



ATTI
DELLA
SOCIETÀ TOSCANA
DI
SCIENZE NATURALI

MEMORIE • SERIE A • VOLUME CXXIII • ANNO 2016



Edizioni ETS



Con il contributo del Museo di Storia Naturale dell'Università di Pisa



e della Fondazione Cassa di Risparmio di Lucca

INDICE - CONTENTS

F. ALQUINI, D. BERTONI, G. SARTI – Extreme erosion of a dune crest within a short timespan (January-September 2016): the recent case in the Migliarino - San Rossore - Massaciuccoli Regional Park (Tuscany, Italy).		M. LEZZERINI, M. TAMPONI, G. D'AMATO AVANZI, S. IACCARINO, N. PERCHIAZZI – XRF analysis of major and minor elements in silicate rocks using fused glass discs at high dilution ratio.	
<i>Erosione molto accentuata della cresta di una duna frontale in un breve periodo di tempo (gennaio-settembre 2016): il recente caso nel Parco Regionale di Migliarino - San Rossore - Massaciuccoli (Toscana, Italia).</i>	» 5	<i>Determinazione XRF degli elementi maggiori e minori in rocce silicatiche utilizzando dischi fusi con alti rapporti di diluizione.</i>	» 55
M. BELGIORNO, P. MARIANELLI, G. PASQUINI, A. SBRANA – A contribution to the study of a Pisa alluvial plain sector for low temperature geo-thermal assessment.	pag. 5	S. MERLINO – OD character and polytypic features of the structure of the molecular crystal (1R,3S)-dimethyl 2-oxocyclohexane-1,3-dicarboxylate.	
<i>Un contributo allo studio di un settore della piana alluvionale di Pisa ai fini di una valutazione geotermica a bassa temperatura.</i>	» 17	<i>Carattere OD e aspetti politipici della struttura del cristallo molecolare (1R,3S)-dimethyl 2-oxocicloesano-1,3-dicarbossilato.</i>	» 61
P. BILLI – Variation of the hydrological characteristics of rivers in Italy throughout the last 80 years.		C. MONTEMAGNI, P. FULIGNATI, S. IACCARINO, P. MARIANELLI, C. MONTOMOLI, A. SBRANA – Deformation and fluid flow in the Muniari Thrust (NW India): a preliminary fluid inclusion study.	
<i>Variazione delle caratteristiche idrologiche dei fiumi in Italia negli ultimi 80 anni.</i>	» 25	<i>Deformazione e “fluid flow” lungo il Muniari Thrust (India NW): studio preliminare su inclusioni fluide.</i>	» 67
A. COLLARETA – Fossil turtle and whale barnacles (Crustacea: Cirripedia: Coronuloidea) kept at the Natural History Museum of Pisa University: an annotated catalogue.		N. PERCHIAZZI, P. ARMIENTI, S. IACCARINO, M. LEZZERINI – A contribution to the mineralogy of the Larderello geothermal field. X-ray crystallographic studies on borate minerals “bechilite” and “lagonite” and crystal structure determination of ginorite.	
<i>Cirripedi fossili simbionti dei vertebrati marini (Crustacea: Cirripedia: Coronuloidea) nelle collezioni del Museo di Storia Naturale dell’Università di Pisa: un catalogo annotato.</i>	» 41	<i>Contributo alla mineralogia del campo geotermico di Larderello. Studi cristallografici a raggi X dei borati “bechilite” e “lagonite” e determinazione strutturale della ginorite.</i>	» 79
S. FARINA – Catalogue of the late Pleistocene-Holocene fossil mammalian collection from “Canale delle Acque Alte (Canale Mussolini)” (Natural History Museum, University of Pisa). <i>Catalogo della collezione a mammiferi fossili del Pleistocene Superiore - Olocene di “Canale delle Acque Alte (Canale Mussolini)” (Museo di Storia Naturale dell’Università di Pisa).</i>	» 47	L. ROOK, Un ricordo di Augusto Azzaroli (1921-2015)	
		<i>In memory of Augusto Azzaroli (1921-2015)</i>	» 89
		Processi Verbali - http://www.stsn.it	» 101

SIMONE FARINA (*)

CATALOGUE OF THE LATE PLEISTOCENE-HOLOCENE FOSSIL MAMMALIAN COLLECTION FROM “CANALE DELLE ACQUE ALTE (CANALE MUSSOLINI)” (NATURAL HISTORY MUSEUM, UNIVERSITY OF PISA)

Abstract - Catalogue of the late Pleistocene-Holocene fossil mammalian collection from “Canale delle Acque Alte (Canale Mussolini)” (Natural History Museum, University of Pisa). The catalogue of the paleontological mammalian collection of “Canale delle Acque Alte (Canale Mussolini)” (Agro Pontino, Latium) stored at the Natural History Museum of the University of Pisa is presented. Besides the mammal remains (456 specimens), the collection includes 3 fossil wood fragments and 27 molluscs (gastropods and bivalves). The present catalogue also includes the description of material referred to newly determined taxa. For each recognized taxon, the collection number(s), the description of the specimen(s), and the stratigraphic provenance (when available) are herein reported. doi: 10.2424/ASTSN.M.2016.19

