

A COLLECTION OF FOSSIL VERTEBRATES FROM THE UPPER VALDARNO (CENTRAL ITALY) CALIBRATED IN THE END PLIOCENE TO SPAN 220,000 YEARS ACROSS THE OLDUVAI MAGNETOCHRON

GIOVANNI NAPOLEONE & AUGUSTO AZZAROLI

Received November 26, 2001; accepted May 23, 2002

Key-words: Upper Valdarno, Fossil Vertebrates, Late Villafranchian, Pleistocene, Museum collections, Magnetochronology.

Riassunto. La collezione di fossili a vertebrati con la dicitura Faella, proveniente dal Valdarno Superiore (VS), ebbe inizio nel Museo di Storia Naturale di Firenze più di due secoli addietro, ma rimase sempre ridotta e non venne mai formalizzata dal punto di vista paleontologico in una associazione faunistica. Negli ultimi due anni la sua consistenza è passata da 17 a 29 esemplari, in rappresentanza di 10 specie, a partire dai primi 3 esemplari della fine del settecento, che raggiunsero il numero di 13 fino al 1883 per poi iniziare ad arricchirsi soltanto nel 1967 con il 14° esemplare. Nell'area del borgo di Faella affiora solo la Successione di Montevarchi, quella intermedia delle tre del bacino intermontano del VS, ed è esposta per quasi tutta la sua estensione nella Cava Pratigliolmi che contiene la sezione di Faella. Recenti tagli hanno messo a giorno argille, limi e sabbie ed hanno consentito di ricostruire l'estensione dei tre membri di questa successione, nella quale è stata rinvenuta la gran parte dei fossili del VS.

La magnetostratigrafia della sezione di Faella fu inizialmente ricostruita per la parte bassa, contenente la base del crono Olduvai (C2n, 1.95-1.77 Ma), e completata poi con la sezione aperta dal taglio per la nuova galleria ferroviaria Tasso dove è stata individuata la fine del magnetocrono. Nella sezione composita è rappresentato quindi l'intero Olduvai, al quale si aggiunge uno spessore sottostante di ca. 15 m per una durata di ca. 50 mila anni, calcolata dalla velocità di accumulo espressa dalla durata delle magnetozone, calibrata con lo standard magnetocronologico. Un livello ancora più basso e non in continuità, nel greto dell'Arno, non è calibrato. Pertanto sono disponibili i valori di età di ogni livello al quale è associabile la posizione che i singoli reperti della raccolta di Faella assumono nella serie magnetostratigrafica, utilizzando la revisione delle notizie ottenute dai controlli incrociati del sistema di catalogazione automatizzata delle collezioni. Le informazioni del catalogo diventano, anzi, l'oggetto delle prime e più importanti ricadute del nuovo assetto geocronologico della serie del VS, poichè alle altre notizie sui reperti ora si aggiunge il valore numerico della loro età. Nella collezione di Faella i fossili di più antica acquisizione, i 13 esemplari che fino al 1883 contenevano 7 specie sono riportati senza un valore della loro posizione stratigrafica. Viene ora ritenuto che essi provengano dalla coltre superiore della Successione di Montevarchi e nella sezione di Faella assumono una posizione media intorno a 1.775 ± 0.050 Ma. I restanti reperti furono tutti rinvenuti nella sezione di Cava Pratigliolmi a partire dal 1967 e quasi tutti in successione stratigrafica secondo un ordine così definito: uno, nello strato appena sovrastante quello contenente l'inizio dell'Olduvai, è datato 1.945 ± 0.002 Ma; un secon-

do, raccolto nel 1992 a circa metà della sezione della cava e quindi ubicabile con l'incertezza di ± 5 m di spessore, ha un'età di 1.870 ± 0.015 Ma, ed il terzo (del 1999) alla base dell'affioramento a 1.985 ± 0.002 Ma. Di un quarto esemplare, del 1977, non è data la posizione e la sua età è stata equiparata a quella degli esemplari antichi e con la stessa loro incertezza. Gli ulteriori 12 esemplari, acquisiti nel gennaio 2000, furono rinvenuti tutti nei ca. 15 metri basali dell'affioramento, con gli estremi a 1.995 ± 0.002 Ma e 1.945 ± 0.002 Ma, tranne uno proveniente dall'unità intermedia della serie e perciò datato 1.885 ± 0.030 Ma. I due reperti rinvenuti nei livelli più bassi, a 1.985 e 1.995 ± 0.002 Ma, hanno un'età di ca. 1 milione di anni successiva a quella degli ultimi esemplari della precedente fauna di Castelnuovo dei Sabbioni raccolti nel deposito di lignite (3.1-3.0 Ma) della successione di base dei sedimenti del VS.

Abstract. The small Faella collection of fossil vertebrates, from the Upper Valdarno (UV) continental sediments, was first assembled in the Natural History Museum of Firenze over two centuries ago, reaching 13 specimens for 7 represented species, until in 1967 new finds were retrieved from the Cava Pratigliolmi clay pit. The latter were mainly collected in the lower stratigraphic levels, reaching 29 specimens for 10 species, while the position of the ancient specimens, which are among the most representative ones of the late Villafranchian mammal age, was tentatively determined from catalogue informations. The magnetic stratigraphy of the clay pit sequence at Faella, and additional controls on their database led to assign them an age of 1.775 ± 0.050 Ma. Each recent specimen was assigned a numerical age comprised in the time span measured in the composite Faella section, extending from 45 ky prior to the onset of the Olduvai magnetochron at 1.95 Ma to shortly before the end of it at 1.77 Ma.

The Faella faunal assemblage will therefore play a key role in the geochronology of the UV faunal events, which occurred during the deposition of the Montevarchi intermediate fluvial-deltaic sequence, because the specimens occupy a wide range of ages and the lowermost ones represent the earliest fauna of the late Villafranchian, close to the beginning of the Mammal zone MN 17 of the Neogene classification. Its magnetostratigraphic date, ranging from 1.995 Ma to 1.775 Ma, represents the first example in the UV fossil collections of a measured time span within one assemblage collected in stratigraphic order. The biochronological position of the Faella fauna fits well the distribution of the late Villafranchian reconstructed in the UV, and the present example will represent a criterion for dating most old collections, especially the classical ones, whenever a magnetostratigraphy of the units containing them will be available for correlation.

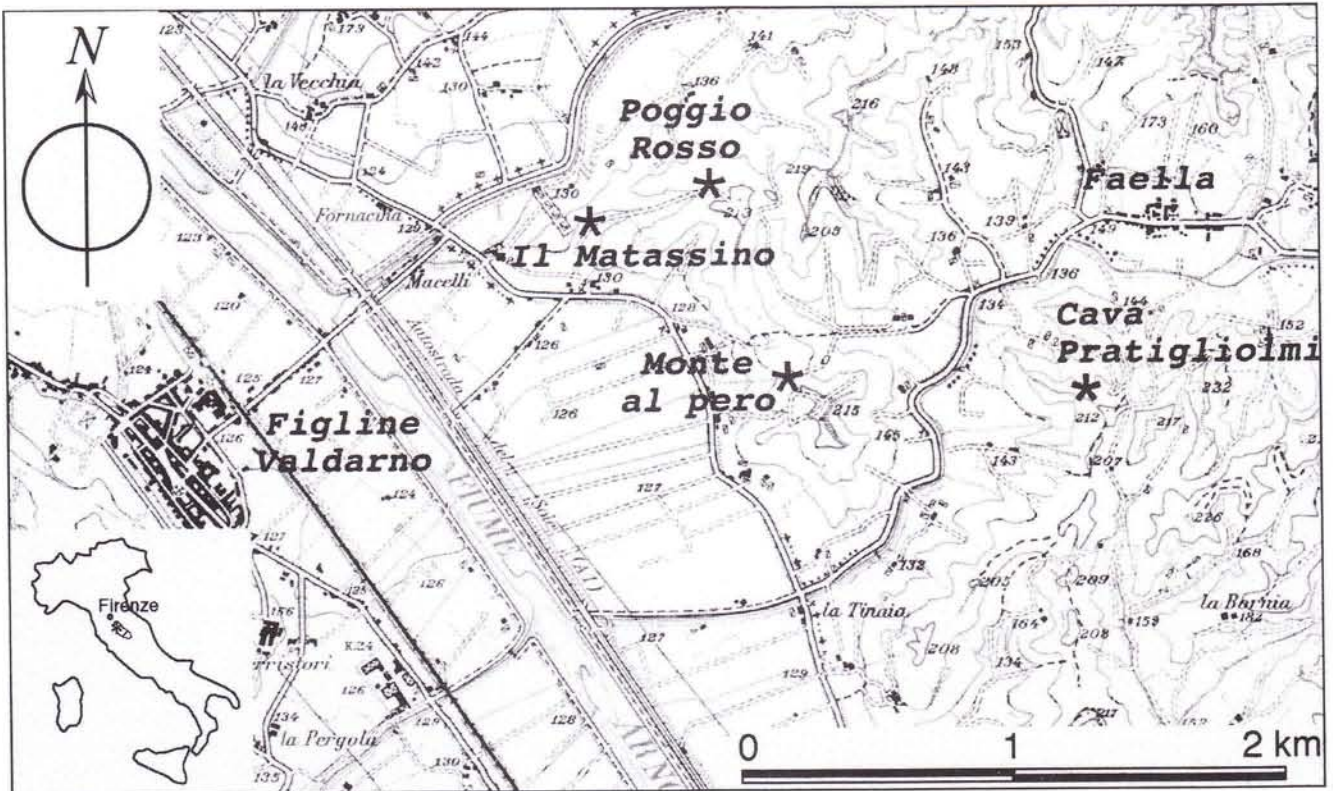


Fig. 1 - Topographic map of the Faella area, ca. 20 km south of Firenze, where some of the main fossiliferous sites of the Upper Valdarno are located. The specimens in the old collection were labelled only with the notation "La Faella", the countryside of the Faella village. The Montevarchi Succession is here represented by large exposures of its lower part at the Matassino and Pratigliolmi clay pits, while the higher sequence was often removed by quarrying. Elevations in the map are related to earlier surveys, before the removal of the hill-tops for 10-20 m thickness.

