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XXIII **LEGGE** 1993 2023 PALEODAYS

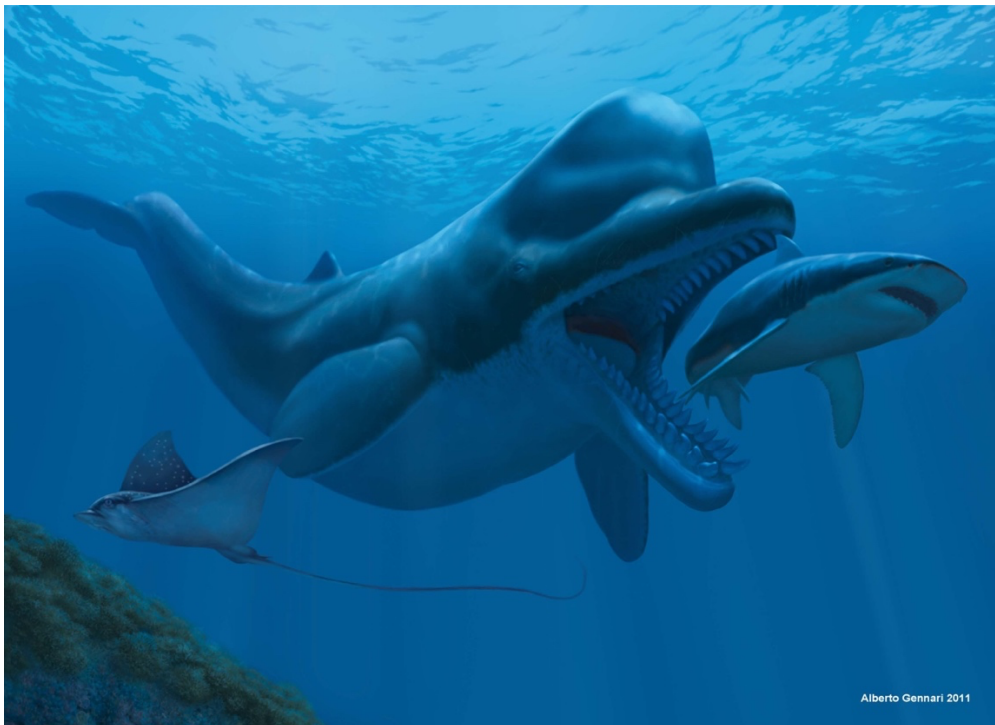
XXIII Edizione delle Giornate di Paleontologia
(6) 7-9 giugno 2023



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DIPARTIMENTO
DI FISICA E GEOLOGIA



ABSTRACT BOOK



Edited by

Marco CHERIN & Alberto COLLARETA

PALEODAYS

Abstract Book

*XXIII Edizione delle Giornate di Paleontologia
Lecce, 7-9 giugno 2023*

Edited by

Marco CHERIN & Alberto COLLARETA



**UNIVERSITÀ
DEL SALENTO**

2023

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e-ISBN: 978-88-8305-196-8

DOI Code: 10.1285/i9788883051968

<http://siba-ese.unisalento.it/index.php/paleodays>

FOREWORD

The Salento Peninsula is an area of extreme geological and paleontological interest, known to the national and international scientific community since the 19th century. With a surface of almost 6000 km² and over 250 km of coasts enclosed between the Adriatic and Ionian Seas, Salento is home to sedimentary successions that span the last 85 million years of Earth’s history. Such successions are often not easy to study due to the almost flat nature of the territory, but when they reveal to the researcher (e.g., along the coasts or in quarry areas), they are able to disclose a unique paleontological heritage: Upper Cretaceous limestones with rudists, bony fishes and terrestrial plants; Paleogene deposits with coral reefs, macroforaminifer and rhodolith facies, as well as nonmarine to brackish facies with mollusks; the Miocene Pietra Leccese, a building material exploited for centuries in the wonders of the Leccese Baroque, from which fossil remains of invertebrates and vertebrates of great value have been extracted, including various holotypes of cetacean species; Plio-Pleistocene marls, calcarenites and clays rich in foraminifers, ostracods, crustaceans, mollusks, brachiopods, bryozoans and red algae, but also bony fishes, cetaceans and other vertebrates; finally, the infilling deposits of the karst cavities (caves and sinkholes, locally called “ventarole”), in which very rich assemblages of continental vertebrates from the end of the Quaternary have been recovered.

The relationship between Salento and the Italian Paleontological Society (SPI) is long and fruitful. In 1993, the SPI held its 12th congress in Lecce, under the presidency of Giulio Pavia. In the introduction to the monumental field-trip guide published on that occasion (Fig. 1), the SPI President underlined the fundamental contribution of the “Gruppo Naturalisti Salentini” for the organization of the congress and, in general, for

their tireless work of promoting the Salento paleontological heritage. For decades, passionate researchers such as Livio Ruggiero, Antonio Meleleo and the late Angelo Varola have systematically collected, prepared and exhibited fossils from Salento, laying the foundations for the core collections of the current Museum of the Environment of the University of Salento (MAUS).

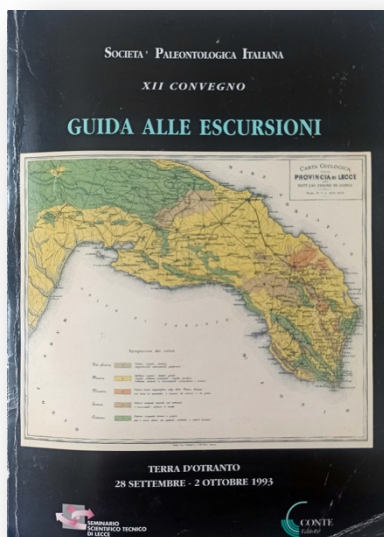


Fig. 1 Cover page of the field-trip guide of the 12th SPI congress; Lecce, 1993.

After 30 years, the time had come to bring the SPI congress, i.e., the XXIII edition of the Paleodays, back to Lecce. We did this to celebrate the opening of the MAUS in its renewed building, which nowadays is shared with the University of Salento Community Library, but also to underline the improved, constructive

relationship between the MAUS and its current director, Piero Lionello, and the Italian paleontological community. This collaboration has led to the recent establishment of a Scientific Committee of the Museum, which coordinated the organization of the Paleodays 2023 and which we hope will coordinate the forthcoming research and outreach activities. In the coming years, all these efforts will converge to unveil the paleontological wonders of the MAUS and of Salento in general.

Marco Cherin

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**UNIVERSITÀ
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L'Università dei due mari



XXIII **LECCF** 1993 2023 PALEODAYS

XXIII Edizione delle Giornate di Paleontologia
(6) 7-9 giugno 2023



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DIPARTIMENTO
DI FISICA E GEOLOGIA



PROGRAM

Mercoledì 7 giugno

08:00 – 09:00 REGISTRAZIONE

09:00 – 10:00 APERTURA DEI LAVORI E SALUTI DELLE AUTORITÀ

10:00 – 10:30 *Invited talk* - **Benazzi S.**

A focus on Italy to disentangle the earliest migration of *Homo sapiens* in Southern Europe

10:30 – 11:00 COFFEE BREAK

Sessione 1 – Moderatori: Maria Marino & Raffaele Sardella

11:00 – 11:10 **Addante M.**, Girone A., Maiorano P., Marino M., Scopelliti G., Trotta S. & Caruso A.

Climate variability in the Monte San Nicola type-section (Sicily): high-resolution calcareous plankton fluctuations over the Pliocene-Pleistocene transition

11:10 – 11:20 **Antonelli M.**, Petti F.M., De Sario F., Sacco E., La Perna R., Marino M., Marsico A., Petruzzelli M., Sabato L., Spalluto L. & Tropeano M.

The high dinosaur biodiversity in the Apulia carbonate platform: evidence from the Lama Balice tracksite (upper Albian, Southern Italy)

11:20 – 11:30 **Argenio C.**, Flores J.A., Fuertes M.A., Balestra B., Cerulo L., Cachão M. & Amore F.O.

Coccolith input into the reconstruction of sea surface dynamic: Iberian margin and North Atlantic Ocean

11:30 – 11:40 **Strani F.**, Di Folco F., Iurino D.A., Cherin M., Pushkina D., Rook L., Sardella R., Azanza B. & DeMiguel D.

Combining palaeoecological and palaeoneurological analyses to disentangle cervid evolutionary history in relation to climate changes: the case study of the Early Pleistocene deer from Pirro Nord (Italian Peninsula)

11:40 – 11:50 **Bartolini Lucenti S.**

Old World Early Pleistocene Canidae record: a biogeographic perspective

11:50 – 12:00 **Bellucci L.**, Bartolozzi L., Biaggini M., Cecchi L., Di Vincenzo F., Innocenti G., Manca R., Mancinelli M.L., Moggi Cecchi V., Porena M., Presutti V., Rossi P.F., Rossi De Gasperis S., Veninata C. & Benvenuti M.

DISSCO RI: towards a European infrastructure for scientific collections

12:00 – 12:10 **Bindellini G.**, Benton M.J., Petti F.M., Bernardi M., Rubidge B., Hancox J. & Romano M.

Middle Triassic: the onset of modern terrestrial tetrapod faunas

12:10 – 12:20 **Borrelli M.**, Perri E., Heimhofer U., Santagati P. & Le Pera E.

Neogene cold-seep microbial carbonates (Crotone basin - South Italy)

12:20 – 12:30 **Bosellini F.R.** & Stolarski J.

Eocene stilt walkers: unique rotatory growth strategy of the scleractinian coral *Stylocoenia*

- 12:30 – 12:40 **Branz R.** & Kustatscher E.
Cuticles: a world waiting to be discovered
- 12:40 – 12:50 **Calzoni P.**, Amalfitano J., Marramà G., Carnevale G. & Giusberti L.
The Rhamphosidae (Teleostei, Syngnathiformes) from the Eocene of Bolca
- 12:50 – 13:00 **Carnevale G.** & Tyler J.C.
The dawn of moorish idols (Teleostei, Zanolidae) in the Eocene of Bolca
- 13:00 – 13:10 **Carniti A.P.**, Della Porta G. & Angiolini L.
Are the Mississippian mud-dominated carbonate buildups of Derbyshire “mud mounds”?

13:10 – 14:10 PRANZO

14:10 – 14:40 MAUS: Sessione poster

14:40 – 14:50 MAUS: Ricordo di Angelo Varola

Sessione 2 – Moderatori: Fabio Bona & Francesca Bosellini

- 14:50 – 15:00 **Caruso A.**, Cosentino C., Scopelliti G. & Herbert T.
Risposta delle associazioni a foraminiferi alle oscillazioni climatiche durante il Gelasiano-Calabriano: dati ottenuti dalla successione di Capo Rossello (Sicilia)
- 15:00 – 15:10 **Chiarenza A.A.**, Farnsworth A.J., Jones L.A., Cantalapiedra J.L., Gamboa S., Galvan S., Sotelo G. & Varela S.
Tempo e modo nell’evoluzione della nicchia climatica in Dinosauria (Sauropsida: Archosauria)
- 15:10 – 15:20 **Nobile F.**, Collareta A., Perenzin V., Fornaciari E., Giusberti L. & Bianucci G.
First Mediterranean record of the delphinidan genus *Kentriodon* from a new lower Miocene odontocete locality at Feltre (northeastern Italy)
- 15:20 – 15:30 **Crippa G.**, Chiari A., Cremaschi M., Dapiaggi M., Lischi S. & Leng M.J.
Mollusc shells as a tool to reconstruct the palaeoenvironment and the palaeoclimate in the HAS1 settlement (Holocene, Oman)
- 15:30 – 15:40 **D’Amico F.**, Guido A., Kočí T., DeVries T.J., Collareta A., Bosio G. & Sanfilippo R.
Double-phased biomineralization processes in marine invertebrates: the example of cirratulids (Polychaeta, Annelida) from southern Peru
- 15:40 – 15:50 **Danise S.**, Giachetti G., Baneschi I., Casalini M., Miniati F., Dominici S. & Boschi C.
Seasonal growth patterns of pectinids from the warm Mediterranean Pliocene
- 15:50 – 16:00 **De Bortoli L.**
Morphometric analyses of the Pliocene oysters from Buttigliera d’Asti (Asti, NW Italy)
- 16:00 – 16:10 **Della Giustina F.** & Vila B.

New allodaposuchid remains from the Late Cretaceous of Catalonia (Spain): insights into dermal and postcranial skeletal anatomy

16:10 – 16:20 **Di Martino E.** & Porto A.

DeepBryo: a web app for bryozoan AI-assisted morphometric characterization

16:20 – 16:50 COFFEE BREAK

Sessione 3 – Moderatori: Giorgio Carnevale & Gaia Crippa

16:50 – 17:00 **Dominici S.**, Danise S. & Tintori A.

The silicified molluscs of Pelsa-Vazzoler (eastern Dolomites, Italy) and the late Middle Triassic diversification of marine life

17:00 – 17:10 **Faggi A.**, Bartolini Lucenti S. & Rook L.

Assessing relevance and vulnerability of palaeontological sites: an analytical procedure

17:10 – 17:20 **Viaretti M.**, Jurikova H. & Angiolini L.

Silicified shells as archives of geochemical proxies: the hidden potential of a diagenetic process

17:20 – 17:30 **Franceschi F.**, Marramà G. & Carnevale G.

Reassessment of a putative peltopleurid fish from the Sinemurian (Lower Jurassic) of Osteno (Como, Italy): preliminary results

17:30 – 17:40 **Frosali S.**, Bartolini-Lucenti S., Madurell-Malapeira J., Costeur L. & Rook L.

The analysis of the frontal sinus in the genus *Eucyon*: evolutionary and ecological insights

17:40 – 17:50 **Guido A.**, Alifano P., Talà A., Calcagnile M. & Belmonte G.

Microbial biomineralizations in tidally-influenced subterranean settings (Zinzulùsa Cave, Castro, Italy)

17:50 – 18:00 **Iannucci A.**, Souron A. & Rabinovich R.

Bethlehem suids reconsidered: chronological and paleobiogeographic implications

18:00 – 18:10 **Kustatscher E.**, Trümper S., Rößler R., Morelli C., Krainer K., Karbacher S., Vogel B., Antonelli M. & Sacco E.

The first Kungurian fossil forest reveals wetland conifers to thrive in peri-Tethyan Pangea

18:10 – 18:20 **Loddi C.**, Bartolini Lucenti S., Madurell-Malapeira J. & Rook L.

Plioviverrops faventinus, a small Messinian hyaenid from Italy: a revision

18:20 – 18:30 **Madurell-Malapeira J.**, Bartolini Lucenti S., Prat-Vericat M., Costeur L. & Rook L.

Pachycrocuta, an active hunter or a social scavenger? Insights from postcranial morphology

Giovedì 8 giugno

08:30 – 19:00 ESCURSIONE

Venerdì 9 giugno

Sessione 4 – Moderatori: Annalisa Ferretti & Piero Lionello

- 09:00 – 09:10 **Malinverno E.**, Saavedra-Pellitero M., Colucci M. & IODP-383 Scientists
Coccolithophore variations in the subantarctic South Pacific along late Quaternary glacial-interglacial cycles
- 09:10 – 09:20 **Marramà G.** & Carnevale G.
Double-armoured herrings (Clupeomorpha: Ellimmichthyiformes) from the Lower Cretaceous of Pietraraja (Southern Italy)
- 09:20 – 09:30 **Mecozi B.**, Iannucci A., Sardella R., Carpentieri M., Pineda A., Rabinovich R. & Moncel M.H.
New paleontological results on the early Middle Pleistocene of Notarchirico (Venosa, Southern Italy)
- 09:30 – 09:40 **Merella M.**, Collareta A., Casati S., Di Cencio A., Pieri A. & Bianucci G.
It's time to eat: great white shark (*Carcharodon carcharias*) bite marks on balaenid (right whale) remains from the Pliocene of Tuscany (Central Italy)
- 09:40 – 09:50 **Mondanaro A.**, Dominici S. & Danise S.
Bivalve response to Plio-Pleistocene climate change in the Mediterranean Sea
- 09:50 – 10:00 **Moscarella A.**, Iurino D.A., Conti J., Bona F., Di Giancamillo M. & Sardella R.
Endocranial pneumatization of *Ursus spelaeus* and implications in the bite force
- 10:00 – 10:10 **Muscioni M.**, Dreossi D. & Fanti F.
Synchrotron tomography provides novel insights into the dental anatomy of *Acynodon adriaticus* (Eusuchia, Hylaeochampsidae)
- 10:10 – 10:20 **Mussini G.**, Smith M.P., Rahman I.A., Murdock D.J.E., Vinther J., Harper D.A.T. & Dunn F.S.
Cambrian bipartite animals reveal a lost chapter in chordate history
- 10:20 – 10:30 **Coletti G.**, Commissario L., Mariani L., Bosio G., Desbiolles F., Soldi M. & Bialik O.M.
Cenozoic carbonate facies of Asia: the hidden potential of the shallow water record
- 10:30 – 10:40 **Pandolfi L.** & Rook L.
Deconstructing the classical Late Miocene faunal assemblages of the Tusco-Sardinian paleobioprovince
- 10:40 – 10:50 **Parisi R.** & Mazzini I.
Middle Pleistocene to Holocene ostracod assemblages from the Corinth Gulf
- 10:50 – 11:00 **Parparousi E.M.**, Madurell-Malapeira J., Sorbelli L., Breda M. & Cherin M.
The outstanding *Dama*-like deer sample from Vallparadís Estació (Iberian Peninsula, Early Pleistocene)

11:00 – 11:30 COFFEE BREAK

Sessione 5 – Moderatori: Angela Girone & Giuseppe Marramà

11:30 – 11:40 **Perri E.**, Borrelli M. & Ponte M.

Microbially mediated Ca-carbonate precipitation in tufa fluvial system: an innovative approach to develop a new generation of sustainable bio-inspired materials

11:40 – 11:50 **Romano M.**, Van den Brandt M.J., Day M.O., Manucci F., Viglietti P.A. & Angielczyk K.D.

In-vivo 3D reconstruction and first volumetric body mass estimate of the oldest Karoo pareiasaur *Bradysaurus baini*

11:50 – 12:00 **Rossi V.**, Iurino D.A., Terranova E., Fornasiero M., Bernardi M., Sardella R. & Kustatscher E.

Impossible fossils: can soft tissues fossilize in volcanoclastic settings?

12:00 – 12:10 **Rosso A.**, Sanfilippo R., Donato G., Sciuto F., D'Alpa F., Caccamo D., Minniti G., Bracchi V.A., Savini A., Malinverno E., Guido A., Bazzicalupo P., Negri M.P., Cipriani M., Leonardi R., Viola A. & Basso D.

Biogenic content of surface cores from deep-shelf bottoms close to the coralligenous off Marzamemi (SE Sicily, Ionian Sea): preliminary data

12:10 – 12:20 **Sardella R.**, Conti J., Germani M., Iannucci A., Iurino D.A., Mecozzi B., Messina M.Y., Moscarella A., Pioviglia M., Strani F. & Vona S.

MAE: Museo Archeologico Ernico - A brand-new museum in Anagni is born

12:20 – 12:30 **Sorbelli L.**, Madurell-Malapeira J., Brugal J.P., Kostopoulos D.S. & Cherin M.

Leptobos and *Bison* limb proportions and body mass changes in response to environmental transitions during the Pleistocene

12:30 – 12:40 **Stefanelli D.**, Mecozzi B., Breda M., Girone A., La Perna R., Maiorano P., Marino M. & Sardella R.

Rediscovering the fossil collection from the late Early Pleistocene site of Pirro Nord (Foggia, Southern Italy) at the Bari University

12:40 – 12:50 **Azzarà B.**, Cherin M., Boschian G., Iurino D.A., Menconero S., Bona F., Cirilli O., Kimambo J.S., Masao F.T., Barili A., Ambrose S.H. & Manzi G.

Reappraisal of the upper Olduvai Beds (Tanzania): insights from a new faunal assemblage from Geolocalità 83

12:50 – 13:00 **Tomelleri I.**, Wagensommer A. & Kustatscher E.

Collezioni storiche: problematiche e strategie per la valorizzazione e comunicazione nel caso della Collezione Georg Gasser (1857-1931)

13:00 – 13:10 **Vallè F.**, Nowak H., Kustatscher E., Roghi G., Morelli C., Krainer K., Preto N. & Hartkopf-Fröder C.

Reconstruction of depositional environments in the Kungurian Megacaldera of the Athesian volcanic group: a multi-proxy approach

13:10 – 13:20	Ferretti A. & Balini M. 60 years of the Italian Paleontological Society through its journal
13:20 – 14:20	PRANZO
14:20 – 14:50	MAUS: Sessione poster
14:50 – 17:00	ADUNANZA GENERALE DEI SOCI SPI
a seguire	COFFEE BREAK CONCLUSIVO E SALUTI

POSTER

Amore F.O., Argenio C., Faranda C., Ferraro L., Gliozzi E., Magri D., Michelangeli F., Relvini A., Russo B., Siciliano J., Vallefucio M., Meo A. & Senatore M.R.

Multidisciplinary analysis of the sedimentary succession at San Giuliano Lake (Matera, Southern Italy): sedimentological, biostratigraphic and palaeoecological reconstruction

Antonelli M., Petti F.M., De Sario F., Sacco E., Petruzzelli M., Sabato L., Spalluto L. & Tropeano M.

Theropod tracks from the Lama Badessa ichnosite (middle-upper Cenomanian, Apulia, Southern Italy)

Bianucci G., Geisler J.H., Collareta A., Sfravara L., Merella M., Carnevale G., Damarco P. & Ferretti M.P.

Disparity *vs* diversity within the *Hemisyntrachelus* lineage (Cetacea, Delphinidae): a review of the Italian Pliocene record

Birarda G., **Buosi C.**, Caridi F., Casu M.A., De Giudici G., Di Bella L., Medas D., Meneghini C., Pierdomenico M., Sabbatini A., Surowka A. & Vaccari L.

Impact of plastic pollution on benthic foraminifera

Bordiga M., Lupi C., Sacchi R., Ferretti P., Crowhurst S.J. & Cobianchi M.

Eccentricity signal in the time-series of nannofossil species at mid-latitude across the mid-Pleistocene transition (ODP site 1209, northwestern Pacific Ocean)

Carnevali V. & **Bona F.**

Paleoenvironmental considerations on the Val Seriana Valley (north-western Italy) during the Upper Pleistocene. The small-mammal fossils from Bùs di Tri Fradèi Cave (Oltre il Colle, BG) as palaeoclimatic proxy data

Carniti A.P., Anderson C.M. & Angiolini L.

Brachiopods and conodonts from the upper Mississippian Tonka Formation of Carlin Canyon, Nevada

Cieszynska W.K.

Odontometric characteristics of the European Miocene primates

Cipriani M., Apollaro C., Basso D., Bazzicalupo P., Bertolino M., Bracchi V.A., Bruno F., Costa G., Dominici R., Gallo A., Muzzupappa M., Rosso A., Sanfilippo R., Sciuto F., Vespasiano G. & **Guido A.**

Evidence of not-genetically controlled biomineralizations in coralligenous build-ups (Marzamemi, Sicily, Italy)

Consorti L., **Fabbi S.**, Cipriani A. & Pampaloni M.L.

Mesozoic and Cenozoic carbonate platform bioevents from the CARG Geological Sheet n. 377 “Trasacco”

D’Amico F., Calidonna C.R., Apollaro C., Vespasiano G. & Guido A.

Agents of climate change: a paleontological point of view

Delfino M., Amoruso N., Macaluso L. & Rook L.

I resti di coccodrilli tomistomini della Pietra Leccese (Miocene, Italia meridionale)

De Pirro D., Bartiromo A., Cherin M., Lionello P. & Spina A.

The Cretaceous flora of Salento: preliminary data on the assemblage from Surbo (Lecce, Italy)

Donato G., Sanfilippo R., D’Alpa F., Sciuto F., Bracchi V.A., Basso D. & Rosso A.

Live and dead bryozoans in the coralligenous build-ups of Marzamemi (Ionian Sea)

Granata V. & Collareta A.

New insights on Middle Triassic invertebrate ichnoassociation from the Monti Pisani megaichnosite (northern Apennines)

Guerrieri S., **Santagati P.**, Borrelli M. & Perri E.

Microfacies and biosedimentary processes of Late Pleistocene (MIS 5.1) deposits (Capo Colonna, Southern Italy)

Lambert O., **Collareta A.**, Benites-Palomino A., Merella M., de Muizon C., Bennion R., Urbina M. & Bianucci G.

A flat-snouted sperm whale from the Lower Miocene of the southeastern Pacific (east Pisco Basin, Peru) supports affinities with the southwestern Atlantic cetacean fauna

Logrosán Soriano P., Luján A.H., Nacarino-Meneses C., **Villa A.**, Abella J., Madurell-Malapeira J. & Casanovas-Vilar I.

New fossil remains and histological study of *Diplocymodon ratelii* (Crocodylia: Diplocynodontidae) from the Middle Miocene site of Els Casots (Catalonia)

Lombardi M. & Crippa G.

Analisi paleoecologica dell’associazione a *Venus-Ostrea* del Torrente Arda (Pleistocene Inferiore)

Madurell-Malapeira J., Bartolini-Lucenti S., Costeur L. & Rook L.

Revising the early European record of the dirk-toothed cat *Megantereon*

Martinelli P., Gennari R., Lirer F. & Cascella A.

Paleoclimatic and paleoceanographic changes and their impact on planktic foraminifera in the Tyrrhenian Sea during the last 32 ka

Maruca G., Bruno F., Lagudi A., Barbieri L., Gallo A., Cipriani M. & Guido A.

Technological innovation for the remote 3D study of marine bioconstructions: a project proposal

Minniti G., Reitano A., Di Geronimo I., Rosso A. & Sanfilippo R.

The Pleistocene malacological collection of Catallarga (Sicily) in the Museum of Paleontology (University of Catania)

Moscarella A., **Fabbi S.**, Bindellini G., Carnevale G., Citton P., Consorti L., D'Ambrogi C., Garzarella A., Muraro C., Pampaloni M.L., Prinzi E.P., Radeff G., Romagnoli G., Romano M., Spanò F. & Cipriani A.

Digital investigation of lamniform shark vertebrae from the Scaglia Cinerea – Bisciaro boundary (Miocene, Umbria-Marche basin)

Mulè F., Collareta A. & Farina S.

