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NON MASTICATORY DENTAL LESIONS IN THE STUDY OF BIOLOGY AND BEHAVIOUR OF ANCIENT POPULATIONS: THE CONTRIBUTION OF THE STEREOMICROSCOPY AND SCANNING ELECTRON MICROSCOPY

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The analysis of the human skeletal remains of archaeological samples plays a leading role in bio-archaeological research. In fact, skeletal features are determined both by genetic and "environmental" factors - diseases, diet and alimentary habits, etc. The study of human bones and teeth enables us to discover socio-economic conditions as well as hygienic practices of ancient populations.

Besides bio-archaeological research, the human skeleton remains are also relevant in forensic anthropology. Forensic anthropology studies human parts (bones, teeth and tender parts) in a legal setting. This aims at answering definite questions asked by legal authorities (for instance to identify individuals), most often in criminal cases where the victim's remains have turned into a skeleton.

Despite these two disciplines appear to be very different, they are quite similar as they share the same investigation methods. Forensic anthropology borrows methods from physical anthropology and applies them to cases of forensic relevance. Its methods can be used to assess age, sex, stature and study trauma and diseases.

As concerns teeth, as they are not shaped or modified by time, they bear evidence of the different events (pathological and not) of a human being. Moreover, as they are made of tissues rich in minerals, teeth are the part of the skeleton that is best preserved over time and in the most different burial places. Therefore, studying teeth provides useful information to reconstruct many biological and cultural aspects such as health and nutrition state, the individual and collective habits and the life style of prehistoric, ancient and modern populations.

Besides their masticatory functions, teeth have always been used in non-masticatory functions both in para-masticatory activities, such as softening food and preparing it before eating and in extra-masticatory activities *sensu strictu*, such as activities ranging from tooth-tool use to the use of teeth as a third hand. Masticatory and non-masticatory functions could produce non-intentional alterations on enamel and dentine either per continuous and important levels of stress, or per accidental occasional traumas (kind of feeding, behaviours, individual habits and working activities, etc.).

Beyond accidental lesions and natural wear, artificial modifications of teeth may be observed – they are intentional alterations of teeth like voluntary mutilations or cultural deformations. They have been largely described in populations world-wide and of every time and they are a widespread practice which may reflect individual or collective habits.

This study is focussed on these investigations. It deals with masticatory alterations (chipping) and non-masticatory ones (occlusal and interproximal groove, notch, anomalous wear) of teeth belonging to skeleton remains from several necropolises, found in different areas of Italian territory (Emilia-Romagna, Marche and Molise), dating back to the Iron Age, the Roman Age and the Early Middle-Age.

Through the analysis of such features, this study aims at reconstructing the behaviours of the single individuals and groups observed, concerning the use of teeth in masticatory and

non-masticatory activities, the intentional alteration of teeth, possible contemporary geographical modifications and possible changes occurring over time. Therefore, a period from the Iron Age until the Early Middle-Age has been studied. Have social, cultural and geographic changes affected the biology and behaviour of Italian ancient peoples in relation to their non-masticatory dental functions? That is what I am going to discuss about.

In particular, taking into account anterior teeth are the most important from an aesthetic point of view as they are well visible, I am going to find out if and how anterior teeth received special "cares" – for instance on occasion of initiation ceremonies and rites, or to aesthetic, therapeutic ends, etc., or to avoid or decrease actions leaving more or less serious permanent damage to teeth).

The purpose of this study is to verify, through the analysis of the dental masticatory and non masticatory alterations of the teeth belonging to skeleton remains from several necropolises, found in different areas of Italian territory (Emilia-Romagna, Marche and Molise), if and how the social and cultural transformations, and the changed relations with the territory happened in the Italian territory from the Iron Age to the Early-Middle Age period, have had an influence on the biology and on the behaviour of these ancient populations, possible contemporary geographical modifications and possible changes occurring over time.

The masticatory dental alterations (chipping) and the non masticatory dental ones (occlusal and interproximal grooves, notch, unusual wear) have been studied with the contribution of the light microscopy (Stereomicroscope, Mod. Zeiss Stemi 2000-C) and of scanning electron microscopy (SEM, Mod. Jeol SEM JSM 5200).

Therefore, I'm going to find out, if and how, the social and cultural transformations and the changed relations with the territory happened in Italy from the Iron Age to the Early-Middle Age period, have had an influence in relation to not-masticatory dental functions in these ancient populations, both in relation to the use of the teeth in masticatory and not-masticatory activities and to the intentional alteration of teeth.

PART I

A. Teeth in anthropological research

Teeth analysis plays an important role in anthropological research. In fact, dental features are determined both by genetic and "environmental" factors (diseases, diet and alimentary behaviour, etc.). Moreover, teeth do not go through shaping or repairing processes. For all these reasons, teeth are a rich "archive" which tell us about health and nutrition state, individual and collective ancient and modern populations habits and life style (Powell, 1985; Moggi Cecchi & Corruccini, 1993; Milner & Larsen, 1991b).

It should be born in mind teeth are the part of the skeleton which is best preserved in time, also after million years. That's because they are mainly made of **mineralized tissues** (the enamel covering the crown consists of a mineralized part, hydroxyapatite, for over 95%). This protects teeth against important modifications over time (Moggi Cecchi & Corruccini, 1993), and makes them resistant against the destructive effects of being buried in the earth for a long time (Hillson, 1996). Archaeological samples show enamel is poorly damaged in the most varied burial conditions and places (Hillson, 1996). Enamel capsules covering the crown are sometimes the only remains of the body, though enamel is lost in very acid earth where some organic remains of dentine may instead be preserved (Beeley & Lunt, 1980), (Stead *et al.*, 1986). Following cremation, the enamel of teeth that have come through is quickly consumed, but teeth that have not come through yet are protected by their bone capsules and their enamel layer may be preserved (McKinley, 1994).

Many investigations can be carried out on teeth.

For example, **morpho-structural studies** describe teeth morphology (shape, structure and dimensions) and take into account metric and non-metric characteristics.

Teeth morphology is specially relevant because it is closely related to genetics. While it is developing, a tooth is scarcely affected by external factors and when calcification starts, a definite shape is given (Moggi Cecchi & Corruccini, 1993). Therefore, teeth are not largely influenced by external factors during their growth. This aspect, as well as the wide morphology variation range, makes it possible to find out if different individuals belong to the same family or not. It also makes it possible to discover to what extent genetic influence varies. Moreover, as such characteristics can be found both in living individuals and fossil samples, they can be used not only to record familiarity relationship within a group, but also to study human phylogeny (Moggi Cecchi & Corruccini, 1993).

Teeth morphology is studied under 2 different aspects:

- Metric characteristics provide records on teeth size by manual or digital calypters. Comparative studies have been using records on length and width of the crown for a long time now (Moggi Cecchi & Corruccini, 1993). Such measurements can be taken both from present-day and ancient populations and show the way individuals are distributed in a group, what sex they are and modifications over time. Many studies carried out on human present-day and ancient populations have pointed out sexual dimorphism as regards metric

characteristics of teeth. In comparison with other primates (like the big apes), dental dimorphism for *Homo* genus is much less relevant, but it is evident especially in canines (Hillson, 1996). In most human present populations, (Garn *et al*., 1967d), lower canines show the highest degree of dimorphism (7,3 %), followed by upper canines: they are bigger in males than in females. Moreover, in the course of human evolution, a steady decrease in the volume of teeth can be observed – especially canines and incisors that are on the same level as other teeth – and also in the dimensions of premolars and molars. It is also to be pointed out the number of teeth tends to decrease – the III° molar has disappeared or has been reduced. These evolutionary trends are closely related to general modifications of facial bones: upper and lower jaws become less prominent, the palate is shorter and wider, dental arches are curved like a parabola and not like a U as is the case with Anthropoids (Brace, 1967; Brace, 1979; Brace, 1981; Brace, 1995; Brace and Molnar, 1967; Brace and Mahler, 1971; Wolpoff, 1971; Wolpoff, 1979; Wolpoff *et al.*, 1981; Wolpoff, 1996; Facchini, 1995)

• Non-metric characteristics include some features called discontinuous, epigenetic or discrete. They provide information mainly on the shape and the structure of teeth and they are detected by a standard method in the United States: Arizona State University Dental Anthropology System (ASUDAS) (Scott & TurnerII, 1988). For example, a special shape of incisors is observed ("shovel shape"; "peg shape"; "barrel shape"), or special structures on incisors, canines and premolars are reported or also an exceeding number of cusps on molars or the agenesis of one or more teeth. The frequency of different kinds of pattern varies according to the different human populations. Therefore, discontinuous characteristics are used by anthropologists as "genetic markers" both for living and for ancient populations, as their frequency is different in the different groups. Non-metric morphologic dental characteristics have a big advantage over other kinds of genetic markers, like blood groups: they can be detected more easily (Moggi Cecchi & Corruccini, 1993).

Another kind of investigation is concerned with the **development and eruption of teeth and the wear of masticatory surfaces in respect with the estimated age of the individual**. As a matter of fact, studying the development phases of teeth and assessing the wear of chewing surfaces make it possible to estimate the age of sub-adult and adult individuals respectively.

Estimating the age and determining sex are the basis not only of paleo-demography, but more generally, of anthropological studies. Sex and age are biological characteristics of primary importance, both to determine the individual's other biological features and to set him properly in the social structure of his group (Ubelaker, 1989; Buikstra & Ubelaker, 1994).

Several methods can be used to assess the presumed death age.

In case of growing-up young individuals, in order to assess death age, it is necessary to study the phases of tooth formation, development and eruption sequence of deciduous and permanent teeth (Moggi Cecchi & Corruccini, 1993). The results of this study are worthy also in paleodemography because they provide quite accurate information about child mortality,

this being an outstanding parameter for quality of life of a given human group (Ubelaker, 1989).

In case of adult individuals (completely grown-up), the techniques to assess age cannot be based any longer on teeth development phases. They are based on the different wear of teeth chewing parts. However, if for young individuals assessing death age by observing sequences and chronological intervals of teeth development involves few mistakes (as is shown by the studies carried out by Ubelaker (1989) on American Natives), for adult individuals, instead, a larger number of difficulties is registered. As a matter of fact, assessing the age through the analysis of the wear of occlusal surfaces leads to a higher number of mistakes (as can be seen from the application of this method by Lovejoy (1985) on a prehistoric population of American Natives from Ohio). It should be taken into account wear is also strongly determined by the kind of diet, food preparation, eating habits and food consistency, as well as by the non-alimentary usage of teeth. Therefore it is more difficult to estimate death age in adults because the processes of degeneration to be studied are less regular and may vary a lot according to different individuals. Although it is accepted that a connection exists between wear and age, a number of cultural factors, mainly relating to alimentary habits, affects this connection and makes it rather misleading. (Ubelaker, 1989). Within the same population, it is possible to try to assess age, previously fixing some other marker, (Zuhrt, 1955), but a lot of individual variations may occur even within the same group. Wearing process may be slowed down due to weaker chewing in old age or by some asymmetry of different origins (Ubelaker, 1989). When studying different populations, some problems arise: if tough kinds of food or foods containing many fibres or abrasive particles are largely eaten by the members of a group, the chewing surfaces of their teeth will be stressed more than the teeth of people eating more tender foods. That is why different wearing may be observed in individuals belonging to different populations but of the same age (Ubelaker, 1989).

In any case, the point is not to determine the exact age of each individual. On the contrary, it is useful to fix age categories and place each individual in one of them. The lager it is, the least accurate the diagnosis is (Ubelaker,1989).

The investigation on **structural defects** observed on the outer layer of teeth (mainly around the mouth) plays an important role, too.

By structural defects of enamel (such as hypoplasia, hypocalcification, fluorosis), we mean all the defects due to an alteration of the ordinary processes of enamel development that can derive from different kinds of stress (malnutrition, undernutrition, diseases) occurring while enamel is developing.

When enamel is developed, it is not re-shaped any longer and its defects, if any, last for the whole life. That's why the analysis on such characteristics is often carried out in the research on prehistoric and ancient populations as it makes it possible to discover kinds of strain caused by different factors – as a matter of fact, a great deal of information about the type of diet (kind and amount of food), health and quality of life of the examined individuals is provided by analysing enamel defects.

Studying the teeth of ancient populations also enables us to carry out research about dento-alveolar pathologies and alterations and, more generally, on epidemiological aspects, paleonutritional and paleodemographic from which life conditions in ancient times can be reconstructed (Kelly e Larsen, 1991). A pathologic condition may be considered as an answer given by the individual to environment situations (broadly speaking). Therefore, from the study of diseases, through the analysis of their causes, you can go back to the ecological situation that determined them (Moggi Cecchi & Corruccini, 1993).

Therefore it is obviously very interesting to study the tooth diseases that, for their nature and causes, witness a **usage of teeth closely linked to eating and chewing**. Chewing is the physiological function preliminary to swallowing that consists of using teeth to crush and grind food and mix it with spittle. As teeth are the structures present in the mouth area specialized and differently shaped for chewing, the repeated contact with foods having different consistency, chemical composition and preparation may cause the onset of modified physiological characteristics of teeth. Once teeth have developed inside the mouth area, as they are in direct contact with external environment, they undergo mechanical, chemical, physical and pathogenic strains (because of the proliferation of micro-organisms such as decay bacteria) and they are all strongly affected by alimentary factors (Powell, 1985).

The analysis of alimentary wear, caries, abscess and ante-mortem tooth loss in ancient populations, makes it possible to reconstruct the kind of diet, for example the quality of eaten food and food-preparation techniques. It enables researchers to reconstruct the life style of examined populations and describe the socio-cultural changes that mankind has undergone through history.

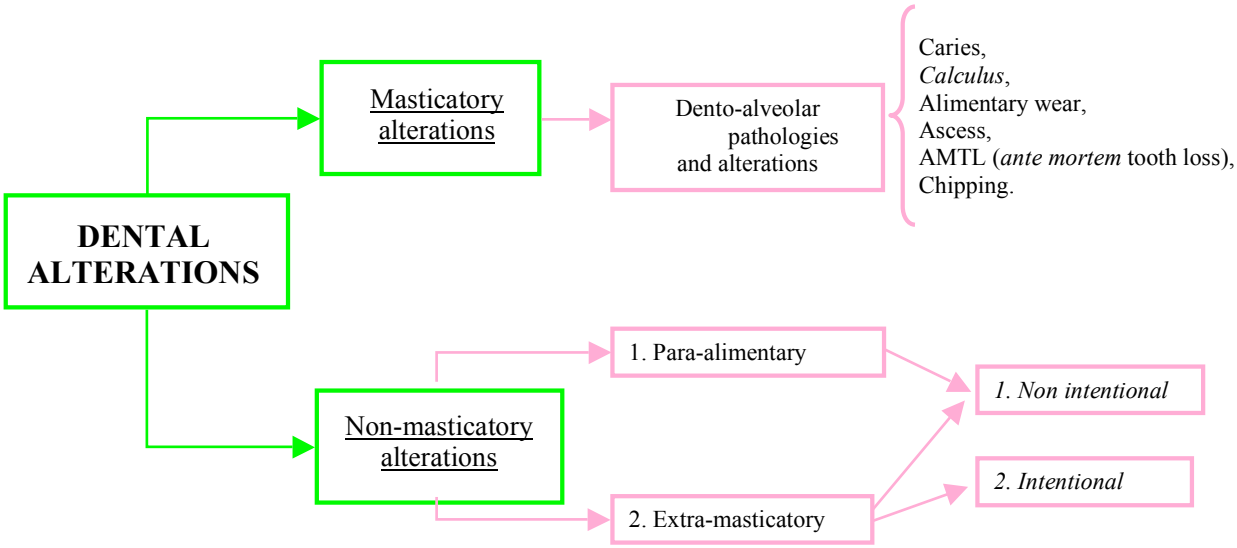
Another kind of investigation deals with **non-masticatory dental alterations**, that is all those alterations caused by activities and/or cultural/individual habits that are not linked to chewing.

As non-masticatory functions, we could take in account both para-alimentary functions (preparation and processing food before consumption), and extra-masticatory functions ranging from tooth- tool use to the use of the teeth as a "third hand" in relation to personal and individual habits and/or daily craft activities (tanning hides, processing materials such as sinews for bow strings or plant fibres for cordage or basketry, keeping objects with teeth, etc.) (Molnar, 1972; Larsen, 1985; Milner & Larsen, 1991; Larsen, 1997; Alt & Pilcher, 1998; Minozzi et al., 2003).

All these masticatory and non-masticatory functions could produce non-intentional alterations on enamel and dentine both per continuous and lengthy levels of stress, and per accidental occasional traumas (kind of feeding, behaviours, individual habits and working activities, etc.). Therefore, studying non-masticatory dental alterations can be ranked among the study of activity markers. (Bonfiglioli, 2002; Belcastro *et al.*, 2004).

Moreover, intentional teeth modifications can also be produced for aesthetic (Ubelaker, 1989), hygienic and cosmetic reasons (Pedersen, 1979; D'Errico *et al.*, 1988; Cox *et al.*, 2000) for therapeutic and/or palliative treatments (White *et al.*, 1997; Coppa *et al.*, 2006;

Borgognini Tarli and Repetto, 1985; Puech and Cianfarani, 1988; Turner, 1988; Frayer, 1991) such as toothpick use, the use of prosthesis-anchorage devices or swinging-teeth fixing (Micheloni, 1976; Alt and Pichler, 1998).



Tab.1-Dental alterations

To have a more detailed description of this kind of alterations, see Part I, Chapter C.

Analysis on teeth plays a major role especially as concerns **forensic investigations**.

Forensic anthropology, according to the American Board of Forensic Anthropology, is the application of the science of physical anthropology and human osteology (the study of the human skeleton) in a legal setting, most often in criminal cases where the victim's remains are more or less skeletonised. A forensic anthropologist can also assist in the identification of deceased individuals whose remains are decomposed, burned, mutilated or otherwise unrecognizable. Forensic anthropology borrows methods developed from the academic discipline of physical anthropology and applies them to cases of forensic importance. These techniques can be used to assess age, sex, stature, ancestry, and analyze trauma and disease.

Forensic anthropologists frequently work in conjunction with forensic pathologists, odontologists, and homicide investigators to identify a decedent, discover evidence of trauma, and determine the postmortem interval. Forensic dentistry or Forensic odontology is the proper handling, examination and assessment of dental evidence, which will be then presented in the interest of justice. The evidence that may be derived from teeth, is the age (in children) and identification of the person to whom the teeth belong. This is done using dental records or ante-mortem (prior to death) photographs.

For example, radiology plays an important role in forensic identification (Brogdon, 1998). Radiological identification, most typically by the use of dental radiography, is based on the comparison of *ante mortem* (am) and *post mortem* (pm) images and is often a valuable alternative to fingerprinting and DNA identification. Of course, individual radiological characteristics can allow positive identification only if am radiographs exist for comparison. In mass casualty situations with, e.g., charred bodies with only calcified bones left, radiographic comparison is often the only viable way when classical identification methods prove futile (Thali et al., 2002; Thali et al., 2003; Thali and Vock., 2003). Dental identification uses the teeth, jaws, and orofacial characteristics in general as well as the specific features of dental work with metallic or composite fillings, crowns, bridges, and removable prostheses as well as distinctive configuration of bony structures of the jaw (mandible and maxilla), the presence and shape of teeth including the roots, the configuration of maxillary sinuses, and longstanding pathology, such as prior fractures and orthopedic procedures (Abrahams, 2001; Fixott, 2001a; Fixott, 2001b; Fixott *et al*., 2001; Gahleitner et al., 2003).

Classical methods for forensic dental identification are the clinically used radiological documentation techniques such as dental periapical radiographs, bitewing films, and panoramic tomographs (OPTs). A novel method in dentism is computerized tomography (CT) of the teeth. Until some years ago, radiographic imaging using the classic axial and coronal CT views of the mandible and maxilla was difficult because of superimposition of dense teeth and dental streak artifacts from dental restoration. Newer dental CT reformation software allows reformatting axial images to multiple panoramic and periapical views (Cattaneo, 2004; Michael *et al.*, 2006; Cameriere *et al*., 2007)

In conclusion, the numerous studies briefly reported above show how, from a series of characteristics of teeth, it is possible to derive various informations. They are useful to reconstruct everyday life and cultural habits which, from the appearance of genus Homo, in prehistoric, ancient and present populations have proved and prove the adapting skills to different kinds of environment.

B. Some hints on the anatomy of teeth

The basic elements of life, that is those necessary to survive – food, water, oxygen – enter our organism through the mouth, a cavity which is also capable of producing sounds and where the sense of taste is placed. Besides breathing, chewing ranks among its leading functions as regards survival and health. As a matter of fact, food is chewed to obtain simpler substances from which nutritive elements are then absorbed.

Teeth play a major role in the chewing system. They are set in the alveoli of upper and lower jawbones and are closely linked to all the other parts of oral cavity. However, despite gums, tongue, lips and submaxillary glands are very important, teeth are the structures (ectodermic, typical of vertebrates and concerned with chewing) studied by some branches of paleobiology, as soft tissues are not generally preserved.

From an anatomycal point of view, a tooth is composed of: **crown** (the part sticking out of the gum), **root** (inside the alveolus, joining the tooth to the inner bone layer) and **neck** (junction between the two parts) (**Fig. 1**).

The tissues teeth are made of have different characteristics.

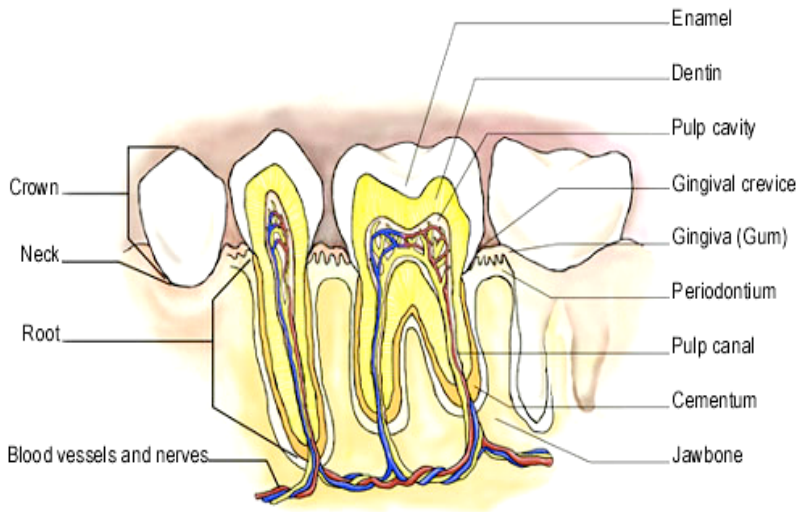


Fig. 1: mesio-distal section (vestibular prospect) of a part of the left hemi-arch .

- **Enamel** covers the crown entirely, so it is affected by all what takes place inside the oral cavity. It is ectodermic and by 96% it is made of minerals (hydroxyapatite can be found in its cellular matrix) and by 4% it is made of organic matter and water. Its mineral composition and the crystalline arrangement of mineral salts make it the hardest tissue of

the whole organism, but it is also fragile and subject to erosions. It stops developing when the tooth has erupted and its thickness may vary from 2-2,5 mm on the top of a cusp or on the incisor's edge to a very thin layer on the neck. It is interesting to note that, once definitely developed, enamel is a non-vital tissue so it will not be replaced or repaired.

- **Primary dentin** forms the root and in the crown it is the supporting structure on which the enamel develops. It is mesenchimatic and less hard than enamel, but harder than bone and envelops the pulpar chamber. It is a vital tissue, so much that the odontoblasts producing it remain living inside the pulpar chamber and develop cytoplasmatic projections inside the tubules of the dentin following it through its thickness. In case of exposing dentin, if infections or caries do not occur, **secondary dentin** may be formed, harder than primary dentin. It prolongs the tooth life and protects it in case of minor traumatic injuries.

- **Cementum** is a calcified substance covering the root of a tooth and it is not very thick (0,02-0,2 mm). It meets the enamel lower on the tooth at the Cement Enamel Junction (CEJ) (cfr. Hildebolt & Molnar, 1991; Hillson, 1996; Türp & Alt, 1998). It is softer than dentin and its chemical makeup is similar to that of the bone, but it lacks vascularization and cannot be reshaped.

Periodontal ligaments (fibrous collagen bundles) are attached to cementum and fix the root – so the tooth – to the alveolus. They permit some physiologic flexibility and protect the tooth in case of small strokes. Therefore enamel, dentin and cementum are differently mineralized, whereas the **pulp** is a soft, non-specialized, connective tissue supplying nourishment through vascular-nervous peduncle.

The tooth supporting structure is formed not only by **cementum** and **periodontal ligament**, but also by

- gum: keratinized epithelium surrounding the physiologic neck of the tooth, different from the anatomic one, as in ordinary conditions the physiologic neck covers it;

- **alveolar bone**: spongy bone covered by periosteum, looking like a cribriform plate on the alveolus to let vessels and nerves go through. It holds the tooth in the place.

Teeth are set in two arches, an upper jaw (maxilla) and a lower jaw (mandible). Each of them is divided into two parts by the median sagittal plane, because each of them derives from two ossification centres. Therefore they have four specular quadrants (upper right specular to upper left, lower right specular to lower left).
In each of them different kinds of teeth are placed*:* incisors, canines, premolars (in the adult) and molars. As a matter of fact, mammals – including mankind – are heterodont and diphyodont, as they develop two dentitions, "**primary**" or "**deciduous**" or "**milk**" teeth (20 teeth) and "**permanent**" or "**adult**" ones (32 teeth) (**Fig. 2**).

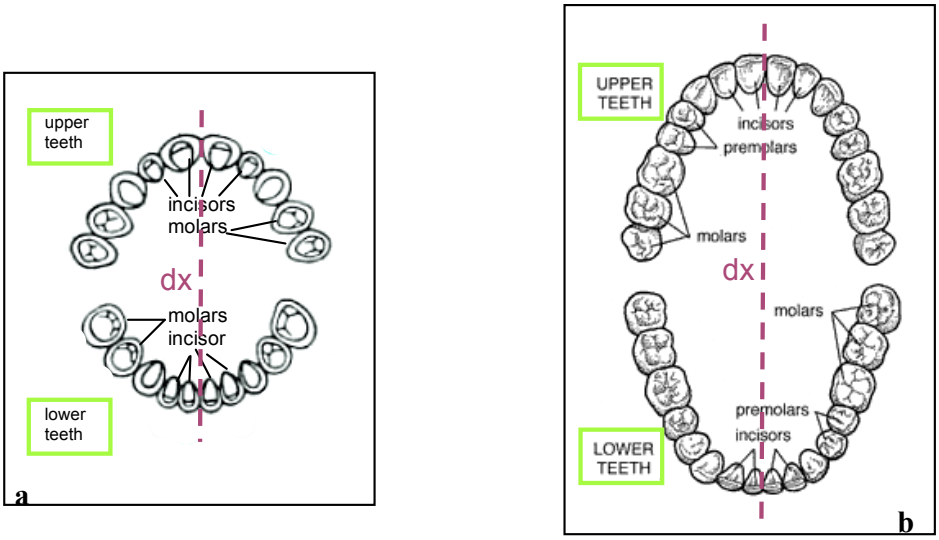


Fig. 2: a. deciduous teeth; **b.** permanentteeth.

It is important to point out the difference between dentition and set of teeth, valid for all vertebrates.

Dentition is a dynamic process and includes all the phases leading to the replacement of the tooth – when it is formed inside the gum, it is mineralized, it grows and erupts, it gets old and is replaced. By set of teeth we mean a static situation, the whole of teeth present at a certain time in the oral cavity (Lautrou, 1987). The succession of the two dentitions gives rise to three sets of teeth in man:

- deciduous teeth (from 6 months to 6 years approximately), made up of 20 milk teeth: 2 central incisors, 2 lateral incisors, 2 canines and 2 molars (first and second) per each arch;

- co-existing teeth (from 6 to 11-12 years approximately), made up of a variable number of teeth, both milk and adult ones;

- permanent teeth (from 11-12 years on) made up of 32 permanent teeth: 2 central incisors, 2 lateral incisors, 2 canines, 2 premolars (first and second) and 3 molars (first, second and third) per each arch (cfr. Ubelaker, 1989).

Different ways are used to describe the anatomic arrangement of human teeth. This report uses the symbols shown in the following table for permanent teeth (**Tab. 2)**:

Upper or lower central incisor	I1 upp or low
Upper or lower lateral incisor	I2 upp or low
Upper or lower canine	C upp or low
First and second upper or lower premolar	P1, P2 upp or low
Fist, second and third upper or lower molar	M1, M2, M3 upp or low

Tab. 2:

➢ Anthropologists use the above terms whereas paleontologists report about third and fourth premolar (P3 e P4), because they refer to the two phylogenetically-left premolars out of the four premolars typical of ancestral mammals.

Teeth are the most specialized structures in the oral apparatus. That is why the shape and the characteristics of each kind of tooth aim at carrying out different functions. Chewing is firstly connected with teeth and in response to this function crowns are differently shaped. Therefore mammals are heterodont.

Incisors have no cusps, but an incisor's edge. Together with canines they are front teeth and they hold, cut and break up food. Facial beauty and look, as well as articulating some phonemes also depend on them.

Canines have two sharp edges joining in the cusp apex. They are used to tearing up.

Premolars originate from the second dental plate and replace milk molars. Together with permanent molars they are back or jugal teeth and are used for connecting the functions between canines and molars. The first premolar, having sharper cusps, cuts together with the canine, whereas the second one, having flatter cusps, grinds food up like molars.

Molars originate from the first dental plate and do not replace any deciduous teeth. Their occlusal area is large and formed by some flat cusps. As their name suggests, they are used for grinding and crushing food (N.d.T. "molar" derives from the Latin "mola", grinding machine).

C. Mechanisms, Models and Meaning of non-masticatory alterations

1. Mechanisms

Tooth is an organ capable of reacting quite easily to the numerous habitat strains. After tooth eruption, the mechanisms altering hard tissues (enamel and dentine) using and wearing them are reported to by British authors as *attrition*, *abrasion and erosion*. In some degree, they are regarded as physiological and they increase with the years. From a clinical point of view, it is necessary to stress the difference among the three for therapeutic reasons, but it is difficult to find out one single cause (cfr. Eccles, 1979; Tuominen, 1991; Nunn *at al.*, 1996; Bell *at al.*, 1998; Bishop & Deans, 1998), although the health, alimentary and working conditions of the individual are well known. Despite these mechanisms are quite different, they do not attack the tooth separately. Indeed, because of the different origins of the examined alterations, it is hard to go back to the single mechanism. (Tuominen *at al.*, 1991; Gallien *at al.*, 1994; Imfeld, 1996). Even more, bio-archaeological studies, dealing with skeletal remains, cannot easily detect their causes.

Abrasion originates from the mechanical action of objects repeatedly introduced into the mouth and from chewing, as teeth and food get in contact. Imfeld (1996) considers it useful to distinguish the two different causes, calling them *abrasion* and *demastication* respectively. In the former case, abrasion may be due to a particular working activity or to the way tooth-tool is used. In the latter case, it has always been reported (Molnar, 1972) tooth destruction is mainly due to the tough or fibrous nature of foods (Smith, 1972, 1984; Van Reenen, 1992, Molnar *at al.*, 1993), to the higher or lower amount of abrasive or exogenous particles (Dahlberg, 1960; Brothwell, 1963; Wolpoff, 1971; Puech, 1979; Peluso, 1980; Powell, 1985; Martnady & Rose, 1991) and the ways foods are prepared (Smith, 1972).

Attrition – occlusal and interproximal – originates from direct contact among teeth, not with food or other substances. This happens as an ordinary consequence of speaking, swallowing, raising heavy objects (physiological attrition), following special attitudes or occlusal defects including really pathological movements of arches (physiological attrition), as for example bruxism (Xhonga, 1977; Deltmar *at al.*, 1987; Catapano, 1990; Khan, 1998).

By ***erosion*** we mean the destruction of tooth hard tissues by chemical dissolving, when pH inside the oral cavity is below 3.7 (Rytömaa *at al.*, 1987). This term may sometimes be replaced by corrosion or, even better, by both of them: "erosion/corrosion". The first term gives the idea of a dynamic process, whereas the second one points out the biochemical mechanism of the dissolving acid (Grippo, 1995). Different causes may exist – too much fruit, especially citrus fruits – orange juices or other acid drinks (Halloway *at al.*, 1958; Boyes, 1959; Huckelbery & Himasohn, 1966; Allan, 1967; Lewis & Smith, 1973; Eccles & Jenkins, 1974; High, 1977; Eccles, 1979, 1982; Reuter, 1978; Smith & Knight, 1984; Lussi *at al.*, 1991; Künzel *at al.*, 2000; Hunter *at al.*, 2000; Moazzez *at al.*, 2000), vino (Brinton, 1997; Chaudhry *at al.*, 1997; Wiktorsson *at al.*, 2000; Gray *at al.,* 1998), medicines or sweets (Lewis & Smith, 1973), acid industrial substances (Boyes, 1959; Malfatti, 1984; Smith &

Knight, 1984; Tuominen *at al.*, 1989; Petersen *at al.*, 1991; Tuominen *at al.*, 1990; Skogedal *at al.*, 1997), overflowing liquid and chronic vomit (Howden, 1971; Eccles & Jenkins, 1974; Eccles, 1979, 1982; Smith & Knight, 1984; White *at al.*, 1978; Jones & Cleaton-Jones, 1988; Robb & Smith, 1990; Robb *at al.*, 1991; Bishop & Deans, 1998*),* gastroenteric reflux and duodenal ulcer (Allen, 1969; Jarvinen *at al.*, 1988).

Considered the above, Eccles (1982) proposes the phrase "tooth surface loss" including the three mechanisms, pointing out this process develops without the action of the bacteria contained in dental plaque.

Imfeld (1996) introduces two other terms to express re-absorption processes: roots that are reabsorbed in deciduous teeth or, as a consequence of a trauma, both in deciduous and in permanent teeth. "Abfraction" refers to wedge-shaped alterations at CEJ, and further investigations are necessary to fully understand them.

In accordance with Wallace (1974), Smith & Knight (1984) e Larsen (1996), from now on only one all-inclusive term will be used: **dental wear**.

2. Models

Alimentary wear is a physiological process occurring while teeth are chewing – the above-reported abrasion and attrition obviously take place at the same time. Many authors focussed their studies on assessing the age on the basis of tooth wear (Murphy, 1959a, 1959b; Miles, 1963, 1978; Brothwell, 1981; Lovejoy, 1985), whereas other authors tried to reconstruct alimentary habits and habitat. In any case, the characteristics of the diet of a population cannot be fully understood apart from the effect age has on tooth wear. As a matter of fact, wear is affected by age, because older individuals result to have been exposed to attrition and abrasion longer than younger individuals. Once more, it is important to take into account some complications – wearing process slows down after the eruption of the second and third molar and as a consequence of lower chewing strength in old age. (Brothwell, 1981).

What is very important to know, however, is not the total amount of the worn material, but the rhythm of the wearing process, determined by different kinds of diet. (Murphy, 1959a, 1959b). To assess it, it is necessary to know the age of the individuals, often impossible to determine, especially if the examined skeletal remains are pubic symphysis or auricle, in most cases unusable.

However, using standard reports based on the simple description of the quantity of worn material, (Walker, 1978; Scott, 1979a, 1979b; Smith, 1984; Bouville *at al.,* 1985; Walker *at al.*, 1991), a change was remarked – the passage from hunting and picking economy to farm economy modified alimentary habits and food preparation techniques. Differences concern tooth inclination – hunters-pickers had flat-orientated teeth as they chewed tough and fibrous foods, farmers had inclined teeth as their diet consisted of crumbled and treated foods (Smith, 1984) . Differences also concern the quantity of worn material, as it is reported to be decreasing with the years. In modern populations it is much less marked than it was in fossils or primitive groups. As a matter of fact, highly-refined foods, lacking of

abrasive particles, were more and more largely used (Greene *at al.*, 1967; Brace *at al.*, 1991; Newesely, 1993; Sciulli, 1997), and this was emphasized mainly around XVIII and XIX centuries (Lavelle, 1970; Kerr, 1988; Kaifu, 1999).

Interesting information can be derived from studying the alterations of wear patterns caused by **non-masticatory use** of teeth.

Since the appearance of genus *Homo*, masticatory system has also carried out non alimentary functions as it has been used both in para-alimentary activities (preparation and processing of food before eating it) and extra-masticatory activities, (or non-masticatory *sensu strictu*) ranging from tooth-tool use to the use of the teeth as a "third hand" in relation to personal and individual habits and/or daily craft activities (tanning hides, processing materials such as sinews for bow strings or plant fibres for cordage or basketry, keeping objects with teeth, etc.) (Molnar, 1972; Larsen, 1985; Milner & Larsen, 1991; Larsen, 1997; Alt & Pilcher, 1998; Minozzi et al., 2003).

Enamel and dentin alterations, besides those referred to as "alimentary wear", can be distinguished into two kinds: (**a**) **intentional** and (**b**) **non-intentional or accidental** (due to traumas and to repeated actions).

a) By ***intentional alterations*** of teeth (leaving aside considerations on therapeutic measures both present and past), we mean voluntary tooth mutilations through filing, carving and/or setting of precious stones (jadeite, turquoise or even gold) aiming at giving the tooth the most various shapes. Apart from natural wear, artificial modifications of teeth are a widespread practice and may reflect individual or collective habits (Alt and Pichler, 1998). They have been observed both in men and women, usually on front teeth, mainly upper incisors, bilateral or not.

Romero (1970) classified in detail what was observed on prehistoric Americans, finding three possible positions of alterations: incisor's edge, mouth surface and the combination of these two, totalling 59 different kinds of mutilations. This practice registered some negative effects: damaged soft tissues or changed position of teeth as adjacent teeth lost their junction points, but infections within the pulp were seldom observed (Walker, 1989).

These alterations were found together with tattoos on faces and bodies (Jones, 1992) and they were mainly due to aesthetic purposes. (Milner & Larsen, 1991). Other purposes were: marking individuals belonging to a given group or a caste, showing their social status or representing an initiation moment. Some examples were found in Africa – referred to skeletal samples and present-day human groups – Asia and Mesoamerica. Apart from Romero (1970) and Willey & Ubelaker (1976) who take into account prehistoric populations, the findings in America belong to Negroid individuals who reached these areas following the slave trade (Ortner, 1966; Stewart & Groome, 1968; Handler *at al.*, 1982).

Avulsions are a particular kind of alterations, that is intentional extractions of tooth, especially permanent upper incisors. Age varies according to different groups (according to Fermbach (1962), it ranges from 8 to 11 years for Taforalt Mesolithic sample for which Bonfiglioli *et al.* (2004) notes that the particular distribution of chipping, notches and

interproximal grooves within the dentition could be related to avulsion of the upper central incisors: the functions of the anterior teeth (cutting and tearing portions of food while eating, holding objects, etc.) would have shifted to the posterior teeth.). The reason for this practice probably lays in a ceremony to celebrate the passage of age (Ferembach, 1962; Collins & Coock, 1981; Jones, 1992; Tayles, 1996) or in the attempt to avoid children fever (Pindborg, 1969). When skeletal samples are examined, the presence of avulsions cannot be demonstrated easily. As a matter of fact, one tooth may be missing because of agenesis, caries and abscess (causing such a big damage that the tooth is lost) or to accidental traumas. However, some criteria should be born in mind in order to evaluate the case properly. For example, it is useful to assess the space between two teeth which seem to be adjacent, find out the possible presence of abscesses or determine the position of a missing tooth and how many are missing.

b) ***Non- intentional alterations*** are accidental lesions. They are not produced intentionally and can be regarded as consequences of various chemical-physical and mechanical stress factors, that is strictly masticatory and non-masticatory usage of teeth. Traumas may also be originated by isolated events or customary actions repeated in time.

In particular, when non-intentional alterations are due to isolated events, teeth are more or less seriously injured and enamel or dentin are chipped (in the worst cases they present real fractures) (Turner & Cadien, 1969; Milner & Larsen, 1991; Bonfiglioli *et al*., 2004; Belcastro *et al.*, submitted). In this case, the term is "chipping" or "pressure chipping" because they look like the intentional chipping of lithic handmade objects. These traumatic lesions usually develop vertically, the part where enamel has chipped off is narrow, sharp, straight, starts from the incisor's edge and turns to CEJ. Larger lesions are irregular fragments that may involve the whole tooth surface reaching the root. (Milner, 1984; Milner & Larsen, 1991). Pulp thus becomes exposed and related pathologies may occur (abscess, tooth loss during life). Both front and rear teeth may undergo, more or less often, non-intentional alterations , depending on different causes. Alimentary lesions produced during chewing by contaminating substances and by tough and abrasive foods can also be extended to rear teeth - thus, chipping and fractures are widespread.

In large meat-consumers, alimentary alterations are reported more frequently and the degree of worn material is higher, especially as regards front teeth – they are used to take out marrow from bones (Turner & Cadien, 1969; Kerr, 1988; Belcastro *et al.*, submitted), break walnuts and hard hazelnuts (Kirch *at al.*, 1989). Turner & Cadien report that among Eskimo's a large number of chipping and fractures originate from the usage of teeth as tools. They are used better than knife blades to cut and tear seal's meat. They are used to open containers whose lid is frozen. Teeth hold drills firmly while hands whirl their bits (Molnar, 1972). Non-masticatory usage of teeth is so evident also with Australian Aborigines (Gould, 1968). They use teeth as a third hand to make arms, to keep their spear while drawing bow, to soften kangaroo's and emu's hides and make them stretchy or hold objects while climbing up trees (Mitchell, 1959).

Non-intentional alterations, provoked by customary and repeated actions, include all the alterations affecting enamel and dentin originating from non-masticatory activities

repeated and protracting in time. They are, for example, "notches" (hollows developing on the incisor's edge after prolonged and repeated activities) (Cruwys *at al.*, 1992) and anomalous wear of mouth and/or tongue surfaces (LSAMAT) of teeth, usually affecting front teeth. (Turner *et al.*, 1983; Alt & Pichler, 1994; Turner *et al.*, 1991; Irish & Turner, 1997; Comuzzie & Steel, 1998; Belcastro *et al.*, 2000; Belcastro et al., 2001). Non-intentional alterations display a large amount of patterns, besides chipping and fractures. This means teeth may be used, both by men and animals, as pliers, vice, grip, that is as a tool and/or "third hand" (Minozzi *et al.*, 2003). This is true not only for ancient populations of which skeletal samples have been preserved or for those human groups belonging to traditional societies living in extreme conditions (ethnographic documentation of non-alimentary tooth use includes leather processing by Eskimo women (Merbs, 1983); the use of anterior teeth as pincers or pliers by Eskimo men (Merbs, 1983); sinew processing by Australian aboriginals (Campbell, 1958, 1963; Brown and Molnar, 1990); and basket, net, or mat production (Powers, 1874; Wheat, 1967)). Reports on this matter also exist for modern Western civilizations (cfr. Bonfiglioli, 2002).

Therefore teeth become activity indicators as they were used as tools in individual habits, but mainly in everyday tasks, necessary to survive. Different aspects of the tooth system may reflect the different ways individuals respond, nowadays as in the past, to various habitat conditions and situations.

3. Meaning: dental alterations as activity indicator

Human culture reveals its greatness in its ability to create a conscious relation with habitat – controlling and organizing it according to a given plan which always gives responses to external solicitations[1] (Facchini, 1999). Changed requests may lead to a change in everyday habits and subsequent modifications in food preparation techniques and eating, baby feeding and weaning, oral hygiene practices, but the need may arise to use teeth differently. As a matter of fact, the usage of tooth system in extra-masticatory activities is widely reported both on very ancient remains (*Homo habilis*) and in recent populations. In any case, whatever function the masticatory system has, some changes may be induced in osseous or dental tissue by uninterrupted and prolonged stress conditions, occasional accidental traumas due to the kind of food and by personal habits and/or activities.

Even when it is not directly involved in any activities, mouth (for its characteristics and functions) is the most exposed organ to diseases, infections and all harmful agents coming from outside. Feeding, chewing, phonation, breathing make it necessary to open the mouth for prolonged periods during which it is not protected by lips. Oral tissues are rich in vascularization, that is why mouth displays the first clinical signs of diseases affecting other parts of the body: it is under the influence of local and general factors. Dental hard tissues (dealt with in this report, the only ones that can be observed on skeletal remains) are an

[1] Similar behaviours have also been observed in anthropoids, but these expressions of psychism and craftsmanship are not intentional, abstract and planned.

exception because they lack vascularization and have acellular nature so they are only influenced by local factors (Schour & Sarnat, 1942*;* Falconi, 1972).

These days, too, working activities are still affecting the dental system. Some are non-intentional alterations, such as: erosions for wine-tasters, abrasions for factory-workers or miners because of the large amount of the dust they breathe; coloured stains on soft and hard tissues of oral cavity due to acid fumes; several caries for bakers and confectioners. Other alterations develop because teeth are used as tools in daily craft activities. Different behaviours and habits affect teeth and their effects are shown by dental system – investigating on them is a way which physicians, anthropologists, forensic anthropologists, archaeologists and ethnographers can follow obtaining very good results.

Starting from a preliminary classification focussed on single aspects of dental alterations, Alt e Pichler (1998), developed a system of classification based on pre-existent literature including all the areas of artificial dental modifications (to be noted that by "artificial dental modifications", Authors mean both accidental and intentional modifications) (**Tab. 1**).

Therefore, from research on dental traumas, it is possible to derive useful information on biological characteristics of ancient populations, on their ability to exploit the resources provided by their habitat and the way they solved their daily problems.

Clinical studies are often the starting point for this type of research – they distinguish different kinds of lesions, their causes and the related complications in living human groups. In this way, asking questions directly to the individuals examined, it is possible to collect information about their life and personal habits which would otherwise get lost (previous jobs, if and when accessories are used in oral practices, acid foods or rich of abrasive particles, kinds of medicines, serious dental traumas if any).

Dealing with skeletal samples, most aspects will not be explored and it will be necessary to set forth hypotheses. It is difficult to explain the causes of these alterations, even because many ancient habits have not survived until present-day populations (for the latter, teeth are less exposed to external strains). It may also be possible to refer to those human groups who exploit basic technology. Food preparation techniques and the way certain activities are carried out provide full information on the way teeth are used – so to what activity a certain wear pattern corresponds in civilizations sharing similar economy.

The onset of dental alterations as a result of local factors takes place because teeth are used in several activities. As a matter of fact, when they are used as tools, remarkable pressure is exerted on them and associated structures.

Teeth are not all involved in the same way, but each function is limited to a special district of the arch until this is working. Front teeth are generally involved (as they are not related with chewing sensu strictu) mainly unilaterally and in these cases upper and lower jawbones do not move as they do when they chew food bolus (Brace & Molnar, 1967*;* Molnar, 1968). Moreover, signs are not left by all the activities. The same activity may produce different alterations as it can be carried out in different ways. Thus, the presence of a dental alteration is remarkable if it is associated to an activity, but if it is lacking, the activity

itself cannot be excluded (Ronchese, 1948). Different kinds of employments may cause the same effects on teeth, so very similar patterns (Molnar, 1972): a very low number of employment leave unique and particular signs.

ARTIFICIAL DENTAL ALTERATIONS				
Accidental alterations			Intentional alterations	
Diet/Parafunctions	**Activities/Traumas**	**Habits**	**Dental and oral mutilations**	**Therapy**
Abrasion	**Teeth as tools in activities**	**Hygienic habits**	**Dental mutilations**	**Prosthetics**
Occlusal wear (mechanical wear due to chewing; effect of subsistence strategy)	Lesions on front-teeth hard tissues (for ex. beating hides; LSAMAT)	Large lesions on teeth hard tissues (wedge-shaped defects as a consequence of use of tooth-tool or toothpick chewing)	Filing Chipping Decorations Ablation Bleaching Dyeing Position change	Artificial sets of teeth Bridges Coated crowns
Interproximal wear (chewing)	Lesions on hard tissues of few teeth or isolated teeth (marker of special activities: twist baskets, work on tendons, etc.; also in modern activites: shoemakers, wind-instrument players)	Isolated lesions on tooth hard tissues (for ex. interproximal notches due to toothpick)	Amputation Germectomy	**Protective Odontotherapy** Fillings with and without metals
Microwear patterns (typical of a special diet)				
Attrition	**Dental traumas**	**Individual dental markers**		**Dental surgery**
Contact wear (physiological attrition)	Cracked edges Broken teeth Fractured clusps	Special lesions on front-teeth hard tissues (for ex. notch due to pipe, faccette da usura a causa di lip plug, dischi, labret o « botoru »)		Extraction of teeth Drilling Tooth implantation Fractures treatment
Bruxism (non physiological attrition caused by stress, etc.)	Broken teeth Vertical fractures on roots Chipping Fractured teeth Traumatic falling of teeth	Non-specific lesions on hard tissues (for ex. Caused by seed breaking, wear surfaces for the habit of sucking small stones)		
Erosion	**Erosion**	**Erosion**	**Oral mutilations**	**Parodontal therapy**
Erosive foods (for ex. fruits) Erosive drinks (for ex. Lemon juice)	Lesions on hard tissues involving the whole set of teeth (miners, stone-cutters, workers in stone-quarries, chemists, etc.)	Habits regarding parental cares (tricks during weaning trying to pacify the baby)	Modern body piercing	junctions with gold

Tab.1: Classification of oral modifications on human teeth (from Alt e Pichler, 1998)

D) The non masticatory dental alterations

1. <u>*CHIPPING*</u> (**Figg. 1,2**)

Chippings are *ante mortem* irregular cracks, mostly quadrangular (in same cases the direction of the propagation is vertical and the shape is narrow and lengthened), present long the incisal edges of the anterior teeth or long cuspids' crests of the posterior ones. They could involve enamel or enamel and dentine, until the loss of considerable parts of the dental crown.

The detachments, apart from the severity, could probably be due to a strong blow. Instead, for the "wavy" chippings (**Fig. 1**), the ones with a detachment wavy surface, it seems that the enamel chip has been detached less strongly. In both the cases the chippings edges are clear, even if they have been smoothed by the stress due to occlusion and to the masticatory activity. So the chippings are distinguishable from a *post mortem* fracture (see standard).

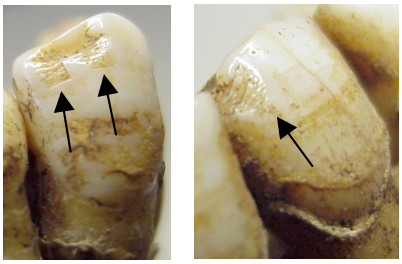


Fig. 1: chipping "ad ondine".

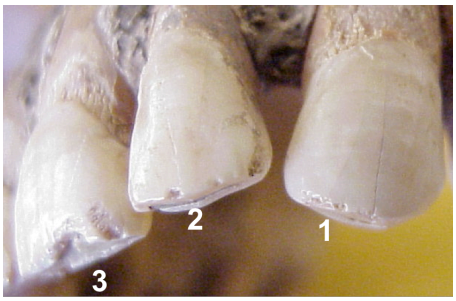


Fig. 2: gradi progressivi di chipping.

The chipping are classified (according to Bonfiglioli *et al*., 2004) on a three-grade scale by evaluation of its *size* and *depth*.

Size and *depth*:

degree 1 – slight crack or fracture (0.5 mm), or larger but superficial enamel flake loss (Fig.1);

degree 2 – square irregular lesion (1 mm) with the enamel more deeply involved (Fig.2);

degree 3 – crack bigger than 1mm involving enamel and dentine or a large, very irregular fracture that could destroy the tooth (Fig.2).

Moreover, the classification takes into account also the *position* on the tooth of the chipping.

Position:

In each tooth the chipping could be situated on the **buccal** (B), **lingual** (L) or **interproximal** (I) edge or crest of the tooth, both separately and in combination each other.

- *Aetiological factors*:

According to Iannetti *et al.* (1984) chippings and other more severe lesions could be related to several predisposing and/or causing factors. In the permanent teeth predisposing

factors could be the anatomical ones, such as primary malocclusions (upper incisors protrusion) or secondary malocclusions due to not inadequate cares, alterations of the ordinary processes of enamel development and accentuated cuspids, severe caries that weaken the tooth and parodontopaties that affect the sustaining dental tissues. Because of these pathologies the sustaining dental tissues are less strong and so the tooth more unstable. There is then all the conditions related to the habits and the activities carried out by the individual that can expose the teeth to great occasional traumas.

Causes predisposing, independently from personal anomalies and developed professions, are the position of the tooth in the arcade and its general form: more stricken will be the anterior teeth, for their smaller mass in comparison to the back ones and because the anterior teeth are more exposed to the traumas (mostly the upper ones).

The causing factors, instead, have been identified in falls, bumps against hard objects and masticatory traumas.

The onset of chipping has been attributed to the presence of contaminants (especially sand's grains) in foods as roots and bulbs (Robinson, 1963) or molluscs and shellfishes (Kirch *et al*., 1989). Moreover, it is to remember the habit to break walnut-trees or other hard foods with the teeth (Kirch *et al*., 1989) that also produce chippings in molars and premolars, for example in that groups of San (Boscimani) of the central Kalahari that have few contacts with the Western world (Van Reenen, 1992).

Among the Eskimo the high frequencies of chipping can be related to the kind of food and its preparation and, particularly, to the use to extract the marrow from animal bones to fight the threat of the hunger, always present in the arctic zones, or to the use of the teeth – testified also among the Neanderthals (Ryan, 1980) - in a wide variety of extra-masticatory activities (vedi **Part I**, **Cap. C** e **D**).

2. *NOTCH*

Notch A ***(Fig. 4)***

It is a concave oval indentation involving the tooth's incisal/occlusal edge, sometimes extending across all the surface. The depression is broader than it is deep and both the enamel and dentine are smooth and polished. It runs in a buccal-lingual direction and the orientation may be perpendicular or transverse to the mesial/ distal axis of the tooth. In this case the orientation could be perpendicular with respect to the incisal edge or transversal if the notch is localized buccally in the 1/3 mesial (or distal) trait and continues distally (or mesially), so lingually the point of maximum concavity is in the 1/3 medium trait.

The notch can be buccal or lingual and sometimes it crosses all the incisal edge transversally.

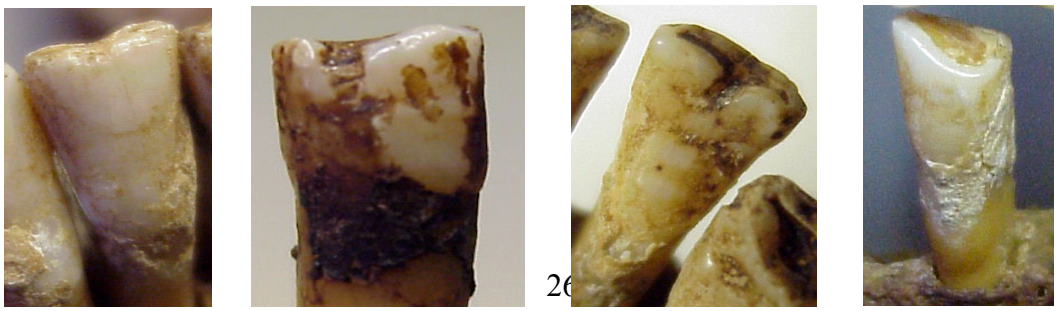


Fig. 4

Notch B ***(Figg. 5, 6)***

It is a concave lesion localized at the corner (mesial and /or distal) of the incisal edge. This lesion involves the enamel or both the enamel and dentine. The enamel and dentine appears homogeneous, smooth and polished. It can slope buccally or cross the incisal edge but, also in this case, the maximum depth of the lesion is localized buccally.

Fig. 5

Fig. 6

The notch is classified on a three-grade scale by evaluation of its *size* and *depth*.

Size and *depth*:

grade 1 (small) - slight superficial indentation affecting only the enamel (Figure 4a);

grade 2 (evident) - wider and deeper indentation with polished dentine (Figure 4b);

grade 3 (strong) - very deep and equally wide depression with heavily polished dentine (Figure 4c, 4d).

Moreover, notch is classified taking also into account of its *position*: in each tooth the notch could be situated **buccally** (B), **lingually** (L) or **transversally** (T) on the edge or crest of the tooth.

➢ *Aetiological factors*:

Alterations seem produced by a circular and cylindrical object, also very narrow (notch B), rigid or soft/flexible, simply held back among the teeth or rubbed above them with a continuous and repetitive action, always done in the same way and with identical orientation. Therefore, gesture after gesture, enamel and dentine are smoothed, become deeper and the depression becomes uniform. The stress to which the tooth is so submitted can also produce, as a secondary effect, chipping in association to the notch.

In numerous studies the notches have been attributed to the habit to hold objects among the teeth while the hands are hocking elsewhere.

One classic form of circular notch results from gripping a clay pipe (Ubelaker, 1989; Hillson, 1996; Kvaal & Derry, 1996; Anderson, 2002) and in those people who chew the fund of pencils and pens (Cruwys, 1988). This type of attrition can be related to using teeth as pincers in such activities such as: grasping the mouthpiece or bit of a bow drill or pump

drill directly with anterior teeth (Angel, 1968; Merbs, 1983); holding nails between the teeth (Turner & Anderson, 2003); or, in particular in women, holding hairpins between the teeth mentre con le mani ci si acconcia (Ronchese, 1948); or using a metal or reed tube to drink (Angel, 1968). Such abrasions relating to personal habits or lifestyle may occur in the linguo-labial direction, and are mostly unilateral and usually large in size (Alt & Pichler, 1992). This type of abrasion on anterior dentition is observed both in Anatolia (Angel, 1968; Özbek, 2000) and other parts of the world (Owsley & Bellande, 1982; Merbs, 1983; Blakely & Beck, 1984; Alt & Pichler, 1992; Turner & Anderson, 2003).

Clinical studies (occupational medicine and restorative dentistry) have found similar mechanical lesions in tailors, carpenters, cobblers, upholsterers and rope-makers who habitually use the teeth to hold or rub foreign objects such as needles, pins, nails, etc. (Dechaume, 1938; Schour & Sarnat, 1942; Thoma, 1944; Ronchese, 1948; Gobbato & Marin, 1965; Caccuri, 1969; Marenduzzo, 1962, 1972; Malfatti, 1984).

Rough Notch (**Fig. 7, 8**)

In the anterior teeth it is a ditch wider (1,5-2,5mm) than deep. It is set on the incisal edge (in the 1/3 mesial or distal) buccally (Fig. 7). It usually does not affect the lingual enamel neither, in the more worn teeth, the rhyme of exposed dentine (due to wear). Its bottom is rather uneven, rough and unequal(**Figg. 7, 8**).

Fig. 7

Fig. 8

In the posterior teeth (**Fig. 8**) the ditch is still buccal, it is deeper even if it does not arrive to affect the dentine and, although the enamel is not smoothed, its general form is rounded and rather regular.

➢ *Aetiological factors*:

This alteration seems, in some cases, border line between the accidental chipping and the lesions due to frequent and repeated microtraumas. The rough notch is distinguishable from the chipping for its ditch form that, however uneven, it is the result of repeated actions and, therefore, more regular, more roundish and with the less jagged borders. Infatti, se ogni singola azione, differente dalla precedente per orientamento, produce una sua lesione, non si forma un'alterazione omogenea, ma un piccolo incavo più regolare - perché prodotto da un'azione protratta nel tempo - ma dal fondo sconnesso.

It can be produced by an object with which the tooth has repeatedly come in contact, but the way of taking could not have been always the same one. In fact, if each single action, different from the previous one for orientation, produces a lesion, a homogeneous alteration is not formed but a small more regular concave one – because it is produced by a repeated action - but with a disconnected bottom.

3. *UNUSUAL WEAR*

• *Buccal and/or lingual enamel wear (lower teeth)* (**Figg. 9, 10, 11, see standard**)

The dental wear pattern, that usually produce dentine ex position, slopes down on the buccal surface until the loss of the buccal enamel (**Fig. 9**). The worn facette has a well delimited and concave edge further the CEJ. The whole buccal surface is very smooth, polished and shiny. In the less serious cases, part of the buccal enamel has been preserved (**Fig. 10**). As soon as the wear proceeds the enamel is completely lost and, while in a first moment the incisal plain and the buccal one show different and well separate orientations, subsequently they are melted in harmonic way forming a convex surface.

Lingually the dental wear pattern is not unique: all the teeth showing this alteration have suffered a considerable reduction in height and it is possible that, to equal buccal degree, there is lingually a thin band of enamel or a wear facette "tongue-shaped" that exposes a very shiny dentine (**Fig. 11**).

Fig. 9

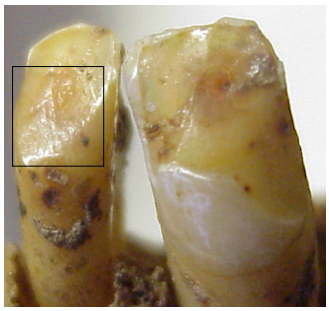


Fig. 10

Fig. 11

The unusual wear is classified by evaluation of its *severity*:

Slight (when the wear affects only the enamel (**Fig. 12 a**) and **Strong:** when the wear exposes also the dentine and the enamel has been totally removed (**Fig. 12 b**).

Fig. 12 a

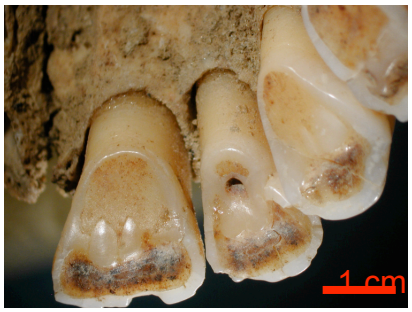


Fig. 12 b

Moreover, the unusual wear is classified taking also into account of its *position*: it could be situated **buccally** (B), **lingually** (L) or **general** (G) (if slopes both in the buccal and

the lingual directions).

➢ *Aetiological factors*:

This dental wear pattern seems to be due to a repetitive action: it is possible that the individual used the lower teeth in grating, scraping and digging something kept firm with the hands or also that the object responsible of the abrasion was downward externally pulled. All these movements could explain the orientation of the wear plans. The substance may have been a kind of foodstuffs but also of another material.

Among many Eskimo has been found that the skin of seal is held back by the teeth during its cleaning or it is softened through the mastication in such way that, the edges, are enough tender above be been able to be sewings (Goldstein, 1932; Lous 1970). This habit provokes strong wear, especially on the anterior teeth, but the models of wear are not properly similar to the alteration here described.

Generally has been found that an heavy wear on the lower anterior teeth with the tendency to develop a buccal rounding, with the aging progress - evident for instance in the Eskimo and in the Aborigines - it could be the result of a non masticatory use of this dental district.

• *LSAMAT ("Lingual Surface Attrition of The Maxillary Anterior Teeth")* (Fig. 13)

The wear pattern termed ''Lingual Surface Attrition of the Maxillary Anterior Teeth,'' (LSAMAT) (Turner and Machado, 1983) is defined as the progressive flat wearing of upper anterior lingual tooth surfaces without corresponding wear on the lower teeth. In individuals with extreme LSAMAT, upper premolars and even first molars can exhibit lingual wear (Turner and Machado, 1983; Irish & Turner II, 1987; Irish & Turner II, 1997). Macro and microscopic striations are often present on the affected teeth, running from the cingulum to the occlusal surface (Turner *et al.*, 1991).

Fig. 13

➢ *Aetiological factors*:

It was hypothesized that LSAMAT was caused by the specialized consumption and/or oral processing and chewing of an abrasive substance. In particular, in South Africa and South America samples it was hypotized the use of high carbohydrate rich food, such as manioc, sugar cane (*Saccharum* sp.) or other fibrous plants. As noted, LSAMAT is specifically thought to result from long-term shredding or sucking on raw tuberous plants

(e.g., manioc roots) between the upper teeth and tongue and drawn across the upper teeth in a back-to-front movement (Turner and Machado, 1983; Irish & Turner II, 1987; Luckacs & Pastor, 1988; Hartnady & Rose, 1991). Finally, the LSAMAT wear pattern does not result from erosion (Turner and Machado, 1983; Robb *et al.*, 1991; Turner *et al.*, 1991), occlusal overbite, overjet, malocclusion, or other anatomical considerations.

4. *STRIAE* **(Figg. 10, 14)**

The *striae* are fine and shallow striations, but well definite and directly visible also under light microscope at low magnifications (15-20x). They are present on the dentine of the incisal edge (**Fig. 10**, riquadro). They usually are long around 3-4 mm. In the same tooth they could all be oriented in the same direction, parallely to the main axis of the incisal edge (mesio-distal direction). They can also be transversal with respect to the tooth width (larghezza) (linguo-buccal direction) and they can also cross each other in several points.

The *striae* could be found also on the interproximal surface of a tooth (**Fig. 14**), usually on the cement near and parallel with respect to the CEJ. In this case, the *striae* are assembled in bands, with a maximum width of around 1-1,5mm, flattened, smooth and polished. A band can extend onto quite all the interproximal tooth surface.

Fig. 14

➢ *Aetiological factors*:

The *striae* seem to be due to a continuous action of rubbing an object, whose physical characteristics have engraved the dentine. In many cases they are found in association with other alterations (rough notch, wear of enamel). For those observed on the interproximal surfaces, it can be hypothesized that they represent the previous formation stage of alterations that, with the going on of the action of rubbing of fibrous object on the tooth surface, can develop in an interproximal groove.

5. ***INTERPROXIMAL AND OCCLUSAL GROOVE***

The interproximal groove is a cervical alteration worn into the interproximal surface of the tooth at or near the cement-enamel junction. It is usually parallel to the cement-enamel junction and extending onto both the crown and the root (Ubelaker et al., 1969; Wallace, 1974; Berryman et al., 1979; Frayer & Russel, 1987; Brown & Molnar, 1990; Lukacs & Pastor, 1988; Lukacs & Pastor, 1990; Frayer, 1991; Milner & Larsen, 1991; Hillson, 1996;

Ubelaker, 2003). It presents a rounded trough-like appearance, with clear inferior and superior edges, a smooth and sometimes polished aspect and fine striations lying parallel to the groove's main axis.

Fig. 14

➢ *Aetiological factors*:

The interproximal groove is one of the oldest and most widespread tooth alterations, and it is present in some current populations. The earliest documented occurrence of the interproximal grooves is in the *Homo erectus* remains from Beijing, China (Weidenreich, 1937; Siffre, 1911). Neandertal remains from La Quina exhibit this feature (Brace, 1975; Martin, 1923) and also among Krapina Neandertal teeth and other fossil hominoids, Frayer and Russel (1987) report the presence of artificial interproximal grooves as evidence of habitual tooth picking. Interproximal grooves were reported also for the Epipalaeolithic Necropolis of Taforalt (Morocco) (Bonfiglioli *et al.*, 2004). In this case, the Authors suppose that the grooves could be the result of therapeutic or palliative actions to alleviate inflammation and pain due to gum irritation. Interproximal groove were also found in Mesolithic and Neolithic Danish (Alexandersen, 1978), in Arikara Indians (Berryman et al., 1979), in prehistoric California Indians (Schultz, 1977), in American Indians (Ubelaker et al., 1969) and in Prehistoric human skeletal remains from Pakistan (Lukacs & Pastor, 1988).

The major reason for interproximal grooving, is thought to be the repeated insertion of tooth picks made of wood or bone. Habitual tooth probing, cleaning of food particles stuck between teeth, results in abrasions in the form of grooves on the interproximal area. Interproximal grooves can also be related to non-bacterial acids or chemical erosion (Brothwell, 1963; Pindborg, 1970). The interproximal grooves are mostly observed on the posterior dentition (Frayer & Russel, 1987; Lukacs & Pastor, 1990; Frayer, 1991) and many aetiologies have been proposed such as therapeutic actions, removal of impacted food, toothpicking, cultural or idiopathic habits, etc. (e.g. Ubelaker et al., 1969; Wallace, 1974; Boaz & Howell, 1977; Schultz, 1977; Berryman et al., 1979; Bermudez de Castro & Arsuaga, 1983; Bermudez de Castro & Perez, 1986; Frayer & Russel, 1987; Formicola, 1988; Lukacs & Pastor, 1990; Lukacs & Pastor, 1988; Brown & Molnar, 1990; Bermudez de Castro et al., 1997; Ungar et al., 2001; Bonfiglioli *et al*., 2004).

In addition the grooves on interproximal area of molars could be related to task activities such as pulling fibrous material between teeth (Schulz, 1977; Blakely & Beck, 1984; Brown & Molnar, 1990; Lukacs & Pastor, 1990). Based on data gathered from skeletal

samples and some ethnographic studies in Australia and Pakistan, it is considered that such grooves on posterior dentition could have resulted from processing of sinew or fibrous material (Brown & Molnar, 1990; Lukacs & Pastor, 1990).

Grooves can be found also on the occlusal surface (occlusal groove) both of the anterior teeth and of the posterior ones (**Fig. 15**). The occlusal grooves are generally polished and rounded with fine scratches lying parallel to the groove's main axis. Moreover, they can be mesio-distally or linguo-labially oriented (**Fig. 1**).

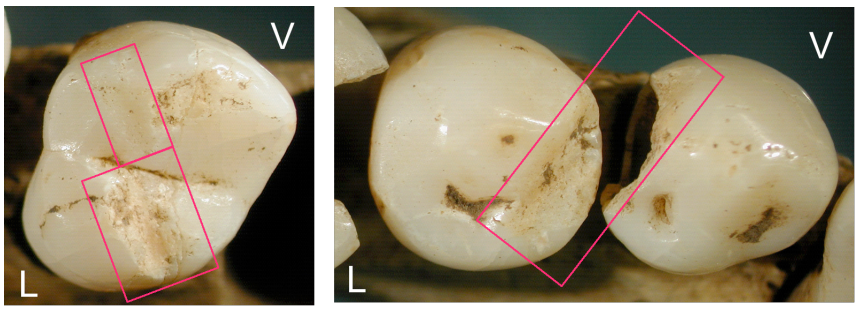


Fig. 16

➢ *Aetiological factors*:

Mesiodistal or linguo-labial grooves on the occlusal surfaces of the anterior teeth, could be due to the abrasion caused by the use of teeth as a tool or by personal habits. In particular, the occlusal groove formation could be related to the long-time repeated habit to pass across the clenched anterior teeth and long the same direction, some type of flexible material such as vegetable fibres (sumac, willow, canes, hemp or flax) and/or animal fibres (sinews), in order to moisten and soften it, for both bow strings or plant fibres cordage or basketry (Covile, 1892; Cybulski, 1974; Schulz, 1977; Larsen, 1985; Pedersen & Jakobsen, 1989; Bemet, 1994; Molleson, 1994; Larsen, 1997; Larsen et al., 1998; Minozzi et al., 2003).

E) Palaeoethnological and ethnographical studies about the non masticatory dental lesions

The non masticatory dental alterations have been described since the appearance of genus Homo. Some of the works related to prehistoric, protohistoric (§1) and pre-hispanic and historic samples are summarized below (§ 2):

1. Prehistoric and protostoric period

- ***Homo habilis***

- Puech e Cianfarani (1988) have found *interproximal grooves* in teeth belonging to *Homo habilis* and coming from the Omo Valley and dating back to 1,84 my BP. Probably they could be due to the attempt of removing food residuals from adjacent teeth. On both the third molars have been observed *chippings* localizepd on the occlusal buccal and distal interproximal edge (Boaz & Howell, 1977).

- ***Homo erectus***

- Turner II (1988) describes *interproximal grooves* on the incisors belonging to 6 individuals coming from the Selungur Cave (Uzbekistan) and referred probably to *Homo erectus*, probably due to an oral hygiene purpose using some objects as toothpicks.

- In the first molar of *Sinanthropus* (*Homo erectus*) and in the teeth belonging to two individuals from Atapuerca (Spain) and referred to *Homo erectus*, have been observed *interproximal grooves* (Puech & Cianfarani, 1988).

- **The Neanderthals**

- Numerose e contrastanti sono le ipotesi sulle cause *dell'arrotondamento degli incisivi* nei Neandertaliani. Le affermazioni di Brace, secondo cui questi denti venivano usati come strumento, non sono in accordo con quelle di Wallace (1975) il quale ritiene che l'usura anomala sia il risultato del contatto con sostanze abrasive presenti nella dieta. Infatti Wallace, osservando al microscopio binoculare la dentatura di La Ferrassie I, che in ogni caso non è l'unico ominide con gli incisivi arrotondati, ha notato numerosi sottili graffi sia sugli incisivi sia sugli altri denti, probabilmente determinati da piccole particelle dure associate al cibo. Il pezzo di carne o le sostanze vegetali fibrose, tenute con le mani, venivano attaccate dai denti e tirate alternativamente verso l'esterno, l'alto e il basso in modo da staccare un boccone (lo stesso modo di agire è documentato tra gli Yuendumu).

Commentando le ipotesi di Wallace alcuni autori si trovano in accordo (Zlabek), alcuni in disaccordo (Howells, Wolpoff) e altri ritengono che si debba pensare alla sovrapposizione

della componente alimentare e di quella extra-masticatoria (Barret & Brown, Koritzer, Sakura, Stloukal).

- In the Krapina sample (279 teeth of which 89 are anterior) in numerous cases the *wear pattern* is similar to the one observed in the La Ferrassie I sample, even if not so strong. Smith (1976) observes that the stronger wear of the anterior teeth in comparison to the wear showed by the posterior teeth, could be interpreted as the result of the use of the teeth as an instrument.

- Rayan (1980) observes that the *dental microwear patterns* of the western and del Vicino Oriente Neanderthals is more similar to the ones observed in the Eskimo (Point Hope, Alaska) rather than the ones described in the african pongides. Because the ethnographic studies suggest that the teeth was strongly involved in daily task activities, it is possible that the Neanderthals used the anterior teeth to clench and hold abrasive objects.