Introduction

In the Upper Valdarno (UV), south of Firenze, the magnetostratigraphic record was recently established, and dates of the faunal events there recorded (Albianelli et al. 1997, 2001; Napoleone et al. 2001b) may summarize most of the Apennine history through the middle and late Pliocene and earliest Pleistocene. The UV fossil record of vertebrates, from either recent findings and old collections, was the base to establish the Villafranchian Stage for the Mammal Age classification (Azzaroli 1977) and the reference for some major events in the European biochronological history (Azzaroli 1983). Its role was critical in pointing out the Pliocene-Pleistocene turnovers for the Italian faunas (Azzaroli 1995; Azzaroli et al. 1997; Rook & Torre 1996; Torre et al. 1999), while the paleomagnetic dates of the main dispersal events were reviewed by Opdyke (1995) and discussed by Lindsay (2001). The greatest part of the UV fossil record was concentrated in the time span considered in this study, as it was calibrated to the new magnetostratigraphic framework (Cioppi & Napoleone 2001), for an age close to the Pliocene-Pleistocene boundary mostly reconstructed from the area shown in Fig. 1 around the Faella village.

The collection of fossils with the reference label of Faella consists of one of the oldest assemblages in the

Natural History Museum of Firenze University (NHMFU). Three specimens were collected "since the time of the Grand Duke" (the second half of 17 hundred). The old assemblage included however only 13 specimens (the last one acquired in 1883), with 7 species (Tab. 1), and two of them are exposed in the permanent exhibition of the Museum (Azzaroli et al. 1992). After nearly one century a new specimen enriched the collection, bringing to 8 the number of species represented until 1999. As a matter of fact, the Faella assemblage was never the object of a palaeontological study aimed to give an account of its biochronological character.

The present interest takes origin from two occasions: the reappraisal of the automated catalogue information (Cioppi et al. 1996) due to new acquisitions made in the last two years, which nearly doubled its record and brought to 10 the number of species, and the new numerical dating provided by magnetostratigraphy of the Faella section, at the Cava Pratigliolmi clay pit. Such circumstances are here stressed for the Faella collection because its specimens were assembled from different stratigraphical levels while they were dated to the base of the late Villafranchian. Consequently, a range of ages could be calculated for them from the Faella magnetostratigraphic section to which they are related, and distributed in the revised geochronology of Berggren et al. (1995) based on the geomagnetic polarity time scale (GPTS).

The UV magnetostratigraphy to study the Museum collections

Magnetostratigraphy, first introduced for pelagic sequences in the Umbrian Series, was applied to continental deposits in various regions (Butler et al. 1977, 1985; Azzaroli & Napoleone 1981; Biquand et al. 1990; Heller et al. 1991; Tamrat et al. 1995). When in the UV the Matassino Locality was dated as the earliest fauna of the late Villafranchian, shortly after the onset of the Olduvai magnetic chron (Torre et al. 1993; Albianelli et al. 1995), the established biochronological classification for that interval had to be reconsidered. The late Villafranchian was in fact originally fixed to begin in the Pleistocene, with the Olivola Faunal Unit from northern Tuscany immediately followed by the Matassino one, and these dates were changed by calibration to the Olduvai chron, to which the Plio-Pleistocene boundary was formally related in the stratotype at Vrica (Van Couvering 1997). It was recently shown that most UV fau-

approximately the same age (Azzaroli & Napoleone in ms.).

After such magnetostratigraphic datings, the ages of specimens reported in the catalogue appeared inadequate, although they represented one of their major characters (Cioppi & Napoleone 1999). Even more difficult were the conditions of the nearly 75% of the collections which lack a dating because the location of old findings was not reported. In the Faella area most remarkable sections of the MS are exposed and the richest fossil sites are located (Fig. 1), but the reconstruction of their faunal associations was made with reference to the classical collections, which often contained the most significant specimens, not dated or dated with too vague ages (e.g., only with a "Pliocene", or "Pleistocene"). The same conditions were also found elsewhere for well located sites, from California to Macedonia, beyond Italy (Dundas et al. 1996; Kostopoulos 1997; Mazzini I. et al. 2000), mostly because they occurred in too short sections whose magnetostratigra-

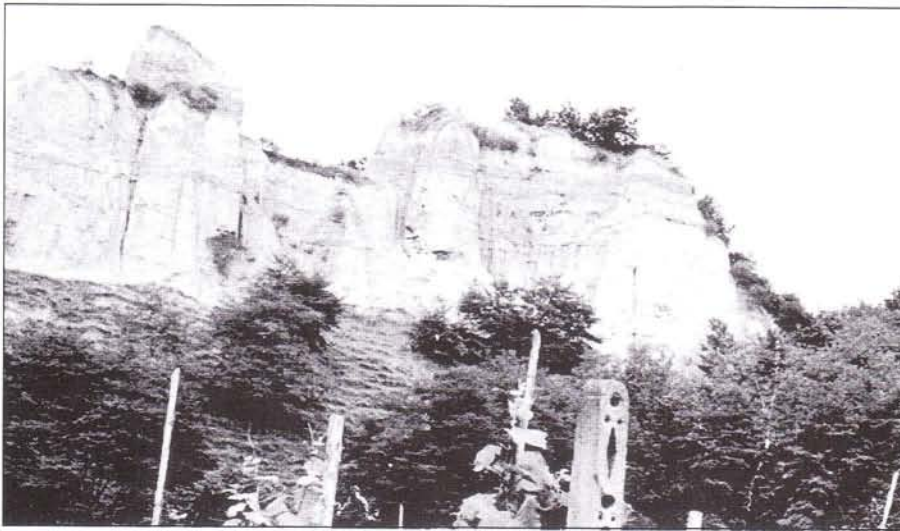


Fig. 2 - View of the escarpments "le balze" near the Faella small town, where the upper Oreno sand closing the Montevarchi Succession is exposed, but of difficult access and not sampled in the present study. Remnants of fresh cuts in the Poggio Rosso and Tasso tunnel sections showed good magnetic properties and were easily measured.

nal assemblages may be dated in an interval around it (Napoleone et al. 2001b), which implies that the Museum collections reported with precise stratigraphical location could be directly dated in the new magnetostratigraphical framework (Napoleone et al. 2001a). In contrast, only inferences could be made for the uncalibrated ones, although also their dates improved into narrower time intervals, as in the case of the Olivola F.U.

Among the UV finds from the late Villafranchian units of the Montevarchi Succession (MS) with detailed stratigraphical positions, either new localities (Mazzini M. et al. 2000) and old Museum collections (Cioppi & Napoleone 2001) were given an accurate paleomagnetic dating. Two cases of dated collections were the rhinoceros recovered by Nesti in 1811 at Monte al Pero (Fig. 1), of 1.830 ± 0.015 Ma (Napoleone et al. 2001a), and the elephant skeleton recovered by one of us (Azzaroli in 1953), not far from the town of Montevarchi, to

phy would not reach a polarity sequence to be correlated with a reference paleomagnetic series.