Key words - Mammals, Late Pleistocene, Catalogue, Collections, Canale Mussolini, Agro Pontino, Latium

Riassunto - Catalogo della collezione a mammiferi fossili del Pleistocene Superiore - Olocene di “Canale delle Acque Alte (Canale Mussolini)” (Museo di Storia Naturale dell’Università di Pisa). Viene presentato il catalogo relativo alla collezione paleontologica del “Canale delle Acque Alte (Canale Mussolini)” (Agro Pontino, Lazio) conservato presso il Museo di Storia Naturale dell’Università di Pisa. Oltre ai resti di mammiferi (456 esemplari), la collezione comprende anche 3 frammenti di legno fossile e 27 molluschi (gasteropodi e bivalvi). Il presente catalogo include anche la descrizione del materiale relativo alle nuove specie determinate. Per ogni taxon presente nella collezione viene riportato il numero di inventario, la descrizione dei reperti e la loro provenienza stratigrafica (quando disponibile). doi: 10.2424/ASTSN.M.2016.19

Parole chiave - Mammiferi, Pleistocene Superiore, Catalogo, Collezioni, Canale Mussolini, Agro Pontino, Lazio

INTRODUCTION

This catalogue is the third dedicated to the collections of the Late Pleistocene - Holocene fossil mammals hosted at the Natural History Museum of the University of Pisa. The first two catalogues were dedicated to the mammal collection of the Cucigliana (Farina, 2013) and Parignana (Farina, 2014) caves (both sited in the Monte Pisano area). In 1935, the Acque Alte channel was excavated by Blanc who firstly report the discovered fauna (Blanc, 1935a, b; Blanc *et al.*, 1957). A systematic review of the mammal assemblage stored

at the Natural History Museum of the University of Pisa attributed the association to a time interval comprised between the end of MIS 5a and MIS 3, whereas the fauna coming from the topmost level was referred to the Holocene (Farina, 2011). The systematic review also assessed the occurrence of *Hippopotamus amphibius*, *Dama dama*, *Megaloceros giganteus*, *Ursus spelaeus*, *Vulpes vulpes*, *Bos taurus longifrons*, and *Capra hircus* that were not reported by Blanc (Farina, 2011). The present work aims to provide a detailed report of the fossil vertebrate specimens from Acque Alte channel, including the newly determined taxa.

MATERIAL AND FORMAT

The fossil mammal collection from Acque Alte channel consists of 456 specimens, including 42 only anatomically determined specimens and 74 completely undetermined specimens (Farina, 2011). The most abundant species are *Bos primigenius*, *Cervus elaphus*, and *Equus ferus*.

The collection includes also 3 fossil wood fragments, 21 molluscs (gastropods and bivalves) from “Canale Mussolini” (including *Acanthocardia* sp., *Acanthocardia tuberculata*, *Nassarius* sp., *Ostrea lamellosa*, *Pecten opercularis*, *Pecten jacobaeus*, *Spondylus* sp., *Strombus bubonius* and *Venus verrucosa*) and 6 molluscs (gastropods and bivalves) from the locality “Le Grottacce” (including *Acanthocardia* sp., *Aporrhais pespelecani*, *Glycimeris* sp. and *Neverita yosephina*) (Farina, 2011). For each taxon recognized in the investigated collection, the inventory number(s), the description of the specimen(s), and a transcription of the label reporting the provenance (when available) are provided.

CATALOGUE

Order CARNIVORA
Family CANIDAE
Canis lupus L.

I12193 - incomplete left mandible (M_1 is preserved); I12448 - incomplete left tibia (the distal epiphysis and 3/4 of the diaphysis are preserved) (the specimen presents the label "Canale Mussolini"); I12483 - incomplete left mandible (M_1 and M_2 are preserved).

Vulpes vulpes (L.)

I13745 - complete right tibia (the specimen presents the label "Canale Mussolini").

Family URSIDAE

Ursus spelaeus Rosenmüller & Heinroth, 1794

I12539 - complete left incisor; I12540 - complete left incisor.

Family HYAENIDAE

Crocuta crocuta spelaea Goldfuss, 1823

I12485 - complete right M_1 ; I13767 - coprolite; I13767 - coprolite.