- Nel campione di Krapina inoltre Frayer e Russel (1987) hanno individuato la presenza di *solchi interprossimali* nel 25,6% degli individui e nell'8% dei denti esaminati. L'alta frequenza, rispetto a quanto pubblicato per molte popolazioni viventi, probabilmente è da mettere in relazione al fatto che molti dei denti di Krapina sono isolati e pertanto più facilmente osservabili nelle superfici mesiali e distali. I solchi sono localizzati alla CEJ e coinvolgono sia la dentina che lo smalto coronale, sono perfettamente levigati e, nel loro fondo, si notano a volte strie longitudinali parallele. Pertanto la forma, le caratteristiche, il coinvolgimento di particolari classi di denti (premolari e molari) e la mancanza di qualsiasi evidenza di processi erosivi inducono a collegarli all'uso di "stuzzicadenti" inseriti tra gli spazi interprossimali. Nessuno dei denti presenta carie e, poiché si tratta di denti isolati, non si può con certezza stabilire la gravità del riassorbimento del margine alveolare, anche se la posizione molto bassa di uno di questi solchi indica la presenza di problemi parodontali. È probabile pertanto che questi specilli servissero per abituali pulizie dei denti e, data l'antichità dell'evidenza di tale alterazione, questa abitudine rappresenta una delle più antiche e persistenti forme di uso di uno strumento.

- Nel terzo molare di Neandarthal Hortus XI (Puech e Cianfarani, 1988) è stato riconosciuto un *solco interprossimale* più pronunciato vestibolarmente. Dall'angolo di inserzione si può dedurre che l'oggetto utilizzato non era flessibile.

- Nelle faccette interprossimali dei denti posteriori di alcuni Neandertaliani (molto meno frequenti sono invece presso altri ominidi) sono stati osservati dei *solchi subverticali* della larghezza di 0,1-0,5mm, disposti a ventaglio e profondamente diversi dai solchi interprossimali generalmente riferiti all'utilizzo di stuzzicadenti. L'esame al microscopio elettronico fatto da Villa e Giacobini (1995) su reperti provenienti dalla Caverna delle Fate in Liguria e da Breche de Genay in Francia rivela che essi sono stati prodotti in vita da un doppio meccanismo di erosione-abrasione. La disposizione subverticale delle bande di Hunter-Schreger favorisce la formazione di microcrepe in seguito a pesanti stress applicati sui denti posteriori dalla masticazione. Queste vengono esposte all'usura che agisce sulle superfici interprossimali: l'abrasione (ma la mancanza di strie orientate suggerisce che questo non sia il meccanismo più importante nella formazione di solchi) e l'erosione chimica da parte di residui di cibi acidi che vengono intrappolati negli spazi interprossimali agiscono

sulle microcrepe, formando solchi. L'osservazione di solchi simili nei denti posteriori di aborigeni australiani attuali, in cui forte risulta lo stress masticatorio, è conforme a questa ipotesi.

- In the dental sample recovered from the Sima de los Huesos (SH) Middle Pleistocene cave site of the Sierra de Atapuerca (Spain), *interproximal wear grooves* have been observed in 20 maxillary and mandibular posterior teeth belonging to at least five of the 32 individuals identified. The interproximal grooves were first noted by Pérez et al. (1982), Bermúdez de Castro and Arsuaga (1983) and Bermúdez de Castro *et al.* (1997). The appearance, morphology, and location pattern of the SH wear grooves are similar to those reported in other fossil hominids and in more recent human populations (Berryman et al., 1979; Frey, 1933; Grilleto, 1977; Hartweg, 1945; Janssens, 1970; Martin, 1923; Patte, 1941; Siffre, 1911; Ubelaker et al., 1969). Two alternative proposals, the toothpicking and the fiber or sinew processing hypotheses, compete for explaining the formation of this anomalous wear. Bermúdez de Castro *et al.* (1997) notes that the characteristics observed in the wear grooves of the SH teeth are compatible only with the habitual probing of interdental spaces by means of hard and inflexible objects. Dietary grit may also have contributed to the abrasion of the root walls during the motion of the dental probes.

There is also a widespread documentation about interproximal grooving in Upper Paleolithic (Formicola, 1988; Frayer and Russell, 1987; Frayer, 1991), Mesolithic (Bermúdez de Castro and Pérez, 1986; Frayer and Russell, 1987), Neolithic (Hartweg, 1945; Patte, 1941; Bonfiglioli *et al.*, 2004), and more recent human skeletal populations (Bermúdez de Castro and Arsuaga, 1983; Berryman *et al.*, 1979; Brown and Molnar, 1990; Campbell, 1925; Grilleto, 1977; Larsen, 1985; Schulz, 1977; Ubelaker *et al.*, 1969;Wallace, 1974).

- **Upper Palaeolithic**

- *Solchi interprossimali* sono stati individuati da Formicola (1988) in 3 degli 8 individui rinvenuti nella Grotta di Grimaldi (Liguria, Paleolitico Superiore). I solchi sono più frequenti nei denti superiori, sono semicircolari, ben lucidati, localizzati a livello della CEJ, ma più spostati verso la radice che verso la corona e con strie sul fondo dirette vestibolo-lingulamente. In mancanza di un qualsiasi segno di decalcificazione acida, la causa più probabile è l'abrasione da parte di specilli inseriti tra i denti, anche se la comparsa di solchi sui denti anteriori e l'assenza di questi nell'individuo femminile possono escludere la funzione esclusivamente terapeutica, come suggerito anche dall'assenza di carie. Si può pensare piuttosto ad una attività stereotipata, probabilmente sorta in seguito ad uno stimolo concreto poi consolidatosi dopo la scomparsa della causa scatenante.

- Nel sito di Neuessing (Bavaria) è stato rinvenuto uno scheletro relativamente completo attribuito al Paleolitico Superiore (Frayer, 1991). Due dei denti mandibolari presentano *solchi interprossimali* alla CEJ, probabilmente provocati da specilli inseriti negli spazi interdentali. La presenza di piccole depressioni anomale sulle radici e sull'osso alveolare del secondo molare destro e sinistro superiori conferma l'utilizzo di stuzzicadenti,

forse con intenzione palliativa, poiché sicuramente il terzo molare superiore sinistro non è erotto.

- **Epipalaeolithic**

- Kennedy *et al.* (1981) describe intentional tooth deformation in a prehistoric skeletal sample assigned to the Indian Mesolithic (Late Stone Age), from the Bhimbetka rocks-shelters of the Vindhya Hills in Raisen District, Madhya Pradesh, India. One individual shows *incised marks* on the right and left upper central incisors and the right lateral incisors.

- **Neolithic**[2]

- In all the adults (males and females) of the Iberomaurusian Necropolis of Taforalt (eastern Morocco) - dated (14C) between 11,900-240 years ago (carbon from the upper level of the necropolis) and 10,800-400 years ago (Iberomaurusian archaeological level) (Roche 1953, 1959, 1976) - Bonfiglioli *et al.* (2004) noted non-masticatory dental alterations such as *chipping*, *notches* and *interproximal grooves*. All these alterations could be an evidence of the use of the teeth in masticatory and non-masticatory activities. Moreover, the particular distribution of the alterations within the dentition of the Taforalt sample could be related to avulsion of the upper central incisors: the functions of the anterior teeth (cutting and tearing portions of food while eating, holding objects, etc.) would have shifted to the posterior teeth. Chipping can result from masticatory or paramasticatory activities (consumption of hard and abrasive foods, food processing, etc.) and from extra-masticatory use of the teeth (holding objects during tool construction, retouching stone tools, etc.). The low frequency of chipping on the anterior teeth can probably be attributed to the predominant use of the posterior teeth for food processing and occupational activities because of the absence of the central incisors. This also probably explains the higher frequency of notches on the posterior teeth. The sex differences suggest different dietary patterns and task specializations within the Taforalt society.

- Nei reperti scheletrici neolitici e calcolitici rinvenuti a Mergharah e in quelli dell'età del Bronzo rinvenuti ad Harappa (Pakistan) sono state evidenziati diversi tipi di alterazioni (Lukacs & Pastor, 1988). I *solchi interprossimali* (esaminati macroscopicamente e al microscopio elettronico a scansione) coinvolgono soprattutto i denti posteriori nella superficie mesiale e nel loro fondo presentano una fine striatura. Sono state individuate più cause possibili. In alcuni individui si ritiene che abbiano significato terapeutico: era probabile la presenza, nei denti adiacenti a quello con il solco, di ascessi e carie che venivano curati con sostanze medicinali fibrose oppure è possibile che la voluminosa cuspide accessoria e la grave ipercementazione di uno dei denti con solco fosse fonte di fastidio, a cui si cercava di far fronte con uno specillo. In altri l'orientamento dei solchi e il fatto che siano ben visibili vestibolarmente fa presupporre l'introduzione di sottili tendini o corde vegetali: i denti sono

[2] Coppa et al. (2006) descrive 11 *drilled* molar crowns from 9 adults discovered in a Neolithic grave-yard in Pakistan that dates from 7,500-9,000 years ago. These findings provide evidence for a long tradition of a type of proto-dentistry in a early farming culture.

pertanto coinvolti in attività extramasticatorie. Nella maggior parte degli individui infine sono legati ad abitudini personali stereotipate e l'orientamento dei solchi indica una continua introduzione e retrazione dello stuzzicadenti. Inoltre sono evidenti *particolari modelli di usura nelle superfici vestibolari e linguali* di denti anteriori di due individui. Nel primo sono completamente usurate la superficie linguale degli incisivi superiori, quella vestibolare e linguale degli incisivi inferiori e quella vestibolare dei canini inferiori. I materiali abrasivi tenuti tra i denti serrati venivano sfregati e tirati soprattutto verso l'esterno e il basso, come evidenziato dall'usura dei denti anteriori. Nel secondo individuo l'usura degli incisivi superiori presenta un solco a "V" entro cui si incastrano, in occlusione, gli incisivi inferiori: il materiale in questo caso non scorreva sui denti, ma era tenuto molto saldamente.

- Nei resti scheletrici di Abu Hureyra (Siria settentrionale) studiati da Molleson (1994) e risalenti al primo neolitico, sono evidenti molti *denti spezzati*, probabilmente a causa di una grossolana tritatura dei cereali e alla presenza nei cibi di parti dure e pietruzze non eliminate dalle farine, forse per l'assenza di setacci. *Solchi sulle superfici incisali* di incisivi e canini si possono osservare in alcuni individui dei livelli più tardi. Sono stati collegati all'abitudine di preparare fibre vegetali e di intrecciare canestri o tappeti usando i denti per manovrare gli elementi mobili del lavoro mentre le mani sono impegnate nello stringere la porzione già completata. Tuttavia i solchi sono presenti in un numero limitato di individui, probabilmente perché queste capacità erano possedute solo da pochi: tale specializzazione potrebbe essere il risultato naturale della suddivisione del lavoro all'interno della comunità. Inoltre, da una zona diversa dell'insediamento, sono state ritrovate mandibole dalla superficie articolare particolarmente ingrossata e dall'usura molto irregolare. Entrambe queste alterazioni riconducono all'applicazione di forze di compressione molto intense ed estese che in alcuni casi arrivano fino alla radice. Alterazioni simili sono state riscontrate nei Maori che masticano steli di piante per preparare corde. Forse anche ad Abu Hureyra le fibre per costruire le stuoie venivano preparate in modo simile.

- **Iron Age**

- L'analisi da parte di Macchiarelli e Salvadei (1985) di 108 individui dell'età del Ferro (VI-V secolo a.C.) provenienti da Alfadena (Abruzzo) ha messo in evidenza un differente uso dei denti: i posteriori sono legati alla masticazione del cibo, rappresentato da alimenti poveri di fibre, ma non proprio teneri, mentre l'*usura degli anteriori* è probabilmente causata dalla frizione di sostanze - utilizzate in attività lavorative di vario tipo - su incisivi e canini. È possibile che venissero preparate cinghie di cuoio tirando e strappando il materiale con movimenti in direzione medio-laterale e facendo perno nel punto di contatto tra l'incisivo laterale e il canino. Il largo uso che si faceva del cuoio nella vita di tutti i giorni spiegherebbe l'assenza di forti differenze tra i sessi, ma il fatto che le dentature più compromesse appartengano ad individui di sesso maschile potrebbe fra pensare ad una suddivisione di ruoli

all'interno della società. Tuttavia molte sono le attività extra-masticatorie in cui possono essere coinvolti i denti e il trattamento del cuoio è solo una delle possibili[3].

2. Pre-Hispanic and historical period

- **Europe[4]**

- Cruwys *et al.* (1992) hanno trovato notch ovali e levigati, corrispondenti tra denti superiori e inferiori, in incisivi e canini di 8 individui del periodo Neolitico-Medioevale inglese (7 maschi e 1 probabile femmina) e li hanno ritenuti causati da materiale abrasivo non troppo duro, come tendini, legno o filati. Nonostante l'impossibilità di risalire all'esatta natura della sostanza che ha causato la lesione, gli autori hanno ipotizzato la possibilità dell'utilizzo dei denti nell'incordare l'arco, cosa che spiegherebbe anche la prevalenza di notch nel sesso maschile.

- Arcini (2005) describes *filed teeth* in 24 men from the Viking Age (ca. 800–1050 AD), found in present day Sweden and Denmark. The type of modification is a horizontally filed furrow on the frontal upper part of the tooth crown. The furrows are single or, more usually, multiple, and are found on the front teeth in the maxilla. The marks are so well-made that it is most likely they were filed by a person of great skill. The reason for, and importance of, the furrows are obscure. The affected individuals may have belonged to a certain occupational group (such as tradesmen), or the furrows could have been pure decoration. This case represents the first found of deliberate dental modification in archaeological human skeletal material from Europe.

- In un campione britannico antico del periodo anglosassone Robb *et al.* hanno riconosciuto *alterazioni da erosione acida*.

- Sui denti di un inumato discovered during the exavation of a medieval cemetery in Clarensac (Gard, France) several peculiar abrasions (*anomalous wear* of lingual face of upper central incisors, *interproximal grooves* and *notch*) have been observed by Gleize and Rougier (2005). The Authors suppose that all these alterations could represent an evidence for paramasticatory activities.

- *Solchi interprossimali* sono stati osservati alla CEJ di denti di popolazioni pre-ispaniche (150-1350 d.C.) della Canarie (Bermudez de Castro & Arsuaga, 1983). C'è stretta relazione tra le lesioni, le carie interprossimali e problemi parodontali: la causa più probabile potrebbe essere stata l'abitudine di rimuovere, tramite strumenti d'osso, frammenti di cibo depositatosi tra i denti durante la masticazione. Ulteriore possibile causa di abrasione potrebbe essere la presenza di particelle abrasive negli alimenti.

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[3] Successivamente, durante il periodo romano, probabilmente in relazione ad una maggiore specializzazione nelle diverse attività lavorative, sono numericamente molto bassi i casi di un intenso uso dei denti, soprattutto anteriori, a supporto dell'attività manuale (uso extra-masticatorio dei denti), ma, quando presenti, le alterazioni sono molto gravi, come si può notare nel campione di Grotta Perfetta (I secolo d.C.) (Macchiarelli, 1987).

[4] In un gruppo di cavalieri provenienti dalla necropoli alto-medioevale di Vicenne-Campochiaro (Molise) Belcastro *et al.* (2000) hanno osservato *usura linguale anomala*.

- Sono stati esaminati i resti scheletrici di individui morti nel 1809 e provenienti dal cimitero della prigione Christiana House of Correction ad Oslo (Norvegia) (Kvaal & Derry, 1996). Nel 25% dei maschi e nel 28,5% delle femmine sono state osservate, con le arcate in occlusione, *aperture anomale formate da 4 denti* (2 superiori e 2 inferiori) che possono essere attribuite all'abitudine di fumare la pipa. Le alterazioni compaiono ad un'età molto giovane (17 anni) e possono essere sia unilaterali sia bilaterali. Durante gli scavi sono stati rinvenuti molti cannelli, ma non fornelli e da ciò sembra che le pipe economiche dal gambo corto fossero quelle più comunemente usate. Tuttavia si rompevano molto facilmente, erano sostituite di continuo e quindi molto spesso i denti venivano a contatto con nuovi oggetti dalle superfici grezze.

- **Italian territory**

Some non masticatory dental lesions have been observed in all of the horsemen (the horsemen sample consists of 9 skeletons – TT. 16, 66, 73, 79-85, 81, 109, 141, 150, 155 – and 225 teeth) of the Necropolis of Vicenne-Campochiaro (CB) (VII-VIII c. AD).

An evident lingual wear of the upper incisors and canines, between the CEJ and incisal edges has been observed in three adult mature horsemen (TT. 16, 66, 109). These features are not present in the adolescent and young horsemen respectively of T.155 and T.141, perhaps properly in relation to the young age, and have been not recorded in the horseman of T.73 and T.81 (Belcastro *et al.*, 2000).

The pattern observed at least in three horsemen (TT. 16, 66,109) recalls those described as LSAMAT (Lingual Surface Attrition of the Maxillary Anterior Teeth) (Turner *et al.*, 1983; Comuzzie & Steel, 1998; Turner *et al.*, 1991; Irish & Turner, 1997).

In the horsemen sample the loss of dental substance does not involve the buccal surfaces of anterior teeth nor the lingual and the buccal surfaces of posterior ones, but only the lingual surface of anterior teeth. Moreover, the surfaces of the lingual wear are flattened and polished for the abrasion (pulling, rubbing, chewing, etc.) of some substance for lengthy period of time. The nature of the substance involved in this unusual wear is unknown, but it is possible to suppose that it is abrasive and lacking in carbohydrates since the low rate of caries only on the posterior teeth in these three mature-aged horsemen (Belcastro *et al.*, 2000). The wear of our sample could suggest that the horsemen could process, between the upper incisors and tongue, some particular substance. However a combination of several aetiological factors could be responsible of this wear. The erosion, due to the chemical composition of some substances, is involved, probably affecting the dental surface doing it more vulnerable to successive abrasion and attrition, as already observed (Bruggen & Cate, 1968; Davies & Winter, 1980). However a massive repetitive mechanical stress is, probably, the main cause of this wear pattern (Belcastro *et al.*, 2000).

It is also interesting to underline that this kind of wear is present only in two adult males of this necropolis (TT. 27 e 63) inferring that some particular substance were disposable only for some individuals. It is possible to suppose that some activities linked to

the horseback riding and fighting could be involved (e.g. chewing of some substances, leather softening, tool making and repairing, etc.). It is also possible to hypothesize a particular habit to chew some substances not related to food or activity. So this could indicate a particular role of these individual in the community (Belcastro *et al.*, 2000).

Intentional teeth modifications can be produced by aesthetic (Ubelaker, 1989) and hygienic and cosmetic reasons (Pedersen, 1979; D'Errico *et al.*, 1988; Cox *et al.*, 2000), a scopo terapeutico (White *et al.*, 1997; Coppa *et al.*, 2006) e per numerosi altri motivi:

- The buccal surfaces of all teeth of Isabella d'Aragona (1470-1524) (D'Errico *et al.*, 1988) have been intensively abraded with *dentine exposition*. This abrasion is particularly evident on the anterior teeth where the enamel was partially or totally removed. The scanning electron microscopic examination revealed on the abraded surfaces of the anterior teeth horizontal striations, while on the buccal surface of posterior teeth obliquely oriented striations in two converging directions. Moreover, the lateral incisors and the upper canines show a convex profile. In contrast, unabraded surfaces were covered by a black patina containing a high mercury level that can be attributed to a chronic mercury intoxication, which was probably used therapeutically in the treatment of syphilis. The Authors suppose that the abrasions were intentionally produced by a rigid instrument while attempting to remove the patina.

- In the dentition of King Christian the Third (1503-1559) (Pedersen, 1979), the facial surfaces of the upper anterior tooth crowns exhibit very pronounced *abrasion of enamel* with exposure of islands of dentine gingivally. These surfaces show fine microscopic scratches in the main running transversally over dentine and cementum. This loss of tooth substance seems to have been caused by frequent cleansing with a fine abrasive applied by means of a piece of cloth or possibly with a brush. The same tooth crowns exhibit loss of approximal contours and microscopic tracks possibly caused by the use of metal toothpicks.

- In a study on the British nobleman Charles Whitworth (1754-1825) (Cox *et al.*, 2000), was observed *enamel erosion* on buccal surface of all anterior dentition. The destruction of the labial enamel was focused on the CEJ junction in most of surviving anterior teeth and was most severe on the upper left incisors where the anterior enamel was totally destroyed. The Authors suppose that a destructive agent may have eroded the enamel. This might be attributed to the application of an acid-based dental tincture or the use of an abrasive substance to whiten the teeth. Further, it bears witness to three *dental restorations*, two of gold and one tin. The two gold (foil) fillings are an occlusal in the upper-right second molar and a cervical on the labial surface of the upper left canine. The tin filling is an occlusal in the upper left second molar.

- **Africa**[5]

- Tra i Boscimani di epoca moderna 4 individui presentano *solchi interprossimali* (4/224), soprattutto nel primo molare superiore, ma è possibile trovarli anche negli altri denti ad eccezione che negli incisivi e nei terzi molari (Wallace, 1974). Le caratteristiche e le cause sono le stesse che l'autore ha riscontrato negli Indiani americani (vedi America del Nord).

- In un gruppo preistorico senegalese 10 individui su 22 presentano un'*usura anomala* delle superfici linguali degli incisivi superiori senza che vi sia corrispondenza nell'usura dei denti inferiori (*LSAMAT*: lingual surface attrirtion of tha maxillary anterior teeth) (Irisch & Turner II,1997). La frequenza, più bassa rispetto a quelle osservate nelle popolazioni americane, potrebbe essere collegata alla piccola taglia del campione, ad un minore uso di cibi abrasivi ricchi di carboidrati oppure all'eterogeneità geografica del campione stesso per cui gli individui, provenendo da due regioni diverse e molto vaste, potrebbero aver avuto diete differenti. In ogni caso si può ipotizzare che LSAMAT sia stato provocato dal consumo o dal trattamento di sostanze vegetali altamente abrasive - trattenute tra i denti superiori e la lingua - e ricche di carboidrati, forse manioca, ma verosimilmente anche dalla canna zucchero, la cui coltivazione non era invece praticata nell'America Latina.

- **North America**

- L'analisi delle dentature di 324 Aleutini, Eskimo e Indiani del Nord di epoca preistorica e protostorica da parte di Turner e Cadien (1969) ha rivelato differenze nelle frequenze di *chipping*. Questi si presentano soprattutto tra gli Eskimo dell'Alaska, del Canada e della Groenlandia, mentre sono molto meno frequenti negli Eskimo dell'Isola di Kodiak, negli Aleutini e negli Indiani del Nord.

Tra gli Eskimo non si notano differenze tra i sessi e le frequenze di chipping aumentano passando dagli infanti-subadulti (6-20 anni) agli adulti (>20 anni). Questa distribuzione probabilmente indica maggiori stress sulla dentatura, da relazionare ad un ambiente più rigoroso di quello degli Aleutini o degli Indiani. Pertanto le differenze sono da imputare al tipo di cibo, alle tecniche di preparazione e di utilizzo di questo - esistono descrizioni etnografiche di Eskimo che masticano ossa per estrarne il midollo, ma non vi sono documenti analoghi, ad esempio, per gli Aleutini - e in genere al modo con cui i denti vengono impiegati (ad esempio in attività extra-masticatorie) piuttosto che solo a differenze determinate geneticamente. Degno di nota è il fatto che tutti i gruppi in esame siano completamente privi di carie, anche se costante è la presenza di ascessi: chiaramente i chipping si presentano nelle popolazioni a dieta carnea.

- L'esame di resti scheletrici di popolazioni indiane americane di differente provenienza e cronologicamente anche molto distanti (da 5000 anni a.C. al 1832 d.C.) (Ubelaker *et al.*, 1969) ha evidenziato, in almeno 6 individui, la presenza di *solchi interprossimali*. Sono posti in prossimità della CEJ, sono di forma tubolare, levigati e orientati disto-lingualmente. In molti casi l'alterazione interessa due denti adiacenti. Il solco

[5] Cruwys e Duhig (1993) hanno riscontrato *erosione acida* nei denti di un cranio anteriore al 1860 e proveniente dal Congo.

sembra essere stato prodotto dalla ripetuta inserzione tra due denti di uno strumento cilindrico, come suggerito dalla forma della lesione, dalla lucentezza dell'area esaminata e dalla presenza di fini strie sul suo fondo. L'oggetto veniva inserito dall'esterno (quando l'alterazione non interessa l'intera larghezza del dente è evidente solo vestibolarmente) e nella maggior parte dei casi non era flessibile. Era probabilmente utilizzato a scopo terapeutico perché nel 92,31% degli individui con solchi si nota riassorbimento del margine alveolare a causa di problemi parodontali (con questo strumento si potevano rimuovere residui di cibo depositato negli spazi interprossimali) e nel 36,56% dei casi i solchi sono associati a carie.

- Nelle popolazioni Eschimesi e Lapponi l'apparato masticatorio può essere utilizzato ad esempio nell'ammorbidimento delle pelli (soprattutto di foca), nella preparazione di tendini (usati ad esempio per cucire abiti), nella fabbricazione di fili di stagno e nell'estrarre i coloranti dalle cortecce, grazie all'azione chimica della saliva durante la masticazione (Lous, 1970).

- I *solchi interpossimali* individuati da Wallace (1974) in Indiani americani moderni hanno le stesse caratteristiche di quelli descritti da Ubelaker (1969), ma è diversa l'interpretazione che ne viene data perché Wallace ritiene che se uno strumento di legno o di una qualsiasi altra sostanza vegetale fosse fatto passare ripetutamente tra i denti, lo smalto non sarebbe così gravemente scalfito. Inoltre le caratteristiche dei solchi sarebbero differenti da individuo a individuo a seconda della forza e della modalità d'azione, cosa che invece non si verifica. Pertanto si ritiene che il fattore eziologico sia rappresentato da particelle abrasive di sabbia o di terra presenti nei cibi che incidono lo smalto e/o il cemento quando la saliva è succhiata con forza attraverso lo spazio interdentale, libero a causa della recessione del margine alveolare. A supporto di questa ipotesi è l'assenza di solchi interprossimali in quei gruppi umani - Caucasoidi o Neri del Sud Africa (sono presenti solo in una donna di 86 anni) - in cui una dieta cosiddetta "civilizzata" prevede l'assunzione di meno cibi ricchi di particelle abrasive.

- In una piccola popolazione preistorica di Indiani della California sono stati individuati *solchi* su almeno un dente di ognuno dei 10 individui del campione (Schltz, 1977). Interessano soprattutto la mandibola, nel lato sinistro e sono più frequenti nei denti anteriori. In 7 individui sono localizzati *interprossimalmente*, mentre in 3 individui il solco si presenta sulle *superfici incisali*, sia in senso vestibolo-linguale sia attraversando mesio-distalmente il C dx e il C sn inferiori. L'alterazione è stata attribuita all'utilizzo dei denti in attività svolte da uomini e donne senza distinzione di età, probabilmente connesse alla preparazione e all'utilizzo di fibre vegetali. Infatti vi è evidenza, nelle tribù moderne residenti in vicinanza del sito, di quanto i denti siano d'aiuto nella produzione di cesti.

- La presenza di *solchi interprossimali* è stata osservata nel 30,4% (46/161) degli individui di un gruppo di Indiani Arikara del Sud Dakota della seconda metà del diciottesimo secolo (Berryman *et al.*, 1979). Anche in questo caso sul fondo vi sono strie e queste scalfitture suggeriscono, come fattore eziologico, l'abrasione piuttosto che l'erosione chimica. I solchi sono stati attribuiti alla presenza di particelle abrasive nella dieta in congiunzione con l'utilizzo di "stuzzicadenti", probabilmente non flessibili (gli angoli di inserzione evidenziano

che il corpo era orientato e limitato nei movimenti dalla presenza delle guance) per lenire il dolore e il fastidio provocati da carie e riassorbimento alveolare.

- Sono stati individuati *chipping* in 3 campioni scheletrici di Indiani dell'Illinois del periodo Missisipiano (Milner, 1984). I chipping sono localizzati in vicinanza delle faccette di usura e si ritiene siano stati determinati dalle pressione esistente tra i denti e le particelle incastratesi negli spazi interprossimali. La gravità e la localizzazione delle alterazioni sono correlate alla struttura dello smalto, all'usura e a traumi di vario genere.

- Nelle popolazione preistoriche del Grat Basin (Larsen, 1985) sono stati rinvenuti *solchi sulle superfici incisali* dei denti.

- Puech e Cianfarani (1988) hanno trovato evidenza di *solchi interprossimali* in due denti di 2500 anni a.C. provenienti da Peyraoutes. Il solco del molare superiore è associato ad una carie. Tre solchi lineari orientati perpendicolarmente all'asse mesio-distale del dente si osservano nell'incisivo centrale e le fini strie presenti sul fondo si incrociano sia al limite vestibolare del solco sia a quello linguale, evidenziando l'utilizzo dei denti anteriori in attività lavorative, probabilmente la preparazione di corde e fibre vegetali, come documentato etnograficamente.

- Comuzzie e Steele (1988) hanno osservato usura anomala delle superfici linguali degli incisivi superiori (*LSAMAT*) in un gruppo preistorico di cacciatori-raccoglitori provenienti dal sito di Blue Bayou (Costa Texana). Il modello è simile a quello rinvenuto a Panama e a quello del Brasile (vedi America Centro-Meridionale), ma nel presente caso non si riscontra una stretta correlazione tra LSAMAT e carie. È possibile quindi che l'azione meccanica fosse la stessa, ma che la sostanze utilizzata non fosse cariogenica (si esclude quindi l'intervento della manioca).

- La presenza di *solchi interprossimali* in una popolazione arcaica della Florida (Dickel, 1989) è stata attribuita all'abrasione dovuta all'utilizzo di specilli, anche se altre cause non possono completamente essere escluse.

- Nei resti scheletrici provenienti dalla Lower Pecos Region in Texas (8000 a.C.-1000 d.C.) Hartnady e Rose (1991) hanno osservato usura sulle superfici linguali degli incisivi superiori (*LSAMAT*). Tale alterazione - in alcuni casi talmente forte da portare anche all'esposizione della polpa e alla successiva perdita del dente – è stata attribuita a sostanze vegetali abrasive passate e tirate più volte sui denti anteriori, non necessariamente a scopo alimentare. Infatti, dalla presenza di resti di corde e di cesti nel sito, si può ipotizzare che i denti venissero utilizzati nella fabbricazione di questi o altri oggetti.

- **Central-South America**

- *Usura anomala* è stata osservata in alcuni individui maschili appartenenti alla tribù indiana degli Zuni (Messico del Nord) vissuti tra la fine del periodo precolombiano e l'inizio di quello postcolombiano (Leight, 1925). L'usura sproporzionata degli incisivi inferiori, sicuramente non provocata dall'occlusione, potrebbe essere stata causata dalla frizione di corpi estranei, probabilmente legati a qualche attività che richiedeva l'utilizzo dei denti. Il modello di usura è simile a quello prodotto dalla pipa.

- Usura anomala delle superfici linguali degli incisivi superiori (*LSAMAT*) è stata riscontrata nella maggior parte (39/46) degli individui provenienti dal sito arcaico di Corondò, in Brasile (4200-3000 anni fa) (Turner II & Machado, 1983). L'usura anomala, che non trova corrispondenza in un modello di usura analogo nei denti inferiori, è associata ad una alta frequenza di carie, interessa indifferentemente uomini e donne e si incomincia ad intravedere già all'età di 10-11 anni. La causa dell'alterazione potrebbe essere l'abitudine di tenere sostanze vegetali tra i denti superiori e la lingua e i piani di usura permettono di immaginare che il movimento fatto sia paragonabile al "moderno" modo di mangiare carciofi (raschiarne le foglie tramite le superfici incisali dei denti anteriori). La gran quantità di carie fa presupporre che le sostanze fossero altamente cariogeniche (semi, frutta e tuberi molto ricchi di carboidrati) e in particolare è stato pensato che si facesse un largo uso di manioca.

- Usura anomala delle superfici linguali degli incisivi superiori (*LSAMAT*) è stata riscontrata in un gruppo di Indiani preistorici (16/28) delle regioni Panamensi (Irish & Turner II, 1987). Non è stata riscontrata usura corrispondente nei denti inferiori. L'alterazione è presente solo negli adulti, maggiormente negli uomini che nelle donne. Le frequenze di carie sono in ogni caso alte. LSAMAT è stato probabilmente causato dall'abrasione da parte di sostanze vegetali sabbiose e ricche di carboidrati, come la manioca e in particolare nel caso in cui le sue radice vengano pelate e lacerate con continuità. Le differenze tra i sessi potrebbero essere correlata ad una suddivisione del lavoro, ma non è escluso che siano effetto della piccola taglia del campione.

- Usura anomala delle superfici linguali degli incisivi superiori (*LSAMAT*) è stata riscontrata anche in non-native americans (10/22) from Senegal (Irish & Turner II, 1997).

- Eckhardt e Piermarini (1988) hanno osservato *solchi interprossimali* in Sud America. Si ritiene siano stati causati da specilli d'osso e di legno ripetutamente, passati tra i denti probabilmente per lenire irritazioni alle gengive. La presenza dell'alterazione in queste regioni mostra quanto vasta sia questa pratica culturale.

- **Asia**

- *Mesiodistally directed grooves* have been observed by Erdal (2007) on the occlusal surfaces of nine incisors of five females in a small skeletal population from Kovuklukaya (Sinop, northern Anatolia, 10th century AD). Unfortunately, there is no archaeological evidence to explain the cultural practices that must have caused such unusual abrasions of the anterior dentition. However, according to the direction of the grooves, the ecological characteristics of the region, and the ethnographic data, the Author proposes that the unusual abrasion observed in the Kovuklukaya population may be linked to passing yarn between the anterior teeth to wet it. Moreover, because of the grooves in the Kovuklukaya population were found only in female skeletons, it could suggest the existence of a sex-based division of labour in yarn production.

- **Australia and Oceania**

- *Solchi interprossimali* sono stati individuati nel 41% (35/85) dei resti scheletrici di aborigeni dell'Australia meridionale del 19° secolo e nel 6,78% (98/1445) dei denti (Brown &

Molnar, 1990). I solchi sono sempre localizzati alla CEJ, diretti orizzontalmente, di forma semicircolare e principalmente interessano i molari e i premolari. Sono inoltre stati individuati differenti e progressivi gradi di gravità (solchi leggeri, medi e profondi). Solo in un caso sono stati individuati solchi simmetrici sulla superficie occlusale sconfinanti lingualmente (molari superiori). Filmati etnografici sul tipo di attività e la vita quotidiana di società aborigene tradizionali hanno messo in evidenza l'importanza dei tendini animali, soprattutto di canguro, come materiale utile nella costruzione di oggetti di vario genere. Prima del loro utilizzo i tendini venivano masticati, perché diventassero più morbidi e duttili, e tirati con la mano destra avanti e indietro tra i denti posteriori serrati, mentre la sinistra teneva l'estremità del tendine guidandone il passaggio tra i denti posteriori.

- Ikehara-Quebral and Toomay Douglas (1997) describe a particular cultural alteration found in a precontact (pre-1521) skeletal semple from Agana, Guam (Mariana Islands). Infact, some individuals show one or more *incising* and/or *abraded* teeth. Examination of the available literature on precontact human remains from the region reveals at least three patterns of dental incising and similar cases of dental abrasion. While the origins of these practices are not known, the presence and style of these cultural alterations may be sex-specific, cosmetic in nature, or an indication of status in a ranked society. Alternatively, they may signify membership in a particular group or lineage, or mark a rite of passage. Because the comparative samples are limited in number and small, and the provenience of many of the skeletons is obscure, temporal variation cannot be ruled out.

PART II

A. Historical-archaeological outline of Emilia-Romagna necropolises

a. The archaeological context of the necropolises in Bologna area

Few kilometres from Bologna (*Bononia*), in northern Italy, in the area of Casalecchio di Reno (Bologna, Italy), where for many years the Local Authority for Archaeological Investigations, under Dr J. Ortalli's direction, carried out several excavation sessions (1986 - 2001), a large number of archaeological ruins were found, belonging to a long period of time. The most ancient ones date back to the Neolithic, documented by hut foundations, and they go through the Iron Age settlements until the Late-Ancient period settlements (4^{th}-5^{th} c. AD). They give evidence that Casalecchio di Reno, situated at the convergence of two valleys connecting the Tyrrhenian to the Adriatic area, was inhabited without interruption from the Neolithic age to the Roman Late-Ancient period. (4^{th}-5^{th} c. AD). Moreover, it was a sort of crossroads for uninterrupted cultural and civilization exchanges. (Kruta Poppi, 1979; Mengoli *et al.,* 1993; Ortalli, 1994; Ortalli, 1995a, 1995b, 1995c; Kruta & Manfredi, 1999).

Necropolises dating back to the period from 4^{th} c. BC to 5^{th} c. AD belong to this context, although the highest number of settlements developed in the Roman period.

b. The Celtic necropolis of Ceretolo (Bologna, Italy)

The **Celtic necropolis** (4^{th}-2^{nd} c. BC) found in Ceretolo, in the area of Casalecchio di Reno, is the earliest archaeological site that could be attributed to the Celtic tribe of the Boi, that migrated from Bohemia to Emilia-Romagna (Northern Italy). In this necropolis were found 97 burial tombs (96 inhumations and one with cremated human remains have been discovered) (Ortalli, 1995a, 1995b). Grave goods are generally poor and show no evidence of admixture with the Italic populations, especially the Etruscans, settled in the same region in the same period. Moreover, social differentiation is not evident except for one individual who was cremated (Ortalli, 1995a, 1995b; Kruta & Manfredi, 1999). Three warriors' tombs have been identified (Ortalli, 1995). About the spatial organisation of the Celtic necropolis of Casalecchio two phases have been recognised (Ortalli, 1995). The first corresponds to the first half of the 4^{th} century BC when the necropolis was limited southwards by a river that later changed course, probably in the second half of the 4^{th} century BC. The second phase, after the deviation of the river, ranges from the second half of the 4th to the beginning of the 3^{rd} c BC. Thus, the tombs located on the dried-up riverbed are the most recent ones.

During the restoration of the skeletal material, a silver coin, an imitation of a Massaliot coin from the third quarter of the 4^{th} c BC (Ortalli, personal communication), was found in the sediment filling one warrior's chest cavity (T. 65). Moreover, at least three warriors, identified on the basis of associated archaeological specimens (Ortalli, 1995), also present

skeletal markers of activity indicating their engagement in war activities (Mariotti, 2001; Belcastro *et al*., 2001). It is thus possible that some of the Celts of Casalecchio had engaged in war activities in the eastern parts of the Old World.

The analyses on the teeth of 94 individuals (Brasili *et al*., 2000; Mariotti, 2001), show a population characterized apart from a fairly well balanced diet mainly made of meat (derived from rearing or hunting), dairy products and also characterized by the oldest evidence of leprosy in the Western world (Mariotti *et al.*, 2005).

c. The Roman necropolises of Casalecchio di Reno (Bologna, Italy)

As regards the **Roman period**, a large area of necropolises, with over 250 tombs, were found in the "A zone" of Casalecchio di Reno. Tombs date back from the Roman-imperial age to the Late-ancient period ($1^{st}/2^{nd}$-5^{th} c. AD), though the highest number of tombs dates back to the Roman-imperial age (2^{nd}-3^{rd} AD) (Ortalli, 1994). In particular, in "A" burial place it is possible to distinguish: necropolis "A" used from 2^{nd} c. AD to the first half of 5^{th} c. AD (76% inhumations and 24% incinerations); necropolis "B" dating back to 2^{nd}-3^{rd} c. AD (59% inhumations and 41% incinerations); necropolis "2000" dating back to 1^{st} c. BC/1^{st} c. AD until 4^{th} /6^{th} c. AD (94% inhumations and 6% incinerations) and a Late-Ancient necropolis, (mainly having inhumations), used from 3^{rd} to 4^{th} c. AD (**Tab. 2**). Therefore, three different temporal groups can be distinguished as regards the use of the necropolis: late Republican age –Augustan age (1^{st} c. BC – 1^{st} c. AD); Imperial age (2^{nd}-3^{rd} c. AD); late-ancient Roman age (4^{th}-5^{th} c. AD).

	Burial kind	
Necropolises	***Inhumation***	***Incineration***
Celtic	99%	1%
"A"	76%	24%
"B"	59%	41%
"2000"	94%	6%
"Late ancient."	>	<

Tab. 2- Burial kind distribution (inhumation and/or incineration) in the necropolises of Casalecchio di Reno.

Graves are mainly "alla cappuccina", but also "brick-case" and " wood-case" graves were found. The buried corpse was always lying on his back, his arms leaning on his hip or along his sides, his head often resting on a funeral pillow made of bricks or stone. Infants were placed into big amphoras having their bottom or neck cut (Terzani 1991). A small number of graves only contained accompanying objects, generally quite poor and consisting mainly of jars, lamps and bronze coins. Some animals' bones turned out to be funeral offers.

The objects accompanying the dead person could be even poorer – small metal medals, bronze rings, little plates.

Therefore, on the basis of their size and funerary goods, these necropolises were probably associated with a *pagus* or *vicus*, small towns of farmers and traders situated next to the city of *Bononia* (Mengoli *et al.,* 1993; Ortalli, 1994).

This archaeological site, densely populated, is believed to be the largest Roman necropolis found in Emilia-Romagna, maybe in whole northern Italy. Archaeological investigations have not made it possible to define its whole structure properly, but a large rural-urban villa and an elegant residential district were certainly part of it (Ortalli, 1994). In the early Imperial age, this settlement was flourishing, as is witnessed by a large necropolis, both under agricultural and residential points of view (Mengoli et al., 1993). Other excavations then showed that between 2nd and 3rd c AD settlements started to decrease and a sort of residential decline developed, followed by further decrease in the late Ancient age (Ortalli, 1994).

B) Historical-archaeological outline of the necropolises in Marche district

a. The necropolis of Novilara (Ascoli Piceno, Italy)

Located in the north of Ancona, Novilara is an outstanding archaeological site and one of the best-known in the archaeological facies of the Iron Age, conventionally called "Picena Civilization". The earliest known excavations were carried out in 1873 by Count Dario Bonamini. Several other excavations went on until 1912. The over 300 graves which were uncovered belonged to a large necropolis, (dating back to the end of IX and the half of VI c BC) whose boundaries and internal arrangement unfortunately are not well defined (Baldelli, 1997).

It may have been linked to only one village, not a very large one, whose location is not certain, but must have been in the nearby, maybe on the median area of Santa Croce Hill, where the most ancient ruins of human settlements date back to the recent Bronze Age. (XIV-XIII c BC) (Baldelli, 1997).

The kinds of burial and of grave goods assign Novilara's necropolis, as already said, to " Picena Civilization", but they do not provide information about the local people's ethnic identity. As a matter of fact, in the territory north of Ancona, the pre-roman ethnic context must have been extremely varied if Plinio, in his *Naturalis Historia*, wrote this region saw the consecutive migrations of Siculians and Liburnians, Umbrians, Etruscans and Gallus, drawing this information from ancient historio-graphic traditions (Baldelli, 1997).

Novilara's necropolis displays two separated sectors, from a topographical point of view, but close to each other. They are called Molaroni necropolis and Servici necropolis and they draw their names from the estates' owners. The two burial sites started to be used between the end of IX and the half of VIII c BC and ceased to be used around 600 BC (Gobbi, 1997).

In Molaroni burial site 142 graves were found (all of them inhumation tombs), where the dead were laid down, squatted in common rectangular holes, digged into the clayey earth. In Servici burial site 121 graves were found, mainly inhumation ones and only two cremation ones. Almost all the graves in the two burial sites were provided with grave goods, placed on the bottom of the hole, near the corpse. The objects found inside the graves may be divided into two categories – some of them date back to the earlier usage of the burial sites (VIII c BC) corresponding to the second phase of the first Italian Iron Age and of "Picena Civilization". Later objects, dating back around VII c BC, attest to Tyrrhenian orientalizing facies as a result of Greek settlements in Sicily and Southern Italy (Gobbi, 1997).

The graves of men contained arms (made of bronze or iron) such as spears' foliate-blade points, swords, daggers, curved knives. Few graves only also contained helmets (usually made of bronze) which used to belong to military leaders only (Gobbi, 1997).

The objects accompanying dead women were mainly clothes and jewels such as pendants and plaques made of bones or amber, coloured glass-paste pearls, bronze rings. Women's grave goods also consisted of fusaroles, spools, loom weights and needles. All these objects are evidence that among Novilara's people women were mainly concerned with

domestic activities such as spinning and weaving and, as is shown by the finding of awls, also with hide dressing. In some women's graves, dating back to the later period of usage of the necropolis, some other interesting objects were found – nail-cleaners and ear-sticks made of bronze (Gobbi, 1997).

b. The Roman necropolises of Suasa (Ancona, Italy)

As a result of the archaeological excavations carried out in the surroundings of Castellone di Suasa (AN), in the hinterland of Senigallia, different burial areas were discovered, all of them related to the Roman town of Suasa (Chemeri, 2005-2006).

Suasa may have its origin in the earliest Roman settlements in *Ager Gallicus*, which developed after Roman victory in the battle of *Sentinum* in 295 BC. However, many Roman colonists settled in this area only in 232 BC, as a consequence of *Lex Flaminia de agro gallico et piceno varitim dividendo.* Suasa became a town centre only during I c BC (Dall'Aglio, 1991).

Since 1987, Bologna Archaeology Department has been carrying out excavations in this area, under the direction of Professors Dall'Aglio and De Maria and they show this site had already been inhabited since the end of III c. BC. However, the town reached its utmost magnificence during the imperial age between I and II c. AD and the two necropolises found in the northern and southern borders of the town date back to this period (Dall'Aglio, 1991).

In the necropolis called "southern", developing along the way to *Sentium*, the ruins of four monumental tombs were found containing no buried people. About forty ordinary graves and three holes (*ustrinae*) were also uncovered, where corpses were cremated before being moved into the grave. Inhumation tombs are of three kinds: "cappuccina", "brick-case" and land hole.

Near the forum an elegant and magnificent *domus* was found, belonging to *gens* Coiedia, a *gens* of high rank, counting senators among its members, (from I to II c d.C).

Suasa's wealth derived from its estates and farming activities, but despite its lands were fertile and though it was located in a strategic position along the road system, this flourishing age was followed by an irreversible decline.

The town was completely abandoned in VI c. during the war between the Goth and the Byzantine (535-553 AD). However, before being definitely abandoned, Suasa went through a period of decadence which had already started in IV c AD and lasted two centuries. During this period, the inhabitants gradually left the town centre to settle on the surrounding hills. Therefore, the buildings and town areas were used as burial sites. For example, the pools in town became pauper's graves and even Coiedii's *domus* and its garden were used as burial places.

During this period (IV c AC) most tombs are single or double, of the kind "alla cappuccina" – they are covered by large sloping tiles and the inner surface of the hole is covered with fired hollow flat tiles.

C. Historical-archaeological outline of the necropolises in Molise district

a. The Iron Age: the Necropolis of Pozzilli (Isernia, Italy)

The necropolis of Pozzilli (Isernia, Italy) consisting of n°103 graves, is a Samnite-pentra burial site located in the village of Camerelle near the town of Pozzilli (IS) in river Volturno valley, a crossroads between the Tyrrhenian coast (Lazio and Campania) and the Adriatic coast (Molise and Abruzzo). The objects found in the graves show the necropolis was constantly used from the late 7th to the middle 4th c. BC, in the very Iron age. Some graves going back to the Hellenistic age (2nd c. BC) and the Roman-imperial age (2nd c. AD) witness this necropolis was occasionally used in the later period (Capini 1996). However, most graves date back to 6th e 5th c BC. They are hole graves closed by large tufa plates orientated casually. The dead were lying face upwards directly on the bare ground, their arms leaning along their sides and their legs parallel. The objects accompanying them were not generally very rich, except for three graves that are outstanding for their magnificence. Among findings we can list some iron fibulas, bronze bracelets, glass-paste rings, some arms (mainly iron spear points), some jars for foods. Rear graves belong to the kind "cappuccina": the Hellenistic ones are covered by tiles, the Imperial graves are covered by flat tiles and reveal the dead laid upon a base.

The burial sites were uncovered in the 1970's during emergency excavations that made it possible to investigate only in the southern part of the necropolis. That is why it was not possible to detect the human settlement connected to it (Capini 1980). Some traces of huts' foundations found in the nearby plane may be the ruins of the village connected to this necropolis. (Capini, 1981; 1991). They may be the only heritage of a Samnite *vicus*, an administrative and territorial unit whose life was based on agricultural-pastoral economy, always located in the nearby of major crossroads or sheep tracks (Rainini 2000). This kind of human settlements was typical of the Samnite area during the Iron age – scattered groups throughout the territory, organized like agro-pastoral clans, physically separated one from the other. Therefore, the necropolis of Camerelle may have been the reference point for some of these human settlements until the Roman age, as it was located in the centre of the plane, in an extremely favourable area for trade and cultural exchange with Campania, Abruzzo and Molise where *Aesernia's* and Campochiaro's necropolises were located (Capini 1980, 1996).

From the middle 4th century, the rivalry between the Samnites and the Romans grew up and an important change occurred in the organization of the local settlements – small towns developed. For example, in the plane of Venafro and in high Volturno valley, the number of villages grew more and more (Rainini 2000). Between 9 and 14 AD, *Venafrum* was assigned by Augusto to *Regio* I along with *Allifae* e *Telesia* (Coarelli, La Regina 1984).

b. The Late Antiquity-Early Middle Ages transition

The Late Antiquity-Early Middle Ages transition in Europe was a period of profound cultural, political, social, and economic transformations after the fall of the western Roman

Empire (dated at 476 AD). The first two centuries of the Roman Imperial Age were characterized by general peace and economic prosperity, but during the III c. AD the socioeconomic and political situation worsened, in line with the general conditions of the Roman State that suffered from political instability, heavier taxes, collapse of trade and agriculture, etc. (Righini, 1976). The following centuries saw the spread of epidemic diseases (plague, smallpox, tuberculosis, leprosy, malaria), famine, and undernourishment, due also to increased contacts with other populations following the wars and barbarian invasions (Kiple, 1999).

Although archaeological, historical, and demographic data testify to this process of transformation—for example, the Italian population was halved from eight million (III c. AD) to four million (second half VI–second half IX c. AD) (Del Panta et al., 1996)—there have been few osteoarchaeological and epidemiological studies of these transitional phases and their possible effects on population biology.

c. The roman necropolis of Quadrella (Isernia, Italy)

The Roman necropolis of Quadrella, consisting of over 110 graves, was an extra-urban area of *Aesernia*, a Roman colony since 263 BC. As soon as Aesernia became a *municipium* (self-governing centre of the Roman Empire), there was a strong influx of people from Latium, which contributed to the prosperity of the small city. Most graves are of the "*cappuccina*" type (burial covered with tiles in a double pitch roof) and the few grave goods are uniform and repetitive, indicating "a rather undifferentiated social extraction of the occupants" (Terzani, 1991; Terzani and Matteini Chiari, 1997). Inscriptions on tombstones refer to *liberti* (freed slaves) (Terzani, 1991).

d. The early medieval necropolis of Vicenne-Campochiaro (Campobasso, Italy)

The early medieval necropolis of Vicenne-Campochiaro, consisting of 167 graves, is situated between Sepino, Bojano, and Isernia and is dated to the Lombard period (VI–VIII c.).

The necropolis refers to a community located in the areas described by the Lombard historian Paolo Diacono, in his History of the Lombards, as extensive uninhabited areas in the plain between Sepino, Bojano, and Isernia (book V, 29) used to control the borders of the Duchy of Spoleto and Benevento. With the current archaeological and historical data, it is not possible to refer the necropolis to a certain town and the graves may have been related to nomadic settlements (De Benedittis, 1988; Ceglia and Genito, 1991). One of the most important elements of the necropolis is the multiethnic context, observed by the archaeologists and historians who studied the materials and the types of burials. In fact, Lombard, local, and Avar materials (jewels, stirrups) were found (Ceglia and Genito, 1991; Genito, 1991).

Moreover, the discovery of 12 graves of horse and man, i.e., the contextual burial with a horse equipped with typically Avar harness and stirrups, is the first documentation of this type of burial in Europe (Genito, 1991). It is also important to underline that stirrups have not been found in any other European necropolis dated to before this period. Stirrups revolutionized the military strategies of fighting, since without them a warrior could not fight

while riding a horse. These graves, with a human skeleton and a horse skeleton buried together in the same pit, are considered high-status graves, because of the inferred sacrifice of the horse on the death of the master (Ceglia, 2000). This is known elsewhere in Italy only in grave 43 of the Lombard necropolis of San Mauro at Cividale del Friuli (Silva, 2000). This type of burial is not reported for Europe: from protohistoric times until the Alemannic cemeteries, horses were buried separately from humans. The type of burial at Vicenne is quite similar to the numerous ones in Eurasian nomadic populations of the Iron Age and persists in the Age of Migrations (IV–X c. AD) (Kurylev *et al.*, 1989). For the community of Vicenne, therefore, we can talk of a multicultural and perhaps multiethnic context with “Asian," Germanic, and local components (Genito, 1991; Belcastro and Facchini, 2001; Belcastro et al., 2001a, b, 2003).

PART III

A. Materials and Methods

a. Materials from Emilia Romagna

The skeletal remains analyzed in this study refer to the Celtic necropolis of Ceretolo (Bologna, Italy) (CRT) and to the roman necropolises of (CSL "A", CSL "B", CSL "2000" considered all together as CSL imp and CSL "TA") (Bologna, Italy) dating back to the Imperial Age to the Late Ancient period.

I. The necropolis of Ceretolo (Bologn, Italy)

In this study have been analyzed the skeletal remains of the celtic necropolis of Ceretolo (BO) (CRT). The funerary goods and the kinds of inhumation belong to 97 (96 inhumations and one with cremated human remains have been discovered) individuals and they assess the necropolis to the to the 4th-2nd c. BC (Ortalli, 1995a, 1995b; Kruta & Manfredi, 1999).

CRT	Males	Females	N.I.	Total
Youg Adults (21-35 anni)	14 *(46,7%)*	16 *(53,3%)*	-	30 (42,8%)
Mature Adults (36-50anni)	26 (74,3%)	8 (22,8%)	1 (2,8%)	35 (50,0%)
Old Adults (>50 anni)	1 (50,0%)	1 (50,0%)	-	2 (2,88%)
Adults (not identified age)	2 (50,0%)	2 (50,0%)	-	4 (5,7%)
Adults	*43 (61,4%)*	*27 (37,1%)*	*1 (1,4%)*	***71*** *(74,5%)*
Infants (<5 anni)	-	-	3 (100,0%)	3 (12,5%)
Children (6-10 anni)	-	-	15 (100,0%)	15 (62,5%)
Adolescents (11-14 anni)	-	-	-	-
Adolescents (15-18 anni)	2 (33,3%)	-	4 (66,6%)	6 (25,0%)
Subadults	*2 (..%)*	-	*22 (91,7%)*	***24 (25,5%)***
Not identifiable age	-	-	-	-
Total	*45 (47,9%)*	*26 (27,7%)*	*23 (24,5%)*	***95***

Tab. 1- Per sex and age distribution of the individuals of Ceretolo (Bologna) (4th-2nd c. BC).

The preservation state of the skeletons has allowed to analyse **95** individuals of which 71 adults (43 males, 27 females and one not identified) and 24 subadults (**Tab. 1**), (Brasili *et al*., 2000; Mariotti, 2001; Mariotti *et al.*, 2005).

The preservation state of the skeletons of the necropolis of Ceretolo has allowed to analyse the teeth of **69** of the 95 adults of which 42 males, 26 females and 1 individual of unidentified sex **(tab. 2)**.

CRT - *Adults*	**Males**	**Females**	**N.I.**	**Total**
Young adults (21-35 years)	14	16	-	30
Mature Adults (36-50 years)	26	9	1	36
Old Adults (>50 years)	1	1	-	2
Adults (not identifiable age)	1	-	-	1
Total	42	26	1	***69***

Tab. 2- Per sex and age distribution of the adults of Ceretolo (Bologna) (4^{th}-3^{rd} c. BC) of which teeth have been analyzed**.**

The examined teeth of the CRT sample are in the total sample **1737** of which 1114 (64,1%) belonging to the males, 608 (35,0%) belonging to the females and 15 (0,9%) belonging tounidentified sex individuals **(tab.3)**.

CRT- *Teeth*	**Males**			**Females**			**N.I.**			**Total (b)**	
Adults:		%a	%b		%a	%b		%a	%b		**%**
Young	388	30,3	48,1	419	68,9	48,1	0	-	-	**807**	46,4
Mature	672	60,3	77,2	183	30,1	21,0	15	100,0	1,7	**870**	50,1
Old	23	2,1	79,3	6	1,0	79,3	0	-	-	**29**	1,7
N.I.	31	2,8	34,1	60	9,9	65,9	0	-	-	**91**	5,2
Total (a)	**1114**	64,1%		**608**	35,0%		**15**	0,9%		***1737***	

Tab. 3- Per sex and age distribution of the analyzed teeth of Ceretolo (Bologna) (4^{th}-3^{rd} c. BC)
%a on the individuals of each gender; **%b** on the total of the individuals in each age class.

II. The roman imperial age necropolis of Casalecchio (Bologna, Italy)

In this study have been analyzed the skeletal remains of the roman imperial age necropolis of Casalecchio di Reno (BO) (CSL imp). The funerary goods and the kinds of inhumation belong to more than 250 burrial tombs (Ortalli, 1995a, 1995b; Kruta & Manfredi, 1999).

The preservation state of the skeletons has allowed to analyse **229** individuals of which 132 adults (57 males, 47 females and 26 not identified) and 43 subadults (**Tab. 1**).

CSL-imp	Males	Females	N.I.	Total
Youg Adults (21-35 anni)	13*(31,0%)*	25*(59,5%)*	4(9,5%)	42 (31,8 %)
Mature Adults (36-50anni)	21(53,8%)	14(35,9%)	4(10,2%)	39 (29,5%)
Old Adults (>50 anni)	20(80,0%)	3(12,0%)	2(8,0%)	25 (18,9%)
Adults (not identified age)	3(11,5%)	5(19,2%)	18(69,2%)	26 (19,7%)
Adults	57 *(43,2%)*	47 *(35,6%)*	26 *(19,7%)*	***132*** *(57,6%)*
Infants (<5 anni)		-	18(100,0 %)	18 (7,9%)
Children (6-10 anni)	-	-	18(100,0 %)	18 (7,9 %)
Adolescents (11-18 anni)	-	1 (14,3%)	6(85,7%)	7 (3,1%)
Subadults	-	1 *(2,3%)*	42 *(97,7%)*	43 ***(18,8%)***
Not identifiable age	-	-	54 *(100,0%)*	54 ***(23,6%)***
Total	57 (24,9%)	48 (21,0%)	122 (53,3%)	***229***

Tab. 1- Per sex and age distribution of the individuals of CSL imp(1^{st}-4^{th} sec. BC)

The preservation state of the skeletons of the CSL imp necropolis of Casalecchio has allowed to analyse the teeth of **119** of the 229 adults of which 55 males, 43 females and 21 individuals of unidentified sex **(tab. 2)**.

CSL-imp - *Adults*	**Males**	**Females**	**N.I.**	**Total**
Young adults (21-35 year)	14	24	6	44
Mature Adults (36-50 year)	21	14	2	37
Old Adults (>50 year)	19	3	2	24
Adults (not identifiable age)	1	2	11	14
Total	55	43	21	***119***

Tab. 2- Per sex and age distribution of the adults of CSL imp of which teeth have been analyzed**.**

The examined teeth of the CSL imp sample are in the total sample **1852** of which 872 (47,1%) belonging to the males, 830 (44,8%) belonging to the females and 150 (8,1%) belonging tounidentified sex individuals **(tab.3)**.

CSL-imp - *Teeth*	**Males**			**Females**			**N.I.**			**Total (b)**	
Adults:		%a	%b		%a	%b		%a	%b		**%**
Young	268	30,7	33,2	500	60,2	61,9	40	26,7	4,9	**808**	43,6
Mature	365	41,8	52,5	312	37,6	44,9	18	12,0	2,6	**695**	37,5
Old	239	27,4	83,8	18	2,2	6,3	28	18,7	9,8	**285**	15,4
N.I.	-	-	-	-	-	-	64	42,7	100,0	**64**	3,4
Total (a)	**872**	47,1%		**830**	44,8%		**150**	8,1%		***1852***	

Tab. 3- Per sex and age distribution of the analyzed teeth of Pozzilli (Isernia) (7^{th}-6^{th} c. BC)

III. The roman late ancient necropolis of Casalecchio (Bologna, Italy)

In this study have been analyzed the skeletal remains of the roman late ancient necropolis of Casalecchio di Reno (BO) (CSL TA). The funerary goods and the kinds of inhumation belong to more than 50 burial tombs (Ortalli, 1995a, 1995b).

The preservation state of the skeletons has allowed to analyse **43** individuals of which 27 adults (8 males, 4 females and 15 not identified) (**Tab. 1**).

CSL TA	Males	Females	N.I.	Total
Youg Adults (21-35 anni)	6 (66,7%)	1 (11,1%)	2 (22,2%)	9 (33,3%)
Mature Adults (36-50anni)	1 (25,0%)	2 (50,0%)	1 (25,0%)	4 (14,8%)
Old Adults (>50 anni)	1 (100,0 %)	-	-	1 (3,7%)
Adults (not identified age)	-	1 (7,7%)	12 (92,3%)	13 (48,1%)
Adults	8 *(29,6%)*	4 *(14,8%)*	15 *(55,6%)*	***27 (62,8%)***
Infants (<5 anni)	-	-	-	-
Children (6-10 anni)	-	-	-	-
Adolescents (11-14 anni)	-	-	-	-
Adolescents (15-18 anni)	-	-	-	-
Subadults	-	-	-	-
Not identifiable age	-	1(6,3%)	15 *(93,8 %)*	16 *(37,2%)*
Total	8 (18,6%)	5 (11,6%)	30 (69,8%)	***43***

Tab. 1- Per sex and age distribution of the individuals of CSL TA

The preservation state of the skeletons of the CSL TA necropolis has allowed to analyse the teeth of **16** individuals of the 27 adults of which 8 males, 4 females and 4 individuals of unidentified sex **(tab. 2)**.

CSL TA - *Adults*	**Males**	**Females**	**N.I.**	**Total**
Young adults (21-35 year)	6	1	2	9
Mature Adults (36-50 year)	1	2	1	4
Old Adults (>50 year)	1	-	-	1
Adults (not identifiable age)	-	1	1	2
Total	8	4	4	***16***

Tab. 2- Per sex and age distribution of the adults of CSL TA of which teeth have been analyzed**.**

The examined teeth of the CSL TA sample are in the total sample **347**of which 215 (47,1%) belonging to the males, 42 (44,8%) belonging to the females and 90 (8,1%) belonging tounidentified sex individuals **(tab.3)**.

CSL TA- *Teeth*	**Males**			**Females**			**N.I.**			**Total (b)**	
Adults:		%a	%b		%a	%b		%a	%b		%
Young	164	76,3	71,6	21	50,0	9,2	44	48,9	19,2	**229**	66,0
Mature	24	11,2	36,4	21	50,0	31,8	21	23,3	31,8	**66**	19,0
Old	27	12,6	100,0	-	-	-	-	-	-	**27**	7,8
N.I.	-	-	-	-	-	-	25	27,8	100,0	**25**	7,2
Total (a)	**215**	62,0%		**42**	12,1%		**90**	25,9		***347***	

Tab. 3- Per sex and age distribution of the analyzed teeth of CSL TA

b. Materials from Marche

I. The Picen necropolis of Novilara (Ascoli Piceno, Italy)

In this study have been analyzed the skeletal remains of the Picena necropolis of Novilara (Ascoli Piceno) (NVL). The funerary goods and the kinds of inhumation belong to more than 300 graves (Baldelli, 1997).

The preservation state of the skeletons has allowed to analyse **94** individuals of which 64 adults (13 males, 27 females and 24 not identified) (**Tab. 1**).

NVL	**Males**	**Females**	**N.I.**	**Total**
Youg Adults (21-35 anni)	1 *(7,7%)*	11 *(84,6%)*	1 (7,7%)	13 (20,3 *%*)
Mature Adults (36-50anni)	2 (33,3%)	4 (66,7%3)	-	6 (9,4 %)
Old Adults (>50 anni)	9 (64,3%)	5 (35,7%)	-	14 (21,9 %)
Adults (not identified age)	1 (3,2%)	7 (22,6%)	23 (74,2%)	31 (48,4%)
Adults	13 *(20,3%)*	27 *(42,2%)*	24 *(37,5%)*	***64 (***68,1***%)***
Infants (<5 anni)	-	-	-	-
Children (6-10 anni)	-	-	3 (100,0 %)	3 (3,2 %)
Adolescents (11-14 anni)	-	-	-	-
Adolescents (15-18 anni)	-	-	-	-
Subadults	-	-	3 *(*100,0 *%)*	3 ***(***3,2 ***%)***
Not identifiable age	-	-	27 *(*100,0 *%)*	27***(***28,7***%)***
Total	13 (13,8%)	27 (28,7%)	54 (57,4%)	***94***

Tab. 1- Per sex and age distribution of the individuals of NVL

The preservation state of the skeletons of the NVL necropolis has allowed to analyse the teeth of **66** individuals of the 94 adults of which 15 males, 27 females and 24 individuals of unidentified sex **(tab. 2)**.

NVL - *Adults*	**Males**	**Females**	**N.I.**	**Total**
Young adults (21-35 year)	1	11	1	13
Mature Adults (36-50 year)	2	4	-	6
Old Adults (>50 year)	9	5	-	14
Adults (not identifiable age)	3	7	23	33
Total	15	27	24	***66***

Tab. 2- Per sex and age distribution of the adults of NVL of which teeth have been analyzed**.**

The examined teeth of the NVL sample are in the total sample **740** of which 202 (27,3%) belonging to the males, 339 (45,8%) belonging to the females and 199 (26,9%) belonging tounidentified sex individuals **(tab.3)**.

NVL- *Teeth*	**Males**			**Females**			**N.I.**			**Total (b)**	
Adults:		%a	%b		%a	%b		%a	%b		%
Young	29	14,3	13,5	179	52,8	83,2	7	3,5	3,2	**215**	29,0
Mature	35	17,3	28,4	61	18,0	49,6	27	13,6	21,9	**123**	16,6
Old	91	45,0	73,4	27	8,0	21,8	6	3,0	4,8	**124**	16,7
N.I.	47	23,3	16,9	72	21,2	25,9	159	79,9	57,2	**278**	37,6
Total (a)	**202**	27,3%		**339**	45,8%		**199**	26,9%		***740***	

Tab. 3- Per sex and age distribution of the analyzed teeth of NVL

II. The roman imperial necropolis of Suasa (Ancona, Italy)

In this study have been analyzed the skeletal remains of the roman imperial age Southern necropolis of Suasa (Ancona) (SUA M). The funerary goods and the kinds of inhumation belong to more than 300 graves (Dall'Aglio, 1991).

The preservation state of the skeletons has allowed to analyse **50** individuals of which 40 adults (15 males and 25 females) (**Tab. 1**).

SUA M	**Males**	**Females**	**N.I.**	**Total**
Youg Adults (21-35 anni)	8*(36,8 %)*	12*(63,1%)*	-	19(47,5 %)
Mature Adults (36-50anni)	4(26,7 %)	11(73,3%)	-	15(37,5%)
Old Adults (>50 anni)	3(60,0%)	2(40,0%)	-	5(12,5%)
Adults (not identified age)	1(33,3%)	-	2(66,7%)	3(7,1%)
Adults	16 *(37,2%)*	25 *(58,1 %)*	2(4,6%)	***43(***81,1***%)***
Infants (<5 anni)	-	-	9(100,0 %)	9 (17,0%)
Children (6-10 anni)	-	-	1(100,0 %)	1 (1,9%)
Adolescents (11-14 anni)	-	-	-	-
Adolescents (15-18 anni)	-	-	-	-
Subadults	-	-	11 *(*100,0*%)*	11 ***(20,7%)***
Not identifiable age	-	-	10*(*100,0*%)*	10 *(*18,9***%)***
Total	16 (30,2%)	25(47,2%)	12 (22,6 %)	***53***

Tab. 1- Per sex and age distribution of the individuals of SUA M

The preservation state of the skeletons of the SUA M necropolis has allowed to analyse the teeth of **43** adults of which 14 males, 25 females and 4 individuals of unidentified sex **(tab. 2)**.

SUA M - *Adults*	**Males**	**Females**	**N.I.**	**Total**
Young adults (21-35 year)	7	14	-	21
Mature Adults (36-50 year)	4	6	-	10
Old Adults (>50 year)	3	2	-	5
Adults (not identifiable age)	-	3	4	7
Total	14	25	4	***43***

Tab. 2- Per sex and age distribution of the adults of SUA M of which teeth have been analyzed**.**

The examined teeth of the SUA M sample are in the total sample **740** of which 202 (27,3%) belonging to the males, 339 (45,8%) belonging to the females and 199 (26,9%) belonging tounidentified sex individuals **(tab.3)**.

SUA M- *Teeth*	**Males**			**Females**			**N.I.**			**Total (b)**	
Adults:		%a	%b		%a	%b		%a	%b		%
Young	171	59,6	36,8	294	72,2	63,2	-	-	-	**465**	66,6
Mature	81	28,2	49,7	82	20,1	50,3	-	-	-	**163**	23,3
Old	35	12,2	83,3	7	1,7	16,7	-	-	-	**42**	6,0
N.I.	-	-	-	24	5,9	85,7	4	100,0	14,3	**28**	4,0
Total (a)	**287**	41,1%		**407**	58,3%		**4**	0,6%		***698***	

Tab. 3- Per sex and age distribution of the analyzed teeth of SUA M

III. The roman late ancient necropolis of Suasa (Ancona, Italy)

In this study have been analyzed the skeletal remains of the roman late ancient necropolis of Suasa (Ancona) (SUA D) belongig to the *Domus*. The excavation of the *Domus* of Suasa is yet in progress, so in this work only the part of the skeletal sample already excavated will be examined.

The preservation state of the skeletons has allowed to analyse **51** individuals of which 29 adults (13males12 females and 4 unidentified sex individuals) (**Tab. 1**).

SUA-*Domus*	**Males**	**Females**	**N.I.**	**Total**
Youg Adults (21-35 anni)	3 *(27,3%)*	8 *(72,7%)*	-	11 (37,9%)
Mature Adults (36-50anni)	5 (83,3%)	1 (16,7%3)	-	6 (20,7%)
Old Adults (>50 anni)	2 (66,7%)	1 (33,3%)	-	3 (10,3%)
Adults (not identified age)	3 (33,3%)	2 (22,2%)	4 (44,4%)	9 (31,3%)
Adults	13 *(44,8%)*	12 *(41,4%)*	4 *(13,8 %)*	***29 (***56,9***%)***
Infants (<5 anni)	-	-	6 (100,0 %)	6 (11,8%)
Children (6-10 anni)	-	-	-	-
Adolescents (11-14 anni)	-	-	-	-
Adolescents (15-18 anni)	-	-	3 (100,0%)	3 (5,9%)
Subadults	-	-	9 *(*100,0*%)*	9 *(*17,6***%)***
Not identifiable age	-	-	13 (100,0%)	13 (25,5%)
Total	13 (25,5 %)	12 (23,5%)	26 (51,0%)	***51***

Tab. 1- Per sex and age distribution of the individuals of SUA D

The preservation state of the skeletons of the SUA M necropolis has allowed to analyse the teeth of **29** adults of which 14 males, 11 females and 4 individuals of unidentified sex **(tab. 2)**.

SUA-*Domus* - *Adults*	**Males**	**Females**	**N.I.**	**Total**
Young adults (21-35 year)	4	8	1	13
Mature Adults (36-50 year)	5	-	-	5
Old Adults (>50 year)	2	1	-	3
Adults (not identifiable age)	3	2	3	8
Total	14	11	4	***29***

Tab. 2- Per sex and age distribution of the adults of SUA D of which teeth have been analyzed**.**

The examined teeth of the SUA D sample are in the total sample **564** of which 280 (49,6%) belonging to the males, 227 (40,2%) belonging to the females and 57 (10,1%) belonging tounidentified sex individuals **(tab.3)**.

SUA-*Domus - Teeth*	**Males**			**Females**			**N.I.**			**Total (b)**	
Adults:		%a	%b		%a	%b		%a	%b	%	
Young	73	26,1	24,3	197	86,8	65,7	30	52,6	10,0	**300**	53,2
Mature	120	42,9	100,0	-	-	-	-	-	-	**120**	21,3
Old	52	18,6	3,6	12	5,3	18,8	-	-	-	**64**	11,3
N.I.	35	12,5	43,8	18	7,9	22,5	27	47,4	33,8	**80**	14,2
Total (a)	**280**	49,6%		**227**	40,2%		**57**	10,1%		***564***	

Tab. 3- Per sex and age distribution of the analyzed teeth of Pozzilli (Isernia) (7^{th}-6^{th} c. BC)

c. Materials from Molise

In this study have been analyzed data about *Status*, chipping and the non masticatory alterations of the teeth belonging to the skeletal samples of the Necropolises of Pozzilli dating back to Iron Age (IS) (PZZ), of Quadrella dating back to Late Ancient period (IS) (QDR) (Bonfiglioli *et al.*, 2003) and of Vicenne-Campochiaro aged to the Early Middle Age (CB) (VCN).

