INTRODUCTION
Probable prostate cancer in a Pre-Incaic individual from Pukara de La Cueva, Northwestern Argentina
Leandro Luna 1, 2 (lunara@gmail.com); Claudia Aranda 2 (aranclay@gmail.com); Ana Luisa Santos 3 (alsantos@antrop.uc.pt)
1 CONICET 2 Ethnographic Museum J. B. Ambrosetti, University of Buenos Aires, Argentina 3 Department of Life Sciences and CIAS, University of Coimbra, Portugal

Prostate cancer is one of the most aggressive malignant tumors that metastasizes in bone, with ca. 70-90% of the patients developing osteoblastic and osteolytic lesions in the skeleton. Nonetheless, the number of paleopathological cases reported worldwide is very small. In South America, only two Peruvian skeletons were identified. In Argentina, a pre-Hispanic hunter-gatherer middle-aged male from Western Pampas was diagnosed with a metastatic carcinoma but the primary focus could not be identified. Aim: To analyze a Pre-Columbian male individual from Pukara de la Cueva, Jujuy province, in the Northwest region of Argentina.

INDIVIDUAL AND METHODS
The individual is a fairly complete skeleton with well-preserved bones except for the skull which is very fragmented and incomplete. From the postcranial skeleton, only the left patella and several small bones were absent. According to standard methods, this skeleton belonged to a middle-aged male. All bones were carefully observed macroscopically and radiologically. Radiographs were taken in Imagen Test facilities, Buenos Aires, Argentina.

RESULTS AND DISCUSSION
The distribution of the pathological manifestations is schematized in the sketch. Lesions are bilateral and present all over the skeleton. The intranskeletal distribution shows that only proliferative lesions occur alone in the skull. In the postcranial skeleton both types are present, with predominance of bone growth in the axial area and in the pelvis. Osteolytic defects are mostly present in the upper limb and in the distal ends of lower limb bones.

The most outstanding lesions are in both os coxae. Both visceral and posterior surfaces are affected by a layer of new bone, with numerous spiculae perpendicular to the cortical surface or with massive outgrowths of highly irregular spiculae. In general, the most affected bones for any secondary cancer are the vertebral column, pelvis girdle, thorax, proximal epiphyses of humerus and femora. The dissemination may occur through the circulatory or lymphatic systems, promoting the proliferation of multiple lesions in the specific areas where lymphatics and arteries enter the bone structure.

The identification of the primary focus should be made mainly considering the difference between proliferative or erosive nature of the lesions and their location. An exuberant osteoblastic activity with very sclerotic borders and in occasions also with some bone destruction is, according to the specialized literature, mainly a response to prostate cancer in males, although primary tumors in the lung, kidney and thyroid cannot be ruled out. Secondary lesions to prostate cancer are more sclerotic and proliferative, while those provoked by lung carcinomas are mainly osteolytic.

Although rectal cancer tends to produce a rather similar pattern of strong new bone deposition, the overall distribution, almost exclusively osteoblastic activity of the metastases and the compactness of the resulting secondary tissue usually deposited in the axial, pelvic and thoracic areas, is dissimilar enough to discard it as a primary focus of the neoplastic disease. Recent studies had identified that the development of prostate cancer metastasizes produces osteoblastic new bone depostions associated with osteoblastic activity, both derived from the same whole process. Thus, the case presented in this paper is more likely related to the first type of disease.

Risk of prostate cancer may be accounted by genetic, dietary habits and lifestyle factor(s). Isotopes values obtained for this individual (613C = -20.2%) indicate a low maize consumption and a diet based on C3 vegetables and herbivore animals, so that diet seems not to have been a fundamental contributor in the development of the disease. Some authors also refer that endogamous groups are more susceptible to these diseases through mutation transmission and residential settlements located in elevated, naturally defended places (pukaras), appeared.

CONCLUSIONS
The paleopathological analysis of this skeleton allowed identifying the development of a metastatic prostate cancer in South America pre-Hispanic societies and the first of its kind in Argentina. It is possible to suggest that the basic socio-environmental conditions were given for the appearance of malignant prostate cells, their proliferation and subsequent spread to the skeleton. As prostate cancer could remain silent due to its slow symptomatic development, this individual seems to have survived long enough to report the disease in his skeleton.

REFERENCES