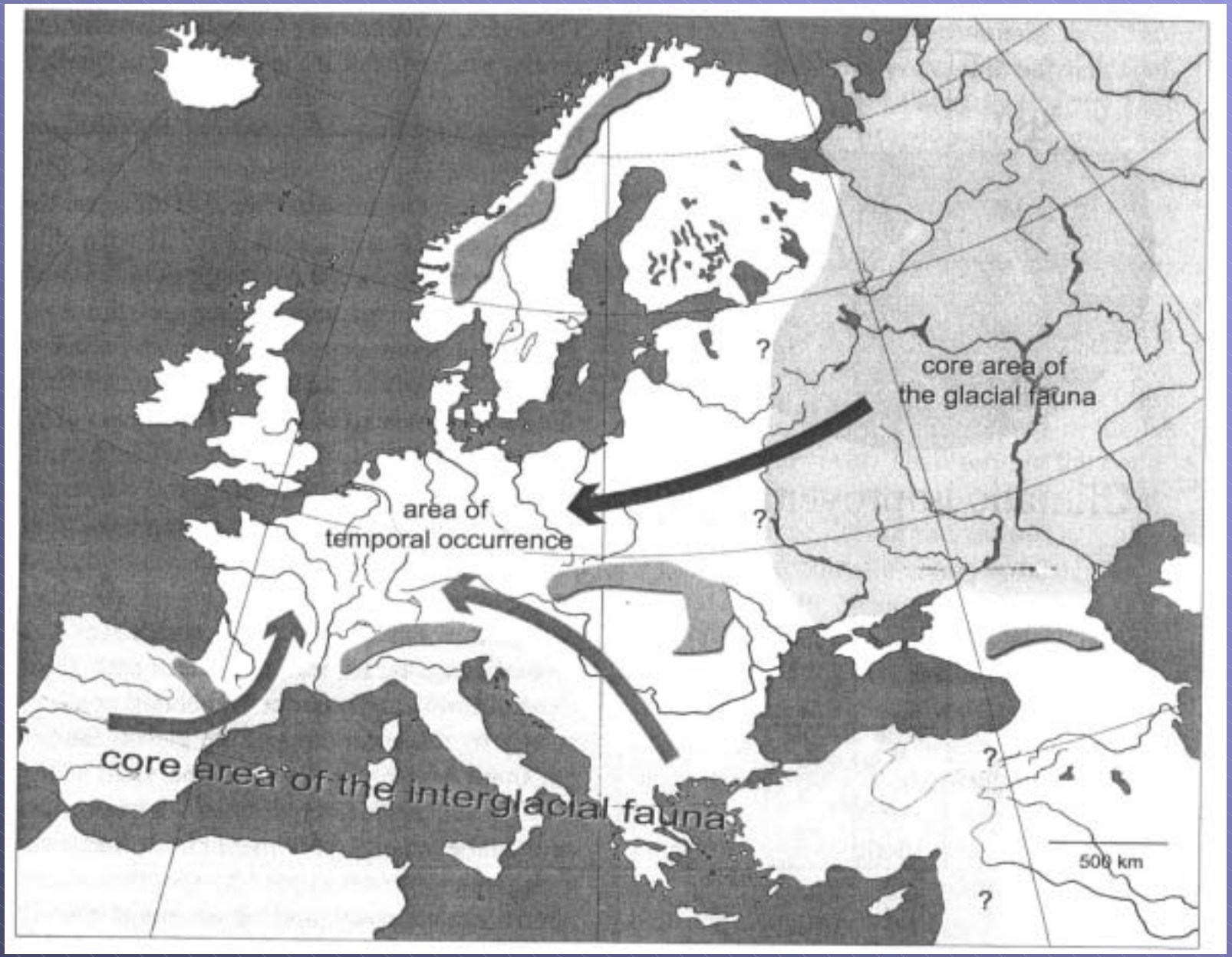
Biochronology of Late Pliocene-Pleistocene Italian mammal faunas

From Raia, Piras & Kotsakis, in press

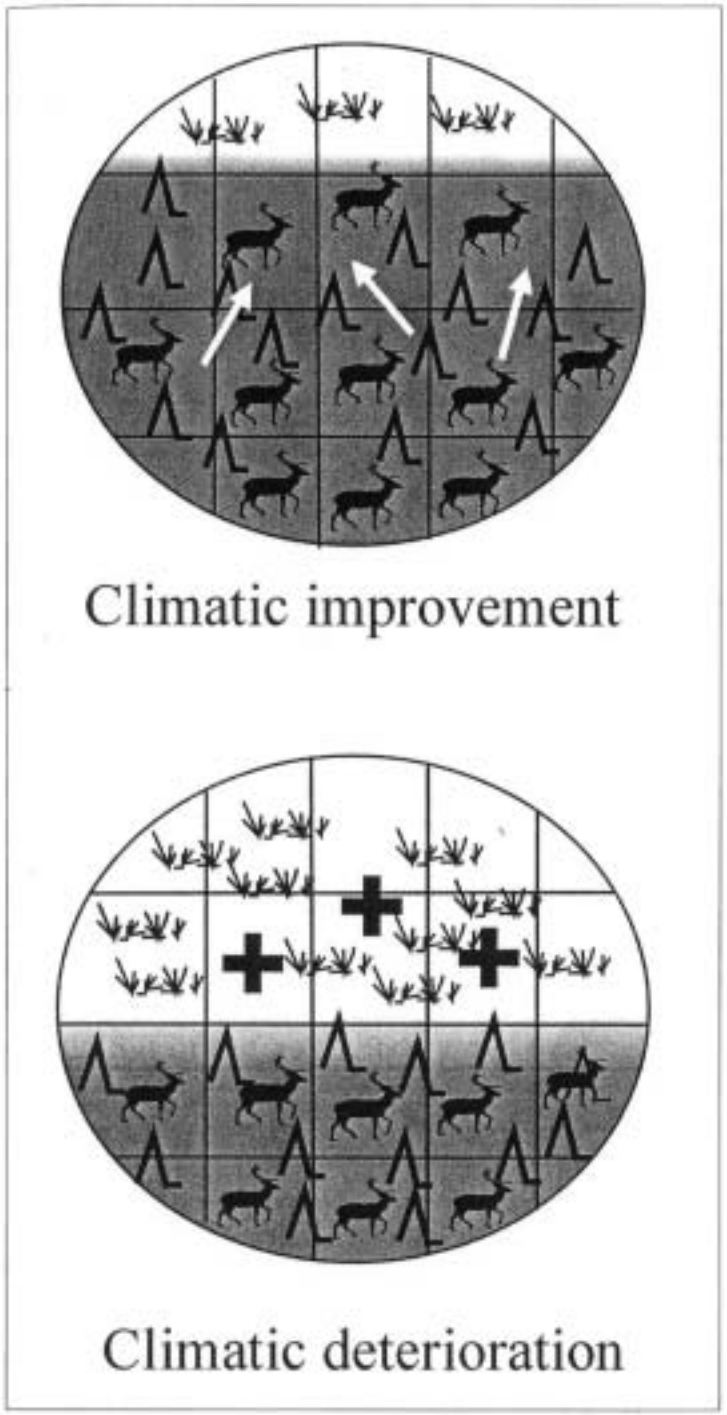
Late Pleistocene large mammals of Central Europe