Lithostratigraphy of the Faella area

The argillaceous and sandy silt of the MS was deposited during the calibrated ages shortly before 2.0 Ma and after 1.8 Ma, measured in this area for the portion bounded at its top by the crags of the Oreno sand (Fig. 2), and at the bottom by the silt and sand of the Terranuova unit, which enclosed in the middle the Ascione clay. All such deposits contained also the largest part of faunas collected in the UV (Azzaroli 1967; Azzaroli et al. 1992). The longest magnetostratigraphic measured sequence in the Oreno unit was that of the Tasso tunnel section. In the Terranuova one only short intervals were exposed in separate sections, the lower-

The Faella Section

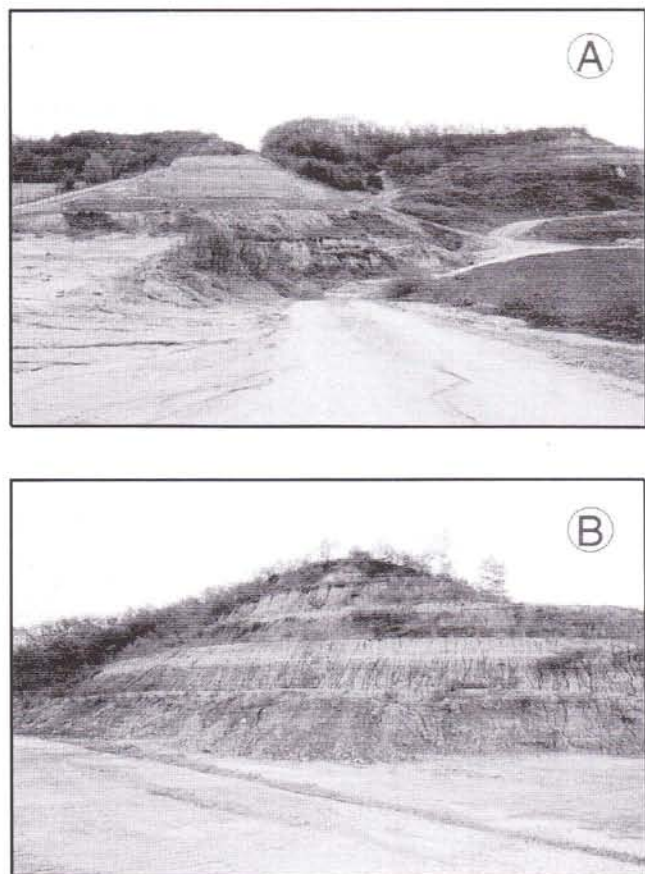


Fig. 3 - Section of the Cava Pratigliolmi clay pit near Faella, where the magnetostratigraphic series was measured. A - The excavation front in the lower Terrenuova silt is mostly exposed in the extreme right (out of view) while the front view is the most recent cut (summer 1999) at an elevation from ca. 150 m to ca. 185 m. It may be correlated to the top of the small white wall (high, to the right) above which a cuspidal section is visible as the end of the outcrop. B - The upper section, seen from the high extreme right of A, reaches 202 m level after the quarry operations have removed the overlying sand; a short wall behind it attains 207 m level but its magnetic record was too poor.

most of which reached the Arno river bed, and the Ascione is overlapping it in several outcrops (Monte al Pero and Poggio Rosso, on the right bank of the river, and Cava Gori at Campitello and Cava Francalanci at Borrassole, on the left bank). The wall of the Cava Pratigliolmi pit, south of Faella, provided the best exposure of the continuous MS, in the fresh section showing all the mentioned units and most of their extent (Fig. 3).

A new sedimentological analysis of the sequence there exposed was carried out with the highest detail (Magi, unpubl. data) after the antler of a cervid was acquired in April 1999. A new recognition was carried out of the key elements within the MS, the intermediate phase of three which characterized the sedimentary sequence of the basin (Merla & Abbate 1967; Magi et al. 1992), for an indicative thickness of over 500 m (Sagri et

al. 1994). The MS phase developed with lacustrine and palustrine sediments in the central part of the basin, and with deposits of alluvial fan in the marginal areas. The first were characterized by sandy and clayey silts with frequent sandy lenses which in their median-upper part contained intercalations of peat and lignite, while the deltaic deposits were characterized by coarse pebbles which change downflow to channelled sands and gravels. Therefore, the averaged thickness of the three MS lithostratigraphic units represent 80-90 m of the mentioned Terranuova silt, Ascione clay, and Oreno sand, as shown by Albanelli et al. (2001).

While detailed information of sedimentological and magnetostratigraphical analyses were reported elsewhere, here some data on the acquisition phases and distribution of the fossil specimens in the catalogue are examined.

The fossil findings in the Faella area

The section of the quarry lies 2 km south-east of that of Cava Matassino (Fig. 3). Denominations of both sites were reported in the old documents, respectively as "Il Matassino" and "La Faella", to indicate the whole surrounding area. The finds recovered from these areas were often reported in old catalogues only with the addition "near Figline Valdarno", the main town in that region, as occurred also for the specimens of the collection labelled as Faella. Those collected until 1883 and those from the Faella section acquired before 2000 are reported in Tab. 1, ordered according to the dates determined in the present study. The remaining specimens collected in the Faella section in 2000 are listed in Tab. 2 according to their stratigraphical positions.

A significant finding for the present discussion was the fauna recovered by Cocchi (1867) with the excavation carried out just at the south-eastern base of the sequence at Monte al Pero (Fig. 1). Although the collection of fossils was lost, the finding deserves to be illustrated for the details of its information. Cocchi reported that "along the Faella creek, in the locality called Casanuova, where in 1862 I ordered to execute an excavation which produced a rich recovery of fossil bones, the hill offers the following section", 80 m high and with 6 described lithotypes (Fig. 4). "In the lower sandy layer, of which the lower limit was not attained, were collected *Drepanodon*, *Ursus*, *Felis*, *Cervus*, *Bos*, *Rhinoceros*, etc."

After about one century from the acquisition of 1883, the Faella assemblage in 1967 was increased, but most specimens were acquired in January 2000. All these new remains were recovered in the Cava Faella section, which has been exposed since over 50 years by the quarry exploitation, but did not release any large fossil deposit. Concerning the stratigraphic log, the entire section was extended more than 80 m, now reduced by the

removal of the sandy top not used for the brick production. Part of it is shown in Fig. 3, and exactly corresponds to that described by Cocchi for the facing site of Casanuova, if the escarpments of the upper sandy deposits shown in Fig. 2 are included. Concerning the distribution of the fossil finds, they were scanty along

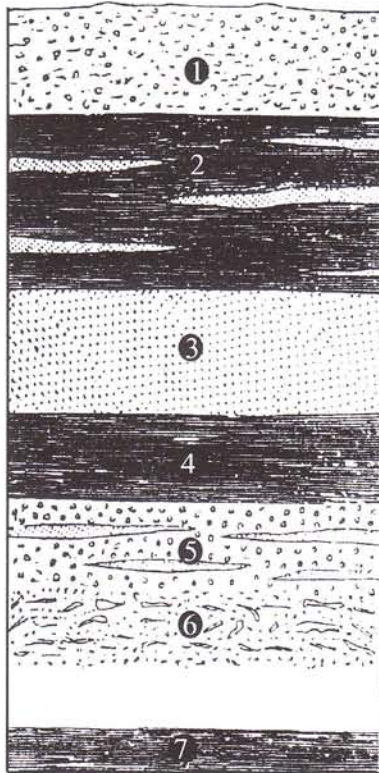


Fig. 4 - Reproduction of the 80 meter section reported by Cocchi (1867) as "The cut of the Faella excavation executed in 1862. 1, Clay-sandy layer with sandy pebble and gravel; 2, Grey clay with thin interbedded sandy levels; 3, Yellow coarse sand; 4, Compacted clay; 5, Pebble and sand, seldom with iron oxides; 6, Sandy layer with bones (*Drepanodon*, *Ursus*, *Felis*, *Cervus*, *Bos*, *Rhinoceros*, etc.). Its lower boundary was not reached; 7, Lower bluish clay outcropping to some distance and at lower level towards the Arno."

the Faella section, the scattered ones collected in last decades usually having an accurate stratigraphic position. The opposite case occurred at the Cava Matassino pit for the two rich deposits of Matassino and Poggio Rosso recovered in 1965 and 1995, respectively. They were collected from individual levels and assembled in local faunal units, but their dates were less accurate because there the magnetostratigraphic sequence was interrupted by a covered portion (Torre et al. 1993; Napoleone et al. 2001b). Other relevant findings in the Matassino hill were the mentioned Nesti's rhinoceros of 1811, on the Poggio near the peak of Monte al Pero, and a complete skeleton of rhinoceros collected in 1999 just on top of the hill (named Poggio Rosso) and 15 m above the stratum level of the rich Poggio Rosso Locality.

Analysis of the catalogue record

The exact positions of the recent specimens of the Faella collection allowed to directly calibrate them in the magnetostratigraphic type series, but for the remaining old findings, still nearly 45% of the collection, only a vague indication on their position can be desumed from catalogue information. A little more may be inferred from the traces of sand deposits referable to the upper unit shown by all of them. This led one of us (Azzaroli) to suggest that the specimens of the old collection might have been retrieved in the shallow cover of the upper sandy layers, due to their characteristic fossilization features in the sand. In contrast, the fossils recovered by Cocchi at the base of the section in front of the Faella one, and at the level of the Faella creek bordering on the left the road from Faella to Figline (Fig. 1), were not further described for definition of their species nor adequately preserved, as they were lost.