I. The necropolis of Pozzilli (Isernia, Italy)

In this study have been analyzed the skeletal remains of the necropolis Sannita of Camerelle, a suburb of Pozzilli (Isernia). The funerary goods and the kinds of inhumation belong to **103** individuals and assess the necropolis to the Iron Age.

PZZ	**Males**	**Females**	**N.I.**	**Total**
Youg Adults (21-35 anni)	14 *(53,85%)*	11 *(42,31%)*	-	25 (44,64%)
Mature Adults (36-50anni)	11 (78,57%)	3 (21,4%3)	-	14 (25,00%)
Old Adults (>50 anni)	6 (60,00%)	4 (40,00%)	-	10 (17,86%)
Adults (not identified age)	1 (14,28%)	3 (42,86%)	3 (42,86%)	7 (12,50%)
Adults	*32 (56,14%)*	*21 (36,84%)*	*3 (5,35%)*	***56 (69,14%)***
Infants (<5 anni)	-	1 (6,67%)	14 (*93,33%*)	15 (65,22%)
Children (6-10 anni)	-	-	4 (100%)	4 (17,39%)
Adolescents (11-14 anni)	-	-	2 (100%)	2 (8,69%)
Adolescents (15-18 anni)	-	-	2 (100%)	2 (8,69%)
Subadulsi	-	*1 (4,34%)*	*22 (25,65%)*	***23 (27,16%)***
Not identifiable age	-	-	*2 (100%)*	***2 (2,47%)***
Total	32 (39,51%)	22 (27,16%)	27 (33,33%)	**81**

Tab. 1- Per sex and age distribution of the individuals of Pozzilli (IS) (VII-VI sec. BC)

The preservation state of the sample had allowed to analyse the teeth of **57** adults of which 32 males (56,14%), 21 females (36,84%) and 3 individuals of not identifiable age and sex and 1 adolescent of not identified sex (7,02%) **(Tab. 2).**

PZZ- *Adults*	**Males**	**Females**	**N.I.**	**Total**
Young adults (21-35 year)	14	11	1	26
Mature Adults (36-50 year)	11	3	-	14
Old Adults (>50 year)	6	4	-	10
Adults (not identifiable age)	1	3	3	7
Total	*32*	*21*	*4*	***57***

Tab. 2- Per sex and age distribution of the adults of Pozzilli (Isernia) (VII-VI sec. BC) of which teeth have been analyzed

The analyzed teeth of the PZZ sample are in the total **1204** of which 660 (54,8%) belonging to males individuals, 364 (30,2%) to females individuals and 15 (1,2%) to individuals of not identifiable sex **(tab.3)**.

PZZ	**Males**			**Females**			**N.I.**			**Total (b)**	
Adults:		%a	%b		%a	%b		%a	%b		
Young	309	46,8	55,2	239	65,7	42,7	12	80,0	2,1	**560**	46,5
Mature	240	36,4	93,4	17	4,7	6,6	-	-	-	**257**	21,3
Old	110	16,7	55,8	87	23,9	44,2	-	-	-	**197**	16,4
N.I.	1	0,2	4,0	21	84,0	84,0	3	20,0	12,0	**25**	2,1
Total (a)	**660**	54,8%		**364**	30,2%		**15**	1,2%		**1204**	

Tab. 2- Per sex and age distribution of the analyzed teeth of Pozzilli (Isernia) (7^{th}-6^{th} c. BC)

II. The necropolis Quadrella (IS)

Near Quadrella (Isernia), at the confluence of the rivers Sordo and Carpino, during the works for a road release, a necropolis referable to the full Imperial Age (I-IV sec. d.C.) has been recovered.

This sepulchral area belongs to a vast complex of necropolis extraurbans of *Aesernia*, dating back to the 1st c BC.

The examined material refers to 85 graves mostly single. In fact, only 5 of these (T. 7, 21, 29, 32, 79) contain more individuals, and some others (from the 1 to the 4, the 27 and the 42) show strongly mixed skeletal rests (Brasili and Belcastro, 1998). The graves contain poor funerary goods and are oriented in various way. They are of the "cappuccina" type with a coverage and plan of deposition constituted from big tegoloni and their presence is often signalled by a heap of pebbles. The incineration burials are few and the infants were interred in olle or amphoras mostly burried in the earth (Terzani 1991).

On the basis of the funerary goods of the 85 exsamined tombs it has been possible to recognize **99** individuals (**Tab.4)**.

QDR	Males			Females			N.I.			TOTAL		
AGE	N	%a	%b	N	%a	%b	N	%a	%b	N	%c	%d
0-9	-	-	-	3	-	-	16	-	-	19	19,9	
10-19	3	-	37,5	1	-	12,5	4	-	50	8	8,08	
20-29	5	19,23	38,46	7	25	53,85	1	5,56	7,69	13	13,13	18,06
30-39	-	-	-	1	3,57	100	-	-	-	1	1,01	1,39
40-49	1	3,85	25	3	10,71	75	-	-	-	4	4,04	5,56
50-59	6	23,08	66,67	2	7,14	22,22	1	5,56	10,11	9	9,1	12,5
>60	10	38,46	50	8	28,57	40	2	11,11	10	20	20,2	27,78
Adults age n. id.	4	15,38	16	7	25	28	14	77,78	56	25	25,25	34,72
Total Adults	26	36,11		28	38,89		18	25		72	72,73	
TOTAL	**29**	**29,29**		**32**	**32,32**		**38**	**38,38**		**99**		

Tab. 4 – Sex and age distribution of the individuals of Quadrella (Isernia) (I-IV sec. d. C.) (Brasili & Belcastro, 1998). **%a** on the adults in each gender; **%b** on the total adults in each age class; **%c** on the total of the individuals; **%d** on the total of the adults.
In **bold** the % values on the total of the individuals of each gender.

The average age at death has been evaluated around 32 years.

In the necroplois of Quadrella the preservation state of the skeletons allowed to analyze the teeth belonging to 67 of the 72 adults of which 26 males, 28 females and 13 of not identifiable sex **(tab. 5)** (Bonfiglioli *et al.*, 2003).

QDR	Males			Females			N.I.			Total (b)	
Adults:		%a	%b		%a	%b		%a	%b		
Young	8	30,8	42,1	9	32,1	47,4	2	15,4	10,5	**19**	28,4%
Mature	4	15,4	44,4	5	17,9	55,6	-	-	-	**9**	13,4%
Old	12	46,2	50,0	9	32,1	97,5	3	23,1	12,5	**24**	35,8%
N.I.	2	7,7	13,3	5	17,9	33,3	8	61,5	53,3	**15**	22,4%
Total (a)	**26**	38,8%		**28**	41,8%		**13**	19,4%		67	

Tab. 3 – Per age and sex distribution of the individuals of Quadrella of which teeth have been analyzed. **%a** on the individuals in each gender;
%b on the total of the individuals in each age class.

The examine teeth of the QDR sample are in the total 1204 of which 514 (42,7%) belonging to males individuals, 514 (42,7%) to females individuals and 176 (14,6%) to not identifiable sex individuals **(tab.5)**.

QDR	Males			Females			N.I.			Total (b)	
Adults:		%a	%b		%a	%b		%a	%b		
Young	214	41,6	43,9	219	42,6	45,0	54	30,7	11,1	**487**	40,4%
Mature	66	12,8	40,5	97	18,9	59,5	-	-	-	**163**	13,5%
Old	207	40,3	49,4	150	29,2	35,8	62	35,2	14,8	**419**	34,8%
N.I.	27	5,3	20,0	48	9,3	35,6	60	34,1	44,4	**135**	11,2%
Total (a)	**514**	42,7%		**514**	42,7%		**176**	14,6%		1204	

Tab. 5 – Per sex and age distribution of theanalyzed teeth of the Quadrella sample.

III. The necropolis of Vicenne-Campochiaro (CB)

At Vicenne**,** in the area of Campochiaro (Campobasso), has been recovered in 1987 a necropolis dating back to the 7thc. AD that is referreble to the longobard period of the southern Italy.

The examined material refers to 167 graves, always single, prepared in parallel file in direction North-south and rigorously direct West-east; the skull of the dead person is always to West. The pits, mostly with a rectangular form, at different depth are positioned (generally in the longobard cemeteries the most superficial graves are belonging to the lowest social classes).

The number of the recovered burials does not correspond to the original one, since the cemetery area has suffered upsettings in rather recent epochs for the realization of a road and for the opening of cave for the extraction of inactive material. Particular is the presence of 12 graves in which man and horse are buried together: these are the T.16, 29, 33, 66, 73, 79, 81, 85, 109, 141, 150 and 155 (of the 79 and 85 rests s has come skeletal remains mixed together and with other individuals) (Ceglia, 1988; Genito, 1991).

The anthropological investigations (Belcastro and Facchini 2001) have put in evidence the presence of 130 interred and, since among these have been found 10 women in advanced age, 17 in fertile age and 32 subadults – with a number of around 2 children for fertile woman -, it can be supposed that in the necropolis is represented not more than two generations included between the 640 and the 670 AD., according to what suggested by Bona (2000).

On the basis of the funrary goods of the 167 examined tombs it has been possible to recocgnize the presence of almost **130** individuals **(tab. 6)**.

VCN	**Males**	**Females**	**N.I.**	**Total**
Young Adults (21-35 year)	21	17	3	41 *(41,8%)*
Mature Adults (36-50 year)	9	6	-	15 (15,3%)
Old Adults (>50 year)	11	10	1	22 (22,4%)
Adults (not identifiable age)	6	9	5	20 (20,4%)
Adults	*47 (47,9%)*	*42 (42,8%)*	*9 (9,2%)*	***98** (75,4%)*
Infants (<3 year)	-	-	2	2 *(6,2%)*
Children (4-12 year)	-	-	27	27 *(84,4%)*
Adolescents (13-20 year)	2	1	-	3 *(9,4%)*
Subadulti	*2*	*1*	*29*	*32 (24,6%)*
Total	49 *(37,7%)*	43 *(33,1%)*	38 *(29,2%)*	**130**

Tab. 2 – Per sex and age distribution of the individuals
of the necropolis of Vicenne (Belcastro *et.al.*, 2003).

In the necropolis of VCN, the preservation state of the skeleton has allowed to analyse the teeth of **88** of the 98 adults of which 47 males, 42 females and 9 not identifiable sex individuals **(tab.7)**.

VCN	**Males**			**Females**			**N.I.**			**Total (b)**	
Adults:		%a	%b		%a	%b		%a	%b		
Young	24	53,3	58,5	16	40,0	39,0	1	33,3	2,4	**41**	46,6%
Mature	8	17,8	57,1	6	15,0	42,9	-	-	-	**14**	15,9%
Old	9	20,0	42,3	12	30,0	57,1	-	-	-	**21**	23,9%
N.I.	4	8,9	33,3	6	15,0	50,0	2	66,7	16,7	**12**	13,6%
Total (a)	**45**	51,1%		**40**	45,5%		**3**	3,4%		**88**	

Tab. 4 – Per sex and age distribution of those individuals of Vicenne
of which teeth have been analyzed.
%a on the individuals in each gender;
%b on the total of the individuals in each age class.

The analyzed teeth of the VCN sample are 1754 of which 1033 (58,9%) belong to the males individuals, 679 (38,7%) to females individuals and 42 (2,4%) t not identifiable sex individuals **(tab. 7)**.

VCN	Males			Females			N.I.			Total (b)	
Adults:		%a	%b		%a	%b		%a	%b		
Young	610	59,1	63,1	336	49,5	34,8	20	47,6	2,1	**966**	55,1%
Mature	182	17,6	58,2	129	19,0	41,5	-	-	-	**311**	17,7%
Old	185	17,9	55,4	149	21,9	44,6	-	-	-	**334**	19,0%
N.I.	56	5,4	39,2	65	9,6	45,5	22	52,4	15,4	**143**	8,2%
Total (a)	**1033**	58,9%		**679**	38,7%		**42**	2,4%		1754	

Tab. 6 – Per sex and age distribution of the analyzed of the Vicenne sample.

b. Methods

b.1. The restoration

With the purpose to investigate chronologically and geographically the nutritional aspects, the state of health and behaviour of the populations I'm going to study, some characteristics of the teeth have been considered: the masticatory and not-masticatory alterations of the teeth.

This study has been carried out for every tooth, whose characters on a special data collecting form (Belcastro *et al.*, 2004) have been brought. In this form maxillary and mandibular teeth are always distinguished and right and left and, where possible, age and sex of the individual are brought.

The samples include maxilla and mandible, complete or in greater dimensions fragments. Sometimes isolated teeth or teeth not fixed in their own alveoli (for the complete absence of maxilla and mandible) have been recovered. In this case, before beginning any type of cleaning or study, every tooth has been identified on the basis of its anatomical characteristics.

At first the material has been cleaned eliminating soil and dust using a soft toothbrush for avoid to produce microwear or to eventually remove the *calculus*. In some cases the tooth has slightly been dampened with water, but always with moderation, in such way not to be damaged the alveolus, if it foresees.

For the interproximal spaces a *specillum* has been used, also in this case without too much energy to avoid artefact alterations. When consolidating - used by the archaeologists to maintain the most compact possible finds has been recovered - it has been eliminated with "cotton fioc" sticks soaked with acetone or alcohol (to 99,9%), cleansing up only the tooth and not notching the bone.

We used the methods recommended by the Workshop of European Anthropologists (Ferembach et al., 1980) to estimate the sex and age, and we compared the results with the previous attributions of Ferembach (1962).

b.2. The light microscope and the digital images capture

All the lesions were observed macroscopically and at a light microscope (Zeiss Stemi-2000C) through which digital images at several magnifications (10x, 20x, 30x, 40x, 50x) have been captured using the camera Nikon Coolpix 990, connected with the stereomicroscope.

At first the lesions have been observed at a magnification of 10x with the purpose to obtain a general view of the lesion. After that a more detailed analysis has been carried out using higher magnifications (until 50x). The best conditions for the observation at light

microscope are between 20x-40x magnifications. In this way quite all the informations about the whole complex of the lesion are preserved and it is possible read some of the micro-wear features eventually present. Under light microscope, it is also possible to describe the smooth and polished aspect and the colours of the surfaces: all characteristics not distinguishable under SEM analysis.

b.3. The scanning electron microscope (SEM)

Moreover, some lesions were examined using the **scanning electron microscope** (SEM, Jeol JSM 5200, Japan) at an accelerating voltage of 20kV and with a tilt angle of between 0-30 degrees.

For the SEM observations were made negative replicas of the surfaces previously cleaned with ALCOOL at 99.9 % (Rose, 1983; Bromage, 1984).

For the negative replicas was used a silicone based, addition curing, elastomeric precision impression material and at fast polymerization (dark green) with a catalyst (light grey) (PROVIL novo Light C.D. - fast set silicone impression material, VPS Vinyl Polysiloxane). For the positive replicas was used an epossidic casting resina (ARALDITE LY 1918 BD) with catalyst (HY 1919 BD) (**Tab. 6**). These substances have been mixed under chimney and then put in an oven (Mod. NSV 9035), at 25°C, for 30 min, under vacuum (-600 mbar), to evacuate the air babbles done during the mixing steps. The resina has been poured on the negative fixed on a support made with a silicon paste (OPTOSIL with his catalyst XANTOPREN). The polymerization of the ARALDITE has been occurred at room pressure and temperature.

Each of the positive replicas was mounted on brass stubs, previously cleaned with ultrasounds. Finally, the specimens were coated in gold with a sputter technique in a metallizator Mod. BROLAD SC 502.

Product name	**Producer firm**
PROVIL novo Light C.D. (fast set) (dark green base and light grey catalyst)	Heraeus Kulzer GmbH & Co. KG
ARALDITE LY 1918 BD	Vantico Srl
HY 1919 BD (catalyst)	Vantico Srl
OPTOSIL	Heraeus Kulzer GmbH & Co. KG
XANTOPREN (blue) (catalyst)	Heraeus Kulzer GmbH & Co. KG

Tab.6: Materials used for made replicas.

Moreover, for some of these alterations has been carried out an analysis of the metallic trace elements. For this analysis was used a scanning electron microscope with a micro-

analyser (SEM, Cambridge Stereoscan 200 with the Oxford INCAX-sight micro-analyser) of the laboratory of CNR of the Istituti Ortopedici Rizzoli (Bologna) .

b.4. Experimental tests

- **Experimental wear with ash and pumice**

Experimental tests have been conducted with the purpose to reproduce on the buccal enamel and dentine the effects of some of the most common substances used in the past (ash and pumice) for cleansing teeth. For these tests healthy upper central incisors belonging to individuals of a modern skeletal collection have been used.

Two different types of abrasive substances have been used: ash (gotten by the wood combustion) and pumice. Both the abrasive substances have been mixed with water, as reported in the literary sources, to get mixtures of the consistence similar to a toothpaste. It has also been tried to reproduce the same direction of the movement observed on the teeth of the samples in examination.

Moreover, to verify the effects of the same substances on the exposed dentine, two upper central incisors belonging to another individual of the same modern collection have been used. In this case, healthy teeth, but with a wide exposure of occlusal dentin have been chosen.

Ash and pumice have been respectively rubbed on the dental surfaces with the forefinger tip for 1 hour.

Finally, the worn surfaces have been observed at light microscope (20-40x) and at the scanning electron microscope.

- **Experimental wear with an iron fine circular object**

Experimental tests have been conducted with the purpose to reproduce the effects of a metallic object back and forth rubbed on the dental interproximal surfaces.

A smooth cylindrical point and a rough one point (both iron made) have respectively been used. Both the two types of points have been parallelly rubbed back and forth on the CEJ with the aim to reproduce the same type of lesion (location and direction of the movement) observed on the teeth with interproximal grooves. For these tests an upper right healthy canine belonging to an individual of a modern skeletal collection has been used (the tooth does not show any carious lesion or any kind of alteration and/or pathology on the cervical interproximal area).

The interproximal surfaces for 1 hour have been rubbed with the iron tips (the mesial interproximal surface with the smooth cylindrical point and the distal one with the rough one point).

Finally, the worn surfaces at light microscope (20-40x) and at the scanning electron microscope have been observed.

Status, masticatory wear, chipping, notches and interproximal grooves were scored following a standardized method (Bonfiglioli, 2002; Bonfiglioli *et al*., 2004).

Unusual wear, *striae* and LSAMAT were scored following a method elaborated in this study:

INTERPROXIMAL STRIAE

The interproximal s*triae* usually localized near the interproximal CEJ are small flattened smooth and polished areas with fine parallel striations.

Striae are recorded if are present or not and on the basis of their *position*: **mesial/distal.**

UNUSUAL WEAR

The unusual wear is classified on an two-grade scale by evaluation of its *severity*:

Slight: when the wear affects only the enamel and the worn surface appears flattened smooth and polished. In some cases parallel striations bucco-lingually directed can be observed (**Fig. 12 a**),

Strong: when the wear exposes also the dentine and the enamel has been totally removed enamel and the worn surface with exposed dentine appears flattened smooth and polished. In some cases parallel striations bucco-lingually directed can be observed (**Fig. 12 b**).

Moreover, the unusual wear is classified taking also into account of its *position*: it could be situated **buccally** (B), **lingually** (L) or **general** (G) (if it slopes both in the buccal and the lingual directions and the tooth is a short root stump).

LSAMAT

The wear pattern termed ‘‘Lingual Surface Attrition of the Maxillary Anterior Teeth,’’ (LSAMAT) (Turner and Machado, 1983) is defined as the progressive flat wearing of upper anterior lingual tooth surfaces without corresponding wear on the lower teeth.

LSAMAT is classified only on the basis of its presence/absence.

c. Data elaboration

For the data analysis the absolute and relative frequencies are been calculated both per individual (number of affected individuals/total number of individuals) and per tooth (number of affected teeth/total number of teeth) taking into account sex, age, arcade, laterality (right/left) and tooth. In the per individual frequencies, have been eliminated from the analysis that subjects for which it is not possible to observe, as minimum, one of their dentition quadrants.

To make easier the elaboration of the eight degrees of wear (masticatory wear) of the Smith's scale, the degree have been gathered in three groups according to the different models of enamel polishing/dentine exposition: degree 1 -2: slight wear; degree 3 -4: moderate wear; degree 5 -8: strong wear.

According to Goodman and Rose (1990), the subjects are considered with/without ipoplastic defects only if it is possible to observe at least four teeth (understanding the central upper incisors and the lower canine).

On the basis of the collected data a comparison among the observed proportions and the experimental ones has been performed without making values reference previously noticed. The test of independence has been used. This test proposes to observe if the results gotten on examined characters (chippings, notch, unusual wear, interproximal grooves, ect.) are independent (H0) from the sex or from the affiliation to the various examined groups.

Because only one comparison at time has been evaluated we can take into account χ^2 distribution.

PART IV

A. Non-masticatory dental alterations considered all together:

a. Emilia-Romagna

a.1. Per individual frequencies (Tabb.1 and 2)

In the total samples the per individual frequencies of the non-masticatory dental alterations considered all together are similar in all the necropolises from Emilia-Romagna. Even if the roman Late Ancient sample of Casalecchio di Reno shows the highest frequency (53,33%, 8/15), the differences with the other Roman samples and the Celtic one are not significant (**Tab.1**).

EMILIA-ROMAGNA	**CRT**			**CSL "A+B+2000"**			**CSL "TA"**		
	N	**n**	**%**	**N**	**n**	**%**	**N**	**n**	**%**
Per individual	66	25	37,88	101	33	32,67	15	8	53,33
Per tooth									
Total	1651	90	5,45	2017	71	3,52	348	32	9,20
Maxilla	794	62	7,81	866	36	4,16	169	23	13,61
Mandible	857	28	3,27	1151	35	3,04	179	9	5,03
Anterior	646	64	9,91	799	40	5,01	145	25	17,24
Posterior	1005	26	2,59	1218	31	2,55	203	7	3,45

Tab.1- Frequencies of all non-masticatory dental alterations per individual and per tooth in the total samples from Emilia-Romagna;
N= teeth observed (M+F+NI); n= teeth with alteration.

As regards of the frequencies of all the non-masticatory dental alterations considered all together per individual per sex, only in the CRT sample there is a significant difference between males and females: the males with the 46,34% (19/41) are more affected than the females (20,83%; 5/24) (**Tab.2**).

a.2. Per tooth frequencies (Tabb. 1, 2)

In the CRT total sample the non-masticatory dental alterations considered all together affect the 5,45% (90/1651) of the teeth. In the CSL "A+B+2000" total sample the 3,52% (71/2017) of the teeth show non-masticatory dental alterations. The difference between these frequencies is significant (p=0,013). Moreover, the teeth of the total CSL "TA" sample (9,20%; 32/348) are significantly more affected both than those of the CRT one (5,45%; 90/1651) (*P*=0,008) and than those of the CSL "A+B+2000" sample (3,52%; 71/2017) (*P*<<0,001) (**Tab.1**).

In the CRT total sample the upper teeth are more affected (7,81%; 62/794) than the lower ones (3,27%; 28/857) (P<<0,001). Also in the total sample of CSL"TA" the upper teeth with the 13,61% (23/169) are more affected than the lower ones (5,03%; 9/179) and the

difference is significant (*P*=0,005). Even if in the CSL "A+B+2000" sample the upper teeth show a higher frequencies of non-masticatory dental alterations, the difference is not significant (**Tab.1**).

As regards the upper teeth, the CRT sample with the 7,81% (62/794) is more affected than the CSL "A+B+2000" (4,16%; 36/866). Moreover, the upper teeth of the CSL "TA" total sample (13,61%; 23/169) are significantly more affected than both the upper ones of the CRT sample (7,81%; 62/794) (*P*=0,016) and of the upper ones of the CSL "A+B+2000" sample (4,16%; 36/866) (*P*<<0,001) (**Tab.1**).

In all the Emilia-Romagna samples, the anterior teeth are more affected by non-masticatory dental alterations than the posterior ones and the differences are significant: in fact, in the CRT sample the 9,91% (64/646) of the anterior teeth and the 2,59% (26/1005) of the posterior ones show non-masticatory dental alterations (*P*<<0,001); in the CSL "A+B+2000" the 5,01% (40/799) of the anterior teeth and the 2,55% (31/1218) show non-masticatory dental alterations (*P*=0,003). Finally, the anterior teeth (17,24%; 25/145) of the CSL "TA" are more affected by non-masticatory dental alterations than the posterior ones (3,45%; 7/203) and this difference is highly significant (*P*<<0,001) (**Tab.1**).

Moreover, the anterior teeth of the CRT total sample show a higher frequency (9,91%; 64/646) of non-masticatory dental alterations than the anterior ones of the CSL "A+B+2000" total sample (5,01%; 40/799) (P<0,001). The anterior teeth of the total sample of CSL "TA" (17,24%; 25/145) is significantly more affected both than the anterior teeth of the CSL "A+B+2000" anterior teeth (5,01%; 40/799) (*P*<<0,001) and than the anterior teeth of the CRT sample (9,91%; 64/646) (*P*=0,011) (**Tab.1**).

Moreover, the anterior teeth of the total sample of CRT (9,91%; 64/646) are more affected than the anterior teeth of the CSL "A" (2,69%; 14/521) (*P*<<0,001) (**Tab.1**). Also the anterior teeth of the total sample of CSL "B" (11,11%; 8/72) and the anterior ones of the total sample of CSL "2000" (8,74%; 18/206) (**Tab.1**) are significantly more affected than the anterior ones of the total sample of CSL "A". In both these cases the *P* is <0,001.

As regards of the frequencies of all the non-masticatory dental alterations considered all together per tooth per sex, in the CRT sample in the total and in each dental region the males are significantly more affected than the females (**Tab.2**).

Also in the CSL "A+B+2000" sample the males are more affected than the females in the total and in all dental region (except for the anterior teeth which show similar frequencies in both males and females) (**Tab.2**).

In the CSL "TA" sample, instead, in the total and in each dental region, there are not significant differences between sexes (**Tab.2**).

In the total sample, the teeth of the CRT males with the 7,11% (75/1055) are more affected by non-masticatory dental alterations (considered all together) than the CSL "A+B+2000" males (3,92%; 33/841) and the difference is significant (*P*=0,003).

Regarding the females samples, the teeth of the females of CSL "TA" with the 9,30% (4/43) are significant more affected both than the teeth of the females of CRT (2,24%; 13/581) (*P*=0,006) and than the CSL "A+B+2000" ones (1,66%; 14/843) (*P*=0,0004).

The males of CRT with the 9,70% (49/505) of upper teeth affected show a significantly higher frequency than the males of CSL “A+B+2000” (4,32%; 15/347) (**Tab.2**). Moreover, the anterior teeth of the males of CSL “TA” (12,79%; 11/86) are more affected than the anterior ones of the males of CSL “A+B+2000” (3,96%; 13/328) (**Tab. 2**).

The upper teeth of the females of CSL “TA” (9,52%; 2/21) show a significantly higher frequency than the females of CSL “A+B+2000” (1,86%; 7/377) (p=0,021). Moreover, the anterior teeth of the females of CSL “TA” (18,18%; 4/22) are significantly more affected than the anterior ones of the females of CRT (4,78%; 11/230) (p=0,001) and also than the anterior ones of the females sub-sample of CSL “A+B+2000” (3,35%; 11/328) (p=0,011).

EMILIA-ROMAGNA	CRT					CSL "A+B+2000"					CSL "TA"				
	Males		Females		*P*	Males		Females		*P*	Males		Females		*P*
	n/N	%	n/N	%		n/N	%	n/N	%		n/N	%	n/N	%	
Per individual	19/41	46,34	5/24	20,83	*0,040*	15/43	34,88	9/39	23,08	-	3/8	37,50	1/2	50,00	-
Per tooth															
Total	75/1055	7,11	13/581	2,24	*0,000*	33/841	3,92	14/843	1,66	*0,005*	13/215	6,05	4/43	9,30	-
Maxilla	49/505	9,70	11/284	3,87	*0,003*	15/347	4,32	7/377	1,86	*0,053*	8/100	8,00	2/21	9,52	-
Mandible	26/550	4,73	2/297	0,67	*0,002*	18/494	3,64	7/466	1,50	*0,037*	5/115	4,35	2/22	9,09	-
Anterior	53/413	12,83	11/230	4,78	*0,001*	13/328	3,96	11/328	3,35	-	11/86	12,79	4/22	18,18	-
Posterior	22/642	3,43	2/351	0,57	*0,005*	20/513	3,90	3/515	0,58	*0,000*	2/129	1,55	0/21	0,00	-

Tab.2- Frequencies of all non-masticatory dental alterations per sex per individual and per tooth in the total samples from Emilia-Romagna.

b. Marche

b.1. Per individual frequencies (Tab.3 and 4)

In the total samples the per individual and per individual and sex frequencies of the non-masticatory dental alterations considered all together are similar in all the necropolises from Marche.

b.2. Per tooth frequencies (Tab.3 and 4)

In the NVL total sample the non-masticatory dental alterations considered all together affect the 6,28% (45/716) of the teeth. In the SUA-NM total sample the 3,75% (25/666) of the teeth show non-masticatory dental alterations. The difference between these frequencies is significant (*P*=0,032). Moreover, the teeth of the NVL total sample are significantly more affected also than the teeth of the SUA-D (2,84%; 16/564) (*P*=0,004) (**Tab.3**).

MARCHE	NVL			SUA-Nec. Merid.			SUA-Domus		
	N	n	%	N	n	%	N	n	%
Per individual	44	18	40,91	31	14	45,16	26	9	34,62
Per tooth									
Total	716	45	6,28	666	25	3,75	564	16	2,84
Maxilla	326	30	9,20	301	16	5,32	247	7	2,83
Mandible	390	15	3,85	365	9	2,47	317	9	2,84
Anterior	215	24	11,16	249	10	4,02	207	7	3,38
Posterior	501	21	4,19	417	15	3,60	357	9	2,52

Tab.3- Frequencies of all non-masticatory dental alterations per individual and per tooth in the total samples from Marche.

In the NVL total sample the upper teeth are significantly more affected than the lower ones: in fact, the 9,20%(30/326) of the upper teeth and the 3,85% (15/390) of the lower ones show non-masticatory dental alterations (*P*=0,003). In the SUA-NM total sample the 5,32% (16/301) of the upper teeth and the 2,47% (9/365) of the lower ones show non-masticatory dental alterations, but in this case the difference is at the limit of significance because of *P*=0,054 (**Tab.3**).

Only in the NVL total sample the anterior teeth (11,16%; 24/215) are significantly more affected than the posterior ones (4,19%; 21/501) (*P*=0,003). Moreover, the anterior teeth of the NVL total sample are more affected than the SUA-D anterior ones (3,38%; 7/207) (*P*=0,002) (**Tab.3**).

As regards of the frequencies of all the non-masticatory dental alterations considered all together per tooth per sex, significant differences have been found only in the anterior teeth between males and females of the SUA-NM sample and in the posterior teeth between males and females of SUA-D sample (**Tab.4**).

In the NVL sample the only significant difference in per tooth and sex frequencies has been observed in the females: in fact, the anterior teeth (11,16%; 24/215) are more affected than the posterior ones (4,19%; 21/501) (*P*=0,004) (**Tab.4**).

In the SUA-D sample the anterior teeth of the females with the 5,88% (5/85) are significantly more affected than the posterior ones (0,70%; 1/142) (*P*=0,019) (**Tab.4**).

In the total sample, the females of NVL with the 7,96% (27/339) are significantly more affected both than the females of SUA-NM (2,73% (11/403) (*P*=0,001) and than the females of the SUA-D sample (2,64%; 6/227) (*P*=0,008) (**Tab.4**).

As regards the upper teeth, the males of NVL sample with the 7,95% (7/88) are more affected than the males of the SUA-D sample (6,78% (8/118) (*P*=0,038). Moreover, the upper teeth of the females of NVL (10,63%; 17/160) are more affected than the upper ones of the females of SUA-NM (4,44%; 8/180) (*P*=0,029) (**Tab.4**).

As regards the anterior teeth, the males of NVL sample are more affected (10,00%; 6/60) than the males of the SUA-D sample (2,02%; 2/99) (*P*=0,026). The females of NVL with the 14,74% (14/95) of affected anterior teeth show a frequency of non-masticatory dental alterations higher than both the females of SUA-NM (1,95%; 3/154) (*P*<0,001) and than the females of SUA-D (5,88%; 5/85), but in this case the difference is at the limit of significance (*P*=0,054) (**Tab.4**).

MARCHE	NVL					SUA-Nec.Merid.					SUA-Domus				
	Males		Females		*P*	Males		Females		*P*	Males		Females		*P*
	n/N	%	n/N	%		n/N	%	n/N	%		n/N	%	n/N	%	
Per individual	6/13	46,15	8/19	42,11	-	6/11	54,55	8/20	40,00	-	6/13	46,15	3/11	27,27	-
Per tooth															
Total	12/211	5,69	27/339	7,96	-	14/259	5,41	11/403	2,73	-	10/280	3,57	6/227	2,64	-
Maxilla	7/88	7,95	17/160	10,63	-	8/118	6,78	8/180	4,44	-	2/111	1,80	5/104	4,81	-
Mandible	5/123	4,07	10/179	5,59	-	6/141	4,26	3/223	1,35	-	8/169	4,73	1/123	0,81	-
Anterior	6/60	10,00	14/95	14,74	-	7/95	7,37	3/154	1,95	*0,034*	2/99	2,02	5/85	5,88	-
Posterior	6/151	3,97	13/244	5,33	-	7/164	4,27	8/249	3,21	-	8/181	4,42	1/142	0,70	*0,044*

Tab.4- Frequencies of all non-masticatory dental alterations per sex per individual and per tooth in the total samples from Marche.

c. Molise

c.1. Per individual frequencies (Tab.5 and 6)

In the total samples the per individual (**Tab.5**) and per individual and sex (**Tab.6**) frequencies of the non-masticatory dental alterations considered all together are similar in all the necropolises from Molise and do not show any significant differences.

c.2. Per tooth frequencies (Tab.5 and 6)

The teeth of the total VCN sample (4,74%; 78/1645) are significantly more affected both than those of the PZZ one (2,87%; 30/1044) (P=0,016) and than those of the QDR sample (2,17%; 25/1150) (P<0,001) (**Tab.5**). The frequencies observed in the PZZ total sample and in the QDR total sample do not show significant differences (**Tab.5**).

MOLISE	PZZ			QDR			VCN		
	N	n	%	N	n	%	N	n	%
Per individual	46	15	32,61	55	13	23,64	74	26	35,14
Per tooth									
Total	1044	30	2,87	1150	25	2,17	1645	78	4,74
Maxilla	485	15	3,09	501	8	1,60	760	53	6,97
Mandible	559	15	2,68	649	17	2,62	885	25	2,82
Anterior	413	15	3,63	429	22	5,13	639	64	10,02
Posterior	631	15	2,38	721	3	0,42	1006	14	1,39

Tab.5- Frequencies of all non-masticatory dental alterations per individual and per tooth in the total samples from Molise;
N=M+F+n.i.; n=….

In the VCN sample the upper teeth with the 6,97% (53/760) are significantly more affected than the lower ones (2,82%; 25/885) (P<<0,001). Moreover, the upper teeth of VCN are significantly more affected both than the upper ones of PZZ (3,09%; 15/485) (P=0,003) and of the upper ones of QDR sample (1,60%; 8/501) (P<<0,001).

In both QDR and VCN samples the anterior teeth are more affected than the posterior ones: in fact, the anterior teeth of QDR with the 5,13% (22/429) shows a higher frequency of non-masticatory dental alterations than the posterior ones (0,42%; 3/721) (P<<0,001); in the VCN sample the anterior teeth with the 10,02% (64/639) are more affected than the posterior ones (1,39%; 14/1006) (P<<0,001).

Moreover, the anterior teeth of the VCN sample are more affected both than the anterior ones of PZZ sample (3,63%; 15/413) (P<<0,001) and the anterior ones of QDR sample (5,13%; 22/429) (P=0,004).

As regards of the frequencies of all the non-masticatory dental alterations considered all together per tooth per sex, significant differences have been observed in the anterior teeth between males and females of the QDR sample and in the posterior teeth between males and females of VCN sample (**Tab.6**).

The anterior teeth are significantly more affected than the posterior ones in males of QDR sample ($P<<0,001$) and in both the sexes of VCN (in both the cases: $P<<0,001$).

Moreover, the upper teeth of both the sexes of VCN are more affected than the lower ones (in both the cases: $P<0,01$) (**Tab.6**).

The males of VCN are significantly more affected than the males of QDR in the per tooth total sample ($P=0,014$), in per tooth upper ($P=0,003$) and per tooth anterior ($P=0,041$) frequencies (**Tab.6**). The upper teeth of the males of VCN are more affected also than the anterior ones of the males of PZZ sample ($P=0,002$).

The females of VCN are significantly more affected than the females of QDR per tooth total ($P<0,001$), upper ($P=0,003$) and anterior ($P=0,041$) frequencies. Moreover, the females of VCN are significantly more affected also than the females of and PZZ per tooth total ($P=0,006$), upper ($P=0,008$) and anterior ($P=0,016$) frequencies (**Tab.6**).

MOLISE	PZZ					QDR					VCN				
	Males		Females		*P*	Males		Females		*P*	Males		Females		*P*
	n/N	%	n/N	%		n/N	%	n/N	%		n/N	%	n/N	%	
Per individual	11/29	37,93	4/16	25,00	-	7/22	31,82	4/24	16,67	-	16/42	38,10	10/30	33,33	-
Per tooth															
Total	24/663	3,62	6/364	1,65	-	10/483	2,07	6/494	1,21	-	45/962	4,68	33/649	5,08	-
Maxilla	12/311	3,86	3/172	1,74	-	3/217	1,38	1/210	0,48	-	31/457	6,78	22/294	7,48	-
Mandible	12/352	3,41	3/192	1,56	-	7/266	2,63	5/284	1,76	-	14/505	2,77	11/355	3,10	-
Anterior	11/265	4,15	4/144	2,78	-	10/178	5,62	3/179	1,68	*0,047*	41/372	11,02	23/253	9,09	-
Posterior	13/398	3,27	2/220	0,91	-	0/305	0,00	3/315	0,95	-	4/590	0,68	10/396	2,53	*0,016*

Tab.6- Frequencies of all non-masticatory dental alterations per sex per individual and per tooth in the total samples from Molise;
n=…; N=….

c.3. Per individual and per tooth frequencies of the horsemen (Tab.7)

In the VCN sample we can compare the frequencies of the non-masticatory dental alterations considered all together between the horsemen and the males non-horsemen.

Even if the horsemen sample shows the highest per individual frequency (60,00%; 6/10) the difference with respect to the males non-horsemen (31,25%; 10/32) is not significant.

MOLISE	Horsemen			Males non-horsemen			
	N	n	%	N	n	%	*P*
Per individual	10	6	60,00	32	10	31,25	-
Per tooth							
Total	242	24	9,92	720	21	2,92	*0,000*
Maxilla	108	18	16,67	349	13	3,72	*0,000*
Mandible	134	6	4,48	371	8	2,16	-
Anterior	100	23	23,00	272	18	6,62	*0,000*
Posterior	142	1	0,70	448	3	0,67	-

Tab.7- Frequencies of all non-masticatory dental alterations per individual and per tooth in the horsemen and males non-horsemen of VCN necropolis.

Instead, the per tooth total frequency of the horsemen (9,92%; 24/242) is significant higher than the one of the non-horsemen sample (2,92%; 21/720) (*P*<<0,001) (**Tab.7**).

The upper teeth of the horsemen are more affected than the lower ones (P=0,002) and anterior teeth are more affected than the posterior ones (P<<0,001).

In the males non-horsemen sample the anterior teeth with the 6,62% (18/272) are more affected than the posterior ones (*P*<<0,001).

Finally, both the upper and anterior teeth of the horsemen sample are significantly more affected than the upper and anterior ones of the males non-horsemen ones (**Tab.7**).

B. Notch:

a. Emilia-Romagna

a.1. Per individual frequencies (Tabb.8 and 9)

In the total samples the frequencies per individual and per individual and sex of the notch are similar in all the necropolises from Emilia-Romagna (**Tabb.8, 9**) except for the females of the CSL "TA" sample which, with the 50,00% (1/2) of individuals with notch are significantly more affected than the females of the CRT sample (4,35%; 1/23) (*P*=0,022).

EMILIA-ROMAGNA	CRT			CSL "A+B+2000"			CSL "TA"		
	N	n	%	N	n	%	N	n	%
Per individual	65	10	15,38	98	20	20,41	14	4	28,57
Per tooth									
Total	1651	15	0,91	2017	30	1,49	348	8	2,30
Maxilla	794	7	0,88	866	11	1,27	169	5	2,96
Mandible	857	8	0,93	1151	19	1,65	179	3	1,68
Anterior	646	7	1,08	799	17	2,13	145	7	4,83
Posterior	1005	8	0,80	1218	13	1,07	203	1	0,49

Tab.8- Frequencies of notch per individual and per tooth
in the total samples from Emilia-Romagna;
N=M+F+n.i.; n=….

c.2. Per tooth frequencies (Tabb.8 and 9)

The teeth of the total CSL "TA" sample (2,30%; 8/348) are significantly more affected by notch than those of the CRT one (0,91%; 15/1651) (*P*=0,027) (**Tab.8**).

In the CSL "A+B+2000" total sample the anterior teeth (2,13%; 17/799) are more affected than the posterior ones (1,07%; 13/1218) but the difference is at the limit of significance (*P*=0,054). Also in the CSL "TA" total sample the anterior teeth with the 4,83% (7/145) are significantly more affected by notch than the posterior ones (0,49%; 1/203) (*P*=0,008) (**Tab.8**).

The upper teeth of the CSL "TA" total sample with the 2,96% (5/169) are significantly more affected than the upper ones of the CRT total sample (0,88%; 7/794) (*P*=0,027).

Moreover, the anterior teeth of the CSL "TA" total sample are more affected than the anterior ones of the CRT sample (1,08%; 7/646) (*P*=0,002) and than of the anterior ones of the CSL "A+B+2000" sample (2,13%; 17/799) but in this case the difference is at the limit of significance (*P*=0,057) (**Tab.8**).

Regarding the frequencies of the notch per tooth per sex, significant differences have been observed between males and females sub-samples of the CRT sample and between males and females sub-samples of the CSL "TA" sample: in the CRT sample the males are more affected than the females; in the CSL "TA" sample the females sub-sample is more affected than the males one (**Tab.9**).

Regarding the different dental regions, the lower and posterior teeth of the males of CRT show more notch than the corresponding ones of the females sub-sample (**Tab.9**).

In the CSL "A+B+2000" sample the posterior teeth of the males are significantly more affected by notch than the posterior ones of the females.

In the CSL "TA" sample for all the dental regions considered (except only for the posterior teeth) the females sub-sample is significant more affected by notch than the males sub-sample (**Tab.9**).

The anterior teeth of the females sub-sample of CSL "A+B+2000" (1,78%; 6/338) are more affected than the posterior ones (0,38%; 2/531) (*P*=0,035). Also the anterior teeth of the CSL "TA" females sub-sample (18,18%; 4/22) are more affected than the posterior ones (0,00%; 0/21) (*P*=0,040) (**Tab.9**).

Moreover, the females of the CSL "TA" sample are significantly more affected by notch than the females sub-samples both of CRT and CSL "A+B+2000" in the total and in all dental regions per tooth frequencies (except only for the posterior teeth). In all these cases the *P* value is <<0,001(**Tab.9**).

EMILIA-ROMAGNA	CRT					CSL "A+B+2000"					CSL "TA"				
	Males		Females		*P*	Males		Females		*P*	Males		Females		*P*
	n/N	%	n/N	%		n/N	%	n/N	%		n/N	%	n/N	%	
Per individual	9/41	21,95	1/23	4,35	-	9/41	21,95	6/39	15,38	-	2/8	25,00	1/2	50,00	-
Per tooth															
Total	14/1055	1,33	1/581	0,17	*0,019*	16/841	1,90	8/869	0,92	-	2/215	0,93	4/43	9,30	*0,001*
Maxilla	6/505	1,19	1/284	0,35	-	6/347	1,73	3/388	0,77	-	1/100	1,00	2/21	9,52	*0,022*
Mandible	8/550	1,45	0/297	0,00	*0,037*	10/494	2,02	5/481	1,04	-	1/115	0,87	2/22	9,09	*0,016*
Anterior	6/413	1,45	1/230	0,43	-	7/328	2,13	6/338	1,78	-	1/86	1,16	4/22	18,18	*0,001*
Posterior	8/642	1,25	0/351	0,00	*0,036*	9/513	1,75	2/531	0,38	*0,029*	1/129	0,78	0/21	0,00	-

Tab.9- Frequencies of notch per sex per individual and per tooth
in the total samples from Emilia-Romagna;
n=…; N=….

b. Marche

b.1. Per individual frequencies (Tabb.10 and 11)

In all the necropolises from Marche the per individual and per individual and sex total frequencies of the notch are similar without any significant differences (**Tab.10, 11**).

MARCHE	NVL			SUA-Nec. Merid.			SUA-Domus		
	N	n	%	N	n	%	N	n	%
Per individual	43	11	25,58	31	11	35,48	26	9	34,62
Per tooth									
Total	716	22	3,07	666	17	2,55	564	12	2,13
Maxilla	326	11	3,37	301	8	2,66	247	5	2,02
Mandible	390	11	2,82	365	9	2,47	317	7	2,21
Anterior	215	6	2,79	249	7	2,81	207	5	2,42
Posterior	501	16	3,19	417	10	2,40	357	7	1,96

Tab.10- Frequencies of notch per individual and per tooth in the total samples from Marche; N=M+F+n.i.; n=….

b.2. Per tooth frequencies (Tabb.10 and 11)

Also in the case of the per tooth frequencies any significant differences have been observed in all the necropolises from Marche. The only exception is the case of the difference between the per tooth and sex frequency of notch showed by the posterior teeth of the females sub-sample of NVL and SUA-D: in fact, the posterior teeth of the females of NVL with the 4,10% (10/244) show a higher frequency of notch than the posterior ones of the females of SUA-D (0,70%; 1/142) but the difference is at the limit of significance (*P*=0,053) (**Tab.11**).

MARCHE	NVL					SUA-Nec.Merid.					SUA-Domus				
	Males		Females		*P*	Males		Females		*P*	Males		Females		*P*
	n/N	%	n/N	%		n/N	%	n/N	%		n/N	%	n/N	%	
Per individual	4/13	30,77	6/19	31,58	-	4/11	36,36	7/20	35,00	-	6/13	46,15	3/11	27,27	-
Per tooth															
Total	6/211	2,84	15/339	4,42	-	8/259	3,09	9/403	2,23	-	8/280	2,86	4/227	1,76	-
Maxilla	2/88	2,27	8/160	5,00	-	2/118	1,69	6/180	3,33	-	2/111	1,80	3/104	2,88	-
Mandible	4/123	3,25	7/179	3,91	-	6/141	4,26	3/223	1,35	-	6/169	3,55	1/123	0,81	-
Anterior	1/60	1,67	5/95	5,26	-	4/95	4,21	3/154	1,95	-	2/99	2,02	3/85	3,53	-
Posterior	5/151	3,31	10/244	4,10	-	4/164	2,44	6/249	2,41	-	6/181	3,31	1/142	0,70	-

Tab.11- Frequencies of notch per sex per individual and per tooth
in the total samples from Marche;
n=…; N=….

c. Molise

c.1. Per individual frequencies (Tabb.12 and 13)

The individuals of the PZZ sample with the 32,61% (15/46) are more affected by notch than the ones of QDR (11,11%; 6/54) and the difference is significant (*P*=0,008).

MOLISE	PZZ			QDR			VCN		
	N	n	%	N	n	%	N	n	%
Per individual	46	15	32,61	54	6	11,11	73	16	21,92
Per tooth									
Total	1044	26	2,49	1150	7	0,61	1645	31	1,88
Maxilla	485	11	2,27	501	4	0,80	760	19	2,50
Mandible	559	15	2,68	649	3	0,46	885	12	1,36
Anterior	413	12	2,91	429	5	1,17	639	24	3,76
Posterior	631	14	2,22	721	2	0,28	1006	7	0,70

Tab.12- Frequencies of notch per individual and per tooth in the total samples from Molise; N=M+F+n.i.; n=….

c.2. Per tooth frequencies (Tabb.12 and 13)

In the total the teeth of the PZZ sample (2,49%; 26/1044) are more affected than the teeth of QDR sample (0,61%; 7/1150) and the difference is significant (*P*<0,001). Moreover, also the teeth of the VCN total sample (1,88%; 31/1645) are significantly more affected by notch than the ones of the PZZ sample (*P*=0,005).

In the VCN sample the anterior teeth with the 3,76% (24/639) are more affected than the posterior ones (0,70%; 7/1006) (*P*<<0,001).

Regarding the per tooth and sex frequencies a significant difference has been observed between males and females of the PZZ sample: the posterior teeth of the males sub-sample are more affected by notch than the posterior ones of the females sub-sample (**Tab.13**).

Moreover, the males of PZZ sample are more affected by notch than the males of QDR (P=0,004); also the males of VCN are more affected by notch than the QDR males (P=0,05) (**Tab.13**).

The lower teeth of the males of PZZ are more affected than the lower ones of the males of QDR (P=0,002) and also the lower teeth of the males of VCN are more affected by notch than the ones of QDR (P=0,028) (**Tab.13**).

The posterior teeth of the males of PZZ (3,02%; 12/398) are more affected by notch both than the males of QDR (0,00%; 0/305) (P=0,002) and of VCN (0,68%; 4/590) (P=0,004) (**Tab.13**).

The upper teeth of the females sub-sample of VCN are more affected than the upper ones of the females of QDR sample (P=0,045).

MOLISE	PZZ					QDR					VCN				
	Males		Females		*P*	Males		Females		*P*	Males		Females		*P*
	n/N	%	n/N	%		n/N	%	n/N	%		n/N	%	n/N	%	
Per individual	11/29	37,93	4/16	25,00	-	3/21	14,29	3/24	12,50	-	9/41	21,95	7/30	23,33	-
Per tooth															
Total	20/663	3,02	6/364	1,65	-	3/483	0,62	4/494	0,81	-	19/962	1,98	12/649	1,85	-
Maxilla	8/311	2,57	3/172	1,74	-	3/217	1,38	1/210	0,48	-	10/457	2,19	9/294	3,06	-
Mandible	12/352	3,41	3/192	1,56	-	0/266	0,00	3/284	1,06	-	9/505	1,78	3/355	0,85	-
Anterior	8/265	3,02	4/144	2,78	-	3/178	1,69	2/179	1,12	-	15/372	4,03	9/253	3,56	-
Posterior	12/398	3,02	2/220	1,65	*0,033*	0/305	0,00	2/315	0,63	-	4/590	0,68	3/396	0,76	-

Tab.13- Frequencies of notch per sex per individual and per tooth
in the total samples from Molise;
n=…; N=….

c.3. Per individual and per tooth frequencies of the horsemen (Tab.14)

In the VCN sample we can compare the frequencies of notch between the horsemen and the males non-horsemen.

Even if the males non-horsemen sample shows the highest per individual frequency (25,81%; 8/31) the difference with respect to the horsemen (10,00%; 1/10) is not significant.

Moreover, any significant differences have been found in the per tooth frequencies in the total and in all the dental regions.

MOLISE	Horsemen			Males without horsemen			
	N	n	%	N	n	%	*P*
Per individual	10	1	10,00	31	8	25,81	-
Per tooth							
Total	242	2	0,83	720	17	2,36	-
Maxilla	108	1	0,93	349	9	2,58	-
Mandible	134	1	0,75	371	8	2,16	-
Anterior	100	1	1,00	272	14	5,15	-
Posterior	142	1	0,70	448	3	0,67	-

Tab.14- Frequencies of notch per individual and per tooth in the horsemen and males non-horsemen of VCN necropolis.

C. Anomalous wear:

a. Emilia-Romagna

a.1. Per individual frequencies (Tabb.15, 16)

In the total samples the per individual (**Tab.15**) and the per individual and per sex frequencies (**Tab.16**) of anomalous wear are similar in all the necropolises from Emilia-Romagna.

a.2. Per tooth frequencies (Tabb.15, 16)

The teeth of the total CSL "TA" sample with the 3,45% (12/348) of teeth with anomalous wear are more affected than the teeth of the CRT total sample (1,39%; 23/1651) ($p=0,008$) and of the CSL I total sample (0,79%; 16/2017) ($p<0,01$) (**Tab.15**).

In all the necropolises the anterior teeth are more affected than the posterior ones (in all the cases the p values are <0,01) (**Tab.15**).

As regards the per tooth and sex frequencies a significant difference has been observed between males and females of the CRT sample: both in the total, and in all the dental regions the males are more affected than the females sub-sample (**Tab.16**).

Moreover, the males of CRT sample in the total per tooth frequencies (2,18%; 23/1055) are more affected by anomalous wear than the males of the CSL I sample (0,71%; 6/841) ($p=0,01$). Also the CSL TA males (3,26%; 7/215) are more affected than the males of the CSL I sample ($p<0,01$). In particular, the anterior teeth of the CRT males (5,08%; 21/413) are

more affected than the anterior ones of the CSL I males (1,52%; 5/328), and also the anterior teeth of the CSL TA males (8,14%; 7/86) are more affected than the anterior ones of the CSL I males (p<0,01).

b. Marche

b.1. Per individual frequencies (Tabb.17, 18)

In the total samples the per individual (**Tab.17**) and the per individual and per sex frequencies (**Tab.18**) of anomalous wear are similar in all the necropolises from Marche.

b.2. Per tooth frequencies (Tabb.17, 18)

The teeth of the total sample of NVL with the 1,96% (14/716) are more affected by anomalous wear than the teeth of the SUA M total sample (0,00%; 0/666) (p<0,01). Also the teeth of the total sample of SUA D (0,71%; 4/564) are significantly more affected than the teeth of the SUA M total sample (P=0,029) (**Tab.17**).

In the NVL sample the anterior teeth (5,58%; 12/215) are more affected by anomalous wear than the posterior ones (0,40; 2/501) (p<0,01).

Regarding the per tooth and per sex frequencies only in the NVL sample significant differences have been found between males and females sub-samples: in the total, for the upper teeth and for the anterior ones (see **tab.18**). Moreover, the females NVL sub-sample (3,54%; 12/339) is significantly more affected both than the females SUA M sub-sample (0,00%; 0/403) (p<0,01) and than the females SUA D sub-sample (0,88%; 2/227) (p=0,046) (**Tab.18**).

c. Molise

c.1. Per individual frequencies (Tabb.19, 20)

In the total samples the per individual (**Tab.17**) and the per individual and per sex frequencies (**Tab.18**) of anomalous wear are similar in all the necropolises from Molise.

c.2. Per tooth frequencies (Tabb.19, 20)

The teeth of the total sample of QDR with the 11,39% (16/1150) are more affected than the teeth of PZZ sample (0,19%; 2/1044) (p=0,002). Also the teeth of the total sample of VCN with the 1,03% (17/1645) are more affected than the PZZ ones (p=0,011).

The anterior teeth of the QDR sample (3,73%; 16/429) are more affected than the posterior ones (0,00%; 0/721) (p=0,000). Also the anterior teeth of the VCN sample with the 2,66% (17/639) are more affected than the posterior ones (0,00%; 0/1006) (p=0,000).

As regards the per tooth and per sex frequencies the males of both QDR and VCN are significantly more affected than the females of the same samples: in the total, in the lower and in the anterior teeth (see **tab.20**).

Moreover, the males sub-sample of QDR (1,45%; 7/483) is more affected by anomalous wear than the males of PZZ (0,30%; 2/663) (p=0,030) and also the males sub-

sample of VCN with the 1,46% (14/962) is significantly more affected than the males of PZZ (p=0,021) (**Tab.20**).

c.3. Per individual and per tooth frequencies of the horsemen (Tab.21)

In the VCN sample we can compare the frequencies of anomalous wear between the horsemen and the males non-horsemen.

In all the cases (except for the posterior teeth) significant differences have been found between the horsemen and the males non-horsemen: both in the per individuals and per tooth frequencies the horsemen are more affected than the males non-horsemen (see **tab.21**).

D. LSAMAT:

a. Emilia-Romagna

a.1. Per individual frequencies (Tabb.22, 23)

In the total samples the per individual (**Tab.22**) and the per individual and per sex frequencies (**Tab.23**) of anomalous wear are similar in all the necropolises from Emilia-Romagna.

a.2. Per tooth frequencies (Tabb.22, 23)

The teeth of the total sample of CRT with the 0,48% (8/1651) are more affected by LSAMAT than the teeth of the CSL I (0,00%; 0/2017) (p=0,002). The anterior teeth of the CRT sample (1,24%; 8/646) are significantly more affected than the posterior ones of the same sample (0,00%; 0/1005) (p<0,01) and than the anterior teeth of CSL I (0,00%; 0/1218) (p=0,002) (**Tab.22**).

Regarding the per tooth and per sex frequencies significant differences have been found between the females of CRT and of CSL I samples. The females of CRT with the 0,69% (4/581) are more affected than the females of CSL I (0,00%; 0/843) (p=0,016). The anterior teeth of the females of CRT (1,74%; 4/230) are more affected than the anterior ones of the females of CSL I (0,00%; 0/328) (p=0,016) and also the upper teeth of the females of CRT (1,41%; 4/284) are more affected than the upper ones of the females of CSL I (0,00%; 0/515) (p=0,021) (**Tab.23**).

b. Marche

b.1. Per individual frequencies (Tabb.24, 25)

In the total samples the per individual (**Tab.24**) and the per individual and per sex frequencies (**Tab.25**) of LSAMAT are similar in all the necropolises from Marche.

b.2. Per tooth frequencies (Tab.25)

Significant differences have been found between males and females of the NVL sample: in the per tooth total frequencies and in the anterior teeth, the males are more affected by LSAMAT than the females of the same sample (see **Tab.25**).

The males of the NVL sample (1,42%; 3/211) are significant more affected by LASAMT than the males of SUA M (0,00%; 0/259) (p=0,054) and than the males of SUA D (0,00%; 0/280) (p=0,045). The upper teeth of the males of NVL with the 3,41% (3/88) are more affected by LSAMAT than the upper ones of SUA M (0,00%; 0/118) (p=0,043) and of the upper ones of SUA D (0,00%; 0/111) (p=0,05). Moreover, the anterior teeth of the males sub-sample of NVL (5,00%; 3/60) are more affected than the anterior ones of SUA M (0,00%; 0/95) (p=0,028) and of SUA D (0,00%; 0/99) (p=0,025) (see **Tab.25**).

c. Molise

c.1. Per individual frequencies (Tabb.26, 27)

In the total samples the per individual (**Tab.26**) and the per individual and per sex frequencies (**Tab.27**) of LSAMAT are similar in all the necropolises from Molise.

c.2. Per tooth frequencies (Tabb.26, 27)

The teeth of VCN sample with the 0,73% (12/1645) are more affected by LSAMAT than the teeth of PZZ sample (0,00%; 0/144) (p=0,006) and of the ones of QDR sample (0,00%; 0/1150) (p=0,004).

The upper teeth of VCN (1,58%; 12/760) are more affected than the upper ones of PZZ (0,00%; 0/485) (p<0,01) and of the upper ones of QDR (0,00%; 0/501) (p<0,01). The anterior teeth of VCN (1,88%; 12/639) are significantly more affected than the posterior ones (0,00%; 0/1006) (p<0,01). Moreover, the anterior teeth of VCN are more affected than the ones of PZZ (0,00%; 0/413) (p<0,01) and of the anterior ones of QDR (0,00%; 0/429) (p<0,01).

Significant differences have been found in the per tooth and per sex frequencies between males and females sub-samples of VCN: the males are more affected by LSAMAT than the females in the total, in the upper teeth and in the anterior ones (**Tab.27**).

The VCN males with the 1,25% (12/962) are more affected than the PZZ males (0,00%; 0/663) (p=0,004) and than the QDR males (0,00%; 0/483) (p=0,014). The upper teeth of the VCN males are more affected than the upper ones of PZZ males sub-sample (p=0,004) and than the anterior ones of QDR males sub-sample (p=0,016). Moreover, the anterior teeth of the males of VCN are more affected than the anterior ones of PZZ males sub-sample (p=0,003) and than the anterior ones of QDR males sub-sample (p=0,015) (**Tab.27**).

c.3. Per individual and per tooth frequencies of the horsemen (Tab.28)

In the VCN sample we can compare the frequencies of LSAMAT between the horsemen and the males non-horsemen.

In all the cases (except for the lower teeth and the posterior ones) significant differences have been found between the horsemen and the males non-horsemen: both in the per individuals and per tooth frequencies the horsemen are more affected than the males non-horsemen (see **tab.28**).

E. Interproximal groove:

a. Emilia-Romagna

a.1. Per individual frequencies (Tabb.29, 30)

In the total samples the frequency of individuals of the CSL TA sample with interproximal groove (21,43%; 3/14) is higher than the one of CSL I sample (6,25%; 6/96) (p=0,053) (**Tab.29**). The per individual and per sex frequencies of interproximal groove are similar in all the necropolises from Emilia-Romagna (**Tab.30**).

a.2. Per tooth frequencies (Tabb.29, 30)

The teeth of the total sample of CRT (0,97%; 16/1651) are more affected than the teeth of CSL I sample (0,40%; 8/2017) (p=0,032). The CSL TA sample with the 3,45% (12/348) of teeth with interproximal groove is more affected than both CRT (p=0,000) and CSL I samples (p=0,000).

As regards the dental regions, the posterior teeth of the CRT sample (1,39%; 14/1005) are more affected by interproximal groove than the anterior ones (0,31%; 2/646) (p=0,030) of the same sample. Also the posterior teeth of the CSL I sample (0,66%; 8/1218) show more interproximal groove than the anterior ones of the same sample (0,00%; 0/799) (p=0,023).

The upper teeth of the CSL TA sample (7,10%; 12/169) are more affected than the lower ones of the same sample (0,00%; 0/179) (p=0,000). Moreover the upper teeth of the CSL TA sample than the upper ones of the CRT (0,88%; 7/794) (p=0,000) and of CSL I (0,46%; 4/866) (p=0,000). Also the anterior teeth of the CSL TA sample (4,14%; 6/145) are more affected than the anterior ones of the CRT (0,31; 2/646) (p=0,000) and of the CSL I (0,00%; 0/799) (p=0,000) samples. Moreover, the posterior teeth of CSL TA with the 2,96% (6/203) are more affected than the posterior ones of CSL I (0,66%; 8/1218) (p=0,002). About the lower teeth, the lower ones of the CRT sample (1,05%; 9/857) are more affected than the lower ones of the CSL I sample (0,35%; 4/1151), but the difference is only quite significant because p is 0,052.

Significant differences have been found in the per individual and per sex frequencies between the females sub-sample of CRT and the females sub-sample of CSL I: the females of CRT with the 8,33% of individuals with interproximal groove are more affected than the females of CSL I (0,00%; 0/38) (p=0,012). Also in the per tooth and per sex frequencies the females sub-sample of CRT (0,52%; 3/581) is more affected than the females sub-sample of CSL I (0,00%; 0/843) (p=0,037).

Significant differences have been found in the per tooth and per sex frequencies between males and females sub-samples of CRT as regards anterior and posterior teeth, and

also in the CSL I sample between males and females sub-samples as regards the lower teeth (**Tab.30**).

b. Marche

b.1. Per individual frequencies (Tabb.31, 32)

In the total samples the per individual (**Tab.31**) and the per individual and per sex frequencies (**Tab.32**) of interproximal groove are similar in all the necropolises from Marche.

b.2. Per tooth frequencies (Tabb.31, 32)

The total sample of SUA M with the 0,75% (5/666) of teeth with interproximal groove is more affected than the total sample of SUA D (0,00%; 0/564) (p=0,039).

As regards the dental regions, the upper teeth of the SUA M sample (1,66%; 5/301) are more affected than the lower ones of the same sample (0,00%; 0/365) (p=0,013) and than the upper ones of SUA D (0,00%; 0/247) (p=0,042).

Regarding the per tooth and per sex frequencies significant difference has been found between males and females of the SUA M sample for the anterior teeth: the males sub-sample is more affected than the females one (**Tab.32**).

The males of the SUA M sample (1,54%; 4/259) are more affected than the males of the SUA D sample (0,00%; 0/280) (p=0,037). Particularly, the upper teeth of the males of SUA M (3,39%; 4/118) are more affected than the lower ones of the same sample (0,00%; 0/141) (p=0,028) and than the upper ones of the SUA D males (0,00%; 0/111) (p=0,050).

c. Molise

c.1. Per individual frequencies (Tabb.33, 34)

In the total samples the per individual (**Tab.33**) and the per individual and per sex frequencies (**Tab.34**) of interproximal groove are similar in all the necropolises from Molise.

c.2. Per tooth frequencies (Tabb.33, 34)

The VCN sample with the 0,79% of teeth with interproximal groove is more affected than the PZZ sample (0,00%; 0/1044) (p=0,009) and than the QDR sample (0,09%; 1/1150) (p=0,004).

The upper teeth of the VCN total sample (1,18%; 9/760) are more affected than the upper ones of the PZZ total sample (0,00%; 0/1044) (p=0,016) and than of the upper teeth of QDR total sample (0,00%; 0/501) (p=0,014). Also the anterior teeth of VCN sample (1,25%; 8/639) are more affected by interproximal groove than the anterior teeth of PZZ (0,00%; 0/413) (p=0,022) and than the anterior ones of QDR (0,00%; 0/429) (p=0,020).

As regards the per tooth and per sex frequencies the females sub-sample of VCN is in the total and for all the dental regions more affected by interproximal groove than the males of the same sample (**Tab.34**).

The females total sub-sample of VCN are more affected also than the females of PZZ (p=0,009) and than the females of QDR (p=0,009) (**Tab.34**). Moreover the upper teeth of the females of VCN (2,72%; 8/294) are more affected than the upper ones of the PZZ females sub-sample (0,00%; 0/172) (p=0,029) and than the upper ones of the females of QDR (0,00%; 0/210)(p=0,016). The anterior teeth of the females of VCN (2,77%; 7/253) are more affected by interproximal groove than the anterior ones of the PZZ females (0,00%; 0/144) (p=0,044) and than the anterior ones of the females of QDR (0,00%; 0/179) (p=0,025).

c.3. Per individual and per tooth frequencies of the horsemen (Tab.35)

In the VCN sample we can compare the frequencies of interproximal groove between the horsemen and the males non-horsemen.

The horsemen are significantly more affected than the males non horsemen both in the per individuals and in per tooth total and anterior teeth frequencies (**Tab.35**).

F. Interproximal *striae*:

a. Emilia-Romagna

a.1. Per individual frequencies (Tabb.36, 37)

In the total samples the per individual (**Tab.36**) and the per individual and per sex frequencies (**Tab.37**) of interproximal *striae* are similar in all the necropolises from Emilia-Romagna.

a.2. Per tooth frequencies (Tabb.36, 37)

The total sample of CSL I with the 0,50% (10/2017) of teeth with interproximal *striae* is more affected than the CRT total sample (0,12%; 2/1651) (p=0,048).

Regarding the per tooth and per sex frequencies significant difference has been found between males and females of the CSL I sample: the males sub-sample is more affected than the females one in the total and in the posterior teeth (**Tab.37**).

The males of CSL I sample are more affected than the males of CRT (0,09%; 1/1055) (p=0,014). Moreover, the posterior teeth of the males of CSL I are more affected by interproximal *striae* than the posterior ones of the males of CRT sample (0,16%; 1/642), but in this case the difference is at the limit of significance (p=0,054).

b. Marche

b.1. Per individual frequencies (Tabb.38, 39)

In the total samples the per individual (**Tab.38**) and the per individual and per sex frequencies (**Tab.39**) of interproximal *striae* are similar in all the necropolises from Marche.

b.2. Per tooth frequencies (Tabb.38, 39)

In the total samples the per tooth (**Tab.38**) and the per tooth and per sex frequencies (**Tab.39**) of interproximal *striae* are similar in all the necropolises from Marche.

c. Molise

c.1. Per individual frequencies (Tabb.40, 41)

In the total samples the per individual (**Tab.40**) and the per individual and per sex frequencies (**Tab.41**) of interproximal *striae* are similar in all the necropolises from Molise.

c.2. Per tooth frequencies (Tabb.40, 41)

The anterior teeth of VCN sample (0,78%; 5/639) are more affected by interproximal *striae* than the posterior ones of the same sample (0,00%; 0/1006) (p=0,005).

As regards the per tooth and per sex frequencies, significant differences have been found between males and females of the VCN sample: the females sub-sample is more affected by interproximal *striae* than the male one in the total, in the lower teeth and in the anterior ones (**Tab.41**).

Moreover, the females of VCN with the 0,77% (5/649) of teeth affected show a higher frequencies of interproximal *striae* than the females of QDR (0,00%; 0/494) but in this case the difference is at the limit of significance (p=0,050) (**Tab.41**).

c.3. Per individual and per tooth frequencies of the horsemen (Tab.42)

In the VCN sample neither in the horsemen sub-sample nor in the males without horsemen one have been found interproximal *striae*. So there are no significant differences between these two sub-samples.

G. Chipping of degree 3:

a. Emilia-Romagna

a.1. Per individual frequencies (Tabb.43, 44)

In the total samples the per individual frequencies of chipping of degree 3 are similar in all the necropolises from Emilia-Romagna (**Tab.43**).

As regards the per individuals and per sex frequencies significant difference has been found only between males and females of the CRT sample (**Tab.44**).

a.2. Per tooth frequencies (Tabb.45, 46)

The total sample of CSL I with the 13,78% (89/646) of teeth with chipping of degree 3 is more affected than the CRT total sample (5,57%; 62/1113) (p=0,000). Also the CSL TA total sample (13,97%; 19/136) is more affected than the CRT total sample (p=0,000).

Regarding the dental regions, the posterior teeth of the CRT sample (7,10%; 44/620) are more affected than the anterior ones of the same sample (3,65%; 18/493) (p=0,013). The anterior teeth of CSL I (16,57%; 55/332) are more affected than the anterior ones of the same sample (10,83%; 34/314) (p=0,034) and also than the anterior ones of CRT sample (3,65%; 18/493) (p=0,000). The posterior teeth of CSL TA (22,22%; 14/63) are more affected than the anterior ones of the same sample (6,85%; 5/73) (p=0,018). The posterior teeth of CSL I are more affected than the posterior ones of CRT (p=0,000) and also the posterior teeth of CSL TA are more affected than the posterior ones of CRT (p=0,000).

As regards the per tooth and per sex frequencies, significant differences have been found between males and females of the CRT sample in the anterior teeth and between males and females of the CSL I sample in the upper and posterior teeth: in all these cases the males sub-sample is more affected than the females ones (**Tab.46**).

In the females sub-sample of CRT the posterior teeth are more affected than the anterior ones (p=0,020). The posterior teeth of the males sub-sample of CSL I are more affected than the anterior ones of the same sample (p=0,005) and also than the posterior ones of the males of CRT (p=0,000). In the males sub-sample of CSL TA the posterior teeth are more affected than the anterior ones of the same sample (p=0,018) and also than the posterior teeth of the males of CRT (p=0,001) (**Tab.46**).

b. Marche

b.1. Per individual frequencies (Tabb.47, 48)

In the total samples the per individual (**Tab.47**) of chipping of degree 3 are similar in all the necropolises from Marche.

As regards the per individual and per sex frequencies significant differences have been found between males and females of the NVL and SUA M samples: in both the cases the males sub-samples are more affected than the females ones (see **Tab.48**).

Moreover, the males of SUA M with 90,91% (10/11) of individuals with chipping of degree 3 are more affected than the males individuals of SUA D (53,85%; 7/13) (p=0,046).

b.2. Per tooth frequencies (Tabb.47, 48)

The NVL sample with the 9,85% (47/477) of teeth with chipping of degree 3is more affected than the SUA D sample (4,77%; 20/419) (p=0,004). Also the teeth of the SUA M total sample (13,86%; 56/404) are more affected by chipping of degree 3 than the teeth of SUA D (p=0,000).

As regards the dental regions the anterior teeth of NVL (10,63%; 17/160) are more affected than the anterior ones of SUA D (4,92%; 9/183) (p=0,046). The anterior teeth of SUA M (10,81%; 20/185) are more affected than the anterior ones of SUA D (p=0,036).

The posterior teeth of NVL (9,46%; 30/317) are more affected than the posterior ones of the SUA D sample (4,66%; 11/236) (p=0,033); the posterior teeth of SUA M (16,44%;

36/219) are more affected both than the posterior ones of NVL (p=0,016) and than the posterior ones of SUA D (p=0,000).

As regard the per tooth and per sex frequencies the only significant differences has been found between males and females of the SUA M sample: in this case the males sub-sample is more affected than the females one (**Tab.48**).

c. Molise

c.1. Per individual frequencies (Tabb.49, 50)

In the total samples the per individual (**Tab.49**) and per individual and per sex frequencies (**Tab.50**) of chipping of degree 3 are similar in all the necropolises from Molise.

c.2. Per tooth frequencies (Tabb.49, 50)

As regards the per tooth frequencies significant differences have been found between the total samples of PZZ and QDR with the QDR sample more affected by Chipping of degree 3 (23,14%, 118/510) than the PZZ one (10,27%, 49/477) (p=0,000). Moreover the total sample of VCN shows teeth more affected by chippings of degree 3 (21,13%, 56/265) than the teeth of PZZ total sample (10,27%, 49/477) (p=0,000).

In all the samples of Molise the posterior teeth are more affected by chippings of degree 3 than the anterior ones (tab. 49).

