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**Key terms:** Monte Postale; Bolca; Early Eocene; Alveolina; Palaeoenvironment

The Eocene locality of the Monte Postale, together with the most famous Pesciara di Bolca, has been known from centuries for its exceptional fossil content of plants and fish (e.g. Sorbini, 1972). Curiously enough, the most recent description of the entire stratigraphic succession of the Monte Postale is due to Fabiani (1914). In 1975 Massari & Sorbini described only a part of this succession, approximately 30 meters thick.

So, this succession has been recently re-examined to determine its age and palaeoenvironmental evolution. Several samples contain larger foraminiferal assemblages, especially *Alveolina*, but also *Nummulites* and "Orthophragminas". Some of them show tests moderately abraded and sorted, suggesting a limited transport of the bioclasts. However, the greater part of the samples contains autochthonous assemblages, with no signs of substantial transport.

The study of the *Alveolina* assemblages allowed us to determine the age of the levels sampled. The assemblages observed along the main part of the succession (approximately 80 m of thickness), including the levels bearing fish and plants, contain *Alveolina cremae*, A. aff. *croatica*, A. *decastro*, A. *distefano*, A. *levantina*, A. *rugosa*, etc. This faunas allowed us to insert all these beds into the SBZ 11 biozone (Middle Cuisian, Ypresian).

With these new data, we can correlate the Pesciara beds with those of the Monte Postale. They turned out to be contemporary, within the resolution power of the shallow benthic alveolina biozones. The main difference appears in the palaeoenvironmental context:

- mostly of shallow water carbonate platform with normal oxygenation at the Monte Postale;

- mostly of restricted anoxic "basin", but with frequent storm events, at the Pesciara.

Therefore, the levels bearing fish and plants of the Monte Postale are contemporary (within the limit of the resolution power of the shallow benthic biozones) to those of the Pesciara. Moreover, the palaeoenvironmental conditions were roughly the same in the two localities. The rather worst preservation of the fishes from the Monte Postale could suggest some differentiation. The Monte Postale succession, where the taphonomic processes acted more effectively, could testify a somewhat more "open" palaeoenvironment with respect to the Pesciara one.

In conclusion, the detailed study of the Monte Postale succession turns out to be essential both to widen our knowledge of the palaeoenvironments of the Bolca area and to better understand the origin of the fossil fishes.

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#### 41-14 Orale Perilli, Nicola

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#### Eocene Calcareous Nannofossil Events: DATA SET FROM NORTHERN APENNINES (ITALY)

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**Key terms:** Calcareous nannofossils; Biostratigraphy; Eocene; Northern Apennines; Italy

The Northern Apennines consists of stacked tectonic units, in places affected by a severe deformation. Consequently, the stratigraphic relationships among several units are frequently unclear, as well as the stratigraphy of some of them is still debatable. This is stressed by lithological similarities which characterize several formations (i.e. marly calcareous or siliciclastic turbidites) assigned to different palaeogeographic domains (i.e. Ligurian, Tuscan). Hence, the definition of a refined biostratigraphic frame is fundamental to improve the time constraints of the tectono-sedimentary evolution of Northern Apennines. Some of these formations were previously dated by means of foraminifera, but the inferred ages were based on scarce and discontinuous fossil records, sometimes represented by few reworked specimens, recovered from biocalcareites or from bioclastic basal portion of turbidites. Besides, in many cases the data are not reproducible as well as unreliable, since the sampled localities and/or the sampled stratigraphic levels are uncertain or even unknown. Hence, in the Northern Apennines the biostratigraphic time resolution based on this fossil group is low.

On the contrary, the dating of the Cretaceous and Paleogene formations cropping out in this thrust-fold belt has been recently deeply improved by means of calcareous nannofossils, because they are abundant within different types of sediments (i.e. marly calcareous turbidites or hemipelagic marls) or with regards to some particular time intervals (i.e. Late Cretaceous or Paleogene). In fact, a large part of the sediments frequently consists of calcareous nannofossil remains dominated by common, solution resistant and age-significant taxa.