Preliminary study of two cave bear cubs from the Late Pleistocene vertebrate assemblage of the “Tecchia” of Equi cave (Equi Terme, Massa-Carrara province, Italy)

Peri E., Collareta A., Granata V. & Bianucci G.

A leathery meal: megatoothed shark bite mark on a *Psephophorus* carapace from the Pietra Leccese formation (Miocene, Southern Italy) and its palaeoecological implications

Pieri A., Falk D., Buchwitz M., Schneider J.W. & Ehling B.C.

The Wolferode Quarry: an amazing middle to late Permian tracksite in Central Germany

Piñero P., López-García J.M., Carnevale G., Furió M., Giuntelli P., Luzi E., Macaluso L., Marramà G., Pavia G., Pavia M., Pezzetti C., Rocca M., Villa A. & **Delfino M.**

Moletto: a new latest middle-earliest Late Pleistocene vertebrate site in Northern Italy

Pizzitola V.O. & Martinetto E.

Nuove evidenze di depositi plio-pleistocenici a conchiglie e vegetali fossili nell'alveo del Torrente Cervo: rassegna preliminare

Romano M., Bindellini G., Moscarella A., Manucci F. & O'Connor J.K.

Reimagining *Velociraptor* 100 years after its discovery

Sacco E., Pignatti J.S. & **Sardella R.**

The Achille Tellini historical collection (Museo Universitario di Scienze della Terra, Sapienza Università di Roma)

Sanfilippo R., Donato G., Basso D., Bracchi V.A. & Rosso A.

Biodiversity and distribution pattern of serpulids from Mediterranean Holocene coralligenous build-ups

Santagati P., Perri E., Borrelli M. & Guerrieri S.

MIS 5.5 SST estimation from a macrofossil assemblage: a multi-proxy reconstruction

Tomelleri I. & Zorzin R.

Collezioni museali e valorizzazione del patrimonio paleontologico. Mappare per costruire reti: il caso studio della Val d'Alpone

Vescogni A. & **Guido A.**

A dendrolite/thrombolite carbonate build-up from the Messinian terminal carbonate complex of the Salento Peninsula (Southern Italy)

Vincenzi M., **Bona F.** & Nappi A.

Some considerations about MIS3 marmots (*Marmota marmota*) of north-western Italy with particular regards to those from Caverna Generosa (Centrovale Intelvi, Como)

Zazzera A., Marsico A., La Perna R., Marino M., Venisti N., De Prezzo G., Bruno Stamerra F., Spisso N., Spada I. & Girone A.

Re-animation of a fossil: bringing back to life the specimens from MUSTE (Museo di Scienze della Terra) of University of Bari with digital technologies

Zoboli D., Masala A. & Pillola G.L.

A new proboscidean tracksite in the Pleistocene of south-western Sardinia (Italy)



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(6) 7-9 giugno 2023



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ABSTRACT BOOK

INVITED LECTURE



A FOCUS ON ITALY TO DISENTANGLE THE EARLIEST MIGRATION OF *HOMO SAPIENS* IN SOUTHERN EUROPE

Stefano BENAZZI

Department of Cultural Heritage, University of Bologna, Italy; stefano.benazzi@unibo.it

Compelling fossil and genetic evidence indicate that our species originated back before 300,000 years ago (ka) in Africa (Hublin et al., 2017; Lipson et al., 2020; Petr et al., 2020). Though, how we became the worldwide dominant, sole human species is a later story of dispersal, admixture and replacement that took place with archaic humans in Eurasia, where preexisting populations (e.g., Neanderthals, Denisovans) were assimilated in a web of gene flow (Pääbo, 2015; Slon et al., 2018).

Recent paleogenomic studies signal interbreeding between Neanderthals and *H. sapiens* took place before 200 ka (Posth et al., 2017). Likewise, the fossils from Misliya, Israel (Hershkovitz et al., 2018), and Apidima, Greece (Harvati et al., 2019), identified as early *H. sapiens*, concur to support their expansion into the Levant and Europe before 200 ka. However, it appears that these first waves of Sapiens were unable to establish themselves permanently in Eurasia.

Then, more successful waves of Sapiens out of Africa into Eurasia occurred between 60 and 40 ka. A partial cranium from Manot cave (Israel) attests *H. sapiens* in the Levant ca. 55 ka (Hershkovitz et al., 2015), and human remains from western Siberia, East and Southeast Asia document a rapid dispersal of Sapiens in Eurasia ca. 45 ka (e.g., Fu et al., 2014; Higham et al., 2008).

In Europe this period (ca. 50-40 ka, also referred to as the Middle-to-Upper Paleolithic Transition) documents dramatic changes in human behavior and the appearance of various technocomplexes (e.g., the Châtelperronian in central and southwestern France and northern Spain, the Uluzzian in Italy and Greece) that replaced pre-existing Mousterian cultures. Some scholars (e.g., Mellars, 2005) have suggested that these changes, coinciding with the origins of modern human behavior in Europe, are directly related to the appearance and dispersal of Sapiens. Other scholars postulate that cultural innovations were either independently achieved by Neanderthals, and that Sapiens entered Europe after Neanderthals had disappeared (d'Errico et al., 1998; Zilhão, 2007), or were produced by late Neanderthals as a result of some level of cultural diffusion from Sapiens to Neanderthals (Hublin et al., 2012).

In this debate, Italy plays a pivotal role for 1) its geographic position and ecological variability at the intersection between eastern and western Mediterranean Europe, 2) the important archaeological sites dating to the transitional period, 3) the presence of transitional and early Upper Paleolithic cultures (e.g., the Uluzzian) and 4) the presence of human fossil remains associated with these technocomplexes (Fig. 1).

Here, I'll present results obtained for Italy between 50-40 ka in the framework of my ERC CoG grant SUCCESS (n. 724046), where we support the attribution of the Uluzzian to *H. sapiens*, and how these results can contribute to disentangling the earliest migration of *H. sapiens* in southern Europe.

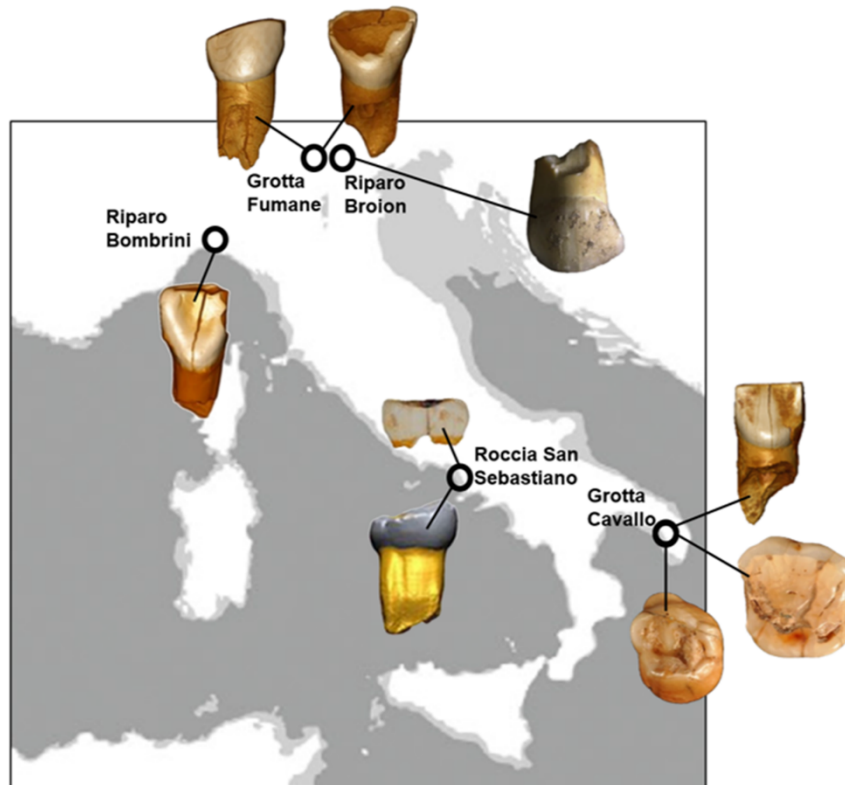


Fig. 1 The Italian human fossil record between 50-40 ka

- d'Errico F., Zilhao J., Julien M., Baffier D. & Pelegrin J. (1998). Neanderthal acculturation in Western Europe? A critical review of the evidence and its interpretation. *Current Anthropology*, 39 (suppl.): S1–S44.
- Fu Q., Li H., Moorjani P., Jay F., Slepchenko S.M., Bondarev A.A., Johnson P.L., Aximu-Petri A., Prüfer K., de Filippo C., Meyer M., Zwyns N., Salazar-García D.C., Kuzmin Y.V., Keates S.G., Kosintsev P.A., Razhev D.I., Richards M.P., Peristov N.V., Lachmann M., Douka K., Higham T.F., Slatkin M., Hublin J.J., Reich D., Kelso J., Viola T.B. & Pääbo S. (2014). Genome sequence of a 45,000-year-old modern human from western Siberia. *Nature*, 514: 445-449.
- Harvati K., Röding C., Bosman A.M., Karakostis F.A., Grün R., Stringer C., Karkanis P., Thompson N.C., Koutoulidis V., Mouloupoulos L.A., Gorgoulis V.G. & Kouloukoussa M. (2019). Apidima Cave fossils provide earliest evidence of *Homo sapiens* in Eurasia. *Nature*, 571: 500-504.
- Higham T.F.G., Barton H., Turney C.S.M., Barker G., Ramsey C.B. & Brock F. (2008). Radiocarbon dating of charcoal from tropical sequence: results from the Niah Great Cave, Sarawak, and their broader implications. *Journal of Quaternary Science*, 24: 189-197.
- Hublin J.J., Talamo S., Julien M., David F., Connet N., Bodu P., Vandermeersch B. & Richards M.P. (2012). Radiocarbon dates from the Grotte du Renne and Saint-Césaire support a Neanderthal origin for the Châtelperronian. *Proceedings of the National Academy of Sciences*, 109: 18743-8.
- Hublin J.J., Ben-Ncer A., Bailey S.E., Freidline S.E., Neubauer S., Skinner M.M., Bergmann I., Le Cabec A., Benazzi S., Harvati K. & Gunz P. (2017). New fossils from Jebel Irhoud, Morocco and the pan-African origin of *Homo sapiens*. *Nature*, 546: 289-292.
- Hershkovitz I., Marder O., Ayalon A., Bar-Matthews M., Yasur G., Boaretto E., Caracuta V., Alex B., Frumkin A., Goder-Goldberger M., Gunz P., Holloway R.L., Latimer B., Lavi R., Matthews A., Slon V., Mayer D.B., Berna F.,

- Bar-Oz G., Yeshurun R., May H., Hans M.G., Weber G.W., Barzilai O. (2015). Levantine cranium from Manot Cave (Israel) foreshadows the first European modern humans. *Nature*, 520: 216-219.
- HersHKovitz I., Weber G.W., Quam R., Duval M., Grün R., Kinsley L., Ayalon A., Bar-Matthews M., Valladas H., Mercier N., Arsuaga J.L., Martínón-Torres M., Bermúdez de Castro J.M., Fornai C., Martín-Francés L., Sarig R., May H., Krenn V.A., Slon V., Rodríguez L., García R., Lorenzo C., Carretero J.M., Frumkin A., Shahack-Gross R., Bar-Yosef Mayer D.E., Cui Y., Wu X., Peled N., Groman-Yaroslavski I., Weissbrod L., Yeshurun R., Tsatskin A., Zaidner Y. & Weinstein-Evron M. 2018. The earliest modern humans outside Africa. *Science*, 359: 456-459.
- Lipson M., Ribot I., Mallick S., Rohland N., Olalde I., Adamski N., Broomandkhoshbacht N., Lawson A.M., López S., Oppenheimer J., Stewardson K., Asombang R.N., Bocherens H., Bradman N., Culleton B.J., Cornelissen E., Crevecoeur I., de Maret P., Fomine F.L.M., Lavachery P., Mindzie C.M., Orban R., Sawchuk E., Semal P., Thomas M.G., Van Neer W., Veeramah K.R., Kennett D.J., Patterson N., Hellenthal G., Lalueza-Fox C., MacEachern S., Prendergast M.E. & Reich D. (2020). Ancient West African foragers in the context of African population history. *Nature*, 577: 665-670.
- Mellars P. (2005). The impossible coincidence: a single-species model for the origins of modern human behavior in Europe. *Evolutionary Anthropology*, 14: 12-27.
- Pääbo S. (2015). The diverse origins of the human gene pool. *Nature Reviews Genetics*, 16: 313-314.
- Petr M., Hajdinjak M., Fu Q., Essel E., Rougier H., Crevecoeur I., Semal P., Golovanova L.V., Doronichev V.B., Lalueza-Fox C., de la Rasilla M., Rosas A., Shunkov M.V., Kozlikin M.B., Derevianko A.P., Vernot B., Meyer M. & Kelso J. (2020). The evolutionary history of Neanderthal and Denisovan Y chromosomes. *Science*, 369: 1653-1656.
- Posth C., Wißing C., Kitagawa K., Pagani L., van Holstein L., Racimo F., Wehrberger K., Conard N.J., Kind C.J., Bocherens H. & Krause J. (2017). Deeply divergent archaic mitochondrial genome provides lower time boundary for African gene flow into Neanderthals. *Nature Communications*, 8: 1-9.
- Slon V., Mafessoni F., Vernot B., de Filippo C., Grote S., Viola B., Hajdinjak M., Peyrégne S., Nagel S., Brown S., Douka K., Higham T., Kozlikin M.B., Shunkov M.V., Derevianko A.P., Kelso J., Meyer M., Prüfer K. & Pääbo S. (2018). The genome of the offspring of a Neanderthal mother and a Denisovan father. *Nature*, 561: 113-116.
- Zilhão J. (2007). The Emergence of Ornaments and Art: An Archaeological Perspective on the Origins of “Behavioral Modernity.” *Journal of Archaeological Research*, 15: 1-54.

PRESENTATIONS



CLIMATE VARIABILITY IN THE MONTE SAN NICOLA TYPE-SECTION (SICILY): HIGH-RESOLUTION CALCAREOUS PLANKTON FLUCTUATIONS OVER THE PLIOCENE-PLEISTOCENE TRANSITION

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The present research falls within the GELSTRAT project, launched in September 2021 within the INQUASQS International Field Workshop, with the aim to reinvestigate the Monte San Nicola - MSN section (Gela, Sicily). The section includes the Global Boundary Stratotype Section and Point (GSSP) for the Gelasian Stage (ca. 2.58 Ma), the chronostratigraphic boundary that marks the base of the Quaternary System. We present high-resolution results on calcareous plankton assemblage and correlation with stable isotope record on planktonic foraminifera across the Pliocene-Pleistocene transition (PPt), not available so far in the type-section. The observed calcareous plankton variations display cyclic change of different magnitudes and non-cyclical trends. Major fluctuations could be interpreted in terms of sea surface productivity and temperature variations. The abundance pattern of key taxa suggests that changes in paleoproductivity are related to precession-induced variations, with productivity increase and the development of deep chlorophyll maximum occurring during sapropel formation. The reconstructed surface water temperature variation, expressed by cyclical changes of specific taxa, is mainly related to obliquity-driven glacial-interglacial cycles, as indicated by the matching with the new oxygen isotope record obtained through the section. Surface water temperature changes also respond to insolation forcing in good agreement with other coeval Mediterranean and Atlantic records. The present work describes the climate signature recorded in the Gelasian type-section improving the recognition and interpretation of climate variability across the PPt and the correlation of the Gelasian GSSP outside the type-section.

**THE HIGH DINOSAUR BIODIVERSITY IN THE APULIA CARBONATE PLATFORM:
EVIDENCE FROM THE LAMA BALICE TRACKSITE (UPPER ALBIAN, SOUTHERN ITALY)**

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The upper Albian ichnoassemblage from Lama Balice (Bari, Apulia, southern Italy; Spalluto & Caffau, 2010) consists of hundreds of tracks, produced by both bipedal and quadrupedal dinosaurs. The dinosaur tracks occur on two distinct track-bearing surfaces of Mazzitelli and Robles quarries belonging to the Calcare di Bari Fm. They were investigated by combining traditional methods and high-resolution digital photogrammetry, with the aim of improving the results of ichnological analyses. The succession cropping out in the quarry also shows the occurrence, at distinct stratigraphic horizons, of several tracks exceptionally exposed in cross-section. The medium-sized tridactyl tracks, some of which arranged in bipedal trackways, reveal a high affinity with the theropod tracks from the Upper Jurassic-Lower Cretaceous of Algeria and Morocco (Belvedere et al., 2010; Bessedik et al., 2019). Numerous quadrupedal couples are characterised by morphological features comparable with the narrow-gauge sauropod trackways from the Upper Jurassic of Morocco. The ichnoassemblage also evidences the presence of ankylosaurian tracks, confirming the existence of a high dinosaur biodiversity in the Apulia Carbonate Platform, thus providing further constraints for a palaeogeographic review of the Periadriatic area during the Cretaceous.

Belvedere M., Mietto P. & Ishigaki S. (2010). A Late Jurassic diverse ichnocoenosis from the siliciclastic Iouaridene Formation (Central High Atlas, Morocco). *Geological Quarterly*, 54 (3): 367-380.

Bessedik M., Mammeri C., Belkebir L. & Mahboubi E.M. (2019). Les empreintes de pieds tri et tetradactyles de dinosaures (Rhétien-Hettangien à Cénomaniens) de l'Atlas Saharien (Algérie). *Mémoire du Service Géologique de l'Algérie*, 21: 3-21.

Spalluto L. & Caffau M. (2010). Stratigraphy of the mid-Cretaceous shallow-water limestones of the Apulia Carbonate Platform (Murge, Apulia, southern Italy). *Italian Journal of Geosciences*, 129: 335-352.

**COCCOLITH INPUT INTO THE RECONSTRUCTION OF SEA SURFACE DYNAMIC:
IBERIAN MARGIN AND NORTH ATLANTIC OCEAN**

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Two pivotal areas for paleoceanographic studies are here compared through coccolith assemblage analyses of two different Integrated Ocean Drilling Program sites: U1385 and U1313, respectively located along the Western Iberian Margin (WIM) and in the central North Atlantic. The study aims to present surface water dynamics, starting from the Last Glacial Maximum until the Holocene, occurring at both sites, comparing the surface paleoproductivity fluctuations and water column stratification, as well as differences concerning the coccolithophore calcification process. The latter is investigated analysing variations of the coccolith size-normalized thickness and total coccolith calcite per slide, in addition to dissolution/preservation indices, to understand coccolithophores response to environmental parameters. The overall reduction of the different species size-normalized thicknesses at both sites testifies the effects of the increasing CO₂ concentrations during the last 25 kyr. During the Heinrich Stadials (HS) values between the two sites differ greatly, while Younger Dryas and Holocene are intervals of constant size-normalized thicknesses at both latitudes. A general high coccolithophore paleoproductivity characterizes the Site U1313 in particular during both HS, concurrently to increasing terrigenous input. The Principal Component Analysis better highlights that conditions of high productivity and terrigenous input are consequence of icebergs influence transporting nutrients and ice-rafted debris over the area. Different calcareous nannoplankton paleo-assemblages define glacial and interglacial phases at Site U1385: glacial conditions are due to the prevalent Portugal Current influence and the southward shift of the Intertropical Convergence Zone, while interglacial conditions correspond to a strong Iberian Poleward Current influence.

**REAPPRAISAL OF THE UPPER OLDUVAI BEDS (TANZANIA): INSIGHTS FROM A NEW
FAUNAL ASSEMBLAGE FROM GEOLOCALITY 83**

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Fieldwork carried out in Geolocality 83 (Olduvai Gorge) by the THOR (Tanzanian Human Origin Research) team in 2018–2022, has resulted in the recovery of a rich and well-preserved faunal assemblage. While research in Olduvai has been traditionally focused on the lower part of the succession (Beds I-IV), much richer in paleoanthropological evidence, our discovery provides an opportunity to reappraise the geological and paleontological features of the upper Olduvai Beds (Masek, Ndutu, and Naisiusiu Beds). Our radiocarbon dating of fossil eggshells from Geolocality 83 gives results spanning from ~38 to ~33 ka, making the assemblage the only Late Pleistocene one with a confident date in Olduvai, and one of the few in eastern Africa. The exceptional preservation of the fossils from the site allowed to carry out a detailed systematic analysis, with an approach rarely used in Olduvai. The assemblage includes the following taxa: *Crocodylus* sp., *Struthio* sp., *Crocota crocuta*, *Lycaon pictus*, *Canis lupaster*, *Vulpes rueppellii*, *Caracal caracal*, *Acinonyx jubatus*, *Panthera pardus*, *Equus quagga*, *Taurotragus oryx*, the extinct buffalo *Syncerus antiquus*, *Nanger* sp., *Eudorcas* sp., *Madoqua* sp., *Aepyceros* sp., *Alcelaphus buselaphus*, *Connochaetes taurinus*, *Damaliscus* sp., *Phacochoerus africanus*, *Pedetes* sp., and *Gerbilliscus* sp. Most of the identified taxa are still found in the Serengeti savannah; however, some taxa which are extinct or limited today to drier areas of the continent, indicate that the Olduvai paleoenvironment must have been more arid in the latest Pleistocene than it is today, in agreement with literature data on eastern African paleoclimate.

OLD WORLD EARLY PLEISTOCENE CANIDAE RECORD: A BIOGEOGRAPHIC PERSPECTIVE

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The Early Pleistocene was time of change in the faunas across Africa and Eurasia: important climatic oscillations affecting the environment globally produced, with a certain degree of simplification, a trend of progressively increasing aridity. The decrease of humidity allowed the expansion of more and more open habitats and, consequently, the dispersal across and between these continents of taxa adapted to these environments. Canidae radiated greatly during the Pliocene in Eurasia and Africa and reached a considerable diversity, possibly in consequence of these environmental changes during the Late Pliocene-Early Pleistocene. Vulpini are represented by the genera *Nyctereutes* and *Vulpes*, both widespread across Eurasia and Africa although the record of the latter is scarcer and less diverse than the former. *Nyctereutes* is a typical element of the Pliocene of Eurasia but reaches its highest diversity in the Gelasian, before disappearing shortly after 2.0 Ma. Unlike *Vulpes*, whose species can adapt to open/arid environments, *Nyctereutes* was possibly related to closed/wooded habitats. Although during the Pliocene the genus *Eucyon* ranged across the three continents, records of the Pleistocene remained limited to Europe and Asia and, in the Gelasian, the number of its species dwindled until it remained confined to central and eastern Asia. Compelling evidence suggests that members of the genus *Canis* started their dispersal shortly after their appearance in Eurasia and Africa (i.e., Late Pliocene). The Gelasian marks the moment of radiation of the medium- to large-sized true dogs with distinct modern cursorial adaptations. Moreover, from this timeframe on, *Canis*-grade canids occupy prominent roles in the respective carnivore guild of Eurasia and Africa. Observing the taxonomic composition of the Early Pleistocene canid guild, a predominance toward more cursorial and carnivorous forms is a clear evolutionary trend, especially for the medium-large species and for the small species, respectively.

DISSCO RI: TOWARDS A EUROPEAN INFRASTRUCTURE FOR SCIENTIFIC COLLECTIONS

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European Natural Sciences Collections (NSCs) consist of around 1.5 billion specimens that are crucial for answering fundamental scientific questions about ecological, evolutionary, and geological processes. In the last decades the volume and diversity of information derived from NSCs exponentially increased due to the digital transformation. A holistic approach is therefore required, where cross-linked information effectively underpins the entire research life cycle and provides open access to mass and precise data for researchers. The Distributed System of Scientific Collections (DiSSCo) is a world-class Research Infrastructure (RI) for NSCs currently in its transition phase. The DiSSCo RI aims to create a new organisational model for collections that digitally unifies all European NSCs under common access, curation, policies and practices ensuring that all the data follow FAIR principles. DiSSCo thus represents the largest ever formal agreement between natural history museums and collection-holding universities. The digitisation of the NSC of the Natural History Museum (NHM) of the University of Florence - one of the largest and most diversified in Italy - is an ongoing, pioneering case study. The NHM of the University of Florence represents, in fact, the current Italian National Node of the DiSSCo Prepare Project (2020 – 2023) and is playing a key role in establishing innovative relationships between its internal Collection Management System (CMS) and: i) ArCo, i.e. the Knowledge Graph of the Italian Cultural Heritage promoted by the Italian Central Institute for Catalogue and Documentation and the Italian National Research Council (CNR), ii) the General Catalogue of Italian Cultural Heritage web portal created by the ICCD (almost 3 million catalogue records) and, finally iii) the DiSSCo RI. In particular, ArCo ontology network, adopted by Agenzia per l'Italia Digitale (AgID), allows the representation on the semantic web of ICCD standards for natural heritage.

MIDDLE TRIASSIC: THE ONSET OF MODERN TERRESTRIAL TETRAPOD FAUNAS

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At the start of the Mesozoic Era, the Triassic witnessed a world left devastated by the Permian-Triassic Mass Extinction (PTME), in which only about 10% of species had survived the PTME. The Early-Middle Triassic was a time of unusual diversification of life, leading to the development of modern ecosystems. On land, the recovery was slow and stepwise. The Early Triassic unbalanced “disaster fauna” gradually changed, eventually building more complex ecosystems at the beginning of the Middle Triassic. In this contribution, we present the preliminary results of a review of Middle Triassic terrestrial tetrapod faunas around the world, obtained by performing a semi-quantitative analysis of a comprehensive dataset. Cluster analysis performed on a taxon presence-absence matrix reveals the presence of three distinct major clusters: 1) a Gondwanan fauna in the Southern Hemisphere, dominated by therapsids, partly still reflecting a Late Permian and Early Triassic distribution of this group; 2) an Asian fauna inhabiting the Russian and Chinese regions, which clusters with the Gondwanan fauna, contrary to the condition characterising the Early Triassic; 3) a European-North American-North African fauna, occupying the Western part of the Northern Hemisphere, dominated by derived archosauriforms and lepidosauromorphs. From a more general perspective, a higher diversity in the Northern Hemisphere sub-equatorial zone is detected, as also reported for the Late Permian; temnospondyls were ubiquitous, although showing a preference for higher warm-temperate latitudes on both hemispheres; avemetarsalians are found both among the North-Western faunas and the Gondwanan faunas with no record from the Asian regions; pseudosuchians were particularly abundant in the Northern Hemisphere, with a distribution opposite to that of therapsids. Overall, these preliminary results provide insights into the evolution and establishment of stable terrestrial ecosystems during the Middle Triassic.