The ancient finds were catalogued with the only indication "Faella", while for the recent ones the provenance was indicated as either "Cava Faella" and "Cava Solava" of Del Buffa Brothers, or "Cava Pratigliolmi" of the present owners, all indicated as Locality 62. Also the old collection may be grouped in this Locality number, in analogy with the nearby Localities, which were collected either as precisely sited (Matassino, Poggio Rosso) or from several scattered findings (Casa Frata, C. Inferno), and even indicated with approximate localities (Tasso). These all produced museal assemblages, formalized into local faunas (De Giuli et al. 1986; Azzaroli et al. 1988) representing the bulk of the late Villafranchian in the UV. The latter case of the Tasso fauna is significant because its almost 300 specimens were recovered in scattered sites below the Tasso village, and assembled as the Tasso Faunal Unit, although labelled only with reference to a generical area of provenance and broadly positioned in its upper unit, whose remnants are the crags shown in Fig. 2 (Azzaroli 1977, 1992).

As already said, the 13 ancient specimens of the Faella assemblage made the bulk of the collection and their systematic aspects were defined in the catalogue with the exact indication of the species (Tab. 1). In the present occasion their position was inferred in the shallowest levels and therefore they may be grouped with the remaining specimens in the order here reconstructed, with reference to the MS outcrop exposed in the Cava Pratigliolmi clay pit. The quarried sequence begins at 143 m a.s.l., and after the old specimens the four finds recovered in it until 1999 were positioned in Tab. 1. The first site was that of the elephant tusk fragments collected by A. Berzi in 1967. These *Archidiskodon* fragments represented also the first finds that could be exactly located; from the catalogue controls they were referred as embedded in the "slid down clay" and "some

Catalogue No.	Taxa	Age (Ma)
1. IGF 1209V	premolar, <i>Pachyrocute brevirostris</i>	1.775 ± 0.050
2. IGF 2377	metacarpal dx, <i>Leptobos vallisarni</i>	" "
3. IGF 416	mandible, <i>Sus strozzi</i>	" "
4. IGF 11785	lower molars. dx M1 M2, <i>Canis arvensis</i>	" "
5. IGF 3280V	calcaneum, <i>Eucladoceros dicranios</i>	" "
6. IGF 31V	tibia, <i>Eucladoceros dicranios</i>	" "
7. IGF 906	skull, <i>Ursus etruscus</i>	" "
8. IGF 2350V	calcaneum dx, <i>Leptobos etruscus</i>	" "
9. IGF 2361	metacarpal sx, <i>Leptobos etruscus</i>	" "
10. IGF 500	humerus sx, <i>Leptobos etruscus</i>	" "
11. IGF 2365	metacarpal sx, <i>Leptobos etruscus</i>	" "
12. IGF 624	mandible sx, <i>Leptobos etruscus</i>	" "
13. IGF 611	mandible dx, <i>Leptobos etruscus</i>	" "
14. IGF 3323V	mandible sx, <i>Leptobos etruscus</i>	" "
15. IGF 6281V	mandible, <i>Sus strozzi</i>	1.880 ± 0.015
16. IGF 14439	tusk, <i>Archidiskodon meridionalis</i>	1.945 ± 0.002
17. IGF 7543	antler sx, <i>Pseudodama nestii</i>	1.985 ± 0.002

Tab. 1 - List of the 13 fossils from the old collection which formed the nucleus of the Faella fauna and of the 4 recent ones. Their age is attributed after calibration by the magnetostratigraphic type section of the Cava Pratigliolmi clay pit at Faella; the error interval is given by the degree of accuracy of the catalogue informations for their position in the series. Specimen 14, unpositioned, was recovered in 1977 (see Appendix 1), and therefore its assigned age is that inferred for the previous ones as collected on the ground and possibly from the same upper sandy levels.

Catalogue No.	Taxa	Elevation
1. IGF 8199V	maxillary dx, <i>Equus stenonis</i>	Ascione level
2. IGF 8198V	metacarpal dx, <i>Leptobos etruscus</i>	152 m
3. IGF 8208V	phalange, I, <i>Leptobos etruscus</i>	150 m
4. IGF 8200V	tarsal, astrag., nav. dx, <i>Equus stenonis</i>	147 m
5. IGF 8201V	tarsal, navicular dx, <i>Equus stenonis</i>	147 m
6. IGF 8203V	mandible D2-D3, <i>Eucladoceros dicranios</i>	146 m
7. IGF 8204V	antler dx, <i>Pseudodama nestii</i>	146 m
8. IGF 8205V	antler sx, fragm., <i>Pseudodama nestii</i>	146 m
9. IGF 8206V	antler, fragment, <i>Pseudodama nestii</i>	
10. IGF 8209V	upper molar, sx <i>Leptobos etruscus</i>	
11. IGF 8210V	tarsal, cubo-navicular, dx <i>Leptobos</i> sp.	
12. IGF 8202V	mandible sx M3-M2, <i>Leptobos etruscus</i>	134 m

Tab. 2 - List of the 12 specimens collected by M. Malpassi since 1985 in the lower part of the series, which is exposed in the abandoned section on the eastern side of the Cava Pratigliolmi clay pit, and acquired by the Museum in January 2000. The bottom specimen at 134 m level is positioned in the wall of the Faella creek, 1-2 m below the walking surface, while the others partly overlap the dated specimens listed in Tab. 1. The ages attributed to the specimens according to their stratigraphic positions range from 1.995 Ma to 1.945 Ma with a resolution better than 2 ky, those in the interval between 134 m - 146 m are dated with less accuracy at 1.975 ± 0.010 Ma and the overlying ones again with a resolution better than 2 ky, at 1.963 Ma, 1.960 Ma, 1.950 Ma and 1.945 Ma. The highest specimen is from the "Ascione level", dated 1.890 ± 0.030 Ma.

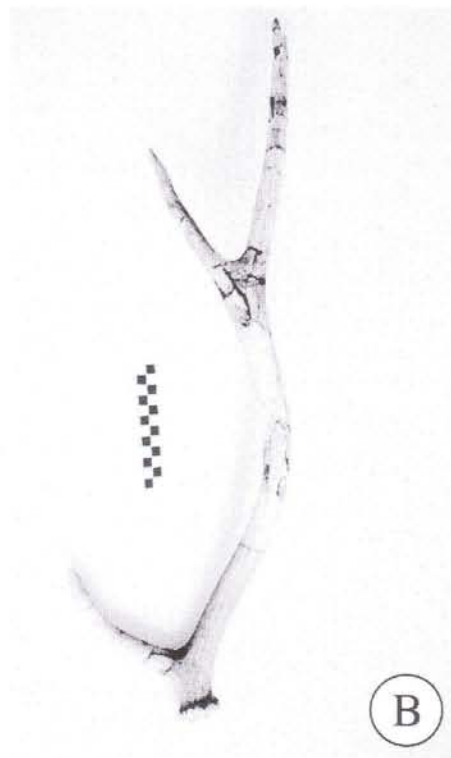


Fig. 5 - The Cervid antler collected by O. Pasquini and acquired in 1999. The site lies 1 - 2 m above the Fig. Fig. 5 - The Cervid antler, acquired in 1999. The site lies 1-2 m above the ground level at the entrance of the brick factory (136 m in elevation), and therefore 5 - 6 m underneath the base of the magnetostratigraphic section (143 m). A - View during the recovery in February 1987; B - After the detached pieces were restored in April 1999.