As regards the per tooth and per sex frequencies significant differences have been found only for the lower teeth in the sample of QDR and VCN. In both the samples the males sub-samples are more affected than the females ones (tab.50).

c.3. Per individual and per tooth frequencies of the horsemen (Tab.42)

in the VCN sample a significant difference has been found in the per individual and per tooth frequencies between the horsemen sub-sample and the males without horsemen sample: the horsemen are more affected by chippings of degree 3 than the other males of the VCN sample (tab 52). Moreover, the anterior teeth of the horsemen are more affected by chippings of degree 3 than the anterior teeth of the males non horsemen (tab.52).

a.1 Regional comparisons between protostoric, imperial and late ancient samples

a.1.1 Non masticatory dental alterations considered all together

I. The protostoric samples (from Emilia-Romanga, Marche and Molise)

The NVL sample with the 6,28% (45/716) of teeth with non masticatory dental alterations (considered all together) is more affected than PZZ (2,87%; 30/1044) (p=0,000). Also the CRT sample (5,45%; 90/1651) is more affected by non masticatory dental alterations than the PZZ sample (p=0,002).

Regarding the dental regions, the anterior teeth of NVL (11,16%; 24/215) and the anterior ones of CRT (9,91%; 64/646) are more affected than the anterior teeth of PZZ (3,63%; 15/413) and in both the cases the p value is <0,01.

As regard the per tooth and per sex frequencies the males of CRT (7,11%; 75/1055) shows more non masticatory dental alterations than the males of PZZ (3,62%; 24/663) (p=0,002). The females of NVL with the 7,96% (27/339) are more affected than the females of CRT (2,24%; 13/581) (p<0,001) and than of the females of PZZ (1,65%; 6/364) (p<0,001). Moreover, the anterior teeth of the males sub-sample of CRT (12,83%; 53/413) are more affected than the anterior ones of the males of PZZ (4,15%; 11/265) (p<0,001). The anterior teeth of the females of NVL with the 14,75% (14/95) with non masticatory dental alterations are more affected than the anterior ones of the females of CRT (4,78%; 11/230) (p=0,002) and than of the anterior teeth of the females of PZZ (2,78%; 4/144) (p=0,001).

II. The roman-imperial samples (from Emilia-Romagna and Marche)

In the total samples the per tooth frequencies of non masticatory dental alteration considered all together are similar in all the necropolises aged to the roman-imperial age from Emilia-Romagna and Marche.

III. The late-ancient and early-middle age samples (from Emilia-Romanga, Marche and Molise)

The CSL TA sample with the 9,20% (32/348) of teeth with non masticatory dental alterations is more affected than the SUA D sample (2,84%; 16/564) (p<0,001) and than the QDR+VCN sample (3,69%; 103/2797) (p<0,001).

As regards the dental regions, the anterior teeth of CSL TA (17,24%; 25/145) are more affected than the anterior teeth of the SUA D sample (3,38%; 7/207) (p=0,000) and than the anterior ones of QDR+VCN sample (8,05%; 86/1068) (p=0,000). Moreover, the anterior teeth of QDR+VCN sample are significantly more affected than the anterior ones of SUA D (p=0,018).

The posterior teeth of QDR+VCN (0,98%; 17/1727) are more affected than the posterior ones of SUA D (2,52%; 9/357) (p=0,017) and than the posterior ones of CSL TA (3,45%; 7/203) (p=0,003).

In the total samples the per tooth frequencies of non masticatory dental alteration considered all together are similar in all the necropolises aged to the late-ancient period and to the early-middle age from Emilia-Romagna, Marche and Molise.

a.1.2. Notch

I. The protostoric samples (from Emilia-Romagna, Marche and Molise)

The NVL sample with the 3,07% (22/716) of teeth with notch is more affected than the CRT sample that shows the 0,91% (15/1651) of teeth with notch ($p<0,001$). Also the PZZ sample (2,49%; 26/1044) is more affected by notch than the CRT sample ($p=0,001$).

As regards the dental regions, the anterior teeth of PZZ (2,91%; 12/413) are more affected than the anterior ones of CRT (1,08%; 7/646) ($P=0,029$). The NVL posterior teeth (3,19%; 16/501) are more affected than the posterior ones of CRT (0,80%; 8/1005) ($p=0,000$) and also the posterior teeth of PZZ (2,22%; 14/631) are more affected than the posterior ones of CRT ($p=0,015$).

II. The roman-imperial samples (from Emilia-Romagna and Marche)

In the total samples significant differences in the per tooth frequencies has been found for the posterior teeth between the CSL I and SUA M samples: the SUA M sample (2,40%; 10/417) is more affected than the CSL I one (1,07%; 13/1218) ($p=0,046$).

III. The late-ancient and early-middle age samples (from Emilia-Romanga, Marche and Molise)

In the total samples significant differences in the per tooth frequencies has been found for the posterior teeth between the SUA D and QDR+VCN samples: the SUA D sample with the 1,96% (7/357) of posterior teeth with notch is more affected than the QDR+VCN sample (0,52%; 9/1727) ($p=0,004$).

a.1.3. Anomalous wear

I. The protostoric samples (from Emilia-Romagna, Marche and Molise)

The CRT sample with the 1,39% (23/1651) of teeth with anomalous wear is more affected than the PZZ sample (0,19%; 2/1044) ($p=0,001$). The anomalous wear affects the 1,96% (14/716) of the teeth of NVL sample and the 0,19% (2/1044) of the teeth of PZZ sample: the difference is significant because $p<0,001$.

As regards the dental regions, the anterior of NVL (5,58%; 12/215) are more affected than the anterior ones of the PZZ sample (0,24%; 1/413) ($p<0,001$) and also the anterior teeth of CRT (3,25%; 21/646) are more affected than the anterior ones of PZZ sample ($p=0,001$).

II. The roman-imperial samples (from Emilia-Romagna and Marche)

Significant differences in the per tooth frequencies has been found for in the total samples between CSL I (0,79%; 16/2017) and SUA M (0,00%; 0/666) ($p=0,021$). Also the anterior teeth of CSL I (1,88%; 15/799) are more affected than the anterior ones of SUA M (0,00%; 0/249) ($p=0,029$).

III. The late-ancient and early-middle age samples (from Emilia-Romanga, Marche and Molise)

The CSL TA sample with the 3,45% (12/348) of teeth with anomalous wear is more affected than the SUA D sample (0,71%; 4/564) (p=0,002) and also than the QDR+VCN sample (1,18%; 33/2795) (p=0,001).

The anterior teeth of CSL TA sample (8,28%; 12/145) are more affected than the anterior ones of SUA D (0,97%; 2/207) (p=0,000) and than the anterior teeth of QDR+VCN sample (3,09%; 33/1068) (p=0,002).

The SUA D sample with the 0,56% (2/357) of posterior teeth with anomalous wear is more affected than the QDR+VCN sample (0,00%; 0/1727) (p=0,002).

a.1.4. Anomalous wear

I. The protostoric samples (from Emilia-Romagna, Marche and Molise)

The NVL sample with the 0,42% (3/716) of teeth with LSAMAT is more affected than the PZZ one (0,00%; 0/1044) (p=0,036) and also the CRT sample (0,48%; 8/1651) is more affected by LSAMAT than the PZZ one (p=0,024).

The anterior teeth of NVL (1,40%; 3/215) are more affected by LSAMAT than the anterior ones of PZZ (0,00%; 0/413) (p=0,016) and also the anterior teeth of CRT (1,24%; 8/646) are more affected than the anterior ones of PZZ (p=0,023).

II. The roman-imperial samples (from Emilia-Romagna and Marche)

In the roman-imperial age samples LSAMAT has not been found.

III. The late-ancient and early-middle age samples (from Emilia-Romanga, Marche and Molise)

In the total samples the per tooth frequencies of LSAMAT are similar in all the necropolises aged to late-ancient and early-middle age from Emilia-Romagna, Marche and Molise.

a.1.5. Interproximal groove

I. The protostoric samples (from Emilia-Romagna, Marche and Molise)

The interproximal groove affect the 0,97% (16/1651) of the teeth of CRT sample and the 0,00% (0/1044) of the teeth of PZZ and the difference is significant (p=0,001).

In particular, the posterior teeth of CRT (1,39%; 14/1005) are more affected than the posterior ones of PZZ (0,00%; 0/631) (p=0,003).

II. The roman-imperial samples (from Emilia-Romagna and Marche)

In the total samples significant difference has been found in the per tooth frequencies between the anterior teeth: the SUA M anterior teeth (1,20%; 3/249) are more affected than the anterior ones of CSL I (0,00%; 0/799) (p=0,002).

III. The late-ancient and early-middle age samples (from Emilia-Romanga, Marche and Molise)

The CSL TA sample (3,45%; 12/348) is more affected than the SUA D (0,00%; 0/564) (p=0,000) and than the QDR+VCN sample (0,50%; 14/2795) (p=0,000).

The anterior teeth of CSL TA (0,97%; 16/1651) are more affected than the SUA D anterior teeth (0,00%; 0/207) (p=0,003) and than the anterior teeth of QDR+VCN (0,75%; 8/1068) (p=0,000).

The posterior teeth of CSL TA (2,96%; 6/203) are more affected than the posterior teeth of SUA D (0,00%; 0/357) (p=0,001) and than the posterior ones of QDR+VCN (0,35%; 6/1727) (p=0,000).

a.1.6. Chippings of degree 3

I. The protostoric samples (from Emilia-Romagna, Marche and Molise)

The chippings of degree 3 affect the 9,85% (47/477) of the teeth of NVL sample and the 5,57% (62/1113) of the teeth of CRT and the difference is significant (p=0,000).

Moreover, the teeth of PZZ (10,27%; 49/477) are more affected than the teeth of CRT (5,57%; 62/1113) (p=0,000).

II. The roman-imperial samples (from Emilia-Romagna and Marche)

In the total samples of the roman imperial age samples significant differences have not been found in the per tooth frequencies of chippings of degree 3.

III. The late-ancient and early-middle age samples (from Emilia-Romanga, Marche and Molise)

The CSL TA sample (13,97%; 19/136) is more affected by chippings of degree 3 than the SUA D (4,77%; 20/419) (p=0,000). Also the QDR+VCN sample (22,45%; 174/775) is more affected than the SUA D sample (4,77%; 20/419) (p=0,000).

Moreover, the QDR+VCN sample (22,45%; 174/775) is significantly more affected by chippings of degree 3than the CSL TA sample (13,97%; 19/136) (p=0,026).

EMILIA-ROMAGNA	ANOMALOUS WEAR PER SEX														
	CRT					CSL "A+B+2000"					CSL "TA"				
	Males		Females		*P*	Males		Females		*P*	Males		Females		*P*
	n/N	%	n/N	%		n/N	%	n/N	%		n/N	%	n/N	%	
Per individual	5/40	12,50	0/23	0,00	-	4/41	9,76	2/39	5,13	-	1/8	12,50	0/2	0,00	-
Per tooth															
Total	23/1055	2,18	0/581	0,00	*0,000*	6/841	0,71	4/843	0,47	-	7/215	3,26	0/43	0,00	-
Maxilla	12/505	2,38	0/284	0,00	*0,001*	2/347	0,58	2/377	0,53	-	3/100	3,00	0/21	0,00	-
Mandible	11/550	2,00	0/297	0,00	*0,014*	4/494	0,81	2/466	0,43	-	4/115	3,48	0/22	0,00	-
Anterior	21/413	5,08	0/230	0,00	*0,000*	5/328	1,52	4/328	1,22	-	7/86	8,14	0/22	0,00	-
Posterior	2/642	0,31	0/351	0,00	-	1/513	0,19	0/515	0,00	-	0/129	0,00	0/21	0,00	/

MARCHE	ANOMALOUS WEAR PER SEX														
	NVL					SUA-Nec.Merid.					SUA-Domus				
	Males		Females		*P*	Males		Females		*P*	Males		Females		*P*
	n/N	%	n/N	%		n/N	%	n/N	%		n/N	%	n/N	%	
Per individual	0/13	0,00	2/19	10,53	-	0/11	0,00	0/18	0,00	/	1/13	7,69	1/11	9,09	-
Per tooth															
Total	0/211	0,00	12/339	3,54	*0,006*	0/259	0,00	0/403	0,00	/	2/280	0,71	2/227	0,88	-
Maxilla	0/88	0,00	9/160	5,63	*0,023*	0/118	0,00	0/180	0,00	/	0/111	0,00	2/104	1,92	-
Mandible	0/123	0,00	3/179	1,68	-	0/141	0,00	0/223	0,00	/	2/169	1,18	0/123	0,00	-
Anterior	0/60	0,00	10/95	10,53	*0,001*	0/95	0,00	0/154	0,00	/	0/99	0,00	2/85	2,35	-
Posterior	0/151	0,00	2/244	0,82	-	0/164	0,00	0/249	0,00	/	2/181	1,10	0/142	0,00	-

MOLISE	PZZ					ANOMALOUS WEAR PER SEX QDR					VCN				
	Males		Females		*P*	Males		Females		*P*	Males		Females		*P*
	n/N	%	n/N	%		n/N	%	n/N	%		n/N	%	n/N	%	
Per individual	1/29	3,45	0/16	0,00	-	4/22	18,18	1/24	4,17	-	4/42	9,52	3/29	10,34	-
Per tooth															
Total	2/663	0,30	0/364	0,00	-	7/483	1,45	1/494	0,20	*0,031*	14/962	1,46	3/649	0,46	*0,056*
Maxilla	2/311	0,64	0/172	0,00	-	0/217	0,00	0/210	0,00	/	8/457	1,75	3/294	1,02	-
Mandible	0/352	0,00	0/192	0,00	/	7/266	2,63	1/284	0,35	*0,026*	6/505	1,19	0/355	0,00	*0,045*
Anterior	1/265	0,38	0/144	0,00	-	7/178	3,93	1/179	0,56	*0,032*	14/372	3,76	3/253	1,19	*0,052*
Posterior	1/398	0,25	0/220	0,00	-	0/305	0,00	0/315	0,00	/	0/590	0,00	0/396	0,00	/

EMILIA-ROMAGNA	ANOMALOUS WEAR								
	CRT			CSL "A+B+2000"			CSL "TA"		
	N	n	%	N	n	%	N	n	%
Per individual	64	5	7,81	98	8	8,16	15	3	20,00
Per tooth									
Total	1651	23	1,39	2017	16	0,79	348	12	3,45
Maxilla	794	12	1,51	866	6	0,69	169	6	3,55
Mandible	857	11	1,28	1151	10	0,87	179	6	3,35
Anterior	646	21	3,25	799	15	1,88	145	12	8,28
Posterior	1005	2	0,20	1218	1	0,08	203	0	0,00

MARCHE	ANOMALOUS WEAR								
	NVL			SUA-Nec. Merid.			SUA-Domus		
	N	n	%	N	n	%	N	n	%
Per individual	44	4	9,09	29	0	0,00	26	2	7,69
Per tooth									
Total	716	14	1,96	666	0	0,00	564	4	0,71
Maxilla	326	11	3,37	301	0	0,00	247	2	0,81
Mandible	390	3	0,77	365	0	0,00	317	2	0,63
Anterior	215	12	5,58	249	0	0,00	207	2	0,97
Posterior	501	2	0,40	417	0	0,00	357	2	0,56

MOLISE	ANOMALOUS WEAR								
	PZZ			QDR			VCN		
	N	n	%	N	n	%	N	n	%
Per individual	46	1	2,17	55	6	10,91	73	7	9,59
Per tooth									
Total	1044	2	0,19	1150	16	1,39	1645	17	1,03
Maxilla	485	2	0,41	501	4	0,80	760	11	1,45
Mandible	559	0	0,00	649	12	1,85	885	6	0,68
Anterior	413	1	0,24	429	16	3,73	639	17	2,66
Posterior	631	1	0,16	721	0	0,00	1006	0	0,00

MOLISE	ANOMALOUS WEAR						
	Horsemen			Males without horsemen			
	N	n	%	N	n	%	*P*
Per individual	8	3	37,50	34	1	2,94	*0,003*
Per tooth							
Total	190	11	5,79	772	3	0,39	*0,000*
Maxilla	84	5	5,95	373	3	0,80	*0,001*
Mandible	106	6	5,66	399	0	0,00	*0,000*
Anterior	83	11	13,25	289	3	1,04	*0,000*
Posterior	107	0	0,00	483	0	0,00	/

	LSAMAT								
EMILIA-ROMAGNA	**CRT**			**CSL "A+B+2000"**			**CSL "TA"**		
	N	**n**	**%**	**N**	**n**	**%**	**N**	**n**	**%**
Per individual	64	2	3,13	96	0	0,00	14	0	0,00
Per tooth									
Total	1651	8	0,48	2017	0	0,00	348	0	0,00
Maxilla	794	8	1,01	866	0	0,00	169	0	0,00
Mandible	857	0	0,00	1151	0	0,00	179	0	0,00
Anterior	646	8	1,24	799	0	0,00	145	0	0,00
Posterior	1005	0	0,00	1218	0	0,00	203	0	0,00

	LSAMAT								
MARCHE	**NVL**			**SUA-Nec. Merid.**			**SUA-Domus**		
	N	**n**	**%**	**N**	**n**	**%**	**N**	**n**	**%**
Per individual	43	1	2,33	29	0	0,00	26	0	0,00
Per tooth									
Total	716	3	0,42	666	0	0,00	564	0	0,00
Maxilla	326	3	0,92	301	0	0,00	247	0	0,00
Mandible	390	0	0,00	365	0	0,00	317	0	0,00
Anterior	215	3	1,40	249	0	0,00	207	0	0,00
Posterior	501	0	0,00	417	0	0,00	357	0	0,00

MOLISE	LSAMAT								
	PZZ			QDR			VCN		
	N	n	%	N	n	%	N	n	%
Per individual	46	0	0,00	54	0	0,00	72	3	4,17
Per tooth									
Total	1044	0	0,00	1150	0	0,00	1645	12	0,73
Maxilla	485	0	0,00	501	0	0,00	760	12	1,58
Mandible	559	0	0,00	649	0	0,00	885	0	0,00
Anterior	413	0	0,00	429	0	0,00	639	12	1,88
Posterior	631	0	0,00	721	0	0,00	1006	0	0,00

MOLISE	LSAMAT						
	Horsemen			Males without horsemen			
	N	n	%	N	n	%	*P*
Per individual	8	3	37,50	33	0	0,00	*0,000*
Per tooth							
Total	190	12	6,32	772	0	0,00	*0,000*
Maxilla	84	12	14,29	373	0	0,00	*0,000*
Mandible	106	0	0,00	399	0	0,00	/
Anterior	83	12	14,46	289	0	0,00	*0,000*
Posterior	107	0	0,00	483	0	0,00	/

EMILIA-ROMAGNA	CRT					LSAMAT per sex									
						CSL "A+B+2000"					CSL "TA"				
	Males		Females		*P*	Males		Females		*P*	Males		Females		*P*
	n/N	%	n/N	%		n/N	%	n/N	%		n/N	%	n/N	%	
Per individual	1/40	2,50	1/23	4,35	-	0/40	0,00	0/38	0,00	/	0/8	0,00	0/2	0,00	/
Per tooth															
Total	4/1055	0,38	4/581	0,69	-	0/841	0,00	0/843	0,00	/	0/215	0,00	0/43	0,00	/
Maxilla	4/505	0,79	4/284	1,41	-	0/347	0,00	0/377	0,00	/	0/100	0,00	0/21	0,00	/
Mandible	0/550	0,00	0/297	0,00	/	0/494	0,00	0/466	0,00	/	0/115	0,00	0/22	0,00	/
Anterior	4/413	0,97	4/230	1,74	-	0/328	0,00	0/328	0,00	/	0/86	0,00	0/22	0,00	/
Posterior	0/642	0,00	0/351	0,00	/	0/513	0,00	0/515	0,00	/	0/129	0,00	0/21	0,00	/

MARCHE	NVL					LSAMAT per sex SUA-Nec.Merid.					SUA-Domus				
	Males		Females		*P*	Males		Females		*P*	Males		Females		*P*
	n/N	%	n/N	%		n/N	%	n/N	%		n/N	%	n/N	%	
Per individual	1/13	7,69	0/20	0,00	-	0/11	0,00	0/18	0,00	/	0/13	0,00	0/11	0,00	/
Per tooth															
Total	3/211	1,42	0/339	0,00	*0,028*	0/259	0,00	0/403	0,00	/	0/280	0,00	0/227	0,00	/
Maxilla	3/88	3,41	0/160	0,00	-	0/118	0,00	0/180	0,00	/	0/111	0,00	0/104	0,00	/
Mandible	0/123	0,00	0/179	0,00	/	0/141	0,00	0/223	0,00	/	0/169	0,00	0/123	0,00	/
Anterior	3/60	5,00	0/95	0,00	*0,028*	0/95	0,00	0/154	0,00	/	0/99	0,00	0/85	0,00	/
Posterior	0/151	0,00	0/244	0,00	/	0/164	0,00	0/249	0,00	/	0/181	0,00	0/142	0,00	/

MOLISE	PZZ					LSAMAT per sex QDR					VCN				
	Males		Females		*P*	Males		Females		*P*	Males		Females		*P*
	n/N	%	n/N	%		n/N	%	n/N	%		n/N	%	n/N	%	
Per individual	0/29	0,00	0/16	0,00	/	0/29	0,00	0/16	0,00	/	3/41	7,32	0/29	0,00	-
Per tooth															
Total	0/663	0,00	0/364	0,00	/	0/483	0,00	0/494	0,00	/	12/962	1,25	0/649	0,00	*0,004*
Maxilla	0/311	0,00	0/172	0,00	/	0/217	0,00	0/210	0,00	/	12/457	2,63	0/294	0,00	*0,005*
Mandible	0/352	0,00	0/192	0,00	/	0/266	0,00	0/284	0,00	/	0/505	0,00	0/355	0,00	/
Anterior	0/265	0,00	0/144	0,00	/	0/178	0,00	0/179	0,00	/	12/372	3,23	0/253	0,00	*0,004*
Posterior	0/398	0,00	0/220	0,00	/	0/305	0,00	0/315	0,00	/	0/590	0,00	0/396	0,00	/

EMILIA-ROMAGNA	INTERPROXIMAL GROOVE								
	CRT			CSL "A+B+2000"			CSL "TA"		
	N	n	%	N	n	%	N	n	%
Per individual	65	7	10,67	96	6	6,25	14	3	21,43
Per tooth									
Total	1651	16	0,97	2017	8	0,40	348	12	3,45
Maxilla	794	7	0,88	866	4	0,46	169	12	7,10
Mandible	857	9	1,05	1151	4	0,35	179	0	0,00
Anterior	646	2	0,31	799	0	0,00	145	6	4,14
Posterior	1005	14	1,39	1218	8	0,66	203	6	2,96

MARCHE	INTERPROXIMAL GROOVE								
	NVL			SUA-Nec. Merid.			SUA-Domus		
	N	n	%	N	n	%	N	n	%
Per individual	43	2	4,65	30	3	10,00	26	0	0,00
Per tooth									
Total	716	2	0,28	666	5	0,75	564	0	0,00
Maxilla	326	2	0,61	301	5	1,66	247	0	0,00
Mandible	390	0	0,00	365	0	0,00	317	0	0,00
Anterior	215	0	0,00	249	3	1,20	207	0	0,00
Posterior	501	2	0,40	417	2	0,48	357	0	0,00

MOLISE	INTERPROXIMAL GROOVE								
	PZZ			QDR			VCN		
	N	n	%	N	n	%	N	n	%
Per individual	46	0	0,00	54	1	1,85	72	3	4,17
Per tooth									
Total	1044	0	0,00	1150	1	0,09	1645	13	0,79
Maxilla	485	0	0,00	501	0	0,00	760	9	1,18
Mandible	559	0	0,00	649	1	0,15	885	4	0,45
Anterior	413	0	0,00	429	0	0,00	639	8	1,25
Posterior	631	0	0,00	721	1	0,14	1006	5	0,50
	-								

MOLISE	INTERPROXIMAL GROOVE						
	Horsemen			Males without horsemen			
	N	n	%	N	n	%	*P*
Per individual	8	1	12,50	33	0	0,00	*0,040*
Per tooth							
Total	190	1	0,53	772	0	0,00	*0,044*
Maxilla	84	1	1,19	373	0	0,00	*0,035*
Mandible	106	0	0,00	399	0	0,00	/
Anterior	83	1	1,20	289	0	0,00	-
Posterior	107	0	0,00	483	0	0,00	/

EMILIA-ROMAGNA	INTERPROXIMAL GROOVE per sex																
	CRT					CSL "A+B+2000"					CSL "TA"						
	Males		Females		*P*	Males		Females		*P*	Males		Females		*P*	N.I.	
	n/N	%	n/N	%		n/N	%	n/N	%		n/N	%	n/N	%		n/N	
Per individual	4/40	10,00	2/24	8,33	-	3/40	7,50	0/38	0,00	-	1/8	12,50	0/2	0,00	-	2/4	5
Per tooth																	
Total	11/1055	1,04	3/581	0,52	-	3/841	0,36	0/843	0,00	-	1/215	0,47	0/43	0,00	-	11/90	1
Maxilla	4/505	0,79	1/284	0,35	-	1/347	0,29	0/377	0,00	-	1/100	1,00	0/21	0,00	-	11/48	2
Mandible	7/550	1,27	2/297	0,67	-	2/494	0,40	0/466	0,00	*0,052*	0/115	0,00	0/22	0,00	/	0/42	0
Anterior	0/413	0,00	2/230	0,87	*0,058*	0/328	0,00	0/328	0,00	/	0/86	0,00	0/22	0,00	/	6/37	1
Posterior	11/642	1,71	1/351	0,28	*0,049*	3/513	0,58	0/515	0,00	-	1/129	0,78	0/21	0,00	-	5/53	9

MARCHE	INTERPROXIMAL GROOVE per sex													
	NVL					SUA-Nec.Merid.					SUA-Domus				
	Males		Females		*P*	Males		Females		*P*	Males		Females		*P*
	n/N	%	n/N	%		n/N	%	n/N	%		n/N	%	n/N	%	
Per individual	0/13	0,00	1/19	5,26	-	2/11	18,18	1/19	5,26	-	0/13	0,00	0/11	0,00	/
Per tooth															
Total	0/211	0,00	1/339	0,29	-	4/259	1,54	1/403	0,25	-	0/280	0,00	0/227	0,00	/
Maxilla	0/88	0,00	1/160	0,63	-	4/118	3,39	1/180	0,56	-	0/111	0,00	0/104	0,00	/
Mandible	0/123	0,00	0/179	0,00	/	0/141	0,00	0/223	0,00	/	0/169	0,00	0/123	0,00	/
Anterior	0/60	0,00	0/95	0,00	/	3/95	3,16	0/154	0,00	*0,026*	0/99	0,00	0/85	0,00	/
Posterior	0/151	0,00	1/244	0,41	-	1/164	0,61	1/249	0,40	-	0/181	0,00	0/142	0,00	/

MOLISE	INTERPROXIMAL GROOVE per sex														
	PZZ					QDR					VCN				
	Males		Females		*P*	Males		Females		*P*	Males		Females		*P*
	n/N	%	n/N	%		n/N	%	n/N	%		n/N	%	n/N	%	
Per individual	0/29	0,00	0/16	0,00	/	0/21	0,00	1/24	4,17	-	1/41	2,44	2/29	6,90	-
Per tooth															
Total	0/663	0,00	0/364	0,00	/	0/483	0,00	1/494	0,20	-	1/962	0,10	12/649	1,85	*0,000*
Maxilla	0/311	0,00	0/172	0,00	/	0/217	0,00	0/210	0,00	/	1/457	0,22	8/294	2,72	*0,002*
Mandible	0/352	0,00	0/192	0,00	/	0/266	0,00	1/284	0,35		0/505	0,00	4/355	1,13	*0,017*
Anterior	0/265	0,00	0/144	0,00	/	0/178	0,00	0/179	0,00	/	1/372	0,27	7/253	2,77	*0,006*
Posterior	0/398	0,00	0/220	0,00	/	0/305	0,00	1/315	0,32		0/590	0,00	5/396	1,26	*0,006*

EMILIA-ROMAGNA	INTERPROXIMAL STRIAE								
	CRT			CSL "A+B+2000"			CSL "TA"		
	N	n	%	N	n	%	N	n	%
Per individual	64	2	3,13	97	10	1,03	14	0	0,00
Per tooth									
Total	1651	2	0,12	2017	10	0,50	348	0	0,00
Maxilla	794	2	0,25	866	7	0,81	169	0	0,00
Mandible	857	0	0,00	1151	3	0,26	179	0	0,00
Anterior	646	0	0,00	799	2	0,25	145	0	0,00
Posterior	1005	2	0,20	1218	8	0,66	203	0	0,00

MARCHE	INTERPROXIMAL STRIAE								
	NVL			SUA-Nec. Merid.			SUA-Domus		
	N	n	%	N	n	%	N	n	%
Per individual	46	0	0,00	29	2	6,90	26	0	0,00
Per tooth									
Total	716	0	0,00	666	2	0,30	564	0	0,00
Maxilla	326	0	0,00	301	2	0,66	247	0	0,00
Mandible	390	0	0,00	365	0	0,00	317	0	0,00
Anterior	215	0	0,00	249	0	0,00	207	0	0,00
Posterior	501	0	0,00	417	2	0,48	357	0	0,00

MOLISE	INTERPROXIMAL STRIAE								
	PZZ			QDR			VCN		
	N	n	%	N	n	%	N	n	%
Per individual	46	0	0,00	54	0	0,00	72	1	1,39
Per tooth									
Total	1044	0	0,00	1150	0	0,00	1645	5	0,30
Maxilla	485	0	0,00	501	0	0,00	760	1	0,13
Mandible	559	0	0,00	649	0	0,00	885	4	0,45
Anterior	413	0	0,00	429	0	0,00	639	5	0,78
Posterior	631	0	0,00	721	0	0,00	1006	0	0,00

MOLISE	INTERPROXIMAL STRIAE						
	Horsemen			Males without horsemen			
	N	n	%	N	n	%	*P*
Per individual	8	0	0,00	33	0	0,00	/
Per tooth							
Total	190	0	0,00	772	0	0,00	/
Maxilla	84	0	0,00	373	0	0,00	/
Mandible	106	0	0,00	399	0	0,00	/
Anterior	83	0	0,00	289	0	0,00	/
Posterior	107	0	0,00	483	0	0,00	/

INTERPROXIMAL STRIAE per sex

EMILIA-ROMAGNA	CRT					CSL "A+B+2000"					CSL "TA"				
	Males		Females		*P*	Males		Females		*P*	Males		Females		*P*
	n/N	%	n/N	%		n/N	%	n/N	%		n/N	%	n/N	%	
Per individual	1/40	2,5	1/23	4,35	-	4/41	9,76	1/38	2,63	-	0/14	0,00	0/2	0,00	/
Per tooth															
Total	1/1055	0,09	1/581	0,17	-	7/841	0,83	1/843	0,12	*0,033*	0/348	0,00	0/43	0,00	/
Maxilla	1/505	0,20	1/284	0,35	-	4/347	1,15	1/377	0,27	-	0/169	0,00	0/21	0,00	/
Mandible	0/550	0,00	0/297	0,00	/	3/494	0,61	0/466	0,00	-	0/179	0,00	0/22	0,00	/
Anterior	0/413	0,00	0/230	0,00	/	1/328	0,30	0/328	0,00	-	0/145	0,00	0/22	0,00	/
Posterior	1/642	0,16	1/351	0,28	-	6/513	1,17	1/515	0,19	*0,057*	0/203	0,00	0/21	0,00	/

INTERPROXIMAL STRIAE per sex

MARCHE	NVL					SUA-Nec.Merid.					SUA-Domus				
	Males		Females		*P*	Males		Females		*P*	Males		Females		*P*
	n/N	%	n/N	%		n/N	%	n/N	%		n/N	%	n/N	%	
Per individual	0/13	0,00	0/19	0,00	/	1/11	9,09	1/18	5,56	-	0/13	0,00	0/11	0,00	/
Per tooth															
Total	0/211	0,00	0/339	0,00	/	1/259	0,39	1/403	0,25	-	0/280	0,00	0/227	0,00	/
Maxilla	0/88	0,00	0/160	0,00	/	1/118	0,85	1/180	0,56	-	0/111	0,00	0/104	0,00	/
Mandible	0/123	0,00	0/179	0,00	/	0/141	0,00	0/223	0,00	/	0/169	0,00	0/123	0,00	/
Anterior	0/60	0,00	0/95	0,00	/	0/95	0,00	0/154	0,00	/	0/99	0,00	0/85	0,00	/
Posterior	0/151	0,00	0/244	0,00	/	1/164	0,61	1/249	0,40	-	0/181	0,00	0/142	0,00	/

MOLISE	INTERPROXIMAL STRIAE per sex														
	PZZ					QDR					VCN				
	Males		Females		*P*	Males		Females		*P*	Males		Females		*P*
	n/N	%	n/N	%		n/N	%	n/N	%		n/N	%	n/N	%	
Per individual	0/29	0,00	0/16	0,00	/	0/21	0,00	0/24	0,00	/	0/41	0,00	1/29	3,45	-
Per tooth															
Total	0/663	0,00	0/364	0,00	/	0/483	0,00	0/494	0,00	/	0/962	0,00	5/649	0,77	*0,006*
Maxilla	0/311	0,00	0/172	0,00	/	0/217	0,00	0/210	0,00	/	0/457	0,00	1/294	0,34	-
Mandible	0/352	0,00	0/192	0,00	/	0/266	0,00	0/284	0,00	/	0/505	0,00	4/355	1,13	*0,017*
Anterior	0/265	0,00	0/144	0,00	/	0/178	0,00	0/179	0,00	/	0/372	0,00	5/253	1,98	*0,006*
Posterior	0/398	0,00	0/220	0,00	/	0/305	0,00	0/315	0,00	/	0/590	0,00	0/396	0,00	/

EMILIA-ROMAGNA	CHIPPING gr 3								
	CRT			CSL "A+B+2000"			CSL "TA"		
	N	n	%	N	n	%	N	n	%
Per individual	61	35	57,38	94	47	50,00	15	10	66,67
Per tooth									
Total	1113	62	5,57	646	89	13,78	136	19	13,97
Maxilla	530	42	7,92	306	49	16,01	84	15	17,86
Mandible	583	20	3,43	340	40	11,76	52	4	7,69
Anterior	493	18	3,65	314	34	10,83	73	5	6,85
Posterior	620	44	7,10	332	55	16,57	63	14	22,22

In the per individual frequencies: N=individuals observed; n=individuals with chipping. In the per tooth frequencies: N=chipped teeth; n=teeth with chipping of degree 3.

MARCHE	CHIPPING gr 3								
	NVL			SUA-Nec. Merid.			SUA-Domus		
	N	n	%	N	n	%	N	n	%
Per individual	47	26	55,32	31	21	67,74	25	12	48,00
Per tooth									
Total	477	47	9,85	404	56	13,86	419	20	4,77
Maxilla	218	26	11,93	180	29	16,11	179	10	5,59
Mandible	259	21	8,11	224	27	12,05	240	10	4,17
Anterior	160	17	10,63	185	20	10,81	183	9	4,92
Posterior	317	30	9,46	219	36	16,44	236	11	4,66

MOLISE	CHIPPING gr 3								
	PZZ			QDR			VCN		
	N	n	%	N	n	%	N	n	%
Per individual	45	26	57,78	53	37	69,81	32	18	56,25
Per tooth									
Total	477	49	10,27	510	118	23,14	265	56	21,13
Maxilla	218	26	11,93	247	63	25,51	139	30	21,58
Mandible	259	23	8,88	263	55	20,91	126	26	20,63
Anterior	196	19	9,96	241	45	18,67	139	20	14,39
Posterior	281	30	10,68	269	73	27,14	126	36	28,57

In the per individual frequencies: N=individuals observed; n=individuals with chipping. In the per tooth frequencies: N=chipped teeth; n=teeth with chipping of degree 3.

EMILIA-ROMAGNA	CHIPPING gr 3 per sex													
	CRT					CSL "A+B+2000"					CSL "TA"				
	Males		Females		*P*	Males		Females		*P*	Males		Females		*P*
	n/N	%	n/N	%		n/N	%	n/N	%		n/N	%	n/N	%	
Per individual	27/39	69,23	8/21	38,10	*0,020*	23/40	57,50	16/36	44,44	-	6/8	75,00	2/2	100,00	-
Per tooth															
Total	50/786	6,36	12/313	3,83	-	43/287	14,98	29/267	10,86	-	12/87	13,79	2/19	10,53	-
Maxilla	35/384	9,11	7/141	4,96	-	27/138	19,57	13/127	10,24	*0,034*	9/53	16,98	2/10	20,00	-
Mandible	15/402	3,73	5/172	2,91	-	16/149	10,74	16/140	11,43	-	3/34	8,82	0/9	0,00	-
Anterior	16/335	4,78	2/155	1,29	*0,056*	12/137	8,76	12/126	9,52	-	2/42	4,76	1/15	6,67	-
Posterior	34/451	7,54	10/158	6,33	-	31/150	20,67	17/141	12,06	*0,048*	10/45	22,22	1/4	25,00	-

In the per individual frequencies: N=individuals observed; n=individuals with chipping. In the per tooth frequencies: N=chipped teeth; n=teeth with chipping of degree 3.

MARCHE	CHIPPING gr 3 per sex														
	NVL					SUA-Nec.Merid.					SUA-Domus				
	Males		Females		*P*	Males		Females		*P*	Males		Females		*P*
	n/N	%	n/N	%		n/N	%	n/N	%		n/N	%	n/N	%	
Per individual	11/14	78,57	7/20	35,00	*0,012*	10/11	90,91	11/20	55,00	*0,041*	7/13	53,85	4/10	40,00	-
Per tooth															
Total	17/144	11,81	18/207	8,70	-	29/164	17,68	27/240	11,25	-	11/236	4,66	6/150	4,00	-
Maxilla	10/65	15,38	9/94	9,57	-	13/77	16,88	16/103	15,53	-	3/95	3,16	4/67	5,97	-
Mandible	7/79	8,86	9/113	7,96	-	16/87	18,39	11/137	8,03	*0,020*	8/141	5,67	2/83	2,41	-
Anterior	6/42	14,29	4/64	6,25	-	11/73	15,07	9/112	8,04	-	5/94	5,32	3/74	4,05	-
Posterior	11/102	10,78	14/143	9,79	-	18/91	19,78	18/128	14,06	-	6/142	4,23	3/76	3,95	-

MOLISE	CHIPPING gr 3 per sex														
	PZZ					QDR					VCN				
	Males		Females		*P*	Males		Females		*P*	Males		Females		*P*
	n/N	%	n/N	%		n/N	%	n/N	%		n/N	%	n/N	%	
Per individual	16/28	57,14	10/16	62,50	-	18/22	81,82	14/23	60,87	-	28/43	65,12	22/32	68,75	-
Per tooth															
Total	32/345	9,28	17/127	13,39	-	64/236	27,12	44/209	21,05	-	89/374	23,80	40/230	17,39	-
Maxilla	17/164	10,37	9/53	16,98	-	31/117	26,50	25/94	26,60	-	45/190	23,68	24/111	21,62	-
Mandible	15/181	8,29	8/74	10,81	-	33/119	27,73	19/115	16,52	*0,039*	44/184	23,91	16/119	13,45	*0,025*
Anterior	13/139	9,35	6/54	11,11	-	24/105	22,86	17/103	16,50	-	42/203	20,69	15/109	13,76	-
Posterior	19/206	9,22	11/73	15,07	-	40/131	30,53	27/106	25,47	-	47/171	27,49	25/121	20,66	-

In the per individual frequencies: N=individuals observed; n=individuals with chipping. In the per tooth frequencies: N=chipped teeth; n=teeth with chipping of degree 3.

CHIPPING gr 3

MOLISE	Horsemen			Males without horsemen			
	N	**n**	**%**	**N**	**n**	**%**	***P***
Per individual	11	10	90,91	32	18	56,25	*0,037*
Per tooth							
Total	109	33	30,28	265	56	21,13	*0,059*
Maxilla	51	15	29,41	139	30	21,59	-
Mandible	58	18	31,03	126	26	20,63	-
Anterior	64	22	34,38	139	20	14,39	*0,001*
Posterior	45	11	24,44	126	36	28,57	-

In the per individual frequencies: N=individuals observed; n=individuals with chipping. In the per tooth frequencies: N=chipped teeth; n=teeth with chipping g3.

a.2. Discussions of the per individuals and per tooth frequencies

Esaminando le lesioni osservate sui denti in chiave geografica, l'indagine svolta sul campione scheletrico della necropoli celtica (IV-III sec. a.C.) di Ceretolo (BO) e sulle necropoli romane (I/II-V sec. d.C.) di Casalecchio di Reno (BO) mette in evidenza che in tutti i campioni sono state trovate alterazioni non masticatorie, ma che il campione celta è significativamente più colpito di quello romano considerato nel suo complesso. Questo dato può far supporre che a Ceretolo i denti venissero usati di più e in diversi tipi di attività non masticatorie, come suggerito anche dall'alta percentuale di chipping vestibolari a carico dei denti anteriori che sono i denti più esposti ad eventi traumatici. Inoltre, emerge anche che mentre nel campione di Ceretolo non c'è differenza significativa nella frequenza di alterazioni non masticatorie tra maschi e femmine, nel campione di Casalecchio i maschi sono significativamente più colpiti delle femmine. Questo può far supporre che durante il periodo romano a Casalecchio vi fosse una differenza nell'utilizzo dei denti tra maschi e femmine nello svolgimento di attività quotidiane e che, in particolare, i maschi utilizzassero i denti di più e in diversi tipi di attività non masticatorie. Questo può far supporre un significativo cambiamento dello stile di vita tra queste popolazioni.

Per quanto riguarda il territorio delle Marche, l'indagine svolta sul campione scheletrico della necropoli picena di Novilara (IX-VI sec. a.C.) (PS) e delle necropoli romane (I/II-IV sec. d.C.) di Suasa (AN), mette in evidenza che in tutte le necropoli sono state trovate alterazioni non masticatorie, ma anche che il campione piceno è significativamente più colpito di entrambi i campioni (uno romano-imperiale, l'altro tardo-antico) di Suasa. Inoltre, dal confronto tra i sub-campioni maschile e femminile, emerge che differenze significative si osservano solo tra il sub campione femminile piceno e quello di Suasa, con il sub-campione femminile piceno significativamente più colpito. Questo può far supporre che a Novilara le femmine utilizzassero i denti di più e in diversi tipi di attività non masticatorie come indicherebbe, soprattutto a carico degli incisivi centrali superiori e inferiori, la presenza di usure anomale riconducibili all'uso dei denti anteriori per trattare fibre vegetali e/o animali.

Per il territorio del Molise, lo studio delle alterazioni non masticatorie della collezione scheletrica della necropoli sannito-pentra (VI-IV sec. a.C.) di Pozzilli (IS), ha messo in evidenza che il sub-campione maschile di PZZ presenta un'incidenza di alterazioni non masticatorie maggiore di quella osservata nelle femmine dello stesso campione. Tale differenza è, però, al limite di significatività. Per quanto riguarda le collezioni scheletriche della necropoli di Quadrella (IS) (I-IV secolo) e di Vicenne-Campochiaro (CB) (VII secolo), lo studio dei chipping o fratture indicherebbe che sia a Quadrella sia a Vicenne le fratture sembrerebbero legate ad attività masticatoria, ma mentre a Quadrella prevalgono i chipping linguali; a Vicenne le più alte frequenze di chipping interprossimali, soprattutto a carico dei denti posteriori, indicherebbero la presenza di elementi contaminanti nella dieta e di un consumo di cibi consistenti e fibrosi. Dallo studio delle altre alterazioni emerge che in entrambe le popolazioni sono state trovate alterazioni non masticatorie, ma il campione alto-medioevale è significativamente più colpito sia di quello romano-imperiale sia di quello sannito-pentra. Questo può far supporre che a Vicenne i denti venissero usati di più e in diversi tipi di attività non masticatorie come emerge anche dallo studio del campione dei cavalieri. Pertanto, l'indagine svolta sulle alterazioni non masticatorie di Quadrella e di Vicenne, indica abitudini diverse nell'uso dei denti come strumento in attività non

masticatorie e potrebbe confermare l'ipotesi di una certa discontinuità e differenza culturale tra le due popolazioni nel passaggio dall'epoca tardo-antica a quella alto-medievale.

In generale, pertanto, tra i campioni scheletrici esaminati di Emilia-Romagna e Marche, procedendo dalle necropoli più antiche (celta di Ceretolo e picena di Novilara) a quelle datate all'epoca romano-imperiale, si osserva una diminuzione significativa dell'incidenza delle alterazioni non masticatorie. Questo dato potrebbe suggerire un miglioramento del livello di tecnologia raggiunto in epoca romano-imperiale tale da svincolare i denti dallo svolgimento di attività non masticatorie. Tuttavia, si osserva anche che nel passaggio dall'epoca romano-imperiale a quella tardo-antica si ha un aumento significativo della frequenza delle alterazioni non masticatorie. Questo dato potrebbe suggerire che, in Emilia-Romagna e Marche, nel passaggio dall'epoca romana-imperiale a quella tardo-antica si sia verificato un deterioramento delle condizioni di vita e un peggioramento del livello di tecnologia utilizzato dalle popolazioni in esame. Per le necropoli molisane si osserva che sebbene tra le necropoli sannita di Pozzilli e quella romana di Quadrella non vi siano differenze significative nell'incidenza delle alterazioni non masticatorie, si ha un aumento significativo nella frequenza di tali alterazioni nella necropoli altomedievale di Vicenne. Anche questo dato confermerebbe un deterioramento delle condizioni di vita e un peggioramento del livello di tecnologia utilizzato dalle popolazioni in esame nel passaggio all'epoca altomedievale.
Inoltre, sono state osservate lesioni intenzionali dei denti in alcuni inumati della necropoli celtica di Ceretolo, delle necropoli romane di Casalecchio di Reno e nella necropoli picena di Novilara.

Infine, dallo studio dei chipping sui denti degli individui adulti emerge che i denti degli adulti dei campioni romano e altomedievale di Quadrella e di Vicenne-Campochiaro presentano basse frequenze di chipping ma anche che, riguardo alla posizione, mostrano più alte frequenze di chipping vestibolari. Le alte frequenze di chipping vestibolari nei denti delle necropoli di epoca storica, sembra suggerire che questi erano fortemente soggetti a ripetuti traumi masticatori e non-masticatori, probabilmente da porsi anche in relazione a un differente uso dei denti nei maschi (come strumento nelle attività quotidiane) e nelle donne (stress masticatori dovuti a contaminanti nella dieta and a cibi fibrosi consistenti). Pertanto, sebbene queste serie siano relative a un periodo storico recente, i denti erano ancora utilizzati come "terza mano" in specifiche attività lavorative quotidiane.

A) The individuals with non-masticatory dental alterations of the necropolises from Emilia Romagna

a) The necropolis of Ceretolo
(7^{th} c. BC)

T.3 male mature adult	
Tooth with alteration	Upper central and lateral incisors Lower central incisors
Alteration	Lingual groove (from right I2 to left I2) Unusual slight lingual wear (right I1) Unusual strong lingual wear (left I1) Unusual slight buccal wear (lower central incisors)
Description of the alteration:	
Feature of the alteration	Lingual groove (from right I2 to left I2): the grooves are near and parallel with respect to the CEJ and surround the dental tubercle mesial-distally directed. Under light microscope (20-40x): sharp margins, deep with an uneven and rough bottom for the lingual groove of the central incisors. The lingual grooves of the lateral incisors are shallow, uneven and rough. In any case striations inside the grooves have been observed. Unusual lingual wear (upper right and left I1): the dental wear pattern slopes in the lingual direction with exposition of dentine. Unusual buccal wear (lower right and left I1): the dental wear pattern involves only the enamel and slopes down buccally. Under light microscope (20-40x): flattened and smooth worn lingual and buccal surfaces with some fine parallel striations buccal-lingually directed.
Occlusal wear (according to Smith, '84)	Upper right I2 and left I2: degree 3; Upper right and left I1: degree 5; Lower central incisors: degree 4.
Corresponding and/or similar alterations in opposite teeth	The lower anterior teeth do not show corresponding alterations with respect to the lingual grooves showed by the upper incisors. The unusual dental wear patterns showed by the upper and lower central incisors are corresponding each other.
General traits of the dentition:	
Teeth present	32/32
AMTL	0/32 (0,00%)

Dento-alveolar pathology and alterations	A penetrating and a non penetrating caries have been observed (upper posterior teeth). Slight deposits of buccal calculus and moderate deposits of lingual calculus have been observed on the lower posterior teeth. The posterior teeth are more worn (5-7, according to Smith, '84) than the anterior ones (3-5, according to Smith, '84). Moderate/severe alveolar margins retraction has been observed on the upper central incisors and on the lower and upper posterior teeth. All the teeth are chipped and quite all show multiple chippings. The anterior teeth show buccal, lingual and interproximal chippings of degree 1 and 2. The right posterior ones show also buccal chippings of degree 2 and 3.

Discussion:

We could suppose that the unusual buccal and lingual wear could be related to frequent and/or severe contacts with hard objects in using teeth as tools in daily activities or to masticatory traumas. In this case repeated pulling-tearing movements in a buccal-lingual direction could be supposed (as suggested by the fine striations bucco-lingually directed on the worn surfaces). As regards of the object we could suppose that it was fibrous but not too much abrasive because the worn surfaces are smooth and polished.

The lingual grooves were probably due to chemical erosion (grooves rough and uneven) caused by the contact of some acidic substances on the lingual surface during masticatory and/or non-masticatory tasks activities.

The presence of buccal chipping and also the presence of teeth with multiple chippings could suggest that this individual used their teeth in carrying out strong masticatory and extra-masticatory activities (as suggested by the presence of buccal chipping and of multiple chips also on the anterior teeth).

The mechanical stress done in this activity could be testified by the considerable development of both the masseter and pterigoid tuberosities (these tuberosities appear very rough).

T.4 male mature adult	
Tooth with alteration	From upper right to left C
Alteration	Lingual groove
Description of the alteration:	
Feature of the alteration	Lingual groove (from right C to left C): the grooves are near and parallel with respect to the CEJ and surround the dental tubercle mesial-distally directed. Under light microscope (20-40x): sharp margins, deep with an uneven and rough bottom for the lingual groove of the central incisors. The lingual grooves of the lateral incisors are shallow, uneven and rough. In any case striations inside the grooves have been observed.
Occlusal wear (according to Smith, '84)	Upper right C: degree 5, Upper right I2: degree 4, Upper right I1 to upper left C: degree 5.
Corresponding and/or similar alterations in opposite teeth	Not present.
General traits of the dentition:	
Teeth present	32/32
AMTL	0/32 (0,00%)
Dento-alveolar pathology and alterations	Few penetrating and non penetrating caries have been observed (posterior teeth). The anterior teeth are slightly more worn (degree 5, according to Smith, '84) than the posterior ones (average degree 4, according to Smith, '84). Moderate deposits of buccal *calculus* have been observed on the upper anterior teeth. Several buccal, lingual e interproximal chippings and multiple chipping of degree 1, 2 and 3 have been observed.
Discussion:	
The lingual grooves were probably due to chemical erosion (grooves rough and uneven) caused by the contact of some acidic substances on the lingual surface during masticatory and/or non-masticatory tasks activities. The presence of buccal chipping and also the presence of teeth with multiple chippings could suggest that these individuals used their teeth in carrying out strong masticatory and extra-masticatory activities (as suggested by the presence of buccal chipping and of multiple chips also on the anterior teeth). Moreover we could suppose that the moderate deposits of buccal *calculus* showed by the upper anterior teeth could be put in relation to the use of these teeth in both masticatory and non-masticatory activities. The mechanical stress done in this activity could be testified by the considerable development of both the masseter and pterigoid tuberosities (these tuberosities appear very rough).	

T.7 male young adult	
Tooth with alteration	Upper central and lateral incisors Lower right I2
Alteration	LSAMAT (upper central and lateral incisors) Buccal "rough" notch (degree 1) (upper right I1) Buccal *striae* (upper central incisors) Buccal notch (degree 3) (lower right I2)
Description of the alteration:	
Feature of the alteration	LSAMAT (upper central and lateral incisors): the dental wear pattern slopes down in the buccal-lingual direction with exposition of dentine between the CEJ and incisal edges. Under light microscope (20x): worn flattened lingual surface with fine parallel striations, buccal-lingually directed, running from the *cingulum* to the incisal edge. Buccal "rough" notch (upper right I1): uneven but smooth bottom (light microscope, 20x). Buccal *striae* (upper central incisors): fine *striae* on the buccal surface enamel. Some of them are disto-mesially directed, some other are perpendicular to the first ones. Buccal notch (lower right I2): observation under light microscope (20x) shows a smooth and polished bottom without striations and slight smoothed chippings at the maximum depth of the lesion.
Occlusal wear (according to Smith, '84)	Upper central incisors: degree 6; Upper lateral incisors: degree 4; Lower right I2: degree 3.
Corresponding and/or similar alterations in opposite teeth	The buccal "rough" notch of the upper right I1 corresponds to the buccal notch of the lower right I2.
General traits of the dentition:	
Teeth present	31/32
AMTL	0/32 (0,00%)
Dento-alveolar pathology and alterations	Penetrating and non penetrating caries affect the lower teeth. Both the lower M1 show buccal abscess. Both the lower P2 are small root stump as a consequence of a destroying caries. All the upper teeth show moderate/considerable buccal deposits of *calculus*. We have to notice also that the buccal deposits of *calculus* showed by the central upper incisors are out and around the area with striations. All the anterior teeth are more worn (4-6, according to Smith, '84) than the posterior ones (2-4, according to Smith, '84). Moderate/severe alveolar margins retraction and a spread porosity of the alveolar cortex have been observed for both the maxilla and the mandible. All the anterior teeth show multiple buccal and

	interproximal chippings (degree 1, 2 and 3).

Discussion:

The lingual wear pattern observed in this individual recalls those described in literature as LSAMAT (Lingual Surface Attrition of the Maxillary Anterior Teeth). The wear of this individual could suggest that the he could process (pulling, rubbing, chewing, etc.), between the upper incisors and tongue, some particular substance for lengthy period of time. It is possible to hypothesize a particular habit to chew some substances not related to food or to masticatory activity. The nature of the substance involved in this unusual wear is unknown. This unusual dental wear pattern has been observed in the female mature adult of T.30 of this necropolis and in all of the horsemen of the VCN sample (Belcastro *et al.*, 2000).
The buccal *striae* showed by the central upper incisors could suggest that a fibrous object was probably rubbed in back and forth movements bucco-lingually and mesio-distally directed. We could suppose these *striae* may be the result of intentional alterations of the anterior surfaces for hygienic and/or aesthetic purpose.
We could also suppose that the individual was used to rub and/or hold between the right upper I1 and the lower right I2, a fine cylindrical fibrous (but not too much abrasive) object (as suggested by the smooth and polished bottom of the buccal notch of the lower right I2). The stress played on the tooth could have produced, as a secondary effect, the chippings associated to the notch.

T. 19 male young adult	
Tooth with alteration	Upper central incisors
Alteration	Buccal notches (degree 2)
Description of the alteration:	
Feature of the alteration	Under light microscope (20x): smooth and polished bottoms with short striations bucco-lingually directed.
Occlusal wear (according to Smith, '84)	Upper right I1: degree 5; Upper left I1: degree 4.
Corresponding and/or similar alterations in opposite teeth	Lingual and interproximal chippings (degree 1 and 2) on the lower central incisors.
General traits of the dentition:	
Teeth present	24/32
AMTL	2/26 (7,69%)
Dento-alveolar pathology and alterations	The upper right P2 and the left M1 have been lost *ante mortem*. Penetrating and not penetrating caries affect the posterior teeth. The upper left I2 shows a destroying carious lesion. The upper anterior teeth are slightly more worn (degree 5, according to Smith '84) than the lower anterior ones (degree 4, according to Smith, '84). A severe alveolar margins retraction has been observed for the lower central incisors. Unfortunately, the maxilla of this sample is not well preserved: the alveolar bones and quite all the posterior parts are not preserved and so abscessing and any pathological conditions cannot be described. The anterior teeth show buccal, lingual and interproximal chips of degree 1 and 2.
Discussion:	
The buccal notches observed on the upper central incisors could be the result of repeated traumas due to cylindrical fine rigid or flexible objects rubbed and/or held on these teeth in some non-masticatory activities. As regards the nature of the objects we could suppose that they were fibrous (striations inside the notches) but not too much abrasive (smooth and polished bottoms). The stress of this activity could have produced also the chippings on the lower central incisors. Moreover, we could suppose that masticatory and non masticatory functions were carried out mostly with the anterior teeth (more worn) because of the lack of some of the upper posterior teeth.	

T. 23 male mature adult	
Tooth with alteration	Upper right M2 From upper right P1 to left P1 Upper left M2 and M3 Lower right and left M2
Alteration	Buccal notch (degree 3) (upper right M2); Unusual strong wear (from upper right P1 to left P1); Interproximal groves (upper left M2 and M3) Lingual notches (degree 3) (lower right and left M2)
Description of the alteration:	
Feature of the alteration	Buccal notch (degree 3) (upper right M2): under light microscope (20x) smooth bottom with short parallel striations bucco-lingually directed. At the maximum depth of the lesion a buccal chipping (degree 3) has been observed. Lingual notch (degree 3) (lower right M2): under light microscope (20x) smooth bottom with short parallel striations bucco-lingually directed. Unusual strong wear (upper right M2): The dental wear patterns slope up buccally. These teeth are short root stump with the pulp canals closed by secondary dentin. Under light microscope (40x): rounded, smooth and polished occlusal surfaces without any striations. Interproximal groves (upper left M2 and M3): distal groove (upper left M2) and mesial groove (upper left M3) localized on the CEJ. The grooves are corresponding both for shape, dimension and localization. The groove of the upper left M2 is on a destroying cervical caries. The groove on the upper left M3 is on a interproximal non penetrating caries. Under light microscope (20x): rounded and polished grooves with fine striations directed long their main axis. They are broadest 2,50-3,00mm at their buccal end. Lingual notches (degree 3) (lower right and left M2): observation under light microscope (20x) shows smooth and polished bottoms with short striations and slight chippings at the maximum depth of the lesions.
Occlusal wear (according to Smith, ’84)	Upper right M2: degree 6; From upper right P1 to left P1: not recordable due to the unusual strong wear; Upper left M2, M3 and lower right and left M2: degree 6.
Corresponding and/or similar alterations in opposite teeth	Upper right M2 and lower right M2: lesions corresponding. The lower teeth show a strong occlusal wear (degree 6, according to Smith, ’84) but not corresponding to the one observed for the upper teeth.

General traits of the dentition:	
Teeth present	30/32
AMTL	0/32 (0,00%)
Dento-alveolar pathology and alterations	Penetrating caries affect the upper posterior teeth. The teeth show a strong wear (6-7, according to Smith, '84). The posterior teeth show buccal, lingual and interproximal chippings and multiple chippings of degree 1, 2 and 3. The lower anterior teeth show interproximal chippings of degree 1 and buccal chippings of degree 3.

Discussion:

We could suppose that the unusual wear showed by the upper anterior teeth and upper P1, could be due to the habit of treating or scraping something held with the hands. It is also possible that the object responsible of this wear was pulled outside to the top. The substance may have been a kind of foodstuffs but also of another material. In any case, we could suppose that this substance was not too much abrasive because of the worn surfaces are smooth and polished. We could also suppose that the object was held between the upper teeth and the tongue (the lower teeth do not show any corresponding lesions).
The corresponding notches on upper right M2 and lower right M2 could be the result of a long-time habit to hold and/or rub back and forth between these teeth a fine cylindrical fibrous object (because of similar striations inside both the notches). The notches showed by the lower left M2 could be the result of a repeated action of fibrous objects but not too much abrasive (smooth and polished bottom) rubbed on the molar. The stress done on the tooth could have also produced slight chippings at the maximum depth of the lesions.
The interproximal grooves seem to be due to the repeated insertion of a fine toothpick probably made of wood or bone. We could suppose that this habitual tooth probing was done for relive the discomfort caused by the caries on the upper left M2. This repeated insertion results in abrasions in the form of grooves on the interproximal area. It is also probable that the interproximal grooves have a vestibular insertion because they show a more rounded and wider buccal border (this operation is easier than a lingual insertion).
The mechanical stress of these activities, probably done in half-open mouth, could be testified by the medium development of the entesis of the right masseter muscle. This muscle, involved in opening and closing movements of the mouth, seems to be stressed for a long time.

T. 27 male mature adult	
Tooth with alteration	Lower left M2
Alteration	Lingual notch (degree 3)
Description of the alteration:	
Feature of the alteration	Under light microscope (20x): smooth bottom with short parallel striations bucco-lingually directed. The lesion is partially damaged *post mortem* by taphonomic agents.
Occlusal wear (according to Smith, '84)	Degree 5.
Corresponding and/or similar alterations in opposite teeth	Not present.
General traits of the dentition:	
Teeth present	27/32
AMTL	5/32 (15,62%)
Dento-alveolar pathology and alterations	Alveolar atrophy due to *ante mortem* tooth loss has been observed at: upper left M1, lower right M1 and P2, lower left P2 and M1. Caries absent. The teeth show a wear of degree 4/5 (according to Smith, '84). Medium deposits of lingual *calculus* have been observed on the upper and lower posterior teeth. A severe alveolar margins retraction has been observed for all the lower molars (for all the upper teeth this character is not recordable). Several buccal, lingual and interproximal chippings of degree 1 have been observed mostly on the lower anterior teeth. The upper right posterior teeth show buccal and interproximal chippings of degree 2 and 3.
Discussion:	
We could suppose that the individual was used to rub on the tooth in a non-masticatory activity, a fine cylindrical fibrous but not too much abrasive object that has produced the fine striations inside the notch.	

T. 31 male young adult	
Tooth with alteration	From upper right C to left I2.
Alteration	Intentional buccal wear (from upper right I2 to left I1) Lingual groove (from upper right C to left I2)
Description of the alteration:	
Feature of the alteration	Intentional buccal wear (from upper right I2 to left I1): the upper central incisors show similar heavy buccal wear with enamel removal from the incisal edge to the CEJ. Both the areas with exposed dentine are sub-oval and mainly localized in the mesial part of the crown. These lesions are mirror-like and mesio-distally divergent at about 45° with respect to the median sagittal plane. The buccal wear is continuous up until the rounded and shining incisal edge. The upper lateral right incisor shows a worn rough sub-oval flattened area not in continuity with the occlusal worn surface. Under light microscope (20-40x): buccal surfaces uniformly worn with smooth polished shiny dentin. SEM analysis: compact and homogeneous buccal exposed dentine with some roughness and some striations without a main direction. Lingual groove (from upper right C to left I2): the lingual grooves are near and parallel with respect to the CEJ and surround the dental tubercle mesial-distally directed. Under light microscope (20x): the groove of the upper right I1 is deep, uneven, and shows rounded smooth margins. The lingual groove of the upper left I1 (partially damaged *post mortem*) is shallow with irregular margins. The lingual groove of the upper right I2 shows rounded smooth margins. Inside and/or over these lingual grooves *calculus* deposits has been observed.
Occlusal wear (according to Smith, ’84)	Upper right C: degree 5 From upper right I2 to left I2: degree 6
Corresponding and/or similar alterations in opposite teeth	The lower anterior teeth show several buccal and interproximal chippings of degree 1 and 2.
General traits of the dentition:	
Teeth present	32/32
AMTL	0/32 (0,00%)
Dento-alveolar pathology and alterations	Few non penetrating caries affect the posterior teeth. A lingual abscess at the lower left M3 has been observed. The teeth show a general high degree of wear (5-6, according to Smith, ’84). Medium deposits of buccal *calculus* on the lower

	incisors and slight deposits of buccal *calculus* on the upper anterior teeth have been observed. A moderate alveolar margins retraction has been observed on the upper teeth. The upper and lower teeth show several buccal, lingual and interproximal chippings of degree 1, 2 and 3.

Discussion:

The macro and microscopic analyses of the buccal worn surfaces of the upper central incisors may be related both to mechanical and chemical factors. We could suppose that the micro-wear buccal surfaces features of the central upper incisors of the individual could be due to an intentional alteration of these teeth and also that they are the result of repetitive movements parallel with respect to the anterior teeth surface mesio-distally directed. Moreover, the direction of the lesions could suggest that they were probably produced by the left hand (by the left forefinger?) on the right I1 and by the right hand (by the right forefinger?) on the left I1.

Moreover, we could suppose that the lingual grooves were made *intra vitam* some time before the death of the individual (*calculus* deposition inside and over them). They could be due both to the contact of a fine object permanently fixed on the lingual surface (in this case they could be a probable evidence of dental fixtures for retaining teeth) and to a chemical erosion (grooves rough and uneven) caused by the contact of some acidic substances on the lingual surface during masticatory and/or non-masticatory tasks activities.

T. 37 male mature adult	
Tooth with alteration	From upper right I2 to left I2
Alteration	Lingual groove
Description of the alteration:	
Feature of the alteration	Lingual groove (from right I2 to left I2): the grooves are near and parallel with respect to the CEJ and surround the dental tubercle mesial-distally directed. Under light microscope (20-40x): sharp margins, deep with an uneven and rough bottom for the lingual groove of the central incisors. The lingual grooves of the lateral incisors are shallow, uneven and rough. In any case striations inside the grooves have been observed. Dentin exposition on the groove bottom of the central incisors has been observed.
Occlusal wear (according to Smith, '84)	From upper right I2 to left I1: degree 4; Upper left I2: degree 3.
Corresponding and/or similar alterations in opposite teeth	Not present.
General traits of the dentition:	
Teeth present	29/32
AMTL	2/31 (6,45%)
Dento-alveolar pathology and alterations	The lower right and left M1 have been lost *ante mortem*. Penetrating and non penetrating carious lesions have been observed at the upper left posterior teeth and at the lower right posterior ones. The lower anterior teeth are more worn (4/5, according to Smith, '84) than the upper ones (3/4, according to Smith, '84). Severe alveolar margins retraction has been observed for all the upper and lower teeth. The upper and lower anterior teeth show buccal, lingual and interproximal chippings and multiple chippings of degree 1, 2 and 3.
Discussion:	
The lingual grooves were probably due to chemical erosion (grooves rough and uneven) caused by the contact of some acidic substances on the lingual surface during masticatory and/or non-masticatory tasks activities. The presence of buccal chipping and multiple chippings particularly on the anterior teeth, could suggest that these individuals used their teeth in carrying out strong masticatory and extra-masticatory activities. The mechanical stress done in this activity could be testified by the slight roughness showed by the right anterior zygomatic tuberosity.	

T. 49 male young adult	
Tooth with alteration	From lower right C to left I2
Alteration	Unusual strong buccal wear.
Description of the alteration:	
Feature of the alteration	The dental wear pattern slopes down in the buccal direction. The preserved incisors and right C are short root stump with the root canals opened. Under light microscope (20-40x): uneven but polished occlusal surfaces (due to *post mortem* alteration) without any striations.
Occlusal wear (according to Smith, '84)	Not recordable.
Corresponding and/or similar alterations in opposite teeth	Not recordable because the upper teeth and the maxilla are not preserved (except for the right P2, isolated).
General traits of the dentition:	
Teeth present	17/32
AMTL	0/16 (0,00%)
Dento-alveolar pathology and alterations	Non penetrating caries at the lower posterior teeth have been observed. The lower posterior teeth show only a slight occlusal wear (1-4, according to Smith, '84) and do not show any chippings. Moderate/slight deposits of lingual *calculus* on the lower molars. Unfortunately, the sample is in a bad preservation state so abscessing and any other pathological condition cannot be described.
Discussion:	
We could suppose that the individual of T.49 used the lower teeth to treat or to scrape something held with the hands. It is also possible that the object responsible of this wear was pull from the outside to below. All these movements could explain the wear plains orientation. The substance may have been a kind of foodstuffs but also of another material. In any case, we could suppose that this substance was not too much abrasive because of the worn surfaces show an exposed smooth and polished dentin. This alteration is very similar to the one described by Bonfiglioli (2002) among the tanners in a 20th century skeletal collection from Italy.	

T. 52 male mature adult	
Tooth with alteration	Upper left M2 and M3; Lower left I1
Alteration	Interproximal distal groove (upper left M2); Interproximal mesial striae (upper left M3); Occlusal striae (lower left I1)
Description of the alteration:	
Feature of the alteration	Interproximal distal groove (upper left M2): groove (length: 7,00mm) localized on the CEJ. Under light microscope (20x): rounded and polished, with sharp margins and fine striations directed long its main axis. Moreover, it is broadest (1,00mm) at its buccal end and tapering off lingually. Interproximal *striae* (upper left M3): the *striae* are localized on the CEJ at the buccal end of a penetrating cervical caries. Under light microscope (20x): small flatted smooth and polished area with fine short parallel striations.
Occlusal wear (according to Smith, '84)	Upper left M2 and M3: degree 3 Lower left I1: degree 3.
Corresponding and/or similar alterations in opposite teeth	The *striae* and the groove are corresponding both for shape, dimension and localization.
General traits of the dentition:	
Teeth present	32/32
AMTL	0/32 (0,00%)
Dento-alveolar pathology and alterations	Penetrating and non penetrating caries affect the posterior teeth. Medium deposits of lingual *calculus* at the upper posterior teeth and of buccal and lingual *calculus* at the lower ones have been observed. Several buccal, lingual and interproximal chippings of degree 1 and 2 have been observed.
Discussion:	
These *striae* and groove seem to be due to the repeated insertion of a fine toothpick probably made of wood or bone. We could suppose that the this habitual tooth probing was done for removing food particles stuck between teeth and/or to relive the discomfort caused by the caries on the upper left M3. This repeated insertion results in abrasions in the form of grooves and/or *striae* on the interproximal area.	

T. 53 male mature adlut	
Tooth with alteration	Upper right M3
Alteration	Interproximal mesial groove
Description of the alteration:	
Feature of the alteration	Under light microscope (20x): groove (length: 6,00mm, width: 2,40mm) localized on the CEJ at the buccal and lingual ends of a penetrating cervical caries. Under light microscope (20x): rounded, smooth and polished without striations inside.
Occlusal wear (according to Smith, '84)	Degree 2.
Corresponding and/or similar alterations in opposite teeth	Not present.
General traits of the dentition:	
Teeth present	31/32
AMTL	0/31 (0,00%)
Dento-alveolar pathology and alterations	A non penetrating caries affects the upper right M2. The upper posterior teeth show slight deposits of buccal and medium deposits of lingual *calculus*. medium deposits of buccal and lingual calculus at the lower posterior teeth have been observed. The right upper and lower teeth show several buccal chippings of degree 3. The other teeth show buccal, lingual and interproximal chippings and multiple chippings mostly of degree 1.
Discussion:	
This lesion seems to be due to the repeated insertion of a fine toothpick probably made of wood or bone (because striations are not present). We could suppose that this habitual tooth probing was done for relive the discomfort caused by the caries.	

T. 61 male young adult	
Tooth with alteration	From upper right I1 to left C
Alteration	Lingual groove
Description of the alteration:	
Feature of the alteration	Lingual groove (from right I1 to left C): the grooves are near and parallel with respect to the CEJ and surround the dental tubercle mesial-distally directed. Under light microscope (20-40x): shallow with an uneven and rough bottom. In any case striations inside the grooves have been observed. The grooves show deposits of *calculus* inside.
Occlusal wear (according to Smith, '84)	Upper central incisors: degree 4; Upper left I2 and C: degree 3.
Corresponding and/or similar alterations in opposite teeth	Not present.
General traits of the dentition:	
Teeth present	30/32
AMTL	0/30 (0,00%)
Dento-alveolar pathology and alterations	Penetrating and non penetrating caries affect only the lower posterior teeth. Slight buccal deposits of *calculus* on the lower anterior teeth and moderate deposits of *calculus* from the upper right I2 to the right P2 have been observed. The upper and lower anterior teeth show few buccal and interproximal chippings of degree 1.
Discussion:	
The lingual grooves were probably due to chemical erosion (grooves rough and uneven) caused by the contact of some acidic substances on the lingual surface during masticatory and/or non-masticatory tasks activities. The presence of buccal chipping on the anterior teeth could suggest that this individual used their teeth in carrying out strong masticatory and extra-masticatory activities (as suggested by the presence of buccal chipping and of multiple chips also on the anterior teeth). In this case we could suppose that the *calculus* deposits observed on the anterior teeth could be put in relation to the use of these teeth in both masticatory and non-masticatory activities.	

T. 62 male mature adult	
Tooth with alteration	Lower left incisors
Alteration	Unusual lingual wear
Description of the alteration:	
Feature of the alteration	The dental wear pattern of these teeth slopes down in the lingual direction. Under light microscope (20x): flattened, smooth and polished worn lingual surfaces with some fine parallel striations directed from the incisal edge toward the CEJ. Only for the left central incisor exposed dentine has been observed. The surfaces are damaged *post mortem*.
Occlusal wear (according to Smith, '84)	Degree 4.
Corresponding and/or similar alterations in opposite teeth	Not recordable because the upper incisors are not preserved.
General traits of the dentition:	
Teeth present	23/32
AMTL	0/17 (0,00%)
Dento-alveolar pathology and alterations	The preserved upper teeth are isolated. Penetrating and no penetrating caries affect only the left posterior teeth. The lower teeth show medium deposits of lingual *calculus* and slight deposits of buccal *calculus*. Buccal, lingual and interproximal chippings of degree 1, 2 and 3 have been observed on quite all the teeth.
Discussion:	
The incisal edges of these teeth seem to define the lower edge of a wide sub-circular hall. We could suppose that these lesions were probably related to the habit to hold an object between the upper left incisors (however they are not recordable in this individual) and the lower left incisors. This repeated gesture could have produced a kind of lodging between the teeth. Therefore, these lesions could suggest that the individual of T.62 used these teeth to hold a cylindrical object kept lingually tilted.	