NEOGENE COLD-SEEP MICROBIAL CARBONATES (CROTONE BASIN - SOUTH ITALY)

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For the first time, the Neogene cold seep carbonate deposits of the Croton Basin (south Italy) are described. These deposits form a carbonate body reaching a maximum length of 350 m and a thickness of 40 m and are characterized by a conduit facies made of authigenic carbonates filling the previously active gas/fluid escape pipes. In addition, a pavement facies is observed, which consists of early carbonate-cemented bioclastic and siliciclastic sediments commonly colonized by a chemosynthetic macrofauna dominated by articulated and in life-position Lucinids bivalves. The conduit facies is characterized by the inward accretion of dark micritic laminae alternating with clear crystalline layers. The micritic laminae show a microbial peloidal to dendrolitic fabric, which commonly incorporates planktonic foraminifera and coprolites. These contrast with the crystalline layers, which are characterized by microspar laminae and sparry crusts made of prismatic zoned calcite crystals. The pavement facies is characterized by laminated microbial boundstones, bioclastic bearing micrite, foraminiferal oozes and hybrid arenites. The foraminiferal assemblage is characterized exclusively by planktonic forms which, together with the relative proportion of sandy/silty grains, suggest a deep-water setting with occasional siliciclastic coarser sedimentary flows. The pavement facies shows common brecciation features, possibly indicating the establishment of post-depositional overpressure conditions due to gas/fluid injection. Clasts of breccias show overgrowth by primary fibrous to acicular isopachous to fan-shaped calcite cement. Stable isotope analysis of all the studied facies reveals negative $\delta^{13}\text{C}$ values (-6.82 to -37.39 ‰) and relatively positive $\delta^{18}\text{O}$ values (-0.04 to 3.39 ‰), most probably indicating the presence of a complex mixture of methane with other hydrocarbons and the destabilization of gas hydrates and/or dehydration of clay minerals.

EOCENE STILT WALKERS: UNIQUE ROTATORY GROWTH STRATEGY OF THE SCLERACTINIAN CORAL *STYLOCOENIA*

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The diversity of scleractinian corals is marked by a plethora of their growth forms. At least some of these habits are considered adaptive to different environmental factors, and consequently, coral growth forms are often used as indirect paleoenvironmental indicators in the fossil record. Most shallow-water colonial corals attach to the hard substrate, but exceptions include some free-living taxa and some spherical coral colonies that are entirely covered by living tissues. The latter are described under different names, i.e., rotatory, circumrotatory, and coralliths, but also informally called “rolling stones”. Various authors have provided different, sometimes controversial interpretations of their growth mechanism and strategy. As a result, their fossil record is poorly explored, and only a few studies focused on comparing present-day rotatory corals to Pleistocene (scleractinians) and Silurian (tabulates) corals. Herein, we provide the first comprehensive analysis of the “rotatory” strategy of extinct, Cenozoic colonial scleractinian *Stylocoenia*, known from some Eocene species. We examined macro- and micromorphology and skeletal microstructure of 60+ specimens of Eocene *Stylocoenia* sp. from Veneto region (N Italy) and Bavaria (Germany) that we found in several museums and private collections. Representatives of *Stylocoenia* form perfectly spherical cerioid colonies with unique, long pillars developed between the corallites. Intercorallite pillars of variable length and thickness show a multi-layered structure and longitudinal ridges. Similar but much smaller pillar-structures (or styles) are developed only in some modern pocilloporiids (*Pocillopora*, *Stylocoeniella*). Although some tissue-protective functions were suggested for styles in modern pocilloporiids, in *Stylocoenia*, these structures could also play the role of “stilts” to avoid sinking in mobile and fine-grained sediments. This interpretation, together with taphonomic signatures, allows us to reconstruct the original habitat of these corals otherwise only known from collections.

CUTICLES: A WORLD WAITING TO BE DISCOVERED

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Cuticles are poorly studied and not well-known, both in botany and in paleobotany, also because they preserve as fossils only under special conditions. However, cuticles are essential parts of a plant. They permit plants to live under aerial conditions and protect them from desiccation and high mutation rates, among others. This waxy coating layer, composed of cutin, covers all plant organs dealing with photosynthesis, and protects them from excessive transpiration while allowing them, at the same time, to exchange oxygen and carbon dioxide. To convey the importance and beauty of the cuticles, a workshop has been designed for adults and/or students. The workshop includes a theoretical part that introduces to the topic and a practical part with hands-on experience with preparation of modern cuticles. Several extracting and staining methods for cuticles were tested, the easiest one turned out to be a “peeling method” of certain leaves such as tulips and cyclamens, which did not necessitate any colouring to be observed. The obtained cuticles were drawn and described with the help of observation keys and explanatory drawings for the study under the microscope. As the last step, participants try to extrapolate the acquired knowledge on extant cuticles by observing exceptionally preserved cuticles from the upper Permian of the Bletterbach. The presence of simplified drawings of the cuticle structures, previously identified in the area, permit participants to identify also 260 million years old cuticles. This does not only consent to fill the gap between botany and paleobotany but it allows as well to form interested citizen scientists.

**THE RHAMPHOSIDAE (TELEOSTEI, SYNGNATHIFORMES) FROM THE EOCENE OF
BOLCA**

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The family Rhamphosidae is a peculiar group of extinct bony fishes exclusively known from the Eocene of Europe, the majority of which has been discovered from the upper Ypresian Konservat-Lagerstätte of Bolca (Verona Province, Italy). The first fossils pertaining to this family were found and described in the 18th century (Volta, 1796-1809), cursorily reviewed by Eastman (1914) and Nielsen (1960), and more recently discussed by Pietsch (1978). A revision of the Rhamphosidae allowed to refer this family to the order of Syngnathiformes, revealing a close affinity to the Pegasidae and Dactylopteridae. The examined material consists of 21 specimens from the “Pesciara” site of Bolca and is housed in the collections of the Museum of Natural History of Verona (Italy), the Museum of Nature and Humankind of the University of Padova (Italy) and the Carnegie Museum of Natural History, Pittsburgh (Pennsylvania, USA). Rhamphosidae are also reported outside Italy from the Fur Formation of Denmark, being represented by a few specimens assigned to the species *Rhamphosus rosenkrantzi*. The morphological analysis of the skeletal anatomy of the members of the Rhamphosidae revealed a suite of skeletal features that are shared with those belonging to the families Dactylopteridae and Pegasidae.

Eastman C.R. (1914). Catalogue of the fossil fishes in the Carnegie Museum. Part II. *Memoirs of the Carnegie Museum*, 6: 315-348.

Nielsen E. (1960). A new Eocene teleost from Denmark. *Meddelelser Dansk Geologisk Forening*, 14: 247-252.

Pietsch T.W. (1978). Evolutionary relationships of Sea Moths (Teleostei: Pegasidae) with a Classification of Gasterosteiform Families. *Copeia*, 1978: 517-529.

Volta G.S. (1796-1809). Ittiolitologia Veronese del Museo Bozziano ora annesso a quello del Conte Giovambattista Gazola e di altri gabinetti fossili veronesi. Stamperia Giuliani, Verona: I-LII+I-CCCXXIII, pl. I-LXXXVI.

THE DAWN OF MOORISH IDOLS (TELEOSTEI, ZANCLIDAE) IN THE EOCENE OF BOLCA

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The acanthuriform family Zanclidae comprises sponge-eating reef fishes exhibiting bright colours. These fishes, commonly known as moorish idols, have a deep and laterally compressed body, accentuated by elongate dorsal-fin spines and a pronounced snout with setiform teeth. Substantial morphological and ontogenetic evidence supports a sister-group relationship between moorish idols and surgeonfishes of the family Acanthuridae (e.g., Tyler et al., 1989). Today, the family Zanclidae is represented by a single species, *Zanclus cornutus*, which is widespread throughout the Indo-Pacific. The known fossil record of the moorish idols is restricted to four specimens from the Eocene of Bolca referred by Blot & Voruz (1970, 1975) to the species *Eozanclus brevirostris*. A detailed revision of the available material from Bolca, including a recently discovered specimen, revealed the presence of two separate taxa, one of which has not previously been recognized and represents a new genus and species. The new and previously undescribed taxon represents the sister group to the extant *Zanclus cornutus* with which it shares a number of morphological features (e.g., body discoid and very deep, snout greatly elongate, pre-anal distance >70% SL, pectoral disc notably expanded, one supernumerary dorsal-fin spine). Therefore, the analysis of the fossil record suggests that the zanclids might have originated in the early Cenozoic and that their morphological diversity was higher in the Eocene.

Blot J. & Voruz C. (1970). Les poissons fossiles du Monte Bolca: La famille des Zanclidae. *Memorie del Museo Civico di Storia Naturale di Verona*, 18: 31-42.

Blot J. & Voruz C. (1975). La famille des Zanclidae. *Studi e Ricerche sui Giacimenti Terziari di Bolca*, 2: 233-271.

Tyler J.C., Johnson G.D., Nakamura I. & Collette B.B. (1989). Morphology of *Luvarus imperialis* (Luvaridae), with a phylogenetic analysis of the Acanthuroidei (Pisces). *Smithsonian Contributions to Zoology*, 485: 1-78.

ARE THE MISSISSIPPIAN MUD-DOMINATED CARBONATE BUILDUPS OF DERBYSHIRE “MUD MOUNDS”?

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The upper Mississippian succession of the Derbyshire Carbonate Platform (UK) hosts lens-shaped, decimeter-scale, carbonate mud-dominated buildups. The buildups host abundant bryozoans, brachiopods, siliceous sponges, and crinoids, which do not form a rigid framework. Carbonate mud is both detrital (allomicrite) and precipitated in situ from biologically-induced and influenced processes associated with microbial mats and siliceous sponges (automicrite). Being laterally confined biogenic structures, these buildups can be included in the definition of reefs by Flügel & Kiessling (2002). The detailed study of the Derbyshire buildups raised the need to investigate the nature of Mississippian reefs, which usually lack a skeletal framework and are mud-rich. In literature, they have been referred to different categories based on the amount of carbonate mud, automicrite vs allomicrite, inferred role of microbial mats and metazoans and content and type of skeletal biota. Various terms were introduced in the literature such as mud mounds, carbonate mounds, mud banks, reef knolls, microbial mounds, reef mounds. However, most are interpretative subjective terms which meaning changed through time. Literature review shows that most Mississippian reefs may be included in the definition of mud mounds given by various authors in the '90s: carbonate buildups having depositional relief and being composed dominantly of carbonate mud, or micrite (Bosence & Bridges, 1995). In particular, the Derbyshire buildups represent a newly defined sub-category of mud mounds dominated by fenestellid bryozoans, brachiopods and sponge spicules.

Bosence D.W.J. & Bridges P.H. (1995). A review of the origin and evolution of carbonate mud mounds. *In* Monty C.L. et al. (eds), Carbonate mud mounds: their origin and evolution. *IAS Special Publication*, 23: 3-9.

Flügel E. & Kiessling W. (2002). A new look at ancient reefs. *In* Kiessling W. et al. (eds), Phanerozoic reef patterns. *SEPM Special Publications*, 72: 3-10.

**RISPOSTA DELLE ASSOCIAZIONI A FORAMINIFERI ALLE OSCILLAZIONI CLIMATICHE
DURANTE IL GELASIANO- CALABRIANO: DATI OTTENUTI DALLA SUCCESSIONE DI
CAPO ROSSELLO (SICILIA)**

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Il Gelasiano rappresenta il primo piano del Pleistocene (2.58-1.80 Ma) ed è stato definito nella successione di Monte San Nicola (MSN) Gela, poco sopra la base del sapropel “NICOLA BED” (MIS 103), quasi in coincidenza con l’inversione magnetica Gauss/Matuyama. Dal punto di vista biostratigrafico, la base del Gelasiano non coincide con alcun evento biostratigrafico a foraminiferi e nannofossili calcarei, anche se poco sopra la base inizia la drastica riduzione dei discoasteridi con la conseguente estinzione di *Discoaster pentaradiatus* e l’aumento in abbondanza di *Neoglobobadrina atlantica*. Capo Rossello rappresenta una delle successioni più complete al mondo dell’intervallo Messiniano-Calabriano ed è stata calibrata astronomicamente. Essa è una eccellente successione, per confronto e correlazione con quella di MSN, che ricopre l’intervallo compreso tra 2.60 a 1.53 Ma (MIS 103-53). In questo lavoro presentiamo i dati sugli isotopi stabili, misurati sui gusci di *Uvigerina peregrina*, e le oscillazioni a foraminiferi. I dati, correlati anche con gli alchenoni, evidenziano una forte riduzione della temperatura nei MIS 100, 78 e 66. In particolare, nel MIS 66 (1.85 Ma) è stata riscontrata una forte riduzione della temperatura delle acque superficiali (circa 8°C), che coincide con la diminuzione delle specie di acque calde e con un drastico cambiamento nell’associazione bentonica.

**TEMPO E MODO NELL'EVOLUZIONE DELLA NICCHIA CLIMATICA IN DINOSAURIA
(SAUROPSIDA: ARCHOSAURIA)**

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Il clade Dinosauria è un ottimo candidato per lo studio degli effetti del clima sulla macroevoluzione dei vertebrati, avendo attraversato numerosi cambiamenti climatici e paleogeografici sin dalla sua origine, ~235 milioni di anni fa (Ma). Per questo studio è stato generato un registro basato su esemplari di tutti i taxa di dinosauri fossili ad oggi noti (uccelli inclusi), includendo la loro provenienza geografica e cronostratigrafica. Le coordinate paleogeografiche, una volta ricostruite, sono state calibrate con modelli paleoclimatici del Mesozoico (HadCM3L). Una serie di matrici filogenetiche sui principali sottogruppi di dinosauri (Ornithischia, Sauropodomorpha, Theropoda) è stata analizzata con analisi Bayesiane. L'evoluzione della nicchia climatica dei dinosauri è stata quindi ricostruita calibrando variabili climatiche e alberi filogenetici tramite metodi analitici di filogenesi comparata: ciò ha permesso di confrontare le tendenze evolutive nella nicchia climatica dinosauriana con modelli di evoluzione a regimi multipli (Ornstein-Uhlenbeck). Mappando l'esplorazione dello spazio adattativo dipendente dal paleoclima, sono emersi regimi evolutivi multipli in Theropoda, con una sostanziale accelerazione nell'occupazione di una più ampia nicchia climatica rispetto al Triassico Superiore nel Giurassico Medio (170 Ma). Ornithischia ha occupato un ampio spazio climatico sin dalla sua comparsa nel registro fossilifero durante il Giurassico Inferiore (200 Ma). Sauropodomorpha mostra un'accelerazione di tasso evolutivo durante il limite fra Triassico e Giurassico (201 Ma), esplorando uno spazio climatico più ridotto e fortemente determinato da una ristretta gamma di temperature rispetto agli altri gruppi. Questi risultati hanno permesso di verificare in maniera quantitativa, applicando principi macroevolutivi originariamente definiti da G. G. Simpson, come i cambiamenti climatici a grandi scale spaziali e temporali, abbiano influenzato la macroevoluzione dei dinosauri.

CENOZOIC CARBONATE FACIES OF ASIA: THE HIDDEN POTENTIAL OF THE SHALLOW WATER RECORD

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The changes in carbonate facies over time are the result of both evolution and changes in environmental conditions. These biotic and abiotic elements are often hard to separate due to difficulties in tracking large-scale facies changes across time and space in a quantitative fashion. This research presents the results of a standardized re-analysis of 144 Paleocene to Miocene, shallow-water carbonates successions, situated in an area comprised between Levant and Bangladesh. Our results indicate that larger benthic foraminifera were the most important group of carbonate producers during the whole period, peaking in the Eocene. Colonial corals and red calcareous algae are common during the Paleocene, Miocene and, in particular, during the Oligocene; whereas they are essentially absent during the Eocene. Green calcareous algae are the fourth and least abundant group of carbonate producers and their abundance decreases from the Paleocene onward. The abundance of both larger benthic foraminifera and colonial corals displays a clear connection with global average temperatures, with extremely warm temperatures favoring the former and milder conditions favoring the latter. The similarity between colonial corals and red calcareous algae suggests that, overall, conditions favorable for the former are also good for the latter, and/or of a positive interaction between the two groups on the large scale. The progressive decline of green calcareous algae could be related to a preservation bias caused by the transition from early Paleogene assemblages with possibly calcitic taxa, to Neogene assemblages entirely constituted of aragonitic taxa with a limited preservation potential. Overall, these results display a significant agreement between the abundance of the various groups of carbonate producers and large-scale processes, showcasing the remarkable potential of shallow-water carbonates for global-scale paleoenvironmental reconstructions.

**MOLLUSC SHELLS AS A TOOL TO RECONSTRUCT THE PALAEOENVIRONMENT AND
THE PALAEOCLIMATE IN THE HAS1 SETTLEMENT (HOLOCENE, OMAN)**

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Mollusc shells are a common component of many archaeological assemblages, as they occur in quite all the environments occupied or exploited by humans in the past. Therefore, shells from archaeological deposits have a significant and growing potential for reconstructing palaeoenvironments and human-environment interactions. For example, the HAS1 settlement (Iron Age and Classical Period) in the Khor Rori Archaeological Park in the Dhofar region, southern Oman, show rich mollusc assemblages in the circular structures within the settlement and in a shell midden nearby. By analyzing the environmental requirements of the mollusc species identified, we reconstruct the past coastal environment during human occupation (9th century BC - 2nd century AD). Also, to reconstruct the palaeoclimate, we analysed through a high-resolution sclerochronological approach ten pristine mollusc specimens belonging to three species, namely, *Anadara uropigimelana*, *Tivela stefaninii*, and *Oliva bulbosa*. Our results show that the environment surrounding the HAS1 settlement was characterised by partially rocky shores and shallow-water sandy to sandy-muddy substrates, where the local population was used to collect shells. Indeed, mainly intertidal to shallow infralittoral taxa were recovered, both infaunal and epifaunal ones. Characteristics species of mangrove settings were recovered in very few numbers, indicating that this environment was not present or was restricted during the analysed time interval.

**DOUBLE-PHASED BIOMINERALIZATION PROCESSES IN MARINE INVERTEBRATES:
THE EXAMPLE OF CIRRATULIDS (POLYCHAETA, ANNELIDA) FROM SOUTHERN PERU**

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Carbonate biomineralization in marine organisms normally occurs as three distinct types, known respectively as: “controlled”, “induced” and “influenced”. Among invertebrates, reef-building tubeworms belonging to the family Cirratulidae appear to provide us with the first known example of “double-phased” biomineralization as they simultaneously combine controlled and induced biomineralization types in the formation process of their tubes. Miocene (*Diplochaetetes*) and Recent (*Dodecaceria*) bioconstructions from southern Peru were studied to investigate the mineral structure of cirratulids: the primary ultrastructure of the tube walls points to controlled biomineralization, while the “intertube” areas between walls filled by a calcareous matrix, frequently with agglutinating extraneous sand grains, are deemed the product of an induced biomineralization. The means by which this double biomineralization process occurs have yet to be described in detail. This study is therefore focused on this aspect by examining cirratulid aggregates via optical microscopy, epifluorescence, SEM, EDS analyses and morphometry. Results have also been statistically evaluated in order to detect the possible relationship between the size and chemical composition of the skeletal component and the morphology of the bioconstructions which in turn hints to environmental parameters. Both fossils and recent specimens show similar correlations among composition and morphometric parameters, suggesting that the development/evolution of these bioconstructions is presumably unaffected by environmental chemical/physical conditions. The peculiar double phased biomineralization system of cirratulids seems not evolved since the Eocene, when they appeared.

SEASONAL GROWTH PATTERNS OF PECTINIDS FROM THE WARM MEDITERRANEAN PLIOCENE

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Bivalves form their shells at varying rates throughout the year. Seasonal growth patterns can be identified through sclerochronological analysis, where growth increments represent interval of times in which the organism produces its shell and provide information on environmental conditions during growth, while growth lines identify periods of growth cessation, caused either by physiological processes (e.g., spawning) or abiotic factors, typically temperature. Here we compare micro-growth increments and stable-isotopes ($\delta^{13}\text{C}$, $\delta^{18}\text{O}$) of two stenohaline Pectinidae, *Gigantopecten latissimus* and *Pecten jacobaeus*, from mid-Pliocene deposits of Tuscany (Siena Basin, Italy). *G. latissimus*, with large and heavy shells, got extinct around 3.0 Ma ago; *P. jacobaeus* survived Plio-Pleistocene climate cooling and is the largest scallop inhabiting the Mediterranean Sea today. Our aim is to characterize the seasonal growth of the two species and to test if different strategies controlled species extinction or survival. The two Pectinidae show similar seasonal growth patterns, typical of bivalves of subtropical affinity, with higher growth rates during colder months and slower rates during warm periods, with summer cessation. *G. latissimus*, however, shows higher correlation between $\delta^{18}\text{O}$ and growth increments compared to *P. jacobaeus*, suggesting that temperature was a primary factor controlling its growth. Considering that in many subtropical bivalves, summer growth cessation coincides with the spawning period, we hypothesize that a drastic decrease in summer temperature after 3.0 Ma, hampered the reproduction potential of *G. latissimus* contributing to its extinction. The survival of *P. jacobaeus* can be explained instead by a less specialized life strategy. Studies on modern species indicate that it has multiple spawning intervals through the year, making it more adapted to a changing climate.

**MORPHOMETRIC ANALYSES OF THE PLIOCENE OYSTERS FROM BUTTIGLIERA
D’ASTI (ASTI, NW ITALY)**

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The aim of this study is the morphometric analyses of the Pliocene oysters from Buttigliera d’Asti (Asti). The most common oyster species is represented by *Ostrea edulis* Linnaeus, 1758, initially attributed to *Ostrea lamellosa* Brocchi, 1814, stored at “Museo Regionale di Scienze Naturali” of Turin (thanks to Dr. Annalaura Pistarino for the availability of the material). These samples (more than a hundred specimens) come from the outcrop called “Bosco delle Conchiglie”, a locality investigated by Caretto in 1982. The facies exposed at this outcrop is comparable to that described by Caretto himself (1981) for the locality “Becchi” of Castelnuovo Don Bosco (Asti), referred to the Middle-Upper Pliocene. The taxonomic revision is currently in progress; however, a preliminary morphometric study was conducted on the specimens of the collection. The applied parameters are: shell height (H), maximum shell length (W), hinge length (W1), distance between the resilifer area and the upper part of the muscle scar (H1), ventral length (W2), distance between the lower part of the muscle scar and the ventral margin (H2) and opening angle of the muscle scar (α), ratios W/H, W1/H1 and W2/H2. In particular, a database of points, landmarks and outlines has been created, in order to understand the abundance trend of specimens and their morphological development, in relation to the distribution of characters, respect to the left and right valves outlines. As for the samples of the Valle Botto area (Asti), “Riserva Naturale Valle Andona, Valle Botto e Valle Grande”, studied previously, it has been tried to verify if a morphological imprint of typical features for each “subgroups” with the same morphological peculiarity could have occurred. The study is in the preliminary phase, but it promises good utility in the analysis of the most similar specimens attributable to different “subgroups”.

Caretto P.G. (1981). Notizie preliminari su paleofaune a molluschi della località “Becchi” di Castelnuovo Don Bosco, Asti (Pliocene medio-superiore). *Natura-Rivista di Scienze Naturali*, 72: 175-184.

**NEW ALLODAPOSUCHID REMAINS FROM THE LATE CRETACEOUS OF CATALONIA
(SPAIN): INSIGHTS INTO DERMAL AND POSTCRANIAL SKELETAL ANATOMY**

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The Late Cretaceous of Europe was a pivotal time for the origin and early radiation of Crocodylia, the group containing all extant crocodylians. Notably, the most common crocodyliforms in this period are the allodaposuchids, whose remains are found in Spain, France, and Romania. Allodaposuchidae is a controversial and recently established clade, but its postcranial record is poorly documented. Here, we describe a new allodaposuchid specimen from the Fontllonga-6 fossil site (Àger Basin, NE Spain) in the lower red unit of the Tremp Formation (early-late Maastrichtian). The specimen is represented by teeth, postcranial, and dermal skeleton remains, and is the most complete crocodyliform from the Late Cretaceous of Spain, with over 30% of the skeleton recovered, including more than 70 osteoderms. Although some of the teeth recovered show diagnostic ornamentations for *Allodaposuchus palustris*, a confident taxonomic assignment is challenging due to poor postcranial record of the group. Taphonomic analyses reveal a disarticulated but probably autochthonous accumulation of bones. The specimen exhibits heterodonty, massive vertebrae, a large ribcage, and the recovered osteoderms show diverse morphology and size, providing insight into the position of these elements in the dermal skeleton. The overall morphology of the specimen suggests a bulky body, with a massive pectoral girdle that shows large areas of muscle attachment, and resembles that of *Allodaposuchus hulki*. This new finding sheds light on the poorly documented postcranial morphology of allodaposuchids, providing new insight into the diversity and ecology of crocodyliforms in the Late Cretaceous of Europe.

Thanks to Adriana Vilaró i Filella and Antoni Lacasa (Institut d'Estudis Ilerdencs), and Xavier Delclòs (Universitat de Barcelona). This research is part of the project I+D+i/PID2020-119811GB-I00 funded by MCIN/AEI/10.13039/501100011033/, the project ARQ001SOL-173-2022 funded by Departament de Cultura, and the CERCA Programme (Generalitat de Catalunya).

DEEPBRYO: A WEB APP FOR BRYOZOAN AI-ASSISTED MORPHOMETRIC CHARACTERIZATION

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The colonial invertebrate phylum Bryozoa has played a fundamental role in classical debates on tempo and mode of morphological evolution. The order Cheilostomatida, in particular, shows a high degree of modularity and division of labor in the colonies: genetically identical, calcified modules develop into a wide array of polymorphs devoted to functions such as feeding, reproduction and defense. Thus, colony-level allocation of resources can be estimated from skeletal features using simple morphometric tools, providing a unique opportunity to study ecological and life-history traits in the fossil record. However, morphometric characterization of bryozoans is notoriously labored. It is usually carried out manually by a dwindling number of taxonomic experts, a process that is low-throughput, costly, and time-consuming to reproduce. Here, we present DeepBryo, a web app for deep learning-based morphometric characterization of cheilostome bryozoans from SEM images. DeepBryo tackles the problem of instance segmentation using state-of-the-art transformer models wrapped in a simple interface. The app detects objects belonging to six classes and outputs 14 morphological shape measurements for each object. The model shows high recall and precision for module-level structures and structure-level measurements are statistically indistinguishable from those obtained via manual annotation. DeepBryo reduces the person-hours necessary to process individual colonies to less than 1% of the time required for manual annotation making morphometric characterization of bryozoans cost-labor and time-efficient. This can greatly increase the scale of macroevolutionary and paleobiological analyses based on this model system. Lastly, with small changes in the source code, the object detection abilities of DeepBryo can be combined with other approaches, e.g., automated landmarking algorithms, and the repository contains all building blocks necessary to adapt the tool to other study systems.