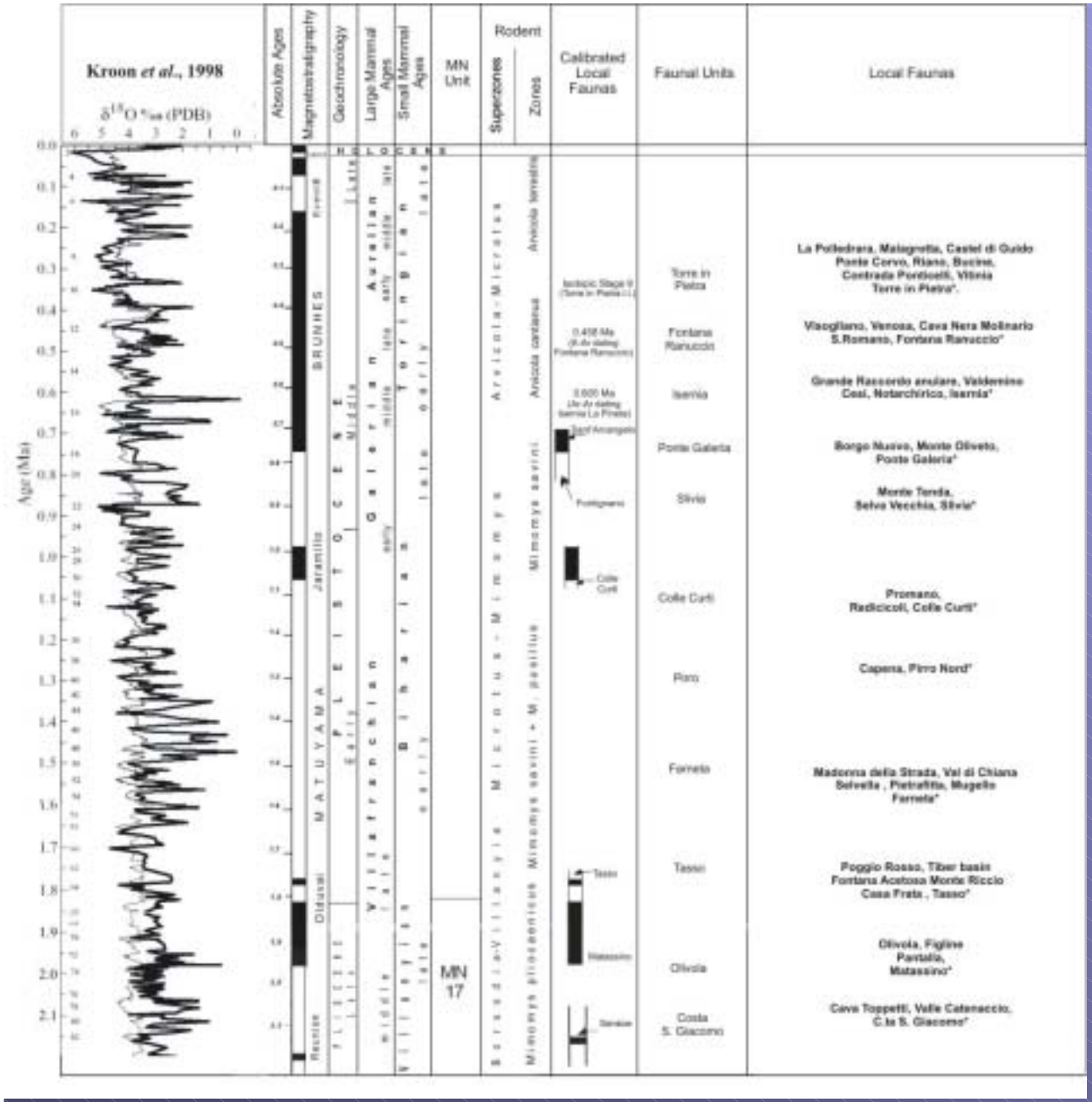
From von Koenigswald, 2003



From von Koenigswald, 2003

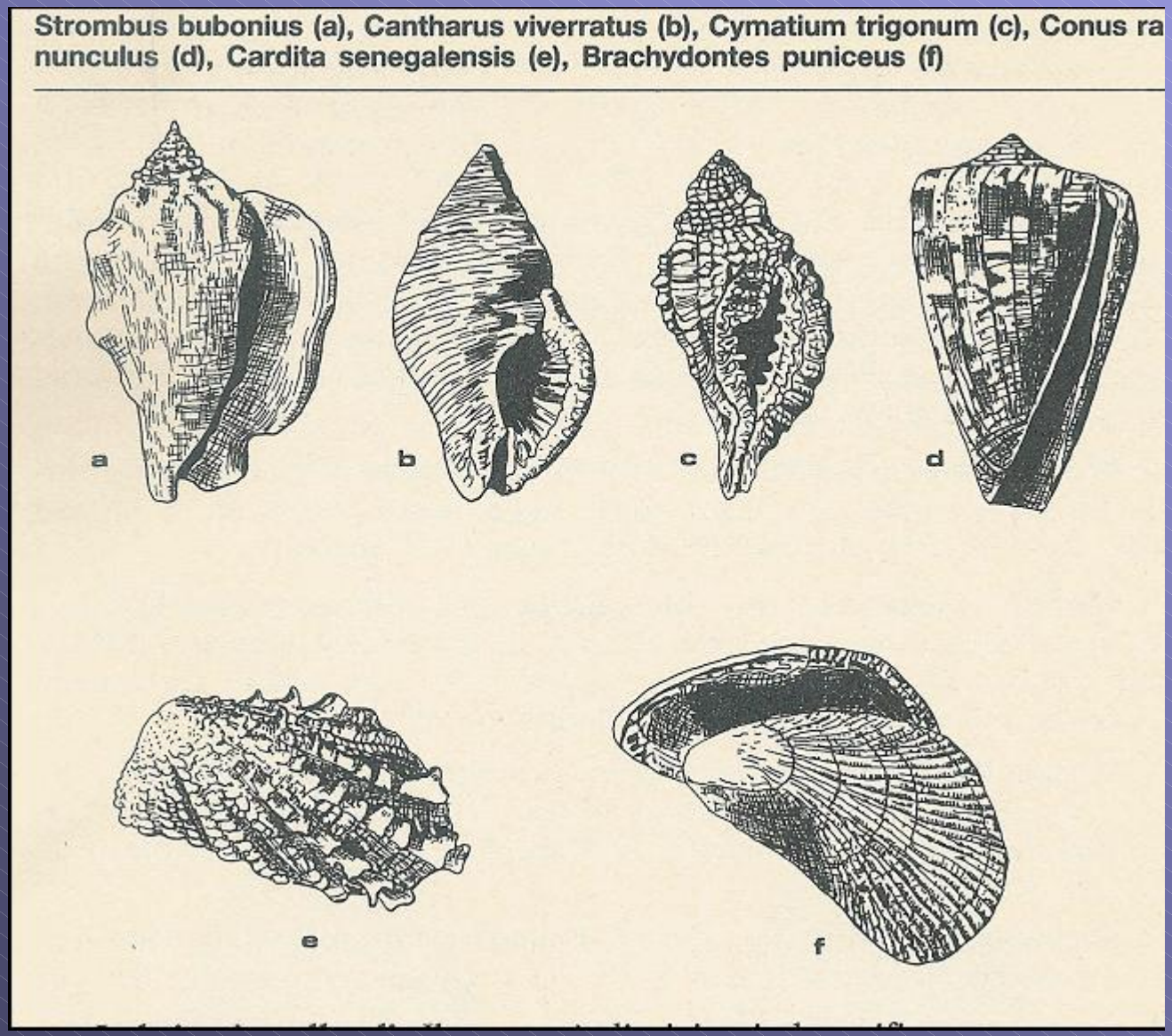


From von Koenigswald, 2003



Biochronology of Late Pliocene-Pleistocene Italian mammal faunas

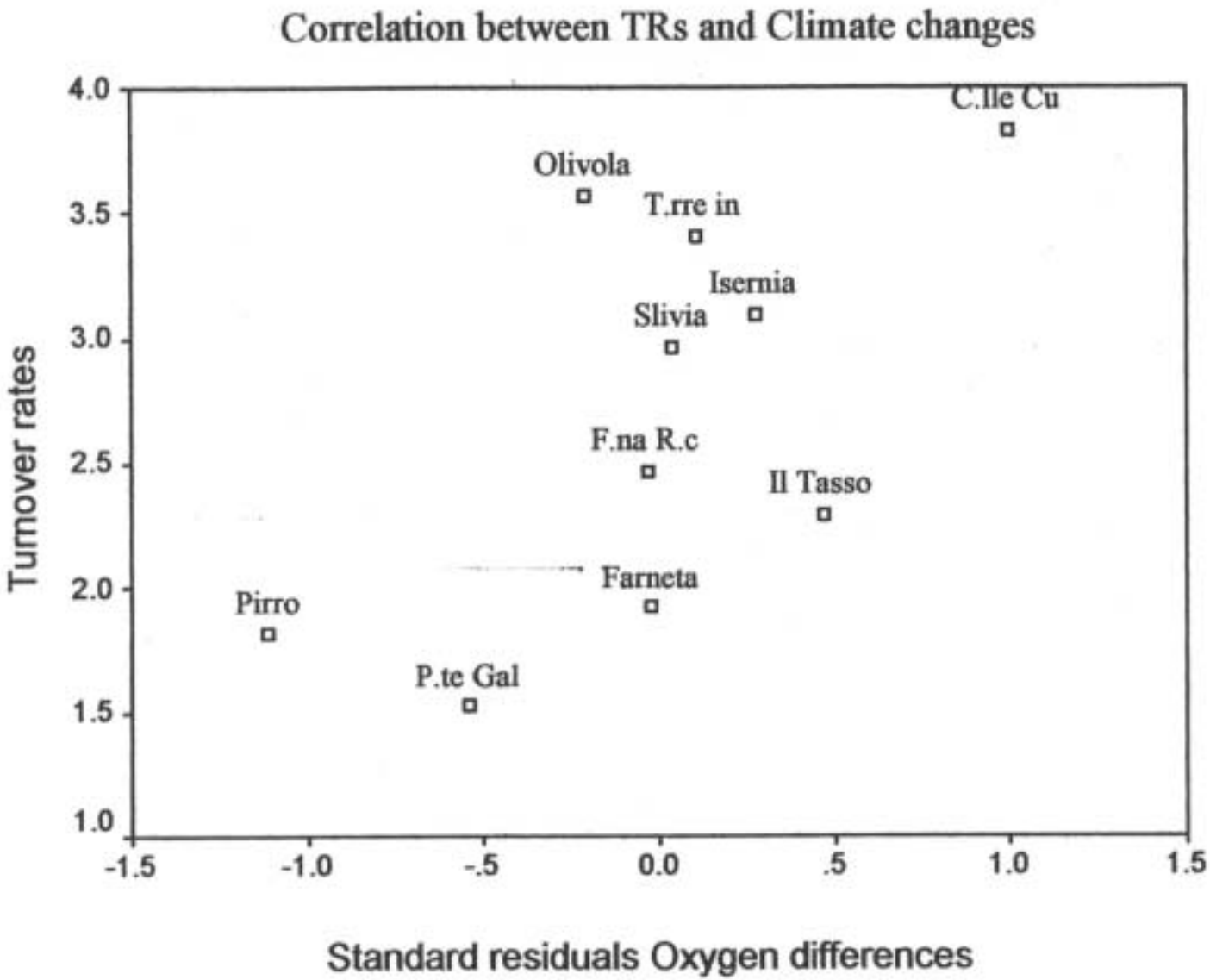
From Raia, Piras & Kotsakis, in press



Tyrrhenian warm hosts of the Mediterranean sea

Dimensions: heigth of *Strombus bubonius* 15 cm. Figures not in scale

From Malatesta, 1985



From Raia, Piras & Kotsakis, in press

Crocidura leucodon

Dimensions: length 8.5 cm

From Mitchell-Jones *et al*., 1998

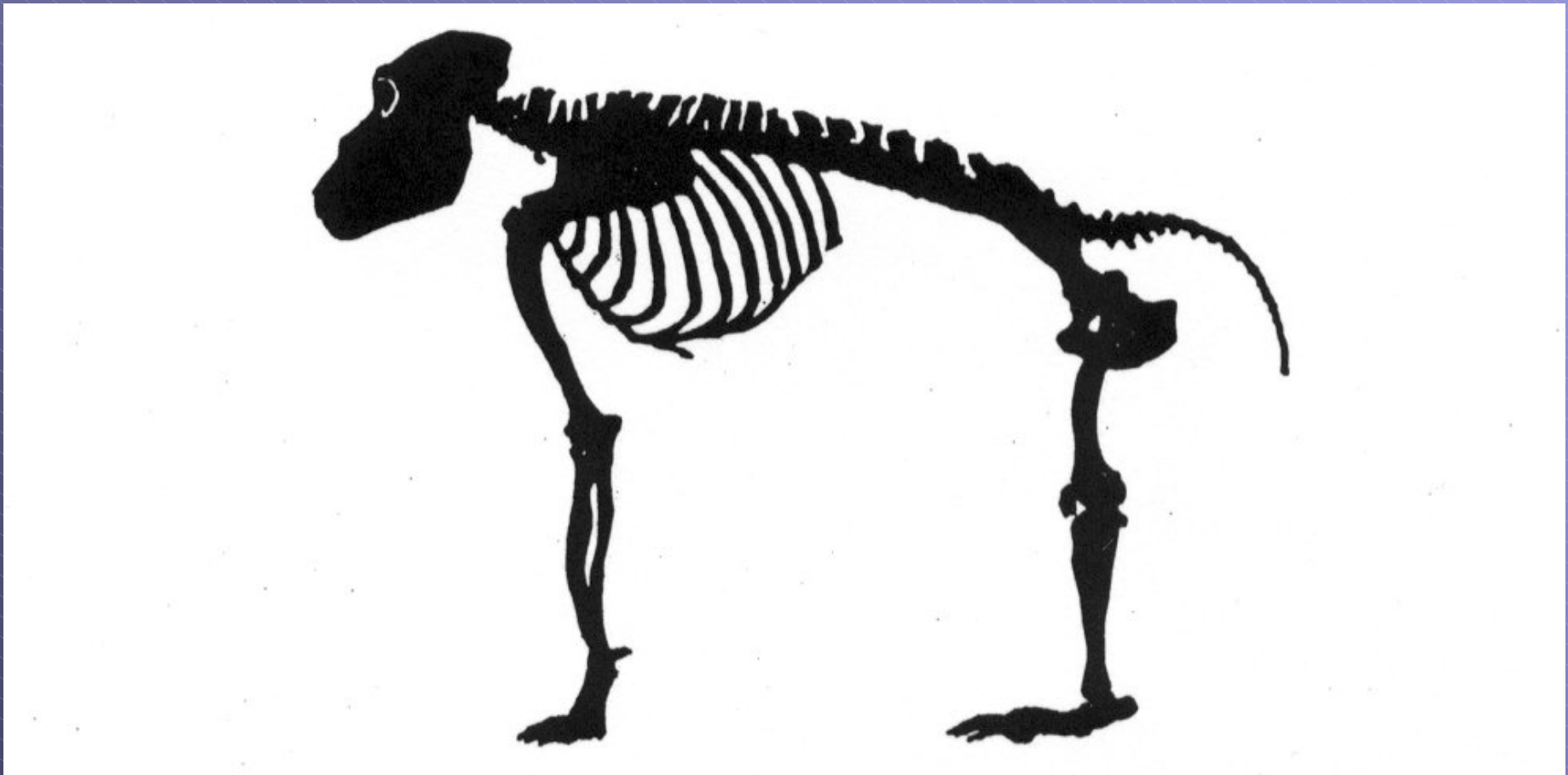
Megantereon whitei

Dimensions: shoulder heigth 75 cm

From Turner & Antón, 1997

Theropithecus oswaldi

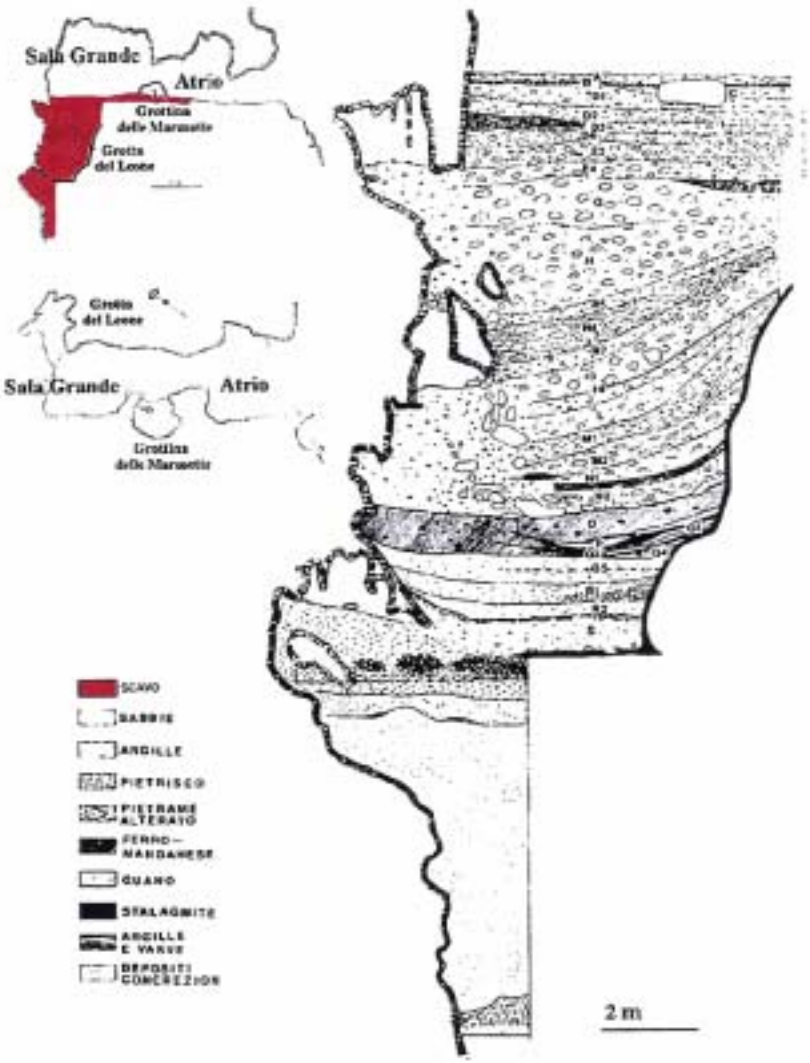
Dimensions: shoulder heigth 75 cm



From Savage & Logan, 1986

Grotta del Broion (Veneto, NE Italy)