T.63 male mature adult	
Tooth with alteration	Lower left I1
Alteration	Buccal notch (degree 2)
Description of the alteration:	
Feature of the alteration	Under light microscope (20x): smooth and polished bottom without striations. At the maximum depth of the lesion slight smoothed chippings have been observed.
Occlusal wear (according to Smith, '84)	Degree 5.
Corresponding and/or similar alterations in opposite teeth	Not present.
General traits of the dentition:	
Teeth present	18/32
AMTL	8/28 (28,57%)
Dento-alveolar pathology and alterations	Alveolar atrophy due to ante mortem tooth loss has been observed at: upper right M1 and P2 and lower right and left molars. The upper and lower anterior teeth show an occlusal wear of degree 5 (according to Smith '84) and buccal, lingual and interproximal chippings (degree 1). Slight/medium deposits of buccal and lingual *calculus* on the lower anterior teeth and on some of the upper anterior teeth have been observed. Moderate alveolar margins retraction for all the lower molars and for the upper right posterior teeth (the left ones are not recordable) has been observed.
Discussion:	
We could suppose that the individual of T.63 mostly used the anterior teeth in masticatory and non-masticatory activities (as suggested by the high degree of wear of the anterior teeth probably due to the lack of the posterior teeth). The notch could be due to a cylindrical fine rigid or flexible object probable rubbed over the tooth. As regards the nature of the object, taking into account of the smooth and polished notch bottom, we could suppose that it was not too much abrasive. The stress that played on the tooth could have produced, as a secondary effect, the chipping associated to the notch. Moreover, we could suppose that the slight/medium deposits of buccal and lingual *calculus* on the lower anterior teeth could be due to this activity, mostly done with the anterior teeth.	

T. 64 male young adult	
Tooth with alteration	Upper right M1
Alteration	Lingual notch (degree 3)
Description of the alteration:	
Feature of the alteration	Under light microscope (20x): smooth and polished bottom without striations.
Occlusal wear (according to Smith, '84)	Degree 7.
Corresponding and/or similar alterations in opposite teeth	Not recordable because the lower right molars have been lost *ante mortem*.
General traits of the dentition:	
Teeth present	11/32
AMTL	10/22 (45,45%)
Dento-alveolar pathology and alterations	Alveolar atrophy due to *ante mortem* tooth loss has been observed at: from lower right M3 to P2, central incisors, left I2 and left molar. The preserved lower teeth are short root stumps, with a flattened, smooth and polished occlusal surface and the pulp canal opened. Also the upper teeth show a very strong occlusal wear (degree 7/8, according to Smith '84).
Discussion:	
The strong occlusal wear showed by all the teeth of the sample could be put in relation to the general alveolar atrophy observed for the mandible. In fact, strong masticatory and non-masticatory stresses played on the lower teeth (notch on the upper right M1). The notch could be due to a cylindrical fine rigid or flexible object probable rubbed over the tooth. As regards the nature of the object, we could suppose that it was not too much abrasive (smooth and polished bottom). The mechanical stress done in this activity could probably be testified by the considerable development of the left masseter tuberosity (the right one is not recordable) and by the moderate development of the external lateral tuberosity of the left mandibular condyle (the right one is not recordable).	

T. 65 male mature adult	
Tooth with alteration	Upper right I1 Lower left M1
Alteration	Buccal notch (degree 1) (upper right I1); Buccal notch (degree 3) (lower left M1)
Description of the alteration:	
Feature of the alteration	Buccal notch (upper right I1): observation under light microscope (20x) shows a smooth and polished bottom without striations. Buccal notch (lower left M1): observation under light microscope (20x) shows a smooth and polished bottom with short parallel striations directed long the main axis of the notch. This lesion is sub-oval, mesio-distally oriented and slopes down buccally.
Occlusal wear (according to Smith, '84)	Upper right I1: degree 4; Lower left M1: degree 3.
Corresponding and/or similar alterations in opposite teeth	Not recordable for the upper right I1 (lower right I1 is not preserved); not present for the lower left M1.
General traits of the dentition:	
Teeth present	28/32
AMTL	1/30 (3,33%)
Dento-alveolar pathology and alterations	The lower left M2 has been lost *ante mortem*. Few penetrating and non penetrating caries affect the posterior teeth. The upper and lower right teeth show a strong occlusal wear (degree 4-5, Smith '84) higher than the one showed by the left side teeth. Slight buccal and lingual deposits of *calculus* have been observed for all the lower incisors and for the upper posterior teeth. Buccal, lingual and interproximal chippings of degree 1 and 2 have been observed.
Discussion:	
These notches could be due to a long time habit to hold and/or rub on the teeth some fibrous rigid or semi-rigid objects (such as vegetable fibres) but not too much abrasive (smooth and polished bottoms). The mechanical stress done in this activity could be testified by the considerable development of the entesis of the right masseter muscle. This muscle, involved in opening and closing movements of the mouth, seems to be stressed for a long time. All these lesions could suggest that the temporo-mandibular joint was strongly stressed in masticatory and non masticatory activities.	

T. 75 male mature adult	
Tooth with alteration	From upper right C to left C Lower central incisors
Alteration	Unusual strong lingual wear (upper right C, I2, upper left I1, I2 and C) Lingual groove (upper right C, left incisors) Intentional buccal wear (right I2 and left I1) Buccal notch (degree 2) (upper left I2) Unusual strong buccal wear (lower central incisors)
Description of the alteration:	
Feature of the alteration	Intentional buccal wear: (upper left I1) dentine exposition from the incisal edge to the CEJ. Sub-oval worn area mainly localized in the mesial part of the crown. The buccal wear is continuous up until the rounded incisal edge. Under light microscope (20-40x): buccal surface uniformly worn with smooth and shiny dentin exposed. On the exposed dentin at the discontinuity buccal/occlusal surfaces, some short and parallel striations perpendicular with respect to the incisal edge have been observed. SEM analysis: irregular but smooth worn buccal surface, with some fine short striations bucco-lingually directed. "Honey-comb pattern" feature spread both on the buccal exposed dentin and the worn enamel surfaces. The prismatic features of the worn buccal enamel show large hexagonal cells with sharp margins. The prismatic features of the exposed dentine, instead, show little and less defined hexagonal cells. Buccal notch (upper left I2): rough bottom due to *post mortem* alterations. Lingual groove (upper right C, left incisors): the lingual grooves are localized near and parallel with respect to the CEJ and surround the dental tubercle mesial-distally directed. Under light microscope (20x): shallow, uneven and rough bottom. Unusual strong lingual wear (upper right C, I2, upper left I1, I2 and C): flattened smooth and polished surfaces with fine parallel short striations bucco-lingually directed (light microscope, 20x). Unusual strong buccal wear (lower central incisors): worn buccal surfaces localized from the incisal edge towards the CEJ. Under light microscope (20x): opaque, quite concave.
Occlusal wear (according to Smith, '84)	Both the upper incisors show heavy occlusal wear (degree, 6 according to Smith, 1984) with dentine exposition and the pulp canal closed by secondary dentine.

Corresponding and/or similar alterations in opposite teeth	Only the unusual buccal and lingual dental wear patterns are corresponding.
General traits of the dentition:	
Teeth present	29/32
AMTL	1/23 (4,35%)
Dento-alveolar pathology and alterations	The lower right M2 has been lost *ante mortem*. The teeth do not show any pathological condition or dento-alveolar alteration such as caries, abscess and *calculus*. The left side teeth are more worn (4-7, according to Smith, '84) than the right side teeth (3-6, according to Smith, '84). The anterior teeth of the individual of T.75 show buccal and interproximal chipping and multiple chippings of degree 1 and 2.

Discussion:

Unfortunately, the skull basis and both the mandibular condyles are not well preserved, so the occlusion cannot be reconstructed. However, the malocclusion could be excluded as aetiological factor of the alterations showed by the anterior teeth. The asymmetry of the occlusal wear could be put in relation to masticatory functions mostly done on the left side (as also suggested by the presence of heavier chippings on the left side teeth).
All the alterations observed could suggest that the anterior teeth were used in non masticatory activities and also that they received special "cares" probably for aesthetic reasons:

- The unusual lingual and buccal wear (upper anterior teeth and lower central incisors) could be related to the habit of treating or scraping something held with the hands. It is possible that the object responsible of this wear was pulled down buccally. As regards of the object it may have been fibrous (such as a vegetable fibre) but not too much abrasive.
- The lingual grooves were probably due to chemical erosion (grooves rough and uneven) caused by the contact of some acidic substances on the lingual surface during masticatory and/or non-masticatory tasks activities.
- The buccal notch could be due to a long time habit to hold and/or rub on the teeth a fine rigid or semi-rigid object (probably made of a vegetable fibre).
- The macro and microscopic analyses of the buccal worn surfaces of the upper central incisors suggest that this buccal wear may be related both to mechanical and chemical factors. We could suppose it may be the result of an intentional alteration due to repetitive movements parallel with respect to the anterior teeth surface. The direction of the main axis of the lesions could suggest that they were probably produced by the right hand (by the right forefinger?) on the left central I1. Moreover, we could suppose that the individual probably used some unknown acid substances in cleansing the buccal surface of these incisors (as suggested by the "honey-comb pattern" feature observed on the buccal worn area of the left I1 and by the presence of only few fine striations). Moreover, we could recognize on the buccal surfaces the result of a strong wear that has smoothed the prismatic features of the exposed buccal dentine.

T. 90 male young adult	
Tooth with alteration	Lower left M1
Alteration	Lingual notch (degree 3)
Description of the alteration:	
Feature of the alteration	Under light microscope (20x): smooth and polished bottom with some parallel striations bucco-lingually directed. At the maximum depth of the lesion a chipping (degree 3) has been observed.
Occlusal wear (according to Smith, '84)	Degree 6.
Corresponding and/or similar alterations in opposite teeth	Not present.
General traits of the dentition:	
Teeth present	28/32
AMTL	0/26 (0,00%)
Dento-alveolar pathology and alterations	The teeth do not show any carious lesions. All the teeth show a moderate degree of wear (3/4, according to Smith, '84) except for upper and lower M1 (degree 6, according to Smith, '84). The lower teeth show slight deposits of buccal *calculus*. Medium deposits of lingual *calculus* have been observed at the lower right posterior teeth. The left side teeth show more and heavier chippings (degree 1, 2 and 3) than the right side teeth (degree 1). Mostly the anterior teeth show multiple chippings.
Discussion:	
We could suppose that the individual was used to rub on the tooth a fibrous but not too much abrasive object (smooth and polished bottom) that has produced the fine striations inside the notch. The stress played on the tooth could have produced, as a secondary effect, the chipping associated to the notch. We could also suppose that this activity was done on the left side mostly involving the lower M1.	

T. 94 male mature adult	
Tooth with alteration	From lower right M2 to P1 and from lower left P1 to M2.
Alteration	Interproximal grooves Lingual notch (degree 3)
Description of the alteration:	
Feature of the alteration	Interproximal grooves (From lower right M2 to P1 and from lower left P1 to M2): the grooves are on the *cementum* near and parallel to the CEJ, and are corresponding in adjacent teeth. Under light microscope (20-40x): rounded and polished grooves with fine striations directed long their main axis. The interproximal mesial groove of the right M1 is localized on a cervical penetrating caries. The interproximal distal groove of the left P2 and the mesial one of left M2 are in front of the left M1 (affected by a destroying caries). In all the other teeth with interproximal grooves a severe alveolar margins retraction has been observed. Lingual notch (lower right M1): observation under light microscope (20x) shows a smooth and polished bottom with fine, short and parallel striations.
Occlusal wear (according to Smith, '84)	Lower right M2, M1: degree 5 Lower right P2, P1: degree 4 Lower left P1: degree 5 Lower left P2: degree 4 Lower left M2: degree 6
Corresponding and/or similar alterations in opposite teeth	The upper teeth corresponding to the lower right M1 are short root stump showing a strong occlusal wear (degree 8, Smith '84). Observation under light microscope (20x) shows smooth and polished occlusal surfaces with short striations bucco-lingually oriented.
General traits of the dentition:	
Teeth present	25/32
AMTL	0/26 (0,00%)
Dento-alveolar pathology and alterations	Penetrating and non penetrating caries affect the posterior teeth. The left M1 shows a destroying caries. The upper posterior teeth are more worn (degree 7-8, according to Smith, '84) than the anterior upper ones (6-7, according to Smith, '84). Moreover, all the upper teeth are more worn than the lower ones (average degree 5, according to Smith, '84). A severe alveolar margins retraction on the lower posterior teeth has been observed. The lower right posterior teeth show medium deposits of lingual *calculus*, buccal and lingual chippings of degree 3 and interproximal chippings of

	degree 1 and 2. The left side teeth show buccal, lingual and interproximal chippings of degree 1 and 2.

Discussion:

The interproximal grooves showed by the individual of T.94 seem to be due to the repeated insertion (bucco-lingual directed) of toothpicks probably made of wood or bone. We could suppose that in this case a habitual tooth probing was done for removing food particles stuck between teeth and/or to relive the discomfort caused both by the exposed dental necks and by the caries. This repeated insertion results in abrasions in the form of grooves on the interproximal area.

We could also suppose that the notch observed on the lower right M1 could be due to the habit to hold and/or rub back and forth a fibrous object between the upper and lower right posterior teeth. This long time gesture may have produced the notch on the lower right M1 and may have been responsible of the strong occlusal wear showed by the upper corresponding teeth.

T. 9 female young adult	
Tooth with alteration	Upper right M2 Lower central incisors
Alteration	Interproximal mesial *striae* (upper right M2) Interproximal mesial groves (lower central incisors)
Description of the alteration:	
Feature of the alteration	Interproximal mesial *striae* (upper right M2): observation under light microscope (20x) shows a flat, smooth and polished area near the buccal border of a mesial cervical penetrating caries with fine parallel striations. Interproximal grooves (lower central incisors): the grooves are localized on the mesial CEJ, are shallow and corresponding each other (length: 1,50mm; width: 0,50-0,80mm). Observation under light microscope (20x) shows a smooth polished bottom with fine striations long the main axis of each grooves.
Occlusal wear (according to Smith, '84)	Upper right M2: degree 5, Lower central incisors: degree 5.
Corresponding and/or similar alterations in opposite teeth	The interproximal mesial grooves of the lower central incisors are corresponding each other.
General traits of the dentition:	
Teeth present	14/32
AMTL	0/12 (0,00%)
Dento-alveolar pathology and alterations	An interproximal mesial penetrating caries affects the upper right M2. All the teeth show a moderate/strong wear (degree 5/6, according to Smith, '84) with wide dentin exposition. The lower anterior teeth show buccal chippings of degree 1, 2 and 3.
Discussion:	
The interproximal grooves and *striae* showed by the female young adult of T.9 seem to be due to the repeated insertion of tooth picks probably made of wood or bone. This habitual tooth probing was probably done for removing food particles stuck between teeth and/or to relive the discomfort caused by the caries. This repeated insertion results in abrasions in the form of grooves and/or *striae* on the interproximal area.	

T. 14 female young adult	
Tooth with alteration	Upper central and lateral incisors
Alteration	Lingual groove
Description of the alteration:	
Feature of the alteration	Lingual groove (from right I2 to left I2): the grooves are near and parallel with respect to the CEJ and surround the dental tubercle mesial-distally directed. Under light microscope (20-40x): sharp margins, deep with an uneven and rough bottom for the lingual groove of the central incisors. The lingual grooves of the lateral incisors are shallow, uneven and rough. In any case striations inside the grooves have been observed.
Occlusal wear (according to Smith, '84)	From upper right I2 to left I1: degree 3; Upper left I2: degree 2
Corresponding and/or similar alterations in opposite teeth	Not present.
General traits of the dentition:	
Teeth present	31/32
AMTL	1/30 (3,33%)
Dento-alveolar pathology and alterations	The lower right P2 has been lost *ante mortem*. The teeth show a slight degree of wear (2-3, according to Smith, '84). The upper anterior teeth (for the lower teeth is not recordable) show a slight alveolar margins retraction. Slight deposits of buccal *calculus* on the lower central incisors have been observed. The upper and lower anterior teeth show buccal, lingual and interproximal chippings and multiple chippings of degree 1 and 2 both.
Discussion:	
These groove are similar to the ones observed in several male individuals of this necropolis (see before). Also in this case we could suppose that the lingual grooves were made *intra vitam* some time before the death of the individual of T.14. The lingual grooves were probably due to chemical erosion (grooves rough and uneven) caused by the contact of some acidic substances on the lingual surface during masticatory and/or non-masticatory tasks activities. Moreover, the presence of buccal chipping and also the presence multiple chippings on the anterior teeth could suggest that this individual used these teeth in carrying out masticatory and extra-masticatory activities.	

T. 30 female mature adult	
Tooth with alteration	From upper right I2 to left I2.
Alteration	LSAMAT
Description of the alteration:	
Feature of the alteration	The dental wear pattern slopes down in the buccal-lingual direction with exposition of dentine between the CEJ and incisal edges only for the central incisors. Under light microscope (20x): worn flattened lingual surface. Unfortunately, the lingual surfaces of the upper incisors are partially damaged *post mortem* by acid substances of the ground that have eroded the enamel.
Occlusal wear (according to Smith, '84)	Upper right I2: degree 4, Upper central incisors: degree 5, Upper left I2: degree 3
Corresponding and/or similar alterations in opposite teeth	Not present.
General traits of the dentition:	
Teeth present	31/32
AMTL	0/27 (0,00%)
Dento-alveolar pathology and alterations	Caries absent. The upper posterior teeth and all the lower teeth show a severe alveolar margins retraction. The lower posterior teeth show medium deposits of buccal and lingual *calculus*. The anterior teeth are slightly more worn (4-5, according to Smith, '84) than the posterior ones (3-4/5 according to Smith, '84). Buccal chippings of degree 1, 2 and 3 and lingual and interproximal chippings of degree 1 have been observed.
Discussion:	
The lingual wear pattern observed in this individual (however the lingual surfaces of the upper incisors are partially eroded *post mortem*) recalls those described in literature as LSAMAT (Lingual Surface Attrition of the Maxillary Anterior Teeth). The wear of this individual could suggest that the he could process (pulling, rubbing, chewing, etc.), between the upper incisors and tongue, some particular substance for lengthy period of time. It is possible to hypothesize a particular habit to chew some substances not related to food or to masticatory activity. The nature of the substance involved in this unusual wear is unknown, but it is possible to suppose that it is abrasive and lacking in carbohydrates since the caries are absent. This unusual dental wear pattern has been observed in the male young adult of T.7 of this necropolis and in all of the horsemen of the VCN sample (Belcastro *et al.*, 2000).	

T. 38 female young adult	
Tooth with alteration	Upper right I1
Alteration	Buccal notch (degree 1)
Description of the alteration:	
Feature of the alteration	Under light microscope (20x): smooth and polished bottom without striations.
Occlusal wear (according to Smith, '84)	Degree 3.
Corresponding and/or similar alterations in opposite teeth	Not present.
General traits of the dentition:	
Teeth present	30/32
AMTL	0/24 (0,00%)
Dento-alveolar pathology and alterations	Unfortunately, the dentition of this sample is not well preserved: all the lower teeth are damaged *post mortem* by acid substances of the ground that have eroded the enamel (for all the posterior teeth and quite all the lower anterior ones chippings are not recordable); the maxilla is fragmentary and so the occlusion cannot be reconstructed. Caries absent. The upper anterior teeth show slight deposits of buccal *calculus*.
Discussion:	
The notch could be due to a cylindrical fine rigid or flexible object probable rubbed over the tooth. As regards the nature of the object, taking into account of the smooth and polished notch bottom, we could suppose that it was not too much abrasive.	

T. 88 female old adult	
Tooth with alteration	Upper left P2
Alteration	Interproximal distal groove
Description of the alteration:	
Feature of the alteration	The groove (length: 3,00mm and width: 0,80mm) occurs on the cementum near and parallel to the CEJ. Under light microscope (20x): shallow rounded and polished groove with fine striations directed long its main axis.
Occlusal wear (according to Smith, '84)	Degree 4.
Corresponding and/or similar alterations in opposite teeth	Not recordable: the upper left M1 is not preserved.
General traits of the dentition:	
Teeth present	6/32
AMTL	0/0
Dento-alveolar pathology and alterations	The tooth does not show any carious lesion. All the teeth present are isolated so abscessing and any other pathological conditions cannot be described.
Discussion:	
Unfortunately, the sample is not well preserved (all the teeth are isolated). However, this interproximal groove seems to be due to the repeated insertion of toothpicks probably made of wood probably for hygienic and/or palliative reasons.	

T.40 mature adult of unidentified sex	
Tooth with alteration	Upper left M2 and M3
Alteration	Interproximal grooves
Description of the alteration:	
Feature of the alteration	All these interproximal grooves occur on the *cementum* just above and parallel to the central part of the CEJ (length: 2,20-3,80mm; width: 0,55mm). The mesial groove of the upper left M3 is localized on the CEJ at a non-penetrating cervical caries. Under light microscope (20x): shallow, slight rounded, polished grooves with fine striations directed long their main axis.
Occlusal wear (according to Smith, '84)	Upper left M2 and M3: degree 5.
Corresponding and/or similar alterations in opposite teeth	The distal groove on the left M2 and the mesial one on the left M3 are corresponding both for shape, dimension and localization.
General traits of the dentition:	
Teeth present	15/32
AMTL	0/0
Dento-alveolar pathology and alterations	The upper left M2 does not show any carious lesion. The lower right posterior teeth show medium and considerable deposits of buccal *calculus*. Slight deposits of lingual *calculus* at the lower anterior teeth have been observed. All the teeth present are isolated so abscessing and any other pathological conditions cannot be described.
Discussion:	
We could suppose that the grooves the individual of T.40 could derive from the repetitive back-and-forth movement of a foreign object for oral hygienic purposes, or more likely from the attempt to alleviate pain and discomfort caused by a carious lesion (upper left M3). It is also probable that the distal groove of the upper left M2 has a vestibular insertion because it shows a wider vestibular border (this operation is easier than a lingual insertion).	

b) The individuals with non-masticatory dental alterations of the Roman Imperial Age necropolises of Casalecchio di Reno (Bologna) (1st-4th c. AD)

T.6 male old adult-CSL"A"	
Tooth with alteration	From lower right I1 to left I2
Alteration	Strong unusual lingual wear (lower right I1) Lingual notch (degree 3) (lower left I1) Lingual notch (degree 2) (lower left I2)
Description of the alteration:	
Feature of the alteration	Unusual wear (lower right I1): the dental wear pattern slopes down in the lingual direction with dentine exposition from the incisal edge up until the lingual CEJ. Under light microscope (20-40x): smooth and shiny exposed dentine with some fine striations bucco-lingually directed. Lingual notches (lower left I1 and I2): observation under light microscope (20x) shows smooth and polished bottoms with some fine parallel striations inside each notch. Both these notches show dentine exposition up until the lingual CEJ.
Occlusal wear (according to Smith, '84)	Lower right I1: degree 6 Lower left I1 and I2: degree 5
Corresponding and/or similar alterations in opposite teeth	Not recordable because the upper teeth have been lost *ante mortem*.
General traits of the dentition:	
Teeth present	13/32
AMTL	3/16 (18,75%)
Dento-alveolar pathology and alterations	Alveolar atrophy due to *ante mortem* tooth loss has been observed at: all the preserved maxillary alveoli and at lower right M3, M1 and lower left M1. Penetrating caries at the posterior teeth and a buccal abscess at the lower right C have been observed. Slight deposits of buccal and lingual calculus have been observed. The teeth show a moderate/high degree of wear (5-6, according to Smith, '84). The lower incisors show slight buccal chippings.
Discussion:	
However the maxillary bone is not well preserved and so the occlusion cannot be reconstructed, these lesions could be due to the habit of rub on the teeth a fibrous but not too much abrasive object that has produced the fine striations inside the notches. We could also suppose that the lower teeth (especially the incisors) were mostly used in masticatory and non masticatory activities, because the upper teeth were lost *ante mortem*. The mechanical stress done in these activities could be testified by the slight porosity showed by both the mandibular condyles and by the articular eminence of the right glenoid fossa. These features could suggest that the TMJ was strongly stressed.	

T.27 male mature adult-CSL"A"	
Tooth with alteration	Upper and lower right M1
Alteration	Lingual notch (degree 3): Upper right M1 Buccal notch (degree 2): lower right M1
Description of the alteration:	
Feature of the alteration	Under light microscope (20x): smooth, polished bottoms without striations inside.
Occlusal wear (according to Smith, '84)	Degree 5-6.
Corresponding and/or similar alterations in opposite teeth	The notches are corresponding each other.
General traits of the dentition:	
Teeth present	28/32
AMTL	0/31 (0,00%)
Dento-alveolar pathology and alterations	Non penetrating caries affect the left posterior teeth. A severe alveolar margins retraction and a spread porosity of the cortex of the alveolar crests have been observed for both the maxilla and the mandible. Slight deposits of lingual *calculus* on the upper teeth and of both buccal and lingual *calculus* on the lower teeth have been observed. The first upper and lower molars show a high degree of wear (5-8, according to Smith, '84). Only the upper and lower left teeth are chipped (interproximal chippings of degree 1, 2 and 3).
Discussion:	
These alterations could be put in relations to a non-masticatory activity that has produced the overlay of long-time stresses responsible of the notches' formation. These notches could be put in relation to a repeated action of objects held between the teeth of the two arcades. We could also suppose that the individual of T.27 was used to rub on the teeth not too much abrasive objects (smooth and polished bottoms). The development of the right masseter tuberosity (more evident than one showed by the left side) and the roughness showed by both the pterigoid tuberosities could testify the mechanical stress done in this non-masticatory activity (mostly carried out on the right side).	

T.28 male old adult-CSL"A"	
Tooth with alteration	Upper left P2 Lower right P2 Lower right I2
Alteration	Interproximal mesial grove (Upper left P2) Interproximal distal groove (Lower right P2) Lingual notch (degree 3) (Lower right I2)
Description of the alteration:	
Feature of the alteration	Interproximal distal and mesial grove (Upper left P2 and Lower right P2): the grooves occur on the *cementum* near and parallel to the CEJ on interproximal cervical carious lesions. Under light microscope (20-40x): rounded and polished grooves with sharp margins and fine striations directed long their main axis. The grooves are broadest (1,00mm) at their buccal end. Lingual notch (Lower right I2): smooth and polished bottom with some parallel striations bucco-lingually directed.
Occlusal wear (according to Smith, '84)	Upper left P2: degree 3 Lower right P2: degree 6 Lower right I2: degree 6.
Corresponding and/or similar alterations in opposite teeth	The upper corresponding teeth of the lower right I2 have been lost *ante* and/or *post mortem*.
General traits of the dentition:	
Teeth present	11/32
AMTL	9/24 (37,50%)
Dento-alveolar pathology and alterations	Alveolar atrophy due to ante mortem tooth loss has been observed at: upper right P2, P1, right I2; lower right M2 and from lower left P2 to M3. All the teeth show a strong wear (degree 6, according to Smith, '84) with a wide dentine exposition. A severe alveolar margins retraction for all the lower teeth and only for few upper teeth (unfortunately the maxillary bone is in a poor preservation state) has been observed.
Discussion:	
The interproximal grooves showed by T.28 seem to be due to the repeated insertion (bucco-lingual directed) of toothpicks probably made of wood or bone. We could suppose that in all these cases a habitual tooth probing was done for relive the discomfort caused by the interproximal carious lesions. This repeated insertion results in abrasions in the form of grooves. This notch could be the result of the habit to hold and/or rub on the tooth with a repetitive action and with the same direction and orientation a fibrous fine rigid or flexible cylindrical object (probably wood-made). The mechanical stress done in this activity could be testified by the porosity showed by both the TMJ and by both the mandibular condyles.	

T.70 male mature adult-CSL"A"	
Tooth with alteration	Lower right M1
Alteration	Lingual notch (degree 3)
Description of the alteration:	
Feature of the alteration	Under light microscope (20x): smooth and polished bottom (even if partially fractured *post mortem*) without any striations. At the maximum depth of the lesion a slight chipping of degree 1 has been observed.
Occlusal wear (according to Smith, '84)	Degree 6.
Corresponding and/or similar alterations in opposite teeth	Not recordable because the upper teeth and the maxilla are not preserved.
General traits of the dentition:	
Teeth present	11/32
AMTL	0/16 (0,00%)
Dento-alveolar pathology and alterations	Non penetrating caries affect the posterior teeth. Slight deposits of buccal and lingual *calculus* have been observed. The right and left molars are more worn (4-6, according to Smith, '84) than the other teeth 82-3, according to Smith, '84). The teeth do not show chippings.
Discussion:	
This notch could be the result of the habit to hold and/or rub on the tooth with a repetitive action and with the same direction and orientation a fibrous fine rigid or flexible cylindrical object (probably wood-made). As regards the possible object, taking into account of the smooth and polished bottom without striations, we could suppose that it was not too much abrasive. The stress played on the tooth could also have produced the chipping associated to the notch. The mechanical stress that has involved the TMJ could be testified by the moderate development of the external lateral tubercle of both the mandibular condyles and by the slight development of both the masseteric tuberosities.	

T.81 male young adult-CSL"A"	
Tooth with alteration	Upper right M2
Alteration	Interproximal distal groove
Description of the alteration:	
Feature of the alteration	The groove occurs on a cervical destroying caries. Under light microscope (20x): shallow, smooth and polished groove with a fine striation directed long its main axis.
Occlusal wear (according to Smith, '84)	Degree 5.
Corresponding and/or similar alterations in opposite teeth	Not present.
General traits of the dentition:	
Teeth present	23/32
AMTL	2/24 (8,33%)
Dento-alveolar pathology and alterations	The lower right and left M1 have been lost *ante mortem*. Penetrating and non penetrating caries affect the posterior teeth. The lower anterior teeth show moderate/slight deposits of buccal and lingual *calculus* and a moderate degree of wear (5, according to Smith, '84). The upper teeth show a slight degree of wear (3-4, according to Smith, '84). Only the anterior teeth show chippings (buccal and interproximal chippings of degree 1 and 2).
Discussion:	
The interproximal groove showed by the individual of T.81 seems to be due to the repeated insertion (bucco-lingual directed) of toothpicks probably made of wood or bone. We could suppose that in all these cases a habitual tooth probing was done for relive the discomfort caused by the interproximal carious lesions. This repeated insertion results in abrasions in the form of groove on the interproximal area.	

T.88 male old adult-CSL"A"	
Tooth with alteration	Lower left I2
Alteration	Unusual strong wear.
Description of the alteration:	
Feature of the alteration	The dental wear pattern slopes down both in the buccal and in the lingual directions. This incisor appears like a short root stump. Under light microscope (20x): smooth and polished but uneven occlusal surface due to *post mortem* alterations.
Occlusal wear (according to Smith, '84)	Not recordable.
Corresponding and/or similar alterations in opposite teeth	Not recordable because the upper teeth and the maxilla are not preserved.
General traits of the dentition:	
Teeth present	6/32
AMTL	3/14 (21,43%)
Dento-alveolar pathology and alterations	Alveolar atrophy due to ante mortem tooth loss has been observed at: lower right M1, P2 and lower left M1. Some of the teeth are affected by penetrating caries. All the teeth show a high degree of wear (6-8, according to Smith, '84). Only the left C shows a chipping (buccal, degree 1).
Discussion:	
The dental wear pattern showed by the lower left I2 is anomalous both for the degree and shape with respect to the wear pattern showed by the other teeth. We could suppose that the lower anterior teeth of the male old adult of T.88 were subjected both to strong masticatory and non masticatory stress. The mechanical stress done in these activities could be testified by the moderate development of the right masseter tuberosity (the left one is not recordable) and by the slight porosity showed by the left zygomatic tuberosity (the right one is not recordable).	

T.99 male mature adult-CSL"A"	
Tooth with alteration	Upper left incisors
Alteration	Buccal notches (degree 1)
Description of the alteration:	
Feature of the alteration	Under light microscope (20x): smooth and polished bottoms with short fine parallel striations bucco-lingually directed.
Occlusal wear (according to Smith, '84)	Degree 5.
Corresponding and/or similar alterations in opposite teeth	The buccal chipping (degree 2) showed by the lower left I1 corresponds to the notch observed on the upper left I1.
General traits of the dentition:	
Teeth present	25/32
AMTL	2/28 (7,14%)
Dento-alveolar pathology and alterations	Alveolar atrophy due to *ante mortem* tooth loss has been observed at: upper right M1 and lower left M1. Penetrating caries affect the lower posterior teeth. A buccal abscess has been observed at the lower right P2 affected by a destroying caries. *Calculus* absent. A severe alveolar margins retraction has been observed for the upper and lower teeth. The anterior teeth show a moderate degree of wear (5, according to Smith, '84). The lower central incisors show buccal chippings of degree 2 and 3. The posterior teeth show interproximal chippings of degree 2 and 3.
Discussion:	
These lesions could be put in relation to a long time habit of hold and/or rub objects between the upper and lower anterior teeth. This activity could have produced repeated punctual traumas (responsible of the chippings) and the overlay of long-time stresses responsible of the notches formation. Moreover, because some of the posterior upper and lower teeth have been lost *ante mortem*, we could suppose that both masticatory and non masticatory activities were mostly carried out on the anterior teeth. The mechanical stress done in both these activities could be testified by a depressed porotic area showed by the left mandibular condyle and also by the considerable development of both the masseter tuberosities.	

T.218 male old adult-CSL"A"	
Tooth with alteration	Upper left P1
Alteration	Interproximal distal *striae*
Description of the alteration:	
Feature of the alteration	The *striae* occur on the *cementum* near the CEJ, at the ends of a non penetrating interproximal cervical caries. Under light microscope (20-30x): small, quite flattened and polished areas with a fine striations long the main axis of the lesion.
Occlusal wear (according to Smith, '84)	Degree 7.
Corresponding and/or similar alterations in opposite teeth	Not recordable because the upper left P2 has been lost post mortem.
General traits of the dentition:	
Teeth present	18/32
AMTL	4/24 (16,67%)
Dento-alveolar pathology and alterations	Alveolar atrophy due to *ante mortem* tooth loss has been observed at: lower right and left M1 and P2. Penetrating caries affect some of the anterior and posterior teeth. The anterior teeth are more worn (6/7, according to Smith, '84) than the posterior ones (3-7, according to Smith, '84). Buccal and interproximal chippings of degree 1 and 2affect the anterior teeth.
Discussion:	
The interproximal *striae* showed by T. 218 seem to be due to the repeated insertion (bucco-lingual directed) of toothpicks probably made of wood or bone. We could suppose that in all these cases a habitual tooth probing was done for relive the discomfort caused by the interproximal carious lesions. This repeated insertion results in abrasions in the form of *striae* on the interproximal area.	

T.230 male mature adult-CSL"A"	
Tooth with alteration	Upper left C and P1
Alteration	Unusual strong wear
Description of the alteration:	
Feature of the alteration	The dental wear patterns of these teeth slope in the buccal direction. Under light microscope (20x): smooth and polished occlusal surfaces with some fine short striations bucco-lingual oriented.
Occlusal wear (according to Smith, '84)	Degree 7.
Corresponding and/or similar alterations in opposite teeth	Not present.
General traits of the dentition:	
Teeth present	23/32
AMTL	5/28 (17,86%)
Dento-alveolar pathology and alterations	Alveolar atrophy due to *ante mortem* tooth loss has been observed at: upper right P1, P2, upper left P2; lower right M1 and C. Buccal abscess have been observed at: upper right I1 and upper left C (both affected by a strong wear of degree 7, according to Smith, '84); lower right M2 (affected by a destroying caries). The upper anterior teeth are more worn (7, according to Smith, '84) than the anterior lower ones (4-6, according to Smith, '84). The upper anterior teeth show buccal chippings of degree 1, 2 and 3.
Discussion:	
All the upper and lower anterior teeth of this individual show a high degree of wear. However, the wear patterns showed by the upper left canine and P1 are unusual both for the degree and shape with respect to the wear pattern showed by the other preserved teeth. Therefore, we could suppose that they could be the result of a long time habit to hold or to rub in back and forth movements a fibrous but not too much abrasive object (as suggested by the fine striations bucco-lingually directed observed on the occlusal surfaces). The mechanical stress of this activity could be testified by the moderate development of the entesis of the left masseter muscle. This muscle, involved in opening and closing movements of the mouth, seems to be stressed for a long time. The abscesses observed at the upper right I1 and upper left C, because the teeth do not show carious lesions, could probably be due to the strong wear that has opened the pulp canal not closet by secondary dentine.	

T.231 male mature adult-CSL"A"	
Tooth with alteration	From Upper right M2 to right P2
Alteration	Interproximal distal and mesial *striae*
Description of the alteration:	
Feature of the alteration	The *striae* occur on the *cementum* near the CEJ, at the ends of destroying caries (M2 and M1) and non penetrating interproximal cervical caries (P2). Under light microscope (20-30x): small, quite flattened and polished areas with a fine striations long the main axis of the lesion.
Occlusal wear (according to Smith, '84)	Upper right M2: degree 3 Upper right M1: degree 5 Upper right P2: degree 4
Corresponding and/or similar alterations in opposite teeth	The mesial interproximal striae of the upper right M1 and the distal ones showed by the upper right P2 correspond each other.
General traits of the dentition:	
Teeth present	23/32
AMTL	2/24 (8,33%)
Dento-alveolar pathology and alterations	The upper left incisors have been lost *ante mortem*. A lingual abscess has observed at the upper left I2. The upper posterior teeth show penetrating cervical interproximal caries. A general moderate degree of wear has been observed. Lingual and interproximal chippings of degree 2 and 3 affect the posterior teeth.
Discussion:	
The interproximal *striae* showed by T.231 seem to be due to the repeated insertion (bucco-lingual directed) of toothpicks probably made of wood or bone. We could suppose that in all these cases a habitual tooth probing was done for relive the discomfort caused by the interproximal carious lesions. This repeated insertion results in abrasions in the form of a flattened and polished area with fine striations long the main axis of the lesion on the interproximal surface.	

T.16 female mature adult-CSL"A"	
Tooth with alteration	Upper left I1 and lower right M1
Alteration	Buccal notch (degree 3) (upper left I1) Lingual notch (degree 1) (lower right M1)
Description of the alteration:	
Feature of the alteration	Buccal notch (upper left I1): observation under light microscope (20x) shows a smooth and polished bottom without any striations. At the maximum depth of the lesion a chipping of degree 3 has been observed. The chipping appears rough but smoothed. Lingual notch (lower right M1): observation under light microscope (20x) shows a smooth and polished bottom without any striations.
Occlusal wear (according to Smith, '84)	Upper left I1: degree 5 Lower right M1: degree 6.
Corresponding and/or similar alterations in opposite teeth	Buccal chipping of degree 3 on the upper right M1.
General traits of the dentition:	
Teeth present	30/32
AMTL	0/31 (0,00%)
Dento-alveolar pathology and alterations	Penetrating caries affect the upper posterior teeth. Slight/moderate deposits of lingual *calculus* have been observed on the upper and lower teeth. The anterior teeth are more worn (5, according to Smith, '84) than the posterior ones (2-5, according to Smith, '84). The first upper and lower molars show a high degree of wear (6, according to Smith, '84). The upper teeth and the lower posterior ones show buccal, lingual and interproximal chippings of degree 1, 2 and 3.
Discussion:	
These buccal and lingual notches could be the result of repeated traumas due to cylindrical fine rigid or flexible objects rubbed and/or held on the teeth for a long time in the same direction in some non-masticatory activities. As regards the nature of the objects we could suppose that they were fibrous (striations inside the notches) but not too much abrasive (smooth and polished bottoms). The stress played on the upper left I1 could have produced, as a secondary effect, the chippings associated to the notch. Moreover, taking into account that these notch are corresponding to buccal chippings on the upper M1, we could suppose that these lesions were probably made by the same aetiological factor. In this case we could suppose that probably an object, lingually tilted, was usually strongly held between these teeth. Moreover, we could also suppose that this activity could be responsible of the formation of slight/moderate deposits of lingual calculus on the upper and lower teeth.	

T.94 female mature adult-CSL"A"	
Tooth with alteration	Lower right I2
Alteration	Buccal notch (degree 1)
Description of the alteration:	
Feature of the alteration	Under light microscope (20x): smooth and polished bottom without any striations.
Occlusal wear (according to Smith, '84)	Degree 4.
Corresponding and/or similar alterations in opposite teeth	Not present.
General traits of the dentition:	
Teeth present	30/32
AMTL	0/31 (0,00%)
Dento-alveolar pathology and alterations	Quite all the posterior teeth are affected by destroying caries (with canal pulp exposition). Buccal abscesses at the upper right M3 and M1 and at the lower right M1 and left M1 and M2 have been observed. *Calculus* and chippings are absent.
Discussion:	
The notch could be due to a cylindrical fine rigid or flexible object probable rubbed over the tooth. As regards the nature of the object, taking into account of the smooth and polished notch bottom, we could suppose that it was not too much abrasive.	

T.247 female mature adult-CSL"A"	
Tooth with alteration	Upper left P1
Alteration	Interproximal distal *striae*
Description of the alteration:	
Feature of the alteration	The striae occur on the *cementum* near the CEJ, at the buccal end of an interproximal cervical penetrating caries. Under light microscope (20x): small, quite flattened and polished area with fine parallel striations.
Occlusal wear (according to Smith, '84)	Degree 3.
Corresponding and/or similar alterations in opposite teeth	Not recordable because the upper left P2 is not preserved.
General traits of the dentition:	
Teeth present	19/32
AMTL	3/14 (21,43%)
Dento-alveolar pathology and alterations	The teeth are partially eroded post mortem due to acids substances of the ground. All the upper teeth are isolated. Alveolar atrophy due to ante mortem tooth loss has been observed at: lower left molars. Penetrating caries affect the posterior teeth. The upper anterior teeth show buccal chippings of degree 1, 2 and 3. The lower anterior teeth show only few lingual chippings of degree 1 and 2.
Discussion:	
We could suppose that these *striae* could derive from the repetitive back-and-forth movement of a foreign fibrous object for relive the discomfort caused by the carious lesion.	

T.32? unidentified sex and age adult-CSL"A"	
Tooth with alteration	Lower right I2 Lower left P2
Alteration	Buccal notch (degree1) (Lower right I2) Lingual notch (degree 3) (Lower left P2)
Description of the alteration:	
Feature of the alteration	Buccal notch (Lower right I2) and Lingual notch (Lower left P2): rough bottoms due to post mortem alterations.
Occlusal wear (according to Smith, '84)	Lower right I2: degree 4. Lower left P2: degree 6.
Corresponding and/or similar alterations in opposite teeth	The corresponding upper teeth do not show similar alterations.
General traits of the dentition:	
Teeth present	12/32
AMTL	0/0
Dento-alveolar pathology and alterations	The teeth are isolated so abscessing and the other pathological conditions are not recordable. The anterior teeth show buccal and interproximal chippings of degree 1 and 2.
Discussion:	
Unfortunately, the sample is not well preserved: the teeth are isolated and also partially damaged due to chemical and mechanical *post mortem* alterations. However, it seems that the lesions observed could be due to the habit to hold and/or rub for a long time cylindrical unknown objects on the teeth.	

T.33 unidentified sex old adult-CSL"A"	
Tooth with alteration	Upper right M1
Alteration	Interproximal distal groove.
Description of the alteration:	
Feature of the alteration	The groove (11,48mm high and 5,12mm width) involves quite all the interproximal distal surface from the CEJ up until the apex of the lingual root. Under light microscope (20-40x): wide, rounded, smooth and polished groove with fine parallel short striations. In the central and deeper part of the bottom the canal pulp has been opened. The striations are bucco-lingually directed and are localized near the pulp canal aperture. SEM analysis shows more clearly the fine parallel striations bucco-lingually directed and shows that these striations cross over the pulp canal aperture.
Occlusal wear (according to Smith, '84)	Degree 5.
Corresponding and/or similar alterations in opposite teeth	Not recordable because the adjacent right M2 is not preserved.
General traits of the dentition:	
Teeth present	13/32
AMTL	5/15 (33,33%)
Dento-alveolar pathology and alterations	The upper teeth are isolated. Alveolar atrophy due to *ante mortem* tooth loss has been observed at: from lower right M2 to right P2, at lower left P1 and left M2. The lower anterior teeth show buccal chippings of degree 1, 2 and 3.
Discussion:	
We could suppose that this wide interproximal groove could derive from the repetitive back-and-forth movements of a foreign large and fibrous object for oral hygienic purposes.	

T.44 unidentified sex adolescent-CSL"A"	
Tooth with alteration	Upper left I1
Alteration	Buccal notch (degree 1)
Description of the alteration:	
Feature of the alteration	Under light microscope (20x): smooth and polished bottom with fine striations inside the notch.
Occlusal wear (according to Smith, '84)	Degree 5.
Corresponding and/or similar alterations in opposite teeth	Not present.
General traits of the dentition:	
Teeth present	29/32
AMTL	0/32 (0,00%9
Dento-alveolar pathology and alterations	Caries absent. Slight deposits of buccal *calculus* have been observed on the upper and lower anterior teeth. The upper central incisors are more worn (5, according to Smith, '84) both than the other upper teeth (1-, according to Smith, '84) and than the lower teeth (1-4, according to Smith, '84). Only the upper anterior teeth are chipped (buccal and interproximal chippings of degree 1 and 3).
Discussion:	
The notch could be due to a cylindrical fine rigid or flexible object probable rubbed over the tooth. As regards the nature of the object, taking into account of the smooth and polished notch bottom, we could suppose that it was fibrous (striations inside) but not too much abrasive.	

T.77III unidentified sex and age adult-CSL"A"	
Tooth with alteration	Lower left M1
Alteration	Lingual notch (degree 3)
Description of the alteration:	
Feature of the alteration	Under light microscope (20x): smooth and polished bottom without striations inside.
Occlusal wear (according to Smith, '84)	Degree 8.
Corresponding and/or similar alterations in opposite teeth	Not present.
General traits of the dentition:	
Teeth present	9/32
AMTL	0/14 (0,00%)
Dento-alveolar pathology and alterations	A destroying caries affect the upper right M1 and penetrating caries have been observed on some of the upper posterior teeth. A buccal abscess has been observed at the upper left P1 (not recordable). The upper teeth show a moderate/high degree of wear (4-8, according to Smith, '84). The lower M1 is the only preserved isolated lower tooth: the mandibular alveolar bones are not preserved and so abscessing and any other pathological conditions cannot be described.
Discussion:	
We could suppose that the notch is the result of the habit to rub on the tooth fibrous cylindrical objects but not too much abrasive (smooth and polished bottom without striations).	

T.246 unidentified sex and age adult-CSL"A"	
Tooth with alteration	Lower central incisors
Alteration	Unusual strong lingual wear.
Description of the alteration:	
Feature of the alteration	The dental wear pattern slopes down in the lingual direction. The worn lingual surface shows dentine exposition from the incisal edge up until the lingual CEJ. Under light microscope (20x): smooth, polished worn surface without striations.
Occlusal wear (according to Smith, '84)	Degree 6.
Corresponding and/or similar alterations in opposite teeth	Strong wear observed on both the upper central incisors (degree 7, according to Smith, 1984) which show the occlusal surfaces flattened and the pulp canal closed by secondary dentine.
General traits of the dentition:	
Teeth present	19/32
AMTL	2/22 (9,09%)
Dento-alveolar pathology and alterations	The lower right and left M1 have been lost *ante mortem*. a destroying caries has been observed at the upper right P2. Penetrating caries affect the lower posterior teeth. The lower M1 shows a penetrating caries and a buccal abscess. General high degree of wear (6-8, according to Smith, '84) has been observed. Buccal, lingual and interproximal chippings of degree 1, 2 and 3 have bee observed.
Discussion:	
The wear pattern of the lower central incisors is anomalous both for the degree and shape with respect to the wear pattern showed by the other preserved teeth and by the upper central incisors. We could suppose that the anterior teeth were subjected to strong non masticatory activities. The mechanical stress done in these activities could be testified by the slight porosity showed by the right glenoid fossa (the left one is not recordable). Both the mandibular condyles show a slight porosity at the external lateral tubercle. Moreover, a moderate development of both the masseter tuberosities have been observed. All these alterations could suggest that the TMJ were strongly stressed.	

T.123 male young adult-CSL"B"	
Tooth with alteration	Upper right I2
Alteration	Buccal notch (degree 1)
Description of the alteration:	
Feature of the alteration	Under light microscope (20x): smooth and polished bottom without striations. At the maximum depth of the notch a slight chipping of the enamel has been observed. This tooth shows also buccal and interproximal chippings of degree 2.
Occlusal wear (according to Smith, '84)	Degree 4.
Corresponding and/or similar alterations in opposite teeth	Not recordable because the lower incisors and left canine have been lost *post mortem*.
General traits of the dentition:	
Teeth present	20/32
AMTL	1/29 (3,45%)
Dento-alveolar pathology and alterations	The lower left M1 has been lost *ante mortem*. The upper right teeth and the lower right molars are more worn (degree 6/7, according to Smith, '84) than the left and anterior ones (4/5, according to Smith, '84). Moderate/considerable deposits of buccal *calculus* have been observed on the upper and lower left teeth. Several buccal and multiple chippings of degree 1 and 2 on the upper anterior teeth have been observed. The upper posterior teeth show buccal and interproximal chippings (degree 1 and 2). Only in one case (upper left P2) a lingual chipping of degree 3 has been observed. The lower posterior teeth show only buccal and interproximal chips of degree 1.
Discussion:	
The presence of multiple buccal chippings could suggest that the individual of T.123 used the teeth in masticatory (interproximal chippings on the posterior teeth) and non-masticatory activities (buccal chippings and multiple chippings on the anterior ones). We could also suppose that the right side teeth were mostly involved in these activities. The notch could be due to the habit to hold and/or to rub on the tooth an object not too much abrasive (smooth and polished bottom). The moderate development of the right masseter tuberosity and the moderate development of the external lateral tubercles of both the mandibular condyles could probably testify the mechanical stress done in this activity and also that the TMJ was strongly stressed.	

T. 129 male mature adult-CSL"B"	
Tooth with alteration	Upper right P1 Lower right M1 Lower central incisors
Alteration	Buccal notch (degree 3) and lingual notch (degree 3) (Upper right P1); Lingual notch (degree 3) (Lower right M1); Unusual strong wear (Lower central incisors).
Description of the alteration:	
Feature of the alteration	Buccal notch and lingual notch (Upper right P1): Observation under light microscope (20x) show smooth and polished bottoms without striations. Lingual notch (Lower right M1): Observation under light microscope (20x) show smooth and polished bottom with parallel striations bucco-lingually directed. Unusual strong wear (Lower central incisors): the dental wear pattern slopes down in the lingual direction with dentine exposition from the incisal edge up until the CEJ. Under light microscope (20x): smooth, polished surfaces without any striations.
Occlusal wear (according to Smith, '84)	Upper right P1: degree 4, Lower right M1: degree 5, Lower central incisors: degree 6.
Corresponding and/or similar alterations in opposite teeth	Interproximal and lingual chippings (degree 2) corresponding to both the notches on the upper right P1 on the lower right premolars have been observed. The upper right M1 shows buccal chippings of degree 3 corresponding to the lingual notch of the lower right M1. The upper right I1 do not show any lesion corresponding to the unusual wear of the lower central incisors.
General traits of the dentition:	
Teeth present	28/32
AMTL	0/28 (0,00%)
Dento-alveolar pathology and alterations	The anterior teeth are more worn (5-6, according to Smith, '84) than the posterior ones (2-4, according to Smith, '84). Only the first upper and lower molars show a moderate degree of wear (5, according to Smith, '84). Slight deposits of buccal *calculus* on the lower incisors and on the upper right premolars have been observed. Several buccal lingual and interproximal chippings and multiple chippings of degree 2 and 3 have been observed on the upper and lower right teeth.
Discussion:	

We could suppose that the lesions observed on the posterior teeth of the individual of T.129 could be due to the habit of hold and/or rub between the upper right P1 and the lower right M1, a fibrous object (such as a vegetable fibre) but not too much abrasive (smooth and polished bottom of the notches).
The unusual lingual wear showed by the lower central incisors could probably be due to an object, lingually tilted, and usually strongly held between the upper and lower teeth.
Therefore, we could suppose that the teeth were used both in masticatory activity (lingual and interproximal chippings on the posterior teeth) and also in non masticatory activities.
We could also suppose that these activities were mostly done on anterior and right posterior teeth (as suggested by slight deposits of buccal *calculus* on the anterior and right side teeth).

T.? unidentified sex and age adult-CSL"B"	
Tooth with alteration	Upper right I1
Alteration	Buccal notch (degree1); buccal notch (degree 2)
Description of the alteration:	
Feature of the alteration	Under light microscope (20x): smooth and polished bottoms without striations. At the maximum depth of the buccal notch (degree 2) a chipping has been observed.
Occlusal wear (according to Smith, '84)	Degree 3.
Corresponding and/or similar alterations in opposite teeth	Not recordable.
General traits of the dentition:	
Teeth present	3/32
AMTL	0/0
Dento-alveolar pathology and alterations	The dention of this sample is not well preserved: all teeth are isolated, the alveolar bones are not preserved and so abscessing and any other pathological conditions cannot be described.
Discussion:	
All these characters could suggest a non-masticatory use of the teeth. We could suppose that the individual was used to rub on the tooth fibrous but not too much abrasive objects that have produced the fine striations inside the notch. The stress played on the tooth could have produced, as a secondary effect, the chipping associated to the notches.	

T.128 unidentified sex and age adult-CSL"B"	
Tooth with alteration	From upper right I2 to left I2
Alteration	Intentional wear of buccal surfaces from the crowns until the exposed roots.
Description of the alteration:	
Feature of the alteration	A wide dentine exposition from the incisal edge until the roots' apexes and a considerable flattening of the anterior surfaces of the upper central and lateral incisors have been observed. Moreover, the central upper incisors are file-marked with a couple of parallel and diagonal marks. Upper right I1: on the exposed dentine of the mesial buccal corner, a couple of parallel and diagonal marks (length 3,00mm), of different width has been observed. The filemarks cut the exposed dentine from the incisal disto-mesially directed at about 45° with respect to the median sagittal plane. Under light microscope (20-40x): the upper mark is deeper and shows a smooth flat bottom. The lower one is wider and with a furrowed flat bottom. These furrows are parallel with respect to the main axis of the mark. The buccal cement is quite all absent and the exposed dentine is smooth, shiny and with fine furrows parallel with respect to the axis of the tooth. Upper left I1: a couple of parallel-diagonal marks (length 4,50mm), similar to the ones observed on the I^1dx, has been observed on the buccal distal corner. These marks are parallel each other and cut the exposed dentine with the same orientation and inclination described for I^1dx. Under light microscope (20-40x): fine furrowed flat bottoms for each marks of the couple. Another longer and finer mark above and parallel with respect to the lowers ones has been observed. SEM analysis: the upper mark is wider (about 550 µm) than the lower one (width about 350 µm). Both these marks show a fine furrowed flat bottom. The upper longer mark (width about 310 µm) shows a fine furrowed V-shaped bottom.
Occlusal wear (according to Smith, '84)	From upper right I2 to left I2: degree 6. All these teeth show dentine exposition with aperture of the pulp canal closed by secondary dentine.
Corresponding and/or similar alterations in opposite teeth	Not present.
General traits of the dentition:	
Teeth present	29/32
AMTL	1/32 (3,12%)
Dento-alveolar pathology and alterations	Alveolar atrophy due to *ante mortem* tooth loss has been observed at: upper right M1. Penetrating and non penetrating caries affect only the

	upper posterior teeth and the upper left C. A destroying caries affects the upper left M1 (reduced as a root stump). The upper teeth show slight deposits of buccal *calculus*. The lower anterior teeth show moderate/considerable deposits of buccal *calculus*. A moderate horizontal bone loss for the upper posterior alveoli and a severe one for the lower alveoli have been observed. Particularly, the upper anterior teeth show a severe alveolar margins retraction and a heavy occlusal wear (degree 6, according to Smith, '84), dentine exposition and the pulp canals closed by secondary dentine. Only few buccal chippings of degree 1 and 2 affect the anterior teeth. The posterior ones show slight buccal and interproximal chippings (degree 1 and 2).
Discussion:	

These dental lesions may be related to other lesions observed in the cranial and postcranial skeleton. Unfortunately, the bones are in a rather poor state of preservation and many of them have been damaged *post mortem*. However, some of them show the following lesions:

- Rhinomaxillary region: a severe resorption and remodelling (striations) of the alveolar margins of both central and lateral incisors has been observed. The hard palate shows porosity, the nasal spine shows resorption, remodelling and appears smooth. The floor of the nasal aperture shows bilateral symmetrical bone reaction and remodelling with a circular lesion (2,00 mm) that communicates with the incisal canal. A rough sub-oval lytic cavity (width 3,60 mm and length 4,80 mm) on the right wall of the nasal aperture has been observed.
- Postcranial skeleton: the lateral surface of the left calcaneus shows remodelling and new woven bone.

These skeletal lesions seem to be referred to inflammatory and infective diseases probably due to leprosy (Hansen's disease).

The couple of parallel-diagonal marks filed on buccal surface of both the central upper incisors could be referred to intentional modifications of the teeth. They seem to be skilfully made and it is most likely that the individual did not make the marks itself, but that someone else must have filed him. Moreover, the lower mark of upper right I1 and the upper one of left I1, show a very similar fine furrowed flat bottoms. We could suppose they were made with the same but unknown object. This object was probably a sharp metallic instrument (similar to a iron or bronze made surgical knife like the ones yet used during the roman imperial age in the Italian territory) with a fine but uneven tip (furrowed bottoms).
We could suppose that the individual of T.128 had intentionally rubbed for a long time the buccal surfaces of the upper anterior teeth. This intentional wear had flattened the buccal surfaces of the teeth involving also quite all the anterior alveolar region. However, we could also suppose that the rhinomaxillary region was yet affected by resorption and remodelling due to an inflammatory and infective disease similar to the one described in literature as typical of leprosy.
Therefore, the dental lesions may be related to those observed elsewhere in the skeleton: we could suppose that the heavy buccal wear of the upper incisors and the bone remodelling (striations) of the maxilla, may be due to intentional operations aimed at cosmetically/therapeutically "solving" the rhino-maxillary changes probably related to leprosy.
Moreover, this sample could be the most ancient documented example of intentional modification of teeth in archaeological human skeletal remains in European territory.

T.19 male mature adult -CSL"2000"	
Tooth with alteration	Lower right I1
Alteration	Unusual slight lingual wear
Description of the alteration:	
Feature of the alteration	Worn flattened sub-circular area with dentine exposition on the lingual tubercle. Under light microscope (20x): the exposed dentine is smooth and polished with some fine parallel striations perpendicular with respect to the incisal edge.
Occlusal wear (according to Smith, '84)	

Corresponding and/or similar alterations in opposite teeth	Not recordable because the upper teeth and the maxilla are not preserved.
General traits of the dentition:	
Teeth present	11/32
AMTL	0/0
Dento-alveolar pathology and alterations	Penetrating and non penetrating caries affect some of the teeth. Few buccal and interproximal chippings of degree 1, 2 and 3 have been observed. The teeth are isolated so abscessing and the other pathological conditions cannot be described.
Discussion:	
The worn lingual area of the lower right I1 could be due to the habit to hold and/or rub over the tooth a fibrous object (fine striations) but not too much abrasive (smooth and polished surface). Moreover, we could suppose that this object was probably held tilted down lingually and pulled outside toward the top.	

T.36 male young adult-CSL"2000"	
Tooth with alteration	Upper central incisors Lower right M3 and M2 Lower left M1 and M2
Alteration	Buccal notch "B" (degree 2) (Upper central incisors) Buccal notch (degree 3) (Lower right M3) Interproximal mesial groove (Lower right M2) Buccal notch (degree 2) and interproximal mesial *striae* (Lower left M1) Interproximal mesial *striae* (Lower left M2)
Description of the alteration:	
Feature of the alteration	Buccal notch "B" (Upper central incisors): observation under light microscope (20-40x) shows smooth, polished and homogeneous bottom without striations. At the maximum depth of each notch slight chippings have been observed. Buccal notch (Lower right M3): observation under light microscope (20-40x) shows smooth and polished bottom with some fine parallel striations directed toward the maximum depth of the notch. Interproximal mesial groove (Lower right M2): the groove (length: 4,50mm and width: 1,60mm) is slight rounded has sharp margins and occurs on the *cementum* near and parallel to the CEJ on an interproximal cervical non-penetrating caries. It is broadest (1,60mm) at its buccal end. Under light microscope (20x): groove smooth and polished bottom with fine striations directed long its main axis. Buccal notch (Lower left M1): observation under light microscope (20-40x) shows smooth and polished bottom without striations. At the maximum depth of the notch slight chippings have been observed. Interproximal mesial *striae* (Lower left M1 and M2): the interproximal *striae* occur on the *cementum* near and parallel to the CEJ. The mesial *striae* of the lower right M2 is on an interproximal cervical non-penetrating caries. The lower left M2 does not show any carious lesions but the mesial *striae* are in front of a destroying interproximal distal caries of the adjacent M1. Under light microscope (20x): smooth and polished small areas with a fine striations parallel with respect to the CEJ.
Occlusal wear (according to Smith, '84)	Upper central incisors: degree 7, Lower right M3: degree 5, Lowe right M2: degree 4, Lower left M1 and M2: degree 5.

Corresponding and/or similar alterations in opposite teeth	Not present or not recordable.
General traits of the dentition:	
Teeth present	18/32
AMTL	0/9 (0,00%)
Dento-alveolar pathology and alterations	The upper teeth are isolated. Penetrating and non penetrating caries affect the lower posterior teeth. A buccal abscess has been observed at the lower right M1 (affected by a destroying caries). A moderate/high degree of wear (5-8, according to Smith, '84) has been observed. Buccal and interproximal chippings of degree 1 and 2 affect the anterior teeth. The posterior teeth show buccal, lingual and interproximal chippings of degree 2 and 3. according to Smith, '84)
Discussion:	
The buccal notches "B" of the upper central incisors could be due to a cylindrical fine rigid or flexible object held and/or rubbed back and forth over the tooth. It is also possible that the object responsible of this lesion was pull toward the top. As regards of the object we could suppose that it was fibrous but not too much abrasive because the worn surfaces are smooth and polished. The stress played on the tooth could have produced, as a secondary effect, the chippings associated to the notch. However, the mechanical stress done in this activity could be testified by the porosity observed on the right mandibular condyle. The interproximal grooves and *striae* seem to be due to the repeated insertion (bucco-lingual directed) of tooth picks probably made of wood or bone. We could suppose that in this case a habitual tooth probing was done to relive the discomfort caused by some interproximal carious lesions. This repeated insertion results in abrasions in the form of grooves and/or *striae* on the interproximal area. As regards of the object we could suppose that it was fibrous but not too much abrasive because the worn surfaces are smooth and polished.	

T.44 male old adult-CSL"2000"	
Tooth with alteration	Lower right C
Alteration	Interproximal mesial and distal *striae*
Description of the alteration:	
Feature of the alteration	The interproximal *striae* occur on the *cementum* near and parallel to the CEJ. Under light microscope (20x): smooth and polished small areas with a fine striations parallel with respect to the CEJ.
Occlusal wear (according to Smith, '84)	Degree 6.
Corresponding and/or similar alterations in opposite teeth	Not recordable.
General traits of the dentition:	
Teeth present	1/32
AMTL	12/13 (92,31%)
Dento-alveolar pathology and alterations	The upper teeth and the maxilla are not preserved. Atrophy due to *ante mortem* tooth loss has been observed at: from lower right M2 to right P2, from lower right I2 to left M3. Buccal abscesses have been observed at : lower right P1 and C.
Discussion:	
The interproximal *striae* showed by the male old adult of T.44 seem to be due to the repeated insertion (bucco-lingual directed) of toothpicks probably made of wood or bone. We could suppose that in this case a habitual tooth probing was done to relive the discomfort eventually caused by the exposed dental necks (the lower right canine does not show any carious lesions and is the only tooth preserved). This repeated insertion results in abrasions in the form of flattened and polished areas on the interproximal surfaces.	

T.54 male young adult-CSL"2000"	
Tooth with alteration	Lower right P2 and left M1
Alteration	Buccal notches (degree 3)
Description of the alteration:	
Feature of the alteration	Under light microscope (20x): smooth and polished bottoms. Striations bucco-lingually directed have been observed only inside the notch of the right P2.
Occlusal wear (according to Smith, '84)	Lower right P2: degree 5, Lower left M1: degree 6.
Corresponding and/or similar alterations in opposite teeth	The notch showed by the lower left M1 is corresponding to the buccal chipping of degree 2 observed on the upper left M1.
General traits of the dentition:	
Teeth present	19/32
AMTL	1/19 (5,26%)
Dento-alveolar pathology and alterations	At the lower right M2 (lost *ante mortem*) a buccal abscess has been observed. Penetrating and non penetrating caries on the posterior teeth have been observed. A destroying caries affects the upper left M1. Medium of buccal *calculus* on the upper teeth and slight deposits of buccal and lingual *calculus* on the lower teeth have been observed. The teeth show a moderate degree of wear (4/5, according to Smith, '84). Moderate alveolar margins retraction at the upper teeth has been observed. Lingual and interproximal chippings and multiple chippings (degree 2 and 3) affect the lower posterior teeth. Buccal chippings (degree 1, 2 and 3) on the anterior upper teeth have been observed.
Discussion:	
The lesion observed on the lower left M1 corresponds to a buccal chipping (degree 3) showed by the upper left M1. These lesions seem to be due to the same aetiological factor such as the habit to hold an object (probably fibrous) between these teeth. The presence of buccal chippings on the upper anterior teeth could be related to frequent and/or severe contacts with hard objects in using teeth as tools in daily activities. Moreover, the presence of lingual and interproximal chippings and multiple chippings on the lower posterior teeth, could suggest that the teeth of the individual of T.54 were subjected to severe masticatory traumas (as also suggested by the moderate degree of wear). The mechanical stress done in these activities could be testified by the moderate development of the right masseter tuberosity and by the porosity showed by the right mandibular condyle (the left one is not recordable). All these characters could suggest that the TMJ was for a long time strongly stressed.	

T.17 female mature adult-CSL"2000"	
Tooth with alteration	Upper left I1
Alteration	Buccal notch "B" (degree 1)
Description of the alteration:	
Feature of the alteration	Under light microscope (20x): smooth and polished bottom without any striations.
Occlusal wear (according to Smith, '84)	Degree 4.
Corresponding and/or similar alterations in opposite teeth	Not recordable because the lower central incisors have been lost *post mortem*.
General traits of the dentition:	
Teeth present	29/32
AMTL	0/30 (0,00%)
Dento-alveolar pathology and alterations	Only the lower right M1 is affected by a carious lesion (penetrating). Moreover, slight deposits of buccal and lingual *calculus* on the upper anterior teeth and moderate/considerable deposits of buccal and lingual *calculus* on the upper molars have been observed. The lower teeth show moderate/considerable deposits of buccal and lingual *calculus*. A slight/moderate degree of wear (1-4, according to Smith, '84) has been observed. Interproximal chippings of degree 1 and 2 have been observed on the lower posterior teeth.
Discussion:	
The buccal notch "B" could be due to a cylindrical fine rigid or flexible object held and/or rubbed back and forth over the tooth. It is also possible that the object responsible of this lesion was pull toward the top. We could also suppose that this activity, mostly done on the anterior teeth, could have produced moderate/considerable deposits of buccal and lingual *calculus* on the anterior upper and lower teeth. The mechanical stress done in this activity could be testified by the porosity observed on the right mandibular condyle.	

T.18 female young adult-CSL"2000"	
Tooth with alteration	Upper left I1 Lower central incisors Upper right M1
Alteration	Unusual strong lingual wear (Upper left I1) Unusual strong buccal wear (Lower central incisors) Interproximal mesial groove (Upper right M1)
Description of the alteration:	
Feature of the alteration	Unusual strong lingual wear (Upper left I1): the dental wear pattern slopes in the lingual direction further the CEJ on the lingual cement. Under light microscopy (40x): smooth and polished worn lingual surface. Unusual strong buccal wear (Lower central incisors): the dental wear pattern slopes down in the buccal direction. The central incisors are short root stumps with the pulp canal closet by secondary dentine. Under light microscopy (40x): rounded, smooth and polished worn surfaces with several short fine striations bucco-lingually mainly directed. Interproximal mesial groove (Upper right M1): The groove (length: 5,50mm) occurs on the *cementum* near and parallel to the mesial CEJ on an interproximal cervical penetrating carious lesion. Under light microscopy (40x): shallow, slight rounded and polished groove with fine striations directed long its main axis. Moreover, the groove is broadest (0,90mm) at its buccal end.
Occlusal wear (according to Smith, '84)	Upper left I1: degree 7, Lower central incisors: degree 8, Upper right M1: degree 5.
Corresponding and/or similar alterations in opposite teeth	corresponding lingual wear to the strong unusual buccal wear of the lower central incisors.
General traits of the dentition:	
Teeth present	18/32
AMTL	5/19 (26,31%)
Dento-alveolar pathology and alterations	Alveolar atrophy due to *ante mortem* tooth loss has been observed at: from the lower right M3 to the right P1 and from the lower left P2 to the left M1. Penetrating and non penetrating caries affect the upper teeth. Buccal abscess have been observed at: upper left P1 (affected by a penetrating caries) and upper left M1 (affected by a destroying caries). A severe alveolar margins retraction has been observed for all the lower teeth (for the upper teeth is not recordable). All the anterior preserved teeth are more worn (degree 7/8, according to Smith, '84) than the

	posterior ones (degree 5/6, according to Smith, '84). Buccal chippings (degree 1, 2 and 3) affect the upper anterior teeth. On the posterior teeth lingual and interproximal chippings (degree 2 and 3) have been observed.

Discussion:

The wear patterns of the preserved incisors are unusual both for the degree and shape with respect to the wear pattern showed by the other preserved teeth.
We could suppose that the individual of T.18 used the lower teeth to treat or to scrape something held with the hands. It is also possible that the object responsible of this wear was pull from the outside to below. All these movements could explain the wear plains orientation. The substance may have been a kind of foodstuffs but also of another material. In any case, we could suppose that this substance was not too much abrasive because of the worn surfaces show an exposed smooth and polished dentin. This alteration is very similar to the one described by Bonfiglioli (2002) among tanners in a 20th century skeletal collection from Italy.
The mechanical stress that played on the anterior teeth could have also produced the occlusal *striae* on the upper right canine, the several buccal chippings of degree 1, 2 and 3 on the upper anterior teeth.

T.29 female mature adult-CSL"2000"	
Tooth with alteration	Lower right C
Alteration	Buccal notch "B" (degree 2)
Description of the alteration:	
Feature of the alteration	Observation under light microscope (40x) reveals a homogeneous, smooth and polished bottom without striations.
Occlusal wear (according to Smith, '84)	Degree 4.
Corresponding and/or similar alterations in opposite teeth	Not present.
General traits of the dentition:	
Teeth present	25/32
AMTL	3/28 (10,71%)
Dento-alveolar pathology and alterations	Alveolar atrophy due to *ante mortem* tooth loss has been observed at: lower right P2 and lower left M1 and M2. Penetrating and non penetrating caries affect mostly the posterior teeth. Buccal abscesses have been observed at: upper left P1 and lower right M1 (both affected by destroying caries). A moderate degree of wear (4/5, according to Smith, '84) has been observed. Buccal, lingual and interproximal chippings and multiple chippings (degree 1, 2 and 3) have been observed.
Discussion:	
This alteration could be due to a very fine cylindrical rigid or flexible object, held between the teeth and/or rubbed back-and-forth over them with a repetitive. The notch on the lower right C and the several buccal chippings could suggest that both masticatory and non masticatory activities were mostly done on the anterior teeth.	

T.41 female mature adult-CSL"2000"	
Tooth with alteration	Upper left I2
Alteration	Buccal notch "B" (degree1)
Description of the alteration:	
Feature of the alteration	Observation under light microscope (40x) reveals a homogeneous, smooth and polished bottom without striations.
Occlusal wear (according to Smith, '84)	Degree 5.
Corresponding and/or similar alterations in opposite teeth	Not present.
General traits of the dentition:	
Teeth present	21/32
AMTL	3/17 (17,65%)
Dento-alveolar pathology and alterations	All the upper teeth are isolated (except for the right M2). Alveolar atrophy due to ante *mortem tooth* loss has been observed at: lower right M3 and M2, lower left M1. Penetrating and non penetrating caries affect the teeth. Buccal abscesses have been observed at: upper right M2, lower left C, left P1 and left P2 (affected by a destroying caries). Destroying caries affect the upper right P2, the lower left P2, M1 and M2. Slight deposits of lingual *calculus* have been observed on the upper and lower teeth. The upper anterior teeth show buccal chippings of degree 1, 2 and 3. A severe alveolar margins retraction has been observed only for some of the lower posterior teeth.
Discussion:	
We could suppose that these alterations could be related to frequent and/or severe contacts with hard objects in using teeth as tools in daily activities or to masticatory traumas. These activities coukld be responsabile also of the formation of slight deposits of lingual calculus on the upper anterior teeth. The porosità showed by both the mandibular condyles could testify the mechanical stress done in these activitie.	