**THE SILICIFIED MOLLUSCS OF PELSA-VAZZOLER (EASTERN DOLOMITES, ITALY) AND
THE LATE MIDDLE TRIASSIC DIVERSIFICATION OF MARINE LIFE**

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The Middle Triassic was a crucial time for the recovery of benthic marine communities after the end-Permian mass extinction. Following an Early Triassic lag phase, a global hyperbolic diversity increase is recorded in the Anisian, connected with the resurgence of large carbonate platforms. In the framework of this diversification, we studied a silicified, upper Ladinian invertebrate fauna recovered from limestones near the Vazzoler lodge, facing Mount Pelsa (Agordino Dolomiti). Facies analysis suggests that the Pelsa-Vazzoler shell beds were transported from a back-reef environment into a moderately-deep intraplatform lagoon. Intercalated fossil assemblages include fishes, plants and insects. The highly diversified marine invertebrate fauna is dominated by benthic molluscs, with subordinate cnidarians, brachiopods, sponges and echinoderms. The taxonomic study revealed 25 bivalve, 51 gastropod and one scaphopod species, for a total richness of 77 species in about 3000 molluscs specimens from seven bulk samples. The vast majority of the species have sizes smaller than 10 mm. The high diversity of gastropods suggests a strong effect of biotic interactions on rates of diversification, relating high richness of small herbivores with new niches made available by producers of carbonate platforms. This new finding fills a knowledge gap between the upper Anisian-lower Ladinian diversity plateau and the exceptional early Late Triassic Lagerstätte of the San Cassiano Formation, also in the Dolomites. The Cassian fauna yields the highest species richness reported from any pre-Cenozoic formation known to science, amounting to a total of 857 species of benthic molluscs recovered in 30 localities. The Pelsa-Vazzoler alpha diversity $S=77$ is comparable to the mean value of 96 species per locality of the famous Cassian 'liberation Lagerstätte', or possibly larger if one considers that the latter are known thanks to almost two centuries of collection effort and taxonomic research.

ASSESSING RELEVANCE AND VULNERABILITY OF PALAEOLOGICAL SITES: AN ANALYTICAL PROCEDURE

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Every year, hundreds of square kilometres are affected by land development projects that may result in the destruction of everything preserved in the sediments. Geopalaeontological heritage, however, rarely receives the same legislative attention reserved to the archaeological one. Part of the problem seems to be, at least in some contexts, the difficulty to acknowledge fossils as distinct assets from other cultural heritage objects and the lack of expertise among the administrative functionaries. For this purpose, the Earth Science Department of the University of Florence is carrying out a PhD project focused on the evaluation, planning and practical intervention of vulnerable areas of Tuscany using GIS. This study aims to describe and test an objective analytic operational procedure that could allow assessing the relevance of any fossiliferous site and its potential vulnerability in its present state. The estimations were obtained using numerous quantitative and qualitative parameters that could describe the probability of fossil discovery for each site (Pr) and scientific and cultural interest of the locality (In). Further subcategories refine these parameters, improving their definition. Simple equations are used to obtain two main indexes: the Site Relevance (R^*), generally expressed as a percentage, and the Vulnerability index (V). Such indexes are made to be applicable to any type of locality, from those with tracks and indirect evidence to direct fossil-bearing sites. To assess the validity of the methodology we tested the indexes on several localities, different from several features (e.g., site extension, site typology, fossil richness and diversity). The results show that the proposed indexes properly describe and characterize each locality. Such an operational procedure is a simple and objective method allowing palaeontologists and non-expert personnel to categorize localities, and therefore act as a base to plan actions in geopalaeontological heritage management, relative to territorial development and land use.

60 YEARS OF THE ITALIAN PALEONTOLOGICAL SOCIETY THROUGH ITS JOURNAL

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The recent reorganization of the *Bollettino della Società Paleontologica Italiana*, with the setting up of an electronic platform for article submission and the completion of the digital archive, enabled as well to revisit the history of the Italian Paleontological Society. Founded in 1947, the Society was officially established in the form of an Association in 1960 when it became obvious to a group of attendees that there was sufficient interest to form a Society. Simultaneously, the Society decided to publish its own journal, named *Bollettino*, with the specific aim of adhering to “*the desire, expressed many times by the Members, to have a national gymnasium of their own, for scientific activity of a clear paleontological nature*” (Montanaro Gallitelli, 1960). Initially published twice a year, the journal shifted later to three issues a year. The language also evolved from contributions in Italian, German, English, French and Spanish to submissions in Italian and English and, recently, only in English. The earliest annual reviews of the social activity are the most direct way to meet the Society through the years, with descriptions rich in anecdotes of the first large meetings, detailed reports of the weather conditions and curiosities (and mistakes) of the past Presidents. What is even more striking is that the original rules given by the Editor in the first page of the *Bollettino* keep being so deeply alive: “*Whoever the editor is tomorrow, let us ask him/her to be relentless in his/her criticism of the authors, as long as the criticism does not demolish but improves. In this way ... the works will be useful, clear and readable*” (Montanaro Gallitelli, 1960). During the past 60 years, the Society has been alive also through its journal thanks to the many pioneers and scientists who have contributed and disseminated research in all fields of paleontology. This presentation will highlight the changes of a Society that is now celebrating over 75 years of progress.

Montanaro Gallitelli E. (1960). Premessa. *Bollettino della Società Paleontologica Italiana*, 1(1).

**REASSESSMENT OF A PUTATIVE PELTOPLEURID FISH FROM THE SINEMURIAN
(LOWER JURASSIC) OF OSTENO (COMO, ITALY): PRELIMINARY RESULTS**

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Between 1964 and 1980, the Museo di Storia Naturale di Milano conducted a series of excavations in the Sinemurian Osteno Quarry (Lugano Lake, Como, Italy), resulting in the discovery of hundreds of fossils, including exceptionally preserved plants, invertebrates, and about 100 fish specimens (Duffin & Patterson, 1993). Notably, one of the most distinctive fossil fish from this Jurassic site is a specimen (MSNM V659) that consists of part and counterpart of an almost complete actinopterygian, measuring about 90 mm in length. Although briefly described by Duffin & Patterson (1993), its taxonomic attribution is challenging due to the inadequate preservation, which precludes observation of most of the skull traits and offers a limited view of the unpaired fins. Duffin & Patterson (1993) suggested a certain degree of similarity to the genus *Peripeltopleurus*, primarily based on the presence of vertically elongated scales on the body flanks and broad pectoral fins. Recent research on the actinopterygian fauna of Osteno prompts a re-evaluation of its taxonomic position, taking into account that this specimen probably represents the only known Jurassic survivor of the order Peltopleuriformes, hitherto considered as restricted to Middle-Upper Triassic (Xu & Ma, 2016). Summarizing, this study will contribute to a better understanding of the evolution of actinopterygian fishes during the Lower Jurassic and of the possible persistence of the order Peltopleuriformes after the Triassic-Jurassic boundary.

Duffin C. & Patterson C. (1993). I Pesci fossili di Osteno: una nuova finestra sulla vita del Giurassico inferiore. *Palaeocronache*, 1993: 18-38.

Xu G.-H. & Ma X.-Y. (2016). A Middle Triassic stem-neopterygian fish from China sheds new light on the peltopleuriform phylogeny and internal fertilization. *Science Bulletin*, 61: 1766-1774.

THE ANALYSIS OF THE FRONTAL SINUS IN THE GENUS *EUCYON*: EVOLUTIONARY AND ECOLOGICAL INSIGHTS

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This study has analyzed the development of the frontal sinus in three different species of genus *Eucyon* (Mammalia, Canidae). The frontal sinuses are cavity of the cranium within the frontal bone, whose origin and evolutionary relevance are still poorly understood and debated even in extant canids. Moreover, no prior study has taken in consideration the analysis of this structure in fossil canids. Using Virtual Paleontology techniques, we reconstructed and analyzed these paranasal cavities aiming to explore the relationship between this structure and their phylogenetic and paleoecological influence, through the description of their development in extant and, especially, fossil species. According to the more widely accepted hypothesis, the function, morphology and size of the frontal sinus are linked to the dietary preferences and biomechanics of feeding. Indeed, their inflated shapes allow dispersing the stresses during hunting and feeding as in durofagous species, e.g., in hyenas where the frontal sinus expands greatly caudally into the sagittal crest toward the occipitals. The study focused mainly on *E. adoxus*, a poorly-known species from the Late Pliocene of Southern France, whose fossil type is particularly well preserved. The study used CT and microCT scans of the fossil and of extant specimens of the genus *Canis*, *Lupulella*, *Lycaon* and *Vulpes* to perform morphological and morphometric comparative analyses. Although this study is still preliminary, a relationship was identified between the fossil species and extant specimens, especially for what concerns the ecological adaptations. Particularly, the frontal sinus of *E. adoxus* has some affinity with that of *Canis simensis*. This hints that the two species might have had similar dietary habits, confirming the evident cranial and dentognathic affinities.

MICROBIAL BIOMINERALIZATIONS IN TIDALLY-INFLUENCED SUBTERRANEAN SETTINGS (ZINZULÙSA CAVE, CASTRO, ITALY)

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The tidally-influenced subterranean settings represent natural geomicrobiological laboratory, not yet explored, that make possible the investigation of new biomineralization processes. The peculiar chemical conditions of these environments derive from the complex mixing of seawater with freshwater and their interactions with the surrounding sediments. In particular, in the Zinzulùsa cave, the marine waters interact with organic deposits and generate hydrogen sulfide as a result of sulfate reduction. This peculiar water chemistry and the oligotrophic and aphotic conditions of this system allow the development of a unique ecosystem in which complex bacterial activities induce rare biomineralization processes. Actually, a diversified microbial community has been demonstrated to develop on the bottom and on the walls of the cave, in particular on centimeter-thick crusts that form at a depth of 3-4 m. The crusts show a variable color from the black of the external surface to the white in the most internal part, passing through different tonality of brown to the medium portion. They are formed of very fine anhedral to sub-euhedral crystals organized in irregular laminations. The thinner black external cover, few microns in thickness, is composed of ferromanganiferous oxides, while the remaining part is formed of Ca-phosphate minerals, mostly carbonate-fluoroapatite, independently from the color and texture. Diffuse spheroidal corpuscles, segmented filaments and amorphous organic matter are mixed with the minerals. The organic nature of ferromanganiferous cover and Ca-fluoroapatite is demonstrated by their high fluorescence under UV-excitation and organic bands in Raman spectra. The overall data point to biomineralization processes, induced by microbial metabolic activities or influenced by organic matter taphonomy, for the deposition of both the component of the crusts.

BETHLEHEM SUIDS RECONSIDERED: CHRONOLOGICAL AND PALEOBIOGEOGRAPHIC IMPLICATIONS

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The Pliocene is a critical period in the study of faunal exchanges between Africa and Eurasia through the “Levantine Corridor”, a biogeographic crossroad between these continental landmasses. Yet, very few Pliocene fossil localities are known from the region. The site of Bethlehem, excavated during the 1930s and 1940s (Bate, 1934, 1941; Garrod & Bate, 1937), yielded a unique fauna that has been referred to as Villafranchian (Hooijer, 1958). Over the years, the site has been either regarded as Late Pliocene or Early Pleistocene in age. Recent studies on revising the archival documentation and fauna of this unique locality had suggested an earlier age based on the proboscideans and rhinoceros (Rabinovich & Lister, 2017, Pandolfi et al., 2020). Bethlehem suids, which were assigned by Hooijer (1958) to *Sus* cf. *strozzii*, a species that would be at odds with a Pliocene age, are here reevaluated. Following comparison with relevant Pliocene and Pleistocene suids from Eurasia and Africa, Bethlehem suids are reassigned to *Sus arvernensis*. *Sus arvernensis* is a Pliocene species best represented in faunas correlative of the Triversa Faunal Unit (MN 16a), not firmly documented in the European fossil record after ca. 3 Ma. Thus, the occurrence of *S. arvernensis* is an important biochronologically constraint. The presence of the species, aligned with recent studies, suggests both a mosaic origin of African and Eurasian species and a Pliocene age for the fauna of Bethlehem.

Bate D.M.A. (1934). Discovery of a fossil elephant in Palestine. *Nature*, 134: 219.

Bate D.M.A. (1941). The bone-bearing beds in Bethlehem. *Nature*, 147: 783.

Gardner E.W. and Bate D.M.A. (1937). The bone-bearing beds of Bethlehem: their fauna and industry. *Nature*, 140: 431-433.

Hooijer D.A. (1958). An Early Pleistocene mammalian fauna from Bethlehem. *Bulletin of the British Museum (Natural History), Geology*, 3: 265-292.

Pandolfi L., Rivals F. and Rabinovich R. (2020). A new species of rhinoceros from the site of Bethlehem: ‘*Dihoplus*’ *bethlehemsis* sp. nov. (Mammalia, Rhinocerotidae). *Quaternary International*, 537: 48-60.

Rabinovich R. & Lister A.M. (2017). The earliest elephants out of Africa: Taxonomy and taphonomy of proboscidean remains from Bethlehem. *Quaternary International*, 445: 23-42.

THE FIRST KUNGURIAN FOSSIL FOREST REVEALS WETLAND CONIFERS TO THRIVE IN PERI-TETHYAN PANGAEA

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Fossil forests in-situ are valuable biological archives for the structure and setting of paleocommunities and the ecology of their organisms. Here, we present the first trees preserved in growth position from the Kungurian (early Permian) Athesian Volcanic Group, N-Italy—one of the most extensive volcanic successions in Europe. The high-resolution documentation of facies architectures and petrography and the paleontological and taphonomic characterization of the fossil content permitted reconstructing the structure, rise and demise of the forest and drawing paleoecological implications. The fossiliferous strata reflect the volcanotectonically controlled base-level rise in a limnic, possibly endorheic wetland basin from a low-relief volcanic landscape. The forest, preserved as calcified stem bases with roots, grew during a short interval of lake-level stasis on a small deltaic sheetflood fan. Less than 5 m tall trees with tabular root systems adapted to the waterlogged substrate built up the forest buried and destroyed by mass flows following rapid submergence. These obrution deposits yield para-autochthonous woody debris providing anatomical evidence of conifers as the major arborescent plants of the fossil forest. Our results not only elucidate the root architecture of Paleozoic conifers. They also document the ecomorphological plasticity of these plants and predate their appearance in wetlands to the early Permian. The evidence of lake perenniality in the studied succession is the youngest known from Europe, indicating late-icehouse aridification in the Euromerican tropics to be much more differentiated in space and time.

***PLIOVIVERROPS FAVENTINUS*, A SMALL MESSINIAN HYAENID FROM ITALY: A
REVISION**

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We present the revision of the fossil hyaenid *Plioviverrops faventinus* (latest Miocene, Cava Monticino, Brisighella, RA), probably the last and most derived species of the genus *Plioviverrops*. After the description of the abundant (and unpublished) cranial and dental material of this species, we focused on the morphological and morphometrical comparison of the species with other carnivores aiming to clarify the ecological role that this hyaenid played in the late Miocene guild. Our results indicate, by size and morphology, the families Herpestidae and Viverridae as the taxa more similar to *P. faventinus*. A range of species of these families was therefore selected to make more targeted comparisons of dental morphologies with *P. faventinus*, looking for the most similar taxa and to infer on the ecological niche occupied by the taxon under study. In further morphometric comparison, in addition to the species used for morphological comparison, several other Carnivora species (belonging to 9 families) were considered in order to have a wider and more complete vision of the morphospace occupied by *Plioviverrops faventinus*, and therefore of its possible ecological role. To perform the former, extant species have been added two other fossil species belonging to the same genus: *Plioviverrops guerini* and *Plioviverrops orbigny*. The results of the analyses do not show a clear exclusive affinity with the examined species of herpestids or with those of viverrids, suggesting that *P. faventinus* occupied an ecological niche that we can assume by and large comparable to that of *Herpestes naso* and *Viverra megaspila*. Concerning the comparative analysis with the fossil species of the genus, *P. faventinus* is more similar to *P. orbigny*. In conclusion, the analyses carried out allow us to hypothesize that *P. faventinus* was a species with a hypocarnivorous diet, based on both invertebrates and small vertebrates, but also on vegetables and other food resources (e.g., eggs).

***PACHYROCUTA*, AN ACTIVE HUNTER OR A SOCIAL SCAVENGER? INSIGHTS FROM
POSTCRANIAL MORPHOLOGY**

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Pachyrocuta brevirostris is one of the most abundantly recorded carnivoran species during the late Early Pleistocene in European large mammal assemblages. During the last decades controversies regarding its feeding behavior arose. Some researchers advocate for a strictly scavenging behavior and a kleptoparasitic relationship with sabertoothed cats, while others hypothesize a feeding behavior more similar to the extant spotted hyena. In one way or the other, all the former inferences were based on the only known putative complete skeleton of this species, a specimen from the Middle Pleistocene Zhoukoudian-1 site in China. Here we present two new partial *Pachyrocuta* skeletons from Upper Valdarno and Vallparadís Section sites, respectively. The postcranial evidence from our samples shows less marked reduction of the distal limb segments compared to previously reported measures, and body proportions more similar to *Parahyaena brunnea* than to the Late Pleistocene *Crocuta spelaea*. Additionally, our body mass estimations show a high degree of variability in body size with a range from 80 to 160 kg, estimated on both cranial and postcranial specimens. Overall, the postcranial evidence of *Pachyrocuta* shows a lower specialization for carcass transport and cursoriality as compared with extant forms. Considering its body mass, the feeding habits of *Pachyrocuta brevirostris* probably differed from that of any extant form, characterized by conspicuous food intake necessarily derived from hunting as well as scavenging.

COCCOLITHOPHORE VARIATIONS IN THE SUBANTARCTIC SOUTH PACIFIC ALONG LATE QUATERNARY GLACIAL-INTERGLACIAL CYCLES

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During IODP Expedition 383 - Dynamics of the Pacific Antarctic Circumpolar Current (Lamy et al., 2019; 2021), three sites were drilled in the Pacific sector of the Southern Ocean in order to explore changes in atmosphere-ocean-cryosphere dynamics on glacial-interglacial cycles. The Southern Ocean is a significant area influencing global ocean circulation and climate. The Antarctic Circumpolar Current (ACC), driven by strong westerly winds, is the world's strongest zonal current system that connects all three major ocean basins of the global ocean. The ACC has an important role on global climate by affecting the global Meridional Overturning Circulation and the stability of Antarctic ice sheets. It is also one of the key players in regulating atmospheric CO₂ concentration, through changes in upwelling strength and related biological productivity, and export of dissolved inorganic carbon. Here we focus on sediment cores retrieved at Sites U1539 (56°09.0655'S, 115°08.038'W, ~1600 NM west of the Strait of Magellan at 4070 m water depth) and U1540 (55°08.467'S, 114°50.515'W, ~1600 NM west of the Strait of Magellan at 3580 m water depth), located in a latitudinal transect of the central South Pacific, across the ACC. We performed quantitative analyses (i.e., coccoliths/gram of sediment estimates) and we used coccolith absolute abundance as a proxy of past carbonate export production. We consider the abundance patterns of selected species as proxies for paleoproductivity changes (e.g., small *Gephyrocapsa*) as well as temperature variations (warmer / colder taxa, e.g., *G. caribbeanica* and *Helicosphaera* spp. / *Coccolithus pelagicus*). Coccolith absolute abundances change dramatically in the studied cores, ranging from high values during interglacials (up to ~1011 coccoliths per gram of sediment during Marine Isotope Stage 11) to extremely low values during glacials, where siliceous microfossils, mainly diatoms and minor silicoflagellates, dominate.

Lamy F., Winckler G., Alvarez Zarikian C.A. & Expedition 383 Scientists (2019). Expedition 383 Preliminary Report: Dynamics of the Pacific Antarctic Circumpolar Current. International Ocean Discovery Program. <https://doi.org/10.14379/iodp.pr.383.2019>.

Lamy F., Winckler G., Alvarez Zarikian C.A. & Expedition 383 Scientists (2021). Dynamics of the Pacific Antarctic Circumpolar Current. Proceedings of the International Ocean Discovery Program, 383. <https://doi.org/10.14379/iodp.proc.383>.

**DOUBLE-ARMOURED HERRINGS (CLUPEOMORPHA: ELLIMMICHTHYIFORMES)
FROM THE LOWER CRETACEOUS OF PIETRAROJA (SOUTHERN ITALY)**

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Known since the end of the XVIII century for its exquisitely preserved fossils, the Lower Cretaceous (Albian) Plattenkalk of Pietraraja (BN, southern Italy) is one of the most celebrated Italian palaeontological sites, especially after the discovery of the first complete dinosaur skeleton found and described in Italy, *Scipionyx samniticus*, exquisitely preserving internal organs and other soft tissues. The clupeomorph fishes of the Pietraraja were among the first fishes described for this world-famous Italian Konservat-Lagerstätte. However, a detailed anatomical and phylogenetic study has never been carried out on these fishes in order to clarify their taxonomic status, systematic position, and relationships within the Clupeomorpha. The examined specimens exhibit diagnostic features that clearly support their alignment with the extinct double-armoured herring order Ellimmichthyiformes. Based on the presence of an incomplete series of heart-shaped predorsal scutes, a new combination, *Armigatus elatus* (Costa, 1850), and the new species *Armigatus plinii* Marramà & Carnevale, 2023 are recognized as the oldest representatives of the ellimmichthyiform family Armigatidae, whereas a unique combination of features allows us to recognize most of the specimens as a new representative of the family Paraclupeidae, *Paraclupea pietrarajae* Marramà & Carnevale, 2023. The presence of lower Albian species of *Armigatus* and *Paraclupea* in the Western Tethys extends the temporal and biogeographical range of these widely distributed genera, providing additional information for our understanding of the evolutionary and biogeographical history of the double-armoured herrings.

Marramà G. & Carnevale G. (2023). Double-armoured herrings (Clupeomorpha: Ellimmichthyiformes) from the Lower Cretaceous of Pietraraja (Southern Italy). *Journal of Systematic Palaeontology*, 21: 2181109.

NEW PALEONTOLOGICAL RESULTS ON THE EARLY MIDDLE PLEISTOCENE OF NOTARCHIRICO (VENOSA, SOUTHERN ITALY)

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The archaeological and paleontological site of Notarchirico (Venosa Basin, Basilicata, Italy) is a reference locality for the study of the human occupation of Mediterranean Europe during the Middle Pleistocene, the evolutionary trends of the fauna, and paleoenvironmental reconstructions during the Early-Middle Pleistocene Transition. Through the 1930s and 1950s, several archaeological and paleontological deposits were discovered in the Venosa Basin, among these Notarchirico, firstly investigated by Virginia Ginetta Chiappella in 1956. The systematic excavations started during April 1980 and continued until 1995, under the direction of Marcello Piperno, with the support of the Italian Institute of Human Paleontology (IsIPU, Anagni, Latium). The extraordinary richness of the site led to the foundation of the Paleolithic Park of Notarchirico, where part of the archeological and paleontological finds is still preserved *in situ*. After more than twenty years, a new project was resumed, coordinated by Marie-Hélène Moncel (CNRS). The aims of the new project are: i) to redefine the age of the different layers by biostratigraphy and radiometric dates; ii) to investigate the basal part of the succession (levels I-F), that was poorly excavated in the past and recently dated between 695-670 ka through ⁴⁰Ar/³⁹Ar and ESR methods; iii) to study the newly excavated materials; iv) to restudy the previous excavated collection from the Paleolithic Park of Notarchirico (stored at the National Archeological Museum of Venosa “Mario Torelli” and at the Museum of Civilizations, Rome, in addition to the fossils *in situ* exposed). Here, we will present the preliminary paleontological results of the new project in the light of the broader framework of the mammal faunal evolution during the Early-Middle Pleistocene Transition.

**IT'S TIME TO EAT: GREAT WHITE SHARK (*CARCHARODON CARCHARIAS*) BITE MARKS
ON BALAENID (RIGHT WHALE) REMAINS FROM THE PLIOCENE OF TUSCANY
(CENTRAL ITALY)**

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Modern marine waters are inhabited by more than 500 shark species. Among them, the great white shark (*Carcharodon carcharias*) represents the apex predator of the present-day global ocean. Even if *C. carcharias* is well-known as a formidable active predator of marine mammals (pinnipeds and odontocetes), it may also behave as a scavenger. In fact, several anecdotal and scientific documentation exists for white sharks feeding on floating whale carcasses, which are rich in blubber, and consequently, highly energetic. Given the latest Miocene origin of *C. carcharias*, the Plio-Pleistocene marine deposits can preserve evidence of the feeding interaction between white sharks and marine mammals in the form of bite marks on bones and/or teeth embedded into (or closely associated with) marine mammal skeletons. Here, we report on two new examples of white shark-cetacean trophic interaction from the Pliocene of Tuscany (Italy), consisting of two scapulae that are densely incised by serrated shark bite marks, up to several centimeters long. The morphology and regular denticulation of the latter allows for identifying the great white shark as the tracemaker. One scapula, stored in the Museo Geopaleontologico GAMPS of Scandicci (Italy), comes from Monterotondo Marittimo (southern Tuscany), whereas the other is part of the historic collection of Tuscan Pliocene cetaceans of the Museo G. Capellini of Bologna (Italy), but its precise provenance is actually unknown. Based on osteoanatomical considerations, these scapulae can be referred to two distinct species of small balaenids (i.e., right whales). Considering the fragmentary nature of the studied specimens, whether the observed bite marks represent scavenging or active predation could not be assessed. What is remarkable here is the kind of trophic interaction that it witnesses to, which includes members of baleen whale morphotypes that are no longer present in the modern Mediterranean Sea, not even in the rest of the global ocean.