	Sorex araneus	*Neomys* sp.	*Talpa europaea*	*Clethrionomys glareolus*	*Arvicola terrestris*	*Chionomys nivalis*	*Microtus*(Terricola) sp.	*Microtus agrestis*	*Microtus arvalis*	*Microtus oeconomus*	*Apodemus* (*Sylvaemus*)	*Muscardinus avellanarius*	*Dryomys nitedula*
D2-1	6,52	0,42	0,50	1,81	1,26	1,86	31,47	14,60	36,57	3,25	1,59	0,02	0,12
D4-3	5,23	0,39	0,45	2,33	3,81	1,68	31,40	17,64	32,88	2,45	1,16	0,06	0,52
E3-1	8,78	0,86	1,72	2,41	3,96	2,07	23,06	27,71	18,42	4,65	5,16	0,69	0,52
E4	8,74	1,60	0,46	3,42	0,08	2,36	26,67	31,23	13,98	2,66	6,69	1,06	1,06
F	8,28	0,89	0,30	2,96	0,59	2,66	22,49	33,73	19,82	1,18	5,33	0,30	1,48
G1	11,26	0,52	0,79	2,36	1,05	1,31	25,13	28,27	21,73	2,36	3,14	1,05	1,05
G2	7,97	0,47	0,74	3,38	1,42	2,03	26,49	26,08	17,77	3,11	8,85	0,68	1,01
H2-1	5,61	0,60	1,60	5,41	5,21	1,40	14,83	17,84	14,83	2,81	26,05	1,80	2,00
H6-3	6,79	1,26	3,32	3,79	4,11	1,11	27,96	16,90	19,27	3,00	11,06	0,32	1,11