T.42 female young adult-CSL"2000"	
Tooth with alteration	Lower right I1
Alteration	Buccal notch (degree 2)
Description of the alteration:	
Feature of the alteration	Under light microscope (40x): smooth and polished bottom without striations. At the maximum depth of the notch slight chippings of the enamel have been observed.
Occlusal wear (according to Smith, '84)	Degree 5.
Corresponding and/or similar alterations in opposite teeth	The upper I1 shows multiple buccal chippings (degree 2) corresponding to the notch of the lower right I1.
General traits of the dentition:	
Teeth present	16/32
AMTL	0/15 (0,00%)
Dento-alveolar pathology and alterations	A destroying caries affects the lower left M2. Buccal and lingual abscesses at the lower right M1 have been observed. Moderate/considerable deposits of buccal and lingual calculus on the lower anterior teeth have been observed. The teeth show a moderate/strong wear (5/6, according to Smith, '84). Buccal, lingual and interproximal chippings and multiple chippings (degree 1, 2 and 3) have been observed.
Discussion:	
All these lesions could be related to frequent and/or severe contacts with hard objects in using teeth as tools in daily activities or to masticatory traumas. The lesion could be put in relation to the habit to rub on the tooth some fibrous objects (like a vegetable fibre) but not abrasive because the bottom is smooth and polished. This gesture, repeated several times in the same position, may have produced also the chipping associated to the notch.	

T.56 female young adult-CSL"2000"	
Tooth with alteration	Lower right canine
Alteration	Buccal notch (degree 2)
Description of the alteration:	
Feature of the alteration	Under light microscope (40x): smooth and polished bottom with fine parallel striations running toward the maximum depth of the notch where a slight chipping of the enamel has been observed.
Occlusal wear (according to Smith, '84)	Degree 5.
Corresponding and/or similar alterations in opposite teeth	The corresponding upper teeth show buccal chips of degree 1 and 2.
General traits of the dentition:	
Teeth present	20/32
AMTL	2/22 (9,09%)
Dento-alveolar pathology and alterations	The lower left M1 and M2 have been lost *ante mortem*. Destroying caries affect the right upper and lower teeth. Penetrating and non penetrating caries affect the anterior teeth. Buccal abscesses have been observed at: lower right M2 and M1 (both affected by a destroying caries). The right teeth are more worn (5-8, according to Smith, '84) than the left ones (3-6, according to Smith, '84). A severe porosity has been observed for the alveolar bone of the lower posterior teeth. Buccal and interproximal chippings affect the anterior teeth.
Discussion:	
The high degree of wear showed by the upper and lower right teeth could probably be due to strong masticatory and non-masticatory activities. The notch could have been produced by a repeated action of a fibrous object (bottom striated) but not too much abrasive (smooth and polished bottom) held or rubbed on the tooth. The mechanical stress done in these activities could be testified by slight porosity showed by the right mandibular condilo and by the moderate development of both the masseter tuberosities.	

T.6B unidentified sex mature adult-CSL"2000"	
Tooth with alteration	Upper central incisors Lower right C and I2 Lower left M2.
Alteration	Unusual strong wear and lingual groove (Upper central incisors) Unusual strong lingual wear (Lower right C and I2) Interproximal mesial groove (Lower left M2)
Description of the alteration:	
Feature of the alteration	Unusual strong wear (Upper central incisors): the central incisors are short root stumps with the pulp canal closed by secondary dentine. The dental wear pattern of the upper right central incisor slopes down in lingual direction. The dental wear pattern of the upper left central incisor slopes both in the buccal and in the lingual directions. Under light microscopy (40x): smooth and polished occlusal surfaces with fine striations bucco-lingually oriented on the occlusal surface of the upper right I1. Lingual grooves (upper central incisors): the lingual grooves occur on the *cementum*, near and parallel with respect to the CEJ and surround the neck teeth mesial-distally directed. Under light microscope (20-40x): shallow, uneven and rough grooves. In any case striations inside the grooves have been observed. Unusual strong lingual wear (Lower right C and I2): the dental wear patterns slope in the lingual direction. The lingual surface shows exposition of dentine from the incisal edge further the CEJ. Under light microscope (20x): smooth lingual exposed dentine with parallel striations bucco-lingually directed. Both these teeth show interproximal chippings (degree 1 and 3). Interproximal mesial groove (Lower left M2): the groove (width<1,00mm and length~1,00mm), parallel with respect to the CEJ, is localized at the lingual end of a non-penetrating cervical caries and is tapering off lingually. Under light microscope (20x): short rounded and polished groove with fine striations long its main axis.
Occlusal wear (according to Smith, '84)	Upper central incisors: degree 7/8, Lower right C: degree 7, Lower rigth I2: degree 6, Lower left M2: degree 7.
Corresponding and/or similar alterations in opposite teeth	Unusual strong wear and lingual groove (Upper central incisors)/Unusual strong lingual wear (Lower right C and I2).

General traits of the dentition:	
Teeth present	11/32
AMTL	3/4 (75,00%)
Dento-alveolar pathology and alterations	The lower right M3 and the lower left M1 and M3 have been lost *ante mortem*. Penetrating and non penetrating caries have been observed. The teeth show a strong wear (6-8, according to Smith, '84). Unfortunately, the dentition of the individual of T.6B is not well preserved: quite all teeth are isolated, maxilla and mandible are not preserved and so abscessing any pathological conditions cannot be described.

Discussion:

We could suppose that the individual of T.6B used the lower teeth to treat or to scrape something held with the hands. It is also possible that the object responsible of this wear was pull from the outside to below. All these movements could explain the wear plains orientation. The substance may have been a kind of foodstuffs but also of another material. In any case, we could suppose that this substance was not too much abrasive because of the worn surfaces show an exposed smooth and polished dentine. This alteration is very similar to the one described by Bonfiglioli (2002) among tanners in a 20th century skeletal collection from Italy.

The lingual grooves were probably due to chemical erosion (grooves rough and uneven) caused by the contact of some acidic substances on the lingual surface during masticatory and/or non-masticatory tasks activities.

The interproximal groove seems to be due to the repeated insertion of a fine toothpicks probably made of wood or bone. We could suppose that this habitual tooth probing was done to relive the discomfort caused by the cervical caries. This repeated insertion results in abrasions in the form of groove on the interproximal surface.

T.20 unidentified sex young adult-CSL"2000"	
Tooth with alteration	Upper right and left M2 Upper left C Lower right I1 Lower left P2
Alteration	Interproximal mesial groove (Upper right M2) Interproximal distal groove (Upper left M2) Interproximal distal *striae* (Upper left C) Buccal notch (degree 2) (Lower right I1) Interproximal mesial groove (Lower left P2)
Description of the alteration:	
Feature of the alteration	Interproximal mesial and distal groove (Upper right and M2 and Lower left P2) and Interproximal distal *striae* (Upper left C): all these interproximal grooves and *striae* occur on the *cementum* near and parallel to the CEJ and. They are localized at the buccal end of interproximal cervical caries or in front of teeth with interproximal cervical caries (as the case of the mesial *striae* observed on the upper left M3). Under light microscope (20-40x): slight rounded, polished grooves (max width ~1,50mm) with fine striations long their main axis. Under light microscope (20-40x): the interproximal *striae* appear as small flattened polished surfaces with fine striations. Buccal notch (Lower right I1): Observation under light microscope (20x) shows an irregular but smooth bottom with some short striations bucco-lingually directed. The tooth shows also a buccal chipping of degree 2.
Occlusal wear (according to Smith, '84)	Upper right M2: degree 4; Upper left M2: degree 6; Upper left C, Lower right I1 and left P2: degree 6.
Corresponding and/or similar alterations in opposite teeth	The interproximal grooves and *striae* correspond in adjacent teeth.
General traits of the dentition:	
Teeth present	23/32
AMTL	0/0
Dento-alveolar pathology and alterations	The teeth are isolated so abscessing and any other pathological conditions cannot be described. Quite all the teeth of the sample show buccal and interproximal chips and multiple chips of degree 1, 2 and 3. Moreover, all the teeth show a severe occlusal wear (6, according to Smith '84).
Discussion:	

The interproximal grooves and *striae* showed by the young adult of T.20 seem to be due to the repeated insertion (bucco-lingual directed) of a fine tooth picks probably made of wood or bone. However, all the teeth of the sample are isolated and any pathological condition cannot be described, we could suppose that in this case a habitual tooth probing was probably done for relive the discomfort caused by the interproximal cervical caries. This repeated insertion results in abrasions in the form of grooves and/or *striae* on the interproximal area.
Moreover, also the presence of buccal chipping and also the presence of teeth with multiple chips could suggest that the individual of T.20 utilizzasse i denti nello svolgimento non solo di una vigorosa attività masticatoria (as suggested by the frequent interproximal chipping on the posterior teeth), ma anche di attività extra-masticatorie.

c) The individuals with non-masticatory dental alterations of the late-ancient roman necropolis of Casalecchio di Reno (Bologna) (5-6th c. AD)

T.8 male young adult-CSL"TA"	
Tooth with alteration	From upper right I2 to left I1.
Alteration	Intentional buccal wear.
Description of the alteration:	
Feature of the alteration	Upper central incisors: heavy wear on the buccal surface from the incisal edge to the CEJ. Only the left incisor shows the lesion medio-laterally divergent at about 45° with respect to the median sagittal plane. Under light microscope (20-40x): the buccal surface of the upper right I1 appears smooth with some striations bucco-lingually directed. The buccal surface of the upper left I1 shows the worn dentine and enamel rough but shiny. SEM analysis: • upper right I1: micro-furrows on the worn buccal surface; • upper left I1: rough buccal surface with some striated furrows.
Occlusal wear (according to Smith, '84)	Upper right I2: degree 5, Upper central incisors: degree 6.
Corresponding and/or similar alterations in opposite teeth	Not present.
General traits of the dentition:	
Teeth present	27/32
AMTL	0/28 (0,00%)
Dento-alveolar pathology and alterations	Penetrating caries affect few posterior teeth. Moderate/slight deposits of lingual *calculus* have been observed on the lower anterior teeth. The upper teeth show a moderate degree of wear (5, according to Smith, '84). The lower posterior teeth are more worn (4/5, according to Smith, '84) than the anterior ones (2/3, according to Smith, '84). Buccal, lingual and interproximal chippings (degree 1 and 2) affect only the anterior teeth.
Discussion:	

Macro and microscopic analyses reveal that the buccal wear of the upper anterior teeth may be related to mechanical (homogeneous surfaces and micro-furrows) and chemical factors (rough aspect of the surfaces). The lesions were probably due to repetitive movements made by the fingertips with some fine abrasive (eg. ash, sand, others fine substances, etc.) and/or acid substances. The inclination of the alteration in the left incisor could suggest that it was produced by the right forefinger. It is possible that the lesion on the right incisor (not divergent respect to the median sagittal plane) was also produced by the right forefinger. Therefore, we could suppose that the macro- and microscopic buccal wear features (enamel and dentine) of the anterior central incisors of the individual of T.8 may be the result of a mechanical action intentionally made on the anterior teeth surfaces probably in similar hygienic and cosmetic practices. We could also suppose that the anterior teeth surface were probably rubbed by the fingertips (forefingers?) with some fine abrasive substance like ash. Then, we could suppose that the lesions observed on the central incisors were intentionally made for voluntarily remove the anterior tooth surface in attempt to cleansing the buccal surfaces.

T. 17 male old adult-CSL"TA"	
Tooth with alteration	From upper right I2 to left I2 From lower right I2 to left I2 Lower right M1
Alteration	Unusual strong general wear (From upper right I2 to left I2) Unusual lingual wear (From lower right I2 to left I2) Buccal and Lingual notch (degree 3) (Lower right M1)
Description of the alteration:	
Feature of the alteration	Unusual strong general wear (From upper right I2 to left I2): the dental wear pattern slopes down both in the buccal and in the lingual directions. The incisors are short root stumps with the pulp canal closed by secondary dentine. Under light microscope (20x): smooth and polished occlusal surfaces without striations. Unusual lingual wear (From lower right I2 to left I2): the dental wear patterns of both the central incisors slope down in the lingual direction. The lingual surface is flattened and shows dentine exposition from the incisal edge until the CEJ. The lateral incisors show dentine exposition in a sub-oval flattened area localized at the lingual tubercle. Under light microscope (20x): lingual worn smooth surfaces with fine parallel striations directed from the incisal edge toward the CEJ. Buccal and Lingual notch (Lower right M1): observation under light microscope (20x) shows smooth and polished bottoms without striation. In both the notches at the maximum depth of the lesion the wear slopes until the CEJ.

Occlusal wear (according to Smith, ’84)	Upper incisors: degree 8, Lower lateral incisors: degree 5, Lower central incisors: degree 7, Lower right M1: degree 7.
Corresponding and/or similar alterations in opposite teeth	The Unusual strong general wear of the upper incisors correspond to the Unusual lingual wear of the lower ones.
General traits of the dentition:	
Teeth present	28/32
AMTL	0/31 (0,00%)
Dento-alveolar pathology and alterations	One penetrating and two non penetrating caries affect only the lower posterior teeth. A lingual abscess has been observed at the upper left M1 that shows a strong wear with the aperture of the pulp canal. The teeth show a strong wear (5-8, according to Smith, ’84). Interproximal chippings affect the lower anterior teeth and buccal, interproximal and lingual chippings (degree 1, 2 and 3) affect the posterior ones.
Discussion:	
We could suppose that the individual of T.17 used the upper and lower incisors to treat or to scrape something held with the hands. It is also possible that the object responsible of this wear was pull outside to the top and kept lingually tilted. All these movements could explain the wear plains orientation. The substance may have been a kind of foodstuffs but also of another material. In any case, we could suppose that this substance was fibrous (striations on the worn lingual surfaces of the lower incisors) but not too much abrasive because of the worn surfaces show an exposed smooth and polished dentine. The notches observed on the lower right M1 could be due to the habit of hold between the teeth an object not too much abrasive as suggested by the smooth and polished bottoms. The mechanical stress of these activities could by testified by the considerable development of both the masseter tuberosities. All these characters could suggest that the teeth were involved in strong masticatory and non masticatory activities (mostly done with the anterior and right ones) and also that the TMJ was strongly stressed.	

T.24 male young adult-CSL"TA"	
Tooth with alteration	Upper left I2 Upper left M3
Alteration	Buccal notch "B" (degree 2) (Upper left I2) Interproximal mesial groove (Upper left M3)
Description of the alteration:	
Feature of the alteration	Buccal notch "B" (Upper left I2): Observation under light microscope (20x) shows a smooth and polished bottom with some fine striations running toward the maximum depth of the lesion where a chipping of degree 3 has been observed. Interproximal mesial groove (Upper left M3): the groove occurs on the *cementum* near and parallel to the CEJ. The groove is broadest (~2,00mm) at its buccal end and tapering off lingually and is in front of a destroying carious lesion of the adjacent left M2. Under light microscope (20x): wide, rounded, polished groove with sharp margins and fine striations long its main axis.
Occlusal wear (according to Smith, '84)	Upper left I2: degree 5, Upper left M3: degree 3.
Corresponding and/or similar alterations in opposite teeth	Not present.
General traits of the dentition:	
Teeth present	26/32
AMTL	0/27 (0,00%)
Dento-alveolar pathology and alterations	A non penetrating caries affects the upper left M2. Considerable deposits of buccal and lingual *calculus* on the lower right teeth have been observed. The left side teeth show slight/medium deposits of buccal and lingual *calculus*. The left side teeth are slightly more worn (degree 4/5, according to Smith, '84) than the right ones (3/4, according to Smith, '84). Buccal chippings (degree1, 2 and 3) affect the upper teeth. The lower anterior teeth show lingual and interproximal chippings of degree 1 and 2.
Discussion:	
The notch could have been produced by a repeated action of a fibrous object (striations inside) but not too much abrasive (smooth and polished bottom) held or rubbed on the incisal edge and pulled toward the top. We could suppose that this activity mostly done on the anterior and left side teeth could be responsabile of the formation of moderate/cosiderable deposits of buccal and lingual calculus on the left upper and lower teeth. The interproximal groove showed by the male young adult of T.24 seem to be due to the repeated insertion (bucco-lingual directed) of tooth picks probably made of wood or bone. We could suppose that in this case a habitual tooth probing was done to relive the discomfort caused by the destroying caries of the upper left M2.	

T.15 female mature adult-CSL"TA"	
Tooth with alteration	Upper right P2 Upper left I1 and M2 Lower right I1
Alteration	Interproximal distal *striae* (Upper right P2) Buccal notch "B" (degree 2) (Upper left I1) Lingual notch (degree 3) (Upper left M2) Interproximal mesial groove (Lower right I1)
Description of the alteration:	
Feature of the alteration	Interproximal distal *striae* (Upper right P2): the striae occur on the *cementum* near and parallel to the CEJ and are localized on a non penetrating cervical caries. Under light microscope (20x): smooth flattened area with fine parallel striations. This lesion is partially damaged *post mortem* by some acids substances that have eroded the interproximal surface. Interproximal mesial groove (Lower right I1): the groove occurs on the *cementum* near and parallel to the CEJ on a penetrating carious lesion. Under light microscope (20x): rounded and polished groove with sharp margins and fine striations long its main axis. Buccal notch "B" (Upper left I1): Observation under light microscope (20x) shows a smooth and polished bottom with out striations. At the maximum depth of the lesion a chipping of degree 2 has been observed. Lingual notch (Upper left M2): under light microscope (20x): smooth and polished bottom with some fine striations running toward the maximum depth of the lesion.
Occlusal wear (according to Smith, '84)	Upper right P2: degree 6, Upper left I1 and M2: degree 5, Lower right I1: degree 4.
Corresponding and/or similar alterations in opposite teeth	The lower left M2 shows a wide cavity due to a destroying caries.
General traits of the dentition:	
Teeth present	22/32
AMTL	0/29 (0,00%)
Dento-alveolar pathology and alterations	Several destroying caries affect the posterior teeth. Buccal abscesses have been observed at: upper right P1 and at lower right P1 (affected by a destroying caries). Slight/moderate deposits of buccal and lingual *calculus* have been observed on the upper anterior teeth. The teeth show a moderate degree of wear (4/5, according to Smith, '84). Buccal and interproximal chippings of degree 1, 2 and 3 affect the anterior teeth.

Discussion:
We could suppose that the individual was used both anterior and posterior teeth to rub and/or treat some objects. As regards the objects, we could suppose that they may have been fibrous but not too much abrasive because the notch "B" does not show striations and even if the notch of the upper left M2 show striations, the bottom of both these lesions are smooth and polished. The stress played on the upper left I1 could have produced, as a secondary effect, a chipping at the maximum depth of the notch. The interproximal groove and *striae* seem to be due to the repeated insertion (bucco-lingual directed) of toothpicks probably made of wood or bone. We could suppose that in this case a habitual tooth probing was done to relive the discomfort caused by penetrating (Lower right I1) and non penetrating (Upper right P2) carious lesions.

T.20 female young adult-CSL"TA"	
Tooth with alteration	Upper right I2 Upper left I1 Lower left I1 and I2
Alteration	Buccal notch (degree 2) (Upper right I2) Buccal notch "B" (degree 2) (Upper left I1) Lingual notch (degree 1 and 2) (Lower left I1 and I2)
Description of the alteration:	
Feature of the alteration	Buccal notch (Upper right I2) and Buccal notch "B" (Upper left I1): Observation under light microscope (20x) shows a smooth and shiny bottom without striations. Lingual notch (Lower left I1 and I2): rough bottom due to post mortem alteration.
Occlusal wear (according to Smith, '84)	Upper right I2: degree 2, Upper left I1: degree 4, Lower left I1: degree 4, Lower left I2: degree 3.
Corresponding and/or similar alterations in opposite teeth	Not present.
General traits of the dentition:	
Teeth present	21/32
AMTL	3/17 (17,65%)
Dento-alveolar pathology and alterations	Alveolar atrophy due to ante mortem tooth loss has been observed at: lower right M1 and lower left P2 and M1. Penetrating and non penetrating caries affect the upper teeth. Buccal abscesses have been observed at: upper right P1 and lower right P2. Upper and lower central incisors show a moderate degree of wear (degree 4, according to Smith '84).

	The other teeth of the sample show only a slight degree of wear (1-3, according to Smith, '84). Moderate/considerable buccal and lingual deposits of *calculus* have been observed on all the lower anterior teeth and also on the right and left lower P1. Buccal and lingual chippings (degree 1, 2 and 3) affect the anterior teeth.

Discussion:

All these notches could be put in relation to a non masticatory use of the teeth such as the habit to rub and/or hold between the anterior upper and lower teeth a fine cylindrical object kept lingually tilted and pulled outside toward the top. This long time gesture could also have produced the notch on the upper right I2 and the chippings on the anterior teeth.
As regard the object, we could suppose that it may have been fibrous (like a vegetable fibre) but not too much abrasive as suggested by the smooth and polished bottoms without striations of the notches.
Moreover, we could suppose that the individual of T.20 used mostly the anterior teeth both in masticatory and non masticatory activities because of some of the posterior teeth have been lost *ante mortem*.
The slight rugosity showed by the right glenoid fossa could testify the mechanical stress done in these activities.

T.13 mature adult of unidentified sex-CSL"TA"	
Tooth with alteration	Upper right P1
Alteration	Interproximal distal groove
Description of the alteration:	
Feature of the alteration	The groove is localized on the CEJ, has sharp margins, is deep and broadest (0,90mm) at its buccal end and tapering off lingually. Observation under light microscope (20x): smooth and polished bottom without striations inside.
Occlusal wear (according to Smith, '84)	Degree 3.
Corresponding and/or similar alterations in opposite teeth	Not present.
General traits of the dentition:	
Teeth present	22/32
AMTL	3/26 (11,54%)
Dento-alveolar pathology and alterations	The upper right P1 does not show any carious lesion or abscessing. Also for the adjacent C any carious lesion has not been observed but abscessing is not recordable. Alveolar atrophy due to *ante mortem* tooth has been observed at: upper right M1 and P2, lower left M1. Penetrating and no penetrating caries affect anterior and posterior teeth. A destroying caries affects the lower right M1. A buccal abscess at the upper left I2 has been observed. The anterior teeth show a moderate degree of wear (5, according to Smith, '84). Few buccal chippings of degree 1 and 2 affect the central upper and lower incisors.
Discussion:	
The interproximal groove showed by the mature adult of T.13 seems to be due to the repeated insertion (bucco-lingual directed) of toothpicks probably made of a not fibrous material (bone?) because the bottom does not show striations. We could suppose that in this case a habitual tooth probing was done to relive the discomfort caused by some pathological conditions probably responsible of the loss of the adjacent P2 and of the right M1.	

T.18 unidentified sex and age adult-CSL"TA"	
Tooth with alteration	Lower right I2, I1 and lower left C
Alteration	Unusual strong lingual wear
Description of the alteration:	
Feature of the alteration	The dental wear pattern slopes down in the lingual direction with exposition of dentine. Only for the lower right I2 the exposed dentine is continuous from the incisal edge until the lingual CEJ. Under light microscope (20x): uneven but smooth and polished worn exposed dentine without any striations.
Occlusal wear (according to Smith, '84)	Lower right I2 and I1: degree 6, Lower left C: degree 5.
Corresponding and/or similar alterations in opposite teeth	Not recordable because the upper teeth (except for the upper right M2) and the maxilla are not preserved.
General traits of the dentition:	
Teeth present	7/32
AMTL	0/0
Dento-alveolar pathology and alterations	The dentition of this sample is not well preserved: the teeth are isolated. Penetrating caries affect the teeth. The lower teeth show a moderate degree of wear (5, according to Smith, '84). The alveolar bones are not preserved and so abscessing and other pathological conditions cannot be described.
Discussion:	
We could suppose that the individual of T.18 used the lower anterior teeth to hold and/or rub some objects kept lingually tilted on the lower teeth. We could suppose that this substance was not too much abrasive because of the worn surfaces show an exposed smooth and polished dentine without striations.	

T.28 unidentified sex mature adult-CSL"TA"	
Tooth with alteration	From upper right P2 to left P2.
Alteration	Interproximal mesial and distal groves (From upper right P2 to left P2), Lingual groove (upper canines and incisors), Intentional buccal wear (upper incisors), Unusual slight lingual wear (upper central incisors and left I2).
Description of the alteration:	
Feature of the alteration	The upper anterior teeth and upper premolars show interproximal furrowed grooves (Width: 1,5-2,5mm; Length: 4,0-5,0mm) involving the adjacent teeth (the second premolars present grooves only on the mesial side). Almost all grooves are tilted from top to bottom at about 45° with respect to the buccal surface. The upper part of the buccal surface of the incisors shows an area with worn enamel and a transversal buccal groove corresponding to the interproximal ones. Lingually, below the CEJ, a groove (arrows) runs from the distal to the mesial interproximal grooves. Under light microscope (20-50X): • Buccal surfaces (upper incisors): smooth but the upper worn part and the enamel inside the transversal groove appears dull (opaca), • Interproximal and lingual grooves: rounded, deep, U-shaped groves with parallel striations long their main axis. SEM analysis of the upper right I1: • Buccal surface: above and below the buccal groove there are many diagonal furrows (arrows). The upper furrows (length 1200-1300µm) are tilted disto-mesially from top to bottom and the inferior ones (length 580µm) are tilted mirror-wise. These furrows show a flat bottom and do not cross over the buccal groove. The bottom of the buccal groove is smooth but has numerous irregular areas with a honeycomb pattern of the enamel prisms. • The enamel prismatic feature is also visible on the bottom of the interproximal, buccal and lingual grooves.
Occlusal wear (according to Smith, '84)	From Upper right P2 to right I1: degree 2, From upper left I1 to left P2: degree 3.
Corresponding and/or similar alterations in opposite teeth	The interproximal grooves correspond for dimension, and localization.

General traits of the dentition:	
Teeth present	30/32
AMTL	0/28 (0,00%)
Dento-alveolar pathology and alterations	Penetrating and non penetrating caries affect the upper teeth from the right P2 to the right I1. These caries are localized above the interproximal grooves. Slight deposits of lingual *calculus* on the upper central incisors and on the lower teeth have been observed. the teeth show a slight degree of wear (1-3, according to Smith, '84). Only few buccal, lingual and interproximal chippings (degree 1,2 and 3) affect the teeth.

Discussion:

The grooves could be due to the action of some thin and cylindrical objects permanently fixed and bounded around the teeth. Unfortunately, the object probably bounded around the teeth has not been found. However, we could suppose that it could be fine and cylindrical and probably made, as indicated by Celsum (25 BC-50 AD) in his book "*De Medicina*", by silk or gold.
The furrows on the buccal surface of the upper right I1 could suggest the probable use of a sharp object in setting these "dental ligatures".
It is also probable that some acid substances that exposed the honeycomb pattern of the enamel prisms made the attachment of these wires.
Therefore, we could suppose that all these lesions may be a probable evidence of dental fixtures for retaining unstable teeth.

T.30 unidentified sex young adult-CSL"TA"	
Tooth with alteration	Upper right I2 Upper left I2
Alteration	Buccal notches "B" (degree 2)
Description of the alteration:	
Feature of the alteration	Under light microscope (20x): smooth and polished bottoms without striations. For both the notches, at the maximum depth of the lesions chippings of the enamel have been observed.
Occlusal wear (according to Smith, '84)	Upper right I2 and left I2: degree 4.
Corresponding and/or similar alterations in opposite teeth	Not recordable because the lower teeth and the mandible are not preserved.
General traits of the dentition:	
Teeth present	14/32
AMTL	0/16 (0,00%)
Dento-alveolar pathology and alterations	Caries absent. Slight deposits of lingual *calculus* on the upper left posterior teeth have been observed. The teeth show a moderate degree of wear (4/5, according to Smith, '84). A severe alveolar margins retraction has been observed. The anterior and posterior left teeth show buccal chippings of degree 1, 2 and 3.
Discussion:	
We could suppose that the anterior teeth of the young adult of T.30 were subjected both to masticatory and non masticatory stresses (as suggested also by the buccal chippings showed by the anterior teeth). These alterations could be due to the habit to hold and/or rub a rigid or flexible object between the teeth of the two arcades. The stress played on both the teeth could have produced, as a secondary effect, the chippings at the maximum depth of the notch.	

B) The necropolises from Marche:

a) The individuals with non-masticatory dental alterations of the necropolis of Novilara (Ascoli Piceno, 9th-6th c. BC)

T. 3 male old adult	
Tooth with alteration	Lower right M1
Alteration	Lingual notch (degree 3)
Description of the alteration:	
Feature of the alteration	Under light microscope (20x): smooth and polished bottom with fine parallel striations confluent towards the maximum depth of the notch.
Occlusal wear (according to Smith, '84)	Degree 5.
Corresponding and/or similar alterations in opposite teeth	Not recordable because of the maxilla and the upper teeth are absent.
General traits of the alteration:	
Teeth present	13/32
AMTL	0/16 (0,00%)
Dento-alveolar pathology and alterations	The individual does not show any carious lesions. Quite all the teeth show a high degree of wear (5-8) and the right posterior ones are more worn (5-8, according to Smith,'84) than the left ones (4-8, according to Smith,'84). Medium/considerable deposits of lingual *calculus* and moderate alveolar margins retraction have been observed on the lower teeth. Buccal, lingual and interproximal chippings of degree 1, 2 and 3 have been observed on the posterior teeth. The anterior teeth show only buccal and interproximal chippings of degree 1 and 2.
Discussion:	
However the maxillary bone and the upper teeth are not preserved, these characters could suggest a non-masticatory use of the teeth (mostly done on the right side teeth). We could suppose that the individual was used to rub on the tooth a fibrous but not too much abrasive object that has produced the fine striations inside the notch. The mechanical stress done in these activities could be testified by the moderate development of the right masseter tuberosity. These features, and also a slight porosity showed by both mandibular condyles, could suggest that the TMJ was strongly stressed.	

T. 36 male old adult	
Tooth with alteration	Upper right M2
Alteration	Lingual notch (degree 3)
Description of the alteration:	
Feature of the alteration	Under light microscope (15x): smooth and polished bottom with fine striations confluent towards the maximum depth of the notch.
Occlusal wear (according to Smith, '84)	Degree 5.
Corresponding and/or similar alterations in opposite teeth	Not recordable because of the lower corresponding tooth is lost *ante mortem*.
Tooth with alteration	Lower right M1
Alteration	Interproximal distal groove
Description of the alteration:	
Feature of the alteration	The groove crosses the CEJ with an inclination of around 30° with respect to the occlusal plain and slopes down buccally. The groove (length: 4,80mm; width: 6,30mm) is wide, smooth and polished without any striations (light microscope, 20x). Moreover, the tooth shows also buccal and interproximal chippings (degree 3) and buccal chipping (degree 1).
Occlusal wear (according to Smith, '84)	Degree 6.
Corresponding and/or similar alterations in opposite teeth	Not recordable because of the adjacent tooth is lost *ante mortem*.
General traits of the alteration:	
Teeth present	9/32
AMTL	15/26 (57,69%)
Dento-alveolar pathology and alterations	Only the lower left M2 shows a penetrating occlusal caries. Alveolar atrophy due to *ante mortem* tooth loss has been observed at: from upper right M1 to left P2; lower right M2, P2 and lower left P2 and M1. All the teeth show a high degree of wear (6-7, according to Smith, '84). Moderate deposits of buccal *calculus* on the upper right M2 and the lower right M1 have been observed. The lower posterior teeth show buccal and interproximal chippings of degree 3.
Discussion:	
We could suppose that the grooves could derive from the repetitive back-and-forth movement of a foreign object for oral hygienic purposes or for some other unknown reasons. As regards the object, because the groove shows a smooth bottom, it is probable that the inserted object was not too much abrasive (like a bone toothpick?).	

T. 91 male mature adult	
Tooth with alteration	Upper right incisors and left I2
Alteration	LSAMAT Lingual groove on upper right I1
Description of the alteration:	
Feature of the alteration	Flattened lingual surface, between the CEJ and the incisal edge, with a little area with exposed dentin. Under light microscope (20x): smooth and polished surfaces without striations. The upper right I1 shows also a fine and slight lingual groove parallel to the CEJ. The groove surrounds the lingual tubercle in a distal-mesial direction. Under light microscope (20x): bottom is irregular and rough.
Occlusal wear (according to Smith, '84)	Upper right I1 and I2: degree 5. Upper left I2: degree 5.
Corresponding and/or similar alterations in opposite teeth	Not present.
General traits of the alteration:	
Teeth present	22/32
AMTL	0/25 (0,00%)
Dento-alveolar pathology and alterations	The individual does not show any carious lesions. All the teeth are chipped. In particular, the upper anterior teeth show buccal and lingual of degree 1 and 2. Slight deposits of buccal and lingual *calculus* have been observed on the lower teeth. All the teeth show moderate wear (3-5, according to Smith, '84) and moderate alveolar margins retraction.
Discussion:	
We could suppose a non-masticatory use of the anterior teeth and also that this individual mostly used his anterior teeth and the right side teeth of both the arcades. The wear on the lingual surface seems to be similar to the one described as LSAMAT (Lingual Surface Attrition of the Maxillary Anterior Teeth). It is possible to hypothesize a particular habit to chew some substances not related to food or to masticatory activity. The lingual grooves observed on upper incisors were probably due to chemical erosion (grooves rough and uneven) caused by the contact of some acidic substances on the lingual surface during masticatory and/or non-masticatory tasks activities.	

T. 93 male old adult	
Tooth with alteration	Upper right C
Alteration	Lingual notch (degree 2).
Description of the alteration:	
Feature of the alteration	Under light microscope (15x): smooth and polished bottom with fine striations confluent towards the maximum depth of the notch.
Occlusal wear (according to Smith, '84)	Degree 6.
Corresponding and/or similar alterations in opposite teeth	Not present.
General traits of the alteration:	
Teeth present	26/32
AMTL	0/32 (0,00%)
Dento-alveolar pathology and alterations	The individual does not show carious lesions. Slight/moderate deposits of buccal and lingual *calculus* on the upper teeth and of lingual *calculus* on the lower teeth have been observed. The lower anterior teeth show medium/considerable deposits of buccal and lingual *calculus*. Moderate alveolar margins retraction has been observed on the upper and lower teeth. The teeth show moderate wear (3-5, according to Smith, '84). All the teeth show buccal, lingual and interproximal chippings and multiple chippings of degree 1, 2 and 3.
Discussion:	
We could suppose that the individual was used to rub on the tooth a fibrous but not too much abrasive object that has produced the fine striations inside the notch in a non-masticatory activity.	

T. 109 male young adult	
Tooth with alteration	Upper central incisors
Alteration	Intentional wear of the buccal surface Lingual groove
Description of the alteration:	
Feature of the alteration	Both the central upper incisors show the buccal surface worn and quite concave. The buccal surface of the upper left I1 is partially damaged *post mortem*. However, in the central part of both these worn surfaces has been observed. Under light microscope (20x): uneven and rough surfaces without any striations. SEM analysis: the buccal surface of the upper right I1 appears uneven and without striations. Around the sub-circular area with exposed dentine patches of "honeycomb" pattern of enamel prisms have been recognised. Both the central upper incisors show a fine and slight groove parallel to the CEJ. The groove surrounds the lingual tubercle in a distal-mesial direction. Under light microscope (20x): irregular and rough bottom.
Occlusal wear (according to Smith, '84)	Both the central incisors: degree 4.
Corresponding and/or similar alterations in opposite teeth	Not present.
General traits of the alteration:	
Teeth present	30/32
AMTL	0/32 (0,00%)
Dento-alveolar pathology and alterations	Only the lower M3 and M2 show caries (penetrating). General slight/moderate degree of wear (2-4, according to Smith, '84). Only a slight alveolar margins retraction has been observed on the upper and lower teeth. Buccal and interproximal chippings of degree 1, 2 and 3 have been observed on the anterior teeth.
Discussion:	
We could suppose an intentional alteration of the buccal surfaces of both the upper central incisors. It is possible that this wear pattern is the result of an intentional teeth mutilation like incrustation of an unknown material. The "honeycomb" pattern observed around the central area with exposed dentin and the absence of striations, could suggest that some acid substances etched the buccal enamel in attempt to stick on something probably for aesthetic reasons. The lingual grooves observed on upper incisors were probably due to chemical erosion (grooves rough and uneven) caused by the contact of some acidic substances on the lingual surface during masticatory and/or non-masticatory tasks activities.	

T. 134 male ? adult	
Tooth with alteration	Lower right M1 Lower left M1 and M2
Alteration	Lower right M1: buccal notch (degree 3) and lingual notch (degree 3)) Lower left M1: transversal notch (degree 3) Lower left M2: buccal notch (degree 3) Chippings of degree 1 have been observed associated to the notches.
Description of the alteration:	
Feature of the alteration	Lower right M1: the buccal and lingual notches show a smooth and polished bottom. Only for the lingual notch fine parallel striations confluent towards the maximum depth of the notch have been observed (light microscope, 20x). Lower left M1: observation under light microscope (20x) reveals a smooth and polished bottom with fine parallel striations long all the main axis of the lesion. Lower left M2:
Occlusal wear (according to Smith, '84)	Lower right M1: degree 6 Lower left M1 and M2: degree 6
Corresponding and/or similar alterations in opposite teeth	Not recordable because the maxilla and the upper teeth are not preserved.
General traits of the alteration:	
Teeth present	9/32
AMTL	0/14 (0,00%)
Dento-alveolar pathology and alterations	Only the lower left M2 shows a non-penetrating caries and a buccal abscess probably due the caries. The teeth show slight/medium deposits of buccal and lingual *calculus* and a moderate/severe wear (3-6, according to Smith, '84) and moderate/severe alveolar margins retraction. The teeth show buccal, lingual and interproximal chippings of degree 1 and 2.
Discussion:	
All these characters could suggest a non-masticatory use of the teeth. We could suppose that the individual was used to rub on the tooth fibrous but not too much abrasive objects that have produced the fine striations inside the notch. The stress played on the tooth could have produced, as a secondary effect, the chipping associated to the notches.	

T. 2 female young adult	
Tooth with alteration	Upper central incisors
Alteration	Buccal notch (degree 1)
Description of the alteration:	
Feature of the alteration	Both the notches are slight concave depressions of the enamel. Under light microscope (20x): smooth and polished bottoms with fine parallel striations perpendicular with respect to the incisal edge.
Occlusal wear (according to Smith, '84)	Both the central incisors: degree 5.
Corresponding and/or similar alterations in opposite teeth	Not recordable because the lower anterior teeth are lost *post mortem* or not preserved.
Tooth with alteration	Lower right M2 and M3
Alteration	Lower right M2: buccal notch (degree 3) Lower right M3: lingual notch (degree 3)
Description of the alteration:	
Feature of the alteration	Under light microscope (20x): both the notches show a smooth and polished bottom with fine striations bucco-lingually directed.
Occlusal wear (according to Smith, '84)	Both the teeth: degree 4.
Corresponding and/or similar alterations in opposite teeth	Not present.
General traits of the alteration:	
Teeth present	25/32
AMTL	1/30 (3,33%)
Dento-alveolar pathology and alterations	Only the lower right P2 shows a penetrating caries. Slight deposits of buccal and lingual *calculus* on the lower right teeth have been observed. The upper anterior teeth are more worn (4-5) than the posterior ones (2-3). The lower posterior teeth show lingual and interproximal chippings and multiple chippings of degree 1, 2 and 3.
Discussion:	
All these lesions could suggest a non-masticatory use of the teeth. We could suppose that the individual was used to rub on the tooth fibrous but not too much abrasive objects that have produced the fine striations inside the notches. The mechanical stress done in this activity could probably be testified by the moderate development of the right masseter tuberosity.	

T. 20 female ? adult	
Tooth with alteration	Upper left P1 and M1 Lower right and left M1
Alteration	Upper left P1 and M1: buccal notch (degree 3) Lower right M1: lingual notch (degree 3) Lower left M1: two lingual notches (degree 3)
Description of the alteration:	
Feature of the alteration	Upper left P1 and M1: analysis under light microscope (20x) of the buccal notches shows smooth and polished bottoms with fine parallel short striations bucco-lingually directed. Lower right M1: analysis under light microscope (20x) of the lingual notch shows a smooth and polished bottom with fine parallel striations confluent towards the maximum depth of the lesion. Lower left M1: analysis under light microscope (20x) of both the lingual notches shows a smooth and polished bottom without any striations.
Occlusal wear (according to Smith, '84)	Upper left P1 and M1: degree 6. Lower right M1: degree 6. Lower left M1: 7.
Corresponding and/or similar alterations in opposite teeth	The buccal notch of the upper left M1 is corresponding to the lingual one of the lower left M1.
General traits of the alteration:	
Teeth present	22/32
AMTL	1/31 (3,23%)
Dento-alveolar pathology and alterations	The upper left I1 is lost *ante mortem*. Only the upper right M3 and the left M1 show penetrating caries. The right teeth are more worn (5-7) than the left ones (3-6). Moderate alveolar margins retraction has been observed. Buccal, lingual and interproximal chippings of degree 1 and 2 have been observed on the posterior teeth.
Discussion:	
These alterations could be put in relations to a non-masticatory use of the teeth mostly carried out on the left side (as suggested by the heavier degree of buccal and lingual chippings of the left teeth than the one showed by the right teeth and by the higher degree of wear of the left teeth than the left ones). These non-masticatory activities could have produced repeated punctual trauma responsible of the chippings. They could have also produced the overlay of long-time stresses responsible of the notches. The notches, in particular, could be put in relation to a repeated action of objects held between the teeth of the two arcades. We could suppose that the individual of T.20 was used to rub on the tooth fibrous but not too much abrasive objects that have produced the fine striations inside the notches.	

T. 22 female young adult	
Tooth with alteration	From the upper right P1 to the left C.
Alteration	Unusual general dental wear.
Description of the alteration:	
Feature of the alteration	The dental wear patterns slope down both in the buccal and in the lingual direction. The teeth are short root stumps, with the occlusal surface smooth and polished. The pulp canal is closed by secondary dentin. Under light microscopy (40x): smooth and polished occlusal surface.
Occlusal wear (according to Smith, '84)	Upper right P1: degree 7 Upper right C and I2: degree 8 Upper left I2: degree 8 Upper left C: degree 7
Corresponding and/or similar alterations in opposite teeth	Not present but most of the lower anterior teeth are lost *post mortem*.
General traits of the alteration:	
Teeth present	18/32
AMTL	5/28 (17,86%)
Dento-alveolar pathology and alterations	The upper left I1 and the lower right M1 and lower left P2, M1 and M2 are lost *ante mortem*. Some of the upper posterior teeth show non-penetrating caries. Buccal abscesses, probably due to carious lesions, on the upper right M2 and M1 and left P1 have been observed. General high degree of wear (5-8, according to Smith, '84). Buccal, lingual and interproximal chippings of degree 1 and 2 have been observed on the posterior teeth.
Discussion:	
The unusual occlusal wear of the upper anterior teeth could be due to a masticatory activity probably because some of lower molars have been lost *ante mortem*. However, the dental wear pattern is anomalous both for degree and shape with respect to the other teeth. It is possible that the upper anterior teeth were used in an extra-masticatory such as the habit to treat something held with the hands. The substance may have been a kind of foodstuffs but also of another material. In any case, we could suppose that this substance was not too much abrasive because of the worn surfaces show an exposed smooth and polished dentin. The mechanical stress done in this activity could probably be testified by a slight porosity showed by the right glenoid fossa and by the moderate development of the lateral external tubercle of the right mandibular condyle.	

T. 48 female young adult	
Tooth with alteration	Upper right I2
Alteration	Lingual notch (degree 2)
Description of the alteration:	
Feature of the alteration	Under light microscope (20x): smooth and polished bottom with parallel striations bucco-lingually directed.
Occlusal wear (according to Smith, '84)	Degree 7.
Corresponding and/or similar alterations in opposite teeth	Not present.
General traits of the alteration:	
Teeth present	22/32
AMTL	1/21 (4,76%)
Dento-alveolar pathology and alterations	The lower left M1 is lost *ante mortem*. The upper left M1 and M2 show carious lesions. In the case of the upper left M1 a lingual abscess has been observed. General moderate/severe degree of wear (5-7, according to Smith, '84). The anterior teeth buccal and interproximal chippings of degree 1.
Discussion:	
The presence of the notch could suggest that the individual was used to rub on the tooth a fibrous but not too much abrasive object that has produced the short fine striations inside the notch in a non-masticatory use of the teeth.	

T. 99 female ? adult	
Tooth with alteration	Upper right M1
Alteration	Interproximal distal groove
Description of the alteration:	
Feature of the alteration	The interproximal distal surface shows a wide V-shaped interproximal groove with flattened walls. The groove occurs on all the distal CEJ (with an inclination of 30° with respect to the occlusal plain). It goes from the dental neck to the root road fork and has sharp margins. Under light microscope (20x): smooth and polished bottom with fine parallel striations bucco-lingually directed.
Occlusal wear (according to Smith, '84)	Degree 4.
Corresponding and/or similar alterations in opposite teeth	Not recordable because of the upper right M1 is isolated.
General traits of the alteration:	
Teeth present	9/32
AMTL	6/13 (46,15%)
Dento-alveolar pathology and alterations	The upper teeth are isolated. Alveolar atrophy due to *ante mortem* tooth loss has been observed at: lower right M2, M1, central incisors, left P1 and M1. Non penetrating caries have been observed only on three teeth. General moderate/severe degree of wear (5-7, according to Smith, '84).
Discussion:	
The interproximal groove seems to be due to the repeated insertion of a toothpick (bucco-lingual directed). The particular shape and dimensions of this groove (very wide, V-shaped, with fine striations parallel to the V corner) could suggest that a quadrangular object was rubbed for a long time on the interproximal surface. As regards of the object, we could suppose it was probably wood made (?) and not a too much abrasive because the groove is very smooth and polished.	

T. 106 female mature adult	
Tooth with alteration	Lower left M1 and M3
Alteration	Lingual notch (degree 3) for both these teeth. Lower left M3: a wide chipping of degree 1 at the maximum depth of the notch has been observed.
Description of the alteration:	
Feature of the alteration	Under light microscope (20x): smooth and polished bottom with fine parallel striations long the main axis of the lesions.
Occlusal wear (according to Smith, '84)	Lower left M1: degree 7 Lower left M3: degree 5
Corresponding and/or similar alterations in opposite teeth	Not present.
General traits of the alteration:	
Teeth present	12/32
AMTL	1/11 (9,09%)
Dento-alveolar pathology and alterations	The upper left P1 is lost *ante mortem*. Only the lower right M2 shows a penetrating caries. All the teeth show a high degree of wear (5-7, according to smith, '84). Quite all the teeth show buccal, lingual and interproximal chippings and multiple chippings of degree 1 and 2.
Discussion:	
We could suppose that the individual was used to rub on the tooth fibrous but not too much abrasive objects that have produced the fine striations inside the notch. The stress played on the tooth could have produced, as a secondary effect, the chipping associated to the notch of the lower left M3.	

T. 118 female young adult	
Tooth with alteration	From upper right P1 to right I1 From lower right P1 to right I2
Alteration	Unusual strong lingual and buccal wear.
Description of the alteration:	
Feature of the alteration	From upper right P1 to right I1: the dental wear pattern slopes lingually. The lingual surfaces appear flattened with dentin exposition from the incisal edge until the dental tubercle. Under light microscope (30-40x): smooth and polished lingual surfaces with some parallel striations bucco-lingually directed. From lower right P1 to right I2: the dental wear pattern slopes down buccally. The buccal surfaces show a slight enamel wear in the upper part of the crown and are quite flattened. Dentine exposition only for the buccal worn surface of the lower P1 has been observed. Under light microscope (30-40x): smooth but dull worn enamel without any striations. Lower right I1 and I2: the dental wear pattern slopes also lingually with dentin exposition further than the CEJ. Under light microscope (20x): smooth and polished surfaces without striations.
Occlusal wear (according to Smith, '84)	Upper right P1, C, I2: degree 5 Upper right I1: degree 4 Lower right P1, C: degree 6 Lower right I2: degree 8
Corresponding and/or similar alterations in opposite teeth	These dental wear patterns are corresponding each other.
Tooth with alteration	Upper right and left M1
Alteration	Lingual notches (degree 3) for both the teeth.
Description of the alteration:	
Feature of the alteration	Under light microscope (20x): smooth but rough bottom because of taphonomic factors. Moreover, the notches are partially damaged by *post mortem* fractures.
Occlusal wear (according to Smith, '84)	Upper right and left M1: degree 6
Corresponding and/or similar alterations in opposite teeth	The corresponding teeth show lingual and interproximal chippings (degree 1, 2 and 3).
Tooth with alteration	Upper right I2
Alteration	Buccal notch (degree 2) associated with a buccal chipping of degree 1 at the maximum depth of the lesion.
Description of the alteration:	
Feature of the alteration	Under light microscope (20x): smooth and polished bottom without striations.

Occlusal wear (according to Smith, ’84)	Degree 5
Corresponding and/or similar alterations in opposite teeth	Not present.
General traits of the alteration:	
Teeth present	26/32
AMTL	1/30 (3,33%)
Dento-alveolar pathology and alterations	The upper left M2 is lost *ante mortem*. Only the upper right M3 shows a penetrating caries. Moderate alveolar margins retraction on upper and lower teeth has been observed. The anterior teeth show buccal, lingual and interproximal chippings of degree 1 and the posterior ones show buccal, lingual and interproximal chippings of degree 2 and 3.
Discussion:	
All these characters could suggest that the individual of T.118 used the teeth in strong masticatory and non-masticatory activities and also that these activities were mostly done with the right anterior teeth. We could suppose that these teeth were involved in repeated pulling-tearing movements in buccal-lingual direction. It is also possible that the object responsible of this wear was pulled on the outside to below. All these movements could explain the wear plains orientation. The substance may have been a kind of foodstuffs but also of another material. In any case, we could suppose that this substance was not too much abrasive because of the worn surfaces are smooth. Moreover, the presence of the notches could suggest the habit to hold and/or rub an object between these teeth. The stress that played on the upper right I2 could have produced a chipping associated to the notch.	

T. 126 female young adult	
Tooth with alteration	Lower right I1
Alteration	Lingual notch (degree 1) and a chipping (degree 1) associated to the notch.
Description of the alteration:	
Feature of the alteration	Under light microscope (20x): small notch with a slightly rough bottom probably due to taphonomic *post mortem* factors.
Occlusal wear (according to Smith, '84)	Degree 5.
Corresponding and/or similar alterations in opposite teeth	Not recordable because the corresponding upper teeth are not preserved.
General traits of the alteration:	
Teeth present	14/32
AMTL	0/17 (0,00%)
Dento-alveolar pathology and alterations	Penetrating and non-penetrating caries have been observed on five (5/14) teeth. Moderate general wear (4-5, according to Smith, '84). The anterior lower teeth show buccal, lingual and interproximal chippings and multiple chippings (degree 1).
Discussion:	
The notch could be due to a cylindrical fine rigid or flexible object probable rubbed over the tooth. The stress that played on the tooth could have produced, as a secondary effect, the chipping associated to the notch.	

T. 31 young adult of unidentified sex	
Tooth with alteration	Upper left M1
Alteration	Interproximal distal groove.
Description of the alteration:	
Feature of the alteration	The groove occurs on the enamel just above and parallel to the CEJ. The groove (6,98mm length and 1,07mm width) is rounded, polished with fine striations long its main axis (light microscope, 30x). Unfortunately, the lingual end of the groove is damaged *post mortem* (fractured bottom and margins).
Occlusal wear (according to Smith, '84)	Degree 3.
Corresponding and/or similar alterations in opposite teeth	Not recordable because the adjacent tooth is not preserved.
General traits of the alteration:	
Teeth present	7/32
AMTL	0/5 (0,00%)
Dento-alveolar pathology and alterations	The lower teeth are isolated. Only the upper right M1 shows a non-penetrating caries. Slight deposits of buccal *calculus* have been observed on the upper teeth. The lower left incisors show medium buccal deposits and slight lingual deposits of *calculus*. All the teeth show a slight degree of wear (2-3, according to Smith,'84).
Discussion:	
We could suppose that the groove could derive from the repetitive back-and-forth movement of a foreign object for oral hygienic purposes. The buccal end has sharp margins and so it is also probable that the groove has a vestibular insertion (this operation is easier than a lingual insertion).	

T. 57 (2) adult of unidentified sex	
Tooth with alteration	Upper left I1
Alteration	Slight unusual buccal wear.
Description of the alteration:	
Feature of the alteration	The wear pattern slopes buccally from the incisal edge in a flattened "half-moon" shaped area. Under light microscope (20x): the worn area is smooth and polished with fine parallel striations perpendicular with respect to the incisal edge. Some fine parallel striations perpendicular to the incisal edge have been also observed on the buccal surface of the upper left I2.
Occlusal wear (according to Smith, '84)	Degree 5.
Corresponding and/or similar alterations in opposite teeth	Not recordable because of the mandibular and the lower teeth are not preserved.
General traits of the alteration:	
Teeth present	9/32
AMTL	0/10 (0,00%)
Dento-alveolar pathology and alterations	The mandible and the lower teeth are not preserved. Non-penetrating caries have been observed on the upper right P2 and left P1. Slight deposits of *buccal* calculus have been observed on the upper teeth. Severe alveolar margins retraction and a severe porosity of the alveolar crests have been observed on the upper teeth. All the teeth show buccal and interproximal chippings of degree 1 and 2.
Discussion:	
We could suppose that these teeth were involved in some non-masticatory activities such as repeated pulling-tearing movements in buccal-lingual direction. It is possible that the object responsible of this wear was pulled on the outside towards the top. All these movements could explain the wear plain orientation. The substance may have been a kind of foodstuffs but also of another material. In any case, we could suppose that this substance was fibrous (presence of striations on the buccal surface) but not too much abrasive because of the worn surfaces are smooth.	

T. 1x individual of unidentified sex and age	
Tooth with alteration	Upper left I1
Alteration	Slight unusual buccal wear.
Description of the alteration:	
Feature of the alteration	The wear pattern slopes buccally from the incisal edge in a flattened "half-moon" shaped area. Under light microscope (20x): the worn area is smooth and polished with fine parallel striations perpendicular with respect to the incisal edge. Some fine parallel striations perpendicular to the incisal edge have been also observed on the buccal surface of the upper left I2.
Occlusal wear (according to Smith, '84)	Degree 5.
Corresponding and/or similar alterations in opposite teeth	Not recordable because the lower teeth (except for the left M2) are not preserved.
General traits of the alteration:	
Teeth present	12/32
AMTL	0/15 (0,00%)
Dento-alveolar pathology and alterations	Only the lower left M2 show a penetrating caries. The teeth show a moderate/strong wear (4-7). The teeth show buccal and interproximal chippings of degree 1 and 2.
Discussion:	
We could suppose that these teeth were involved in some non-masticatory activities such as repeated pulling-tearing movements in buccal-lingual direction. It is possible that the object responsible of this wear was pulled on the outside towards the top. All these movements could explain the wear plain orientation. The substance may have been a kind of foodstuffs but also of another material. In any case, we could suppose that this substance was fibrous (presence of striations on the buccal surface) but not too much abrasive because of the worn surfaces are smooth. This alteration is very similar to the one observed in the individual of T57 (2).	

T. 102 (B) individual of unidentified sex and age	
Tooth with alteration	Upper left M1
Alteration	Lingual notch (degree 2)
Description of the alteration:	
Feature of the alteration	Rough surface due to *post mortem* alterations.
Occlusal wear (according to Smith, '84)	Degree 7.
Corresponding and/or similar alterations in opposite teeth	Not recordable because the mandible and the lower teeth are not preserved.
General traits of the alteration:	
Teeth present	4/32
AMTL	0/6 (0,00%)
Dento-alveolar pathology and alterations	A non-penetrating caries on the upper left P2 and a penetrating one on the upper left M3 have been observed. Slight deposits of buccal *calculus* on the upper left P2 and M1 have been observed. All the teeth show a high degree of wear (6-7, according to Smith, '84).
Discussion:	
Unfortunately, the lesion described above is damaged *post mortem*. However, it could be the result of a repeated action of an unknown object rubbed on the molar.	

b) The individuals with non-masticatory dental alterations of the Southern necropolis of Suasa (Ancona, 1st-2nd c. AD)

T. 1 male mature adult	
Tooth with alteration	Lower right and left M1 Lower left M2
Alteration	Lingual notch (degree 3) (for the three teeth).
Description of the alteration:	
Feature of the alteration	Under light microscope (20x): smooth and polished bottoms with fine parallel striations bucco-lingually directed. Slight chippings at the maximum depth of the notch of the lower left M2 have been observed.
Occlusal wear (according to Smith, '84)	Lower right M1: 4 Lower left M1: 5 Lower left M2: 4
Corresponding and/or similar alterations in opposite teeth	A buccal chipping (degree 3) on the upper right M1. The upper left posterior teeth are not recordable because they and the left posterior maxilla are not preserved.
General traits of the alteration:	
Teeth present	19/32
AMTL	0/27 (0,00%)
Dento-alveolar pathology and alterations	A penetrating and a non-penetrating caries on the upper right M3 and M2 have been observed. Slight buccal and lingual deposits of *calculus* on the upper and lower teeth have been observed. The lower left molars are slightly more worn (4-5, according to Smith, '84) than the right ones (3-4, according to Smith, '84). The upper and lower teeth show a severe alveolar margins retraction. The upper left teeth show buccal, lingual and interproximal chippings of degree 1, 2 and 3. The lower left and right posterior teeth show lingual and interproximal chippings of degree 1 and 2. Moreover, a buccal chipping of degree 3 on the lower left M1 has been observed.
Discussion:	

All these characters could suggest that the individual was used to rub on the teeth fibrous but not too much abrasive objects that have produced the fine striations inside the notches. The stress played on the lower left M2 could have produced, as a secondary effect, the chipping associated to the notch.
A sub-oval porotic area on the articular eminence of the right glenoid cavity and the marginal lipping observed on the right anterior zygomatic tuberosity could testify that the TMJ were strongly stressed in this activity. Moreover, a considerable development of the entesis of the right masseter muscle has been observed. This muscle, involved in opening and closing movements of the mouth, seems to be stressed for a long time.

T. 109 male young adult	
Tooth with alteration	Upper left I2
Alteration	Lingual notch (degree 2)
Description of the alteration:	
Feature of the alteration	Under light microscope (20x): smooth and polished bottom.
Occlusal wear (according to Smith, '84)	Degree 4.
Corresponding and/or similar alterations in opposite teeth	Not recordable because the lower teeth and the mandible are not preserved
General traits of the alteration:	
Teeth present	9/32
AMTL	2/14 (14,28%)
Dento-alveolar pathology and alterations	The upper right P2, I2 and the upper left M1 have been lost *intra vitam*. The upper teeth show some penetrating and non-penetrating caries. Destroying caries on the upper left P1 and M1 have been also observed. Moreover, buccal abscesses have been observed at the upper left P2 (lost *ante mortem*) and at the right left P1 (probably due to the destroying caries). The teeth show only slight deposits of buccal and lingual *calculus* and a slight degree of wear (2-4, according to Smith, '84). The teeth show a moderate/severe alveolar margins retraction. Buccal and interproximal chippings (degree 1, 2 and 3) have been observed.
Discussion:	

The notch could be due to a cylindrical fine rigid or flexible object probable rubbed over the tooth. As regards the nature of the object, taking into account of the smooth and polished notch bottom, we could suppose that it was not too much abrasive.
The mechanical stress done in this activity could probably be testified by a slight marginal lipping showed by the right glenoid fossa (the left glenoid fossa and both the mandibular condyles are not recordable). All these characters could suggest that the TMJ was for a long time strongly stressed.

T. 115 male mature adult	
Tooth with alteration	Upper left M2
Alteration	Interproximal distal *striae*.
Description of the alteration:	
Feature of the alteration	Under light microscope (30x): small flatted and smooth area with fine parallel striations directed long the main axis of this area. This lesion is at the buccal end of a penetrating cervical caries.
Occlusal wear (according to Smith, '84)	Degree 4.
Corresponding and/or similar alterations in opposite teeth	Not recordable because the adjacent tooth (upper left M1) has been lost *ante mortem*.
General traits of the alteration:	
Teeth present	15/32
AMTL	9/30 (30,00%)
Dento-alveolar pathology and alterations	Alveolar atrophy due to *ante mortem* tooth loss has been observed at: from upper right M3 to upper right P1, upper left P2 and M1, lower left I2 and P1. The upper teeth show penetrating and non-penetrating caries. A destroying caries affects the lower left I1. The upper left M2 shows a penetrating interproximal cervical caries. A buccal abscess, probably related to the strong wear (7, according to Smith, '84), at the lower right I2 has been observed. The upper and lower anterior teeth show a high degree of wear (5-8, according to Smith, '84). Interproximal chippings of degree 1, 2 and 3 on the lower posterior teeth have been observed.
Discussion:	
The interproximal *striae* on the upper left C could be due to the repetitive back-and-forth movements of a foreign fibrous (like a toothpicks probably made of wood) object for oral hygienic purposes to relive the discomfort due to the destroying caries.	

T. 129 male mature adult	
Tooth with alteration	Lower central incisors
Alteration	Lingual notch (degree 2) (for both the teeth)
Description of the alteration:	
Feature of the alteration	Under light microscope (20x): smooth and polished bottoms.
Occlusal wear (according to Smith, '84)	Degree 4 (for both the teeth).
Corresponding and/or similar alterations in opposite teeth	The upper right I1 is lost *post mortem*. The upper left I1 shows buccal chippings of degree 1 and 3.
General traits of the alteration:	
Teeth present	28/32
AMTL	1/32 (3,12%)
Dento-alveolar pathology and alterations	A buccal abscess at the upper left M1 (lost *ante mortem*) has been observed. Carious lesions (penetrating) have been observed only on the upper left molars and lower right M1. The upper lower left teeth show Considerable deposits of buccal and lingual *calculus*. On the right side only slight deposits of buccal and lingual *calculus* have been observed. The lower anterior teeth show a moderate wear (4, according to Smith, '84). The upper and lower teeth show a moderate alveolar margins retraction. Buccal and lingual chippings of degree 1, 2 and 3 on the anterior teeth have been observed. The posterior teeth show lingual and interproximal chippings of degree 1, 2 and 3.
Discussion:	
The notches could be due to a cylindrical fine rigid or flexible object probable rubbed and/or held on the teeth in a non-masticatory activity. As regards the nature of the object, taking into account of the smooth and polished notch bottom, we could suppose that it was not too much abrasive.	

T. 141C male mature adult	
Tooth with alteration	Upper right P1 Upper right C From upper left I1 to left C Lower right P1
Alteration	Upper right P1: lingual groove; Upper right C: lingual notch (degree 3), lingual groove; Upper left I1 and I2: interproximal distal and mesial grooves, lingual groove; Upper left C: interproximal mesial groove, lingual groove; Lower right P1: buccal notch (degree1)
Description of the alteration:	
Feature of the alteration	Lingual groove: from upper right P1 to upper right C. Under light microscope (20-30x): the grooves occur parallelly to the CEJ and surround (totally and/or partially) the lingual tubercle in a distal-mesial direction. The grooves are shallow, irregular and rough. In the case of the upper left C the groove is depth with sharp margins and tapers off distally. Interproximal grooves: from upper left I1 to upper left C. The distal and mesial grooves occur on the enamel near the CEJ and are tilted of an angle of 30° with respect to the occlusal plain. The grooves are wide, slight rounded, broadest (1,44-2,53mm). The mesial groove of the upper left C shows a squared flattened bottom. Under light microscope (20x): smooth and polished bottom (in some case with dentin exposition) with fine parallel striations directed long the main axis of the grooves. Lingual notch (degree 3): upper right C; Buccal notch (degree 1): lower right P1. Under light microscope (20x): smooth and polished bottom.
Occlusal wear (according to Smith, '84)	Upper right P1: degree 7; Upper right C: degree 6; Upper left I1, I2 and C: degree 5; Lower right P1: degree 5.
Corresponding and/or similar alterations in opposite teeth	The lingual notch of the upper right C and the buccal notch of the lower right P1 are corresponding each other. The interproximal grooves are in front of each other.
General traits of the alteration:	
Teeth present	23/32
AMTL	5/31 (16,13%)
Dento-alveolar pathology and alterations	Alveolar atrophy due to *ante mortem* tooth loss has been observed at: upper left M2 and M3 and lower right molars. Penetrating and non-penetrating carious lesions on the upper right posterior teeth and on the lower teeth

	have been observed. The upper right P2 (affected by a destroying caries) and the upper right P1 (affected by a penetrating caries) show buccal abscesses. The teeth show slight deposits of buccal and lingual *calculus*, a moderate/severe degree of wear (5-7, according to Smith, '84) and a moderate alveolar margins retraction. Quite all the teeth show buccal, lingual and interproximal chippings of degree 1, 2 and 3.

Discussion:

We could suppose that the lingual grooves were made *intra vitam* and also that they could be due both to chemical erosion (grooves rough and uneven) caused by the contact of some acidic substances on the lingual surface and also to some mechanical stresses during masticatory activity and/or non masticatory tasks activities.
The interproximal grooves (slight rounded and/or quadrangular, shallow and with striated bottoms) seem to be due to the repeated insertion of some thin and fibrous foreign objects probably made of wood or of some vegetable fibre.
Moreover, the corresponding notches of the upper right C and of the lower right P1 could be due to the habit to hold and/or rub a fine circular object between these teeth. As regards the object, it is possible it was not too much abrasive because of the smooth and polished bottoms.
The porosity and roughness showed by both the glenoid fossae could testify that the TMJ ware strongly stressed during these activities.

T. 147A male mature adult	
Tooth with alteration	Upper right P2
Alteration	Interproximal mesial groove
Description of the alteration:	
Feature of the alteration	The groove occurs on the *cementum* near and parallel with respect to the CEJ. Under light microscope (30x): rounded, smooth and polished with fine parallel striations directed long the main axis of this area. This lesion is at the buccal end of a destroying interproximal caries.
Occlusal wear (according to Smith, '84)	Degree 3.
Corresponding and/or similar alterations in opposite teeth	A small flattened and polished area on the interproximal distal surface of the upper right P1 (in front of the groove) has been observed.
General traits of the alteration:	
Teeth present	25/32
AMTL	1/27 (3,70%)
Dento-alveolar pathology and alterations	The upper left M2 has been lost *ante mortem*. The upper right P2 and the upper left M1 show destroying caries. Medium deposits of buccal *calculus* on the upper anterior teeth have been observed. The lower posterior teeth show medium/considerable deposits of buccal and lingual *calculus*. The teeth show only a slight degree of wear (2-4, according to Smith, '84). A moderate alveolar margins retraction has been observed on the upper left teeth and on the lower posterior teeth. The anterior teeth show buccal chippings of degree 2 and interproximal chippings of degree 1.
Discussion:	
We could suppose that the groove could derive from the repetitive back-and-forth movement of a foreign object for oral hygienic purposes to relive the discomfort due to the destroying caries. It is also probable that the toothpick has a vestibular insertion (this operation is easier than a lingual insertion).	

T. 110 female young adult	
Tooth with alteration	Lower right P1
Alteration	Lingual notch (degree 3)
Description of the alteration:	
Feature of the alteration	Under light microscope (20x): smooth and polished bottom.
Occlusal wear (according to Smith, '84)	Not recordable.
Corresponding and/or similar alterations in opposite teeth	Not present.
General traits of the alteration:	
Teeth present	20/32
AMTL	5/26 (19,23%)
Dento-alveolar pathology and alterations	Alveolar atrophy due to *ante mortem* tooth loss has been observed at: upper right M1 and from upper left P2 to left M2 and lower right P2. A destroying caries affects the upper right P2. a buccal abscess at the upper left P2 (lost ante mortem) has been observed. Slight deposits of buccal and lingual calculus have been observed on upper and lower teeth. Only the lower central incisors show medium/considerable deposits of buccal calculus. General high degree of wear (5-7, according to Smith, '84).
Discussion:	
This lesion could be due to the repeated passage of a fine, cylindrical object rubbed on the tooth. The mechanical stress done in this activity could probably be testified by the presence of a sub-oval porotic area on the articular eminence of the right glenoid cavity. Moreover, a slight roughness of the external lateral tubercle of the right condyle have been observed (the left one is not preserved).	

T. 112 female young adult	
Tooth with alteration	Upper right M1 Upper left I1
Alteration	Upper right M1: lingual notch (degree 3) Upper left I1: buccal notch (degree 1)
Description of the alteration:	
Feature of the alteration	Lingual notch (upper right M1): observation under light microscope (20x) shows a smooth and polished bottom without striations. Buccal notch (upper left I1): observation under light microscope (20x) shows a smooth bottom and slight chippings at the maximum depth of the lesion.
Occlusal wear (according to Smith, '84)	Upper right M1: degree 6. Upper left I1: degree 6.
Corresponding and/or similar alterations in opposite teeth	Not recordable because the lower right M1 has been lost *ante mortem*. Moreover, the lower left I1 is not preserved.
General traits of the alteration:	
Teeth present	13/32
AMTL	8/19 (42,10%)
Dento-alveolar pathology and alterations	Alveolar atrophy due to *ante mortem* tooth loss has been observed at: upper right P1, P2, I2, upper left P1, P2; lower right M1, P2 and I1. Penetrating and non penetrating caries affect the upper anterior teeth and the lower posterior ones. The teeth show slight deposits of buccal and lingual *calculus* and a moderate alveolar margins retraction. Moderate/severe degree of wear (4-6, according to Smith, '84). Lingual and interproximal chippings (degree 1, 2 and 3) affect the posterior teeth.
Discussion:	
The lesions described above could be the result of a repeated action of objects not too much abrasive (because of the notch bottoms are smooth and polished) rubbed on the teeth. The stress played on the upper left I1could have produced the slight chippings associated to the notch. The mechanical stress done in this activity could probably be testified by the slight porosity showed by the right mandibular condyle.	

T. 113 female mature adult	
Tooth with alteration	Upper right M2
Alteration	Interproximal distal *striae*
Description of the alteration:	
Feature of the alteration	Under light microscope (20x): small flattened smooth area with short striations parallel with respect to the CEJ. This lesion is at the buccal end of a penetrating interproximal cervical caries.
Occlusal wear (c	Degree 3.
Corresponding and/or similar alterations in opposite teeth	Not present.
General traits of the alteration:	
Teeth present	11/32
AMTL	4/28 (14,28%)
Dento-alveolar pathology and alteration	The upper right P1, the upper left P2 and M1 and the lower right M1 have been lost *ante mortem*. A buccal abscess has been observed at the upper left P1 (affected by a destroying caries). Penetrating caries and a severe alveolar margins retraction affect the upper right posterior teeth. The posterior teeth show buccal, lingual and interproximal chippings of degree 1 and 2. The teeth show a moderate degree of wear (4-5, according to Smith, '84). Medium/considerable deposits of buccal *calculus* on the upper right posterior teeth and on the lower left posterior ones have been observed.
Discussion:	
The interproximal *striae* showed seem to be due to the repeated insertion (bucco-lingual directed) of toothpicks probably made of wood. We could suppose that in this case a habitual tooth probing was done for relive the discomfort caused both by the penetrating interproximal cervical caries and the exposed dental necks (due to the severe retraction of the alveolar margins) showed by the upper right M2.	

T. 117 female young adult	
Tooth with alteration	Upper right I1
Alteration	"Rough" buccal notch (degree 2)
Description of the alteration:	
Feature of the alteration	Under light microscope (20x): uneven, rough but smooth bottom.
Occlusal wear (according to Smith, '84)	Degree 4.
Corresponding and/or similar alterations in opposite teeth	The lower central incisors have been lost *post mortem*.
General traits of the alteration:	
Teeth present	24/32
AMTL	5/32 (15,62%)
Dento-alveolar pathology and alterations	Alveolar atrophy due to *ante mortem* tooth loss has been observed at: upper right M1, left M2; lower right M2, lower left P2 and M1. The individual shows several penetrating, non penetrating and destroying caries. Buccal abscesses have been observed on: upper right M2 and upper P1 (both affected by penetrating caries), upper right P2 and lower right M1 (both affected by destroying caries). Slight deposits of buccal *calculus* on the upper anterior teeth and of lingual *calculus* on the lower posterior ones have been observed. The upper teeth are more worn (3/4, according to Smith, '84) than the lower ones (2/3, according to Smith, '84). A severe alveolar margins retraction has been observed on the lower teeth. The anterior teeth show buccal and interproximal chippings of degree 1 and 2. Only two of the posterior right teeth are chipped (interproximal chippings of degree 1).
Discussion:	
The "rough" notch could be due to a cylindrical fine rigid or flexible object probable strongly held and/or rubbed between the anterior teeth (as suggested by the chippings on the upper central incisors). Moreover, the roughness showed by the right glenoid fossa and the porosity showed by the right mandibular condyle could testify that the TMJ was for a long time strongly stressed.	

