

È quindi possibile oggi, e sempre di più lo sarà per il futuro, affrontare razionalmente la patologia andrologica, tipica della nostra cultura; essa, per sua natura, nella sua doppia articolazione di sterilità e di deficit erettile, è una delle più insidiose minacce alla stessa qualità di vita.

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Articoli/Articles

PALEOANDROLOGY AND PROSTATIC HYPERPLASIA  
IN ITALIAN MUMMIES (XV-XIX CENTURY)

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SUMMARY

*Prostatic hyperplasia, a very common condition today, was well known in the past as cause for bladder distension. The difficulty to identify, at autopsy of natural or artificial mummies, even a normal-sized prostate is probably the result of putrefaction processes and its usually dramatic size reduction as well. We report two ancient cases of prostatic hyperplasia recently observed in natural mummies from Italy.*

*The first case regards Pandolfo III Malatesta (1370-1427), a leading figure of the Italian Renaissance. He was a valiant soldier and horseman with a very active life style. The tomb, containing his naturally mummified body, has recently been discovered in Fano (Marche, Central Italy). After careful X-ray and videographic examination, the autopsy showed good preservation of the skeletal muscles, cartilage, internal and external organs, included prostate gland and penis. Macroscopic examination revealed a staghorn calculus (calcium urate) of the left kidney and a severe enlargement of the prostate, with calcifications detectable by X-ray and large nodules protruding in the lumen of an ectatic urethra. Histology shows fibrous bands of connective and muscular tissue surrounding circular and oblong lacunae, with no preservation of epithelial structures. The macroscopic and histological picture allowed us to diagnose prostatic nodular hyperplasia.*

*The second case (XIX century) concerns the natural mummy of an anonymous 50-60 years old man, found in ancient friary near L'Aquila (central Italy), which underwent computed tomography and a complete autopsy. Pelvic CT scans showed distended urinary bladder and a ring of dense tissue at the site of the prostate. At autopsy the bladder measured 7 x 6 x 5 cm and the prostate was 4 x 5 x 3 cm; prostatic urethra had a diameter of*

Key words: Paleopathology - Mummies - Histology - Prostate nodular hyperplasia.

2 cm. Histology revealed dense fibrous tissue containing muscular fibers and roundish cavities of variable size, filled with eosinophil, PAS-positive material. Concretions were also present in some of these spaces. Strong immunohistochemical reactivity for PSA was observed in this material. The existence of glandular structures containing eosinophil, PAS-positive material, immunoreactive for PSA, confirmed the prostatic nature of the specimen, already suspected after CT scan and gross examination. The presence itself of the prostate, its histological picture, the preserved and distended urinary bladder, in addition to the age of the subject, supported the diagnosis of prostatic hyperplasia.

#### *Paleoandrology of mummies*

In natural mummies (spontaneously mummified bodies) the enzyme-rich fluids (in particular those of the abdomen) tend to gravitate to the lowest portion of the body's burial position. In many cases this is a sitting position, and in such burials the perineum is the most interested area. Post-burial desiccation in such mummies is frequently slow enough to permit the enzymatic and bacterial decay processes sufficient time to destroy the external genitalia, preventing recognition in both males and females<sup>1</sup>.

The supine position offers a higher frequency of identification. In artificial mummies (embalmed bodies), recognition of these structures is heavily dependent upon mummification practice traditions. Because of their prominence and contours, those of the male may remain identifiable more frequently than those of the female (Fig. 1). Egyptian embalmers, for example, frequently made considerable effort to preserve external genitalia, at least among males of royal or noble classes. So the presence or absence of circumcision can be judged quite frequently in Egyptian male bodies, even in many preserved by spontaneous mummification. Among Egyptian boys it was part of a puberty ritual even in predynastic times<sup>2</sup>.

In natural mummies, genitalia are preserved less frequently. Aufderheide & Allison (1994) found 71 % of 21 males but only 29 % of 22 females had identifiable external genitalia in a pre-ceramic group from northern Chile that had been buried in a supine position<sup>3</sup>.



Fig. 1 – Natural mummy from the Basilica of St. Domenico Maggiore in Naples (XVI century) with well preserved external genitalia.