H7	8,76	0,74	2,32	5,70	6,01	1,27	16,67	19,94	13,92	2,00	19,30	1,16	2,22
I4-1	3,95	0,81	3,25	8,25	9,06	2,32	4,88	7,08	9,41	0,93	41,11	1,97	6,97
I5	3,56	0,44	4,44	4,44	9,33	0,00	1,78	2,67	1,78	0,00	65,33	1,78	4,44
J	2,56	0,00	3,21	10,90	11,54	3,21	2,56	5,77	4,49	1,28	49,36	0,64	4,49
L	1,85	0,00	2,96	8,52	18,89	3,70	4,44	7,41	1,11	0,00	43,33	1,48	6,30
M2-1	2,52	0,31	1,89	7,23	12,26	2,20	2,20	3,77	4,40	0,63	56,29	0,94	5,35
N2-1	0,00	0,00	7,69	0,00	30,77	0,00	2,56	5,13	0,00	0,00	38,46	2,56	12,82
O1-O	0,00	0,00	24,39	2,44	14,63	0,00	2,44	0,00	2,44	0,00	34,15	7,32	12,20
P	15,98	0,46	1,23	3,69	17,05	1,38	2,00	28,26	14,75	0,77	13,52	0,61	0,31
Q3-1	15,93	0,74	1,35	3,92	12,50	0,86	2,21	20,71	25,61	0,61	13,73	0,49	1,35
Q5-4	14,96	0,87	2,00	4,36	19,70	1,37	2,00	22,94	4,99	0,62	24,06	0,62	1,50
R2-1	23,10	0,94	1,45	2,56	12,11	1,79	2,56	30,69	7,42	0,68	15,94	0,43	0,34