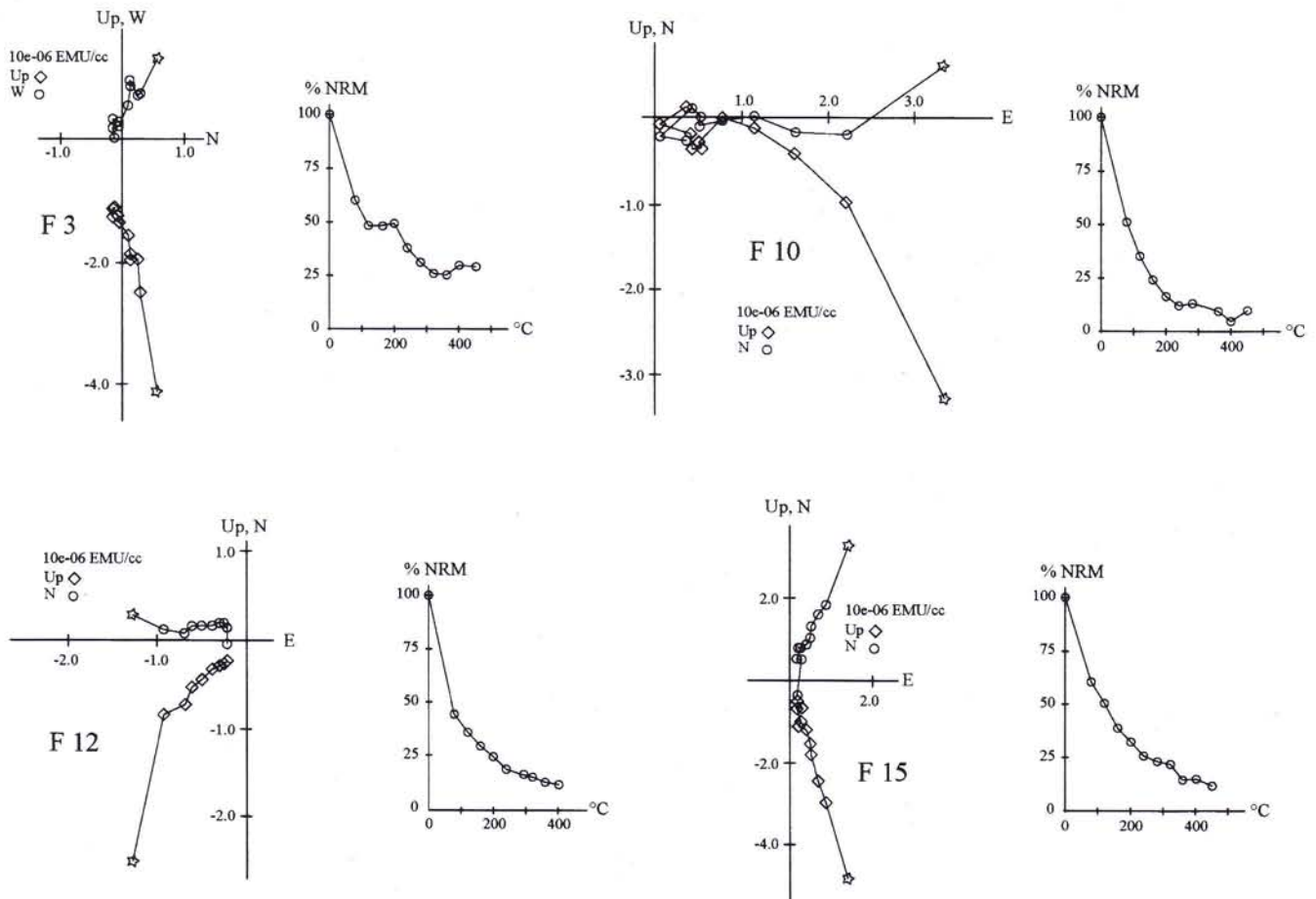


Fig. 6 - An indication of the rock-magnetic properties is here reported after the vector diagrams for the NRM demagnetization procedures, under alternative current (AC) and increasing temperatures, shown for some lithologic types at different levels. The main carrier of the primary magnetization was inferred to be magnetite (From Albanelli et al. 2001, modified).

3 meters above the base level of the pit" (see Appendix). The lowest bank in the pit is nearly 8 m thick, in the Teranuova silt, and is followed by one of ca. 2 m sand. The elevation of the escarpment can be reconstructed as being not higher than 10 m above the base and immediately overlain by a silty clay bank which is presently exploited. The fossil position may have reached at most meter 153, with a lower limit at 146 m (the reported 3 meters above the base level). Furthermore, considering that also the fossilization is typical of sand instead of silt and clay, it may be presumed that the fragments were contained in the sand on top of the escarpment, which slid down. The original altitude therefore should have been close to 150 m.

The next two specimens were collected, one in 1977 with the only reference Faella, and the second one in 1992, in the mid section. The fourth specimen (IGF 7543V) is the left antler of a cervid acquired in April 1999 and retrieved from the base of the abandoned north-eastern wall of the quarry. In Fig. 5a it is shown in its natural position, 1-2 m above the ground level at the entrance of the brick factory (136 m in elevation), and in Fig. 5b after its restoration. The importance of this finding was to trigger new interest in re-examining the cata-

logue for timing it and the remaining collection into the UV magnetostratigraphy, and it increased for the specimens of Tab. 2 acquired in January 2000. The stratigraphically most significant one of the latter was part of a mandible of *Leptobos etruscus*, recovered in the wall of the Faella creek, almost 3 m below the cervid antler, i.e. 1-2 m underneath the treading plane, which represents the oldest find in the MS. In a short digression, the Casanuova Locality was recovered by Cocchi (1867) from a level very close to that, on the hillfoot of Monte al Pero, whose top (Poggio) yielded the famous rhinoceros of Nesti also calibrated to the Faella magnetostratigraphic type section.

More details on the last 4 specimens acquired before January 2000 are reported from the catalogue files in the Appendix, with additional notes to show the criteria adopted to assign their ages.

Discussion of the catalogue data

The dating of the Faella sequence was the main aim to summarize the time span of most faunal records of the MS, including that of the largest collections stored in the NHMFU. The acquisition in 1883 of the

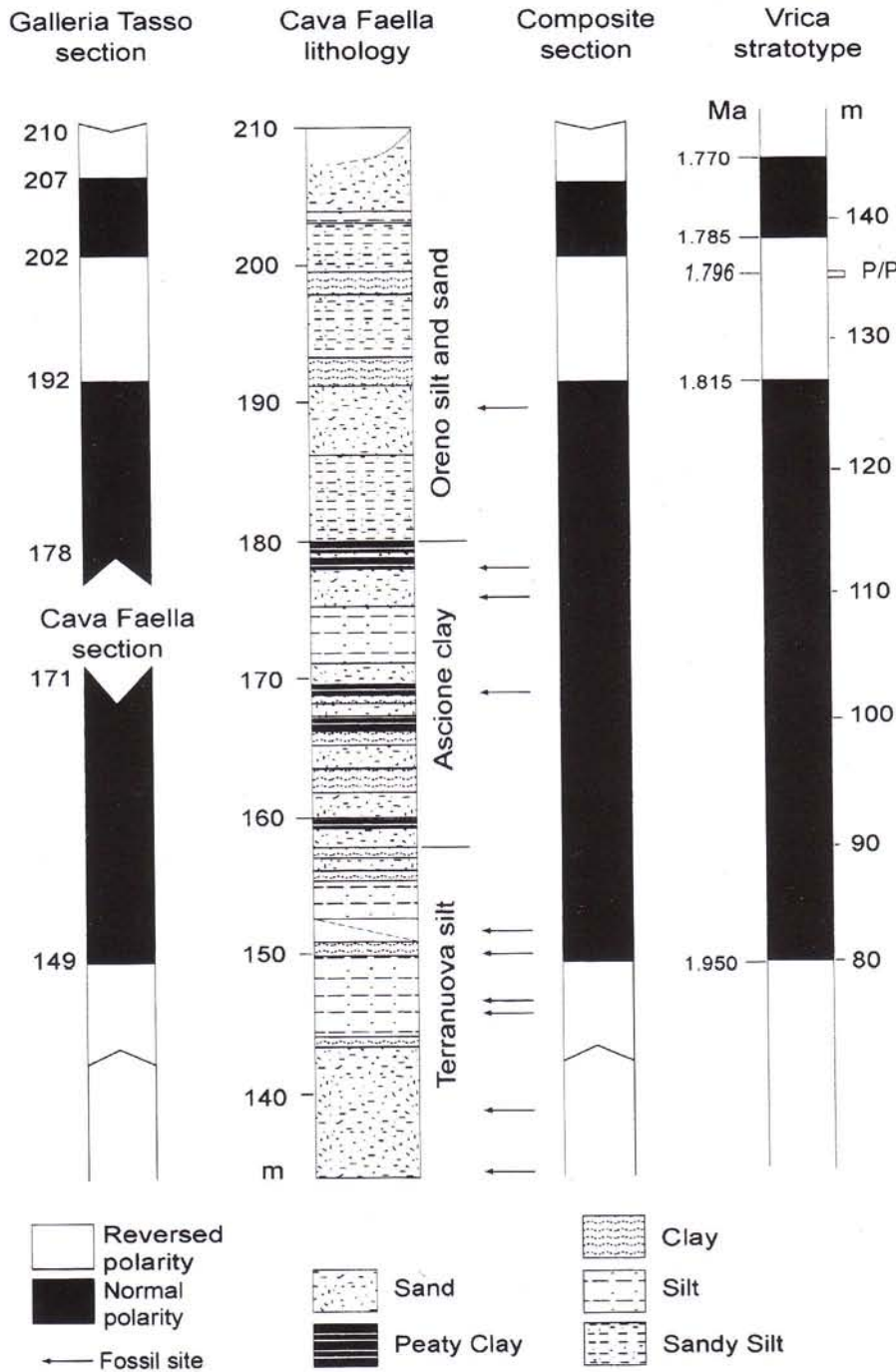


Fig. 7 - Magnetostratigraphic composite section of Faella (modified, after Napoleone et al. 2001a), on which all samples of the Faella collection may be located and their ages measured accordingly. The samples listed in Tab. 1 include the old ones grouped at the youngest age value and the recent ones (except that one without location reference, IGF 3323V), whose ages are also reported. The samples listed in Tab. 2 are the last ones, acquired in January 2000 and distributed versus their measured levels. The Olduvai magnetochron is made by the two normal polarity zones; the same split Olduvai formed also the magnetochron within which the Pleistocene boundary was fixed in the Vrica stratotype, according to the magnetostratigraphic composite section there reconstructed (modified, after Zijdeveld et al. 1991).

last specimen of the Faella collection, and then an interruption of recoveries for almost a century was significant because it coincided with the occurrence of two major events which marked an epoch in the activities of the NHMFU. One was the recovery of rich deposits at Olivola and Montopoli, respectively in northern and western Tuscany (Forsyth Major 1877, 1889), with several samples diffused in European museums, mostly in London and Basel, while there were no findings at Faella until 1967. The second event was the recovery made by Azzaroli in 1949 and 1953 near Montevarchi, south of Figline Valdarno, of two almost complete skeletons of elephant which were since exposed in the Museums of Montevarchi and of Firenze, respectively. The attention

paid to the exhibition aspects moved to reconsider the old collections and the key finds of Olivola and Montopoli outside the UV, together with those of Matassino and Tasso in the UV, became thence the base for assembling the biochronological history of the Villafranchian mammal age. After the revision on those faunas had already begun (Azzaroli 1947, 1950), a new asset was made (Azzaroli 1977) which is still in use (Gliozzi et al. 1997; Torre et al. 2001).

