

# Antonio Ascenzi (1915-2000), a Pathologist devoted to Anthropology and Paleopathology

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## Summary

Antonio Ascenzi is well known within the scientific community for his original contributions to morbid anatomy and in particular for his studies on the fields of bone biology, bone biomechanics, haematology and congenital heart disease. Additionally, Ascenzi was also interested in human evolution and applied his deep knowledge of pathology to ancient human remains, conducting research in paleoanthropology on fossilized Neanderthal specimens found in Italy. The name of Ascenzi is linked with the discovery and study of the most ancient Italian bone fossils, namely the Ceprano skull, an early specimen of *Homo erectus*.

Furthermore, his pioneering researches on the Uan Muhuggiag and Grottarossa mummies and his rigorous studies on several aspects and problems concerning the pathologies of past human populations made him a pioneer in the fields of Italian mummiology and paleopathology. The thread that linked his diversified research interests outside and within human anthropology was a profound passion for the search and discovery of scientific truth.

## Introduction

Antonio Ascenzi was born on May 4, 1915 at Boulogne sur Mer, France. He obtained his degree *cum laude* in Medicine and Surgery at the "La Sapienza" University of Rome in 1940, discussing a thesis on the hypophyseal alterations secondary to leptomenin-gitis. During the Second World War, he took service as Medical Officer in Libya, an experience that he always remembered as one of the most important in his life, which profoundly affected his human and professional formation.

After the war, Ascenzi started to work at the Institute of Pathological Anatomy, where he attained the position of Assistant Professor, and then of Tenured Assistant Professor University Lecturer, Senior Assistant Professor and finally, from 1957 to 1959, Professor "Incaricato" of the chair of Pathology (Morbid Anatomy). Starting in 1960 he held the same position at the University of Pisa, where he obtained the chair of Tenured Professor from 1963 to 1968 (Fig. 1). In 1968 he became Full Professor of the chair of Pathology (Morbid Anatomy) at the "La

Sapienza" University of Rome where he continued and concluded his academic career.

Morbid Anatomy was Ascenzi's main interest. The results of his original researches spanning from bone biology and bone biomechanics, to haematology and congenital heart diseases were published in prestigious national and international scientific journals. Alongside Morbid Anatomy, Ascenzi devoted himself to Pale-oanthropology and Paleopathology. In early 1958, he became University Lecturer of Anthropology (Physical Anthropology) and, in 1961-1963, Professor "In-caricato" of Human Palaeontology at the "La Sapienza" University in Rome. He was member of the Committee for Auxiliary Sciences of Archaeology of the National Research Council (CNR) from 1966 and President of the Italian Institute of Human Palaeontology from 1973. As a member of the Paleopathology Association, Ascenzi participated in several European Member Meetings<sup>1-4</sup>. He was member of the Advisory Board of several scientific anthropological journals, including Rivista di Antropologia, L'Anthropologie (Paris), Bulletin et Memoires de la

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Fig. 1. Antonio Ascenzi (third of the second row on the right) at the Institute of Pathology of the University of Pisa in 1967.



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His medical activity and researches moved in parallel with his studies on Physical Anthropology, Human Paleontology and Paleopathology, reflecting a deeply rooted interest in the human being and his history. The application of modern biomedical and diagnostic technologies on ancient human remains allowed Ascenzi to pursue important studies on the material and cultural history of Antiquity, and to investigate the relationships between life-style, environment, and development of specific ancient pathologies. He also authored important studies on the action of pathogenic microorganisms in history. An enthusiastic researcher, Ascenzi was a Magister of Medicine in the true sense, devout to his Profession, and an heir to the "humanism" that has always defined the history of *ars medendi*.

The aim of this contribution is to shed light on the importance of Ascenzi's work on Human Anthropology and Paleontology, and especially on his role as founder of modern Italian Paleopathology.

## Ascenzi: studies in Paleoanthropology

Ascenzi's interests in Paleoanthropology developed as an extension of his research on micro- and nano-structures of human bone deprived of its inorganic component, to bones in which the destruction of os-sein had occurred "naturally", or fossilized bones. By application of electron microscopy to specimens from the Neanderthal skull of Saccopastore and the ethmoid bone of *Elephas antiquus*, Ascenzi observed that the finely spongy structure of these very ancient specimens

findings: a congenital malformation of the sphenoidal sinus, which was asymptomatic for the subject, and a healed depressed fracture of the right brow bridge, an injury probably caused by the attack of an animal<sup>16-19</sup>. In 2000, a new reconstruction of the calvarium demonstrated that it could be classified as an early

was similar to that of bone artificially deprived of the organic component<sup>5</sup>.

In 1950, Ascenzi and Giovanni Lacchei made an important discovery. They brought to light another incomplete Neanderthal mandible (mandible III B) in the bone *breccia* alongside the entrance of the Guattari cave on Monte Circeo (Latium, Italy), where the remains of a skull (Circeo I) and a fragmented Neanderthal mandible (Circeo II, mandible A) were discovered in 1939. The mandible, estimated to belong to a male adult aged 18 to 20 years, was carefully studied. The results of the study were first published by Ascenzi and the anthropologist Sergio Sergi in 1955<sup>6,7</sup>.