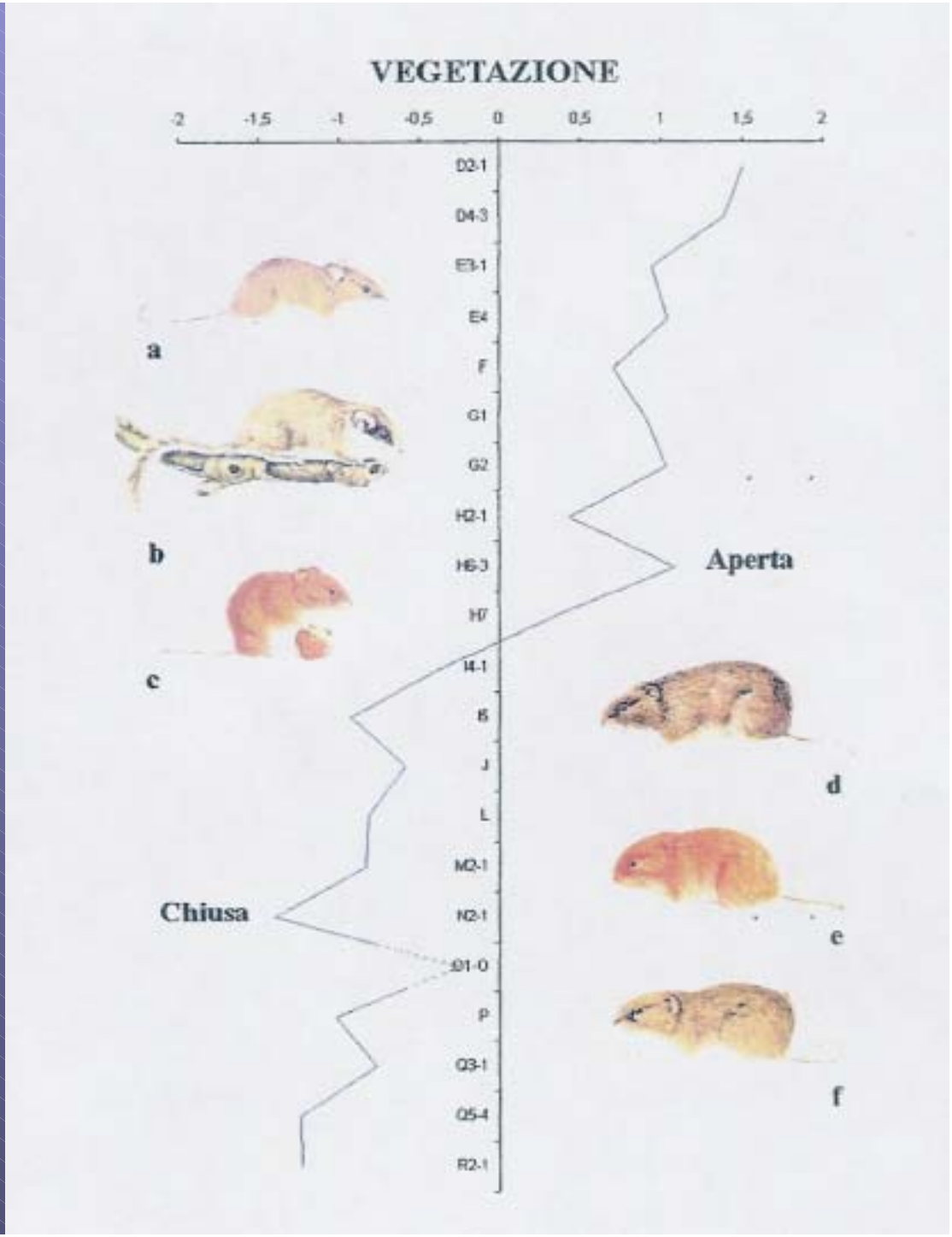
From Colamussi, 2002

Arboreal covering

First Factor variation (29% of total variance accounted for F1)

a – *Apodemus* (*Sylvaemus*) spp.
b – *Dryomys nitedula*
c – *Clethrionomys glareolus*
d – *Microtus oeconomus*
e – *Terricola* sp.
f – *Microtus arvalis*

From Colamussi, 2002

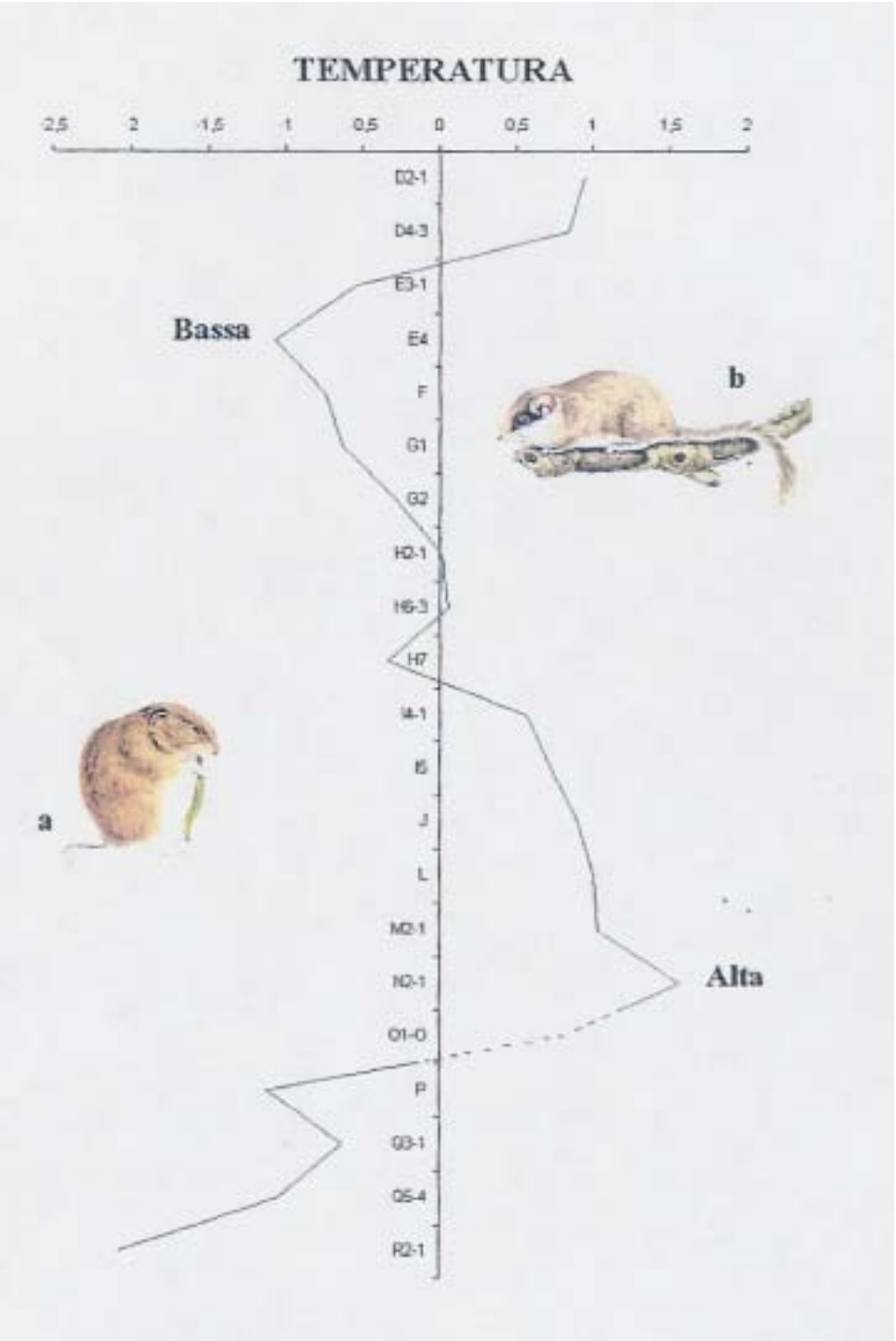


Temperature

Second Factor variation (21% of total variance accounted for F2)