BIVALVE RESPONSE TO PLIO-PLEISTOCENE CLIMATE CHANGE IN THE MEDITERRANEAN SEA

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The Mediterranean Sea is recognized as a hotspot of marine biodiversity. Analyzing its past biodiversity can help in understanding species response to climate change. In this study we built a species level dataset of bivalve occurrences that spans the Zanclean-Calabrian interval, a time characterized by strong climate change, with the shift from subtropical to temperate conditions. Data were gathered from the literature and, after taxonomic and chronostratigraphic revision, include a total of 400 species belonging to 68 families, collected in 138 localities from the Eastern to the Western Mediterranean Sea. We measured changes in species richness and turnover (i.e., proportion of species either gained or lost relative to the total number of species) through time, after dividing the record into four consecutive time bins. Since the number of sites and occurrences was uneven across time, with the lowest values in the Gelasian, we rarefied the data to make them statistically comparable. Our results confirm a loss of biodiversity since 3 Ma, although we find that this phenomenon was less intense and more gradual than previously estimated (loss of 17% of species from the Pliocene to the Pleistocene). We also observed that, although bivalve richness continues to decrease through time, with the loss of warm-water species, the Early Pleistocene has the highest proportion of species appearance. Species loss is counterbalanced by the introduction of boreal guests, especially during the Calabrian, which is the interval of time with the highest turnover (24%). In addition, we divided bivalve species according to different combination of tiering and feeding categories and paleoenvironments. Our results further show that among the most abundant feeding/tiering categories, suspension feeders (both infaunal and epifaunal) lost a higher proportion of species compared to infaunal deposit feeders. Similarly, we found that species loss was higher on the shoreface compared to the shelf.

ENDOCRANIAL PNEUMATIZATION OF *URSUS SPELAEUS* AND IMPLICATIONS IN THE BITE FORCE

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The cave bear (*Ursus spelaeus*) is one of the best known extinct carnivorans of the Middle-Late Pleistocene ecosystems of Eurasia. The cave bear lineage (*U. deningeri* - *U. spelaeus*) and that of the extant brown bear diverged approximately 1.2 million years ago from the common ancestor *U. etruscus*, while approximately 24,000 years ago *U. spelaeus* became extinct together with other representatives of the Pleistocene megafauna. Numerous hypotheses have been proposed about the ecology and diet of *U. spelaeus*. Early morphological studies suggested that the cave bear was likely specialized on processing tough and/or abrasive foods, while later microwear studies indicated that it was omnivorous and may have consumed more bone than *U. arctos*. Moreover, CT based simulations see the frontal sinuses as a biomechanical trade-off in mastication and as an adaptation to long hibernation periods. What emerges is still an open debate regarding an increasingly complex interpretation of the paleobiology of *U. spelaeus*. Here, we present the preliminary results on the morphology of the inner cranial pneumatizations of *U. spelaeus*, interpreted as flexible structures designed to dissipate shear stresses during the bite. Through CT scans and digital reconstructions, we compare the cranial pneumatizations between *U. spelaeus* and other extant and fossil taxa, to highlight similarities and differences in the structures adapted to dissipate the stresses caused by the bite muscle contractions. These interpretations, together with other evidence in literature, could be useful in better understanding the potential of the biting force in *U. spelaeus*, in order to contribute to shedding light on its paleobiology.

SYNCHROTRON TOMOGRAPHY PROVIDES NOVEL INSIGHTS INTO THE DENTAL ANATOMY OF *ACYNODON ADRIATICUS* (EUSUCHIA, HYLAECHAMPSIDAE)

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The Villaggio del Pescatore quarry (Duino-Aurisina, Trieste, Italy) has produced an exceptionally preserved, multitaxic fossil assemblage dated to the earliest Campanian. An ongoing research project focusing on the site vertebrate diversity led to a comprehensive revision of the material assigned to the small hylaeochampsid *Acynodon adriaticus*. As specimens are preserved in limestone there are major limits in mechanical preparation, whereas chemical dissolution of the matrix has been largely employed in the past. To reduce further risks related to preparation processes, key specimens have been the target of μ -Ct scanning (void resolution of 28 μ m) at the Elettra Synchrotron facility in Trieste. We here present preliminary results of μ -Ct tomographies of MCSNT 57248, type specimen of *A. adriaticus*, which include a complete and articulated skull with the complete cervical series. Data allowed to unfold the complete dentition of this taxon revealing a previously unknown heterodonty, with large molariform dentary teeth. Living sauropsids with similar teeth morphology are durophagous predators consuming hard-shelled mollusks. Some extinct taxa with analogous traits, such as placodonts and globidensine mosasaurs, seem to confirm the same predatory specialization. We propose benthic mollusk foraging (i.e., bivalves and gastropods) as a potential explanation for the heterodonty, peculiarly flattened skull and splanchnocranium anatomy of *A. adriaticus*. Technical issues regarding specimen size and placement emerged during the acquisition, and despite the high-energy tomographic approach, high-density limestone matrix and partial diagenetic deformation led to low-contrast final imagery, preventing precise recognition of any other anatomical structures apart from the contrasting teeth enamel. Despite technical challenges, digital paleontology remains a key aspect of future researches on vertebrate and invertebrate fossils from the Villaggio del Pescatore site.

CAMBRIAN BIPARTITE ANIMALS REVEAL A LOST CHAPTER IN CHORDATE HISTORY

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Chordates are among the most disparate and ecologically significant animal phyla, but our understanding of their earliest evolution is hampered by a lack of convincing intermediates between canonical early chordates, like *Pikaia* (Conway Morris & Caron, 2012), and other deuterostomes. In consequence, current understanding of the origins of chordates is built largely on the developmental biology and interrelationships of their derived living representatives (Lowe et al., 2015). Vetulicolians and vetulocystids are enigmatic Cambrian bilaterians with a distinctive bipartite body plan, variously interpreted as stem-group deuterostomes, tunicates, echinoderms, or ecdysozoans (Shu et al., 2004; Aldridge et al., 2007). We present new exceptionally preserved vetulicolians and vetulocystids from the Sirius Passet and Chengjiang Lagerstätten (Cambrian, Series 2), informing the most complete phylogenetic test of early deuterostome interrelationships to date. Contrary to previous studies we resolve these “bipartite animals” as paraphyletic, and part of a grade of stem-group chordates including the problematic bilaterian *Yunnanozoon*. These results shed light on the morphology of the last deuterostome common ancestor and challenge the current consensus on the polarity of character acquisition in Chordata, casting doubt on popular enteropneust- and amphioxus-based models of its ancestral body plan (Lowe et al., 2015). Instead, in accord with classical evolutionary-developmental hypotheses (Romer, 1972), our findings chart an early phase of chordate evolution defined by the gradual integration of the pharyngeal region with a segmented tail, revealing a “lost chapter” in the history of our phylum.

Aldridge R.J., Xian-Guang H.O.U., Siveter D.J., Siveter D.J. & Gabbott S.E. (2007). The systematics and phylogenetic relationships of vetulicolians. *Palaeontology*, 50: 131-168.

Conway Morris S. & Caron J.B. (2012). *Pikaia gracilens* Walcott, a stem-group chordate from the Middle Cambrian of British Columbia. *Biological Reviews*, 87: 480-512.

Romer A.S. (1972). The vertebrate as a dual animal—somatic and visceral. *Evolutionary Biology*, 6: 121-156.

Shu D.G., Conway Morris S.C., Han J., Chen L., Zhang X.L., Zhang Z.F., Liu H.Q., Li Y. & Liu J.N. (2001). Primitive deuterostomes from the Chengjiang Lagerstätte (Lower Cambrian, China). *Nature*, 414: 419-424.

Lowe C.J., Clarke D.N., Medeiros D.M., Rokhsar D.S. & Gerhart J. (2015). The deuterostome context of chordate origins. *Nature*, 520: 456-465.

**FIRST MEDITERRANEAN RECORD OF THE DELPHINIDAN GENUS *KENTRIODON* FROM
A NEW LOWER MIOCENE ODONTOCETE LOCALITY AT FELTRE (NORTHEASTERN
ITALY)**

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Fossil odontocetes from the “Belluno Molasse” (Friulian-Venetian basin, northeastern Italy) have been mainly studied and described by Giorgio Dal Piaz in the early 20th century. These historic finds originate from outcrops in the neighborhood of Belluno where the Lower Miocene Libano Sandstone was quarried. This odontocete assemblage depicts a costal-marine (or even estuarine) fauna that includes seemingly endemic lineages such as Dalpiazinidae and Eoplatanistidae. The odontocete remains from the Belluno area are crucial to understand the diversity and richness of marine vertebrate communities in the Early Miocene, a key moment for the evolutionary radiation of many odontocete lineages. New odontocete remains have recently been found by one of the authors (P.V.) in the Colle della Croce quarry (Feltre, Belluno Province). The strata cropping out therein belong to the aforementioned Libano Sandstone (represented by a distal, fine-grained facies) and to the overlying Bolago Marl, both dating back to the Early Miocene. Most of the odontocetes from the Colle della Croce quarry (including the specimen here examined) originate from the Bolago strata, which we have preliminarily dated to the Burdigalian by means of nannoplankton biostratigraphy. In the present work, we focus on a partial cranium including associated ear bones (right petrosal, stapes, malleus and right tympanic bulla). This specimen was recovered from the Bolago Marl strata of Colle della Croce quarry and is housed at “Museo Civico Archeologico” in Feltre. Osteoanatomical considerations and comparisons with other early-branching delphinidans kentriodontid genera allow to assign the cranium and ear bones to the kentriodontid genus *Kentriodon*. This is the first record of *Kentriodon* in the Mediterranean Basin – one that fills a palaeobiogeographical gap in the distribution of this genus, which was widespread globally during the Early and Middle Miocene.

DECONSTRUCTING THE CLASSICAL LATE MIOCENE FAUNAL ASSEMBLAGES OF THE TUSCO-SARDINIAN PALEOBIOPROVINCE

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Over the past decades numerous studies have been aiming to reconstruct the evolution and faunal succession of endemic mammals from the Late Neogene of the Tyrrhenian area in the Tusco-Sardinian paleobioprovince. In particular, four fossil vertebrate-bearing faunal assemblages, V0 through V3, have been recognized along the Upper Miocene sedimentary succession at the Baccinello-Cinigiano Basin. The V0 to V2 faunal assemblages belong to an endemic faunal complex, the so called “*Oreopithecus*-Zone Faunas [OZF]”, with a high level of endemism, low taxonomic diversity, and a tendency for the development of hypsodonty. The V3 faunal assemblage instead includes continental taxa with Eurasian affinities such as the genera *Hippotherium* and *Procapreolus* and the species *Pliorhinus megarhinus*. The localities belonging to the V1 and V2 faunal assemblages are rather similar in composition, but the V2 fauna includes new immigrants such as *Parapodemus* sp. II, *Eumaichoerus etruscus*, as well as, most probably, *Indarctos anthracitis*, suggesting a temporary reconnection with Europe. Furthermore, the V2 fauna shows new species resulting from the in situ evolutionary transformation of locally endemic forms. New data resulted from the revision of the mammal remains from the Tusco-Sardinian paleobioprovince suggests that some assemblages could be intermediate between the classical V1 and V2 assemblages from Tuscany, but also suggests the existence of separated areas within the Tusco-Sardinian Paleobioprovince. A new paleogeographic and biochronological framework is proposed herein for the Tusco-Sardinian archipelago, hypothesizing a fragmentation of the area into several domains, with sporadic reconnections, and the establishment of different faunal assemblages.

MIDDLE PLEISTOCENE TO HOLOCENE OSTRACOD ASSEMBLAGES FROM THE CORINTH GULF

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Ostracods have a great potential for ecological monitoring and palaeoecological analyses in highly variable environments, especially in transitions between freshwater-brackish and brackish-marine habitats. They are an excellent proxy for the palaeoenvironmental reconstruction of a setting that connects and disconnects to the global oceans, being the only aquatic proxy that could occur continuously in environments with a large difference in chemical-physical parameters. Within the International Ocean Discovery Program (IODP) Expedition 381 in the Gulf of Corinth, ostracods assemblages have been studied from two sediment cores sampled in two different sectors: M0078 in the center of the Corinth Gulf and M0080 in the eastern part of the gulf, in the Gulf of Alkyonides. The two cores have quite a different sedimentation rate, that affects the diversity and richness of the ostracod assemblages. The comparison between the ostracod fauna in the two cores has allowed the identification two different kind of assemblages: 1) Mediterranean marine (*Cytheropteron* spp.; *Henryhowella* spp.; *Aurila* spp.; *Cytherois* spp.); 2) Brackish with Black Sea influences (*Amnicythere* spp.; *Tuberoloxoconcha* spp.; Candonidae). These assemblages indicate a complex history of sea level changes that changed the drainage and depth of the Corinth Gulf during the last 200 ky. The analysis of the ostracod assemblages has allowed to reconstruct a detailed history of the glacial and interglacial cycles since the late Middle Pleistocene.

**THE OUTSTANDING *DAMA*-LIKE DEER SAMPLE FROM VALLPARADÍS ESTACIÓ
(IBERIAN PENINSULA, EARLY PLEISTOCENE)**

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The Vallparadís composite section (VCS) includes the two paleontological sites of Cal Guardiola (CGR) and Vallparadís Estació (EVT), located in the western and eastern banks of the Torrent de Vallparadís, respectively (Terrassa, Catalonia, NE Iberian Peninsula). The whole VCS records a timespan from the late Early to the earliest Middle Pleistocene (ca. 1.1–0.6 Ma). From its layers, more than 30,000 vertebrate remains were recovered, making VCS one of the richest Pleistocene paleontological sites in Europe. In this current work, we present the preliminary study of the small cervid sample from Early Pleistocene EVT layers, consisting of both craniodental and postcranial remains for a total of more than 400 specimens. Amongst the remains, noteworthy is the exceptional presence of three complete antlers, as well as postcranial elements preserved in anatomical connection. Both quantitative and qualitative comparisons suggest the attribution of the sample to a Plio-Pleistocene *Dama*-like deer. More specifically, the morphology of the EVT antlers fits that of those from CGR analyzed previously, and both samples resemble those from the latest Villafranchian and Epivillafranchian sites of Capena, Pietrafitta, Collecureti (Italy), Le Vallonnet (France), and Untermassfeld (Germany). These records have been attributed to different taxa that can be grouped into the cluster of *Pseudodama farnetensis-vallonnetensis*. Further analyses of the VCS material, which is one of the largest fossil collections of this group of cervids in Europe, will expand our knowledge and shed further light on the geographic and chronological distribution of the group, as well as its phylogenetic relationships and taxonomic status.

MICROBIALLY MEDIATED CA-CARBONATE PRECIPITATION IN TUFA FLUVIAL SYSTEM: AN INNOVATIVE APPROACH TO DEVELOP A NEW GENERATION OF SUSTAINABLE BIO-INSPIRED MATERIALS

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For many decades fossil and recent microbial mediated carbonates, that include the oldest evidence of life on Earth (stromatolites), were the focus of numerous studies. Recently these bio-sedimentary systems inspired an innovative approach to produce sustainable biomaterials, to reduce the harmful impact on the natural environment due to industrial activities, such as microbially induced Ca-carbonate precipitate (MICP). MICP has been studied for many applications including environmental remediation, production of construction material, cations removal in wastewater, and carbon sequestration. With the aim to develop a bio-cement for increasing the geotechnical properties of a common multiminerals sand, a more sustainable process of MICP was tested introducing the sand in the water flow of a tufa-forming river with active microbial Ca-carbonate deposition. The tufa deposits are covered by a lithifying biofilm composed of a microbial community including autotrophic and heterotrophic bacteria, algae, viruses, and extracellular polymeric substances. Biominerals forming the tufa deposit replace the organic substrates starting with an amorphous phase rich in Ca, Si, and other cations, followed by massive precipitation of fibrous to polyhedral Ca-carbonate crystals and subordinately lamellar/fibrous Mg-clay crystals. During the 16 weeks of the experiment, the biofilm colonized rapidly all the surface of the sand grains, which were gradually encrusted by neoformed Ca-carbonate biominerals showing the same crystal structures and composition of those forming the tufa deposit. Moreover, the sand showed a progressive increase of the internal friction angle from 28.6° to 35.4°, with a trend very similar to MICP lab experiments that used a single bacterial species. This suggests that is possible to use natural Ca-carbonate biominerals, induced by natural microbial communities, for engineering applications with very sustainable procedures.

***IN-VIVO* 3D RECONSTRUCTION AND FIRST VOLUMETRIC BODY MASS ESTIMATE OF
THE OLDEST KAROO PAREIASAUR *BRADYSAURUS BAINI***

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In this contribution we present the first volumetric body mass estimate and a new *in-vivo* reconstruction of the most basal pareiasaurs, *Bradysaurus baini*. First appearing during the Guadalupian Epoch, pareiasaurs were among the world's first large terrestrial tetrapods, being widespread across Pangea in the Lopingian when they formed a significant part of the large herbivore guild. Like many such key groups of early tetrapods, little is known about the palaeobiology of the oldest pareiasaurs, the Bradysauria, from the Lower Beaufort Group of the Karoo Basin of South Africa. Starting from 3D photogrammetric models of two mounted skeletons from the Iziko South African Museum in Cape Town (SAM-PK-5624) and the Field Museum of Natural History in Chicago (FMNH UC 1533), we have digitally reconstructed the *in-vivo* appearance of *Bradysaurus baini*, obtaining a range of possible volumes. We then applied different known densities of living tissues to these volumes and compared the results with those obtained using classical regression methods based on measurements of long bones. Considering the larger adult *Bradysaurus* specimen, our volumetric body mass estimates range from a minimum of 851.4 kg to a maximum of 1,276.5 kg, with an overall mean body mass of 1,022 kg, approximately the body weight of a large domestic cow. This study provides evidence for the evolution of body masses exceeding one ton in adult specimens of upper Paleozoic tetrapods, offering insight into one of the earliest instances of large body size among herbivores as they expanded into new trophic niches within terrestrial ecosystems. Once again, the comparison with classical body mass estimation methods revealed how the use of regression formulas for large sprawling extinct taxa tends to result in a significant overestimation of body mass. Continued reliance on such methods will consequently mislead studies on paleoecology, physiology, and macroevolution.

IMPOSSIBLE FOSSILS: CAN SOFT TISSUES FOSSILIZE IN VOLCANICLASTIC SETTINGS?

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The study of fossilised soft tissues (e.g., skin and internal organs) offer a unique opportunity to understand the biology and behaviour of ancient animals. Fossil vertebrates with evidence of soft tissues are usually found preserved in fine-grained lacustrine and/or marine sediments and rarely these are preserved in primary volcanic or volcanoclastic settings. The Italian fossil record yielded two diverse specimens found in such unusual settings: the Permian protosaur *Tridentinosaurus antiquus* (Athesian Volcanic Complex, Trento Province) and the Late Pleistocene griffon vulture *Gyps fulvus* (Colli Albani volcanic complex, Rome). *T. antiquus* shows a dark-coloured body outline suggestive of organically preserved skin. *G. fulvus* exhibits part of the plumage of one of the wings, with feathers three-dimensionally preserved. These “impossible fossils” are of great paleontological importance and have been recently (re)studied using novel approaches to solve their taphonomy. Here the use of a suite of methods spanning from electron microscopy, infrared and Raman spectroscopy unveils new insights into the origin of the soft tissues in both specimens. In *T. antiquus* no original soft tissues are preserved and the dark-coloured body outline has been identified to be a forgery. In the case of the plumage of *G. fulvus*, the feathers are original and mineralized via aluminosilification, a newly discovered mode of preservation for feathers. Further, the presence of mineralized melanosomes (melanin-rich organelles) and keratin fibers suggest that the feather structures were mineralized early during diagenesis. The combination of these two studies highlights the power of the emerging field of applied palaeontology to resolve complex taphonomic enigmas and expand our understanding of soft tissue preservation in relatively unexplored geological settings.

BIOGENIC CONTENT OF SURFACE CORES FROM DEEP-SHELF BOTTOMS CLOSE TO THE CORALLIGENOUS OFF MARZAMEMI (SE SICILY, IONIAN SEA): PRELIMINARY DATA

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Four sediment cores collected offshore Marzamemi (Gulf of Noto, SE Sicily, Ionian Sea) were studied in the frame of the project “CRESCIBLUREEF – Grown in the Blue: new technologies for knowledge and conservation of Mediterranean reefs”. In this area, coralligenous build-ups occur in a wide shallow bathymetric range of 30 to 42 m and in a deep one between 86 and 92 m, whereas isolated structures are scattered at intermediate depths. Three cores were collected in the latter area, in closely spaced sites between 59 and 81 m water depth, in a mosaic of coralligenous build-ups raising from a gently dipping coarse detritic bottom, which often hosts diffuse maerl factories and is locally interspersed with zones characterized by muddy sedimentation. A fourth core originated from a wide but slightly incised channel roughly perpendicular to the coastline. Cores and their bioclastic content have been analysed to investigate the recent depositional history in these areas adjacent to the coralligenous bioconstructions, and especially to understand the possible influence of the build-ups (if any) in contributing bioclastic material to neighboring sedimentation. Preliminary analyses of these cores ranging from 60 to 100 cm in length, and still to be dated, allowed us to document: 1) a persistence of maerl (facies of the Biocoenosis of Coastal Detritic Bottoms: DC) production in the whole area though some lateral and temporal variations; 2) the widespread occurrence of the Biocoenosis of the Offshore Detritic Bottoms (DL, largely indicated by fresh-looking molluscs) and its transitions mainly to the DC Biocoenosis; 3) local evidence of high hydrodynamic energy and of early diagenesis; 4) marked differences in the preservation state of the bioclasts between and within samples. The neighbor occurrence of the coralligenous seems hardly detectable through both a few species and the peculiar morphology of selected taxa.

MAE: MUSEO ARCHEOLOGICO ERNICO - A BRAND-NEW MUSEUM IN ANAGNI IS BORN

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The Museo Archeologico Ernico (MAE) is a brand-new civic museum opening in the municipality of Anagni (Frosinone, Latium, central Italy), with the scientific supervision of the Department of Earth Sciences and the Polo Museale of Sapienza University of Rome, and the financial support of the Municipality of Anagni and BancAnagni. Anagni is mostly known for its medieval past, but this territory yielded evidence of a much more ancient archaeological and paleontological history. The part of the MAE exhibition currently opened is mainly focused on these aspects, telling and placing the story of Anagni and its prehistoric archaeological and paleontological heritage in the general context of the natural history of the territory and human evolution. Two sites play a prominent role in this regard, Coste San Giacomo (2.2 Ma) and Fontana Ranuccio (0.4 Ma), offering unique windows on the Pleistocene terrestrial ecosystems of Mediterranean Europe. Both sites are precisely radiometrically dated and associated with multiple lines of paleontological and, in the case of Fontana Ranuccio, archaeological evidence. For instance, the concurrent presence at Coste San Giacomo of small and large mammals is of great biochronological and paleoenvironmental value, being almost unique among European sites of similar chronology. At Fontana Ranuccio, alongside the diverse fauna, human presence is attested by four teeth and abundant lithic and bone tools. The high scientific value of these two sites is reflected in the Italian biochronological scale of large terrestrial mammals, where Coste San Giacomo and Fontana Ranuccio are chosen as Faunal Unit for the middle Villafranchian and Galerian biochrons, respectively. Paleoenvironmental reconstructions and immersive video-mapping experiences, based on updated scientific evidence and produced with artistic expertise, accompany the visitors of MAE in a journey to the past of Anagni and its territory.

LEPTOBOS AND BISON LIMB PROPORTIONS AND BODY MASS CHANGES IN RESPONSE TO ENVIRONMENTAL TRANSITIONS DURING THE PLEISTOCENE

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Large ungulate limb bones are often used as palaeoenvironmental predictors due to their plasticity in adapting to habitat changes and their abundance in the fossil record. It is often sustained that ungulates with cursorial behaviour undergo to an elongation of the distal limb elements in open environments, whereas larger taxa do not experience this allometric pattern. The triggering factors of this characteristic are still matter of debate. In this study we analyse the limb proportions and body mass of several samples of *Leptobos* and *Bison*, the commonest large bovids of the Western Palaeartic Pleistocene, related with the inferred palaeoenvironments through a timespan covering the last 2.58 Ma. The results show a general trend toward an increased metapodial robusticity from the Early Pleistocene onwards, following the progressive harshening of the climatic conditions and the opening of the habitats. At the same time, it is observed a constant trend toward gigantism, paired with increased radius size, starting from the earliest Pleistocene, and reaching a peak during the late Middle Pleistocene, before recording an opposite trend (i.e., body size reduction) from the Late Pleistocene on. In *Bison*, due to the long history and wide geographic distribution, some fluctuations in size and limb proportions are observed. This study shows that relatively slender forms of *Bison* are always found in more humid, closed habitats, often related with warm interglacial phases, whereas the stouter members of this clade are typical of the open, steppe/prairie-like habitats of the glacial stages. At the same time, the body mass estimations suggest that *Bison* living in open arid habitats were generally smaller than those living in wooded, humid habitats. In our opinion, these oscillations were most probably determined by a complex combination of factors including: ecogeographical patterns, trophic conditions, inter-intraspecific competition, and predatory pressure.

**REDISCOVERING THE FOSSIL COLLECTION FROM THE LATE EARLY PLEISTOCENE
SITE OF PIRRO NORD (FOGGIA, SOUTHERN ITALY) AT THE BARI UNIVERSITY**

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Since its discovery in 1969, Pirro Nord (Foggia, southern Italy) represents an important window on the Early Pleistocene terrestrial ecosystems of the northern Mediterranean. The discovery of the site is related to quarry activities started in the second half of 1960s, which exposed a number of karst fissures within the same karst network. In the early 1970s, geo-paleontologists from Leiden Museum (The Netherlands) and Bari University (Italy) collected many vertebrate bones that were stored at the Department of Earth and Geoenvironmental Sciences (Bari University). Starting from 1980s up to now, further geo-paleontological surveys were conducted by the Florence, Sapienza, Turin and Ferrara Universities. In 2006, the discovery of stone tools made the Pirro Nord site one of the earliest in Europe with evidence of human presence. Because of its great biochronological value, the Pirro Nord faunal assemblage was chosen as representative of the homonymous Faunal Unit of the late Villafranchian biochron in the Italian biochronological scale of large terrestrial mammals. The fossils stored at the Department of Earth and Geoenvironmental Sciences of the University of Bari remained boxed until October 2021, when they were “rediscovered” and are now under analysis. Seven wooden crates, almost all still sealed, revealed hundreds of skeletal and dental remains from Pirro Nord. At a preliminary analysis, the content consists of numerous remains of herbivorous mammals such as equids, bovids, cervids, proboscideans, rhinoceroses, but above all carnivorans such as saber-toothed cats, bears, giant hyenas, canids, other felids and mustelids. Rodents and lagomorphs are also represented, as well as other vertebrates, among which a beautifully preserved tortoise carapace. The study of the historical collection is in progress and will provide new data on such an interesting site, pivotal to a better understanding of the late Early Pleistocene terrestrial ecosystems of Mediterranean Europe.