Aims of our talk is to outline the distribution pattern of marker species recovered from Eocene deposits of Northern Apennines, and to describe the succession of the characteristic assemblages of each Zone and Subzone in order to improve the time resolution based on this fossil group. Hence, on the basis of the quantitative analysis of the sampled units assigned to different sedimentary (i.e. deep sea fan, hemipelagic ramp) or tectonic (i.e. piggy-back, foredeep) settings, the reproducibility and the reliability of the nannofossil events proposed and/or utilized in literature will be underlined. The proposed succession of biohorizons also includes events (here proposed for the first time) based on sharp abundance increase (acme beginning) or decrease (acme end) of well recognizable species.

#### 41-15 Orale Trevisani, Enrico

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#### RUDIST BIVALVES IN THE SCAGLIA ROSSA FM. (LATE CRETACEOUS, VENETIAN PREALPS, NORTHERN ITALY)

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**Key terms:** Rudist bivalves; Late Cretaceous; basinal deposits; Venetian Alps; Northern Italy

Rudist bivalves with elongate right valve are usually found in shallow water deposits throughout Cretaceous Tethys. In Venetian Prealps (Northern Italy), the findings of these distinctive fossils and of other organisms in red marly limestones has driven the attention of first scientists who wrote pioneering palaeontological works since 1700, collecting numerous fossils today in Museum's collections. More recently, well preserved specimens were reported in the Upper Cretaceous basinal sediments of the Scaglia Rossa Fm. that have been deposited some ten km away west from the Friuli Carbonate Platform and from the southward Bagnolo Platform (Bosellini et al., 1981). In the Lessini Mts. study area, the analysis of these rudist assemblages has been performed in condensate successions cropping out in well exposed quarries producing ornamental stones (Lastame or Pietra del Prun), particularly near S. Anna di Alfaedo. Moreover, nearly 70 specimens either as a whole or in fragments, collected in Southern Alps and southward in the Euganei Mts., have been studied in the historical rudist collections preserved at some Italian museums. A complete photographic catalogue of nearly all of the specimens in museum's collections has been made at disposal in the Natural History Museum of Ferrara. Studied material is usually represented by elongate right valves (can reach a height of 30 cm) composed of mainly cellular outer shell layer, they are found isolate or sometimes organized in small bouquets, usually topped parallel to bedding planes (enhanced by compaction). These are embedded in well stratified foraminiferal mudstone of late Turonian-Coniacian age (Marginotruncana schneegansi-lower part of the Dicarinella concavata Zone in Cigala Fulgosi et al., 1980). The left valve, being little developed and operculiform, is usually disarticulated and has been rarely found. Taxa are represented by genera Praeradiolites, Radiolites, Distefanella, Sauvagesia, Durania, Lapeirousella, a preliminary list of species (still under study) is given: Radiolites angelesii (LAPEIROUSE), Radiolites biosculatus (CATULLO), Radiolites galloprovincialis MATHERON, Radiolites mamillaris MATHERON, Distefanella rossii PARONA, Durania cornupastoris (DES MOULINS), Durania gaensis (DAQUE), Durania spadai PARONA, Durania cf. austiniensis, all belonging to the Radiolitidae family. In the study area sedimentologic and preliminary taphonomic analysis (Trevisani, 1999) mark the lack of any debris flow input and tend to exclude the possibility of gravitational redeposition or floating phenomena as the length of the shells (often exceeding 10 cm) and their weight prevented the ingestion by predators (as gastroliths) nor they could be passively transported by currents or due to root trapping. Studied fossil assemblages could represent the adaptation of some members of the rudist family Radiolitidae to oligophotic conditions in deeper settings. Thus, to explain the occurrence of great part of these radiolitids in the pelagic foraminiferal mudstone, it seems more reasonable to hypothesize that they mainly lived encrusting the sea-bottoms of the Scaglia Rossa Fm. depositional environment as faunal elements, in the lower photic zone of a basinal high. Bosellini, A., Mattavelli, L., Masetti, D. and Sarti, M. (1981) La piattaforma di Bagnolo (sottosuolo padano). Annali dell' Università di Ferrara (Nuova Serie), Sezione IX, Scienze Geologiche e Paleontologiche, 7, 103-109.  
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#### 41-16 Orale Stolarski, Jaroslaw

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#### POSSIBLE TRIASSIC REPRESENTATIVES OF COMPLEX VS. ROBUST SCLERACTINIAN CLADES