a – *Microtus agrestis*
b – *Dryomys nitedula*

From Colamussi, 2002

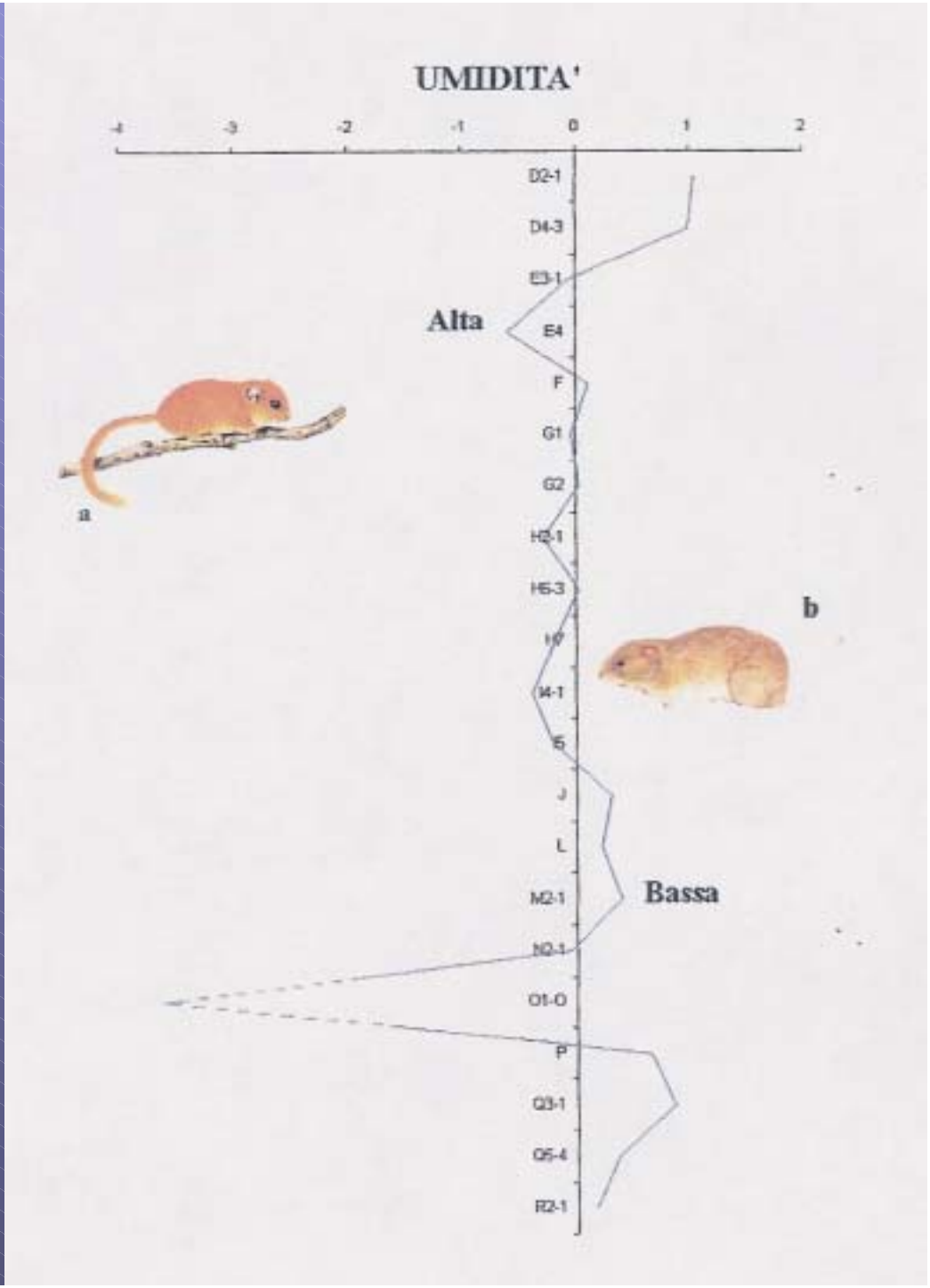


Humidity

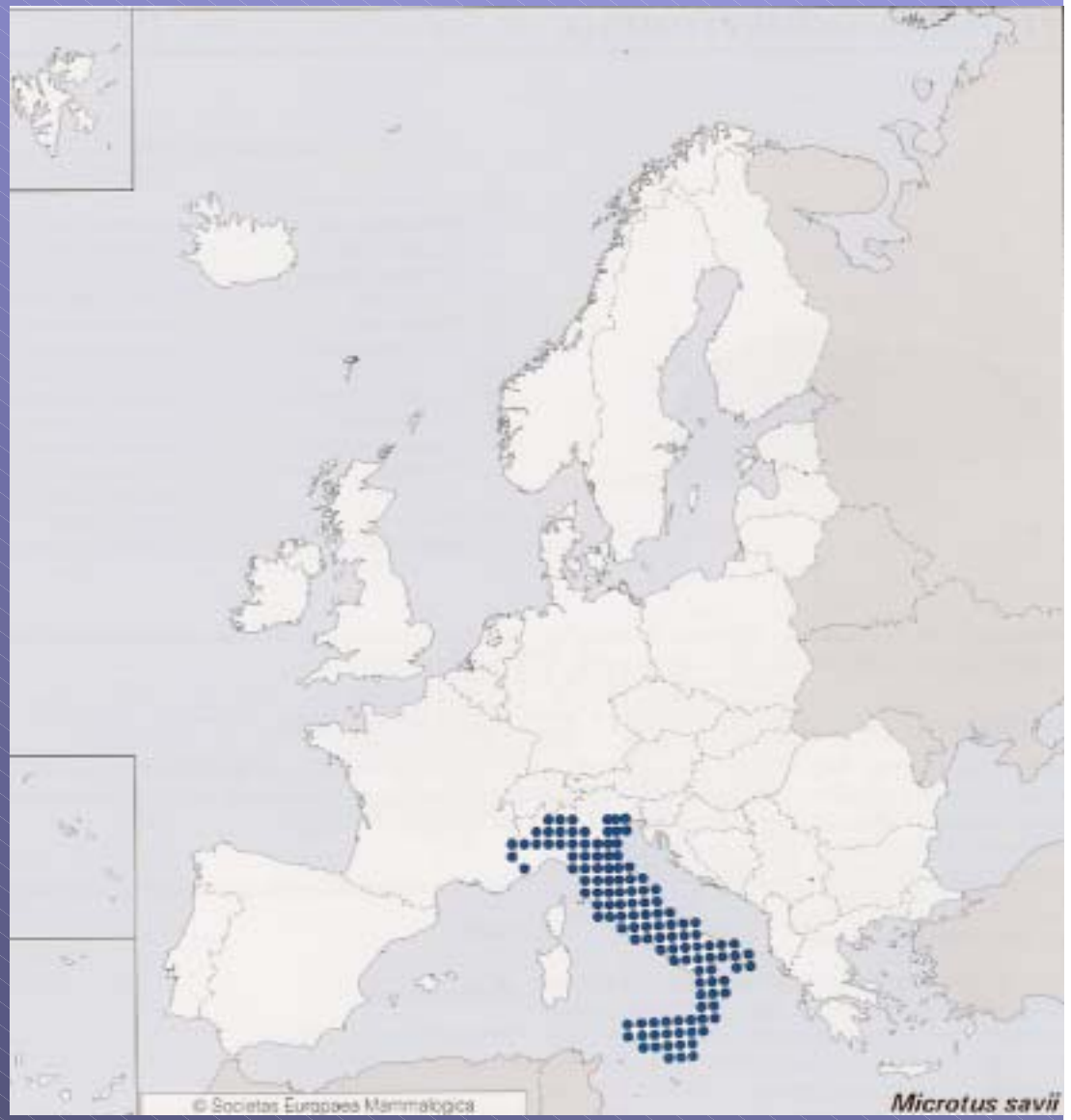
Third Factor variation (17% of total variance accounted for F3)