**COMBINING PALAEOECOLOGICAL AND PALAONEUROLOGICAL ANALYSES TO
DISENTANGLE CERVID EVOLUTIONARY HISTORY IN RELATION TO CLIMATE
CHANGES: THE CASE STUDY OF THE EARLY PLEISTOCENE DEER FROM PIRRO NORD
(ITALIAN PENINSULA)**

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Research on the evolutionary history of medium-sized deer from the Villafranchian has focused largely on the taxonomy and biochronology of these cervids which resulted in several systematic revisions with material being ascribed to both fossil (*Pseudodama*, *Metacervoceros*) and modern genera (*Rusa*, *Axis*, *Dama*, *Cervus*). This group evolved during a phase of major changes in the global climate system with the onset of the Quaternary glaciations that characterized the Late Pliocene-Early Pleistocene transition. Here we attempt to explore the evolutionary history of these deer by combining palaeoecological and palaeoneurological analyses, a novel approach to investigate how this group could have evolved in relation to climatic shifts. As case study we selected the fossil material of the enigmatic middle-sized deer from the Early Pleistocene locality of Pirro Nord (Apricena, southeastern Italy). We integrate dietary proxies from dental wear and stable isotopes analysis with morphological data from the virtual endocast of a well-preserved male specimen comparing it with those of modern *Dama dama* (fallow deer), *Cervus elaphus* (red deer) and *Axis axis* (chital). The endocast of the Pirro Nord specimen seems to display a closer affinity to those of modern *Dama dama* than to *Cervus elaphus* or *Axis axis*. Dental mesowear patterns point to a long-term mixed diet for the Pirro Nord deer, while dental microwear patterns record a leaning towards a grazing behaviour. The range of the stable isotope $\delta^{13}\text{C}$ ratios implies that it foraged on abrasive water-stressed C3 vegetation in warm woodland and semi-open habitats, a result consistent with both the dental wear analysis and other palaeoenvironmental reconstructions of the site.

COLLEZIONI STORICHE: PROBLEMATICHE E STRATEGIE PER LA VALORIZZAZIONE E COMUNICAZIONE NEL CASO DELLA COLLEZIONE GEORG GASSER (1857-1931)

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Nella sfera del patrimonio museale scientifico, le collezioni storiche possono avere dei limiti per la moderna ricerca per la scarsa disponibilità di informazioni, legata a diverse variabili, come la modalità di acquisizione e registrazione dei dati al momento della raccolta e/o gli eventi intercorsi nel tempo prima della definitiva inventariazione. Eppure, nonostante queste problematiche non trascurabili, le collezioni storiche possiedono ancora oggi un valore nella conservazione, fornendo un valido contributo nel ricostruire e integrare la memoria scientifica e divenendo, in alcuni casi, l'unica risorsa per lo studio di determinate aree, laddove queste non siano più accessibili o esistenti. È questa una delle idee alla base del progetto del Museo di scienze naturali dell'Alto Adige sul recupero, catalogazione e inventariazione della collezione paleontologica "Georg Gasser", parte del nucleo originario dello stesso museo. Nato a Rentsch, nel 1857, Gasser collezionò nel corso della sua vita una ricca raccolta di reperti naturalistici e archeologici, realizzando nella propria abitazione un'esposizione permanente, accessibile al pubblico. Di questa raccolta, la parte paleontologica sopravvissuta fino a noi, è costituita da circa 3500 reperti di cui il 10% è materiale paleobotanico e il 90% paleozoologico. Attraverso l'inventariazione e la digitalizzazione della collezione il progetto ha avuto l'obiettivo di caratterizzare la raccolta dal punto di vista tassonomico, nonché di stabilire, dove possibile, la provenienza geografica e stratigrafica dei campioni. I dati ottenuti, integrati dall'analisi dei documenti scritti, forniscono un interessante strumento di storytelling sulla visione del collezionista e l'impronta data dal contesto geopolitico del tempo. Inoltre le informazioni registrate sono risultate utili per avvicinare il grande pubblico alla paleontologia anche attraverso strumenti di comunicazione diversi come la realizzazione ad hoc di una mostra interattiva.

RECONSTRUCTION OF DEPOSITIONAL ENVIRONMENTS IN THE KUNGURIAN MEGACALDERA OF THE ATHESIAN VOLCANIC GROUP: A MULTI-PROXY APPROACH

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In N-Italy, between the provinces of Trento and Bolzano, is located one of the reference areas to study the late Cisuralian tropical terrestrial ecosystems. The explosive activity of the Athesian Volcanic Group (~289–274 Ma) formed a long-lived megacaldera that preserves fossiliferous sedimentary formations – intercalated between the volcanic units – that were deposited during periods of reduced volcanic activity or quiescence. We applied lithofacies, palynological, and carbon stable isotope analyses on two Kungurian successions of the Guncina Formation to reconstruct the depositional environments and the plant communities in the megacaldera. In that phase, at least one shallow water body with an irregular shape was present within the megacaldera. The diverse sporomorph assemblages indicate that the caldera was colonised predominantly by xeromorphic-hygromorphic plants, such as seed ferns and conifers. In contrast, lycophytes and ferns were rare and restricted to the margin of the water bodies. Although the $\delta^{13}\text{C}_{\text{org}}$ values are comparable with those of other Cisuralian continental successions, the stable carbon isotope records evidence for a small variability, which correlates significantly with the abundance of xeromorphic elements. Based on our palynological and chemostratigraphic data, we reconstructed semiarid to arid climate conditions, typical of the mid-late Cisuralian in tropical areas, without major climatic shifts. The presence of perennial water bodies and local environmental conditions gave origin to an occasionally high abundance of spore plants.

**SILICIFIED SHELLS AS ARCHIVES OF GEOCHEMICAL PROXIES: THE HIDDEN
POTENTIAL OF A DIAGENETIC PROCESS**

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Silicification is a diagenetic process consisting of the replacement of original carbonate hard tissues through the concurrent carbonate dissolution and silica precipitation. This process has a strong potential for enhancing the preservation of fossil specimens, with the silica accurately moulding the external morphology. However, very little is known about silicification, its timing and trigger mechanisms. To date, high-quality silicified specimens have been used almost exclusively in systematics studies, with their potential as geochemical archives yet to be evaluated. Here, we investigate the structural and chemical preservation of Permian brachiopods with different degrees of silicification. SEM analysis of shell microstructure of specimens from the Kungurian of Oman showed that despite heavy silicification, large portions of the original calcite microstructures were still preserved underneath silica-replaced external mould. To assess the chemical preservation, we used a novel approach applying in situ laser ablation boron isotope ($\delta^{11}\text{B}$) analyses on a specimen of *Callytharella websteri*. With this technique, the $\delta^{11}\text{B}$ and [B] of shell structures of choice can be measured at a scale $<100\ \mu\text{m}$ and directly linked to the SEM images. Boron is an ideal element for examining the chemical preservation: $\delta^{11}\text{B}$ variability in modern and well-preserved Permian brachiopods is relatively well-constrained, and due to the large mass difference between B stable isotopes (^{10}B and ^{11}B) and its high geochemical reactivity, B is significantly fractionated during diagenesis and between different mineral phases. Our results show that $\delta^{11}\text{B}$ in the preserved microstructures of the silicified specimen is consistent with values measured in well-preserved shells, demonstrating that the silicification of the external shell portions may act as a protective sheath for the innermost microstructures, thus making partially silicified specimens a valuable geochemical archive.

POSTERS



MULTIDISCIPLINARY ANALYSIS OF THE SEDIMENTARY SUCCESSION AT SAN GIULIANO LAKE (MATERA, SOUTHERN ITALY): SEDIMENTOLOGICAL, BIOSTRATIGRAPHIC AND PALAEOECOLOGICAL RECONSTRUCTION

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A geological field mapping, and sedimentological, micropaleontological and palynological analyses were performed near Lago San Giuliano (Matera-Italy) to reconstruct the depositional environment of a fossil whale. The sedimentological analyses identify clay and silty clay. In the upper part of the succession silt and sandy silt with shell fragments samples were collected. Above clayey silty sediments still occur. The succession is Early Pleistocene in age for the presence, from the bottom, of nannoplankton species *Reticulofenestra asanoi* (CN 13b Biozone). The LO of *Helicosphaera selli* (1.2/1.1 Ma) and the LCO of *R. asanoi*, at ~0.91 Ma, in the medium and upper part respectively occur. The most common ostracod species are *Krithe compressa*, *Cytherella robusta* and *Henryhowella sarsi profunda*, occasionally with *Argilloecia acuminata*, *Pajenborchella malajensis cymbula*, *Bythocypris producta* and *Anchistrocheles interrupta*, as well as *Cytheropteron testudo*. The benthic foraminiferal species *Bolivina spathulata*, *Bulimina marginata*, *Cassidulina carinata*, *Melonis affinis*, *Uvigerina mediterranea* and *U. peregrina*, suggest high productivity, low oxygen, and high organic matter contents of bottom waters; events of lower productivity, relatively high oxygen and oligotrophic conditions are testified by *Cibicidoides subhaidingerii/Heterolepa dutemplei*, *Hyalinea balthica*, *Trifarina angulosa*, and *Cibicides pachyderma*. The planktonic foraminifera assemblages are dominated by *Globigerina bulloides* and *G. glutinata*, indicating an environment characterized by upwelling currents. Toward the top a marked increase of *Globigerinoides* species and the occurrence of *Neogloboquadrina pachyderma* dx and sx, *N. dutertrei* and of *Globorotalia inflata* take place. The fossil whale layers preserve pollen of *Abies*, *Carpinus*, *Alnus*, *Betula*, and *Quercus*, indicating a warm climate; the regionally extinct taxa *Cedrus*, *Picea*, *Carya*, and *Tsuga* suggest a mid-Calabrian age, consistent with nannoplankton data.

**THEROPOD TRACKS FROM THE LAMA BADESSA ICHNOSITE
(MIDDLE-UPPER CENOMANIAN, APULIA, SOUTHERN ITALY)**

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More than thirty dinosaur tracks were recently discovered and preliminary investigated on the Upper Cretaceous surface from the Lama Badessa ichnosite, about 3 km south of Sannicandro di Bari in the Murge region (Apulia, southern Italy). The succession belongs to the top of the Calcari di Bari Fm, referred to the middle-upper Cenomanian (Spalluto & Caffau, 2010). The track-bearing area is about 1,600 m² wide and is characterised by the occurrence of only tridactyl footprints. Two bipedal trackways (constituted respectively by 11 and 8 tracks) and numerous isolated specimens were recognised. Their morphological features (i.e., outlines, phalangeal pad and claw traces) were evidenced *in situ* by using coloured chalks and replicated on acetate overlays for further analyses. The study was supported by close-range and aerial-based (i.e., drone) photogrammetry, with the aim of accurately digitise the whole ichnoassemblage. The tridactyl tracks are characterised by small to medium size (Footprint Length \leq 20 cm), strong mesaxony and gracile morphologies. The anatomical details, identifiable in the best-preserved specimens (e.g., the presence of 2, 3 and 4 pads on digits II, III and IV respectively), as well as the high pace angulation, led to undoubtedly attribute the tridactyl tracks to theropod trackmakers.

Spalluto L. & Caffau M. (2010). Stratigraphy of the mid-Cretaceous shallow-water limestones of the Apulia Carbonate Platform (Murge, Apulia, southern Italy). *Italian Journal of Geosciences*, 129(3): 335-352.

DISPARITY VS DIVERSITY WITHIN THE *HEMISYNTRACHELUS* LINEAGE (CETACEA, DELPHINIDAE): A REVIEW OF THE ITALIAN PLIOCENE RECORD

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The delphinids (Odontoceti: Delphinidae) comprise the most diverse extant cetacean family. Delphinids are mostly known as fossils from Pliocene deposits of the Emilia Romagna, Piedmont, and Tuscany regions of Italy. Many of the Italian delphinid remains belong to *Hemisyntrochelus*, an extinct genus that appears to be crucial for reconstructing the evolutionary history of this highly derived odontocete clade. *Hemisyntrochelus* is a delphinid whose size and shape are intermediate between those of the extant bottlenose dolphin (*Tursiops truncatus*) and killer whale (*Orcinus orca*). These morphological affinities are supported by recent phylogenetic analyses that suggest a basal position within the Orcininae for *Hemisyntrochelus*. Although only two *Hemisyntrochelus* species – namely, *H. cortesii* (Fisher, 1829) and *H. pisanus* Bianucci, 1996 - are currently recognized from the Pliocene of Italy, an unexpectedly high intrageneric disparity is being revealed by our ongoing studies of the Italian *Hemisyntrochelus* fossil record. Indeed, the data we have collected in recent years seem to reevaluate the pioneering studies carried out in the second half of the 19th century, when a plethora of species and subspecies were described based on several specimens from Italy. Our integrated studies follow several approaches: 1) the analysis of the intraspecific skeletal morphological variability in extant delphinids using statistically significant samples in order to identify robust characters for diagnosis and phylogeny; 2) the implementation with new taxa and characters of a large matrix to obtain a better resolution of the delphinid phylogeny; 3) the acquisition of 3D skeleton models for geometric morphometrics analyses; and 4) the morphofunctional analyses of skull and postcranium for reconstructing trophic strategies and swimming styles. Our preliminary results suggest that *Hemisyntrochelus* is probably a paraphyletic genus that includes several species and constitutes an evolutionary grade towards the killer whale ecomorph.

IMPACT OF PLASTIC POLLUTION ON BENTHIC FORAMINIFERA

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Plastics are ubiquitous contaminants that currently affects worldwide oceans and marine biota, with about 5 billion tons of waste accumulated in the natural environment. The ubiquitous nature of microplastics means that marine biota can interact with them. While the fate of microplastics is well known, the biochemical effects of synthetic molecules especially on marine unicellular eukaryotic organisms is poorly investigated. To understand the fate of plastic in oceans and in marine organisms, we investigated the incorporation of (bio)polymers and microplastics in benthic foraminiferal species by applying FTIR (Fourier Transform Infrared) microscopy. Benthic foraminifera are an important component of marine communities, playing a key role in ecosystem functioning and biogeochemical cycling. Their sensibility and rapid response to environmental stress make them an efficient environmental proxy of past and present climate and environmental changes. We applied the infrared spectroscopy analysis to selected benthic foraminifera species: *Rosalina globularis* grew in laboratory experiments and to *Cibicides lobatulus*, *Rosalina bradyi* and *Textularia bocki* collected in a plastic remain found buried into sandy-silty sediment in the Mediterranean seabed. Foraminifera from laboratory experiments were also treated with bis-(2-ethylhexyl) phthalate (DEHP) molecule that incorporates in cytoplasm. The analyses reveal that: 1) microplastic debris can be found in the cytoplasm and inside the agglutinated test of *T. bocki*; 2) *C. lobatulus*, *R. bradyi* and *T. bocki*, grown on plastic remains, show signals of oxidative stress and protein aggregation; 3) DEHP can be incorporated in the cytoplasm of the commonly calcareous foraminifera *R. globularis*, thus entering biogeochemical cycles. This study confirmed that foraminifera are good proxy of on-going plastic pollution and the associated molecules can be found in their text.

ECCENTRICITY SIGNAL IN THE TIME-SERIES OF NANNOFOSSIL SPECIES AT MID-LATITUDE ACROSS THE MID - PLEISTOCENE TRANSITION (ODP SITE 1209, NORTHWESTERN PACIFIC OCEAN)

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The Mid-Pleistocene Transition (MPT; 1.25–0.6 million years ago, myr) is one of the most important and still debated climate reorganizations during which the glacial/interglacial cycles switched from a 41-thousand years (kyr) cycle (i.e., obliquity) to a quasi-periodic 100-kyr years cycle (associated with orbital eccentricity). Variations in the orbital geometry can affect the abundance and distribution of certain marine biota such as the coccolithophores, which represent a valid tool within the geological archives to inspect the influence of the main orbital cyclicities. Here, we apply for the first time various time series analytical techniques (including autocorrelation and cross correlation) to different nannofossil species of a dataset from mid-latitude ODP Site 1209 (Northwest Pacific Ocean) for the interval spanning the last 1.6 myr. The aim is to identify the main periodicities recorded by single nannofossil species during the MPT and to investigate further their response timings to those orbital drivers. In addition, we investigated how the recorded periodicities can improve understanding of the paleoecological preferences of particular species. The combination of multiple time series analyses allowed identification of the 100-kyr periodicity as the main cyclicity recorded in the most analyzed species confirming the predominance of the eccentricity-related signal at mid-latitudes and a reduced or absent influence of the obliquity response. Thus, our data highlight how orbital influence varies by latitude impacting the nannofossil species. This study documents a lag between eccentricity and species abundance fluctuations ranges between 20 and 40 kyr for the species *Calcidiscus leptoporus*, *Gephyrocapsa caribbeanica* small, and *Reticulofenestra* spp. This study corroborates the potential of nannofossils to deepen understanding of the dynamics and effects of variations in orbital geometry through time.

PALEOENVIRONMENTAL CONSIDERATIONS ON THE VAL SERIANA VALLEY (NORTH-WESTERN ITALY) DURING THE UPPER PLEISTOCENE. THE SMALL-MAMMAL FOSSILS FROM BÜS DI TRI FRADÈI CAVE (OLTRE IL COLLE, BG) AS PALAEOCLIMATIC PROXI DATA

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Büs di Tri Fradèi is a cave that opens at 1200 m a.s.l. in the municipality of Oltre il Colle (BG) in Northern Italy. The sedimentary deposit that fills the cave is divided in five main stratigraphic levels, of which only one fossiliferous. It is believed to have served as nursery for cave bears (*Ursus spelaeus*) as many remains of females and cubs were found inside, together with those of groundhogs, lacertids and anthropic traces such as flint or cervid antlers artifacts. Alongside these, of particular importance for this study, multiple remains of small mammals (Eulipotyphla, Rodentia and Chiroptera), naturally collected as prey by tawny owls (*Strix aluco*), barnowls (*Tito alba*) and small carnivores, were identified. These finds are fundamental for palaeoenvironmental and palaeoclimatic reconstruction due to their rapid growth and evolution and the fact that they occupy strictly specific ecological niches linked to certain environments and climatic conditions. As the calibrated dating of the remains is around 32.000-34.000 years, the purpose of this study is to reconstruct the Upper Pleistocene environments in Val Seriana Valley (north-western Italy, Lombardy) using the small-mammal fossils remains from Büs di Tri Fradèi. The data gathered on the distribution of local taxa from this cave, suggest that the paleoenvironmental conditions were between temperate and cold-temperate (boreal). Data from Büs di Tri Fradèi are then compared with those from other caves of near areas to draw a more complete picture of the palaeoenvironment of the Lombardy PreAlps during the Upper Pleistocene.

**BRACHIOPODS AND CONODONTS FROM THE UPPER MISSISSIPPIAN TONKA
FORMATION OF CARLIN CANYON, NEVADA**

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The area of north-eastern Nevada in USA is of great interest for studies in invertebrate palaeontology and biostratigraphy: the area includes the base-Kungurian GSSP candidate at Rockland, and possibly the Standard Auxiliary Boundary Stratotypes for the base-Sakmarian, base-Artinskian and base-Kungurian at Carlin Canyon, Elko. Located near Carlin, famous for its gold ores and for the Humboldt River route that pioneers followed in the 19th century (California Trail), the Carlin Canyon Carboniferous-Permian succession is known since the 19th century for the occurrence of a spectacular angular unconformity of Upper Pennsylvanian limestones on Mississippian to Mid-Pennsylvanian sedimentary rocks. A small assemblage of 53 brachiopod specimens was collected by L. Angiolini and C.M. Henderson during fieldwork in October 2022 in Carlin Canyon, Nevada, USA. The assemblage comes from steeply dipping yellowish bioclastic marlstone beds in the Serpukhovian (Upper Mississippian) Tonka Formation. The fauna is quite diverse with 15 species representing 13 genera and seven orders: Productida, Orthotetida, Orthida, Athyridida, Spiriferida, Spiriferinida, and Terebratulida. Most specimens are disarticulated, abraded and suffered bioerosion, thus the assemblage can be defined a neighbourhood assemblage. The identified brachiopod taxa record a wide spectrum of life strategies from pedicle-attached athyridides and spiriferides adapted to varied substrates to seminafaunal productides more typical of soft muddy substrates. The brachiopod fauna shares affinities with Chesterian (Serpukhovian) faunas in western United States such as the *Carlinia phillipsi* association and the *Rhipidomella nevadensis* Zone of the Great Basin of Utah and Nevada and of the Arco Hills Formation of Idaho, and the *Carlinia amsdeniana* Subzone of the Amsden Formation (Wyoming). A low diversity conodont assemblage has been recovered from the same beds. It is dominated by *Vogelgnathus campbelli*, but also includes indeterminate prioniodinid fragments. In addition, sarcopterygian dermal denticles and actinopterygian teeth were common in the residues. *Vogelgnathus campbelli* ranges from upper Viséan to lower Serpukhovian.

ODONTOMETRIC CHARACTERISTICS OF THE EUROPEAN MIOCENE PRIMATES

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During the Miocene, primates in Europe were widely distributed and highly diverse. Since the early 19th century numerous species have been described. Due to their high potential for taphonomical conservation dental remains are among the fossil remains better used for the reconstruction of their ecology and phylogeny. The main aim of this study was to explore the differences among dental elements of Miocene primates using odontometrics. Odontometrics is a useful tool for investigating variation among primates and characterizing their possible dietary patterns. For such a purpose, dental elements belonging to a selection of Miocene primates from Europe were measured. The included taxa belong to fossil species of the families Hominidae (*Dryopithecus*, *Oreopithecus*), Pliopithecidae (*Pliopithecus*), and Cercopithecidae (*Mesopithecus*). Only unworn or nearly unworn teeth belonging to mature specimens were considered. According to previously established protocols, two measurements were taken on the crown, buccolingual width (B-L) and mesiodistal length (M-D). Although numerous species possessed specializations, they share traits like small incisors or narrow but long lower molars. The results also show differences that may be related to diverse diets among the studied taxa and to the different patterns of sexual dimorphism.

DeMiguel D., Domingo L., Sánchez I.M., Casanovas-Vilar I., Robles J.M. & Alba D.M. (2021). Palaeoecological differences underlie rare co-occurrence of Miocene European primates. *BMC Biology*, 19: 6.

McCollum, M.A. (2007). Rethinking incisor size and diet in anthropoids: diet, incisor wear and incisor breadth in the African apes. *American Journal of Physical Anthropology*, 133: 986-993.

Schmidt C.W., El Zaatari S. & Van Sessen R. (2020). Dental microwear texture analysis in bioarchaeology. In Schmidt C.W. & Watson J.T. (eds) *Dental Wear in Evolutionary and Biocultural Contexts*, Academic Press: 143-168.

**EVIDENCE OF NOT-GENETICALLY CONTROLLED BIOMINERALIZATIONS IN
CORALLIGENOUS BUILD-UPS (MARZAMEMI, SICILY, ITALY)**

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Coralligenous build-ups form in open marine systems and their comparison with coeval bioconstructions of confined environments, like submarine caves, allow us depicting the complex interactions that develop between metazoans and microbial communities involved in the formations of recent bioconstructions in different settings of the Mediterranean Sea. In this study, two coralligenous build-ups were characterized in terms of the organisms and sediments involved in their formation. The main framework is made up by coralline algae and subordinate bryozoans and serpulids. Sponges affect bioconstruction development, both interacting with skeletonized organisms and through bio-erosive activity. The micrite (microcrystalline calcite) is a minor component of the build-ups and consists of autochthonous (*in situ*) and allochthonous (detrital) micrite. Fine autochthonous micrite mineralizes directly inside the framework cavities and shows aphanitic or peloidal fabric, produced by organomineralization processes of soft sponge tissues and microbial metabolic activity, respectively. The detrital micrite accumulates inside cavities and derives from external sources or is originated by erosion processes within bioconstruction itself. It is plausible that the abundance of sponges, competing with carbonatogenic bacteria for the same living cryptic spaces, prevented the development of conspicuous amount of microbialites in the coralligenous. A similar relationship between sponges and microbial communities was observed also in the biotic crusts of confined submarine caves, suggesting that this competition is not habitat specific. On the contrary, it may develop in a range of environmental settings, from open to cryptic systems, and could be used to clarify the role of metazoans *vs* microbialite in the paleoecological reconstruction of the fossil record.

**MESOZOIC AND CENOZOIC CARBONATE PLATFORM BIOEVENTS FROM THE CARG
GEOLOGICAL SHEET N. 377 “TRASACCO”**

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The micropaleontology of the limestone units included into the geological sheet n. 377 “Trasacco” (CARG Project) has been studied to identify key bioevents and to discuss the relative stratigraphic implications. The recognized shallow-water biozones, event not fully calibrated, help to define the relative position of taxa through time, as well as to decipher lithostratigraphy in geological surveys. The analysed shallow-water succession covers great part of the Jurassic and Cretaceous ‘Bahamian-type’ facies, and Lower Miocene heterozoan carbonates. Through the Lower to Middle Jurassic, few foraminiferal associations are recorded restricted to the supratidal and near-emersion settings, along with crustacean coprolites (*Favreina*) and the cyanobacterial aggregation ‘*Rivularia*’. The Middle to Upper Jurassic succession records a recovery of the Pfenderinidae foraminifers, dasycladaceans green algae (species of *Clypeina*, *Salpingoporella* and *Selliporella*) and stromatoporoids. Larger agglutinated and porcelaneous foraminifera typify the Lower Cretaceous benthic association, among representative of the genera *Akcaya*, *Mesorbitolina*, *Praechrysalidina*, *Cribellopsis* and *Archaeoalveolina*, associated with green algae (including also species of *Heteroporella*, *Piriferella* and *Permocalculus*) and *Chondrodonta*. The Cenomanian records a foraminiferal diversity with *Cisalveolina*, *Sellialveolina*, *Rotorbinella*, and several soritids and nezzazatids, which become extinguished soon after at the Cenomanian-Turonian boundary (related to the Oceanic Anoxic Event 2). The Upper Cretaceous succession displays the diversification of some group of benthic foraminifera and rudist bivalves, whose evolution is likely related to those representatives that survived to the Cenomanian-Turonian boundary extinction. The Lower Miocene benthic coenosis was inhabited by foraminiferal genera still thriving in Recent seas.