A similar condition presently occurs in the UV, after the new findings in large deposits contributed a spectacular enrichment of the Museum patrimony, and a new asset for redrawing the sedimentary history of the basin was provided by magnetostratigraphy. Also the

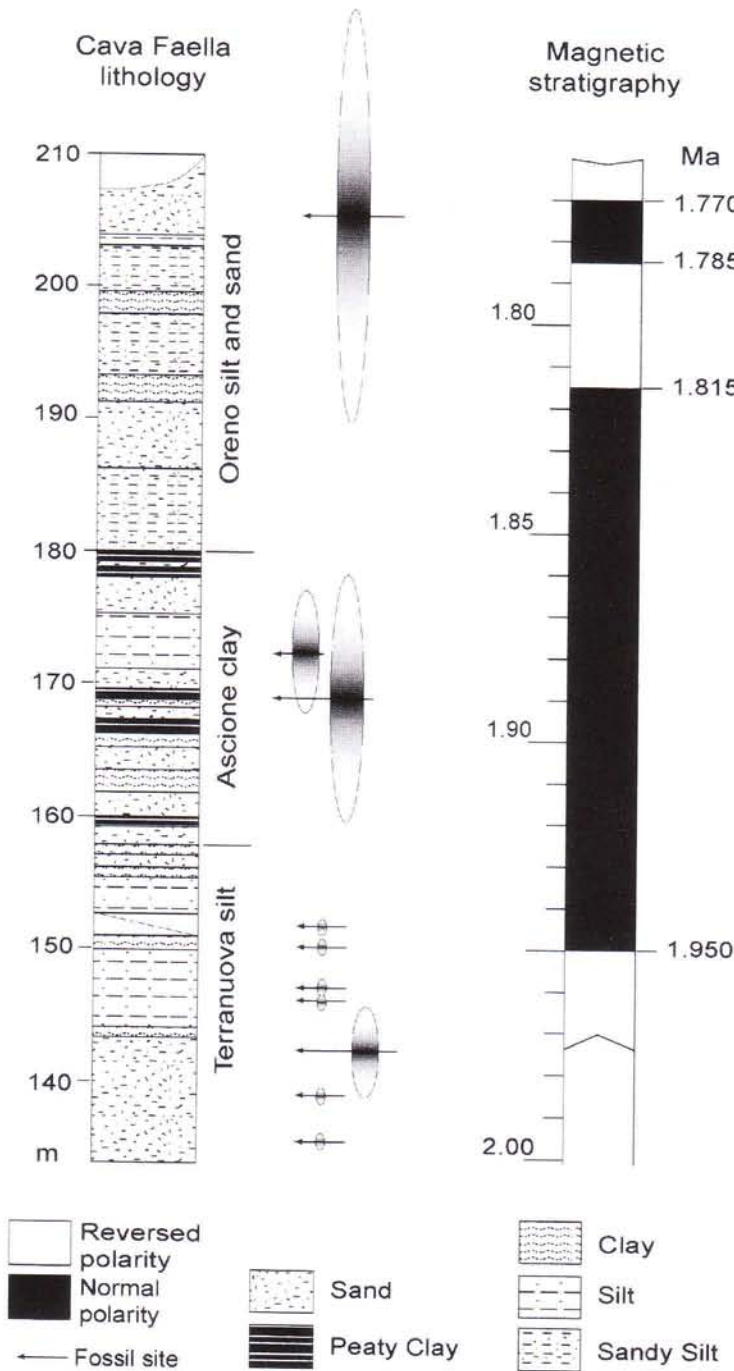


Fig. 8 - Summary of the stratigraphical setting of the Faella collection in the measured section of Cava Pratigliolmi pit; each positioned specimen is shown with the accuracy of the ages assigned to it. The overlapping and uncertainty range are more extended for the younger ages, based on the reconstruction by Napoleone & Albianelli (1998).

faunal events in its three basic sequences underwent a drastical revision of their ages, involving the mentioned Matassino and Poggio Rosso Localities (Napoleone et al. 2001b), to which the specific dates of the 1811 rhinoceros and of the 1953 elephant were added. Therefore, the catalogue indications on the Faella collection suggest the following two proposals, to assign to all findings the site number of Cava Faella (n. 62), comprehensive of all labelled synonymous references (Cava Pratigliolmi, C. Solava, C. Del Buffa), and to assemble all the catalogued specimens under a single denomination as the Faella local fauna. It would group a fairly wide variety of forms, considering that it is made by the 10 species in the catalogue and 2 more genera (*Megantereon* and *Rhi-*

noceros, now *Stephanorhinus*) included by Cocchi's finds of 1862 at Casanuova.

Therefore, all specimens of the Faella collection, reported in Tab. 1 and Tab. 2 may be dated with the accuracies determined for each one by their position in the magnetostratigraphic type section.

Magnetostratigraphy of the Faella section and age of its fauna

The elements for the magnetostratigraphy of the Faella section were based on rock-magnetic properties of good quality, summarized from those reported in

Albianelli et al. (2001) and shown in Fig. 6. The measured section begins at ground level of the quarry, 143 m a.s.l., with a reversed polarity registered over more than 6 m thickness, and dated as the end of chron C2r 1r, Matuyama, preceding the onset of the Olduvai C2n normal chron (Torre et al. 1993). This was measured up to 171 m, where sampling was interrupted, and then the magnetostratigraphic record was integrated with that of the Tasso section (Fig. 7). In it, the terminal Olduvai chron showed a 10 m long reversed interval above 190 m, containing the Plio-Pleistocene boundary, as defined in the Vrica stratotype "just before the end of the magnetic chron" (Van Couvering 1997). The date of the Ascione-Oreno sedimentary transition is in a time interval of the order of 80 ky before the end of the Olduvai at 1.77 Ma in the GPTS magnetostratigraphy (Berggren et al. 1995). This magnetostratigraphic framework completed the detailed sedimentological and stratigraphical reconstructions of the sequence, and the fossil specimens from the Faella collection were stratigraphically ordered so that they may now be calibrated on the Faella magnetostratigraphic type section for the UV.

The elephant tusk fragments assumed a key position in the stratigraphic record, lying closely above the onset of the Olduvai (dated 1.950 Ma in the GPTS), which was identified at 149.5 m level. Their position between 150 m and 153 m would date them nearly 5 ky after the polarity change, at 1.945 ± 0.002 Ma, according to the accumulation rate measured from the magnetostratigraphic polarity sequence. The second positioned specimen of the list in Tab. 1 was reported from the middle of the section and may be dated with larger uncertainty, at the best within a stratum level ca. 10 m thick, corresponding to a time span of approximately ± 15 ky, around the age of 1.880 Ma. The last one is the deer antler at the base of the outcrop, in the abandoned quarry and 1–2 m above the ground level; again, it can be dated with better accuracy, at an age of 1.985 ± 0.002 Ma. Finally, the specimen from the Faella creek, acquired in January 2000 and laying just underneath the previous one is dated 1.995 ± 0.002 Ma. Both specimens assume a great relevance, as they become the oldest fossil remains in the UV mammal faunas of late Villafranchian age and the ones dated with the highest resolution. Their dates are 45 ky and 35 ky before the onset of the Olduvai chron, while the re-calibrated age of the Matassino Locality is ca. 30 ky younger than it (Napoleone et al. 2001b). It may be remarked that this result extends the duration of the UV late Villafranchian, significantly enlarging the interval for dating the faunal diversification in the basin.

The last acquired specimens are listed in Tab. 2, with their stratigraphical position. The whole range of ages is calculated from the magnetozones durations of Fig. 7, with minor adjustments made after the first results of the cyclostratigraphical analysis of the continuous magnetic record changes.