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**Key terms:** Scleractinia; robust and complex clades; Triassic; phylogeny

Molecular studies are the major flywheel that drive changes in modern phylogenetic hypotheses of several invertebrate groups. Until recently, scleractinian corals belonged to organisms whose interpretations of phylogeny, based on morphological skeletal characters, were proposed several years ago by paleontologists but still used by the biologists. The last 10 years of molecular research challenged this traditional phylogenetic scheme: several traditional suborders, families and genera appeared poly- or paraphyletic (see respectively: Caryophylliina, Faviina, Fungiina, Romano & Cairns 2000; B. Mar. Sci. 67; Caryophylliidae, Faviidae, Guyniidae, Romano & Cairns 2000; Cuif et al. 2003; Zool. Scr. 32; Favia, Scolymia, Montastraea; Cuif et al. 2003; Fukami et al. 2004; Nature 427). Nonetheless, several newly distinguished clades can be supported by skeletal synapomorphies, though different ones in comparison to traditional schemes. For example, the transverse pattern of "centers of calcification" arrangement seems to support the major robust clade of scleractinian corals (Cuif et al. 2003), microstructure of the wall (epithelial vs. marginothecal) and septa ("calcification centers" separated vs. non-separated) allows one to discriminate three clades within traditional Guyniidae (Stolarski 2000; Lethaia 33), whereas Atlantic vs. Pacific clades of Favia can be distinguished by septothecal vs. "trabeculothecal", respectively, wall types (Fukami et al. 2004).

Application of such refined skeletal criteria to the fossils requires excellent preservation of the material and our overview indicates that, indeed, such materials are available for the most epochs of the Mesozoic. For a century, the Late Carnian fauna from the Italian Dolomites has held a particular status of

the best preserved Triassic coral fauna of the World and is especially important for understanding the beginning of scleractinian diversification. Most commonly, fossil coralla from Carnian localities in Dolomites preserve a spectrum of biogeochemical and structural information that is available at different skeletal levels: (1) macromorphological (e.g., colony/corallite shape), (2) micromorphological (e.g., septal faces granulations, menianae, pennulae, etc.), (3) microstructural (e.g., pattern of "calcification centers" arrangement), and (4) nanostructural (e.g., nanogranular organization of organomineral fibers). These data allow one to draw some conclusion about coral paleoecology, anatomy, physiology and, respectively, physicochemical processes that operated during biomineralization. Using micromorphological and microstructural characters that proved to bear phylogenetic signal for modern corals, we have differentiated three main groups of traditional Triassic caryophyllinans: (1) volzeiid group (ca. 5 species) with a single linear series of very small, nearly coalescent "calcification centers" distributed along the septal plane; (2) reimaniphylliid group (ca. 20 species) with zigzag arrangement of a series of small "calcification centers", and (3) margarophyllid group (ca. 10 species) with short series of "calcification centers" perpendicular to the septal plane.

Volzeiid and reimaniphylliid skeletal microstructures resemble those of traditional caryophyllinans that after molecular characters were placed in clade of complex corals (especially Flabellidae and some Caryophyllidae). On the other hand, margarophyllid microstructure resembles the skeletal synapomorphy of "robust corals" by Cui et al. 2003 hence may hint for a very different position on the phylogenetic tree. The origin of the major scleractinian clades is dated at least 300Ma (well before mass appearance of the scleractinian skeleton in the fossil record Romano & Palumbi 1996: Science 271) hence the quest and possible recognition of their representatives in the Triassic are justifiable.

#### 41-17 Orale Perugini, Gianluca

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##### BIOSTRATIGRAPHY OF THE DINOSAUR TRACK SITE OF ALTAMURA (APULIA, SOUTHERN ITALY)

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Key terms: Benthic foraminifera; Cretaceous; Mediterranean; biostratigraphy; Altamura

This work presents a summary of a detailed investigation of the microfossil content from the spectacularly exposed dinosaur footprint site of Altamura (Bari, Southern Italy). The investigated succession consists of well-bedded limestones belonging to the Altamura Limestone Formation and is composed of two outcropping sections and about 30 m of borehole. The investigated succession has been densely sampled in particular for the first 15 m (including at the base the footprint surface). Paleocological and lithologic characteristics indicate a peritidal environment. Above the footprint level, marine sediments record shallow subtidal environments with vegetated substrates, as testified by the abundance of epiphytic foraminifera.