AGENTS OF CLIMATE CHANGE: A PALEONTOLOGICAL POINT OF VIEW

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Anthropogenic climate change is now a well-known threat to the environment at various local-to-global levels. However, most data concerning climate change studies are focused on present-day and historical observations, with some of the research considering longer time spans which are still inappropriately compared to the history of our home planet. Among the most important climate-altering components there are carbon dioxide (CO₂), carbon monoxide (CO), and methane (CH₄). They have specific isotopic fingerprints which help determine whether they are of anthropic or natural origin: anthropic sources are mostly related to the massive consumption of fossil fuels in modern-day society, while natural sources are related to several processes, such as underground microbial activity, volcanic eruptions, and tectonic activities. The combined use of measurements of CO₂, CO, and CH₄, and other agents of climate change in the atmosphere can provide important insights into the origins and temporal variations of these gases and their impacts on the Earth's climate. The geological and paleontological records offer relevant insights into how natural sources developed over Earth's history. In particular, the evolution of the organisms driven by extinction and radiation events may have influenced these climate-altering components. However, the type and amount of organic matter preserved in the fossil record can be related to the events mentioned above, and no detailed research on the possible source and rate of gaseous emissions from this component has been performed. This research is the first attempt in paleontological studies aimed at recording and distinguishing the source of gases in pilot areas and evaluating the production rate from possible fossil sources.

I RESTI DI COCCODRILLI TOMISTOMINI DELLA PIETRA LECCESE (MIOCENE, ITALIA MERIDIONALE)

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La presenza di cocodrilli nella calcarenite miocenica della Pietra leccese (Burdigaliano superiore-Messiniano inferiore) è conosciuta sin dalla metà del diciannovesimo secolo grazie ai lavori di Oronzo Gabriele Costa, Giovanni Capellini e Pasquale Aldinio che attribuirono i resti a *Crocodylus* sp., *Rhytisodon tuberculatus*, *Streptospondylus lyceensis*, *Steneosaurus lyciensis*, *Suchosaurus cultridens* e *Tomistoma lyceense*. I resti da loro descritti, e in alcuni casi figurati, sono al momento dispersi, con l'eccezione di un calco dell'olotipo di *Tomistoma lyceense* (# 2-4511) e tre denti isolati (# 8880-1 RE 43) conservati al Museo Geologico e Paleontologico Giovanni Capellini dell'Università di Bologna. Attualmente, nessuna delle identificazioni ottocentesche viene considerata corretta e *T. lyceense* viene considerato un nomen vanum o un nomen dubium. Tuttavia, un cranio parziale (MAUS 972/1) proveniente da Melpignano (LE) consente di rivalutare la morfologia e l'identificazione dei cocodrilli della Pietra Leccese. Questo reperto fa parte di una ricca collezione di resti fossili di vertebrati raccolta negli anni '80 da Angelo Varola e attualmente conservata presso il Museo dell'Ambiente dell'Università del Salento. I resti offrono informazioni sulla morfologia dei seguenti elementi scheletrici: dentale, lacrimale, mascellare, nasale, palatino, prefrontale, premascellare e spleniale. Sulla base di MAUS 972/1 non è possibile diagnosticare un nuovo taxon o confermare la validità di *T. lyceense*, ma l'inclusione dei caratteri morfologici rilevabili (47 su 244) in una matrice filogenetica aggiornata consente, grazie a una analisi di parsimonia, di confermare che MAUS 972/1 è un tomistomino collocato alla base del clade che comprende i taxa europei e l'unico tomistomino attuale, *Tomistoma schlegelii*.

**THE CRETACEOUS FLORA OF SALENTO: PRELIMINARY DATA ON THE ASSEMBLAGE
FROM SURBO (LECCE, ITALY)**

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A Cretaceous flora recovered in the 1980s in a quarry near Surbo (Lecce, Italy) and yet unpublished, is reported. The fossils lie on about one hundred limestone slabs referred to the Cenomanian-Turonian Altamura Limestone Formation, belonging to the Apulia Carbonate Platform. The specimens are referred to the following taxa: *Brachyphyllum* sp., *Frenelopsis* sp., *Geinitzia?*, *Pagiophyllum* sp. and *Cupressinocladus?*. All these taxa are documented for the first time in this area. Further studies will be required to determine Conifer 1, Conifer 2 and Conifer 3. The specimens are preserved as impressions, but in some cases the conservation is not optimal due to taphonomic compression. Macrofloral remains are stored at the Museum of the Environment of the University of Salento (MAUS). The identified taxa fit well within the reconstructions of the Cretaceous Salento platform as characterized by a shallow water sea surrounded by continental areas under a hot, humid and seasonal climate. A multiproxy stratigraphic study has been started in the area surrounding the quarry in order to confirm the age of the floral assemblage and to extract additional palaeoenvironmental data. Once again, the genus *Frenelopsis*, with its xeromorphic features, demonstrates the importance of the Cheirolepidiaceae in this sector of Tethys Ocean during the Cretaceous. Palaeobotanical remains from Surbo share some similarities with those found in the *Fossil-Lagerstätte* of Pietraroja (Benevento, Italy), indicating a similar tropical/sub-tropical palaeoenvironment. The Surbo assemblage is noteworthy because it helps uncover information on the palaeoecology and palaeogeography of the little-known emerged lands comprised between the Tethys carbonate platforms in the early Upper Cretaceous.

**LIVE AND DEAD BRYOZOANS IN THE CORALLIGENOUS BUILD-UPS OF MARZAMEMI
(IONIAN SEA)**

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Coralligenous is among the most biodiverse habitats of the Mediterranean Sea. It results from the active construction of skeletonized marine organisms, mainly crustose coralline algae and subordinately selected groups of invertebrates. In this context, bryozoans are relevant both for biodiversity and for the contribution they provide to the bioconstruction. Indeed, most have heavily mineralized colonies that, although usually small, can provide carbonate to the build-up whereas all species increase Coralligenous biodiversity. In the framework of the FISR project CRESCIBLUREEF “Grown in the blue: new technologies for knowledge and conservation of Mediterranean reefs”, 8 samples were scraped from 4 columnar build-ups arising from a coarse biogenic bottom at a depth of 33.5-37.2 m off Marzamemi (SE Sicily, Ionian Sea). Living and dead bryozoans were identified and scored, distinguishing colonies settled on the canopy (mostly fleshy algae and erect bryozoans) from those forming the concretion. Communities include a total of 85 species (1337 colonies), while only 42 species (287 colonies) were identified in the thanatocoenoses. No species are shared by all build-ups but relevant differences in the total diversity and species composition of both communities and thanatocoenoses have been detected between build-ups confirming the high heterogeneity of this habitat both in the present-day and the recent past. These data, and still ongoing research on further build-ups including a deeper one, provide new information increasing previous knowledge about the role of bryozoans in the Coralligenous of the area and of the whole Mediterranean. Structural and/or compositional differences between live and dead bryozoan associations are being particularly addressed in order to detect possible (paleo)-environmental proxies.

**NEW INSIGHTS ON MIDDLE TRIASSIC INVERTEBRATE ICHNOASSOCIATION FROM
THE MONTI PISANI MEGAICHNOSITE (NORTHERN APENNINES)**

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The “Verrucano” succession of the Monti Pisani (Northern Apennines, central Italy) has long been the subject of palaeontological research due to the abundance of fossil tetrapod tracks (including some of the oldest dinosauriform footprints worldwide) that are found in the Middle Triassic Quarziti del Monte Serra Formation. Although much is known about the Monti Pisani tetrapod ichnoassociation, the associated invertebrate traces have received much less attention. Here, we provide a first report on the invertebrate fossil traces from the basal Scisti Verdi Member of the Quarziti del Monte Serra Formation. This stratal package consists of alternations of green-coloured quartzitic phyllites and light-coloured sandstone reaching a maximum total thickness of ~110–120 metres. The presence of imprints of gypsum crystals and ripple marks depicts a semi-protected, lagoonal palaeoenvironment. The following ichnotaxa have been preliminary identified from the Scisti Verdi Member: *Asteriacites* (both *A. lumbricalis* and *A. stelliformis*), cf. *Diplocraterion* isp., *Planolites* cf. *montanus*, and *Gyrochorte* vel *Cruziana*. The ichnotaxonomic composition of the studied assemblage resembles that of the Lower Triassic ichnosite of Mount Pallone (Carnic Alps, northern Italy), which was recently revealed to reflect stressed environmental conditions in a marginal-marine paleoenvironment. Similar considerations may apply to the Middle Triassic assemblage studied herein. Moreover, the dense aggregation of asterozoan traces, in addition to morphological evidence such as arm duplication, missing arm tips and vertical reaccommodation/superimposition, stresses the importance of a gregarious lifestyle for these ancient *Asteriacites* tracemakers.

**MICROFACIES AND BIOSEDIMENTARY PROCESSES OF LATE PLEISTOCENE (MIS 5.1)
DEPOSITS (CAPO COLONNA, SOUTHERN ITALY)**

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Interglacial MIS 5.1 mixed carbonate and siliciclastic deposits, cropping out along the marine terrace of Capo Colonna (Kr), were studied. Two main bio-sedimentary facies can be recognized: 1) Red algae-dominated decimeter- to meter-scale domal to stratiform bioconstructions (Coralligenous), rich of encrusting red algae, with less bryozoans, serpulids, and encrusting foraminifera; laterally, these are associated to medium to coarse mixed bioclastic grainstone/packstones that also fill most of the cavities of the skeletal framework; 2) Maerl facies, mainly composed of free branches and fragments of red algae immersed in mixed bioclastic medium to coarse grainstone/packstone. In mixed bioclastic sediments of both biofacies, micrite is ubiquitous and generally well preserved. Several typical microbialite fabrics characterize most of the micrite: aphanitic, peloidal/dendritic, pseudo-thrombolitic and stromatolitic. Primary marine cements are commonly micritic isopachous rims, whereas vadose and botryoidal are rare. Late diagenesis affects all the deposits with dissolution, aragonite conversion into calcite, neomorphic recrystallization of calcite (e.g., micrite to microspar), and precipitation of meteoric dogtooth cements. The primary skeletal framework of the buildups is composed of encrusting red algae, foraminifera, bryozoans, and serpulids, while both primary micritic cement and early indurated microbialites contribute to bind skeletal and detrital components in both biofacies. Physical and biological destructive processes are commonly detected, producing erosional surfaces and dissolution cavities mainly due to endolithic sponges.

A FLAT-SNOUDED SPERM WHALE FROM THE LOWER MIOCENE OF THE SOUTHEASTERN PACIFIC (EAST PISCO BASIN, PERU) SUPPORTS AFFINITIES WITH THE SOUTHWESTERN ATLANTIC CETACEAN FAUNA

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Contrasting with the suction feeding of modern relatives in the families Kogiidae and Physeteridae, Miocene physeteroids display a broad range of feeding strategies. Despite the continuous improvements of the fossil record, the transition from the earliest sperm whales to suction feeding forms as well as the once prominent macroraptorial forms remains poorly understood. Here, we investigate a partial skull from Lower Miocene (Burdigalian) strata of the Chilcatay Formation of the East Pisco Basin (southern Peru). This specimen is recognised as belonging to an undescribed species of *Diaphorocetus*, a genus previously known only by the holotype of *Diaphorocetus poucheti*, from a roughly coeval unit in Patagonia (Argentina). Differing from the latter in its smaller cranial dimensions, higher tooth count, and minor differences in the position of facial foramina, the Peruvian fossil confirms the presence of a key character of *D. poucheti*, the marked dorsoventral flattening of the maxillary portion of the rostrum. Such cranial proportions suggest that, compared to other physeteroids, *Diaphorocetus* spp. were more efficient at performing fast lateral sweeps of their rostra to capture small- to medium-sized prey items with their proportionally small teeth. Recovered as stem physeteroids in our phylogenetic analysis, these forms contribute to the ecomorphological disparity of the Early Miocene sperm whales, but without displaying any of the cranial and dental changes occurring in later, macroraptorial and suction-feeding sperm whales. The discovery of a member of *Diaphorocetus* in southern Peru increases the similarities between the toothed whale faunas from the local Chilcatay Formation and the Gaiman and Monte Leon formations of Argentinian Patagonia, pointing not only to dispersal routes between the southeastern Pacific and southwestern Atlantic during the Burdigalian, but also to overall similar ecological settings along the coasts of Peru and Patagonia at that time.

**NEW FOSSIL REMAINS AND HISTOLOGICAL STUDY OF *DIPLOCYNODON RATELII*
(CROCODYLIA: DIPLOCYNODONTIDAE) FROM THE MIDDLE MIOCENE SITE OF ELS
CASOTS (CATALONIA)**

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Els Casots (Subirats, Catalonia) is one of the richest vertebrate localities in the Vallès-Penedès Basin and is considered a major reference site for the European early Middle Miocene (MN5, early Aragonian subzone Cb). The fossil remains of crocodylians are abundant, but only skulls and isolated elements, such as osteoderms and teeth, had been described so far and attributed to *Diplocynodon ratelii*. During the 2021 excavation campaign, a nearly complete skeleton was found in anatomical connection (IPS127899). A combination of cranial and postcranial features supports its assignment to *D. ratelii*, such as: 1) a distinct dorsoventral step on the frontal, 2) the slightly concavo-convex frontoparietal suture, and 3) keeled dorsal osteoderms and bipartite ventral osteoderms. Estimated total length of the individual is 1.38 m, the size of the smallest crocodylian species. Like extant small crocodylians (e.g., *Paleosuchus palpebrosus* and *Paleosuchus trigonatus*), *D. ratelii* was likely a generalist predator that preyed on small animals. To provide an initial insight into the paleobiology of the species, we also analysed the histology of an isolated femur of *D. ratelii* (IPS25075) found in a previous excavation. The primary bone tissue found in the thin sections studied (i.e., parallel-fibered bone) suggests similar growth rates to extant alligators. Future histological studies will focus on the analysis of vascular canals and lines of arrested growth to obtain more detailed information on the growth pattern of *D. ratelii*.

Funded by R+D+I projects PID2020-117289GB-100 (MCIN/AEI/10.13039/501100011033/), OSIC project CLT0009_22_000019 (Departament de Cultura, Generalitat de Catalunya), Generalitat de Catalunya/CERCA Programme, AGAUR (2021 SGR 00620, 2019 BP 00154 to À.H.L, 2021 BP to C.N.M.), Agència Estatal de Investigació (FCI2019-039443-I/AEI/10.13039/501100011033 to A.V). Preparation of IPS127899 defrayed by the Ajuntament de Subirats.

ANALISI PALEOECOLOGICA DELL'ASSOCIAZIONE A *VENUS-OSTREA* DEL TORRENTE ARDA (PLEISTOCENE INFERIORE)

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La presenza dell'associazione a *Venus-Ostrea* nella successione pleistocenica del Torrente Arda (Emilia-Romagna) è stata segnalata in diversi studi, ma mai esaminata in modo approfondito. In questo lavoro è stata svolta un'analisi paleoecologica dell'associazione e, per le specie attualmente viventi, è stato effettuato un confronto con il loro ambiente di vita attuale, per osservare eventuali cambiamenti nelle loro distribuzioni dal Pleistocene a oggi. Il Pleistocene Inferiore è un intervallo di tempo caratterizzato da oscillazioni climatiche legate all'alternanza di cicli glaciali e interglaciali e da una generale tendenza al raffreddamento climatico. L'analisi sistematica ha permesso di identificare 23 taxa di molluschi, evidenziando una compresenza tra organismi infaunali di substrati fangosi ed epifaunali di substrati duri, interpretata come conseguenza dell'apporto sedimentario periodico nel bacino. Durante i periodi di apporto di materiale fine si sono stanziati i taxa infaunali, mentre nei periodi quiescenti hanno potuto stanziarsi quelli epifaunali. Tra quest'ultimi è presente *Ostrea edulis* che ha sviluppato una strategia per adattarsi al substrato fangoso, aggregandosi in cluster di ridotte dimensioni per non sprofondare. Analizzando i range batimetrici attuali delle specie identificate, si osserva che molte di esse attualmente sono presenti dal piano infralitorale al circolitorale profondo; invece, durante il Pleistocene Inferiore, mostravano una distribuzione limitata tra 20 e 40 m. Questa differenza è attribuibile alle variazioni climatiche intercorse dal Pleistocene all'attuale che hanno influenzato la distribuzione dei molluschi. Alcune specie non sono state in grado di adattarsi al raffreddamento climatico del Pleistocene Inferiore e si sono estinte; altre non hanno subito variazione nella loro distribuzione; altre specie ancora, come *Venus nux*, dal Pleistocene Inferiore hanno subito un approfondimento del loro range batimetrico (75-100 m).

**REVISING THE EARLY EUROPEAN RECORD OF THE DIRK-TOOTHED CAT
*MEGANTEREON***

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Megantereon was a leopard-sized cat recorded during the Pliocene and Pleistocene of the Old World. Its fragmentary record prompted a hot debate during the last decades between scholars advocating for a single species and others who identified several forms and dispersal events. Here we revise the earliest records of *Megantereon* in Europe including the sites of Serrat d'en Vaquer (France, ca. 4 Ma), Les Etouaires (France, ca. 2.8 Ma), Saint Vallier (France, ca. 2.5 Ma) and Senèze (France, ca. 2.2 Ma), further describing two unpublished partial skeletons from the Upper Valdarno (Italy; ca. 1.8 Ma) and Pardines (France; ca. 2.6 Ma) including one cranium and several postcranial bones. The focus of the present contribution is to categorize the early *Megantereon* forms and to clarify if their evolution and/or derivation of characters in Europe is stable or continuous through time. Their intraspecific variability and sexual dimorphism are also tested. First, the present revision shows that the earliest European records of *Megantereon* correspond to the latest Pliocene of Les Etouaires furthermore better considering the specimens of Serrat d'en Vaquer and Odessa Catacombs as belonging to the genus *Dinofelis*. Our results also highlight a high intraspecific variability among these forms and an undetected sexual dimorphism, somewhat partially masking the derivation of characters in more advanced forms putatively present after (or coeval to) the Olduvai magnetostratigraphic subchron.

PALEOCLIMATIC AND PALEOCEANOGRAPHIC CHANGES AND THEIR IMPACT ON PLANKTIC FORAMINIFERA IN THE TYRRHENIAN SEA DURING THE LAST 32 KA

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The marine sediment core NDT_22_2016 was recovered offshore of La Spezia Gulf at 436 m depth in 2016 during an oceanographic survey by the National Research Council (CNR), as part of the NextData project. Within the 320 cm-long core, only one stratigraphic level (at 150 cm) was dated at 15.912 ± 111 cal kyrs BP by means of AMS¹⁴C on planktonic foraminifera *Globigerina bulloides*. So, considering a constant sedimentation rate, we can estimate a possible age of ca. 32 kyr BP for the bottom of the core. The main aim of this research is to investigate the paleoenvironmental and paleoceanographic changes that took place in the northern sector of the Tyrrhenian Sea over the past 32000 years, as revealed by planktic foraminifera (PF). The preliminary quantitative analyses, performed on >125 µm size fraction, identify that in the first 80 cm (cmbsf), the thanatocoenosis is composed of a rather wide PF biodiversity, mainly composed of *Globigerinoides elongatus*, *G. ruber*, *Globoconella inflata*, *Globorotalia truncatulinoides*, *Globigerina bulloides*, *G. falconensis* and *Neogloboquadrina incompta*. Below 80 cm, the planktonic foraminiferal assemblage exhibits a drastic reduction in biodiversity, as the 70% of the association is commonly composed by cold species such as *G. bulloides*, *Turborotalita quinqueloba*, and *Globorotalia scitula*, while *Neogloboquadrina pachyderma* is absent. Since this variation occurs in a stratigraphic level younger than 15.912 ± 111 cal kyr BP, we believe that this faunal change reflects the transition from warmer conditions, occurring during the Holocene, to colder conditions, which were established during the Younger Dryas event. Work is in progress to increase the sample resolution to achieve a century-scale resolution and identify paleoceanographic oscillations both during the warm (interglacial) and cold (glacial) configurations.

This research has been financially supported by ERC-Consolidator TIMED project (REP-683237).

TECHNOLOGICAL INNOVATION FOR THE REMOTE 3D STUDY OF MARINE BIOCONSTRUCTIONS: A PROJECT PROPOSAL

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Marine bioconstructions are biodiversity-rich systems built by bioconstructor organisms, topographically distinct with respect to the surrounding marine landscape and characterized by good resistance to the action of destructive agents. The main bioconstructions in the Mediterranean Sea are represented by coralligenous build-ups, vermetid reefs, deep-sea coral build-ups, sabellarid build-ups, and polychaeta/bryozoans bioconstructions. They form in a wide range of marine settings, from shallow to deep sea and from open to confined sectors. Despite of their importance, Mediterranean bioconstructions have not received the same attention that tropical coral reefs, and their knowledge in term of distribution and biological, ecological and geobiological processes are still fragmentary. Traditionally, underwater habitat mapping has been carried out coupling acoustic remote sensing techniques with RGB images, videos, and bottom sampling. During the last decade, the implementation of hyperspectral devices has become a viable alternative to regular photography. In contrast to ordinary cameras (that acquire three color bands), hyperspectral cameras record the full spectrum of reflected light, in each pixel of the acquired image. Recently, different instrument carriers for the underwater hyperspectral imager have been used in underwater field applications, such as *Remotely Operated underwater Vehicle* (ROV). ROVs play an important role in several application fields like marine science and underwater archeology in both shallow and deep water. The current project proposal aims to suggest a new protocol for the study of the Mediterranean marine bioconstructions based on the implementation of high-resolution 3D mapping and reconstruction models starting from the data remotely acquired through ROVs equipped with specific optical-stereo and hyperspectral cameras. The protocol could represent a highly innovative tool, in the scientific and environmental fields, useful for monitoring and enhancing of these delicate habitats, which are protected by EU.

THE PLEISTOCENE MALACOLOGICAL COLLECTION OF CATALLARGA (SICILY) IN THE MUSEUM OF PALEONTOLOGY (UNIVERSITY OF CATANIA)

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A rich fossiliferous sandy level is well exposed along the western side of the Catallarga hill, near the Grammichele village in the north-western margin of the Hyblaean Plateau (Southern Sicily). It belongs to the Pleistocene clayey-sandy succession that fills the Gela-Catania Foredeep and consists of white-to-yellowish organogenic calcarenites and coarse sands lower Pleistocene in age. The fossiliferous outcrop of Catallarga, discovered at the end of the 19th century by Travaglia and later studied by Malatesta (1960-63), was more extensively investigated during the 1980s by Di Geronimo and collaborators (University of Catania). Numerous sampling surveys allowed us to gather a large amount of material, mainly mollusc shells, presently stored in the Palaeontological Museum of the Department of Biological, Geological, and Environmental Sciences. Based on this large collection of about 300 species, including Bivalves, Gastropods, Scaphopods, and Polyplacophors, the present study deals with bivalves, revising and updating taxonomy, and implementing previous literature. From a palaeoecological point of view, infaunal soft bottom-dwelling species, typical of infralittoral and circalittoral biocenoses, largely dominate. Among them, several species (among which *Laevicardium crassum*, *Callista chione*, and *Glycymeris glycymeris*) indicative of the SGCF Biocenosis are dominant. The co-occurrence of species of cold climatic affinity, such as the Boreal Guests *Arctica islandica*, *Macoma obliqua*, *Polinitapes rhomboides*, and thermophilic species, such as *Varicorbula revoluta*, *Chama placentina*, *Plicatula mytilina*, deserves in deep investigation. The malacological Catallarga deposit is highly informative for its relevant palaeobiodiversity and the excellent preservation state of most shell remains.

DIGITAL INVESTIGATION OF LAMNIFORM SHARK VERTEBRAE FROM THE SCAGLIA CINEREA – BISCIARO BOUNDARY (MIOCENE, UMBRIA-MARCHE BASIN)

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During the sampling of a stratigraphic section along the shore of the Fiastra Lake (Carg Project - sheet 313 Camerino of the Geological Map of Italy 1:50000), a rock boulder with partially exposed skeletal materials has been discovered at the base of a small cliff at the northern termination of the Sibillini Mts. Ridge. In this area the Umbria-Marche Basin stratigraphic succession is extensively exposed. The Oligo-Miocene portion of the succession is well-exposed in the examined section, represented by the ~200 m-thick Scaglia Cinerea Formation passing upwards to the ~100 m-thick Bisciario Formation. The studied specimen was found erratic in close proximity to the boundary between the two formations, in a stratigraphic interval attributable to the Aquitanian *p.p.* To better investigate the nature of the exposed skeletal structures, the block has been examined using a CT scan. From the acquired digital data, the elements appeared to be articulated fish vertebrae affected by a certain degree of lithostatic compression. Through computed tomography investigations, the vertebrae have been digitally isolated and extracted from the block, and the digital model has been 3D printed. Thanks to the identification of diagnostic characters, the vertebral material has been attributed to a lamniform shark (order Lamniformes). The vertebrae were also digitally retro-deformed, and a body length estimate has been proposed, suggesting an individual not shorter than four meters of total length. The effectiveness of these non-invasive methods has been demonstrated for the intended purpose. The obtained data also allowed a taxonomic identification of the specimen and to report the first occurrence of a large vertebrate remains discovered to date at the Scaglia Cinerea – Bisciario boundary.