T. 120 female mature adult	
Tooth with alteration	Upper left P2
Alteration	Lingual notch (degree 3)
Description of the alteration:	
Feature of the alteration	Under light microscope (20x): smooth and polished bottom with fine parallel striations confluent toward the maximum depth of the notch.
Occlusal wear (according to Smith, '84)	Degree 6.
Corresponding and/or similar alterations in opposite teeth	Lingual chipping (degree 3) on the lower left P2.
General traits of the alteration:	
Teeth present	28/32
AMTL	2/32 (6,25%)
Dento-alveolar pathology and alterations	The upper right M1 and the lower left I1 have been lost *post mortem*. The individual does not show carious lesions. Buccal abscess have been observed at: upper right C and I2 (both affected by a strong wear of degree 7 until the opening of the root canal) and upper left M1 (affected by a strong wear of degree 7) and left M2 (affected by a sever chippings that involved enamel and dentin until the opening of the root canal). The upper teeth are more worn (degree 5-7) than the lower ones (degree 4-5) and the anterior teeth are more worn (degree 5-7) than the posterior ones (degree 4/5). Slight deposits of buccal and lingual *calculus* on the upper anterior teeth and on the lower posterior ones have been observed. Medium/considerable deposits of buccal and lingual *calculus* have been observed on some upper posterior teeth and on some lower anterior ones. Moderate alveolar margins retraction has been observed. All the teeth are chipped and some of them show multiple chippings. The anterior teeth show buccal, lingual and interproximal chippings of degree 1 and 2. The left posterior teeth show buccal, lingual and interproximal chippings of degree 1, 2 and 3.
Discussion:	

The presence of the notch and of teeth with multiple chipping could suggest that the teeth were involved in extra-masticatory activities. The notch could be the result of a repeated action of an object not too much abrasive (because of the notch bottom is smooth and polished) rubbed and/or strongly held between the upper and lower left P2. The stress of this gesture could have produced the strong lingual chipping on the lower left P2. The slight porosity showed by the left mandibular condyle could testify that the TMJ was strongly stressed in this activity.

T. 139 female old adult	
Tooth with alteration	Upper right M2 Upper left I1
Alteration	Upper right M2: interproximal mesial groove Upper left I1: buccal notch (degree 1)
Description of the alteration:	
Feature of the alteration	Interproximal groove (upper right M2): the groove (length: 2,47mm, width: 1,57mm) occurs on the *cementum* near and parallel with respect to the CEJ. Under light microscope (30x): rounded but rough bottom due to *post mortem* alteration. This lesion is at the buccal end of a penetrating cervical interproximal caries. Buccal notch (upper left I1): observation under light microscope (20x) shows a smooth and polished bottom.
Occlusal wear (according to Smith, '84)	Upper right M2: Upper left I1:
Corresponding and/or similar alterations in opposite teeth	Not recordable because the corresponding opposite/adjacent teeth are lost *post mortem* and/or *ante mortem*.
General traits of the alteration:	
Teeth present	7/32
AMTL	18/30 (60,00%)
Dento-alveolar pathology and alterations	Alveolar atrophy due to *ante mortem* tooth loss has been observed at: from upper right P2 to right I1 and from upper left I2 to left P2; from lower right M2 to right P2, from lower right I2 to left I2 and lower left M1 and M2. Penetrating caries and a severe alveolar margins retraction affect some of the upper and lower teeth. The teeth show a medium degree of wear (3-5, according to Smith, '84). Only the lower left P1 is chipped (interproximal, degree 1).
Discussion:	

The interproximal groove seems to be due to the repeated insertion (bucco-lingual directed) of a fine foreign object. We could suppose that in this case a habitual tooth probing was done for relive the discomfort caused by the penetrating cervical interproximal caries.
We could also suppose a non-masticatory use of the teeth as suggested by the notch on the upper left I1. The notch could be due to a cylindrical fine rigid or flexible object probable rubbed over the tooth. As regards the nature of the object, taking into account of the smooth and polished notch bottom, we could suppose that it was not too much abrasive.
The slight porosity showed by both the mandibular condyles could testify that the TMJ was strongly stressed in this activity.

T. 142 female young adult	
Tooth with alteration	Lower left I1
Alteration	Lingual notch (degree 1)
Description of the alteration:	
Feature of the alteration	Under light microscope (20x): smooth and polished bottom.
Occlusal wear (according to Smith, '84)	Degree 3.
Corresponding and/or similar alterations in opposite teeth	The upper left I1 shows only a lingual chipping (degree 1).
General traits of the alteration:	
Teeth present	11/32
AMTL	2/28 (7,14%)
Dento-alveolar pathology and alterations	The lower right and left M1 have been lost *ante mortem*. A destroying caries affects the upper left M1. The teeth show only a slight wear (1-3, according to Smith, '84). Considerable deposits of lingual *calculus* on the lower right teeth and of occlusal *calculus* on the upper right posterior teeth have been observed. Moderate deposits of buccal *calculus* and slight deposits of lingual *calculus* on the upper teeth have been observed. A slight alveolar margins retraction has been observed. Only few buccal, lingual and interproximal chippings of degree 1 on the anterior and some posterior teeth have been observed.
Discussion:	

The presence of occlusal *calculus* on the upper right posterior teeth could suggest an anomalous occlusion and also that the occlusal surfaces of these teeth were not subjected to the attrition due to mastication. The lingual notch observed could be due to a repeated action of a fine circular object (such as a vegetable fibre or wood-made stick) held and/or rubbed on the lower anterior teeth (as the considerable deposits of lingual *calculus* on these teeth could suggest). As regards the nature of the object, taking into account of the smooth and polished notch bottom, we could suppose that it was not too much abrasive.

T. 151 female young adult	
Tooth with alteration	Upper right M1 Lower left M2
Alteration	Upper right M1: buccal notch (degree 2) Lower left M2: lingual notch (degree 2)
Description of the alteration:	
Feature of the alteration	Buccal notch (upper right M1): observation under light microscope (20x) shows a depth but thin notch with smooth and polished bottom. Lingual notch (lower left M2): observation under light microscope (20x) shows a smooth and polished bottom with a slight chipping at the maximum depth of the lesion.
Occlusal wear (according to Smith, '84)	Upper right M1: Lower left M2:
Corresponding and/or similar alterations in opposite teeth	The lower right M1 shows lingual and interproximal chippings of degree 1 and 2. The upper left M2 shows interproximal chipping of degree 1 and 3.
General traits of the alteration:	
Teeth present	25/32
AMTL	2/28 (7,14%)
Dento-alveolar pathology and alterations	The upper right P1 and the upper left M1 have been lost *ante mortem*. Carious lesions are not present. All the teeth show a high degree of wear (degree …7...): the dental wear pattern of the upper ones slopes up lingually and the dental wear pattern of lower ones slopes down buccally. The upper teeth show slight deposits of buccal and lingual *calculus*. Also the lower anterior teeth show considerable deposits of lingual calculus. The lower

	right posterior ones show medium deposits of buccal *calculus*. Moderate alveolar margins retraction has been observed. All the teeth show buccal, lingual and interproximal chippings of degree 1, 2 and 3.
Discussion:	
The notches could be due to the habit to rub and/or hold on the teeth fibrous but not too much abrasive objects (because the bottoms are smooth and without striations). The stress played on the lower left M2 could have produced the chipping associated to the notch. The wear patterns showed by the upper and lower teeth are corresponding and probably due to malocclusion. The slight porosity showed by both the mandibular condyles (the left one shows also a slight eburnation) and the slight porosity showed by the left glenoid fossa, could testify that the TMJ was strongly stressed both in masticatory and in non-masticatory activities.	

C) The individuals with non-masticatory dental alterations of the *Domus* of Suasa (Ancona, IV-V c AD)

T. 26 male old adult	
Tooth with alteration	Lower right M1 and M2
Alteration	Lingual notches (degree 3)
Description of the alteration:	
Feature of the alteration	Lower right M2: observation under light microscope (20x) shows a rough but smooth bottom without striations. Lower right M1: observation under light microscope (20x) shows a smooth and polished bottom without striations.
Occlusal wear (according to Smith, '84)	Lower right M2: degree 6. Lower right M1: degree 6.
Corresponding and/or similar alterations in opposite teeth	Buccal chippings (degree 1 and 2) on upper right P2 and M1.
General traits of the alteration:	
Teeth present	27/32
AMTL	1/32 (3,12%)
Dento-alveolar pathology and alterations	The lower left M3 has been lost *ante mortem*. A buccal abscess has been observed at the upper left P2 affected by a destroying caries. Few penetrating and non penetrating caries affect the posterior teeth. The teeth show a general medium degree of wear (5-6, according to Smith, '84). The lower posterior teeth are more worn (degree 6) than the lower anterior ones (degree 5). The upper posterior teeth show medium/considerable deposits of buccal *calculus*. The lower central incisors show considerable deposits of lingual

	calculus. A severe alveolar margins retraction affects both the upper and lower teeth. Buccal, lingual and interproximal chippings and multiple chippings of degree 1, 2 and 3 on the lower right teeth and of degree 1 on the other teeth have been observed.
Discussion:	
These alterations could be put in relation to the repeated action of objects held between the right posterior teeth. We could also suppose that these objects ware made of a not corrosive and/or abrasive material because both the notches show a smooth and polished bottom. This gesture could have produced repeated punctual traumas responsible of the chippings in the corresponding upper right P2 and M1 (all the lower right teeth show more and heavier chippings than the left side ones). The mechanical stress done in this activity could be testified by a sub-oval porotic area on the articular eminence of the left glenoid fossa and by the moderate marginal lipping showed by both the mandibular condyles. Moreover, a slight development of the external lateral tubercle of the left mandibular condyle has been observed. All these characters could suggest that the temporo-mandibular joint was for a long time stressed.	

T. 30 male young adult	
Tooth with alteration	Lower right M1
Alteration	Buccal notch (degree 2)
Description of the alteration:	
Feature of the alteration	Under light microscope (20x): smooth and polished bottom. A wide chipping of degree 2 at the maximum depth of the notch has been observed. The notch slopes down buccally.
Occlusal wear (according to Smith, '84)	Degree 7.
Corresponding and/or similar alterations in opposite teeth	Not recordable because the upper teeth have been lost *ante mortem*.
General traits of the alteration:	
Teeth present	10/32
AMTL	20/32 (62,50%)
Dento-alveolar pathology and alterations	All the upper teeth and the lower incisors have been lost *ante mortem* and a severe alveolar margins retraction and alveolar bone remodelling and resorption can be observed. Only few penetrating caries have been observed. The lower teeth show a high degree of wear (6-7, according to Smith, '84), slight deposits of lingual *calculus* and a severe alveolar margins retraction. Quite all the teeth are chipped: the lower right teeth show buccal and lingual chippings of degree 1 and 2, on the lower left a buccal chippings of degree 3 and interproximal and lingual chippings o degree 1 have been observed.

Discussion:
The high degree of wear showed by the lower teeth could be put in relation to the lack of all the upper teeth and of the lower incisors (lost *ante mortem* many time before the death of the individual, as suggested by the severe alveolar margins retraction and alveolar bone remodelling and resorption observed). So we could suppose that both the masticatory and non-masticatory functions were carried out on the lower posterior teeth. The lesion observed on the lower right M1 could be the result of a repeated action of a not too much abrasive object (smooth and polished bottom) rubbed and/or held tilted down buccally on the molar. The stress done on the tooth could have produced a chipping associated to the notch. Moreover, a sub-circular porotic area showed by the articular eminence of the right glenoid fossa could testify the mechanical of this activity.

T. 32 male mature adult	
Tooth with alteration	Lower right I1
Alteration	Buccal notch (degree 1)
Description of the alteration:	
Feature of the alteration	Under light microscope (20x): smooth and polished bottom.
Occlusal wear (according to Smith, '84)	Degree 5.
Corresponding and/or similar alterations in opposite teeth	Not present.
General traits of the alteration:	
Teeth present	31/32
AMTL	1/32 (3,12%)
Dento-alveolar pathology and alterations	The lower right P2 has been lost *ante mortem*. Few penetrating and non penetrating caries affect the lower teeth. The lower incisors show medium/considerable deposits of lingual *calculus* and slight deposits of buccal *calculus*. The teeth show a general moderate/high degree of wear (4-7, according to Smith, '84) and a severe alveolar margins retraction. Quite all the teeth show chippings and multiple chippings: on the anterior ones buccal, lingual and interproximal chippings of degree 1 and 2 have been observed. The right posterior teeth show also lingual and interproximal chippings of degree 3.
Discussion:	

The notch could be due to a cylindrical fine rigid or flexible object probable rubbed over the tooth. As regards the nature of the object, taking into account of the smooth and polished bottom, we could suppose that it was not too much abrasive. This gesture could have produced repeated punctual traumas responsible of the slight buccal chippings on the upper incisors. Moreover, the medium/considerable deposits of lingual *calculus* showed by the lower incisors could also be put in relation to a long time gesture of holding an object between the anterior teeth.

T. 41 male ? adult	
Tooth with alteration	Upper right I1 Upper left C Lower right P2 and left P1
Alteration	Upper right I1: buccal notch (degree 3), Upper left C: lingual notch (degree 2), Lower right P2 and left P1: unusual strong buccal wear.
Description of the alteration:	
Feature of the alteration	Buccal notch (upper right I1): observation under light microscope (20x) shows a smooth and polished bottom. At the maximum depth of the notch a buccal chipping (degree 3) has been observed. Lingual notch (upper left C): smooth and polished bottom with fine parallel striations bucco-lingually directed (light microscope, 20x). Unusual strong buccal wear (lower right P2 and left P1): the dental wear patterns slope down buccally with dentin exposition further the CEJ. The anterior part of the crown has been removed. Under light microscope (20x): the worn surfaces are smooth, polished, without striations. The pulp canals are closed by secondary dentine (the pulp canal of the lower left P1 is not totally closed).
Occlusal wear (according to Smith, '84)	Upper right I1: degree 5; Upper left C: not recordable because of the presence of the lingual notch; Lower right P2 and left P1: not recordable because of the unusual strong buccal wear.

Corresponding and/or similar alterations in opposite teeth	The lower right I1 shows a buccal chipping (degree 3) corresponding to the buccal notch of the upper right I1. The lower left C shows an interproximal chipping of degree 2. The upper right premolars have been lost *post mortem* and the upper left P1 shows an interproximal chipping of degree 1.
General traits of the alteration:	
Teeth present	22/32
AMTL	5/30 (16,67%)
Dento-alveolar pathology and alterations	Alveolar atrophy due to *ante mortem* tooth loss has been observed at: upper right M1, upper left P2, M2 and M3 and lower left M1. Destroying caries have been observed on: upper right C and I2. A buccal abscess has been observed at the lower left P1 probably due to the unusual strong buccal wear. The posterior teeth are more worn (6-8, according to Smith, '84) than the anterior ones (5, according to Smith, '84). The lower teeth show a severe alveolar margins retraction and the anterior ones show slight deposits of lingual *calculus*. Buccal chippings of degree 1, 2 and 3 affect the anterior teeth. The posterior ones show slight buccal chippings and interproximal and lingual chippings of degree 1, 2 and 3.
Discussion:	
The notches could be due to fine rigid or flexible cylindrical objects probable rubbed and/or held between the upper and lower anterior teeth (because of the presence of corresponding lesions with respect to the observed notches). As regards the nature of the object, taking into account of the smooth and polished notch bottom, we could suppose that it was not too much abrasive. The stress that played on the upper right I1 could have produced, as a secondary effect, the chipping associated to the notch. The strong unusual buccal wear (lower right P2 and left P1) is anomalous both for degree and shape with respect to the dental wear pattern showed by the other teeth. We could suppose that these teeth were used to treat or to scrape something held with the hands both in masticatory and non-masticatory activities. As regards of the object, we could suppose that it was not too much abrasive because the worn surfaces show an exposed smooth and polished dentin. The mechanical stress produced in these activities could be testified by a slight porosity showed by the right glenoid fossa and by the right mandibular condyle and also by the moderate development showed by both the external lateral tubercle of both the mandibular condyles. All these characters could suggest that the temporo-mandibular joint was for a long time strongly stressed.	

T. 43C male ? adult	
Tooth with alteration	Lower right M2
Alteration	Lingual notch (degree 2)
Description of the alteration:	
Feature of the alteration	Under light microscope (20x): smooth and polished bottom. At the maximum depth of the notch a lingual chipping of degree 2 has been observed.
Occlusal wear (according to Smith, '84)	Degree 6.
Corresponding and/or similar alterations in opposite teeth	Not recordable because the upper right teeth from M3 to P1 have been lost *post mortem*.
General traits of the alteration:	
Teeth present	16/32
AMTL	1/30 (3,33%)
Dento-alveolar pathology and alterations	The upper left M2 has been lost *ante mortem*. Penetrating and non penetrating caries have been observed on the posterior teeth. The teeth show a moderate/strong wear (4-6, according to Smith, '84). The lower posterior teeth show a moderate alveolar margins retraction. Quite all the teeth show buccal, lingual and interproximal chippings and multiple chippings of degree 1, 2 and 3.
Discussion:	
This lesion could be due to the repeated passage of a fine, cylindrical object rubbed and/or held on the tooth. The stress of this gesture could have produced a chipping associated to the notch. The presence of the notch and of teeth with multiple chippings could suggest that the posterior teeth were subjected to repeated strong traumas due to masticatory and non-masticatory activities. The presence of lingual chipping could suggest that the individual of T.43C used the teeth in a strong masticatory activity because, as observed by Belcastro *et al.* (2007), the presence of lingual chippings on the posterior teeth seems to be due to masticatory traumas. The slight development of the external lateral tubercle of the right mandibular condyle could testify that the temporo-mandibular joint was stressed for a long time.	

T. 49 male old adult	
Tooth with alteration	Upper left P2 Lower left M1
Alteration	Upper left P2: lingual notch (degree 2) Lower left M1: lingual notch (degree 1)
Description of the alteration:	
Feature of the alteration	Under light microscope (20x): both the notches are smooth and polished. At the maximum depth of the lingual notch of the lower left M1 a slight lingual chipping has been observed.
Occlusal wear (according to Smith, '84)	Upper left P2: degree 4; Lower left M1: degree 6.
Corresponding and/or similar alterations in opposite teeth	The notches are corresponding each other.
General traits of the alteration:	
Teeth present	25/32
AMTL	3/23 (13,04%)
Dento-alveolar pathology and alterations	Alveolar atrophy due to *ante mortem* tooth loss has been observed at: lower right molars. The upper right M3 and C are isolated. A penetrating caries affects the lower left M1 and a non penetrating caries affects the lower left P2. Considerable deposits of buccal and of occlusal *calculus* on the upper right molars have been observed. Considerable deposits of buccal and lingual *calculus* on the lower anterior teeth have been observed. The left side teeth are more worn (4-6, according to Smith, '84) than the right ones (1-4, according to Smith, '84). The lower teeth show a severe alveolar margins retraction. Quite all the teeth show buccal, lingual and interproximal chippings and multiple chippings of degree 1, 2 and 3.
Discussion:	

The asymmetry of the occlusal wear degree (left side teeth more worn than the right ones) and the considerable deposits of buccal and of occlusal *calculus* on the upper right molars could be due to a masticatory activity carried out mostly on the left side, probably because of the lack of the lower right molars. However, we could suppose an extra-masticatory use of the left side teeth such as the habit to hold and/or rub with back-and-forth movements on the posterior teeth, a fine and circular fibrous but not too much abrasive objects (as suggested by the smooth and polished notch bottoms). The stress done on the lower left M1 could have produced a chipping associated to the notch. The mechanical stress of this activity could probably be testified by the slight roughness showed by the right glenoid fossa and by the slight marginal lipping showed by the left glenoid fossa. Moreover, a slight marginal lipping of the right mandibular condyle and a a moderate development of the external lateral tubercle of the left mandibular condyle have been observed. All these characters could suggest that the temporo-mandibular joint was for a long time strongly stressed.

T. US 749 female young adult	
Tooth with alteration	Lower left I1
Alteration	Lingual notch (degree 1)
Description of the alteration:	
Feature of the alteration	Under light microscope (20x): smooth and polished bottom.
Occlusal wear (according to Smith, '84)	Degree 2.
Corresponding and/or similar alterations in opposite teeth	Not recordable because the upper left I1 has been lost *post mortem*.
General traits of the alteration:	
Teeth present	29/32
AMTL	0/32 (0,00%)
Dento-alveolar pathology and alterations	A buccal abscess has been observed at the upper left M1 (affected by a destroying caries). Penetrating and non penetrating caries affect the posterior teeth. Slight deposits of buccal and lingual *calculus* have been observed. The upper left posterior teeth show considerable deposits of buccal *calculus*. The show a slight degree of wear (1-3, according to Smith, '84). A moderate alveolar margins retraction has been observed on the upper anterior teeth. Buccal, lingual and interproximal chippings of degree 1 and 2 have been observed only on the anterior teeth.
Discussion:	
The notch could be due to a cylindrical fine rigid or flexible object probable rubbed over the tooth. As regards the nature of the object, taking into account of the smooth and polished bottom, we could suppose that it was not too much abrasive.	

T. 724 female young adult	
Tooth with alteration	Upper right and left I1
Alteration	Buccal notches (degree 1)
Description of the alteration:	
Feature of the alteration	Under light microscope (20x): smooth and polished bottoms.
Occlusal wear (according to Smith, '84)	Degree 4.
Corresponding and/or similar alterations in opposite teeth	The lower central incisors show multiple chippings (buccal, lingual and interproximal) of degree 1 and 2.
General traits of the alteration:	
Teeth present	30/32
AMTL	0/32 (0,00%)
Dento-alveolar pathology and alterations	Penetrating caries affect the upper right M3 and the lower left M3. Slight deposits of buccal and lingual *calculus* have been observed. The teeth show a slight degree of wear (2-4, according to Smith, '84) and a slight alveolar margins retraction. The upper anterior teeth show buccal chippings of degree 1. The lower anterior teeth show multiple chippings (buccal, lingual and interproximal) of degree 1 and 2.
Discussion:	
The slight buccal notches and buccal chippings observed on the upper central incisors could be the result of repeated traumas due to cylindrical fine rigid or flexible objects rubbed and/or held over these teeth in some non-masticatory activities. As regards the nature of the object, taking into account of the smooth and polished notch bottom, we could suppose that it was not too much abrasive. The stress of this activity could have produced also the multiple chippings on the lower anterior teeth.	

T. 38 (1°) female young adult	
Tooth with alteration	Upper right I1
Alteration	Buccal notch "B" (degree 3)
Description of the alteration:	
Feature of the alteration	Under light microscope (20x): smooth and polished bottom. At the maximum depth of the notch a slight buccal chipping has been observed.
Occlusal wear (according to Smith, '84)	Degree 2.
Corresponding and/or similar alterations in opposite teeth	Not recordable because the lower right I1 is not preserved.
General traits of the alteration:	
Teeth present	24/32
AMTL	1/30 (3,33%)
Dento-alveolar pathology and alterations	The lower right M1 has been lost *ante mortem*. Penetrating and non penetrating caries have been observed on the posterior teeth. A destroying caries affects the lower left M1. The teeth show a slight degree of wear (2/3, according to Smith, '84). The upper right molars and the lower anterior teeth show slight/medium deposits of buccal and lingual *calculus*. A slight alveolar margins retraction has been observed at the lower posterior teeth. The anterior teeth show multiple buccal, lingual and interproximal chippings of degree 1 and 2. The lower posterior teeth show interproximal chippings of degree 1, 2 and 3.
Discussion:	
The buccal notch "B" could be due to a cylindrical fine rigid or flexible object held and/or rubbed back and forth over the tooth. It is also possible that the object responsible of this lesion was pull toward the top. The stress of this activity could have produced the chipping associated to the notch and the multiple chippings showed by the upper right I1.	

T. 38 (2°) female young adult	
Tooth with alteration	Upper right C and I2 Lower right P1
Alteration	Upper right C and I2: Unusual slight lingual wear, Lower right P1: buccal notch (degree 3)
Description of the alteration:	
Feature of the alteration	Unusual slight lingual wear (upper right C and I2): the dental wear pattern slope up lingually. The lingual surfaces are flattened, smooth and polished and show fine parallel striations bucco-lingually directed and mesio-distally oriented (light microscope, 20x). Buccal notch (lower right P1): smooth and polished bottom with fine shallow parallel striations bucco-lingually directed and mesio-distally oriented (light microscope, 20-40x).
Occlusal wear (according to Smith, '84)	Upper right C: degree 3; Upper right I2: not recordable because of the unusual lingual wear; Lower right P1: not recordable because of the wide buccal notch.
Corresponding and/or similar alterations in opposite teeth	These lesions are corresponding each other.
General traits of the alteration:	
Teeth present	24/32
AMTL	2/32 (6,25%)
Dento-alveolar pathology and alterations	Alveolar atrophy due to *ante mortem* tooth loss has been observed at: upper right M1 and lower left M3. The individual shows only a slight degree of wear (2/3, according to Smith, '84) and does not show caries and *calculus*. Slight alveolar margins retraction has been observed. The teeth show few buccal, lingual and interproximal chippings of degree 1 and 2.
Discussion:	
The unusual slight lingual wears showed by the upper right C and I2 is anomalous both for degree and shape with respect to the dental wear pattern showed by the other teeth. Moreover it corresponds with the wide buccal notch showed by lower right P1. These lesions could be due to repeated pulling-tearing movements in a buccal-lingual direction. The strong mechanical stress done in this activity could be testified by the slight porosity showed by the left glenoid fossa.	

RESULTS and DISCUSSIONS

The necropolises from Molise:

A) The individuals with non-masticatory dental alterations of the necropolis of Pozzilli (Isernia, 7th c BC)

T. 2 male old adult	
Tooth with alteration	Upper left P1
Alteration	Buccal notch (degree 3)
Description of the alteration:	
Feature of the alteration	Enamel smooth and polished up until half height of the crown. Under light microscope (20x): parallel striations bucco-lingually oriented.
Occlusal wear (according to Smith, '84)	Degree 5 (concave occlusal surface) Pulp canal closed by secondary dentin.
Corresponding and/or similar alterations in opposite teeth	Not recordable because the lower teeth show *post mortem* enamel fractures.
General traits of the dentition:	
Teeth present	28/32
AMTL	3/29 (10,34%)
Dento-alveolar pathology and alterations	The lower right M1 and M2 are lost *ante mortem*. The individual shows only a destroying carious lesion on the upper left M2. In quite all the teeth slight deposits of buccal and lingual *calculus* have been observed. Left posterior teeth are more worn (degree 5-6, according to Smith, '84) than the right ones (degree 3-4, according to Smith, '84), show slight buccal and interproximal chippings (degree 1) and show a higher retraction of the alveolar margins.
Discussion:	
The asymmetry of the occlusal wear degree could be due to a masticatory activity carried out mostly on the left side, probably because of the lack of the lower right molars. However, we could suppose an extra-masticatory use of the teeth such as the habit to rub on the teeth with back-and-forth and down movements, fibrous but not too much abrasive objects (as suggested by the striations observed on the notch smooth bottom).	

T. 27 male old adult	
Tooth with alteration	Upper right M2
Alteration	Lingual notch (degree 2) and a chipping (degree 2) at the maximum depth of the notch.
Description of the alteration:	
Feature of the alteration	Rough surface due to *post mortem* alterations. Lingual chipping of degree 2 associated to the notch.
Occlusal wear (according to Smith, '84)	Not recordable because of a destroying caries of the crown.
Corresponding and/or similar alterations in opposite teeth	Not recordable because of the lower corresponding M2 is damaged *post mortem* and the adjacent teeth are lost *post mortem*.
General traits of the dentition:	
Teeth present	21/32
AMTL	1/19 (5,26%)
Dento-alveolar pathology and alterations	The upper right P1 is lost *ante mortem*. Presence in several upper and lower posterior teeth of destroying caries. Buccal abscesses at lower right P2 and left P1 have been observed probably due to the destroying caries. Slight/medium deposits of buccal and lingual *calculus* have been observed on the upper and lower teeth. Moderate alveolar margins retraction on the upper teeth has been observed. Buccal and interproximal chippings (degree 2 and 3) on the anterior teeth have been observed.
Discussion:	
This lesion could be due to the repeated passage of a fine, cylindrical object rubbed on the tooth. The stress that played on the tooth could have produced a chipping associated to the notch. The mechanical stress done in this activity could probably be testified by the presence of a sub-oval porotic area on the articular eminence of both the glenoid fossa near the anterior zygomatic tuberosities. Moreover, a moderate development of the right masseter tuberosity and a slight roughness of the external lateral tubercle of the right mandibular condyle have been observed (all the left side of the mandible is not preserved).	

T.45 male old adult	
Tooth with alteration	Lower right C
Alteration	Buccal notch (degree 2) and occlusal short *striae* associated to the notch.
Description of the alteration:	
Feature of the alteration	Surface partially rough because of *post mortem* alterations.
Occlusal wear (according to Smith, '84)	Degree 7. Pulp canal closed by secondary dentine.
Corresponding and/or similar alterations in opposite teeth	Not recordable because the upper corresponding teeth are lost *post mortem*.
Tooth with alteration	Lower left M1
Alteration	Lingual notch, degree 3.
Description of the alteration:	
Feature of the alteration	Rough surface because of *post mortem* damage.
Occlusal wear (according to Smith, '84)	Degree 5.
Corresponding and/or similar alterations in opposite teeth	Not recordable because the upper M1 is lost *ante mortem*.
General traits of the dentition:	
Teeth present	17/32
AMTL	5/28 (17,86%)
Dento-alveolar pathology and alterations	Penetrating carious lesions have been observed at: upper left P1, lower left M2 and M3. Non-penetrating carious lesions have been observed at: lower right P1 and C. All the teeth show a severe occlusal wear (degree 5-8). Some teeth show the pulp canals closed by secondary dentin. Both the upper left incisors and the lower right M3 and M1are lost *intra vitam*. Considerable/medium deposits of lingual *calculus* and moderate alveolar retraction have been observed on the lower anterior teeth. Some of the teeth show buccal, lingual and interproximal chippings of degree 1.
Discussion:	

The posterior teeth are more worn than the anterior preserved ones probably because of the lack of the upper left incisors. In fact, because of the lack of these teeth, many of the functions usually done by the anterior teeth shift on the posterior ones as observed by Bonfiglioli *et al.* (2004) in the skeletal remains of Taforalt (Morocco) in the case of ritual avulsion of the central upper incisors. We could also suppose an extra-masticatory use of the teeth such as the habit to rub on the lower right C and on the left M1, some fine cylindrical objects. The stress done on the lower right C could have produced the occlusal *striae* associated to the notch.

T.69A male mature adult	
Tooth with alteration	Lower right and left M1.
Alteration	Lingual notch (degree 3).
Description of the alteration:	
Feature of the alteration	Under light microscope (20x): bottom smooth and polished.
Occlusal wear (according to Smith, '84)	Lower right M1: degree 5. Lower left M1: degree 4.
Corresponding and/or similar alterations in opposite teeth	Upper right and left M1 show high degree of wear (degree 5) and concave occlusal surfaces.
Tooth with alteration	Lower left I2
Alteration	Buccal notch (degree 2).
Description of the alteration:	
Feature of the alteration	Rough surface due to *post mortem* alteration.
Occlusal wear (according to Smith, '84)	Degree 4.
Corresponding and/or similar alterations in opposite teeth	Corresponding buccal chipping (degree 2) on the upper left I1.
General traits of the dentition:	
Teeth present	31/32
AMTL	1/32 (3,13%)
Dento-alveolar pathology and alterations	Only the upper left M2 shows caries (penetrating). Considerable/medium deposits of buccal and lingual *calculus* have been observed on the lower left anterior teeth. The upper right I2 is lost *intra vitam*. Moderate alveolar retraction on the upper left teeth and slight alveolar retraction on lower teeth have been observed. The upper anterior teeth show multiple buccal and interproximal chippings (degree 2 and 3).
Discussion:	

These alterations could be put in relation to the repeated action of an object held between the teeth of the two arcades (because of the presence of depth cavities in the corresponding upper molars). We could also suppose that this object was made of a not corrosive and/or abrasive material because both the notches show a smooth and polished bottom.
This gesture could have produced repeated punctual traumas responsible of the chippings and long-time stresses responsible of the notches.

T.87 male mature adult	
Tooth with alteration	Upper and Lower right M1.
Alteration	Lingual notch (degree 3).
Description of the alteration:	
Feature of the alteration	Rough surface due to *post mortem* alterations.
Occlusal wear (according to Smith, '84)	Upper right M1: degree 5. Lower right M1: degree 6.
Corresponding and/or similar alterations in opposite teeth	The notches are corresponding each other.
Tooth with alteration	Lower left M2.
Alteration	Buccal notch (degree 2).
Description of the alteration:	
Feature of the alteration	Under light microscope (20x): smooth and polished bottom.
Occlusal wear (according to Smith, '84)	Degree 5.
Corresponding and/or similar alterations in opposite teeth	Not present.
Tooth with alteration	Upper left C.
Alteration	Occlusal *striae*.
Description of the alteration:	
Feature of the alteration	Under light microscope (25x): parallel striations bucco-lingually directed.
Occlusal wear (according to Smith, '84)	Degree 6.
Corresponding and/or similar alterations in opposite teeth	Not present.
General traits of the dentition:	
Teeth present	23/32

AMTL	2/29 (6,90%)
Dento-alveolar pathology and alterations	The upper left P2 and M1 are lost *ante mortem*. Buccal abscesses at upper right P1 (affected by a destroying caries) and left P1 (lost *post mortem*) have been observed. Penetrating and non penetrating caries on the posterior teeth have been observed. All the teeth show a strong occlusal wear (degree 5-6) that has determined primary dentin exposition and secondary dentin formation. The right teeth are more worn (degree 5-6) than the left ones (degree 4-5). Considerable deposits of buccal *calculus* have been observed on the lower anterior teeth. Medium deposits of lingual *calculus* have been observed on the lower left posterior teeth. Lingual and interproximal chipping (degree 2 and 3) on the upper and lower right teeth.

Discussion:

The asymmetry of wear between the two sides could be put in relation to a masticatory activity mostly shifted on the right side (because of the lack of some left posterior teeth). This fact could be suggested by the presence of lingual and interproximal chippings on the right posterior teeth of both the arcades.
The corresponding notches on the upper and lower right M1 could be due to a repeated action of an object strongly held between the two molars.
The notch of the lower left M2 could have been produced by a not too much corrosive and/or abrasive object (the bottom is without striations) rubbed on the tooth.
The formation of the *striae* on the upper left C could be put in relation to some fibrous objects usually back-and-forth rubbed on this tooth.

T.89 male young adult	
Tooth with alteration	Upper and lower right I1
Alteration	Buccal notch (degree 2).
Description of the alteration:	
Feature of the alteration	Under light microscope (20x): bottom smooth and polished.
Occlusal wear (according to Smith, '84)	Upper right I1: degree 4. Lower right I1: degree 4.
Corresponding and/or similar alterations in opposite teeth	The two notches are not corresponding. Similar alterations are not present in the opposite teeth.
Tooth with alteration	Lower left M1
Alteration	Lingual notch (degree 3) and a chipping (degree 3)
Description of the alteration:	
Feature of the alteration	Under light microscope (20x): smooth and polished bottom.
Occlusal wear (according to Smith, '84)	Degree 3.
Corresponding and/or similar alterations in opposite teeth	Not present.
General traits of the dentition:	
Teeth present	32/32
AMTL	0/32 (0,00%)
Dento-alveolar pathology and alterations	Penetrating and non penetrating caries on the posterior teeth have been observed. The teeth show slight deposits of buccal and lingual calculus. The anterior teeth are more worn (3-4, according to Smith, '84) than the posterior ones (2-3, according to Smith, '84). Moderate/severe alveolar margins retraction on the anterior teeth has been observed. Anomalous apposition of buccal enamel in both the central upper incisors probably due to defects during amelogenesi. Only slight buccal, lingual and interproximal chippings of degree 1 have been observed.
Discussion:	
The lesions observed on the upper right I1 and on the lower right I1 seem not to be due to the same aetiological factor because they are not corresponding (the first is mesial, the second is distal). As regards the object that may have produced the notch on the upper right I1, because its smooth and polished bottom, we could suppose that it was not abrasive and also that it was pull out towards and up. The mechanical stress of this activity, probably done in half-open mouth, could be testified by the medium development of the entesis of the right masseter muscle. This muscle, involved in opening and closing movements of the mouth, seems to be stressed for a long time. Moreover, the external lateral left mandibular tubercle shows a slight porosity.	

T. 91 male mature adult	
Tooth with alteration	Upper left I1
Alteration	Buccal notch (degree 1).
Description of the alteration	
Feature of the alteration	Under light microscope (20x): smooth and polished enamel.
Occlusal wear (according to Smith, '84)	Degree 4.
Corresponding and/or similar alterations in opposite teeth	Not recordable because the lower incisors are not recordable and/or not preserved or lost *post mortem*.
General traits of the dentition:	
Teeth present	21/32
AMTL	7/29 (24,14%)
Dento-alveolar pathology and alterations	The upper right M3, the lower right M2, M1 and from the lower left P1 to the lower left M2, are lost *ante mortem*. Buccal abscess at the upper right M2 (affected by a destroying caries) has been observed. All the preserved teeth show a moderate retraction of the alveolar margins. Slight buccal chippings (degree 1) have been observed on the upper left teeth.
Discussion:	
We could suppose that these lesions could be due to a long time rubbing on the tooth towards the top, of an object not too much abrasive and/or corrosive (as suggested by the smooth and polished notch bottom). The mechanical stress of this activity could be testified by some alterations observed on both the glenoid fossae. They show a rough articular eminences and a sub-oval depressed porotic area, localized in front of the anterior zygomatic tuberosities. Moreover, also the right mandibular condyle (the left one is not recordable because damaged *post mortem*) shows a slight porosity on the lateral external tubercle. Therefore, all these characters could suggest that the TMJ was strongly stressed.	

T. 92 male young adult	
Tooth with alteration	Lower right M2
Alteration	Buccal notch (degree 3).
Description of the alteration	
Feature of the alteration	Under light microscope (20x): smooth and polished bottom.
Occlusal wear (according to Smith, '84)	Degree 4.
Corresponding and/or similar alterations in opposite teeth	Not recordable because all the upper teeth and maxilla are not preserved.
General traits of the dentition:	
Teeth present	11/32
AMTL	0/11 (0,00%)
Dento-alveolar pathology and alterations	Considerable/medium deposits of lingual *calculus* have been observed on the preserved teeth. Buccal, lingual and interproximal chippings (degree 1, 2 and 3) have been observed only on the posterior teeth.
Discussion:	
The lesion described above could be the result of a repeated action of an object not too much abrasive (because of the notch bottom is smooth and polished) rubbed on the molar.	

T. 103 male young adult	
Tooth with alteration	Upper right I1
Alteration	Buccal "rough" notch (degree 1) and a chipping (degree 1) associated with the notch.
Description of the alteration	
Feature of the alteration	Under light microscope (20x): rough but smooth bottom.
Occlusal wear (according to Smith, '84)	Degree 5.
Corresponding and/or similar alterations in opposite teeth	Not present.
Tooth with alteration	Upper left I1
Alteration	Buccal notch (degree 2).
Description of the alteration:	
Feature of the alteration	Under light microscope (20x): smooth and polished bottom.
Occlusal wear (according to Smith, '84)	Degree 5.
Corresponding and/or similar alterations in opposite teeth	Not present.
Tooth with alteration	Upper right C Upper right P1
Alteration	Heavy unusual lingual wear.
Description of the alteration:	
Feature of the alteration	The dental wear patterns slope up in a disto-lingual direction with a wide dentin exposition on the lingual surface.
Occlusal wear (according to Smith, '84)	Upper right C: degree 5. Upper right P1: degree 6.
Corresponding and/or similar alterations in opposite teeth	Corresponding strong wear of the lower right teeth from P2 to M3 (degree 6/7 Smith, '84).
Tooth with alteration	Upper central and lateral right incisors.
Alteration	Lingual groove
Description of the alteration:	
Feature of the alteration	Fine and slight groove parallel to the CEJ. The bottom of this groove is irregular and rough. The groove surrounds the lingual tubercle in a distal-mesial direction. The groove of the upper right incisors shows slight deposits of *calculus* inside (light microscope, 20x).

Occlusal wear (according to Smith, '84)	Central upper incisors: degree 5; lateral right incisor: degree 3.
Corresponding and/or similar alterations in opposite teeth	Not present.
Tooth with alteration	Lower left M2
Alteration	Mesial lingual notch (degree 3); Distal lingual notch (degree 3) associated with a chipping (degree 1).
Description of the alteration:	
Feature of the alteration	Under light microscope (20x): rough but smooth bottom.
Occlusal wear (according to Smith, '84)	Degree 4.
Corresponding and/or similar alterations in opposite teeth	Only the Mesial lingual notch is corresponding to a lingual chipping (degree 3) on the upper left M2.
General traits of the dentition:	
Teeth present	27/32
AMTL	1/27 (3,13%)
Dento-alveolar pathology and alterations	Penetrating caries have been observed on the posterior left teeth. Buccal abscesses (associated to destroying caries) at the upper right M1 and P2 have been observed. The lower right posterior teeth are more worn (6-7, according to Smith, '84) than the left ones (4-5, according to Smith, '84). Considerable deposits of lingual *calculus* and medium buccal deposits with moderate alveolar retraction have been observed on the lower teeth. Buccal, lingual and interproximal chippings (degree 1, 2 and 3) on the anterior teeth and lingual and interproximal chippings (degree 2 and 3) have been observed.
Discussion	

We could suppose that this individual mostly used his anterior teeth and the right side teeth both in masticatory and non-masticatory activities. The lesions observed on the upper right C and P1 corresponding to the strong wear of the lower right teeth from P2 to M3, seem to be due to the repeated action of an object strongly held between these teeth. Moreover, the lesions observed on the lower and upper left M2, could have been produced by the repeated action of a not too much abrasive object rubbed or more simply held for a long time between the teeth (because of the notch bottoms are rough but smooth).

The lingual grooves observed on upper incisors were probably due to chemical erosion (grooves rough and uneven) caused by the contact of some acidic substances on the lingual surface during masticatory and/or non-masticatory tasks activities. Moreover, we could suppose that these lingual grooves were made *intra vitam* some time before the death of the individual (*calculus* deposition inside).

T.105 male mature adult	
Tooth with alteration	Upper right P2
Alteration	Lingual notch (degree 3).
Description of the alteration:	
Feature of the alteration	Under light microscope (25x): smooth bottom with short fine striations confluent toward the maximum depth of the notch.
Occlusal wear (according to Smith, '84)	Degree 4.
Corresponding and/or similar alterations in opposite teeth	Lingual chipping (degree 3) on the lower right M1.
General traits of the dentition:	
Teeth present	32/32
AMTL	0/32 (0,00%)
Dento-alveolar pathology and alterations	Only the upper left M2 shows caries (non penetrating). Upper and lower central and lateral incisors and the right side teeth are more worn (degree 4/5, according to Smith, '84) than the left ones (3-4, according to Smith, '84). Moderate deposits of lingual *calculus* have been observed on the lower teeth. Buccal, lingual and interproximal chippings (degree 1, 2 and 3) on the upper posterior teeth and the lower teeth have been observed. The upper anterior teeth show only buccal chippings of degree 1.
Discussion:	
The asymmetry of wear between the two sides could be put in relation to masticatory and non-masticatory activities mostly done on the right side. This fact could be suggested by the presence of lingual and interproximal chippings on the posterior teeth of both the arcades. We could also suppose the individual used to rub on the tooth a fibrous but not too much abrasive object that has produced the short fine striations inside the notch.	

T.110 male young adult	
Tooth with alteration	Upper left I1.
Alteration	Buccal notch "B" (degree 1)
Description of the alteration:	
Feature of the alteration	Rough surface due to *post mortem* taphonomic agents.

Occlusal wear (according to Smith, '84)	Upper left I1: degree 6. The anterior teeth show a heavy occlusal wear (degree 6) sloping lingually that has determined a wide dentin exposition and dentin secondary apposition.
Corresponding and/or similar alterations in opposite teeth	Not recordable because the lower anterior teeth are loss *post mortem*.
General traits of the dentition:	
Teeth present	12/32
AMTL	3/28 (10,71%)
Dento-alveolar pathology and alterations	The upper right M2, the upper left P2 and the lower right M1 are lost *ante mortem*. The lower right M2 and lower left M1 show destroying caries. Buccal abscesses at the upper right M1 and left M1 have been observed. All the upper anterior teeth show non penetrating caries. The upper central incisors show a strong wear (6, according to Smith, '84). Moderate retraction of the alveolar margins has been observed on the upper preserved teeth. Only buccal chippings of degree 1 and 2 have been observed on the upper anterior teeth.
Discussion:	
This alteration could be due to a very fine cylindrical rigid or flexible object, held between the teeth and/or rubbed back-and-forth over them with a repetitive. The notch on the upper left I1 and the strong occlusal wear showed by all the upper anterior teeth (in particular by the central incisors), could suggest that both masticatory and non masticatory activities were mostly done on the anterior teeth. The mechanical stress done in these activities could be testified by the slight development of both the masseter tuberosities. These features, and also a slight porosity showed by the glenoid fossa surface, could suggest that the TMJ was strongly stressed.	

T. 8 female young adult	
Tooth with alteration	Lower left M1
Alteration	Lingual notch (degree 3)
Description of the alteration:	
Feature of the alteration	Rough surface due to *post mortem* taphonomic agents.

Occlusal wear (according to Smith, '84)	Degree 4.
Corresponding and/or similar alterations in opposite teeth	Not recordable because the corresponding upper teeth are damaged *post mortem*.
General traits of the dentition:	
Teeth present	27/32
AMTL	0/28
Dento-alveolar pathology and alterations	Only few penetrating caries on the posterior teeth have been observed. Considerable deposits of buccal *calculus* have been observed on the upper left posterior teeth. Considerable and medium deposits of buccal and lingual *calculus* have been observed on the lower teeth. The teeth show a slight degree of wear (2-4, according to Smith, '84) and only slight buccal and interproximal chippings (degree 1 and 2).
Discussion:	
Unfortunately, the teeth are partially damaged *post mortem* by acid substances of the ground that have eroded the enamel. However, this lesion seems to be due to the repeated action of an object, probably circular, usually rubbed on the tooth.	

T. 49 female young adult	
Tooth with alteration	Upper left I2
Alteration	Lingual notch (degree1)
Description of the alteration:	

Feature of the alteration	Under light microscope (20x): smooth and polished bottom.
Occlusal wear (according to Smith, '84)	Degree 4 (flattened wear surface sloping up distally) Buccal surface: worn smooth and polished enamel.
Corresponding and/or similar alterations in opposite teeth	The lower left I2 shows a strong unusual wear sloping down disto-buccally.
Tooth with alteration	Lower left Canine
Alteration	Buccal notch (degree 3)
Description of the alteration:	
Feature of the alteration	Under light microscope (20x): smooth and polished bottom.
Occlusal wear (according to Smith, '84)	Degree 4.
Corresponding and/or similar alterations in opposite teeth	Not present.
General traits of the alteration:	
Teeth present	29/32
AMTL	0/32
Dento-alveolar pathology and alterations	A buccal abscess has been observed on the upper right M2 (affected by a destroying caries). Penetrating and non penetrating caries on the posterior teeth have been observed. Moderate/considerable deposits of lingual *calculus* on upper and lower posterior teeth and moderate retraction of the alveolar margin on the teeth of both the arcades have been observed. The anterior teeth are slightly more worn (3-4, according to Smith, '84) than the posterior ones (1-3, according to Smith, '84). The teeth show only slight buccal, lingual and interproximal chippings (degree 1).
Discussion:	
The upper left I2 is fixed into the maxillary bone behind the other upper teeth. In the occlusion, the lesions described above are corresponding and bound a kind of sub-circular quite large hall. We could suppose that these lesions were probably related to the habit to hold an object between the upper left I2 and the lower left I2 and C. This repeated gesture could have produced a kind of lodgings between the teeth. Therefore, these lesions considered all together, could suggest that the female individual of T.49 used these teeth to hold a cylindrical object kept tilted linguo-buccally from top to below such as observed in the lesions due to pipe-smoking (Morris, 1988; Kvaal and Derry, 1996; Alt *et al.*, 1998) or in the chewing of pens (Hickel, 1989; Alt *et al.*, 1998).	

T. 63 female young adult	
Tooth with alteration	Upper right I1
Alteration	Buccal notch (degree 2)
Description of the alteration:	
Feature of the alteration	Under light microscope (25x): bottom with fine striations oriented long the main axis of the notch.
Occlusal wear (according to Smith, '84)	Degree 4.
Corresponding and/or similar alterations in opposite teeth	Not present.
General traits of the dentition:	
Teeth present	30/32
AMTL	1/31
Dento-alveolar pathology and alterations	The lower right P2 has been lost *intra vitam*. Penetrating and non penetrating caries on the posterior teeth have been observed. All the teeth show a slight occlusal wear (degree 2-3 according to Smith, '84). Only the upper right I1 shows an occlusal wear of degree 4 (according to Smith, '84). Only three teeth are chipped (buccal chippings, degree 1).
Discussion:	
The lesion could be put in relation to the habit to rub on the tooth some fibrous objects (like a vegetable fibre) but not abrasive because the bottom is smooth and polished. This gesture, repeated several times in the same position, may have produced the notch on the upper right incisors.	

T. 90 female old adult	
Tooth with alteration	Lower right M1
Alteration	Lingual notch (degree 3)
Description of the alteration:	
Feature of the alteration	Under light microscope (20x): smooth and polished bottom. At the lowest point of the notch a wide but slight chipping of the enamel has been observed.
Occlusal wear (according to Smith, '84)	Degree 6.

Corresponding and/or similar alterations in opposite teeth	Buccal chippings (degree 2 and 3) on the upper M1 and M2.
Tooth with alteration	Lower right M1
Alteration	Buccal notch (degree 3)
Description of the alteration:	
Feature of the alteration	Under light microscope (20x): smooth and polished bottom.
Occlusal wear (according to Smith, '84)	Degree 6.
Corresponding and/or similar alterations in opposite teeth	Buccal chippings (degree 2 and 3) on the upper M1 and M2.
General traits of the dentition:	
Teeth present	19/32
AMTL	5/30 (16,67%)
Dento-alveolar pathology and alterations	Buccal abscesses at the upper right C (lost *post mortem*) and I1 and at the lower right M3 (lost *post mortem*) have been observed. Only the lower left M2 shows carious lesions (penetrating and non penetrating). The right teeth show a severe occlusal wear (5-7, according to Smith, '84), higher than the one of the left side (4-6, according to Smith, '84). Considerable deposits of lingual and buccal *calculus* on the lower anterior teeth have been observed. Medium deposits of buccal *calculus* on upper anterior teeth have been observed. Moderate retraction of the alveolar margins has been observed on all the preserved teeth. The upper posterior teeth show buccal and interproximal chippings of degree 3. Buccal, lingual and interproximal chippings (degree 1, 2 and 3) on the lower anterior teeth, only slight lingual chippings have been observed.
Discussion:	
We could suppose that the individual of T.90 used her teeth in a strong masticatory activity (as suggested by the high occlusal wear) and in extra-masticatory activities (because the presence of more than one notch). Both these activities were probably made mostly with the anterior teeth (as suggested by the considerable/medium deposits of lingual and buccal *calculus* on the anterior teeth and by the higher degree of chippings) and with the posterior right ones (as suggested by the higher occlusal wear of the right teeth and by the presence of notch on the lower right M1 and by the higher degree of chippings).	

B) The individuals with non-masticatory dental alterations of the late-ancient necropolis of Quadrella (Isernia, I-IV sec. AD)

T. 16 male old adult	
Tooth with alteration	Lower central and lateral incisors.
Alteration	Unusual heavy general (total) wear.
Description of the alteration:	
Feature of the alteration	The dental wear patterns slope down both in the buccal and in the lingual direction. The preserved incisors are short root stumps, with the occlusal surface smooth and polished. The pulp canal is closed by secondary dentin. Under light microscopy (20-40x): the occlusal surface of lower right I2 shows a fine striations bucco-lingual directed.

Occlusal wear (according to Smith, '84)	The lower teeth show a strong occlusal wear (degree 6/7).
Corresponding and/or similar alterations in opposite teeth	Not present.
General traits of the dentition:	
Teeth present	22/32
AMTL	3/27(11,11%)
Dento-alveolar pathology and alterations	The lower right M2 and M1 and the upper left P2 are lost *ante mortem*. A buccal abscess has been observed at the lower left C (affected by a destroying caries). The lower teeth are more worn (degree 5-7) than the upper ones (degree 2-4).
Discussion:	
We could suppose that the individual of T.16 used the lower teeth to treat or to scrape something held with the hands. It is also possible that the object responsible of this wear was pull from the outside to below. All these movements could explain the wear plains orientation. The substance may have been a kind of foodstuffs but also of another material. In any case, we could suppose that this substance was not too much abrasive because of the worn surfaces show an exposed smooth and polished dentin. This alteration is very similar to the one described by Bonfiglioli (2002) among tanners in a 20th century skeletal collection from Italy.	

T. 27C male old adult	
Tooth with alteration	Lower left I2
Alteration	Unusual buccal wear
Description of the alteration:	
Feature of the alteration	The dental wear patterns slope down both in the buccal and in the lingual direction. The incisor is a root stump, with the occlusal surface smooth and polished. The pulp canal is closed by secondary dentin. Under light microscopy (20-40x): the worn surface shows slight striations parallel each other and bucco-lingually oriented.
Occlusal wear (according to Smith, '84)	The tooth shows a strong occlusal general wear pattern (degree 5).

Corresponding and/or similar alterations in opposite teeth	The corresponding upper teeth are lost *ante mortem*.
General traits of the dentition:	
Teeth present	9/32
AMTL	17/29(58,62%)
Dento-alveolar pathology and alterations	Alveolar atrophy due to *ante mortem* tooth loss has been observed at: upper right premolars and from the upper left teeth I1 to P1 and from M2 to M3; lower right molars and central and lateral right incisors and lower left molars are lost *ante mortem*. The upper left M1 and the lower left P1 show destroying caries. The teeth show a high degree of wear (5/6, according to Smith, '84).
Discussion:	
We could suppose that the lower left anterior teeth were used to treat or to scrape something held with the hands and also that the lower left anterior teeth mostly did the masticatory and non-masticatory functions. In fact, the corresponding upper teeth and all the lower anterior and posterior right teeth are not present because lost *ante mortem*. As regards of the object, we could suppose that it was not too much abrasive because of the worn surfaces show an exposed smooth and polished dentin. The mechanical stress produced in these activities could be testified by a slight roughness and by a slight marginal lipping showed by the right glenoid fossa. Moreover, a little osteophyte on the anterior articular tuberosity.	

T. 29 bis male old adult	
Tooth with alteration	Lower right I2 and lower left I1.
Alteration	Unusual lingual wear
Description of the alteration:	
Feature of the alteration	The dental wear pattern slopes down lingually with exposition dentin. Lower right I2: analysis under light microscope (20x) shows exposed smooth and polished dentin with parallel striations mesio-distally directed.
Occlusal wear (according to Smith, '84)	Both the teeth with unusual lingual wear show an occlusal wear of degree 5.

Corresponding and/or similar alterations in opposite teeth	The maxilla is not preserved.
General traits of the dentitions:	
Teeth present	13/32
AMTL	2/16 (12,5%)
Dento-alveolar pathology and alterations	The lower right and left M1 are lost *ante mortem*. The lower right P2 shows a destroying caries. Penetrating and non penetrating caries on anterior and posterior teeth have been observed. Moderate/severe retractions of the alveolar margins have been observed. The teeth show a wear of degree 4-5 (according to Smith, '84). Buccal and interproximal chippings of degree 1, 2 and 3 on the posterior teeth have been observed.
Discussion:	
We could suppose that the lower teeth were used to treat something in some non-masticatory activities. As regards of the object, we could suppose that it was fibrous but not too much abrasive (as suggested by the smooth and polished lingual surface). A slight porosity and a slight marginal lipping present on the left mandibular condyle could testify the mechanical stress produced in these activities.	

T. 33 male old adult	
Tooth with alteration	Upper right I2
Alteration	Buccal notch (degree 1)
Description of the alteration:	
Feature of the alteration	Under light microscope (25x): smooth and polished bottom.
Occlusal wear (according to Smith, '84)	Degree 4.

Corresponding and/or similar alterations in opposite teeth	Not present.
General traits of the dentition:	
Teeth present	28/32
AMTL	3/31 (9,68%)
Dento-alveolar pathology and alterations	Alveolar atrophy due to ante mortem tooth loss has been observed at: upper right M3 and M2, lower left M3. The lower right M3 is affected by a destroying caries and shows a buccal abscess. The posterior teeth show penetrating caries. Destroying caries at lower right P1 and P2 have been also observed. The teeth show a wear of degree 4 (according to Smith, '84). Moderate retraction of the alveolar margins has been observed on upper and lower teeth. Interproximal chipping (degree 3) on the posterior teeth of both the arcades.
Discussion:	
The notch could have been produced by a repeated action of an object not too much abrasive (smooth and polished bottom) held or rubbed on the incisal edge. The slight marginal lipping showed by the right anterior articular tuberosity of the right glenoid fossa and a slight roughness showed by the right masseter tuberosity, could suggest that the TMJ was strongly stressed in both masticatory (as suggested by interproximal chippings of degree 3 on the posterior teeth) and non-masticatory activities.	

T.57 male young adult	
Tooth with alteration	Upper right I1
Alteration	Buccal notch "B" (degree 1)
Description of the alteration:	
Feature of the alteration	Under light microscope (20x): bottom homogeneous, smooth and polished.

Occlusal wear (according to Smith, '84)	Degree 3.
Corresponding and/or similar alterations in opposite teeth	Not present.
General traits of the dentition:	
Teeth present	32/32
AMTL	0/32 (0,00%)
Dento-alveolar pathology and alterations	Penetrating and non penetrating caries on the posterior teeth have been observed. All the teeth show only a slight occlusal wear (degree 1-3). The upper central incisors show buccal and interproximal chippings of degree 1. The lower left I2 shows an interproximal chipping of degree 3.
Discussion:	
We could suppose that a fine cylindrical object rigid or flexible, held or rubbed between the anterior teeth with a repetitive movement may have produced this notch "B". The gesture could have also produced chippings on both the upper central incisors and on the lower left I2.	

T. 62 male old adult	
Tooth with alteration	Lower right I1
Alteration	Unusual lingual wear
Description of the alteration:	
Feature of the alteration	Under light microscope (25x): the worn lingual surface is smooth and polished with dentin exposition from the incisal edge up until the CEJ.
Occlusal wear (according to Smith, '84)	Degree 5.
Corresponding and/or similar alterations in opposite teeth	The upper right I1 shows a wide and worn buccal chipping (degree 3).
General traits of the dentition:	
Teeth present	22/32
AMTL	6/29 (20,69%)
Dento-alveolar pathology and alterations	Alveolar atrophy due to ante mortem tooth loss has been observed at: upper right P1 and upper left M2 and M3. The upper right P1 shows a destroying caries. General heavy occlusal wear (degree 4/5). Medium deposits of buccal and lingual *calculus* on all the lower teeth especially on the lower anterior ones. Moderate/severe alveolar margins retraction has been observed.
Discussion:	
This lesion could be due to the repeated habit of held between the teeth a rigid or flexible circular fine object (such as a vegetable fibre). We could also suppose that this object was probably kept lingually tilted inside the mouth. This long-time gesture, repeated in the same position, may have produced both the buccal chipping on the upper right I1 and the anomalous wear on the lingual surface of the lower right I1 and the deposits of buccal and lingual *calculus* especially on all the lower anterior ones.	

T. 113 male young adult	
Tooth with alteration	Upper left I1
Alteration	Buccal notch (degree 1) associated with a buccal chipping of degree 2 at the maximum depth of the lesion.
Description of the alteration:	
Feature of the alteration	Under light microscope (20x): smooth and polished bottom.
Occlusal wear (according to Smith, '84)	Degree 5.
Corresponding and/or similar alterations in opposite teeth	The lower incisors show buccal, lingual and interproximal chippings of degree 1, 2 and 3.
General traits of the dentition:	
Teeth present	29/32
AMTL	2/32 (6,25%)
Dento-alveolar pathology and alterations	The upper right and left M1 have been lost *ante mortem* The upper right M2 is affected by a destroying caries and shows a buccal abscess. General slight/moderate degree of wear (2-5, according to Smith, '84). Moderate alveolar margins retraction has been observed. Several buccal chips of degree 2 have been observed on the upper anterior teeth. Moreover, quite all the teeth show buccal, lingual and interproximal chippings of degree 2 and 3.
Discussion:	
The presence of several teeth with buccal chippings on the anterior teeth and the buccal notch on the upper left I1, could suggest that the teeth were subjected to repeated strong traumas due both to masticatory and non-masticatory activities. The buccal notch could be due to the repeated passage of a fine, cylindrical object rubbed on the tooth. The stress that played on the tooth could have produced a chipping associated to the notch. A little osteophyte showed by the anterior edge of the mandibular right condyle could testify the mechanical stress played in these activities. Moreover, the left mandibular condyle shows on the posterior surface a wide depressed and porotic sub-oval area. These characters and also depressed areas on the anterior edge of both the fosse glenoidee could suggest that the TMJ was strongly used.	

T. 37 female old adult	
Tooth with alteration	Lower right I1
Alteration	Buccal notch (degree 3)
Description of the alteration:	
Feature of the alteration	Under light microscope (20x): smooth and polished bottom.
Occlusal wear (according to Smith, '84)	Degree 4.
Corresponding and/or similar alterations in opposite teeth	The upper right I1 shows an interproximal chipping of degree 1.
General traits of the dentition:	
Teeth present	24/32
AMTL	3/30 (10,00%)
Dento-alveolar pathology and alterations	Penetrating and non penetrating caries on the upper posterior teeth have been observed. General slight degree of wear (2-4, according to Smith, '84). The lower right M3 and M2 and the lower left M3 are lost *ante mortem*. Severe retractions of the alveolar margins and porosity on the alveolar crest cortex for both maxilla and mandible have been observed. The teeth show only few slight buccal, lingual and interproximal chippings (degree 1).
Discussion:	
We could suppose that a fine cylindrical object rigid or flexible, hold or rubbed on the lower right I1 may have produced the buccal notch in some non masticatory activities. The mechanical stress played in these activities could be testified by the marginal lipping showed by the left mandibular condyle and by the anterior edge of the right glenoid fossa. These characters and the strong corresponding showed by the anterior teeth could suggest that the individual of T.37 used strongly used the TMJ.	

T. 55 female old adult	
Tooth with alteration	Lower left M1
Alteration	Mesial buccal notch (degree 3); distal notch buccal and lingual (both of degree 3).
Description of the alteration:	
Feature of the alteration	Wide and depth notch involving both the enamel and the dentin with a smooth and polished bottom (light microscope, 20x).
Occlusal wear (according to Smith, '84)	Degree 5.
Tooth with alteration	Lower left M2
Alteration	Lingual notch (degree 3).
Description of the alteration:	
Feature of the alteration	Under light microscope (25x): short parallel striations bucco-lingually oriented on the smooth bottom.
Occlusal wear (according to Smith, '84)	Degree 5.
Corresponding and/or similar alterations in opposite teeth	The upper left M1 shows mesially a wide and depth lingual chipping of degree 3. This chipping is corresponding to both the notches of the lower left M1.
General traits of the dentition:	
Teeth present	29/32
AMTL	1/27 (3,70%)
Dento-alveolar pathology and alterations	A buccal abscess has been observed at the lower right M2. Quite all the teeth show buccal, lingual and interproximal chippings of degree 2 and 3. The posterior left teeth (degree 4-5) and the incisors (degree 4/5) are more worn than the other teeth (degree 2-4) and show a severe retraction of the alveolar margins. The left upper and lower posterior teeth show buccal, lingual and interproximal chippings (degree 2 and 3).
Discussion:	
The corresponding lesions seem to be due to the habit of held between the teeth rigid or flexible circular fine objects. We could suppose that the teeth were subjected to repeated strong traumas due to masticatory and non-masticatory activities. Moreover, these activities were probably mostly done on the posterior left teeth more worn, more chipped and with a more severe alveolar retraction than the teeth of the opposite side.	

T. 67 female ? adult	
Tooth with alteration	Lower right P2
Alteration	Mesial interproximal groove
Description of the alteration:	
Feature of the alteration	The groove (3,88mm length and 1,34mm width) occurs on the enamel just above and parallel to the central part of the CEJ. Under light microscope (30x): rounded, smooth and polished without any striations.
Occlusal wear (according to Smith, '84)	Degree 5.
Corresponding and/or similar alterations in opposite teeth	Not present neither in the corresponding upper tooth nor in the adjacent P1.
General traits of the dentition:	
Teeth present	10/32
AMTL	Not recordable: all the teeth are isolated.
Dento-alveolar pathology and alterations	The lower right P2 does not show any carious lesions. The dentition of this sample is not well preserved: all teeth are isolated, the alveolar bones are not preserved and so abscessing and any other pathological conditions cannot be described.
Discussion:	
We could suppose that the groove of the female of T.67 could derive from the repetitive back-and-forth movement of a foreign object for oral hygienic purposes. It is also probable that the groove has a vestibular insertion because it shows a more rounded vestibular border (this operation is easier than a lingual insertion).	

T. 79B female old adult	
Tooth with alteration	Upper left C
Alteration	Buccal "rough" notch (degree 2)
Description of the alteration:	
Feature of the alteration	Rough surface due to *post mortem* taphonomic agents.
Occlusal wear (according to Smith, '84)	Degree 2.
Corresponding and/or similar alterations in opposite teeth	Not present.
Tooth with alteration	Both the lower central incisors
Alteration	Anomalous buccal strong wear
Description of the alteration:	
Feature of the alteration	The wear patterns slope down buccally. The surface with exposed dentin appears rough but smooth. Under light microscope (20x) short parallel striations bucco-lingually oriented has been observed on I1 dx.
Occlusal wear (according to Smith, '84)	Degree 5.
Corresponding and/or similar alterations in opposite teeth	Buccal chipping of degree 3 on the upper incisors.
General traits of the alteration:	
Teeth present	11/32
AMTL	4/31 (12,90%)
Dento-alveolar pathology and alterations	The upper left M3 shows a destroying caries. The incisal edges of both the upper central incisors show several slight smoothed chippings. Considerable deposits of buccal and lingual *calculus* on the lower anterior teeth have been observed.
Discussion:	
The lesions observed could be due to a repeated action of an object (such as a vegetable fibre or wood-made stick) hold and/or rubbed on the anterior teeth (as suggested also by the deposits of buccal and lingual *calculus* on the lower anterior teeth).	

T. 85 adult of an unidentified sex	
Tooth with alteration	Upper and lower incisors
Alteration	Unusual strong general wear.
Description of the alteration:	
Feature of the alteration	The wear patterns slope down buccally and lingually. Under light microscope (20x): rough but smooth occlusal surface with exposed dentin. The incisors are root stump with flattened/slight convex occlusal surfaces bordering on the alveolar crests. The pulp canal is closed by secondary dentin.
Occlusal wear (according to Smith, '84)	Degree 7.
Corresponding and/or similar alterations in opposite teeth	The worn surfaces are corresponding each other.
General traits of the dentition:	
Teeth present	23/32
AMTL	4/26 (15,38%)
Dento-alveolar pathology and alterations	The lower right M1 and the lower left molars are lost *ante mortem*. The upper left P1 and P2 show destroying caries. The anterior teeth are more worn (degree 7) than the posterior ones (degree 2-5).
Discussion:	
We could suppose that the individual of T.85 used the anterior teeth to treat some substances in non-masticatory and/or para-masticatory activities (as suggested by the higher degree of wear of the anterior teeth). It is also possible that the object responsible of this wear was pull from the outside to below. The substance may have been a kind of foodstuffs but also of another material. In any case, we could suppose that this substance was not too much abrasive because of the worn surfaces show an exposed smooth dentin.	

C) The individuals with non-masticatory dental alterations of the early-middle age necropolis of Vicenne-Campochiaro (Campobasso, 6th-7th sec. AD)

T. 3 male old adult	
Tooth with alteration	Upper central and lateral left incisors and upper left canine.
Alteration	Strong unusual wear.
Description of the alteration:	
Feature of the alteration	The dental wear pattern of the central incisors slopes down both in the buccal and in the lingual direction. The dental wear pattern of the left I2 and left canine slopes in a mesio-distally direction. The incisors are root stumps. Observation under light microscope (20x): occlusal surfaces uneven but smooth and polished; the left I2 shows on the occlusal surface some striations bucco-lingually oriented. In all the cases, the pulp canals are closed by secondary dentin.
Occlusal wear (according to Smith, '84)	Upper central and lateral left incisors: degree 8. Upper left canine: degree 7.
Corresponding and/or similar alterations in opposite teeth	Not recordable because of the lower anterior teeth are lost *ante mortem*.
General traits of the dentition:	
Teeth present	9/32
AMTL	15/29 (51,72%)
Dento-alveolar pathology and alterations	At the upper left I2 a buccal abscess is observed. This abscess, because of the tooth does not show caries, could probably be due to the strong wear. Abscesses at other maxillary alveoli are also observed, but in these cases the teeth are loss *post mortem* and/or *intra vitam*. Alveolar atrophy due to *ante mortem* tooth loss has been observed at: upper right I2, upper left molars, lower right M1 and from lower right I2 to left M3. The teeth show high grade of wear (5-7, according to Smith '84).
Discussion:	
The strong unusual wear showed by the upper central and lateral incisors and by the left canine is anomalous both for the degree and shape with respect to the wear pattern showed by the other preserved teeth. Therefore, we could suppose that the anterior teeth of the male old adult of T.3 were involved both to strong masticatory activity (due to the lack of the lower teeth as suggested by high grade of wear) and non-masticatory tasks activities.	

T. 26 male young adult	
Tooth with alteration	Lower right I2
Alteration	Transversal notch (degree 1).
Description of the alteration:	
Feature of the alteration	At the maximum depth of the notch a buccal chipping of degree 2 has been observed. Under light microscope (25x): smooth and polished bottom.
Occlusal wear (according to Smith, '84)	Degree 2.
Corresponding and/or similar alterations in opposite teeth	Not present.
General traits of the dentition:	
Teeth present	28/32
AMTL	0/10 (0,00%)
Dento-alveolar pathology and alterations	All the upper teeth and the lower right molars and right I2 are isolated so abscessing and any other pathological conditions cannot be described.
Discussion:	
The notch could be due to a cylindrical fine rigid or flexible object probable rubbed over the tooth. As regards the nature of the object, taking into account of the smooth and polished notch bottom, we could suppose that it was not too much abrasive. The stress that played on the tooth could have produced, as a secondary effect, the chipping associated to the notch.	

T. 27 male ? adult	
Tooth with alteration	Upper right I2
Alteration	LSAMAT
Description of the alteration:	
Feature of the alteration	Flattened lingual surface, between the CEJ and the incisal edge, with a little area with exposed dentine. Unfortunately the lingual surface is seriously damaged *post mortem* probably due to acid substances of the ground.
Occlusal wear (according to Smith, '84)	Degree 2.
Corresponding and/or similar alterations in opposite teeth	Not recordable because the lower teeth from right I2 to left M2 are lost *post mortem*.
General traits of the dentition:	
Teeth present	12/32
AMTL	0/0
Dento-alveolar pathology and alterations	All the teeth present are isolated so abscessing and any other pathological conditions cannot be described.
Discussion:	
The wear on the lingual surface seems to be similar to the one described as LSAMAT (Lingual Surface Attrition of the Maxillary Anterior Teeth). It is possible to hypothesize a particular habit to chew some substances not related to food or to masticatory activity. This unusual dental wear pattern has been also observed in all of the horsemen of the VCN sample (Belcastro *et al.*, 2000).	

T. 54 male adolescent	
Tooth with alteration	Upper right I1.
Alteration	Buccal notch (degree 1).
Description of the alteration:	
Feature of the alteration	Under light microscopy (40x): homogenous, smooth and polished bottom, without striations.
Occlusal wear (according to Smith, '84)	Degree 4.
Corresponding and/or similar alterations in opposite teeth	Lingual chipping (degree 2).
General traits of the alteration:	
Teeth present	28/32
AMTL	0/30 (0,00%)
Dento-alveolar pathology and alterations	Only the posterior teeth show few penetrating and non penetrating caries. Slight deposits of buccal and lingual *calculus* have been observed. The teeth show only a slight degree of wear (1-4, according to Smith, '84). The anterior teeth show buccal chippings of degree 1 and 2.
Discussion:	
The notch could be due to a cylindrical fine rigid or flexible object probable rubbed over the tooth. As regards the nature of the object, taking into account of the smooth and polished notch bottom, we could suppose that it was not too much abrasive.	

T. 63 male mature adult	
Tooth with alteration	Upper central and lateral left incisors.
Alteration	LSAMAT
Description of the alteration:	
Feature of the alteration	Flattened lingual surfaces, between the CEJ and incisal edges, with a little area with exposed dentine. The lingual surface is seriously damaged *post mortem* probably due to acid substances of the ground.
Occlusal wear (according to Smith, '84)	Degree 4 (for both the teeth).
Corresponding and/or similar alterations in opposite teeth	Not present. The lower central incisors show buccal chippings of degree 1.
General traits of the alteration:	
Teeth present	18/32
AMTL	7/21 (33,33%)
Dento-alveolar pathology and alterations	Alveolar atrophy due to *ante mortem* tooth loss has been observed at: upper right I1, upper left P1, lower right M3, M1, lower left P1, M1 and M2. Penetrating and non penetrating caries have been observed on few upper and lower teeth. A buccal abscess at the lower right P1 (not recordable) has been observed. Slight deposits of lingual *calculus* have been observed on the lower teeth. Only buccal chippings of degree 1, 2 and 3 have been observed on the anterior teeth.
Discussion:	
The wear on the lingual surface seems to be similar to the one described as LSAMAT (Lingual Surface Attrition of the Maxillary Anterior Teeth). It is possible to hypothesize a particular habit to chew some substances not related to food or to masticatory activity. This unusual dental wear pattern has been observed in all of the horsemen of the VCN sample (Belcastro *et al.*, 2000).	