The microfossil assemblages are made up of smaller and larger benthic foraminifera and calcareous algae. Generally, the occurrence of *Moncharmontia apenninica* (De Castro) allows us to refer to the Turonian-Maastrichtian interval the part of the succession closer to the tracksite surface. On the whole, a comparison of the assemblages with similar communities typical of carbonate shelves and the benthic foraminiferal biozonations proposed by various authors for Central and Southern Italy suggests a more restricted range for the lower part of the succession (Upper Coniacian-Lower Santonian). Upsection, the last 15 m include a level in which the larger foraminifer *Murciella cuvillieri* sensu De Castro, 1988 is abundant. This taxon has been interpreted as a transitional form between *Cuvillierella salentina* Papetti & Tedeschi (Santonian) and *Murciella cuvillieri* Fourcade (Upper Campanian-Maastrichtian) on account of its internal characters and coiling degree, which agree with an intermediate stratigraphic distribution (Campanian p.p.).

Micropaleontological analysis of thin sections from the well shows the same association of the lower part of the outcropping succession above the footprint layer. However, a biometric investigation on the more abundant taxa, among which are *Rotorbinella scarsellii* Torre, *Scandonea samnitica* De Castro and *Moncharmontia apenninica* (De Castro), allows us to tentatively constrain the biostratigraphic attribution, whereas data on *Murgeina apula* (Luperto Sinni) only in part confirm a Santonian-Campanian p.p. age.

#### 41-18 Orale Lombardo, Cristina

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##### THE ITALIAN TRIASSIC VERTEBRATE FAUNAS: THE POTENTIAL OF A PALEONTOLOGICAL HERITAGE

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Key terms: fossil vertebrates; Triassic; paleobiology; Northern Italy

In the last decades several new vertebrate bearing beds have been discovered in the Italian Middle and Upper Triassic, from the classical Ladinian and sites of the Besano-Monte San Giorgio to the norian ones of the Lombardy and Friuli Venezia Giulia.

The systematic field works and the better established stratigraphical position of these sites allowed to elaborate a succession of ichthyofaunal assemblages which could be very useful for their possible biostratigraphical use. The validity of this method is being at present tested in different localities within the Lunado Formation (Ladinian, Middle Triassic, Northern Italy) and in a fossiliferous layer in the Middle Triassic Buchenstein Formation on northern Grigna Mountains. The first encouraging results induce us to consider this as an effective tool for biostratigraphy: this could be very useful for example for new fossiliferous levels in Southern China, where marine vertebrate faunas, similar to those of the Italian sites, are being discovered.

But besides this, even though fundamental, use of fossils as tools in support of stratigraphy, the different, often rich and diversified, faunal assemblages found

in our localities, keep on widen the knowledge of the vertebrates, reptiles but above all fishes, in such a crucial moment for their evolution. The number and the variety of specimens, together with an often extraordinary quality of preservation, allow detailed anatomical descriptions; besides systematics, we are able to follow not only the evolutionary history of vertebrates, but also to carry out interesting paleobiological analysis.

Thanks to functional morphology principles, and above all the comparison with the living organisms, the anatomical characters of fishes and reptiles tell us about their mode of life and feeding strategy. From the kind of diet, it is possible to hypothesize the food chain and consequently the original environment in which the fishes had lived, even in absence of benthos remain. In many cases some variations found in fishes belonging to the same taxon had revealed as due to ontogenetic changes; these transformations involve body proportions, tooth shape, degree of squamation and dermal bones ornamentation. Besides the remarkable paleobiological significance, the identification of juvenile characters helps to avoid the erection of invalid congeneric species exclusively based on size differences.

Peculiar reproductive strategies are inferred by the structures found in specimens belonging to perleidiforms and peltopleuriforms; these sexually dimorphic fishes possess a modified anal fin which has been interpreted as a gonopodium-like device for facilitate eggs fertilization, as happens in extant cypriniforms; some species of peltopleurids show also structures interpreted as secondary sexual traits: these are tubercles on some skull bones and hooklets on margin of fins, similar in shape to the so called "breeding tubercles", epidermal structures that develop in many extant fish groups (e.g. Cypriniformes and Salmoniformes).