The scrotum is often identifiable in natural or artificial mummies, but the testes rarely undergo spontaneous mummification. Scrotal enlargements in mummies have been attributed to hernia but are most probably a postmortem artifact of bacterial decay with gas formation. One would expect that the fibrotic reactions of gonorrhoeal or tubercular testicular infections would remain detectable, but so far none have been reported. We have not testicular tumors, even though today the most common (seminoma, embryonal carcinoma) demonstrate a peak of frequency between 20 and 30 years, ages commonly represented in mummies<sup>4</sup>.

Prostatic hyperplasia, a very common condition today, was already known in the past as a cause for bladder distension. The difficulty to identify at autopsy of natural or artificial mummies even normal-sized prostate is probably the result of the same processes as those related to the external genitalia. As prostate

usually undergoes a dramatic size reduction after dehydration, it is very difficult to identify this gland in mummified bodies.

We report two ancient cases of prostatic hyperplasia recently observed in natural mummies from Italy.

*The case of Pandolfo III Malatesta (1370-1427)*

The first case concerns an important figure of the Italian Renaissance, Pandolfo III Malatesta (1370-1427), a valiant soldier and horseman with a very active and particular life style, representing a typical example of XV century warrior-prince (Fig. 2). Historical sources report that his death was due to a fever during a pilgrimage to the Sanctuary of the Virgin Mary at Loreto (Central Italy) in 1427<sup>5</sup>.

Recent exploration of his sarcophage, preserved in the church of St. Francis in Fano (Marche, Central Italy), revealed the naturally mummified body of a strongly built male 180 cm tall, 55-60 years aged and wearing precious clothes (Fig. 3).



Fig. 2 - Coin portrait of Pandolfo III Malatesta (1370-1427).



Fig. 3 - Natural mummy of Pandolfo in its sarcophage.

Autopsy, performed after careful X-ray and videographic examination with portable apparatus, showed good preservation of the skeletal muscles, cartilage and internal organs such as the trachea and main bronchi, heart, stomach, small and large intestines, penis, and prostate. A large round stone of uric acid, still *in situ*, was found in the left kidney.

The different skeletal lesions may be related to Pandolfo's particular life style as horseman and knight: strong muscular insertion of the bones of the arms and forearms (especially of the right ones) as well as of the femurs and legs; severe bilateral sternoclavicular and sternocostal arthritis, due to frequent hard impacts in jousting; vertebral osteophytosis of the dorsal rachis with discal lesion, caused by heavy armour; strong iliac crest exostoses with calcification of muscle insertions of gluteus maximus and ileopsoas, due to frequent riding; marked exostoses in the right hand bones, caused by the use of the sword and, finally, malposition of the second toes, caused by iron shoes.

#### *The external genitalia of Pandolfo*

The external genitals of Pandolfo appeared in good conditions (Fig. 4): the penis had dropped, assuming the shape of a large ribbon at the level of the anterior perineal region and adhering to the scrotal residual skin on the medial surface of the left thigh. It

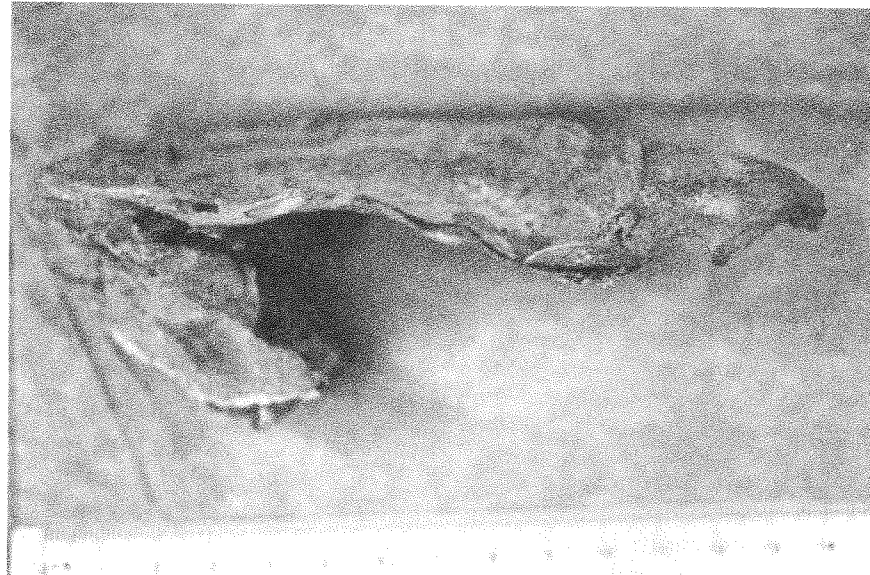


Fig. 4 – The penis with the large, oblong "formation" at its base.