T. 67 male young adult	
Tooth with alteration	Upper right I1
Alteration	Buccal notch (degree 1).
Description of the alteration:	
Feature of the alteration	Under light microscopy (40x): homogenous, smooth and polished bottom, without striations.
Occlusal wear (according to Smith, '84)	Degree 4.
Corresponding and/or similar alterations in opposite teeth	Buccal chipping (degree 1) on the lower right I1.
General traits of the alteration:	
Teeth present	32/32
AMTL	0/32 (0,00%)
Dento-alveolar pathology and alterations	Buccal and interproximal chipping of degree 1, 2 and 3 have been observed on the posterior upper and lower teeth. Slight deposits of buccal and lingual calculus have been observed on the upper teeth and moderate lingual deposits have been observed on the lower right posterior teeth. Moderate retraction of the alveolar margins for all the teeth has been observed. The caries are absent.
Discussion:	
The notch could be due to a cylindrical fine rigid or flexible object probable rubbed over the tooth. As regards the nature of the object, taking into account of the smooth and polished notch bottom, we could suppose that it was not too much abrasive.	

T. 70 male old adult	
Tooth with alteration	Lower right P2
Alteration	Buccal notch (degree 3)
Description of the alteration:	
Feature of the alteration	Under light microscope (20x): smooth and polished bottom.
Occlusal wear (according to Smith, '84)	Degree 5.
Corresponding and/or similar alterations in opposite teeth	Unusual strong wear and buccal and interproximal chippings (degree 2 and 3) on both the upper right premolar.
Tooth with alteration	Upper right P1 and P2.
Alteration	Unusual strong wear
Description of the alteration:	
Feature of the alteration	The dental wear pattern slopes for P1 mesio-distally from below to top and for P2 mesio-distally in the opposite direction.
Occlusal wear (according to Smith, '84)	Degree 6 (for both the teeth).
Corresponding and/or similar alterations in opposite teeth	Buccal notch (degree 3) on the lower right P2.
Tooth with alteration	Upper left M1
Alteration	Buccal notch (degree 3)
Description of the alteration:	
Feature of the alteration	Under light microscope (20x): smooth and polished bottom.
Occlusal wear (according to Smith, '84)	Degree 7.
Corresponding and/or similar alterations in opposite teeth	The lower left M2 show lingual chippings (degree 3).
General traits of the alteration:	
Teeth present	24/32
AMTL	4/32 (12,50%)
Dento-alveolar pathology and alterations	Alveolar atrophy due to *ante mortem* tooth loss has been observed at: upper right I2, lower right M3, lower left I1 and M3. Penetrating caries at the upper left posterior teeth have been observed. The upper left M1 shows a buccal abscess and the lower left M1 a lingual one. All the teeth show a strong occlusal wear (degree 4-7,

	according to Smith, '84) with a wide dentin exposition. A general severe horizontal alveolar margins retraction has been observed in both the arcades.
Discussion:	
The alterations observed on the lower right P2 and on both the upper right premolars seem to be due to the habit of held a rigid or semi-rigid object between these teeth. Moreover, we could suppose that the individual of the T.70 used the teeth both in strong masticatory and non-masticatory activities (as suggested by the strong occlusal wear). A porotic sub-oval depressed area in the central part of the articular eminence of both the glenoid fossae and the slight eburnation on the posterior surface of the left mandibular condyle (the right one is not recordable) could testify that the TMJ was strongly stressed in these activities.	

T. 112 male young adult	
Tooth with alteration	Upper right I2
Alteration	Buccal notch (degree1).
Description of the alteration:	
Feature of the alteration	Under light microscope (20x): smooth and polished bottom.
Occlusal wear (according to Smith, '84)	Degree 3.
Corresponding and/or similar alterations in opposite teeth	Lingual chipping (degree 3) on the lower right I2.
Tooth with alteration	Upper central and lateral left incisors
Alteration	Upper right I1: buccal notch (degree 2) Upper left incisors: buccal notch (degree 3).
Description of the alteration:	
Feature of the alteration	Under light microscope (20x): smooth and polished bottoms; fine parallel striations perpendicular with respect to the incisal edge on the buccal surface of both the central upper incisors.
Occlusal wear (according to Smith, '84)	Upper right I1: degree 4 Upper left I1: degree 4 Upper left I2: degree 3
Corresponding and/or similar alterations in opposite teeth	Buccal and lingual notch (degree 1 and 2) on the lower incisors.

Tooth with alteration	Lower central and lateral left incisors
Alteration	Lower right I1: buccal notch (degree 1); lower left I1: buccal notch (degree 1); lower left I2: buccal notch (degree 2).
Description of the alteration:	
Feature of the alteration	All the notches on the lower incisors are damaged *post mortem*.
Occlusal wear (according to Smith, '84)	Lower central incisors: degree 3 Lower left I2: degree 2
Corresponding and/or similar alterations in opposite teeth	Buccal chippings (degree on the upper incisors
General traits of the alteration:	
Teeth present	31/32
AMTL	0/32 (0,00%)
Dento-alveolar pathology and alterations	Only few posterior teeth show caries (penetrating and non penetrating). Slight deposits of buccal and lingual calculus on the upper left teeth and on the lower anterior ones have been observed. The teeth show only a slight occlusal wear (degree 1-4, according to Smith, '84).
Discussion:	
The notches showed by the upper left I2 and the lower left I2 are corresponding each other and therefore probably due to the same aetiological factor such as holding and/or rubbing between the teeth a rigid or semi-rigid object. This gesture, repeated several times in the same position, may have produced the notches and striations on the buccal surface of both the central upper incisors.	

T. 121 male old adult	
Tooth with alteration	Lower left I2
Alteration	Lingual notch (degree 3)
Description of the alteration:	
Feature of the alteration	At the maximum depth of the notch a chipping (degree 3) has been observed. Under light microscopy (20x): on the exposed dentin of the notch bottom, some fine parallel striations disto-mesially directed have been observed.
Occlusal wear (according to Smith, '84)	Degree 5.
Corresponding and/or similar alterations in opposite teeth	Buccal chippings (degree 1) on the upper left I2.
General traits of the alteration:	
Teeth present	25/32
AMTL	0/13 (0,00%)
Dento-alveolar pathology and alterations	Only a non penetrating caries has been observed. The lower anterior teeth show buccal, lingual and interproximal chippings of degree 3 and considerable deposits of buccal and lingual *calculus* and a severe retraction of the alveolar margins (for the upper teeth this character is not recordable because of the lack of the maxillary bone). The upper anterior teeth show a moderate occlusal wear (degree 4/5, according to Smith '84). This wear pattern is corresponding to the buccal wear showed by the lower incisors long their incisal edge.
Discussion:	
All these alterations could suggest that the anterior teeth were subjected to repeated strong traumas due both to masticatory and non-masticatory activities. We could suppose that the notch is the result of the habit to rub on the tooth fibrous but not too much abrasive objects (as suggested by the striations observed on the notch smooth bottom) The mechanical stress done in this activity could probably be testified by a sub-oval and slightly porotic depressed area localized in front of the anterior zygomatic tuberosity of the right glenoid fossa (the left glenoid fossa and both the mandibular condyles are not recordable). All these characters could suggest that the TMJ was strongly stressed.	

T. 165 male old adult	
Tooth with alteration	Upper right canine
Alteration	Lingual notch (degree 3)
Description of the alteration:	
Feature of the alteration	Under light microscope (20x): some short fine striations on the bottom exposed dentine. These striations are bucco-lingually directed and join together towards the maximum depth of the notch.
Occlusal wear (according to Smith, '84)	Not recordable because of a destroying caries.
Corresponding and/or similar alterations in opposite teeth	Buccal and interproximal chippings (degree 1 and 2) on the lower right C.
Tooth with alteration	Lower right M1
Alteration	Lingual notch (degree 3)
Description of the alteration:	
Feature of the alteration	Under light microscope (20x): some short fine striations on the bottom exposed dentine. These striations are bucco-lingually directed and join together towards the maximum depth of the notch.
Occlusal wear (according to Smith, '84)	Degree 6.
Corresponding and/or similar alterations in opposite teeth	Not present.
General traits of the alteration:	
Teeth present	15/32
AMTL	9/31 (29,03%)
Dento-alveolar pathology and alterations	Alveolar atrophy due to *ante mortem* tooth loss has been observed at: upper right M2, P2 and left M2 and M3; lower right M3 and M2, left molars. Destroying caries and buccal abscesses at the upper right and left C have been observed. A buccal abscess has also been observed at the upper left M1 (lost *post mortem*). The upper and lower posterior teeth show penetrating caries. All the teeth show a strong occlusal wear (degree 5-6, according to Smith, '84) with a wide dentin exposition. The pulp canals are closed by secondary dentin. A severe horizontal retraction of the margins alveolar has been observed in both arcades.

	Quite all the preserved teeth show mostly interproximal chippings (degree 2 and 3).
Discussion:	
The presence of notches and of teeth with multiple chippings could suggest that the teeth were involved in extra-masticatory activities. Moreover, the presence of lingual chipping could suggest that the individual of T.165 used the teeth in a strong masticatory activity because, as observed by Belcastro *et al.* (2007), the presence of lingual chipping seems to be due to masticatory traumas.	

T. 16 male old adult – horseman	
Tooth with alteration	Upper central incisors and right canine.
Alteration	LSAMAT
Description of the alteration:	
Feature of the alteration	The dental wear pattern of the slopes down in the buccal-lingual direction with exposition of dentine between the CEJ and incisal edges. Under light microscope (20x): on the worn lingual surface of upper anterior teeth fine striations parallel each other, buccal-lingually directed, running from the *cingulum* to the incisal edge have been observed.
Occlusal wear (according to Smith, '84)	All these teeth show a occlusal wear of degree 5.
Corresponding and/or similar alterations in opposite teeth	Not present.
General traits of the alteration:	
Teeth present	31/32
AMTL	0/32 (0,00%)
Dento-alveolar pathology and alterations	The caries are absent. Buccal abscess on the lower M2 has been observed. The upper anterior teeth are more worn (degree 5, according to Smith,'84) than the lower ones (degree 3/4, according to Smith,'84). Buccal chippings (degree 1) on the lower incisors have been observed. Slight deposits of buccal and lingual *calculus* on the posterior lower teeth.
Discussion:	

The pattern observed in this horseman recalls those described in literature as LSAMAT (Lingual Surface Attrition of the Maxillary Anterior Teeth) (Turner *et al.*, 1983; Comuzzie & Steel, 1998; Turner *et al.*, 1991; Irish & Turner, 1997).
The wear of this individual could suggest that the horseman could process (pulling, rubbing, chewing, etc.), between the upper incisors and tongue, some particular substance for lengthy period of time. The nature of the substance involved in this unusual wear is unknown, but it is possible to suppose that it is abrasive and lacking in carbohydrates since the low rate of caries only on the posterior teeth in the three mature-aged horsemen which show LASAMAT (TT. 16, 66, 109) (Belcastro *et al.*, 2000).

T. 66 male young adult – horseman	
Tooth with alteration	Upper incisors and canines.
Alteration	LSAMAT
Description of the alteration:	
Feature of the alteration	The dental wear pattern of the slopes down in the buccal-lingual direction with exposition of dentine between the CEJ and incisal edges. Under light microscope and SEM analysis: on the worn lingual surface of upper anterior teeth some fine parallel striae directed from the CEJ towards the incisal edge has been observed.
Occlusal wear (according to Smith, '84)	Upper central incisors: degree 5 Upper lateral incisors: degree 4 Upper right C: degree 4 Upper left C: degree 3
Corresponding and/or similar alterations in opposite teeth	Not present.
General traits of the alteration:	
Teeth present	28/32
AMTL	3/31 (9,68%)
Dento-alveolar pathology and alterations	The upper left M1, the lower right M3 and m1 are lost *ante mortem*. The upper left P2 show a destroying caries. General moderate degree of wear (3-5, according to Smith, '84). The central upper and lower incisors show corresponding buccal chipping (degree 2 and 3). Slight deposits of lingual *calculus* have been observed on the upper and lower teeth.

Discussion:
The pattern observed in this horseman recalls those described in literature as LSAMAT (Lingual Surface Attrition of the Maxillary Anterior Teeth) (Turner *et al.*, 1983; Comuzzie & Steel, 1998; Turner *et al.*, 1991; Irish & Turner, 1997). The wear of this individual could suggest that the horseman could process (pulling, rubbing, chewing, etc.), between the upper incisors and tongue, some particular substance for lengthy period of time. The nature of the substance involved in this unusual wear is unknown, but it is possible to suppose that it is abrasive and lacking in carbohydrates since the low rate of caries only on the posterior teeth in the three mature-aged horsemen which show LASAMAT (TT. 16, 66, 109) (Belcastro *et al.*, 2000). The corresponding buccal chipping showed by the upper and lower incisors seem to be due to the same aetiological factor such as the habit to hold an object between the anterior teeth of both the arcades. Moreover, both the fosse glenoidee show roughness. Slight eburnation on right condyle has been observed. These characters could suggest that both the TMJ were strongly stressed.

T. 109 male mature adult – horseman	
Tooth with alteration	From upper right Canine to left I2.
Alteration	LSAMAT
Description of the alteration:	
Feature of the alteration	The dental wear pattern of the slopes down in the buccal-lingual direction with exposition of dentine between the CEJ and incisal edges. Under light microscope (20x): only for the right canine on the worn lingual surface fine parallel striations buccal-lingually directed have been observed.
Occlusal wear (according to Smith, '84)	All these teeth show an occlusal wear of degree 5.
Corresponding and/or similar alterations in opposite teeth	Not present.
General traits of the alteration:	
Teeth present	21/32
AMTL	7/31 (22,58%)
Dento-alveolar pathology and alterations	Alveolar atrophy due to *ante mortem* tooth loss has been observed at: upper right M3 and M1, upper left M1 and M2, lower right and left M1. A buccal abscess has been observed at the upper left P1 (not recordable). The lower left M2 shows a destroying caries. General moderate degree of wear (5, according to Smith, '84).

	A severe horizontal retraction of the margins alveolar has been observed in both arcades. The upper left P1 shows a buccal abscess. Slight deposits of buccal and lingual *calculus* on the upper and lower anterior teeth have been observed. The upper and lower anterior teeth show buccal chippings (degree 1, 2 and 3).
Discussion:	
A similar wear pattern with respect to the horsemen of TT. 16 and 66 has been observed also in the upper anterior teeth (from right canine to left I2) of the horseman of T.109. The pattern observed in this horseman recalls those described in literature as LSAMAT (Lingual Surface Attrition of the Maxillary Anterior Teeth) (Turner *et al.*, 1983; Comuzzie & Steel, 1998; Turner *et al.*, 1991; Irish & Turner, 1997). The wear of this individual (such as observed for TT. 16 and 66) could suggest that the horseman could process (pulling, rubbing, chewing, etc.), between the upper incisors and tongue, some particular substance for lengthy period of time. The nature of the substance involved in this unusual wear is unknown, but it is possible to suppose that it is abrasive and lacking in carbohydrates since the low rate of caries only on the posterior teeth in the three mature-aged horsemen which show LSAMAT (TT. 16, 66, 109) (Belcastro *et al.*, 2000).	

T. 79-85 ? adult - horseman	
Tooth with alteration	Upper right I2, upper left I1 and I2 Lower central incisors
Alteration	Unusual (buccal and lingual) wear pattern.
Description of the alteration:	
Feature of the alteration	The wear pattern of the lower anterior teeth slopes down buccally; the wear pattern of the upper anterior teeth slopes lingually. The worn surfaces are flattened with exposition of dentin. Under light microscope (20x): only on the upper left I2 worn lingual surface fine striations have been observed. The lingual surface of the left I1 is damaged *post mortem*.
Occlusal wear (according to Smith, '84)	Upper right I2: degree 5 Upper left I1 and I2: degree 6 Lower central incisors: degree 5 (higher than that of the posterior teeth (3-4) and with secondary dentin exposition.
Corresponding and/or similar alterations in opposite teeth	The anterior mandibular and maxillary teeth show correspondent buccal and lingual wears.
Tooth with alteration	Upper right I2
Alteration	Interproximal mesial and distal grooves.
Description of the alteration:	
Feature of the alteration	Distal groove (length 3,35mm and width 2,30mm); mesial groove (length 4,35mm and width 2,50mm) The grooves are shallow, polished and occur on the dentin parallely to the CEJ.

	Under light microscope (20x): smooth and polished bottom with fine striations long the main axis of each grooves.
Occlusal wear (according to Smith, '84)	Degree 5.
Corresponding and/or similar alterations in opposite teeth	Not present.
General traits of the alteration:	
Teeth present	25/32
AMTL	1/29 (3,45%)
Dento-alveolar pathology and alterations	The upper left M2 is lost *ante mortem*. Slight deposits of lingual *calculus* on the lower teeth have been observed. The lower central incisors (degree 5) are more worn than the other teeth (3-4) and show secondary dentin exposition. Buccal and lingual chippings of degree 2 and 3 on the anterior teeth have been observed.
Discussion:	
In the case of the unusual buccal and lingual wear pattern of the anterior teeth a repeated pulling-tearing movements in a buccal-lingual directions could be supposed. The strong mechanical stress done in this activity could be testified by the widening of the anterior edge of the left glenoid fossa. We could suppose that the grooves could derive from the repetitive back-and-forth movement of a foreign object for oral hygienic purposes or for some other unknown reasons.	

T. 81 male old adult – horseman	
Tooth with alteration	Lower right incisors
Alteration	Unusual wear and lingual chipping (degree 3) and lingual chipping (degree 3).
Description of the alteration:	
Feature of the alteration	The dental wear patterns slope lingually in front of each other with dentin exposition. So a wide concave lodging is delimited between the teeth. Under light microscope (20x): uneven but smooth surfaces.
Occlusal wear (according to Smith, '84)	Both these teeth show degree 5.
Corresponding and/or similar alterations in opposite teeth	Not recordable because the upper anterior teeth are lost *post mortem*.
General traits of the alteration:	
Teeth present	25/32
AMTL	8/25 (32,00%)

Dento-alveolar pathology and alterations	Alveolar atrophy due to *ante mortem* tooth loss has been observed at: upper right M2, M1, P1 and C; upper left M1 and M2; lower right M3 and M2. Buccal abscesses at the upper right P2 and upper left P1 and P2 and at the lower right M1 and P2 have been observed. The lower anterior teeth show lingual chippings of degree 3.
Discussion:	
All the alterations observed could suggest a non-masticatory use of the anterior teeth. We could suppose that an object, lingually tilted, was usually strongly held between these teeth.	

T. 150 old adult – horseman	
Tooth with alteration	Upper and lower central incisors
Alteration	Unusual lingual and buccal wear
Description of the alteration:	
Feature of the alteration	The dental wear pattern slopes both in lingual and buccal direction and a lingual wear of the lower central incisors has been observed. Under light microscope (20x): the worn surfaces of upper central incisors show short striations buccal-lingually directed and the lingual worn surface of the lower central incisors show fine parallel striations perpendicular with respect to the incisal edge.
Occlusal wear (according to Smith, '84)	Upper central incisors: degree 6/7 Lower central incisors: degree 5.
Corresponding and/or similar alterations in opposite teeth	The wear patterns are corresponding each other.
Tooth with alteration	Upper right P2 and lower right I1
Alteration	Lingual notch (degree 2)
Description of the alteration:	
Feature of the alteration	Under light microscope (20x): in both the notches smooth and polished bottom with short striations buccal-lingually directed.
Occlusal wear (according to Smith, '84)	Upper right P2: degree 7 Lower right I1: degree 5

Corresponding and/or similar alterations in opposite teeth	The lower right P2 shows an interproximal chipping (degree 3).
General traits of the alteration:	
Teeth present	20/32
AMTL	11/32 (34,38%)
Dento-alveolar pathology and alterations	The upper right and left M2 and M3, and the lower right and left molars are lost *ante mortem*. Destroying caries have been observed at the upper right P1 and left P1 and P2. Buccal abscess, probably due to these carious lesions, have been observed at the upper right P1 and at the upper left P1 and P2 (both affected by destroying caries). Quite all the lower anterior teeth show penetrating caries A severe alveolar margins retraction has been observed on the upper and lower teeth. Buccal and lingual chippings of degree 2 and 3 have been observed on the lower anterior teeth.
Discussion:	
The unusual wear showed by the upper and lower central incisors could suggest that the horseman of T.150 used the teeth in some non-masticatory daily-task activities such as pulling, rubbing and/or chewing between the upper and lower incisors some particular substance for lengthy period of time (as also suggested by the chippings on the lower anterior teeth). Moreover, both the glenoid fossae show a strong porosity on the anterior zygomatic tuberosity and the left mandibular condyle (the right one is not recordable) shows a slight eburnation. All these characters could suggest that the TMJ were strongly stressed.	

T. 10 female ? adult	
Tooth with alteration	Upper right P2
Alteration	Buccal notch (degree 2)
Description of the alteration:	
Feature of the alteration	Rough and uneven surface due to *post mortem* alterations that have eroded and fractured enamel and dentin.
Occlusal wear (according to Smith, '84)	Degree 7.
Corresponding and/or similar alterations in opposite teeth	The lower right P2 show an interproximal chipping (degree 1).
Tooth with alteration	Upper left Canine
Alteration	Unusual wear
Description of the alteration:	
Feature of the alteration	The dental wear pattern of the left C slopes down in disto-mesial direction from the top to below.

Occlusal wear (according to Smith, '84)	Degree 5.
Corresponding and/or similar alterations in opposite teeth	Not present.
General traits of the alteration:	
Teeth present	14/32
AMTL	0/0
Dento-alveolar pathology and alterations	The lower right M2 shows a destroying caries. The teeth are isolated and not well preserved because of taphonomic agents that have eroded and fractured *post mortem* enamel and dentin.
Discussion:	
All these alterations could suggest that the teeth were used both in masticatory and non-masticatory activities such as the habit to hold and/or rub an object between these teeth. Unfortunately, the teeth of the female of T.10 are in a bad preservation state because of *post mortem* taphonomic agents that have eroded and fractured enamel and dentin.	

T. 18 female young adult	
Tooth with alteration	Upper right Canine and upper right I2
Alteration	Buccal notch "B" (degree 1)
Description of the alteration:	
Feature of the alteration	The notches are slightly rounded, polished, with fine striations long their main axis (light microscope, 20x) and tilted from the top to below of an angle of 30° with respect to the occlusal plain.
Occlusal wear (according to Smith, '84)	Upper right C: degree 2 Upper right I2: degree 3
Corresponding and/or similar alterations in opposite teeth	These two lesions are in adjacent teeth and are corresponding both for shape and position.
Tooth with alteration	Lower right Canine and lower right I2
Alteration	Lower right C: Transversal notch (degree 1) Lower right I2: buccal notch "B" (degree 1).
Description of the alteration:	
Feature of the alteration	Under light microscope (20x): smooth and polished bottom. These notches slopes down buccally.
Occlusal wear (according to Smith, '84)	Lower right C: degree 3. Lower right I2: degree 3.
Corresponding and/or similar alterations in opposite teeth	Also these two notches are in adjacent teeth and are corresponding both for shape and position.
Tooth with alteration	Upper right I1 and upper left I2
Alteration	Upper right I1: buccal and lingual notches (degree 1) Upper left I2: buccal notch (degree 1)

Description of the alteration:	
Feature of the alteration	Under light microscope (20x): smooth and polished bottom.
Occlusal wear (according to Smith, '84)	Upper right I1: degree 4. Upper left I2: degree 3.
Corresponding and/or similar alterations in opposite teeth	Not recordable because the lower central incisors are lost *post mortem*.
General traits of the alteration:	
Teeth present	27/32
AMTL	0/31 (0,00%)
Dento-alveolar pathology and alterations	Penetrating and non penetrating caries on the posterior teeth have been observed. The teeth show only a slight degree of wear (1-4, according to Smith, '84). Buccal, lingual and interproximal chipping on the upper right I2 and on the lower right C and I2 have been observed.
Discussion:	
The notches on the upper right C and right I2 and on the lower right C and right I2 are corresponding both for shape and position. Moreover, they delimit a little sub-circular hall (Ø≤2mm). We could suppose that they are due to the repeated action of holding and/or pass between these teeth a fine circular object. This repeated gesture may have produced a kind of lodgings between the teeth and buccal, lingual and interproximal chipping on the upper right I2 and on the lower right C and I2. Moreover, because of the inclination showed by the lesions, we could suppose that this object was tilted down. All these alterations could suggest that the female of T.18 used the teeth in non-masticatory activities and also that these activities were done mostly with the anterior teeth.	

T. 23 female old adult	
Tooth with alteration	Upper right I1
Alteration	Unusual wear.
Description of the alteration:	
Feature of the alteration	The dental wear pattern slopes down both in the buccal and in the lingual direction and the tooth is a root stump. The pulp canal is closed by secondary dentin. Under light microscope (20x): smooth and polished occlusal surface.
Occlusal wear (according to Smith, '84)	Degree 8.
Corresponding and/or similar alterations in opposite teeth	Not present.
General traits of the alteration:	

Teeth present	13/32
AMTL	14/31 (45,16%).
Dento-alveolar pathology and alterations	From upper right P1 to left M3 alveolar atrophy due to *ante mortem* tooth loss has been observed (except for the right I1 and the left P2) such as for the lower posterior teeth. Penetrating and non penetrating caries affect both the anterior and the posterior teeth. All the teeth show a high degree of wear (5 to 7, according to Smith, '84). Severe alveolar margins retraction at the lower anterior teeth has been observed.
Discussion:	
The wear pattern of the upper right I1 is anomalous both for the degree and shape with respect to the wear pattern showed by the other preserved teeth. We could suppose that the female old adult of T.23 used the anterior teeth in strong masticatory and non-masticatory activities. The mechanical stress played in these activities could be testified by some porosity showed by the anterior zygomatic tuberosity of the left glenoid fossa.	

T. 31 female mature adult	
Tooth with alteration	Upper right I1
Alteration	Buccal notch (degree 3)
Description of the alteration:	
Feature of the alteration	Under light microscope (20x): smooth and polished bottom.
Occlusal wear (according to Smith, '84)	Degree 5.
Corresponding and/or similar alterations in opposite teeth	The lower right I1 shows an interproximal chipping of degree 2.
General traits of the alteration:	
Teeth present	29/32
AMTL	1/31 (3,23%)
Dento-alveolar pathology and alterations	The lower right M1 shows a destroying caries and a buccal abscess. The upper anterior teeth show a strong occlusal wear (degree 4-6, according to Smith, '84). The dental wear pattern of the upper anterior teeth slopes up lingually with exposition of dentin up until the CEJ. This wear pattern is corresponding to the buccal wear showed by the lower incisors long their incisal edge. The lower anterior teeth show lingual chippings of degree 2 and 3. The left side teeth show buccal, lingual and interproximal chippings of degree 1, 2 and 3.
Discussion:	

All these alterations could suggest that the teeth were used both in masticatory and non-masticatory activities such as the habit to hold and/or rub an object between these teeth.

T. 87 female young adult	
Tooth with alteration	Upper left P1; lower left P1 and P2
Alteration	Upper left P1: occlusal groove Lower left P1: interproximal distal groove Lower left P2: occlusal groove
Description of the alteration:	
Feature of the alteration	The occlusal groove of the upper left P1 crosses transversally both the cuspids. The grooves of the lower left P1 and P2 are in adjacent teeth and correspond each other. Under light microscope (30-40x): all these grooves are rounded (broad 2mm), smooth and polished. SEM observation of the groove of upper left P1: smooth and polished bottom with only few fine striations parallel to its main axis. The enamel surrounding the groove appears chipped but smoothed.
Occlusal wear (according to Smith, '84)	Upper left P1: degree 3 Lower left P1: degree 2 Lower left P2: degree 2
Corresponding and/or similar alterations in opposite teeth	All these grooves correspond each other for position, orientation, dimension and shape.
General traits of the alteration:	
Teeth present	25/32
AMTL	0/26 (0,00%)

Dento-alveolar pathology and alterations	The upper left M1 shows a destroying caries and a buccal abscess. Penetrating and non penetrating caries on the lower left posterior teeth have been observed. The teeth show only a slight occlusal wear (degree 2/3, according to Smith, '84). Only three teeth (upper left I2, lower right M1 and C) are chipped. Moreover, medium deposits of lingual *calculus* have been observed on the left posterior teeth.
Discussion:	
We could suppose that these grooves have been made by the repeated habit to hold and pass back-and-forth across the clenched teeth a fine circular object. Moreover, because on the upper left P1 the groove deepest trait is on the lingual cuspid and on the lower left P2 the groove slopes down buccally between the lower left P1 and P2, we could suppose that this object was held tilted down buccally. In literature, grooves like these ones are described in people who are used to pull across the clenched teeth, in the same position and direction, vegetable and/or animal flexible fibres, in order to moisten and soften it, for both bow strings or plant fibres cordage or basketry. SEM analysis shows a smooth and polished bottom with only few fine striations parallel to its main axis. This feature is similar to the one described by Minozzi (1994-1995) in the experimental tests with leather and sinew rubbed on a tooth. Moreover, the surrounding chipped but smooth enamel could suggest that the teeth were subjected to a strong pressure stress during this activity.	

T. 111 female old adult	
Tooth with alteration	Upper right Canine
Alteration	Unusual lingual wear
Description of the alteration:	
Feature of the alteration	The dental wear pattern slopes up in the lingual direction with a wide dentin exposition.
Occlusal wear (according to Smith, '84)	Degree 7.
Corresponding and/or similar alterations in opposite teeth	The lower left C show an interproximal chipping (degree 2).
General traits of the alteration:	
Teeth present	22/32
AMTL	5/26 (19,23%)
Dento-alveolar pathology and alterations	The upper right M2 and M1 and the upper left P1 and P2 have been lost *ante mortem*. The upper right P2 and the upper left M1 are affected by destroying caries and show buccal abscesses. A buccal abscess is present also at the upper left M1 (not recordable). The upper anterior teeth show a very strong lingual wear (5-7, according to Smith,'84).

	The upper central incisors show buccal chippings (degree 1, 2 and 3).
Discussion:	
The wear pattern of upper anterior teeth could be due to a strong occlusion between the opposite teeth. However, the wear pattern of the upper incisors and canine is anomalous both for the degree and shape with respect to the wear pattern showed by the other preserved teeth. Therefore, we could suppose that the upper anterior teeth of the female old adult of T.111 were subjected to strong masticatory and non-masticatory stress.	

T. 126 female ? adult	
Tooth with alteration	Upper left I1
Alteration	Buccal notch "B" (degree 1)
Description of the alteration:	
Feature of the alteration	Rough surface due to *post mortem* alterations.
Occlusal wear (according to Smith, '84)	Degree 4.
Corresponding and/or similar alterations in opposite teeth	Not present.
General traits of the alteration:	
Teeth present	10/32
AMTL	0/0
Dento-alveolar pathology and alterations	Penetrating and non penetrating caries affect the teeth. General moderate degree of wear (3-4, according to Smith, '84). The teeth are isolated and not well preserved because *post mortem* damages so abscessing and any other pathological conditions cannot be described.
Discussion:	
The notch could be due to a cylindrical fine rigid or flexible object probable rubbed over the tooth in a non-masticatory activity.	

T. 128 female mature adult	
Tooth with alteration	Upper left central and lateral incisors
Alteration	Unusual wear
Description of the alteration:	
Feature of the alteration	The upper right I1 is a root stump. Under light microscope (20x): occlusal flattened surface, smooth and polished. The dental wear pattern of the left I2 slopes disto-mesially from the top to below. For both the incisors the pulp canals are closed by secondary dentin.
Occlusal wear (according to Smith, '84)	Upper left I1: degree 8 Upper left I2: degree 7
Corresponding and/or similar alterations in opposite teeth	Not present.
Tooth with alteration	Lower left P1
Alteration	Lingual notch (degree 3)
Description of the alteration:	
Feature of the alteration	Under light microscope (30x): smooth and polished bottom with short fine parallel striations bucco-lingually directed.
Occlusal wear (according to Smith, '84)	Degree 7
Corresponding and/or similar alterations in opposite teeth	Not recordable because the upper left premolars have been lost *ante mortem*.
General traits of the alteration:	
Teeth present	17/32
AMTL	4/22 (18,18%)

Dento-alveolar pathology and alterations	The upper left premolars the lower right M1 and left M2 and M3 are lost *ante mortem.* Buccal abscess are present at the upper and lower left M1 (both affected by penetrating caries). The upper right C shows a destroying caries. Slight deposits of buccal *calculus* at the lower teeth have been observed. The teeth are partially *post mortem* damaged by some acid substances that have eroded the enamel, so chippings cannot be recorded.
Discussion:	
The wear pattern observed on the upper left central and lateral incisors is anomalous both for the degree and shape with respect to the wear pattern showed by the other preserved upper teeth and the lower anterior ones. Therefore, we could suppose that the female old adult of T.128 used the teeth both in strong masticatory and the lower teeth to strong masticatory and non-masticatory stress.	

T. 142 female old adult	
Tooth with alteration	From the upper right C to the left M3 From the lower right C to the left C
Alteration	Interproximal grooves and interproximal *striae*.
Description of the alteration:	
Feature of the alteration	The interproximal grooves are on the *cementum* near and parallel to the CEJ. The grooves are wide, slight rounded, broadest (1,50-2,00mm) at their buccal end and tapering off lingually. The grooves showed by the upper left molars are on an interproximal cervical caries. Under light microscope (20x-40x): sharp margins, polished bottom with fine striations directed long their main axis. SEM analysis (200x): sub-parallel well-delimited striations on the bottom. The striations are longer than wide and are directed in the same direction (max width: 0,1µm-0,05mm). The interproximal *striae* are on the *cementum* near and parallel to the CEJ. Under light microscope (20x-40x): flattened and polished area with fine parallel striations. SEM analysis (200x): flattened area with sub-parallel well-delimited striations.
Occlusal wear (according to Smith, '84)	Upper and lower anterior teeth: degree 4-5 Upper and lower posterior teeth: degree 4-7
Corresponding and/or similar alterations in opposite teeth	The grooves and the striae are corresponding in adjacent teeth.

Tooth with alteration	Upper left M2
Alteration	Buccal notch (degree 3)
Description of the alteration:	
Feature of the alteration	Under light microscope (20x): smooth and polished bottom.
Occlusal wear (according to Smith, '84)	Degree 6.
Corresponding and/or similar alterations in opposite teeth	Not present
General traits of the alteration:	
Teeth present	27/32
AMTL	3/31 (9,68%)
Dento-alveolar pathology and alterations	The upper right M3, M1 and P1 are lost *ante mortem*. Penetrating caries affect the upper left posterior teeth. A buccal abscess at the upper left M1 has been observed. The teeth show a moderate-severe occlusal wear (degree 5/6, according to Smith, '84). A general severe retraction of the alveolar margins for all the lower teeth and only for few upper teeth (the maxilla is not well preserved) has been observed. Moreover, a spread porosity of the alveolar crests for both maxilla and mandible has been observed. Buccal chippings of degree 1, 2 and 3 have been observed on the upper anterior teeth.
Discussion:	
The interproximal grooves and *striae* showed by the female old adult of T.142 seem to be due to the repeated insertion (bucco-lingual directed) of toothpicks probably made of wood. We could suppose that in this case a habitual tooth probing was done for removing food particles stuck between teeth and/or to relive the discomfort caused both by the exposed dental necks (due to the severe retraction of the alveolar margins) and by the caries for the upper left M1. This repeated insertion results in abrasions in the form of grooves and/or *striae* on the interproximal area. We could also suppose a non-masticatory use of the teeth (notch on the upper left M2).	

B. Conclusions

"Lo scopo di questo studio è stato quello di ricostruire, attraverso lo studio di tali caratteri, le abitudini comportamentali dei singoli individui e dei gruppi in esame, in relazione all'uso dei denti in attività masticatorie e non-masticatorie, così come in relazione ad alterazioni intenzionali dei denti, sia in relazione ad eventuali variazioni geografiche territoriali di serie coeve sia in relazione a possibili variazioni nel corso del tempo. Pertanto, si è inteso verificare, se e in che modo, le trasformazioni sociali, culturali e i mutati rapporti col territorio che si sono verificati in Italia nell'arco di tempo che va dall'Età del Ferro all'epoca Alto-medievale, abbiano avuto un'influenza sulla biologia e sul comportamento di queste antiche popolazioni in relazione alle funzioni non-masticatorie dei denti. In particolare, poi, tenendo conto dell'importanza che i denti anteriori hanno dal punto di vista estetico, essendo i denti più esposti, l'indagine svolta ha inteso verificare, se e in che modo i denti anteriori siano stati o no oggetto di "cure" particolari (quali interventi intenzionali relativi a riti e cerimonie di iniziazione, fini estetici e/o terapeutici, etc).

L'indagine svolta ha messo in evidenza che in tutte le serie osteoarcheologiche esaminate, sono presenti alterazioni non-masticatorie dei denti. Questo dato suggerisce che dall'epoca protostorica a quella storica in queste popolazioni del territorio italiano i denti erano utilizzati in attività non-masticatorie. È emerso, inoltre, una possibile relazione tra incidenza delle alterazioni non-masticatorie e livello tecnologico espresso dalle popolazioni in esame: ad un miglioramento del livello tecnologico (epoca romano-imperiale) corrisponderebbe una diminuzione della frequenza delle alterazioni non-masticatorie dei denti (denti maggiormente svincolati dallo svolgimento di attività lavorative come strumenti e/o "terza mano"). Al contrario, ad un deterioramento delle condizioni di vita e ad un peggioramento del livello di tecnologia utilizzato dalle popolazioni in esame (età tardo-antica e alto-medievo), corrisponderebbe un aumento dell'incidenza di tali alterazioni.

Inoltre, sono state osservate lesioni intenzionali (riconducibili a fini di tipo estetico e curativo/palliativo) dei denti anteriori di alcuni inumati delle necropoli in esame."

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Images Standard of the non-masticatory dental alterations

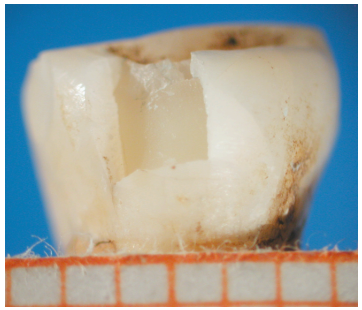
and

Atlas of images

FOULSE chipping

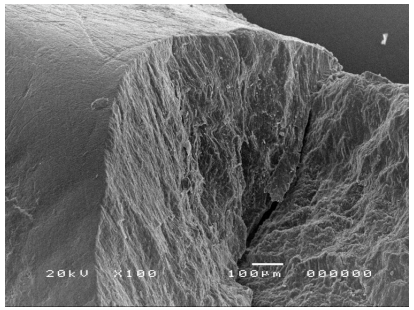
A. Macroscopic observation

B. Light microscope

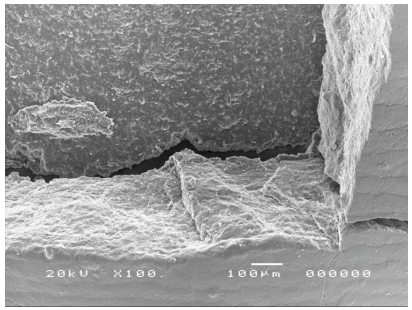


16x

C. Scanning electron microscope



150x



100x

DESCRIPTION:

A. and B.
Macroscopic and under light microscope observation:

- sharp and well defined edges of the fracture
- rough surfaces of detachment without any evidence of wear

C.
Scanning Electron Microscope:

- surfaces of detachment rough, irregular without any evidence of wear
- enamel: regular and well defined pattern of prisms layers. The layers run diagonally through the enamel thickness.
- dentine: more irregular and rough surface of detachment with a globular structure.

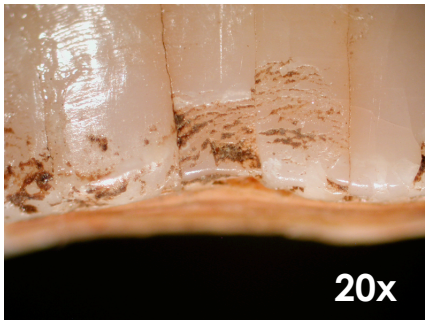
DISCUSSIONS:
Accidental *post mortem* fractures.

CHIPPING

A. Macroscopic observation

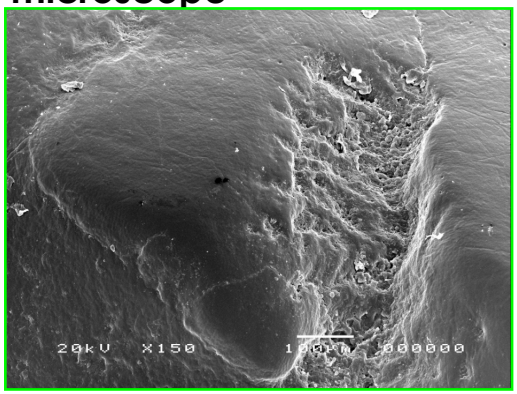
T.28 m, VCN

B. Light microscope



T.28 m, VCN
Chipping degree 3
Right upper I1

C. Scanning electron microscope



Chipping of degree 1 **150x**

DESCRIPTION:

A. and B. Macroscopic and under light microscope observation:

- Edges irregualr but smoothed due to wear of the fracture.
- Rough surfaces of detachment but smoothed due to wear.

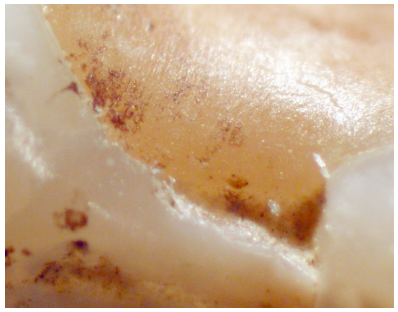
C. Scanning Electron Microscope:

- dimensions of the chippings: more than 0,5mm (Wallace, 1973)
- surfaces of detachment rough, irregular and continuous up the surrounding enamel
- enamel: rough but smoothed. The prisms layers are worn and not distinguishable.
- dentine: rough but smoothed. The globular structure is worn and not distinguishable

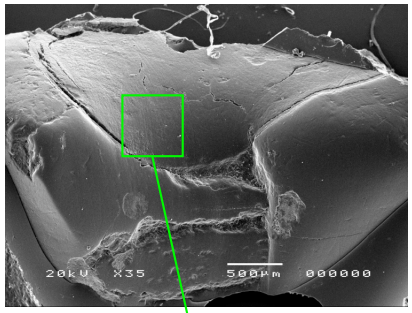
DISCUSSIONS:

Ante mortem more or less serious fractures of the enamel or dentin. The term is "chipping" or "pressure chipping" because they look like the intentional chipping of lithic handmade objects. Alimentary or non alimentary lesions produced during chewing by contaminating substances and by tough and abrasive foods or during treating some object in daily task activities.

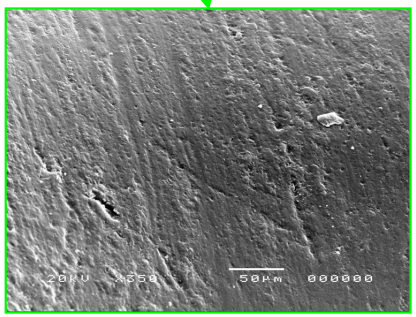
NOTCH



30x



35x



350x

DESCRIPTION:

A. and B. Macroscopic and under light microscope observation:

- concave lesions developing on the tooth's edge (involving the enamel or enamel and dentine).
- sometimes at the maximum depth of the lesion a chipping can be observed.

C. Scanning Electron Microscope:

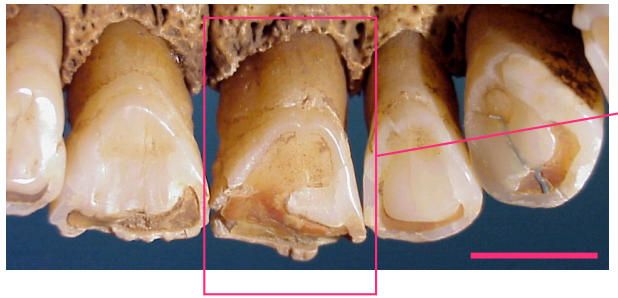
- enamel: smooth and polished.
- dentine: (when exposed) smooth and polished.
- in some cases fine parallel striations (width 0,1µm-0,05mm) running toward the maximum depth of the lesion can be observed

DISCUSSIONS:

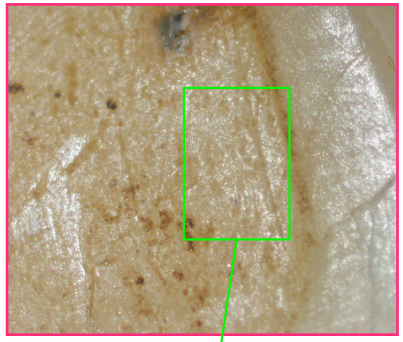
Dental alterations due to prolonged non-masticatory activities repeated and protracting in time such as rubbing on the tooth a fibrous but not too much abrasive object that can produce the fine striations inside the notch. The stress played on the tooth can produce, as a secondary effect, the chipping associated to the notch.

LSAMAT

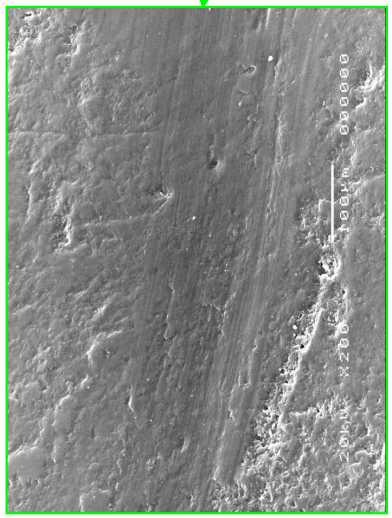
A. Macroscopic observation



B. Light microscope



C. Scanning electron microscope



DESCRIPTION:

A and B: macroscopic and under light microscopic observation

- The dental wear pattern slopes in the buccal-lingual direction with exposition of dentine between the CEJ and incisal edges.
- Flattened, smooth and polished surfaces.
- Sometimes parallel striations bucco-lingually directed have been observed.

C: scanning electron microscope

- Homogenous and slightly rough exposed dentine
- Fine parallel *striae* (and striated furrows directed from the CEJ toward the incisal edge on the exposed dentine have been observed.

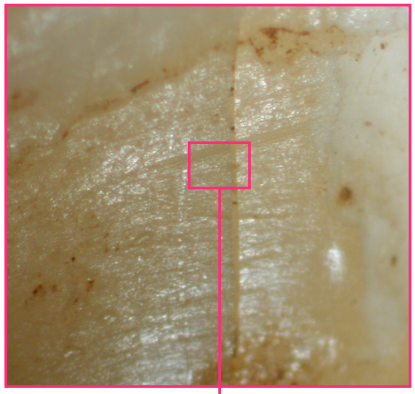
DISCUSSIONS:

This wear pattern could be the result of pulling, rubbing and/or chewing between the upper incisors and tongue, some particular substance for lengthy period of time. The microwear features are similar to the one described by Minozzi (1994-1995) in the experimental tests with leather and sinew rubbed on a tooth. So this unusual wear could be due to the contact on the lingual surface of an object like leather and/or sinew.

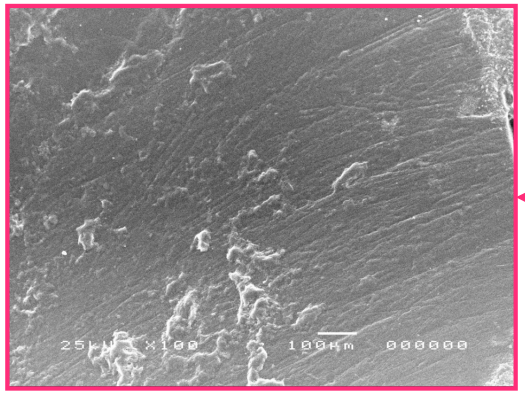
INTERPROXIMAL *STRIAE*

A. Macroscopic observation

B. Light microscope



C. Scanning electron microscope



DESCRIPTION:

A and B: macroscopic and under light microscopic observation

- The interproximal *striae* are on the *cementum* near and parallel to the CEJ.
- Under light microscope (20x-40x): flattened and polished area with fine parallel striations.

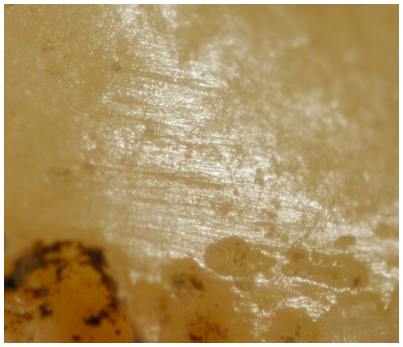
C. Scanning electron microscope
SEM analysis (200x): flattened area with sub-parallel well-delimited striations (width 0,1µm-0,05mm).

DISCUSSIONS:
The interproximal *striae* could be due to the repetitive back-and-forth movements of a foreign fibrous object (like a toothpick probably made of wood).

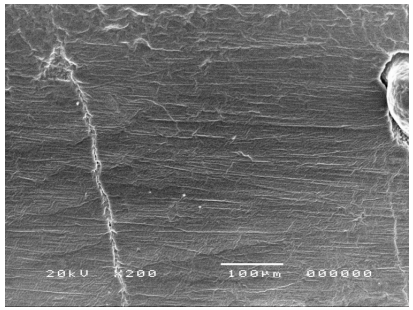
INTERPROXIMAL GROOVE

A. Macroscopic observation

B. Light microscope



C. Scanning electron microscope



DESCRIPTION:

A and B: macroscopic and under light microscopic observation
The interproximal grooves occur on the *cementum* near and parallel to the CEJ.
- The grooves may be narrow or wide, slight rounded or deep.
- Under light microscope (20x-40x): smooth and polished bottom with fine striations directed long the main axis clearly evident.
- Sometimes sharp margins can be observed.

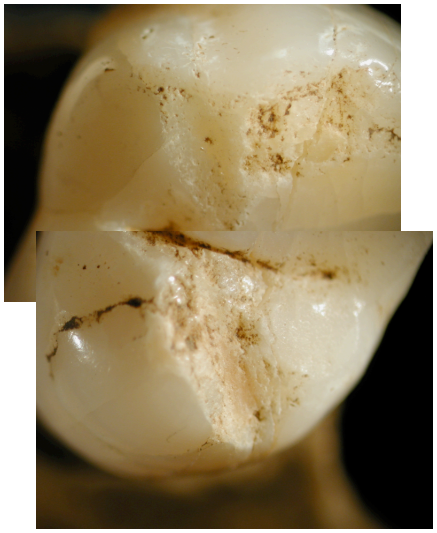
C: SEM analysis (200x):
- sub-parallel well-delimited striations on the bottom.
- The striations are longer than wide and are directed in the same direction (max width: 0,1µm-0,05mm).

DISCUSSIONS: The interproximal grooves seem to be due to the repeated insertion (bucco-lingual directed) of toothpicks probably made of wood or of a fibrous object. It is possible that a habitual tooth probing could have been caried out or for removing food particles stuck between teeth and/or to relive the discomfort caused by interprroximal caries an/or by the exposed dental necks (due to the severe retraction of the alveolar margins). The repeated insertion results in abrasions in the form of smooth and polished furrowed grooves on the interproximal area.

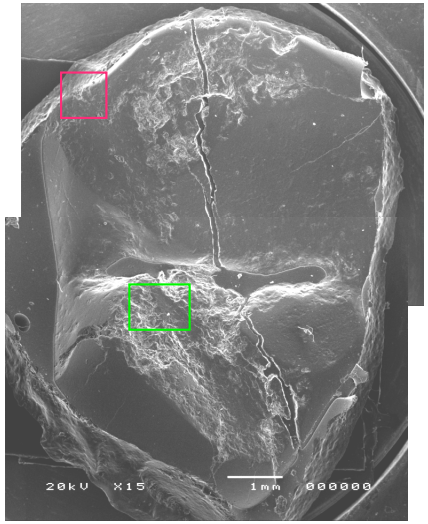
OCCLUSAL GROOVE

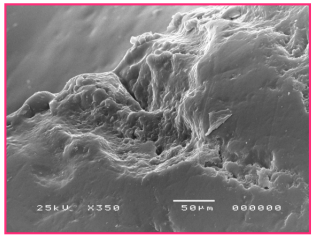
A. Macroscopic observation

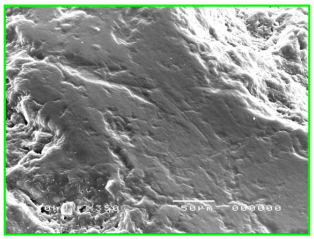
B. Light microscope



C. Scanning electron microscope







DESCRIPTION:

A. e B.
Macroscopic and under light microscope observation:
- concave, smooth and polished groove
- in some cases it could be surrounded by a chipped and uneven occlusal enamel.

C.
Scanning Electron Microscope:
- smooth bottom with few and slight parallel striations directed long the main axis of the lesion.
- Around and at the ends of the groove there is a uneven surface due to chippings of the occlusal enamel.
- occlusal chippings smoothed.

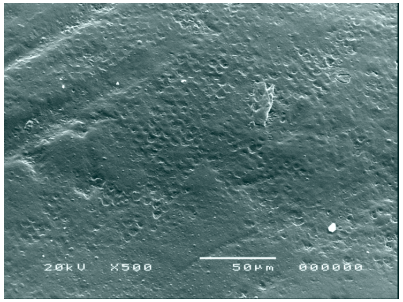
DISCUSSION:
These grooves could have been made by the repeated habit to hold and pass back-and-forth across the clenched teeth a fine circular object.
The microwear features inside the groove appear quite similar to the ones described in literature due to the repeated passage back and forth on the occlusal surface of fibrous fine objects like leather and/or sinew (see Minozzi, PhD Thesis).

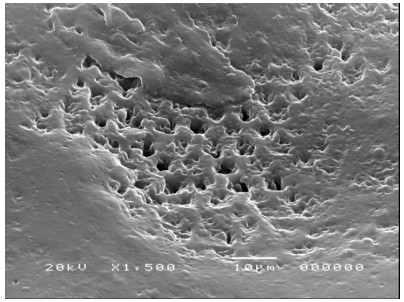
FIGURES OF ACIDS ETCHING

A. Macroscopic observation

B. Light microscope observation

C. Scanning electron microscope





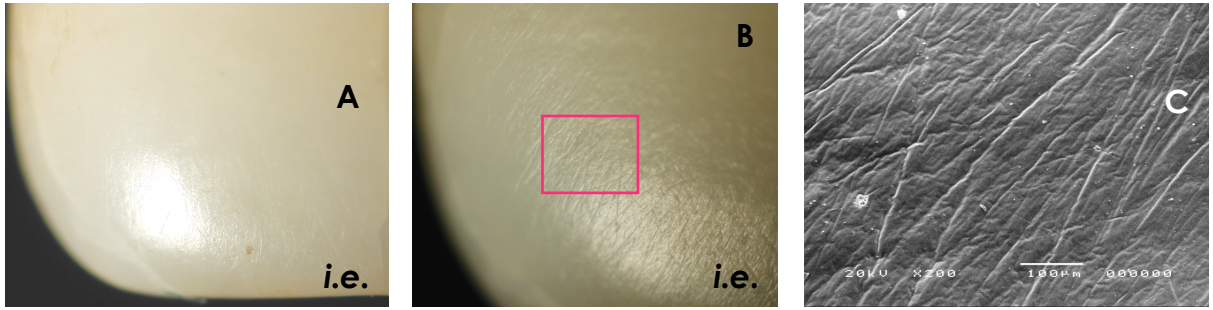
DESCRIPTION:

A. e B.
Macroscopic and under light microscope observation:
- Fine roughness on the surfaces.
- The area etched appears uniformly dull

C. SEM observation:
- The enamel etched shows numerous spread "honeycomb pattern" structures of the enamel prisms.
- The honey-cells are hexagonal, usually well-dilimited and with a diameter les than 5µm (magnification of 1,500x)

DISCUSSIONS:
It is made by some acid substances which expose the honeycomb pattern of the enamel prisms.
The extensions and depth of these lesions are related to the pH value of the substance and to the time of exposition to acid substances: more the time of the acid exposition, more the extended and deep the cells are (see King, 1999).

TESTS with PUMICE and ASH

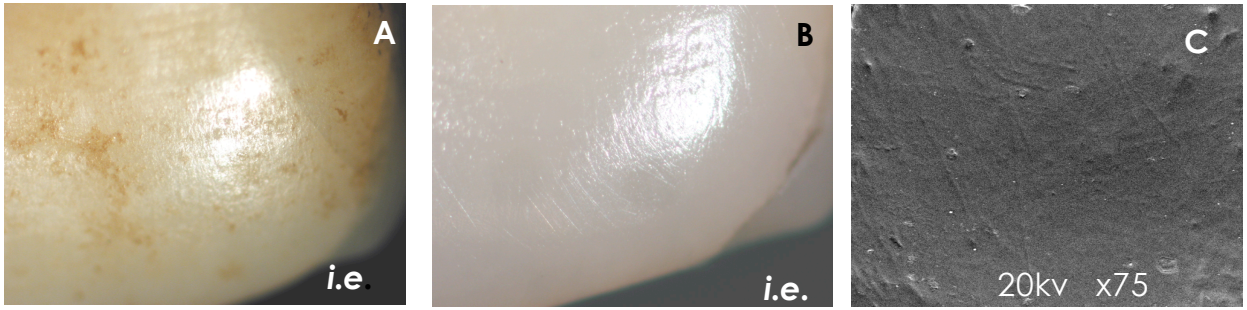


PUMICE

A. **Light microscope observation (30x):** the enamel before the test with pumice: smooth and polished surfaces

B. **Light microscope observation (40x):** the enamel appears smooth but not shiny with parallel striations directed long the axis of the experimental wear.

C. **SEM observation:** deep parallel scratches, directed long the axis of the experimental wear.



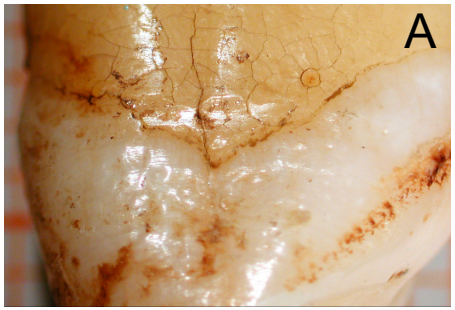
ASH

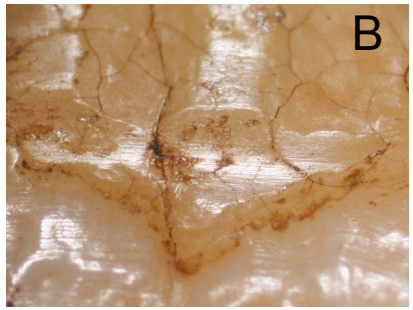
A. **Light microscope observation (30x):** the enamel before the test with ash: smooth and polished surfaces (in the picture some rough brown ares are clearly evident.

B. **Light microscope observation (40x):** the enamel appears smooth, polished, very shiny and blanched. Only a fine parallel striations directed long the axis of the experimental wear has been observed.

C. **SEM observation:** shallow parallel scratches, directed long the axis of the experimental wear.

TESTS with IRON SHARP TIPS

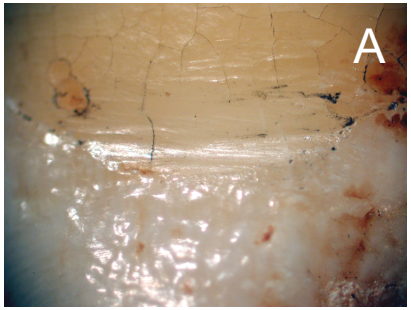


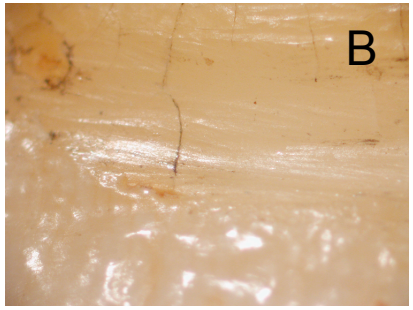


Circular tip

A. **Light microscope observation (12x):** after 1h of wear the interproximal area shows on the *cementum* a fine shallow rounded polished groove with only a very fine striation

B. **Light microscope observation (40x):** the worn area appears smooth, shiny only with short parallel striations directed long the axis of the experimental wear.





Rough tip

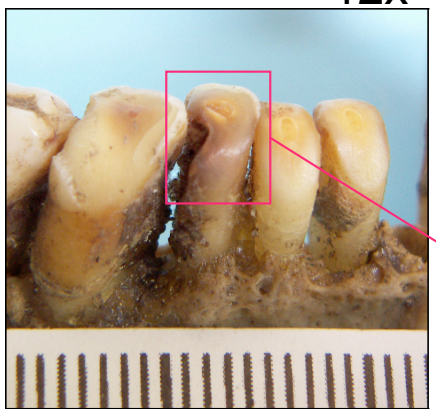
A. **Light microscope observation (12x):** after 1h of wear the interproximal area shows only on the cementum a deep groove. It appears smooth and polished but with an uneven bottom.

B. **Light microscope observation (40x):** uneven bottom with strong parallel striations striations directed long the axis of the experimental wear.

UNUSUAL WEAR

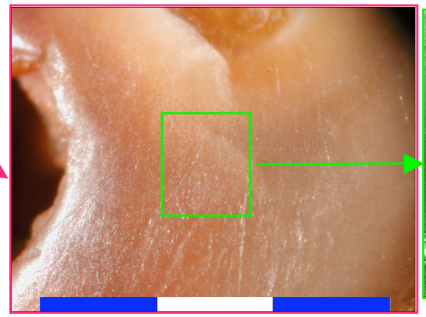
A

12x

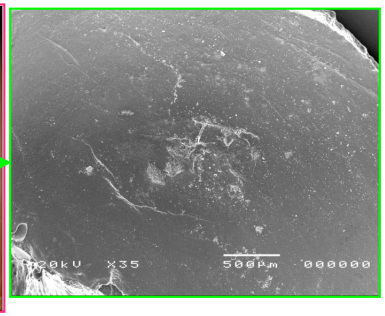


B

50x



SEM



C

DESCRIPTIONS:

A. And B. Macroscopic and at light microscope observation:

- The dental wear pattern slope down buccally.
- Buccal surface convex, smooth and polished
- At the high magnification (50x) some striations can be observed.

C. SEM observation:

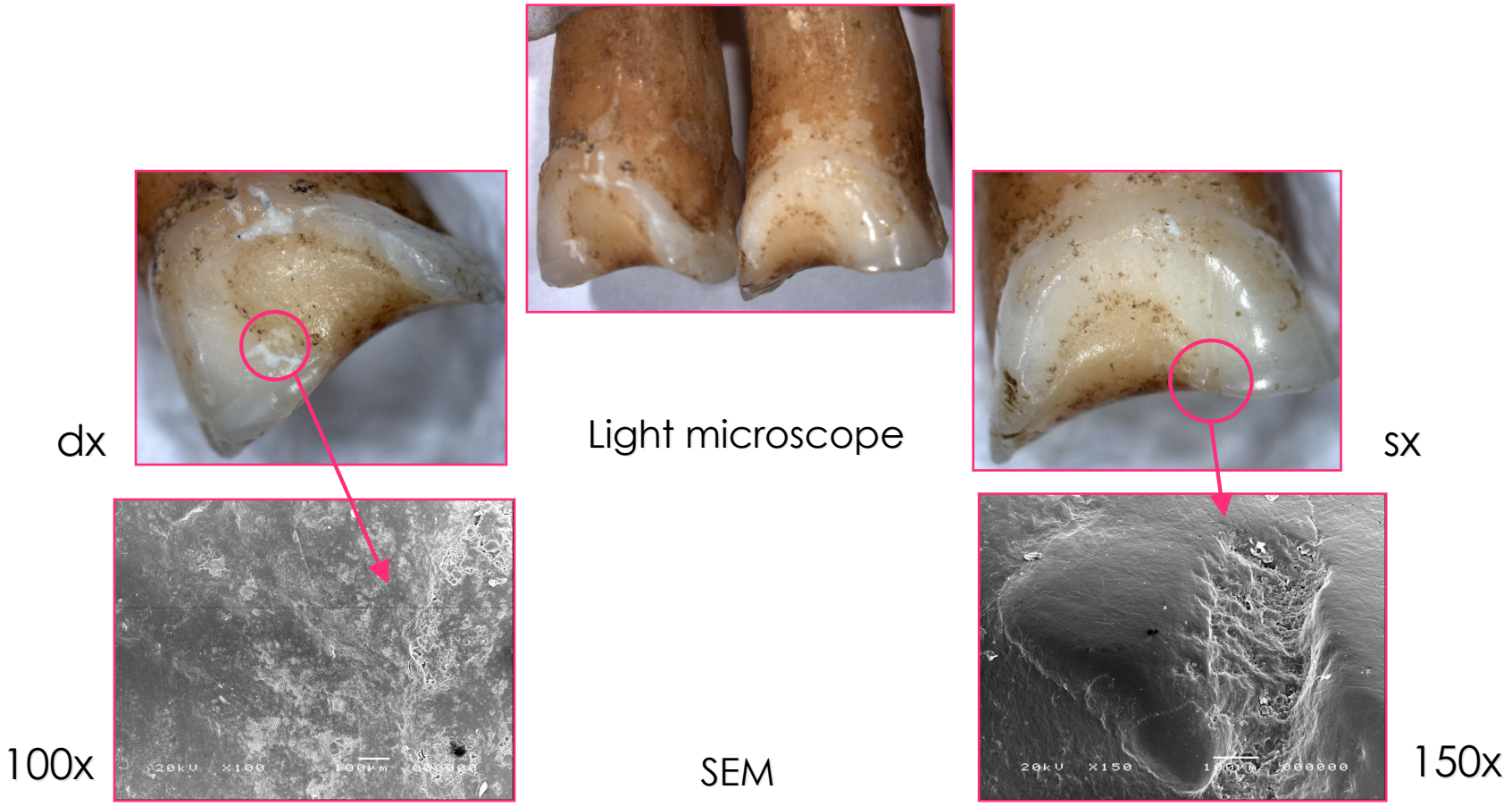
- strie subparallele oblique rispetto all'asse del dente
- fratture *post mortem*
- pozzetti subcircolari di diametro variabile. I pozzetti subcircolari mostrano margini frastagliati e superficie interna molto irregolare.

DISCUSSIONS:

The lower teeth show a wear due to the habit to treat or to scrape something held with the hands.
It is possible that the object responsible of this wear was pull from the outside to below. All these movements could explain the wear plains orientation. The substance may have been a kind of foodstuffs but also of another material. In any case, we could suppose that this substance was not too much abrasive because of the worn surfaces show an exposed smooth and polished dentin. This alteration is very similar to the one described by Bonfiglioli (2002) among tanners in a 20th century skeletal collection from Italy.
I microtraumi dovuti all'uso continuato della dentatura hanno provocato la perdita di piccole scaglie di dentina e la conseguente formazione di queste piccole cavità subcircolari sulla superficie del dente.

1. Intentional alterations

Buccal wear



Ceretolo (Bo) T.31 (Maschio, Adulto giovane) (CSL, III-II a.C.)

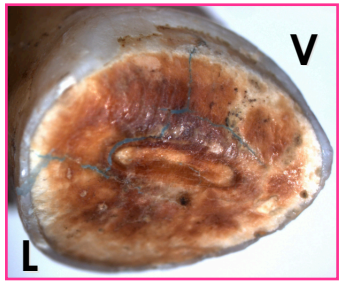
1. Intentional alterations

T.8 (M, AG) (CSL, IV-V c. d.C.)

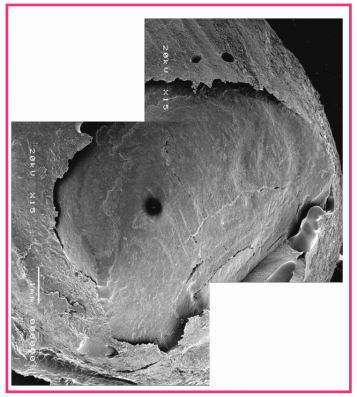
Buccal wear

dx

sx

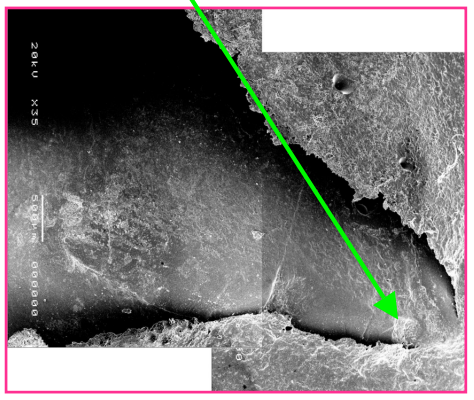


Light microscope



15x

SEM



375x

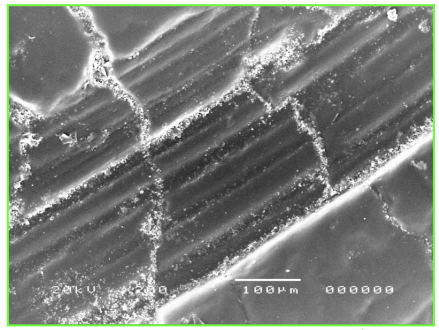
1. Intentional alterations

T. 128 CSL (CSL, II-III c. d.C.):

Buccal wear and buccal filing-marks on the central upper incisors

- parallel and diagonal filing-marks

SEM



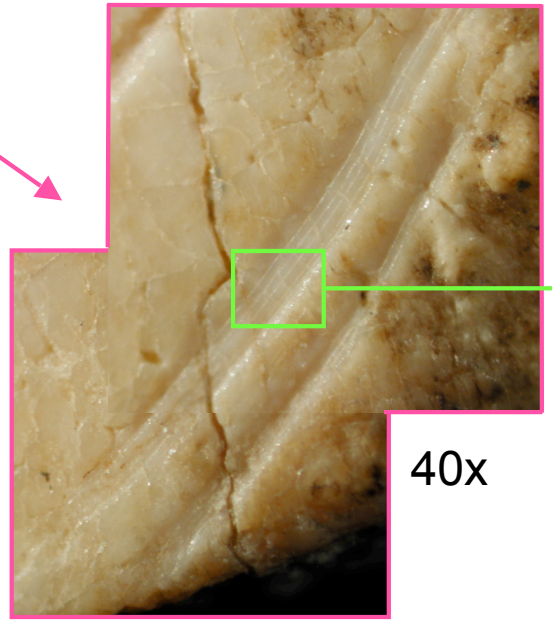
200x

dx

20x

Light microscope

sx

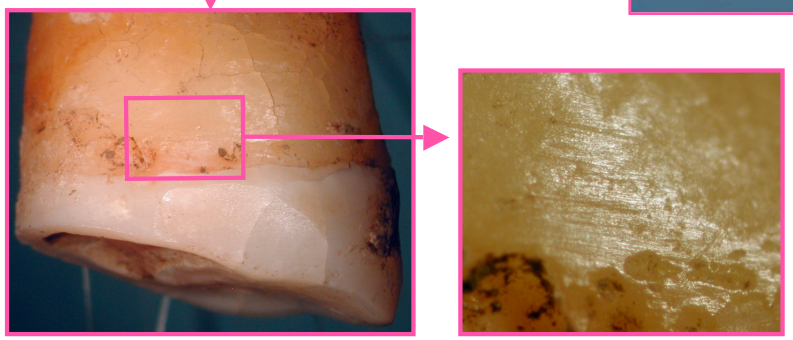


40x

1. Intentional alterations

T.142 F (AV)
Campochiaro-Vicenne (CB) VII secolo

INTERPROXIMAL GROOVE:



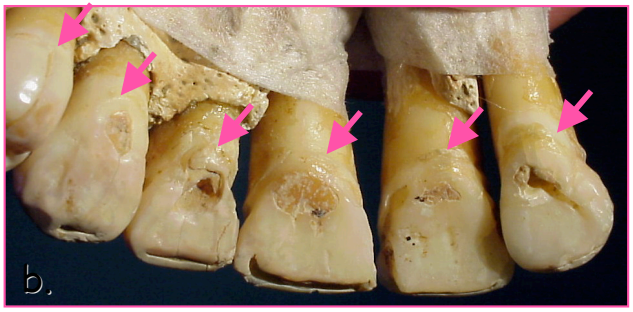
• P2 sx sup.:
distal interproximal groove.

• M1 sx sup.:
mesial interproximal groove

1. Intentional alterations

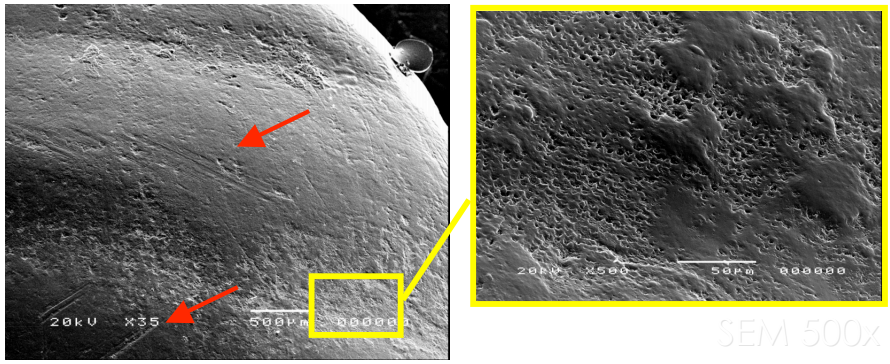
T.28 (NI, young adult) of the Roman necropolis (1st-2nd AD)

"DENTAL LIGATURES"



Denti anteriori: a. Superficie vestibolare, b. Superficie linguale

First right incisor of the T.28:



The "Honeycomb pattern"

- Some thin and circular objects were probably permanently fixed and bound all around the teeth like "dental ligatures".

- Attachment probably made by some acid substances which exposed the honeycomb pattern of the enamel prisms.