The lowermost find at meter 134 was dated at 1.995 ± 0.002 Ma, while those recovered between the latter and the ones at 146 m were confined at 140 ± 3 m, and therefore dated 1.975 ± 0.010 Ma. The remaining specimens were dated again with 2 ky accuracy, those at 146 m at an age shortly older than 1.960 Ma, i.e. 1.963 Ma, that at 147 m 1.960 Ma, that at 150 m was almost coincident with the magnetozones boundary at 1.950 Ma, while the last one at 152 m was dated slightly younger than the polarity change, say 1.945 Ma, corresponding to that of the *Archidiskodon* of Tab. 1. The uppermost specimen is less accurately positioned, being only reported as recovered in the Ascione unit which extends almost 20 m around 170 m level; if placed in the mid Ascione unit, within ± 10 m uncertainty, it would date 1.890 ± 0.030 Ma (Fig. 8).

Conclusions

Two criteria were tested on the Faella collection: the rapid controls of the NHMFU automated catalogue to review the indications on the palaeontological collections and the magnetostratigraphic numerical dating of the series in which the fossil remains were recovered. The results from the former allowed to reconstruct the positions of the specimens which spanned the whole stratigraphic unit, and led to consider it a Locality with a special character, due to its stratigraphical significance. Those from the latter provided the Faella collection a chronological position with the highest accuracy, and an age in years for its whole extent covering most of the late Villafranchian faunal record to which the richest collections in the NHMFU do belong. In spite of that, the Faella assemblage remained for over two centuries a minor collection, which was never reported for its palaeontological relevance, and only lately increased by doubling its total amount up to 29 specimens.

The catalogue indications on the Faella collection suggested the following two proposals, to assign the whole collection the site number of Cava Faella n. 62, comprehensive of all labelled references (Cava Pratigliolmi, C. Solava, C. Del Buffa), and to assemble all catalogued specimens under a single denomination of Faella local fauna. It would group a fairly wide variety of forms, considering that it is made by 10 species. The whole range of ages extends over 220 ky, from 1.995 ± 0.002 Ma for the lowermost specimen to 1.775 ± 0.050 Ma for those of the old collection, near the end of the Olduvai chron. Successive steps were marked by the cervid antler of Tab. 1 at 1.985 ± 0.002 Ma, and the three specimens of Tab. 2 undetermined between the bottom one and that of 146 m, at 1.975 ± 0.010 Ma, followed by those positioned with 1 m accuracy, at 1.963 Ma, 1.960 Ma, 1.950 Ma, and 1.945 Ma. Also the *Archidiskodon* tusk of Tab. 1 was dated to the same age, at $1.945 \pm$

0.002 Ma, while last sample of Tab. 2 is located in the Ascione unit and dated 1.890 ± 0.030 Ma, followed by that in the mid section at 1.880 ± 0.015 Ma. All the specimens with undetermined location were inferred to come from the Oreno unit, whose full extent in the Faella area reached an average height of 225-230 m, with a middle level close to the end of the Olduvai, where they were positioned.

The numerical sequence of the GPTS, by which the Faella magnetostratigraphic type section was calibrated to the Pliocene/Pleistocene boundary stratotype, has become a relevant character of the automated catalogue. Revision of old collections can now drive to

update the UV fossil catalogue and enable for a new biochronological asset of their stages, tightly constrained in the frame of paleomagnetic calibration. Numerically dated faunal events enable to fix benchmarks on the evolution of life in the basin, during 220,000 years just preceding the chronostratigraphic renewal of the geologic system into the Quaternary age. It should be also remarked that during such time span the late Villafranchian fauna, although represented by several Localities through the MS and by its richest assemblages, did not evidence any significant diversification, because it was fully summarized within the Faella small collection.

REFERENCES

- Albianelli A., Bertini A., Magi M., Napoleone G. & Sagri M. (1995) - Il bacino plio-pleistocenico del Valdarno Superiore: eventi sedimentari, paleomagnetici e paleoclimatici. *Il Quaternario*, 8: 11-18, Roma.
- Albianelli A., Azzaroli A., Bertini A., Ficarelli G., Napoleone G. & Torre D. (1997) - Paleomagnetic and palynologic investigations in the Upper Valdarno basin (central Italy): calibration of an early Villafranchian fauna. *Riv. It. Paleont. Strat.*, 103: 111-118, Milano.
- Albianelli A., Magi M., Mazzini M. & Napoleone G. (2001) - The Plio-Pleistocene boundary in the Northern Apennine continental deposits as defined by the Faella magnetostratigraphic section in the Upper Valdarno. *Mem. Soc. Geol. It., Spec. Vol. 1*, Piali Mtg, Perugia 18-21 February, 2000, Roma. (In press)
- Azzaroli A. (1947) - I cervi fossili della Toscana, con particolare riguardo alle specie villafranchiane. *Palaeontogr. Ital.*, 43: 1-45, Pisa.
- Azzaroli A. (1950) - Osservazioni sulla formazione villafranchiana di Olivola in Val di Magra. *Atti Soc. Tosc. Sc. Nat., Mem.*, 57: 104-111, Pisa.
- Azzaroli A. (1967) - Lineamenti geologici del bacino fluvio-lacustre del Valdarno Superiore. Comitato del Neogene del Mediterraneo: IV Congr., Bologna. *Guida alle escursioni*, pp. 161-172, Bologna.
- Azzaroli A. (1977) - The Villafranchian Stage in Italy and the Plio-Pleistocene boundary. *Giorn. Geologia.*, 41: 61-79, Bologna.
- Azzaroli A. (1983) - Quaternary mammals and the "End-Villafranchian" dispersal event. A turning point in the history of Eurasia. *Palaeogeogr. Palaeoclimat. Palaeoecol.*, 44: 117-139, Amsterdam.
- Azzaroli A. (1992) - The Cervid genus *Pseudodama* n.g. in the Villafranchian of Tuscany. *Palaeontogr. Ital.*, 79: 1-41, Pisa.
- Azzaroli A. (1995) - The "Elephant-Equus" and the "End-Villafranchian" Events in Eurasia. In: Vrba E.S., Denton G.H., Partridge T.C., Burckle L.H. (Eds.) - *Paleoclimate and Evolution, with Emphasis on Human Origins*. Yale Univ. Press, pp. 311-318.
- Azzaroli A. & Napoleone G. (1981) - Magnetostratigraphic investigation of the Upper Sivaliks near Pinjor, India. *Riv. It. Paleont. Strat.*, 87: 739-762, Milano.
- Azzaroli A., De Giuli C., Ficarelli G. & Torre D. (1988) - Late Pliocene to early Mid-Pleistocene mammals in Eurasia: faunal succession and dispersal events. *Palaeogeogr. Palaeoclimat. Palaeoecol.*, 66: 77-100, Amsterdam.
- Azzaroli A., Cioppi E. & Mazzini M. (1992) - Il Museo di Geologia e Paleontologia dell'Università degli Studi di Firenze, Sezione Vertebrati. 76a Riunione estiva Soc. Geol. It., Firenze, 21-23 sett. 1992, 19 pp., Roma.
- Azzaroli A., Colalongo M.L., Nakagawa H., Pasini G., Rio D., Ruggieri G., Sartoni S. & Sprovieri R. (1997) - The Pliocene-Pleistocene boundary in Italy. In: Van Couvering J.A., (ed.), (1997) - "The Pleistocene Boundary and the Beginning of the Quaternary", World and Regional Geology Series, Cambridge Univ. Press, v. 9, pp. 141-155.
- Berggren W.A., Kent D.V., Swisher III C.C. & Aubry M.P. (1995) - A revised Cenozoic geochronology and chronostratigraphy. *SEPM, Special Publ.*, 54: 129-212, Tulsa.
- Biquand D., Dubar M. & Sémah F. (1990) - Paleomagnetic correlation of the Mediterranean upper Neogene biochronology and Villafranchian vertebrate sites of the Massif Central, France. *Quaternary Research*, 33: 241-252, Duluth.
- Butler R.F., Lindsay E.N., Jacobs L.L. & Johnson N.M. (1977) - Magnetostratigraphy of the Cretaceous-Tertiary boundary in the San Juan Basin, New Mexico. *Nature*, 267: 318-323, London.
- Butler R.F., Krause D. & Gingerich P.D. (1985) - Magnetic polarity stratigraphy and biostratigraphy of Middle-Late Paleocene continental deposits of South-Central Montana. *Jour. Geol.*, 95: 647-657, Chicago.
- Cioppi E. & Napoleone G. (1999) - La catalogazione informatizzata dei vertebrati fossili del Valdarno Superiore come strumento di una maggiore fruibilità di studio per la sua magnetocronologia. Secondo Forum FIST 1999, Bellaria, 19-23 September, 1999. (Abt)
- Cioppi E. & Napoleone G. (2001) - The fossil vertebrate database of the Natural History Museum of Florence and