Order PERISSODACTYLA

Family EQUIDAE

Equus ferus Boddaert, 1785

I12216 - incomplete thoracic vertebra; I12219 - incomplete left radius (the distal epiphysis and 1/2 of the diaphysis are preserved); I12296 - incomplete left tibia (the distal epiphysis and 3/4 of the diaphysis are preserved); I12307 - complete left tibia; I12376A - complete left astragalus (the specimen presents the label "Canale Mussolini"); I12376B - complete left calcaneus (the specimen presents the label "Canale Mussolini"); I12376C - complete left navicular bone (the specimen presents the label "Canale Mussolini"); I12376D - complete left cuneiform bone (the specimen presents the label "Canale Mussolini"); I12376E - complete left cuboid bone (the specimen presents the label "Canale Mussolini"); I12378 - complete first phalanx (the specimen presents the label "Canale Mussolini"); I12382A - incomplete metatarsal (1/2 of the diaphysis is preserved) (the specimen presents the label "Canale Mussolini"); I12382B - fragment of metatarsal (the distal epiphysis is preserved) (the specimen presents the label "Canale Mussolini"); I12387 - incomplete right coxal bone; I12397 - complete left calcaneus (the specimen presents the label "Canale Mussolini"); I12409 - complete right tibia; I12415 - incomplete right scapula; I12445 - complete cervical vertebra (the specimen presents the label "Canale Mussolini"); I12464 - complete thoracic vertebra (the specimen presents the label "Canale Mussolini"); I12468 - complete axis (the specimen presents the label "Canale Mussolini"); I12469 - incomplete right femur (3/4 of the diaphysis is preserved) (the specimen presents the label "Canale Mussolini"); I12472 - complete right metatarsal; I12477 - incomplete right coxal bone; I12481 - incomplete right radius (the distal epiphysis and 1/2 of the diaphysis are preserved); I12505 - complete right tibia (the specimen presents the label "Canale Mussolini"); I12506 - complete left metatarsal (the specimen presents the label "Canale Mussolini") (Fig. 1); I12515 - complete left

IV metacarpal (the specimen presents the label "Canale Mussolini"); I12521 - incomplete left tibia (the distal epiphysis and 3/4 of the diaphysis are preserved) (the specimen presents the label "Canale Mussolini"); I12524 - incomplete left radius (3/4 of the diaphysis is preserved) (the specimen presents the label "Canale Mussolini"); I12545 - complete right lunate bone; I12546A - incomplete first phalanx (the proximal epiphysis and 1/2 of the diaphysis are preserved); I13735 - incomplete right metatarsal (the distal epiphysis and 1/2 of the diaphysis are preserved) (the specimen presents the label "Canale Mussolini"); I13739 - complete left tibia (the specimen presents the label "Canale Mussolini"); I13766 - complete right kneecap (the specimen presents the label "Canale Mussolini").

Equus hyrcanus Regalia, 1907

I12324 - fragment of right humerus (the distal epiphysis is preserved) (the specimen presents the label "Canale Mussolini" and the layer of provenance "C2"); I12471 - incomplete right tibia (3/4 of the diaphysis is preserved) (the specimen presents the label "Canale Mussolini"); I12514 - complete first phalanx; I12518 - complete right molar tooth (M_1 or M_2) (the specimen presents the label "Canale Mussolini"); I12529 - incomplete right humerus (the distal epiphysis and 3/4 of the diaphysis are preserved).

Family RHINOCERONTIDAE

Stephanorhinus hemitoechus (Falconer, 1868)

I12466 - incomplete right scapula.

Order ARTIODACTYLA

Family HIPPOPOTAMIDAE

Hippopotamus amphibius L.

I12283 - incomplete left tibia (the distal epiphysis and 1/2 of the diaphysis are preserved) (the specimen presents the label "Canale Mussolini"); I12461 - fragment of left coxal bone (the specimen presents the label "Canale Mussolini"); I12509 - incomplete left tibia (1/2

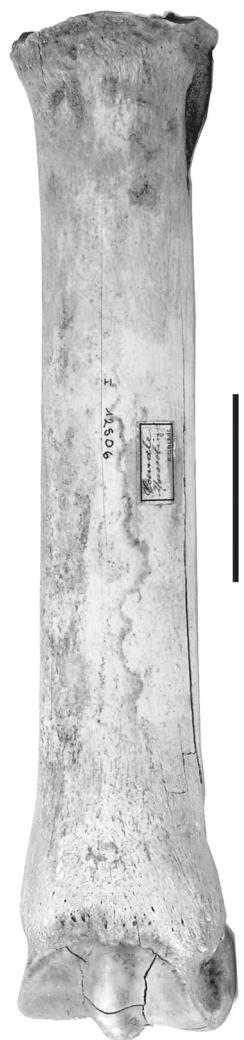


Fig. 1 - I12506 *Equus ferus*
- Left metatarsal, anterior view. The scale bar is 5 cm long.

of the diaphysis); I12550G - fragment of right humerus (the specimen presents the label "Canale Mussolini C2"); I13726 - fragment of right radius (the specimen presents the label "Canale Mussolini").

Family SUIDAE

Sus scrofa L.

I12530 - fragment of mandible; I12533 - incomplete right tibia (the distal epiphysis and 1/2 of the diaphysis are preserved); I12551 - fragment of mandible; I12736 - incomplete occipital bone (the specimen presents the label "Canale Mussolini"); I13722 - incomplete left mandible (P_2 , P_3 , P_4 , M_1 , M_2 , M_3) (the specimen presents the label "Canale Mussolini"); I13729 - incomplete right humerus (1/2 of the diaphysis).

Family BOVIDAE

Capra hircus L.