measured 13 cm from the root to the apex of the glans with a 4 cm diameter in the middle of the body, and a 2.5 cm narrowing at the basis of the glans. It appeared flattened, with maximum thickness of about 0.5 cm. Considering the relative enlargement of the post-mortal collapse and flattening, these dimensions were in the normal range. The testes, which could be identified under the scrotal skin, were reduced to a sort of thin foil.

#### *The prostate*

The stretched out penis showed a large 3.5 × 2 cm oblong formation at its base, easily and surprisingly identifiable as the prostate in its typical position at the root of the penis (Fig. 4). It was evidently pushed to the bottom by collapse of the perineal plan, likely to be caused by the formation of gas in the abdominal cavity, as a consequence of initial putrefaction.

X-ray and videographic examination of the root of the penis with the prostate showed the presence of calcifications (Fig. 5).

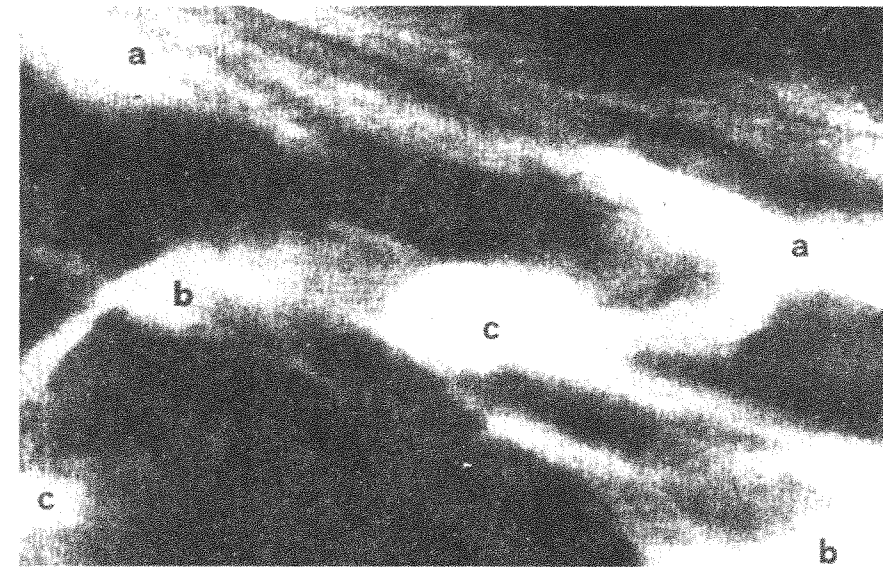


Fig. 5 – X-ray of the penis root (a) with the prostate (b): two calcifications (c) are well evident.

At transversal sectioning the prostate revealed a rounded cavity of  $13 \times 20$  mm (Fig. 6), with 2-3 mm walls, containing two large anterior fibrous nodular formations with regular surfaces,  $7 \times 6$  and  $6 \times 5$  mm respectively, which narrowed the lumen to about 5 mm (Fig. 7). Cavity and relative nodules could be identified by the prostatic tract of a very ectatic urethra with two central large nodules of benign prostatic hypertrophy. These nodules corresponded to the nodular enlargements of the middle lobe generally occurring under this condition, and projected into the floor of the urethra like hemispheric masses located under the urethral mucosa.

Samples of the prostate were rehydrated for 7 days using Sandison solution<sup>6</sup>, fixed in 10% buffered formalin for 24 hours and embedded in paraffin to obtain  $4 \mu\text{m}$  thick histologic sections. The slides were stained with hematoxylin-eosin, periodic acid Schiff (PAS) and Gardner's trichrome. Histology<sup>7</sup> showed fibrous bands of connective and muscular tissue surrounding