- high-resolution magnetostratigraphy in the Upper Valdarno Basin, as a clue to date old collections. *Riv. It. Paleont. Strat.*, 107: 297-303, Milano.
- Cioppi E., Dorbolò D. & Berdondini E. (1996) - GEF: un sistema di catalogazione automatizzata delle collezioni paleontologiche. *Museologia scientifica*, 13: 9-21, Verona.
- Cocchi I. (1867) - L'uomo fossile nell'Italia centrale. Studi paleontologici. *Mem. Soc. It. Sci. Nat.*, 2: 1-80, Milano.
- De Giuli C., Ficarelli G. & Torre D. (1986) - Mammal sequence and biostratigraphy. *Mem. Soc. Geol. It.*, 31: 131-133, Roma.
- Dundas R.G., Smith R.B. & Verosub K.L. (1996) - The Fairmead Landfill Locality (Pleistocene, Irvingtonian), Madera County, California: preliminary report and significance. *Paleobios*, 17: 50-58, Berkeley.
- Forsyth Major C.J. (1877) - Considerazioni sulla fauna dei mammiferi pliocenici e post-pliocenici della Toscana. *Atti Soc. Tosc. Sci. Nat., Proc. Verb.*, 3: 202-221, Pisa.
- Forsyth Major C.J. (1889) - L'ossario di Olivola in Val di Magra (Provincia di Massa Carrara). *Atti Soc. Tosc. Sci. Nat., Proc. Verb.* 7: 57-75, Pisa.
- Gliozzi E. & 20 more Authors (1997) - Biochronology of selected mammals, molluscs, ostracods from the middle Pliocene to the late Pleistocene in Italy. The state of the art. *Riv. It. Paleont. Strat.*, 103: 369-388, Milano.
- Heller F., Liu X.M., Liu T.S. & Xu T.C. (1991) - Magnetic susceptibility of loess in China. *Earth Planet. Sci. Lett.*, 103: 301-310, Amsterdam.
- Kostopoulos D.S. (1997) - The Plio-Pleistocene artiodactyls (Vertebrata, Mammalia) of Macedonia 1. The fossiliferous site "Apollonia-1", Mygdonia basin of Greece. *Geo-diversitas*, 19: 845-875, Paris.
- Lindsay E.N. (2001) - Correlation of mammalian biochronology with the Geomagnetic Polarity Time Scale. *Boll. Soc. Paleont. It.*, 40: 225-233, Modena.
- Magi M., Marri C. & Sagri M. (1992) - Carta geologica del Bacino fluvio-lacustre del Valdarno Superiore. 76a Riunione estiva *Soc. Geol. It.*, Firenze, 21-23 sett. 1992. Riassunti, 187-188.
- Mazzini I., Paccara P., Petronio C. & Sardella R. (2000) - Geological evolution and biochronological evidences of the Monte Riccio section (Tarquinia, Central Italy). *Riv. It. Paleont. Strat.*, 106: 247-256, Milano.
- Mazzini M., Borselli V., Cioppi E. & Napoleone G. (2000) - Poggiorosso: un importante arricchimento delle faune a vertebrati villafranchiane del Valdarno Superiore. *Boll. Soc. Paleont. It.*, 39: 381-388, Modena.
- Merla G. & Abbate E. (1967) - Note illustrative della Carta Geologica d'Italia, F. 114 Arezzo: Servizio Geologico d'Italia, 52 pp., Roma.
- Napoleone G. & Albianelli A. (1998) - Magnetic stratigraphy as a constraint for cycle resolution in Pliocene lacustrine sequences of the Apennine basins, Italy. IAS 15th Intern. Congr., Alicante, 13-17 Apr. 1998, (Abt).
- Napoleone G., Albianelli A. & Mazzini M. (2001a) - The fossil Rhinoceros found by Nesti on 1811 and its age calibrated by the magnetostratigraphy of the Upper Valdarno. *Boll. Soc. Paleont. It.*, 40: 249-256, Modena.
- Napoleone G., Albianelli A., Azzaroli A. & Mazzini M. (2001b) - The Poggio Rosso Locality calibrated to the end-Pliocene and its significance for dating the late Villafranchian faunas of the Upper Valdarno, Central Italy. *Riv. It. Paleont. Strat.*, 107: 287-296, Milano.
- Opkyke N.O. (1995) - Mammalian migration and climate over the last seven million years. In: Vrba E.S., Denton G.H., Partridge T.C., Burckle L.H. (Eds.) "Paleoclimate and Evolution, with Emphasis on Human Origins", Yale Univ. Press, pp. 109-114.
- Rook L. & Torre D. (1996) - The wolf-event in western Europe and the beginning of the late Villafranchian. *N. Jb. Geol. Palaentol. Mb.*, 8: 495-501, Stuttgart.
- Sagri M., Martini I.P., Benvenuti M. & Magi M. (1994) - Basin fill architecture of the Neogene-Quaternary extensional basins In: the Northern Apennines. 15th Regional Mtg IAS, Ischia. Field Trip Guidebook, pp. 39-74.
- Tamrat E., Thouveny N., Taïeb and Opdyke N.O. (1995) - Revised magnetostratigraphy of the Plio-Pleistocene sedimentary sequence of the Olduvai Formation (Tanzania). *Palaeogeogr. Palaeoclimat. Palaeoecol.*, 114: 273-283, Amsterdam.
- Torre D., Albianelli A., Azzaroli A., Ficarelli G., Magi M., Napoleone G. & Sagri M. (1993) - Paleomagnetic calibration of Late Villafranchian mammal faunas from the Upper Valdarno, central Italy. *Mem. Soc. Geol. It.*, 49: 335-344, Roma.
- Torre D., Rook L. & Ficarelli G. (1999) - The mammal fauna turnover in Italy at the early and middle Pleistocene transition. In: Gibert J., Sanchez F., Gibert L. & Ribot F. (eds), The Hominids and their environment during the Lower and Middle Pleistocene of Eurasia, pp. 541-548.
- Torre D., Abbazzi L., Bertini A., Fanfani F., Ficarelli G., Masini F., Mazza P. & Rook L. (2001) - Structural changes in Italian Pliocene-Pleistocene large mammal assemblages. *Boll. Soc. Paleont. It.*, 40: 303-306, Modena.
- Van Couvering J.A., (ed.) (1997) - The Pleistocene Boundary and the Beginning of the Quaternary, World and Regional Geology Series, Cambridge Univ. Press, v. 9, 296 pp.
- Zijderveld J.D.A., Hilgen F.J., Langereis C.G., Verhallen P.J.J.M. & Zachariasse W.J. (1991) - Integrated magnetostratigraphy and biostratigraphy of the upper Pliocene-lower Pleistocene from the Monte Singa and Crotona areas in Calabria, Italy, *Earth Planet. Sci. Lett.*, 107: 697-714, Amsterdam.

Appendix

The first four finds after almost one century from the last one of 1883, as they are reported in the catalogue cards. The original parts and some immediate annotations are included for comment.

1967: *Archidiskodon meridionalis* - tusks (various fragments)

IGF 14439 (Solava Brick Factory, Faella) (Plate 1 A-7).

It has to be noted that in the list it is also reported:

Foss. Loc. 62 FAELLA, followed then by further notations:

Furnace of Del Buffa Bro. - Parts of *Elephas* tusks in the clays.

Coll. A. Berzi (Nov. 19, 1967). The specimen has been reported by the workers, almost 3 meters above the excavation ground level in the slid clay.

1977: *Leptobos etruscus* - Mandible sin., fragment of.

IGF 3323V (without location, but only with an indetermined FAELLA label). To be noted that any position datum is missing. Although the finding is so recent, annotations are so scarce that its precise dating within the interval 1.95-1.77 Ma of the Olduvai chron (or even before?) becomes questionable.

1992: *Sus strozzi* - Mandible, fragment of a left jaw. (with P4-M3)

IGF 6281V (Pratigliolmi Quarry, foss. loc. 62)

Retrieved at ca. half the height of the section in the quarry.

Coll. M. Martinelli.

To be noted that it is a relevant sample because the elevation of the site is quoted as intermediate in the outcrop. It therefore represents the specimen at the highest level in the Faella quarry together with the sample of Tab. 2 found in the "Ascione layer", and below the inferred elevation of the unlocalised ones in the old collection averaged at 190-195 m.

1999: *Pseudodama nestii* - Antler sin.

IGF 7543V (Pratigliolmi Quarry, foss. loc. 62) (Fig. 5)

From the basal levels of the Pratigliolmi Quarry.

Coll. O. Pasquini.

It should be remarked that this is a juvenile specimen. At the note "From the basal levels" the estimate of their elevation may be seen in the photographs taken in February 25, 1987 during the recovery, with an allowance of about 1 m, being the site 1.5-2 m above the base level of the entrance to the Pratigliolmi Factory located at an altitude of 136 m, in the dismissed banks of the left wall.

The date of acquisition is April 1999, and for the moment it may be left as a reference date for the catalogue. The age calculated by magnetostratigraphy is 1.985 ± 0.002 Ma, i.e. of approximately 35 ± 2 ky before the onset of the Olduvai. Two new data may therefore be added in the notes:

"Descr. Magnetostratigraphical age: 1.985 ± 0.002 Ma, 35 ± 2 ky before Olduvai";

"Geological map of the area (M. Magi), photo of the find in situ (O. Pasquini)".