a – *Muscardinus avellanarius*
b – *Chionomys nivalis*

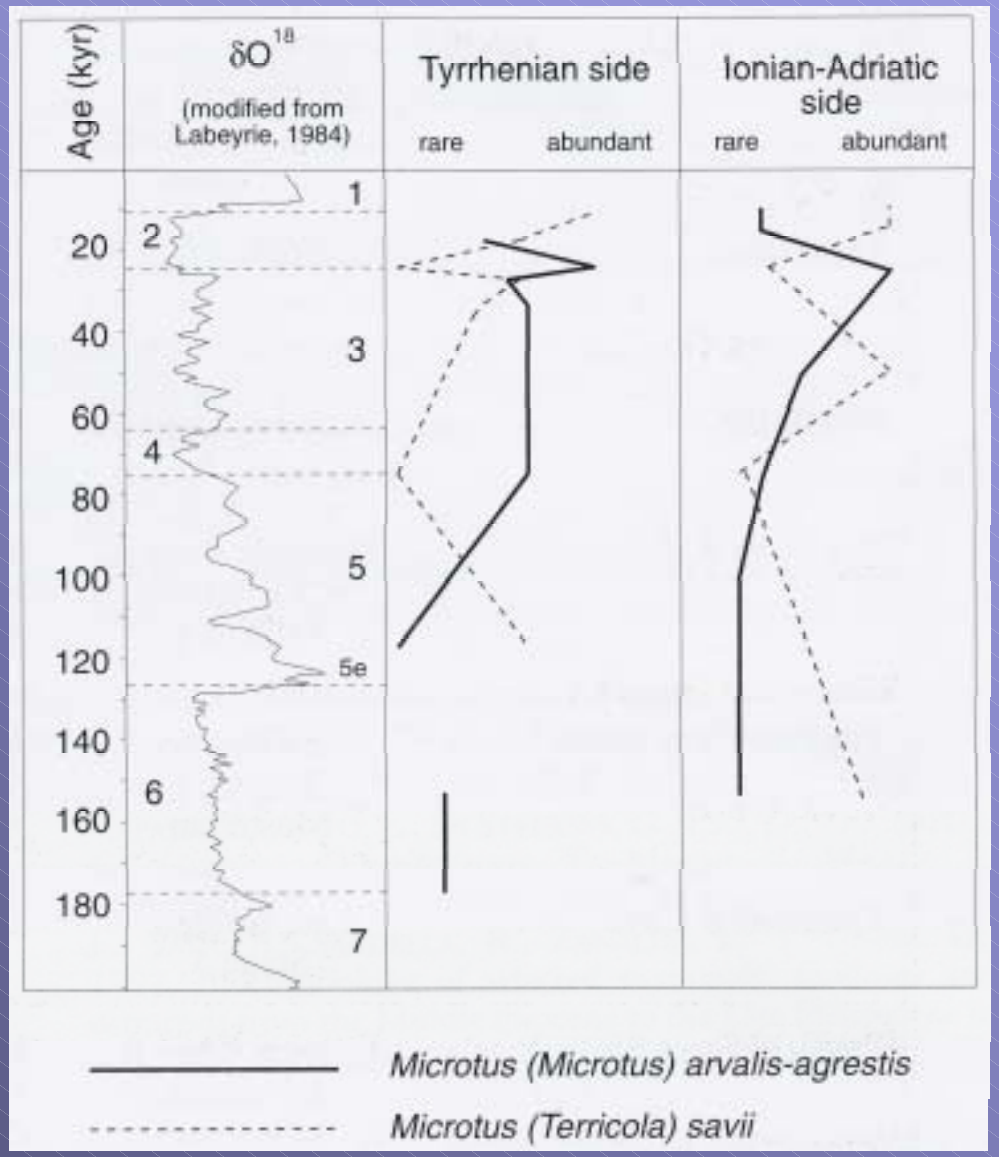
From Colamussi, 2002



Terricola savii (Savi's pine vole)



Comparison between *Microtus* gr. *arvalis-agrestis* and *Terricola savii* frequency percentage curves



From Capasso Barbato & Gliozzi, 2001

Scenario of migrations of some micromammals in Maghreb during Middle and Late Pleistocene