I12244 - incomplete left humerus (the distal epiphysis and 3/4 of the diaphysis are preserved).

Ovis vel Capra

I12260 - incomplete left scapula; I12351 - complete right metatarsal.

Bos primigenius Bojanus, 1827

I12195 - complete right jaw (dP^2 , dP^3 , dP^4 , M^1 , M^2); I12199 - incomplete right mandible (P_2 , P_3 , P_4); I12196 - fragment of right femur (the proximal epiphysis is preserved); I12203 - incomplete left mandible (dP_4 , M_1 , M_2); I12206 - (P_2 , P_3 , P_4); I12211 - incomplete left mandible; I12215 - fragment of left metatarsal; I12231 - fragment of atlas; I12252 - complete right navicular bone; I12277 - incomplete left radius (1/2 of the diaphysis is preserved) (the specimen presents the label "Canale Mussolini C1"); I12282 - complete right metatarsal (the specimen presents the label "Canale Mussolini C2"); I12284 - complete right humerus (the specimen presents the label "Canale Mussolini") (Fig. 2); I12285 - complete left metatarsal (the specimen presents the label "Canale Mussolini"); I12286 - complete right tibia; I12287 - incomplete right radius (the distal epiphysis and 1/2 of the diaphysis is preserved); I12289 - incomplete right femur (the proximal epiphysis and 3/4 of the diaphysis is preserved); I12290 - incomplete left coxal bone; I12291 - incomplete left coxal bone; I12292 - complete right metacarpal; I12293 - incomplete right femur (the distal epiphysis and 1/4 of the diaphysis is preserved); I12295 - fragment of os cornu; I12297 - incomplete left coxal bone; I12300B - fragment of left metacarpal; I12309 - fragment of left humerus (the specimen presents the label "Canale Mussolini C1"); I12312 - fragment of left humerus (the specimen presents the label "Canale Mussolini C2"); I12313 - fragment of skull (the specimen presents the label "Canale Mussolini C1"); I12314 - incomplete cervical vertebra (the specimen presents the label "Canale Mussolini C1"); I12315 fragment of os cornu (the specimen presents the label "Canale Mussolini C2"); I12316 - incomplete right metatarsal (the proximal



Fig. 2 - I12284 *Bos primigenius* - Right humerus, posterior view. The scale bar is 5 cm long.

epiphysis and 3/4 of the diaphysis are preserved) (the specimen presents the label "Canale Mussolini C2"); I12317 - fragment of left coxal bone (the specimen presents the label "Canale Mussolini C1"); I12325 - fragment of left tibia; I12332 - incomplete thoracic vertebra; I12333 - incomplete lumbar vertebra; I12337 - fragment of skull; I12348 - complete right navicular bone; I12358 - incomplete left metatarsal (1/2 of the diaphysis is preserved) (the specimen presents the label "Canale Mussolini F"); I12374 - fragment of os cornu; I12375 - incomplete left humerus (the distal and 1/2 of the diaphysis are preserved); I12377 - incomplete right humerus (1/4 of the diaphysis is preserved) (the specimen presents the label "Canale Mussolini"); I12381 - incomplete cervical vertebra (the specimen presents the label "Canale Mussolini"); I12384 - incomplete left metacarpal (the proximal epiphysis and 3/4 of the diaphysis are preserved) (the specimen pres-

ents the label "Canale Mussolini"); I12386A - incomplete right calcaneus (the specimen presents the label "Canale Mussolini"); I12386B - incomplete right calcaneus; I12388 - complete right metacarpal; I12389 - complete left astragalus; I12390 - complete left metatarsal; I12391 - incomplete right femur (the proximal epiphysis and 3/4 of the diaphysis are preserved); I12393 - incomplete right femur (the diastal epiphysis and 1/4 of the diaphysis are preserved); I12394 - incomplete left radius (the proximal epiphysis and 1/2 of the diaphysis are preserved); I12396 - incomplete kneecap; I12398 - incomplete left calcaneus (the specimen presents the label "Canale Mussolini"); I12399 - fragment of left coxal bone; I12400 - incomplete metatarsal (the distal epiphysis and 1/2 of the diaphysis are preserved) (the specimen presents the label "Canale Mussolini"); I12402 - incomplete right radius (the distal epiphysis is preserved) (the specimen presents the label "Canale Mussolini"); I12403 - incomplete right radius (the distal epiphysis and 1/2 of the diaphysis are preserved) (the specimen presents the label "Canale Mussolini"); I12404 - incomplete left tibia (3/4 of the diaphysis is preserved); I12406 - incomplete right metatarsal (1/2 of the diaphysis is preserved); I12408 - incomplete right tibia (the distal epiphysis and 1/2 of the diaphysis are preserved) (the specimen presents the label "Canale Mussolini"); I12411 - incomplete left tibia (the distal epiphysis and 1/2 of the diaphysis are preserved); I12413 - incomplete thoracic vertebra; I12418 - incomplete thoracic vertebra; I12420 - incomplete left coxal bone; I12422 - incomplete right tibia (the proximal epiphysis and 3/4 of the diaphysis are preserved); I12424 - incomplete left metatarsal (the proximal epiphysis and 1/2 of the diaphysis are preserved); I12425 - fragment of right tibia; I12426 - incomplete left femur (1/2 of the diaphysis is preserved); I12427 - fragment of left humerus (the distal epiphysis is preserved); I12428 - incomplete left humerus (the distal epiphysis and 1/2 of the diaphysis are preserved) (the specimen presents the label "Canale Mussolini D"); I12429 - complete first phalanx; I12430 - incomplete metacarpal (the distal epiphysis is preserved); I12432 - incomplete left scapula; I12433 - complete right astragalus; I12435 - incomplete right ulna; I12436 - incomplete right coxal bone; I12437 - incomplete right radius (the proximal epiphysis and 1/2 of the diaphysis are preserved) (the specimen presents the label "Canale Mussolini"); I12438 - complete left tibia (the specimen presents the label "Canale Mussolini"); I12443 - incomplete thoracic vertebra (the specimen presents the label "Canale Mussolini"); I12450 - incomplete left mandible; I12453 - incomplete right metatarsal (the proximal epiphysis and 1/2 of the diaphysis are preserved) (the specimen presents the label "Canale Mussolini"); I12455 - incomplete right upper deciduous premolar; I12457 - incomplete left femur