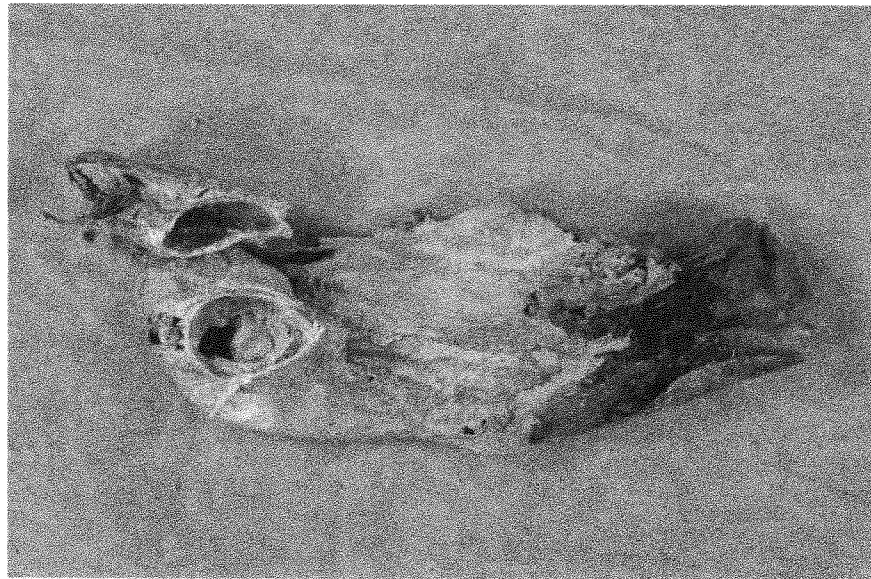


Fig. 6 – Section of the prostate with a very large prostatic urethra.



Fig. 7 – Section of the prostate (particular) with very large nodules.

some circular and oblong lacunae, with no preservation of epithelial structures (Figs. 8, 9).

#### *The clinical picture of Pandolfo*

The macroscopic and histological picture showed clear prostatic nodular hyperplasia<sup>8</sup>. This condition, present in about 50% of the men of Pandolfo's age, caused stenosis of the urethra with difficulty in urination and retention of urine in the bladder. Recurrent cystitis and renal infection, likely to be facilitated by renal calculosis, were probably relatively frequent and facilitated by the life style of Pandolfo and in particular by his constant practice of horse-riding with heavy and uncomfortable armors. We know with certainty that his last 6 months of life were particularly intense: after his marriage to a young woman in May, Pandolfo spent the summer of that year in a series of feasts, banquets, and tournaments. For this reason an urinary



Fig. 8 – Abundant fibrous tissue with circular lacunae (Hematoxylin-Eosin, original magnification 50×).

sepsis may have been the cause of the fever which, on the basis of historical records, killed the prince at 57 years of age.

#### *The natural mummy of Goriano Valli (XIX century)*

The natural mummy of an anonymous, 50-60 years old man, strongly built and 165 cm tall, was found in the friary of “San Giorgio degli Osservanti” (XVIII century) in Goriano Valli (L’Aquila, central Italy). The subject, labeled GVSG 02, belonged to a series of four well-preserved bodies (two males and two females), found in an ossuary near the friary and dating back to the XIX century<sup>9</sup>.

#### *The external genitalia*

The examination of the external genitalia showed a big distension of the scrotal sac, with a poorly evident penis. No testicular tissue was identified inside the scrotum.