The microscopic studies of Ascenzi on fossil bones continued on a specimen from the Neanderthal mandible "Circeo II A" observed by polarizing light microscopy and by electron microscopy on a number of animal specimens found in close proximity to the Neanderthal mandible "Circeo III B". This research was the first to demonstrate the presence of histologically detectable organic matrix and the existence of a collagen component within the organic phase of a Neanderthal bone. Histologic methods and histochemical staining were established by this study as suitable techniques to verify the state of preservation of ossein in fossil bones<sup>8</sup>. The aims of the microscopic investigations performed on prehistoric bones and the results reached until then, were summarized by Ascenzi in several papers<sup>9,10</sup>. In the meantime, the mandible of a Neanderthal child found at Archi (Calabria, Italy) in 1970 was studied by Ascenzi and the geologist Aldo Segre<sup>11,12</sup>. The studies on Neanderthal remains were continued by Ascenzi with the analysis of the Circeo I skull, discovered by Alberto Carlo Blanc in the Guattari cave at Monte Circeo in 1939. The skull belonging to a male, aged 40 to 50 years, showed typical features of the European *Homo Neandertalensis*. In particular, Ascenzi and co-workers<sup>13</sup> examined the irregularities of the palatal surface using histologic, microradiographic and electron microscopic techniques. The conclusion was that the Neanderthal man had a well developed *torus palatinus* of a nodular type, which was developing into the lobular type. Two years later Ascenzi edited the posthumous analytical work on the Circeo I skull (which Sergi had not been able to finish), by collecting the material, completing the unfinished observations of his colleague and providing a systematic draft of the work. The book was published by the Accademia Nazionale dei Lincei and represents a fundamental text on the subject and is accompanied by excellent iconography<sup>14</sup>. For his contribution and life-long experience in Paleoanthropology, Ascenzi was asked to write the contents for the entry "Man (Origin)" of the Italian Encyclopaedia Treccani<sup>15</sup>. Finally, the name of Ascenzi is strictly linked to another even more important discovery for Italian paleoanthropology. In 1994, during excavations for the construction of a highway near the town of Ceprano (Latium), a fossilized hominid calvarium of the Lower Pleistocene was brought to light. The calvarium, fragmented and incomplete, was estimated to belong to a strong young adult man. The specimen presented two pathological specimen of *Homo erectus*<sup>20,22</sup>. The Ceprano skull represents the most ancient human fossil bone ever found in Italy and shows unique characteristics that contribute towards a better understanding of the history of human evolution.

## Ascenzi: studies in Paleopathology

An innovative field of investigation pursued by Ascenzi is represented by bone alterations due to burial conditions. A first study on the state of preservation of skeletal remains immersed in sea-water for an extended period of time filled a gap due to the absolute lack of information at that time. The skeletal remains of three individuals dated back to the X century A. D. and found off the Mediterranean coast of France were analyzed to evaluate their state of preservation. Ascenzi and co-workers ascertained that the bones were quite well preserved, in particular the organic matrix, whose histological and histochemical properties were similar to those of fresh bones. In contrast, the inorganic component showed an increase, whereas the observed deterioration of the bones was attributed to the activity of micro-organisms<sup>23</sup>.

Ascenzi dealt successfully with fundamental problems in paleopathology, such as the origin of thalassemia in Italy. Ascenzi carried out a wide survey of the Italian skeletal material with evidence of porotic hyperostosis, especially hyperostosis from southern sites. Because porotic hyperostosis occurs within a large group of haematologic disorders, and it is not only characteristic of thalassemia, he proposed rigorous criteria to formulate a diagnosis of the disease<sup>24-26</sup>.

In a further study, Ascenzi provided evidence that haemoglobin can be quantitatively determined in ancient skeletal remains, even dating back to the Eneolithic age, using an immunochemical technique. Although haemoglobin had been shown to decrease with time, it was still found even in older specimens. This opened a new path to the solution of paleopathological problems, especially those on the origin of thalassemia<sup>27</sup>. Additional progress was made and recorded in a contribution presented in the volume of Ortner and Aufderheide<sup>28</sup>. While a single macroscopic examination does not allow diagnosis of the aetiology of chronic anemias in skulls with evidence of porotic hyperostosis, the immunochemical technique was estimated to be sufficiently reliable to detect the content of haemoglobin traces in ancient bones. This represented a possible tool for an unequivocal diagnosis of alpha and beta thalassemia in skeletal remains, although a careful interpretation of these data is necessary<sup>29</sup>.

Ascenzi was also interested in minor problems of Paleopathology. Some contributions summarized the value and results of modern medical techniques applied to paleopathology, such as regular light microscopy, electron microscopy<sup>30</sup> and histology of human bone remains<sup>31</sup>.