(3/4 of the diaphysis is preserved); I12458 - incomplete left radius (the distal epiphysis and 1/2 of the diaphysis are preserved) (the specimen presents the label "Canale Mussolini"); I12459 - incomplete right radius (1/2 of the diaphysis is preserved); I12460 - fragment of left humerus (1/4 of the diaphysis is preserved); I12463 - incomplete left femur (the proximal epiphysis and 3/4 of the diaphysis are preserved); I12470 - incomplete right radius (the distal epiphysis and 1/2 of the diaphysis are preserved) (the specimen presents the label "Canale Mussolini"); I12474 - incomplete left radius (the distal epiphysis is preserved); I12475 - incomplete left tibia (the distal epiphysis and 1/2 of the diaphysis are preserved) (the specimen presents the label "Canale Mussolini"); I12478 - incomplete left metacarpal (the proximal epiphysis and 3/4 of the diaphysis are preserved) (the specimen presents the label "Canale Mussolini"); I12479 - incomplete left metacarpal (the distal epiphysis and 1/4 of the diaphysis are preserved); I12480 - incomplete right scapula; I12486 - incomplete right lower premolar (the specimen presents the label "Canale Mussolini C2"); I12487 - incomplete left metatarsal (the distal epiphysis and 1/2 of the diaphysis are preserved); I12488 - complete first phalanx (the specimen presents the label "Canale Mussolini C1"); I12489 - incomplete right ulna (the specimen presents the label "Canale Mussolini C2"); I12490 - incomplete right humerus (the distal epiphysis and 1/2 of the diaphysis are preserved) (the specimen presents the label "Canale Mussolini D"); I12491 - incomplete thoracic vertebra (the specimen presents the label "Canale Mussolini C2"); I12492 - incomplete right humerus (the distal epiphysis and 3/4 of the diaphysis are preserved) (the specimen presents the label "Canale Mussolini C2"); I12493 - incomplete right coxal bone; I12494 - incomplete left coxal bone; I12495 - fragment of left humerus (the distal epiphysis is preserved) (the specimen presents the label "Canale Mussolini F"); I12496 - incomplete left radius (the proximal epiphysis and 1/4 of the diaphysis are preserved); I12497 - incomplete right radius (the proximal epiphysis and 1/2 of the diaphysis are preserved); I12498 - incomplete left humerus (the distal epiphysis and 1/4 of the diaphysis are preserved); I12499 - incomplete left metatarsal (the proximal epiphysis and 1/2 of the diaphysis are preserved) (the specimen presents the label "Canale Mussolini D"); I12500 - incomplete right metatarsal (the proximal epiphysis and 3/4 of the diaphysis are preserved) (the specimen presents the label "Canale Mussolini"); I12501 - incomplete right humerus (1/2 of the diaphysis is preserved); I12502 - incomplete right radius (the proximal epiphysis and 1/4 of the diaphysis are preserved); I12503 - fragment of os cornu; I12504 - incomplete left humerus (the distal epiphysis and 1/4 of the diaphysis are preserved) (the specimen presents the label "Canale Mussolini"); I12510 - incomplete meta-