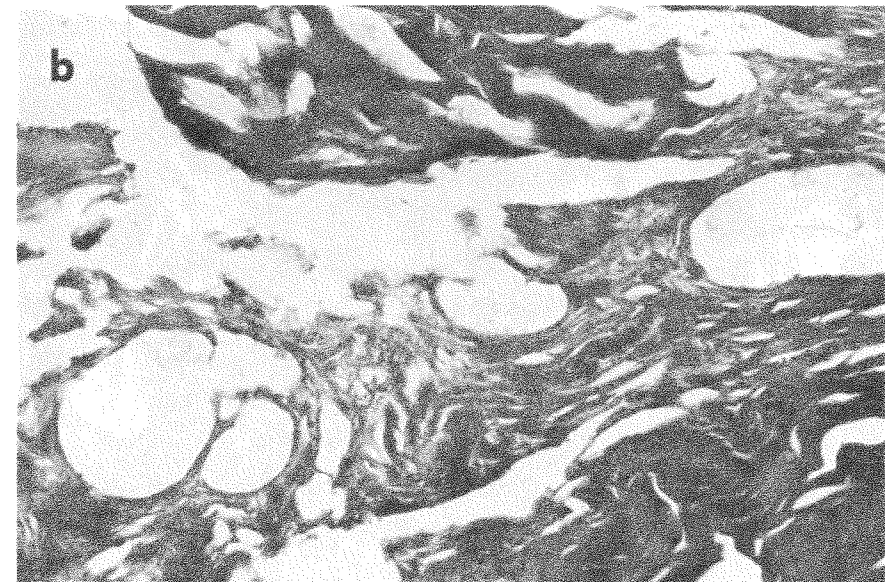


Fig. 9 – Typical circular glandular lacunae in fibrous and muscular tissue (Gardner’s trichromic staining, original magnification 100×).

Computed tomography scanning was performed to find pathologic processes of skeletal system and internal organs and to orient the autopsy. Pelvic CT scans showed distended urinary bladder and a ring of dense tissue at the site of the prostate (Fig. 10).

#### *The prostate*

The autopsy was performed by posterior surface of the body in order to preserve its frontal aspects and allow further exhibition of the mummy. The bladder measured 7 × 6 × 5 cm and the prostate was 4 × 5 × 3 cm; prostatic urethra had a diameter of 2 cm (Fig. 11).

Samples of the prostate were rehydrated for 5 days using Sandison solution<sup>10</sup>, fixed in 10% buffered formalin for 24 hours and embedded in paraffin to obtain 4 μm thick histologic sections.

The slides were stained with hematoxylin-eosin, periodic acid Schiff (PAS) and Masson’s trichrome. A single slide was im-

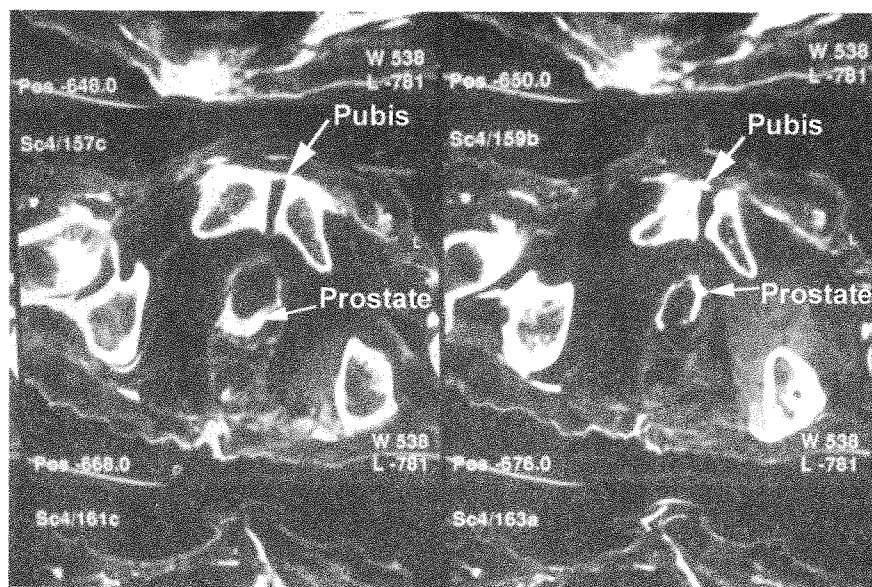


Fig. 10 – Mummy of Goriano Valli (XIX century): pelvic CT scan showing the rectum and a dense ring of tissue corresponding to the prostate.

munostained with polyclonal antibody against prostatic specific antigen (PSA) (YLEM, Avezzano, AQ, Italy) using LSAB peroxidase technique.

Histology revealed dense fibrous tissue containing muscular fibers and roundish cavities of variable size, filled with eosinophil, PAS-positive material (Fig. 12). Strong immunohistochemical reactivity for PSA was observed in this material (Fig. 13). Concretions were also present in some of these spaces. The existence of glandular structures containing eosinophil, PAS-positive material, immunoreactive for PSA, confirmed the prostatic nature of the specimen, already suspected after CT scan and gross examination.

The presence itself of the prostate, its histological picture, the preserved and distended urinary bladder, in addition to the age of the subject, supported the diagnosis of prostatic hyperplasia<sup>11</sup>.