Another interesting, but problematical aspect of the study of our ichthyofauna concerns the morphological variability within some fish orders. The identification of remarkable intra- and interspecific variability (today well represented by the "species flocks" of East African cichlids) is possible also in the fossil forms. Besides the well-known case of *Semionotus*, with its several species from the same cycles of the lake deposit of Newark Basin, (Triassic/Jurassic, USA), other groups (e.g. peltopleuriforms) are turning to be very complicated, from a systematic point of view: there are so subtle differences between taxa, often stratigraphically very close to each other, that is difficult to put boundaries even between genera.

#### 41-19 Orale Renesto, Silvio

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##### RECENT DEVELOPMENTS OF RESEARCH ON MIDDLE AND LATE TRIASSIC REPTILES FROM LOMBARDY

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Key terms: Reptilia; Triassic; paleogeography; biostratigraphy; functional morphology

Paleogeographic and morphofunctional studies about the reptile faunas of the Middle Triassic of Varese (Italy) and Canton Ticino (Switzerland) and of the Late Triassic of the Bergamo area (Italy) continue to yield significant results. For what concerns vertebrates, the Middle Triassic of Lombardy had an exceptional scientific importance since the second half of XIX century, comprising the Monte San Giorgio area, recently acknowledged as World Heritage by UNESCO. New areas however have been investigated, among which a new site in Valtravaglia, close to Lake Maggiore, where an outcrop of the Cunardo Formation yielded a new interesting fauna. At present at least 10 species of fishes and one of reptiles have been collected. The reptile has a great significance because it can be ascribed to *Neusticosaurus pusillus*, a pachypleurosaurid species which occurs in the Cava Inferiore beds in the Monte San Giorgio Area and in the Lettenkeuper beds of Germany. Its finding is of particular significance because the different species of pachypleurosaurids were short lived and there is no overlap in their stratigraphic range, rendering them an useful tool for correlations.

Thanks to an agreement with the Museo Cantonale di Storia Naturale di Lugano (Switzerland) I was allowed to study a new specimen of the long-necked protosauroid reptile *Tanystropheus* collected in Val Serrata (canton Ticino Switzerland), of Lower Ladinian age. Its study allowed to address some controversies about the life habits of this reptile. In addition this is the first *Tanystropheus* specimen with soft parts preserved. The study of the phosphatic patches and of the carbonatic spherules which occur at the base of the tail allowed to hypothesize the existence of an huge muscular mass in that area, which shifted back the center of mass helping to balance the weight of the neck, which could also have been kept above the horizontal plane and out of the water. In addition no clues of caudal autotomy neither adaptations to fully aquatic life have been found in the anatomy of this reptile, casting doubts about recent interpretations of its ecology and mode of life.

For what concerns the Late Triassic, new relationships have been discovered between the Norian reptiles of the Zorzino Limestone (Bergamo Prealps) and those of other coeval sites. Anatomical revisions of the drepanosauroid reptiles (which are represented by fairly complete and articulated specimens in the Italian sites) allowed a dramatic increase of knowledge about this group, suggesting striking morphological affinities with pterosaurs and with enigmatic forms like the Russian genus *Longisquama*. While the systematic and taxonomic implications of these results are still under evaluation and study, the redescription of the Italian drepanosauroids allowed many enigmatic taxa known from other sites to be recognized as members of this group, testifying its wide geographic distribution. Drepanosauroids have been now described from the Petrified Forest Formation and Rock Point Formation, Chinle Group New Mexico, as well as from the Newark and Hartford basins of the Newark Supergroup New Jersey. More recently, the discovery of drepanosauroid material among the isolated elements collected from the British fissure infills, further increased the distribution of this group, reinforcing also the affinities between the Italian and British faunas, already testified by the sharing of the genera *Diplhyodontosaurus* and *Psephoderma*. Furthermore, the study of a new specimen of the talatosaurs *Endennasaurus* allows to hypothesize that *Pachystropheus*, another enigmatic taxon from the fissure infills, which relationships are still controversial, could be very close to *Endennasaurus*.

#### 41-20 Orale Tintori, Andrea

# *Epitome*

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