tarsal (the distal epiphysis and 1/2 of the diaphysis are preserved) (the specimen presents the label "Canale Mussolini"); I12512 - incomplete right radius (the proximal epiphysis and 1/2 of the diaphysis are preserved); I12513 - incomplete metatarsal (the distal epiphysis is preserved) (the specimen presents the label "Canale Mussolini"); I12517 - fragment of right coxal bone (the specimen presents the label "Canale Mussolini D"); I12520 - incomplete right radius (the proximal epiphysis and 1/2 of the diaphysis are preserved); I12527 - incomplete right metacarpal (the proximal epiphysis and 3/4 of the diaphysis are preserved) (the specimen presents the label "Canale Mussolini"); I12528 - incomplete right femur (3/4 of the diaphysis is preserved); I12531 - incomplete right mandible (the specimen presents the label "Canale Mussolini C2"); I12536 - complete right scaphoid bone (the specimen presents the label "Canale Mussolini"); I12541 - incomplete lumbar vertebra (the specimen presents the label "Canale Mussolini C2"); I12547 - fragment of left femur (the specimen presents the label "Canale Mussolini C2"); I12550A - fragment of left metacarpal; I12550C - fragment of right mandible; I13721 - incomplete left metatarsal (the distal epiphysis and 1/4 of the diaphysis are preserved) (the specimen presents the label "Canale Mussolini D"); I13723 - fragment of metatarsal (the specimen presents the label "Canale Mussolini"); I13724 - incomplete right metatarsal (the proximal epiphysis and 1/2 of the diaphysis are preserved); I13725 - fragment of metatarsal; I13728 - incomplete left tibia (the distal epiphysis and 1/2 of the diaphysis are preserved) (the specimen presents the label "Canale Mussolini"); I13730 - fragment of right radius; I13731 - fragment of left tibia (the specimen presents the label "Canale Mussolini C1"); I13734 - fragment of coxal bone (the specimen presents the label "Canale Mussolini"); I13738 - fragment of mandible (the specimen presents the label "Canale Mussolini"); I13747 - fragment of thoracic vertebra (the specimen presents the label "Canale Mussolini"); I13748 - incomplete left metatarsal (1/2 of the diaphysis is preserved) (the specimen presents the label "Canale Mussolini"); I13751 - fragment of left humerus (1/4 of the diaphysis is preserved) (the specimen presents the label "Canale Mussolini"); I13753 - incomplete right calcaneus (the proximal epiphysis and 3/4 of the diaphysis are preserved) (the specimen presents the label "Canale Mussolini"); I13754 - complete left astragalus (the specimen presents the label "Canale Mussolini"); I13756 - fragment of second phalanx (the specimen presents the label "Canale Mussolini"); I13757 - complete first phalanx (the specimen presents the label "Canale Mussolini"); I13758 - complete first phalanx (the specimen presents the label "Canale Mussolini"); I13771 - fragment of right femur (the specimen presents the label "Canale Mussolini");

I13782 - fragment of right humerus; I13785 - fragment of left ulna; I13786 - fragment of os cornu; I13788 - fragment of atlas; I13790 - fragment of right os cornu; I13795 - fragment of os cornu.

Bos sp.

I12228 - complete third phalanx; I12240 - incomplete right metatarsal (3/4 of the diaphysis is preserved); I12241 - incomplete left metatarsal (the proximal epiphysis and 3/4 of the diaphysis are preserved); I12242 - complete right astragalus; I12243 - complete right astragalus; I12247 - incomplete left radius (1/4 of the diaphysis is preserved); I12250 - fragment of left coxal bone; I12254 - complete right third phalanx; I12255 - complete first phalanx; I12262 - complete second phalanx; I12328 - fragment of left radius (the proximal epiphysis is preserved); I12331 - incomplete right metatarsal (the distal epiphysis and 1/2 of the diaphysis are preserved); I12338 - incomplete right calcaneus (1/2 of the diaphysis is preserved); I12347 - incomplete first phalanx (the distal epiphysis and 3/4 of the diaphysis are preserved); I12447 - incomplete left humerus (the distal epiphysis and 3/4 of the diaphysis are preserved) (the specimen presents the label "Canale Mussolini"); I12449 - incomplete left mandible; I12526 - incomplete left femur (3/4 of the diaphysis is preserved) (the specimen presents the label "Canale Mussolini").

Bos taurus longifrons Owen, 1844

I12462 - fragment of metatarsal.

Family CERVIDAE

Capreolus capreolus (Linnaeus, 1758)

I12210 - incomplete right femur (3/4 of the diaphysis is preserved); I12355 - incomplete left humerus (the distal epiphysis and 1/2 of the diaphysis are preserved).

Dama dama (Linnaeus, 1758)

I12197 - incomplete right metatarsal (3/4 of the diaphysis is preserved); I12204 - fragment of antler; I12205 - fragment of antler; I12208 - incomplete left jaw (P2, P3, P4, M1); I12213 - incomplete right metatarsal (the distal epiphysis and 1/2 of the diaphysis are preserved); I12279 - incomplete antler (the specimen presents the label "Canale Mussolini D"); I12281 - incomplete antler (the specimen presents the label "Canale Mussolini D"); I12322 - incomplete left mandible (P4, M1, M2, M3) (the specimen presents the label "Canale Mussolini C2"); I12350 - incomplete left metacarpal (the distal epiphysis and 3/4 of the diaphysis are preserved); I12417 - incomplete antler (the specimen presents the label "Canale Mussolini"); I12431 - incomplete antler; I12462C - fragment of right radius; I12516 - incomplete right humerus (the distal epiphysis and 1/2 of the diaphysis are preserved) (the specimen presents the label "Canale Mussolini D"); I12519 - incomplete left metacarpal (the proximal epiphysis and 1/2 of the diaphysis are preserved).