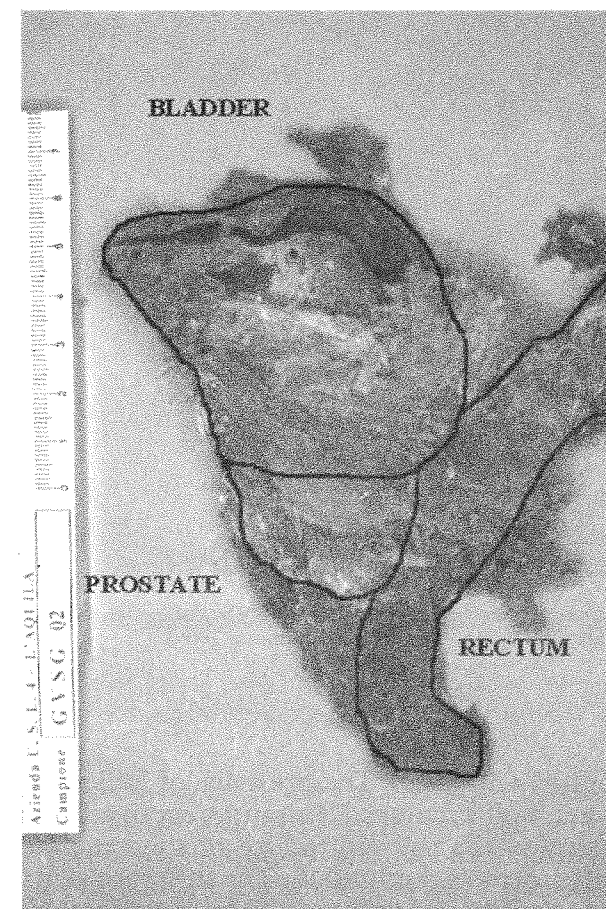


Fig. 11 – Lateral view of the pelvic organs.

#### *The thyroid*

Autopsy also revealed a swelling of the thyroid gland with irregular outlines. Histologic examination showed abundant fibrous tissue containing round follicles, filled with acidophil, colloid-like material. Multiple calcifications were present. Strong immunohistochemical reactivity for thyroglobulin was observed

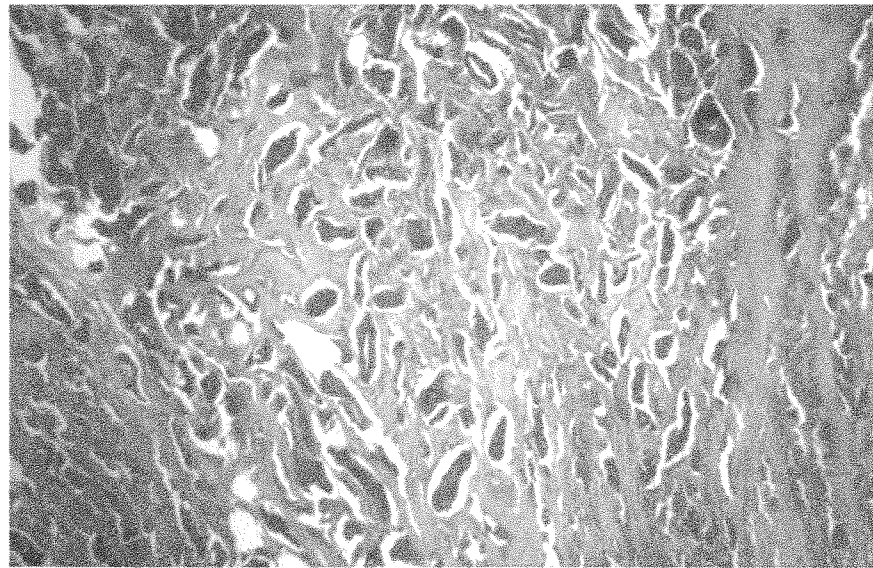


Fig. 12 – Fibromuscular tissue containing glands of variable size, filled with eosinophil material (Hematoxylin-Eosin, original magnification 100×).

in the colloid-like material. The presence of follicular structures containing acidophil material, immunoreactive for thyroglobulin, demonstrated the thyroid nature of the specimen, already suspected after gross examination. The different size of follicles, along with dense fibrosis and multifocal calcifications, supported the diagnosis of multinodular goiter<sup>11</sup>. We also observed extensive left pleural adhesions and a large calcified area of the left lung, already noted during CT scan. Such macroscopic findings showed strong evidence of pulmonary post-primary tuberculosis. Both lungs presented diffuse anthracosis<sup>12</sup>.