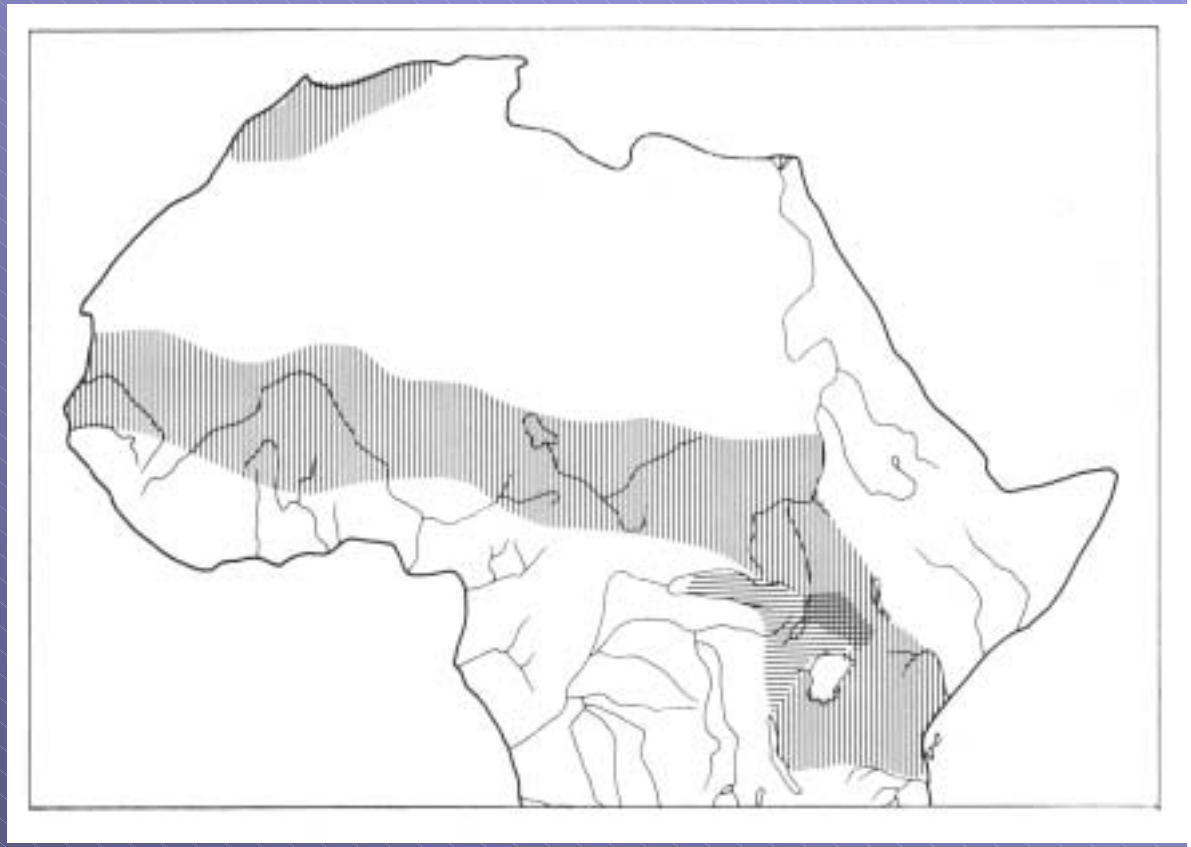
From Ouahbi *et al.*, 2001

Stratigraphic sequence in the Casablanca area

From Raynal *et al.*, 2001

	LITHOSTRATIGRAPHIE (d'après travaux récents (1978-1996) (1) et inédits)		Faciès I S C	Altitude > mer	CHRONOLOGIE Ages (3,4,5,6,7)	Aminozones Maroc (2)	Stades isotopiques	SERIE CLASSIQUE DE CASABLANCA (BIBERSON, 1961)	
HOLOCENE	FORMATION DE REDDAD BEN ALI			0-2 m	1 à 3 ka OSL (3) 3,7 à 3,5 ka BP	H	1	MELLAHIEN	Néolithique
									Iberomaurusien
PLEISTOCENE SUPERIEUR	FORMATION DE DAR BOU AZZA	Membre de Lahlafa				S	4 à 2	SOLTANIEN	Atérien
		Membre de l'Ain Roummana		0-6 m		O	5	OULJIEN	
PLEISTOCENE MOYEN	GROUPE DE KEF EL HAROUN	Formation de Bir Feghloul		7-8 m	164 ka OSL (3)	BF	6 7		
		Formation d'Oulad Aj Jmel		9-11 m	320 ka OSL (3) 350 ka OSL (3)	OAJ	9	HAROUNIEN	
	GROUPE D'ANFA	Complexe continental de Sidi Abderrahmane			890 ka OSL (3)	Pré-OAJ	11	PRESOLTANIEN (D2)	Acheuléen évolué Stade VIII
								TENSIFTIEN (D0, D1)	Ach. évolué Stade VII Ach. moyen Stade VI
		Formation 3		20-23 m				ANFATIEN (G)	Ach. moyen Stade V Ach. moyen Stade IV
		Formation 2		18-20 m					
		Formation1		17-20 m	>0,4 Ma U/Th (4)	Pré-OAJ	11	AMIRIEN (H) MAARIFIEN (J) et complexe K-L-M-N-O	Ach. ancien I, II, III Pebble-C. Stade IV

Lemniscomys barbarus (stripped grass mice)



Arvicanthis niloticus (Unstriped grass rat)

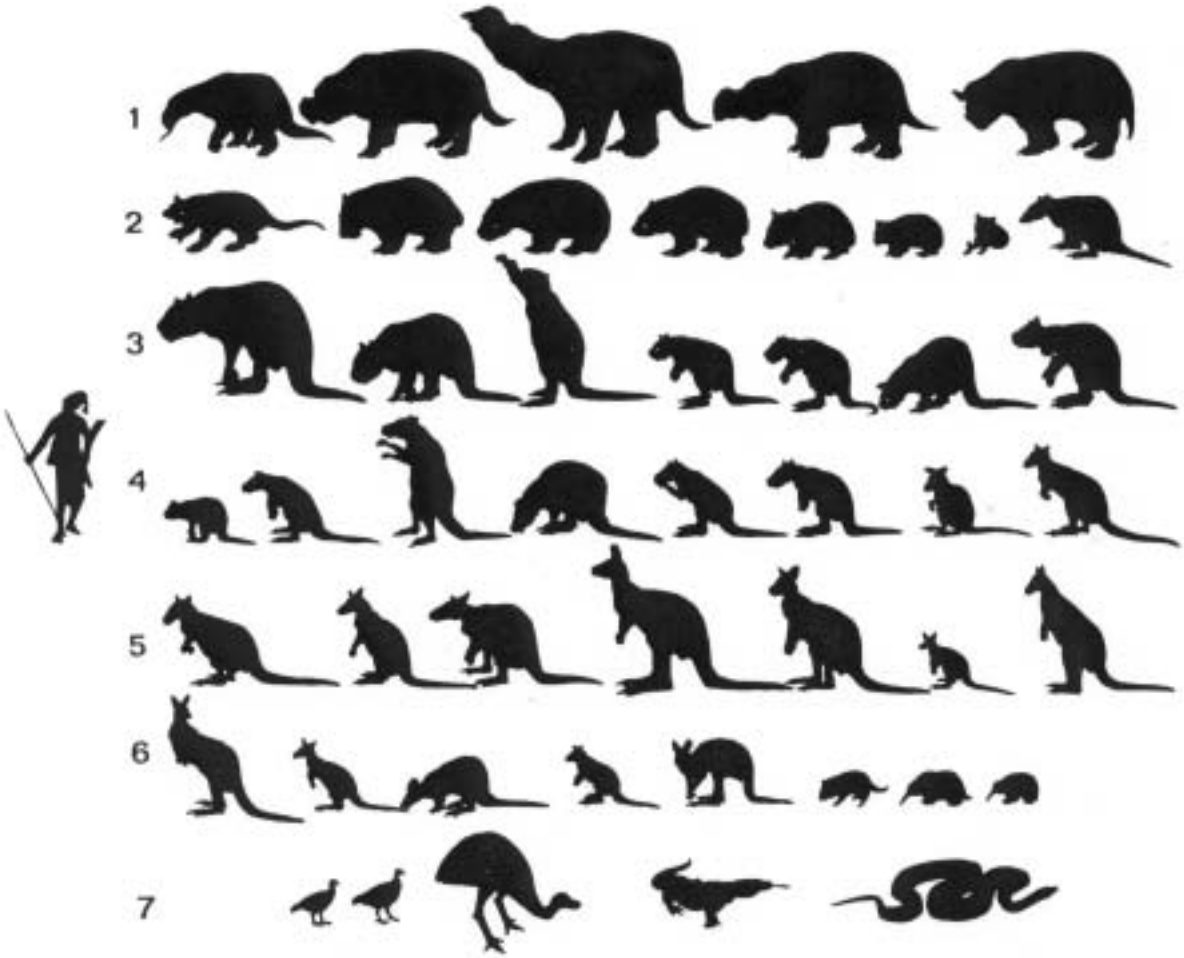


Figure 27.21. Silhouettes of most of the extinct late Pleistocene Australian vertebrate species drawn to scale (human hunter provides scale).

Row 1, right to left: *Palorchestes azeal, Zygomaturus trilobus, Diprotodon optatum, Diprotodon minor, Euowenia grata* (*Nototherium* not shown).

Row 2, *Thylacoleo carnifex, Ramsayia curvirostris, Phascolonus gigas, Phascolomys major, Phascolomys medius, Vombatus hacketti, Phascolarctos stirtoni, Propleopus oscillans.*

Row 3, *Procoptodon goliah, Procoptodon rapha, Procoptodon pusio, Sthenurus maddocki, Sthenurus brownei, Sthenurus occidentalis, Sthenurus orientalis* (*P. texasensis* not shown).

Row 4, *Sthenurus gilli, Sthenurus atlas, Sthenurus tindalei, Sthenurus pales, Sthenurus oreas, Sthenurus andersoni, Troposodon minor, Wallabia indra* (not shown, *Fissuridon, Troposodon kenti*).

Row 5, *Protemnodon roechus, Protemnodon anak, Protemnodon brehus, Macropus ferragus, Macropus (Osphranter) birdsellі, Macropus siva, Macropus titan.*

Row 6, *Macropus rama, Macropus thor, Macropus piltonensis, Macropus gouldi, Macropus stirtoni, Sarcophilus lanіarius, Zaglossus hacketti, Zaglossus ramsayi.*

Row 7, *Progura naracoortensis, Progura gallinacea, Genyornis newtoni, Megalania prisca, Wonambi naracoortensis.*

Extinct Late Pleistocene Australian large vertebrate species

From Murray, 1984