Cervus elaphus L.

I12194 - incomplete right femur (the proximal epiphysis and 1/4 of the diaphysis are preserved); I12200 - fragment of antler; I12201 - fragment of antler; I12202 - incomplete left tibia (3/4 of the diaphysis is preserved); I12207 - incomplete right mandible ; I12209 - fragment of antler; I12212 - incomplete left ulna; I12217 - fragment of right coxal bone; I12220 - fragment of antler; I12223 - fragment of antler; I12246 - complete right calcaneus; I12249 - fragment of right coxal bone; I12251 - complete left calcaneus; I12258 - incomplete sacrum; I12261 - fragment of metatarsal; I12268A - complete right pisiform bone; I12304 - complete right dp3; I12306 - fragment of right scapula; I12320 - fragment of antler (the specimen presents the label "Canale Mussolini C2"); I12329 - incomplete right radius (the proximal epiphysis and 1/2 of the diaphysis are preserved); I12334 - incomplete left coxal bone (the distal epiphysis is preserved); I12335 - fragment of axis; I12336 - incomplete right humerus (the distal epiphysis and 1/4 of the diaphysis are preserved); I12339 - fragment of antler; I12340 - complete right calcaneus; I12346 - incomplete right ulna; I12356 - incomplete left coxal bone; I12380 - fragment of antler; I12410 - incomplete right coxal bone; I12412 - incomplete right tibia (the distal epiphysis and 3/4 of the diaphysis are preserved) (the specimen presents the label "Canale Mussolini"); I12414 - incomplete right scapula; I12416 - incomplete left coxal bone; I12419 - incomplete lumbar vertebra; I12421 - incomplete left tibia (the distal epiphysis and 3/4 of the diaphysis are preserved) (the specimen presents the label "Canale Mussolini"); I14423 - incomplete left tibia (the distal epiphysis and 1/2 of the diaphysis are preserved) (the specimen presents the label "Canale Mussolini"); I12434 - incomplete right femur (the distal epiphysis and 1/2 of the diaphysis are preserved); I12439 - incomplete left metatarsal (the proximal epiphysis and 1/4 of the diaphysis are preserved); I12440 - incomplete left metatarsal (the distal epiphysis and 1/4 of the diaphysis are preserved); I12442 - complete right P4 and M1; I12444 - incomplete thoracic vertebra (the specimen presents the label "Canale Mussolini"); I12452 - incomplete antler (the specimen presents the label "Canale Mussolini"); I12462B - fragment of right tibia (the proximal epiphysis is preserved); I12462D - fragment of left radius (the proximal epiphysis is preserved); I12507 - fragment of left scapula; I12508 - complete left calcaneus; I12522 - fragment of antler; I12532 - incomplete right scapula (the specimen presents the label "Canale Mussolini C2-D"); I12538 - incomplete right metatarsal (the proximal epiphysis and 1/2 of the diaphysis are preserved); I12543 - fragment of antler; I12544 - fragment of antler; I12548C - fragment of left ulna (the specimen presents the label "Canale Mussolini"); I13732 - incomplete left radius (3/4 of the diaphysis

is preserved); I13733 - incomplete right radius (1/2 of the diaphysis is preserved) (the specimen presents the label "Canale Mussolini"); I13740 - incomplete left metatarsal (the proximal epiphysis and 3/4 of the diaphysis are preserved) (the specimen presents the label "Canale Mussolini"); I13741 - incomplete right metatarsal (the proximal epiphysis and 1/2 of the diaphysis are preserved) (the specimen presents the label "Canale Mussolini"); I13743 - fragment of left coxal bone (the specimen presents the label "Canale Mussolini"); I13749 - fragment of left humerus (the specimen presents the label "Canale Mussolini"); I13752 - incomplete left humerus (1/2 of the diaphysis is preserved).

Megaloceros giganteus Blumenbach, 1799

I12198 - incomplete left humerus (1/2 of the diaphysis is preserved); I12238 - incomplete left radius (3/4 of the diaphysis is preserved); I12239 - incomplete right radius (the proximal epiphysis and 1/2 of the diaphysis are preserved); I12245 - incomplete right metacarpal (1/2 of the diaphysis is preserved); I12248 - complete left calcaneus; I12259 - fragment of left tibia (the proximal epiphysis is preserved); I12288 - complete left femur; I12326 - incomplete left tibia (1/2 of the diaphysis is preserved); I12327 - incomplete right radius (the proximal epiphysis and 1/4 of the diaphysis are preserved); I12330 - fragment of metacarpal (the distal epiphysis is preserved); I12451 - incomplete right humerus (the distal epiphysis and 3/4 of the diaphysis are preserved); I12456 - incomplete left tibia (3/4 of the diaphysis is preserved) (the specimen presents the label "Canale Mussolini"); I12465 - incomplete left femur (3/4 of the diaphysis is preserved) (the specimen presents the label "Canale Mussolini"); I12467 - complete right radius (the specimen presents the label "Canale Mussolini"); I12473 - incomplete left tibia (the distal epiphysis and 3/4 of the diaphysis are preserved) (the specimen presents the label "Canale Mussolini"); I12476 - complete left radius; I12484 - fragment of premolar tooth (P3 or P4); I12525 - incomplete right femur (3/4 of the diaphysis is preserved) (the specimen presents the label "Canale Mussolini").