All pathologic conditions are compatible with the age and the life-style of a nineteenth-century subject. The demonstration of an ancient multinodular goiter in the inner Abruzzo region (central Italy) is not surprising, as the latter still represents an endemic area for this disease.

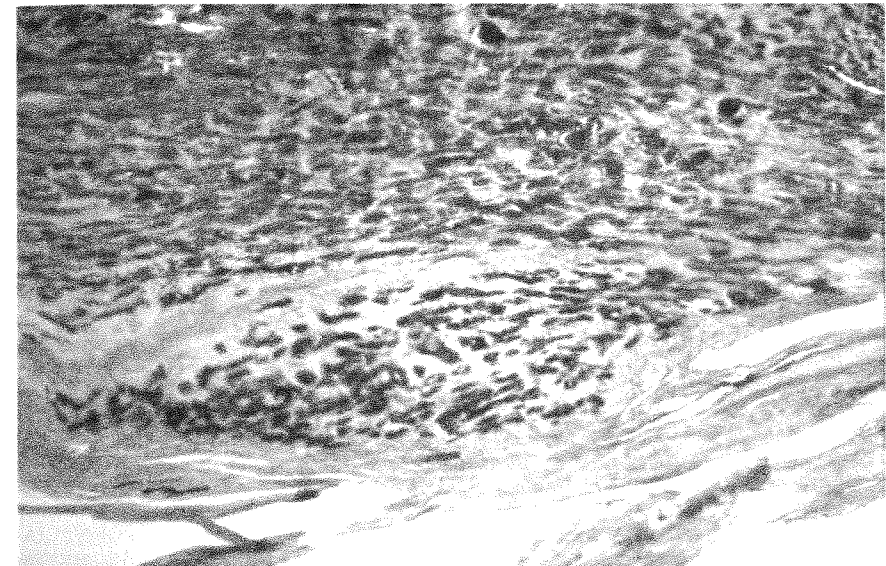


Fig. 13 – Strong PSA immunohistochemical reactivity of the glandular material (original magnification 100×).

### Conclusions

As far as we know, so far neither benign nor malignant forms of prostatic enlargements had appeared in the paleopathology literature<sup>13</sup>. Therefore the Italian cases, of Renaissance and Modern age, represent the only known reports of prostatic hyperplasia in mummies and clearly demonstrate that, by the use of different and modern technologies, paleoandrological studies are possible. The good preservation of the external and internal genitalia of these two individuals may be related to the supine position of the bodies after death, which allowed a rapid dehydration of these structures.

This type of approach, at present limited to prostate but easily extensible to other organs on a larger number of mummies, could solve some important medical problems, as for example the origin and diffusion of some sexually transmitted diseases and genital tumors, whose natural history is still unclear and currently discussed by the andrologists.



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Articoli/Articles

THE ANCIENT NAME OF ROSE

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SUMMARY

*The article is a survey of plants foods and drugs that Greeks and Romans thought to be aphrodisiac and to have a specific effect on the male libido. The article is a useful support to study the sexual therapy in ancient world.*

Introduction

This is a survey of plant foods and drugs that were considered in ancient Greece and Rome to have an aphrodisiac effect. With very few exceptions, the available information bears on substances that were supposed to have an effect on the *male* libido. I hope the paper will assist in understanding the approach to sexual therapy of ancient physicians and others and of the people whom they advised. To this end, the survey will be followed by some questions and answers.

First, an outline of the sources of information. Medical writings are useful, but they do not come first in point of time: I will begin, therefore, with general literature.

Already by 430 BC references were being made in the Athenian comic drama to supposed aphrodisiacs. These references continued from time to time through the hundred and fifty years during which Athenian comedy was a living genre; they are mostly brief and humorous asides. Those quoted in the following pages are from plays by Aristophanes, Plato Comicus, Alexis and Xenarchus. Some of Aristophanes' plays survive complete. Those of other authors survive only as brief excerpts, and most of these are to be found in a later Greek work on food and dining, the *Deipnosophists* by Athenaeus, a scholarly author of

Key words: Ancient medicine - Aphrodisiacs - Sexual therapy