## Ascenzi: studies in experimental Archaeology

An interest that guided the researches of Ascenzi in Paleopathology was *post mortem* alterations of bone, by means of experimental archaeology. The first study was aimed at investigating the osteoclastic activity of fungi on buried bones. Fragments of human vertebrae obtained from fresh cadavers were buried in garden dirt for 45 days. Once exhumed, the histological preparations of the specimens were observed by electron microscopy, using fragments of the Circeo I skull for comparison. The fungal activity was represented by bone erosion, with resorption pits and boring channels; the degradation of crystallites and the organic matrix were similar between buried and fossil bones<sup>32</sup>. Experimental archaeology was also

used to obtain information about the activity of micro-organisms on the above-mentioned bone immersed in Mediterranean Sea water. Ten specimens of fresh bone from bovine meta-tarsals were deposited on the seabed, at a depth of about 60 m. Every six months, two specimens were removed and observed by optical and electron microscopy. This research showed that micro-organisms that produce boring channels are amoebic<sup>33</sup>.

Ascenzi also used experimental archaeology to propose a provocative and fascinating interpretation of the artificial aperture in the occipital bone of Circeo I, already observed and commented by Sergi. Sergi had hypothesized that the opening in the skull had been artificially created in order to remove the encephalon. This conclusion was partially reached on the basis of the comparison with similar lesions found in crania belonging to Papuan tribes that practiced cannibalism. To verify this hypothesis, Ascenzi rehydrated a dry human cranium and reconstructed the stone tools used by the Circeo Neanderthals (pontinian type tools) to practice an artificial aperture in the occipital bone. The result, very similar to the original lesion, supported the hypothesis of an intentional opening of the Circeo I skull<sup>34</sup>.

## Ascenzi: studies in Mummiology

Fig. 2. Antonio Ascenzi (first on the left) and colleagues at the Museum of Anthropology of Costanza (Romania) in 1972.



The contribution of Ascenzi to Paleopathology is represented not only by the studies on fossilized and skeleton remains, but also on mummies in which soft tissues are preserved. During the winter of 1958-59, an archaeological expedition designed to survey the Tadrart Aca-cus in southern Libya explored a deposit under a natural shelter called Uan Muhuggiag, where the well preserved mummy of a child was discovered. The mummy was wrapped in an animal skin in an unusual position and wore a shell necklace. Anthropological, radiological, histological and chemical analyses were performed under the direction of Ascenzi. It was ascertained that the mummy belonged to a 30-month-old child of undetermined sex with Negroid features. The mummification had been conducted first by evisceration, attested by a long incision of the abdominal wall, and then by natural desiccation<sup>35 36</sup>.

Furthermore, Ascenzi was involved in the study of a unique specimen, the so-called "mummy of Grottar-ossa", discovered along the via Cassia in Rome in 1964. The body, belonging to an 8-year-old girl and dating back to the second half of the II

century A.D., was buried in a marble sarcophagus. This is the only Roman example of mummification known to date. Ascenzi and his co-workers carried out an interdisciplinary project on the Grottarossa mummy, which involved traditional anthropological and paleopathological studies, as well as modern medical exams, such as X-ray of the teeth, CT scan imaging, sampling of tissues using CT-guided needle biopsies, regular light and electron microscopy, chemical analysis of embalming materials, pollen analysis, and study of textiles, jewelry and funerary items that accompanied the mummy. The results demonstrated that the body had been treated using a method typical of Egypt's Roman Period. The body preserved brain and internal organs, showing that excerebration and evisceration had not been performed. The body and dressings were spread with resin, responsible for the brownish colour of the skin. No traces of natron or bitumen were detected. The paleopathological research showed that the girl had suffered from infection or malnutrition episodes, as evidenced by the Harris' lines, from osteopenia, an-thracosis, and that she had died as a result of a bilateral fibrinous pleuritis of uncertain nature. The presence of textiles suggested that the mummification was performed in Italy following the Egyptian style<sup>37 38</sup>.

## The place of Ascenzi in Italian Anthropology and Paleopathology

For the fundamental nature of his contributions to the Italian Paleopathology, Ascenzi (Fig. 2) can be rightly considered the founder of modern Paleopathology as an autonomous discipline in Italy. Ascenzi was an eclectic researcher, a passionate experimenter and an illuminate teacher, who combined his profound knowledge of Morbid Anatomy to the study of the diseases in past populations. His interests in Paleopathology covered many fields, from osteoarchaeology to anthropology and mummiology. He applied the scientific method to the discipline rigorously, exploiting the medical techniques, such as radiology, electron microscopy, histology and histochemistry, in the study of ancient human remains. He did not hesitate to use experimental archaeology to explain certain phenomena and to obtain answers. We would like to conclude this tribute to Ascenzi by mentioning some aspects of his personality. He was a reserved person who detested adulation and was driven by a passion for search of scientific truth. He combined strong intuition and high rigor, which are crucial qualities for successful fundamental research. Additionally, his devotion and love for the work of the physician emerges from various episodes of his life. He felt that it was his duty as a physician to help the population of Albano Laziale where he resided during World War II. Working tirelessly, Ascenzi made up for the lack of medical assistance for many months, distinguishing himself for his spirit of abnegation and competence. In the years that followed, the City Council of Albano Laziale awarded him a gold medal for valor and freedom of the city, a recognition that he most appreciated.

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