Order PROBOSCIDEA

Family ELEPHANTIDAE

Elephas antiquus Falconer & Cautley, 1857

I12218 - fragment of tusk; I12221 - fragment of left ulna (?); I12225 - fragment of tusk; I12236 - fragment of tusk; I12298 - fragment of tusk; I12345 - fragment of tusk; I12357 - fragment of molar tooth (the specimen presents the label "Canale Mussolini F"); I12397 - fragment of tusk; I12542 - fragment of right ulna; I13773 - fragment of molar tooth; I13774 - fragment of molar tooth; I13775 - fragment of molar tooth; I13776 - fragment of tusk; I13781 - fragment of tusk; I13794 - fragment of molar tooth; I13796 - fragment of tusk.

Mammuthus primigenius Blumenbach, 1799

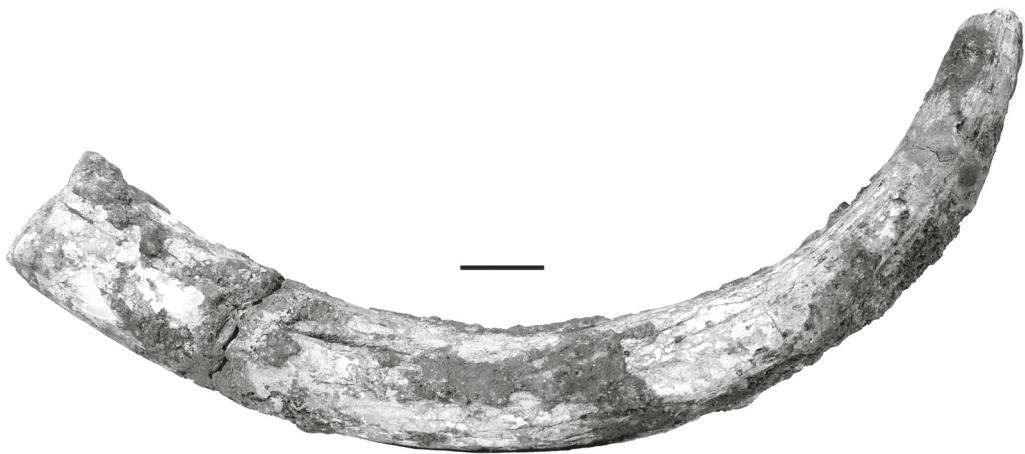


Fig. 3 - I12280 *Mammuthus primigenius* - Fragmental tusk. The scale bar is 5 cm long.

I12280 - incomplete tusk (the specimen presents the label "Canale Mussolini C2") (Fig. 3); I12401 - incomplete left ulna (1/4 of the diaphysis is preserved) I12454 - fragment of right radius (1/4 of the diaphysis is preserved) (the specimen presents the label "Canale Mussolini"); I12511 - incomplete left humerus (1/2 of the diaphysis is preserved) (the specimen presents the label "Canale Mussolini").

REFERENCES

- BLANC A.C., 1935a. Stratigrafia del Canale Mussolini nell'Agro Pontino. *Processi Verbali della Società Toscana di Scienze Naturali* 44: 3-7.
- BLANC A.C., 1935b. Sulla fauna quaternaria dell'Agro Pontino. *Processi Verbali della Società Toscana di Scienze Naturali* 44: 108-110.

BLANC A.C., DE VRIES M. & FOLLIERI M., 1957. A first C 14 date for the Würm I chronology on the Italian coast. *Quaternaria* 4: 83-89.

FARINA S., 2011. Late Pleistocene-Holocene mammals from "Canale delle Acque Alte (Canale Mussolini)" (Agro Pontino, Latium). *Bollettino della Società Paleontologica Italiana* 50 (1): 11-22.

FARINA S., 2013. Catalogue of the Late Pleistocene fossil mammalian collection from "Grotta Cucigliana" (Natural History Museum, University of Pisa). *Atti Società Toscana di Scienze Naturali, Memorie, Serie A* 120: 55-62.

FARINA S., 2014. Catalogue of the Late Pleistocene fossil mammalian collection from "Grotta Parignana" (Natural History Museum, University of Pisa). *Atti Società Toscana di Scienze Naturali, Memorie, Serie A* 121: 19-28.

(ms. pres. 22 agosto 2016; ult. bozze 29 settembre 2016)

Edizioni ETS
Piazza Carrara, 16-19, I-56126 Pisa
info@edizioniets.com - www.edizioniets.com
Finito di stampare nel mese di marzo 2017