**PRELIMINARY STUDY OF TWO CAVE BEAR CUBS FROM THE LATE PLEISTOCENE
VERTEBRATE ASSEMBLAGE OF THE “TECCHIA” OF EQUI CAVE (EQUI TERME, MASSA-
CARRARA PROVINCE, ITALY)**

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Taking its place in the northern portion of the Apuan Alps, the “Tecchia” of Equi cave (Equi Terme, Massa-Carrara Province, Italy) represents a cave of great palaeontological and archaeological relevance. Here, abundant faunal remains have been collected, mostly Late Pleistocene (MIS3) mammals such as the cave bear (*Ursus spelaeus* Rosenmuller, 1794). In 2014, two extremely small skeletons of this species were collected from a single stratigraphic horizon at the “Tecchia”. Both specimens (hereinafter, Cub 1 and Cub 2) exhibit an excellent state of preservation. Cub 1 includes the skull, which preserves an undeformed three-dimensional morphology and is still connected to the cervical vertebrae. The cervical and thoracic vertebrae and the ribs are fully articulated. The 23-mm-long scapulae, a 33-mm-long humerus and a tibia are also preserved. Cub 2 features the thoracic cage and part of the vertebral column. Preserved elements of the forelimbs consist of both the 31-mm-long humeri, ulnae and radii, plus a 25-mm-long scapula. Many anatomical traits of Cub 1 and Cub 2 reveal a very young age at death, including vertebrae that are not fully ossified and the lack of epiphyses of the long bones. Cub 1 is edentulous, and its cranium displays open fontanelles and unfused sutures. By comparing the measurements of the scapulae and long bones of both cubs to the values reported in literature for early juvenile conspecific individuals from other sites of central Europe, an age at death of less than a week was estimated. These cave bear cubs may have died from malnutrition a few days after their birth, similar to what happens to many modern bear cubs, due to the oftencritical nutritional conditions of their mothers during hibernation.

A LEATHERY MEAL: MEGATOOCHED SHARK BITE MARK ON A *PSEPHOPHORUS* CARAPACE FROM THE PIETRA LECCESE FORMATION (MIOCENE, SOUTHERN ITALY) AND ITS PALAEOECOLOGICAL IMPLICATIONS

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Ancient prey-predator interactions are sometimes preserved in the vertebrate fossil record in the form of traces such as bite marks and gnaw marks. Here, we report on a probable shark bite mark affecting a partial carapace belonging to the extinct leatherback turtle *Psephophorus polygonus* (Chelonioidae: Dermochelyidae) from the Pietra Leccese Formation (Miocene, southern Apulia). This specimen is kept at the Museo dell'Ambiente dell'Università del Salento (MAUS) with accession number MAUS 1008/1. In order to characterise the observed mark, we acquired a digital model of the carapace via photogrammetry and performed an elevation analysis of the injury. The latter appears as a furrow-like incision that cut through the turtle's dermal ossicles. It is narrow (maximum width 11 mm) and elongated (total length 55 mm). The trace is slightly asymmetrical as its deepest point (as deep as 18 mm) is eccentric, and damaged areas occur at both ends of the mark. The long margins of the injury are characterized by a downward bending of the ossicles, which appears to be fairly more abrupt on one side than on the other. Based on the size and morphology of the studied trace, it likely represents the mark left by the impact of a large-sized shark tooth. This interpretation is supported by actualistic observations that have provided evidence that macropredatory sharks such as *Carcharodon carcharias* feed upon the extant leatherback turtle (*Dermochelys coriacea*). Furthermore, the chelonian fossil record preserves several examples of shark bite marks on turtle shell elements. Among the many selachian genera whose remains have been collected from the Pietra Leccese Formation, the extinct genus *Carcharocles* (Lamniformes: Otodontidae) represents the most probable producer of the trace observed on MAUS 1008/1. Despite its fragmentary nature, this find contributes to reconstruct the structure of the central Mediterranean trophic chain during the Miocene.

THE WOLFERODE QUARRY: AN AMAZING MIDDLE TO LATE PERMIAN TRACKSITE IN CENTRAL GERMANY

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The sediments of the middle to late Permian Hornburg Formation (Fm) (Saxony-Anhalt, Germany) reveal a rarely preserved fan- and playa-system in central Europe. The successions represent an exceptional window into the continental environments and biotas of the Euramerican Permian Pangean palaeoequatorial northern trade wind zone. In September 2022, an international excavation (ca. 60 m²) in the NE corner of the abandoned “Quarry Held”, Wolferode (Upper Hornburg Fm), unearthed a variety of well-preserved trace fossils (40 excavation boxes) including tetrapod trackways, tetrapod scratch marks (probably swimming traces), insect trackways, insect body imprints, jellyfish imprints and microbially induced sedimentary structures. It was the first excavation of its size in the Upper Hornburg Fm strata. The fossil-bearing strata is approximately 6 m thick and includes laminated silt and clay stones; intercalated sandstone channels show internal cross bedding structures, and on the bottom desiccation crack fillings, ice crystal casts, flute casts and/or load casts. The trace fossil content of these dry evaporitic red beds is exceptional on a worldwide scale and of great interest for Permian biostratigraphy and ichnology. It will also add to the interpretation of ancient food chains and environments. The excavation will be continued in 2023 and is open for volunteers.

MOLETO: A NEW LATEST MIDDLE-EARLIEST LATE PLEISTOCENE VERTEBRATE SITE IN NORTHERN ITALY

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The palaeontological site of Moletto (Ottiglio, AL, Piedmont, Italy) was discovered in the 1990s in an abandoned quarry carved into a Burdigalian-Langhian (Lower-Middle Miocene) carbonate succession called Pietra da Cantoni. Sediment collection in three closely spaced fissures provided a rich vertebrate association whose age can be constrained to the latest Middle-earliest Late Pleistocene on the basis of the presence of the rodent *Arvicola mosbachensis* and its enamel characteristics (enamel differentiation quotient [SDQ] values ranging from 100 to 130). The very similar faunal content, particularly with respect to the common presence of *A. mosbachensis* and its similar SDQ values, suggests a geologically coeval deposition of the fillings of the three fissures. The vertebrate assemblage is represented by amphibians (*Salamandra salamandra*, *Bufo* gr. *B. bufo*, *Rana* sp.), reptiles (*Anguis* gr. *A. fragilis*, Lacertidae indet., *Hierophis* sp., *Natrix* sp., *Vipera* gr. *V. aspis*), birds (Passeriformes indet.), and mammals (*Erinaceus europaeus*, *Talpa europaea*, *Sorex* sp., *Arvicola mosbachensis*, *Microtus* cf. *M. agrestis*, *Microtus* cf. *M. arvalis*, *Apodemus* gr. *A. sylvaticus-flavicollis*, *Sciurus* sp., *Glis glis*, *Muscardinus avellanarius*, *Clethrionomys glareolus*, Lagomorpha indet., *Mustela putorius*, Carnivora indet., *Stephanorhinus* sp., *Sus* cf. *S. scrofa*, *Dama* cf. *D. dama*, *Cervus elaphus*, *Capreolus capreolus*, Bovidae indet.). Interestingly, a diverse fish assemblage including squalomorph and galeomorph sharks, batoids, and percomorph bony fishes reworked from the embedding sediments of the Miocene Pietra da Cantoni, and indicative of shallow to deep shelf marine biotopes, has been found in the fissure fillings. The habitat weighting method and a bioclimatic model applied to the small-mammal assemblage of Moletto reveals a landscape dominated by woodland habitats with presence of open humid meadows, under temperate and moist climatic conditions.

NUOVE EVIDENZE DI DEPOSITI PLIO-PLEISTOCENICI A CONCHIGLIE E VEGETALI FOSSILI NELL'ALVEO DEL TORRENTE CERVO: RASSEGNA PRELIMINARE

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Il Torrente Cervo in piena eccezionale nell'ottobre 2020 ha sfondato la briglia di Castelletto Cervo nel Biellese, causando l'erosione di alcuni affioramenti testimoniata da sopralluoghi i cui risultati sono qui riportati. Sono stati esposti ingenti spessori di sabbie mal classate a stratificazione incrociata e allineamenti ciottolosi al di sopra di un noto deposito a conchiglie presso Candelo. Nel sito "Castellengo" sono riemersi nuovi fossili quali colonie di Thoracica e Bryozoa, Bivalvia (Pectinidae, *Panopea*, *Ostrea*, tronchi carbonificati scavati da Teredinidae), Gastropoda (Muricidae, *Xenophora*, *Bufo naria marginata*), Echinoidea (*Schizaster*) e pigne fossili. A valle della diga di Cossato sono esposte sabbie grossolane che comprendono un noto strato a frutti fossili e un fitto intreccio di *Domichnia* (*Thalassinoides*, *Ophiomorpha*). Alla confluenza del Cervo con lo Strona presso Cossato, uno strato a impronte di foglie già studiato in passato affiora a 5 metri dal fondo alveo. Un nuovo deposito con impronte di Bivalvia, correlato con uno ciottoloso più a monte, indica disomogeneità laterale del paleoambiente secondo l'antica linea di costa. A valle del guado di Castelletto Cervo i resti fluitati di tronchi, frutti e semi (*Juglans*, *Styrax*, *Fagus*) sono associati a una foresta fossile i cui ceppi in posizione di crescita hanno scorze compatibili con quelle di *Alnus* attuali. La distruzione della briglia di Castelletto Cervo ha rivelato depositi ricchi in resti carpologici (*Stewartia*, *Fagus*, *Styrax*), rizomi di monocotiledoni e *Domichnia* (*Thalassinoides*). Il corpo sabbioso grossolano denominato "Castelletto Cervo II" (Gelasiano) ha restituito nuove pigne e rami fogliosi di *Picea*, oltre a semi di *Magnolia*, ecc. Più in alto sono risaltate, meglio che in passato, le ghiaie alla base dello strato di lignite di Garella di Fondo e la successione che le comprende. I dati in studio registrano circa due milioni di anni di cambiamenti paleoambientali ai piedi delle Alpi Occidentali.

REIMAGINING *VELOCIRAPTOR* 100 YEARS AFTER ITS DISCOVERY

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This year marks the 100th anniversary of the discovery of *Velociraptor*. In this contribution, our aim is to trace the history of the discoveries related to this fascinating non-avian theropod and to examine how it has been depicted by palaeoartists over the past century. The first *Velociraptor* fossil was discovered on August 11th, 1923 by the staff of the American Museum of Natural History during an expedition in the Gobi Desert. The name *Velociraptor* is derived from Latin and means “swift thief”, reflecting the perceived nature of this taxon as a fast-moving predator. This animal is characterized by using only two toes to walk with the inner digit possessing a raised sickle-shaped unguis phalanx. This peculiar adaptation was discovered only in the 70's, with the description of *Deinonychus*, by John Ostrom. Among the many other specimens recovered over the past fifty years, utterly fascinating is the finding of the “fighting dinosaurs”, recovered in 1971. Over the years, *Velociraptor* has been reconstructed by many palaeoartists, with varying degrees of accuracy. Early depictions by illustrators like Giovanni Caselli and Zdenek Burian, did not include the sickle-claw or had inaccurate head proportions. More accurate reconstructions were proposed in the 1980's, by palaeoartists such as Mark Hallett and Gregory Paul, that envisioned *Velociraptor* as entirely feathered for the first time, an inference supported by the discovery of fully feathered dromaeosaurids in the 21st century from the Early Cretaceous of China. *Velociraptor* got most of its fame in pop culture with the “Jurassic Park” novel by Michael Crichton in 1990 and the homonymous film directed in 1993 by Stephen Spielberg, which depicted the theropod as a bloodthirsty killer hunting in packs. These fictitious reconstructions were highly inaccurate, being two times bigger than they would have been and lacking any plumage coverage. Nonetheless, popular imagination often sees this animal as depicted in cinematography. Within this context, our aim here is to provide an updated, accurate and original *in-vivo* reconstruction of this small, feathered theropod.

THE ACHILLE TELLINI HISTORICAL COLLECTION (MUSEO UNIVERSITARIO DI SCIENZE DELLA TERRA, SAPIENZA UNIVERSITÀ DI ROMA)

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During the renovation work of the MUST (Museo Universitario di Scienze della Terra, Sapienza Università di Roma), it was necessary to reorganise all the collections in order to move them to the new repository. As part of this project, several historical collections were selected as tests for a standardised approach to digitisation, cataloguing, and valorisation from a scientific and historical point of view. Among these collections, the Tellini collection stands out. Achille Tellini was one of Portis' most promising assistants. He was a student of Portis in Turin and followed him in Rome, after his graduation in 1888. Here at La Sapienza University, Tellini started his research career, which initially focused on palaeontology. Between 1888 and 1892, he enriched the museum with a large collection of invertebrate fossils and mainly foraminifera. The collection consists of over 6,000 specimens including many types of specimens. Within the entire collection, it is possible to identify two main sub-collections in terms of both number of pieces and scientific value: one dating from 1889-1890, and the other from 1888. The work done on the Tellini collection led to the production of the complete inventory and mapping of the collection held at MUST. Moreover, it was possible to carry out a systematic revision on some taxa established by Tellini (1888), namely *Nummulites bormienseis*, *N. rosai*, and *N. saccoi*. Lastly, the catalogue standard cards BN-P-ICCD (Beni Naturalistici – Paleontologica – Istituto Centrale per il Catalogo e la Documentazione) were reviewed and then applied to the whole collection.

Tellini A. (1888). Le Nummulitidee terziarie dell'Alta Italia Occidentale. *Bollettino della Società Geologica Italiana*, 7: 169-230.

**BIODIVERSITY AND DISTRIBUTION PATTERN OF SERPULIDS FROM
MEDITERRANEAN HOLOCENE CORALLIGENOUS BUILD-UPS**

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Coralligenous is a priority habitat of the Mediterranean Sea, also known in the fossil record being composed of skeletonised organisms (calcareous algae and invertebrates) but its nature and associated biodiversity are still not adequately known. In the framework of the FISR project CRESCIBLUREEF – “Grown in the blue: new technologies for knowledge and conservation of Mediterranean reefs”, serpulid associations (communities and thanatocoenoses) from four Holocene coralligenous build-ups (25 to 40cm high) collected in August 2021 from 33.5 to 37.2 m depth off Marzamemi (SE Sicily) were examined. Besides calcareous algae that constitute the primary framework, serpulids and other skeletonized invertebrates secondarily contribute to the build-up growth. Living serpulid associations consist of 22 species (including 984 specimens), while a total of 31 serpulid species (including 1153 specimens) were identified in the thanatocoenoses. The most widely distributed and abundant species are overall *Placostegus* cfr. *crystallinus*, *Josephella marenzelleri*, *Metavermilium multicristata* and *Semivermilium crenata*. All species detected on the examined build-ups are already known from the Mediterranean, but 11 species are reported for the first time from the Coralligenous, among which *Vermiliopsis infundibulum*, *Filigranula annulata* and *Spirorbis cuneatus*. These new data remarkably increase the serpulid biodiversity known for the Coralligenous, highlighting the need of further research on this habitat.

The still ongoing research is aimed at clarifying: 1) which serpulid species form/inhabit the coralligenous build-ups in the studied region, 2) any structural/compositional differences of species associations between live and dead serpulid associations and their possible paleo-ecological meaning, as well as between the studied four build-ups and 3) any difference in the degree and pattern of colonisation between top and bottom halves of each build-up and between sheltered and exposed parts.

MIS 5.5 SST ESTIMATION FROM A MACROFOSSIL ASSEMBLAGE: A MULTI-PROXY RECONSTRUCTION

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This contribute presents a multi-proxy palaeoclimatic study performed on a macrofauna coming from a MIS 5.5 calcarenite, exposed along the coastline of the Mar Piccolo of Taranto (MP). Three bulk samples returned 120 mollusc species, including four of the tropical “Senegalese Fauna”. Mollusc species with a southern or warm affinity are present in a double percentage in respect to today, whereas the northern or cold affinity species are equally represented, indicating warmer, but not tropical, SST during MIS 5.5. This is supported by the most recurring preferred SST ranges of the assemblage, that indicate 20 °C in average. For further SST estimations, trace elements (Mg/Ca and Sr/Ca), and oxygen stable isotope ($\delta^{18}\text{O}$) analyses, were performed on well preserved specimens of *Thetystrombus latus*, *Spondylus gaederopus*, *Venus verrucosa*, *Pinna nobilis*, and corallites of *Cladocora caespitosa*. Only some SST estimations, derived from equations available in literature, are realistic and converge on similar mean annual SST, on average of 20.8 ± 0.9 °C. As the modern annual mean SST of the study area ranges from 18 °C to 18.8 °C in the semi-closed MP basin and in the facing open sea Gulf of Taranto (GT) respectively, the final estimate of the MIS 5.5 SST falls in the range 1.2 - 2.0 °C for the GT, and 2.0 - 2.8 °C for the MP. Albeit warmer than today, this is not a firmly warmer tropical-like SST setting as it would be derived from the mean annual SST requirement of the Senegalese *T. latus*, that would suggest at least +2.7 °C in respect to modern GT, and +3.5 °C in respect to modern MP. To conclude, the approximations and assumptions made for obtaining SST values with any single proxy-based method return a wide uncertainty, strongly suggesting the need of a multi-proxy approach to infer the most reliable SST estimation.

**COLLEZIONI MUSEALI E VALORIZZAZIONE DEL PATRIMONIO PALEONTOLOGICO.
MAPPARE PER COSTRUIRE RETI: IL CASO STUDIO DELLA VAL D'ALPONE**

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Nel panorama dei siti paleontologici nazionali e internazionali la Val d'Alpone, situata nella porzione estrema dei Monti Lessini orientali Veronesi, rappresenta un fortunato esempio per il gran numero di giacimenti conosciuti. Lungo circa i 30 chilometri di sviluppo della valle, tre sono le località fossilifere dell'Eocene storicamente note: Roncà, San Giovanni Ilarione e Bolca. Il loro eccezionale patrimonio paleontologico ha favorito una proficua ricerca scientifica che prosegue tutt'ora con importanti collaborazioni fra i musei del territorio, il Museo di Storia Naturale di Verona e università italiane ed estere. Accanto ad una notevole produzione bibliografica, l'interesse nei confronti di queste tre località è testimoniato anche da un diffuso fenomeno collezionistico che, in tempi storici, ha dato origine a raccolte confluite, in molti casi, all'interno di musei italiani e stranieri. Il collezionismo dei secoli scorsi ha contribuito ad accrescere la notorietà dei giacimenti, amplificandola dal contesto locale a quello internazionale. Attualmente, tali raccolte svolgono un importante ruolo nella conservazione dei beni paleontologici, base necessaria per consentirne la valorizzazione e promuovere la ricerca. Per questo motivo, è stato avviato un progetto di censimento e verifica della consistenza del patrimonio paleontologico della Val d'Alpone presso le collezioni di musei e università nazionali e internazionali. Aggiornando lo stato delle conoscenze sulle collezioni paleontologiche storiche della Val d'Alpone sparse nel mondo, questa mappatura punta a sostenere la tutela dei beni paleontologici e dei siti in esame, nonché ad agevolare la crescita di reti che possano facilitare lo scambio di informazioni, la cooperazione scientifica e la promozione di iniziative per la divulgazione al grande pubblico. Ciò favorirà l'accesso e la diffusione del sapere, secondo uno degli obiettivi prefissati dall'Unesco, per cui la Val d'Alpone si candida a divenire patrimonio.

**A DENDROLITE/THROMBOLITE CARBONATE BUILD-UP FROM THE MESSINIAN
TERMINAL CARBONATE COMPLEX OF THE SALENTO PENINSULA (SOUTHERN ITALY)**

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A late Messinian shallow-water succession composed of bioclastic/microbialitic carbonate deposits has been described in the Salento Peninsula and has been considered as a central Mediterranean equivalent of the Terminal Carbonate Complex (TCC), up to now mainly known from the Western Mediterranean. The changes forced by the Messinian Salinity Crisis on the Mediterranean marine environments, particularly on shallow-water carbonate factories, allowed the development of microbial communities, driving metabolic induced microbialite deposition, mostly under shallow-water and normal marine salinity conditions during warm climatic phases. Here we present a micromorphological and biogeochemical approach integrating optical and electron microscopy analyses with UV-Epifluorescence observations, EDS microanalyses and Raman Spectroscopy, in order to investigate the processes involved in the deposition of massive dendrolite/thrombolite facies. Two different wave-resistant fabric have been recognized at meso- and microscale observations: a) dendritic mesofabric made of short, digitate ramifications; b) thrombolitic growth forms made of larger, upward oriented branches. Data of UV-Epifluorescence and Raman spectroscopy indicate the presence of organic matter remains trapped among the fine crystals of the microbialite textures, suggesting biomediated processes involved in their precipitation. Dendrolites and thrombolites show very rare traces of abrasion and bioperforation and biotic crusts of metazoans. Both microbialite textures are interspersed by small sediment pockets: a grainstone/packstone with abundant remains of gastropods and bivalves, pellets and fragmented oolites. These features suggest the development of the build-up under high-energy conditions and relatively fast accumulation of sediment, that was trapped among the dense microbial structures.

SOME CONSIDERATIONS ABOUT MIS3 MARMOTS (*MARMOTA MARMOTA*) OF NORTH-WESTERN ITALY WITH PARTICULAR REGARDS TO THOSE FROM CAVERNA GENEROSA (CENTROVALLE INTELVI, COMO)

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This work focuses on fossil bones of the alpine marmot *Marmota marmota* (Rodentia, Sciuridae), a poorly-studied topic in previous palaeontological works. In northern Italy the alpine marmot seems to be absent during the Lower Pleistocene and very poorly present in the Middle Pleistocene. Only during the Upper Pleistocene, this rodent spread. The fossil remains studied herein come from Upper Pleistocene deposits of Caverna Generosa (Centro Valle Intelvi, CO; 1450 m a.s.l.), Buco del Frate (Prevalle, BS; 253 m a.s.l.) and Bùs di Tri Fradei (Oltre il Colle, BG; 1200 m a.s.l.). Furthermore, remains of the extant alpine marmot were analysed for comparison. The morphometric study revealed that the sexual dimorphism is negligible and that fossil and extant specimens are dimensionally similar, although most the extant marmots seem to be slightly larger than the fossil ones. The Caverna Generosa fossil specimens were divided into classes of dental eruption and wear, associated to different ontogenetic stages. This allowed to highlight a peak of mortality for the juvenile specimens. Furthermore, the Caverna Generosa sample was compared with those from Grotte di Pradis (Friuli Venezia Giulia, Italy) and Grotte Colomb (France) where human exploitation on marmot is attested. This comparison confirmed that the pattern of mortality at Caverna Generosa is not related to human exploitation. Dating of two alpine marmot bones from two different levels of two different areas of Caverna Generosa returned ages of 35616-34378 BC cal and 32537-32031 BC cal, respectively. These results testified that the frequentation of the cave by *M. marmota* is more or less contemporary to that of *Ursus spelaeus* and other Upper Pleistocene species found in the site.

RE-ANIMATION OF A FOSSIL: BRINGING BACK TO LIFE THE SPECIMENS FROM MUSTE (MUSEO DI SCIENZE DELLA TERRA) OF UNIVERSITY OF BARI WITH DIGITAL TECHNOLOGIES

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Advanced 3D technologies, such as terrestrial laser scanner points clouds, structured light scanner image, and photogrammetry are becoming a standard methodology for obtaining detailed 3D digital models of fossils through a non-invasive process. These technologies allow digital palaeontology to move through countless possibilities in research and science communication. The combination of museums and the virtual world is increasingly seen internationally as an excellent tool for spreading knowledge and reaching an ever wider and more aware public. The MuSTe (Museo di Scienze della Terra, University of Bari), in collaboration with CETMA (European Research Centre for Design Technologies and Materials), is carrying out a project supported by the Apulia Region (POC Puglia FESR FSE 2014-2020-action 10.4), that concerns digitisation process of the museum collection not only for scientific and conservation purposes, but also to improve the accessibility of the scientific museums and to involve a wider and heterogeneous audience through digital media. The project envisages the use of the above-mentioned technologies to obtain digital models of some of the fossil remains of Quaternary vertebrates found in Apulia and preserved at the MuSTe. The digital models of the skeletons will be processed through 3D software to reproduce the soft tissues of the animals and their appearance in life, and then breathe life into them through digital animation techniques and recreate their movements within digital dioramas ('animation' in its original meaning means 'to give life'). The resulting digital products will be part of the permanent exhibition of MuSTe. Digital reconstructions are also easily accessible to the public and highly attractive, therefore they are today the best way to convey information immediately to visitors and students.

**A NEW PROBOSCIDEAN TRACKSITE IN THE PLEISTOCENE OF SOUTH-WESTERN
SARDINIA (ITALY)**

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The western coast of Sardinia contains extensive outcrops of Quaternary shallow marine and alluvial-aeolian deposits where numerous vertebrate ichnosites have been identified (Pillola et al., 2020; Zoboli & Pillola, 2018). A new Pleistocene vertebrate ichnosite is reported from the locality of S'Enna 'e S'Arca (Arbus, along the SW coast of Sardinia). The Pleistocene succession at S'Enna 'e S'Arca discontinuously covers the Paleozoic basement and consists of aeolian sandstones, beach sandstones and conglomerates. The footprints are referable to megacerine deer and small proboscideans and are visible both in bedding plane and cross-section. Previously, small proboscidean footprints have been reported exclusively in the site of Funtana Morimenta near Gonnese (late Middle Pleistocene) (Pillola & Zoboli, 2017). The proboscidean footprints preserved in cross-section from both localities are very similar in shape and dimensions and are likely attributable to the dwarf mammoth *Mammuthus lamarmorai*. The age of the Pleistocene coastal deposits of Sardinia mainly spans from the late Middle Pleistocene to the Late Pleistocene. Two main generations of aeolian deposits are recognised. Considering the chronological framework based on luminescence (OSL) and U/Th data, the oldest of them is assigned to the Middle Pleistocene (MIS7/6) while the most recent to the Late Pleistocene (MIS5/4). To date, the only proboscidean taxon reported in the Quaternary of Sardinia is the poorly known dwarf mammoth *Mammuthus lamarmorai*. However, the possible presence of other small proboscidean taxa cannot be excluded. Proboscidean remains and footprints are reported only in the Middle Pleistocene deposits of Sardinia and a persistence of these mammals during the post- MIS5 is not supported by unequivocal data. Radiometric and/or OSL dating in the S'Enna 'e S'Arca ichnosite could provide a useful contribution to improve our knowledge about the temporal distribution of proboscideans of Sardinia.

Pillola G.L., Palombo M.R., Panarello A. & Zoboli D. (2020). The Pleistocene non-hominid vertebrate ichnofossil record of Italy. In Romano M. & Cifon P. (eds), Tetrapod ichnology in Italy: the state of the art. *Journal of Mediterranean Earth Sciences*, 12: 193-212.

Pillola G.L. & Zoboli D. (2017). Dwarf mammoth footprints from the Pleistocene of Gonnese (southwestern Sardinia, Italy). *Bollettino della Società Paleontologica Italiana*, 56(1): 57-64.

Zoboli D. & Pillola G.L. (2018). New evidences of mammal tracks from the Pleistocene of Gonnese area (southwestern Sardinia, Italy). *Journal of Mediterranean Earth Sciences*, 10: 173-175.

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XXIII Edizione delle Giornate di Paleontologia

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