

Treviso
2017



2nd International
Conference of
Funerary
Archaeoentomology

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Funerary
Archaeoentomology**

ICFAE 2017

7 th June 2017, Treviso, Italy



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Program

8:30-9:00	Registration
9.00-9.15	S. Vanin Welcome Speech
	Oral Presentations - Session I
9:45-10.00	Martín-Vega D., Russell S., Leyden J., Landals A., Hall M.J.R. Bone damage related to blow fly puparia (Diptera: Calliphoridae) in bison remains from the Wearmouth Buffalo Jump, Canada
10.00-10:15	Vanin S. Not only from humans, what insects can tell us about animal offerings
10:15-10:30	Giordani G., Vanin S. Characterization and identification of puparia of <i>Hydrotaea</i> Robineau-Desvoidy, 1830 (Diptera: Muscidae) from forensic and archaeological contexts
10:30-10:45	Tuccia F., Giordani G., Bortolini S., Vanin S. The contribution of molecular and phylogenetic analyses to the study of ancient puparia collected from the crypt of Roccapelago (XV-XVII century), Italy
10:45-11:15	Coffee Break
	Oral Presentations – Session II
11:15-11:30	C. Rossetti The putridarium of the Franciscan monastery in Azzio (Varese, Northern Italy)
11:30-11:45	Porzionato A., Macchi V., Tabarin L., Gusella F., Vanin S., De Caro R Entomological analyses in the scientific recognition of Saint Leopoldo Mandic (1866-1942)
11:45-12:00	Forbes V., Huchet J.B., Masson-Maclean E., McManus E., Knecht R. Archaeoentomology and the investigation of a scene of indigenous conflict: preliminary results from Nunalleq, Alaska
12:00-12:30	Huchet J.B., Gibault T. Archaeoentomological survey of ww1 soldier burials from the western front (Boult-sur-Suippe, France)
12:30-14:30	Lunch and Posters
14:30	Soldier Recovery Workshop
14:30-14:45	Millions of missing soldiers, an international problem
14:45-15:15	F. Nicolis “Rest in pieces! Recovery and identification of WWI soldiers from the Alpine Front”

15:15-16:00	Mann B. “We Regret to Inform You: Anthropology and War”
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16:00-16:30	TBC
16:30-16:45	Break
16:45-17:30	C. Cattaneo From the skeleton to the person
17:30-18:00	D. Gaudio War injuries, identification of the cause of death
18:00-18:30	TBC “Molecular identification of soldier remain, new strategies and potentiality
19:00-20:00	2 ICFAE Goodbye Reception and 14th EAFE Meeting Welcome Reception

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ORAL PRESENTATIONS AND POSTERS

**BONE DAMAGE RELATED TO BLOW FLY PUPARIA (DIPTERA:
CALLIPHORIDAE) IN BISON REMAINS
FROM THE WEARMOUTH BUFFALO JUMP, CANADA**

Martín-Vega D.¹, Russell S.², Leyden J.³, Landals A.³, Hall M.J.R.¹

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During millennia, Native Americans used cliff formations to hunt and kill plain bisons (*Bison bison* (L.)) en masse. These hunting areas are commonly known as ‘buffalo jumps’ and can provide archaeological deposits containing massive numbers of bison bones and diagnostic cultural material. The huge numbers of piled up carcasses should have provided a continued and abundant source of carrion and, therefore, sustained high densities of necrophagous insects. The Wearmouth Buffalo Jump is a sandstone cliff located in southern Alberta (Canada), probably used to hunt bisons repeatedly between c. 1700 and 1850 A.D. A recent investigation of this archaeological site unveiled different stratigraphic layers containing massive quantities of bison bones. Whereas some layers did not show any insect remains or traces, some layers contained vast amounts of blow fly puparia, usually inside the horn-core cavities, cranial sinuses and marrow cavities of long bones. Alongside the blow fly puparia, fragments of Heleomyzidae (Diptera) puparia and of Scarabaeidae, Silphidae, Trogidae and cf. Cleridae (Coleoptera) were found. Two blow fly species were identified from the puparial material: *Protophormia terraenovae* (Robineau-Desvoidy) and *Phormia regina* (Meigen), with the latter representing only a small proportion of the samples. Identification was made on the basis of morphological characters. Both empty and unopened puparia were found for the two species. Some unopened puparia were imaged using X-ray micro-computed tomography to visualise the unemerged adult fly inside. Additionally, DNA extraction from the puparial samples was performed using both a commercial kit and a CTAB/chloroform based-method. Regrettably, none of the derived sequence data identified the presence of insect DNA, but further molecular work is in progress.

Severe damage was observed only on the bison bones containing blow fly puparia. Bone lesions caused by insects have been reported in archaeological contexts, although damage associated with flies appears to be atypical (Huchet, 2014). The observed bone lesions in the present case are reviewed and the potential role of the blow flies is discussed.

Reference cited:

Huchet, J.-B. 2014. Approche ichnologique et taphonomique des alterations ostéolytiques dues aux insectes en context archéologique. In: Denys, C., Patou-Mathis, M. (eds.), *Manuel de Taphonomie*, Errance, Paris, pp. 185–207

**NOT ONLY FROM HUMANS, WHAT INSECTS CAN TELL US
ABOUT ANIMAL OFFERINGS**

Vanin S.

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CHARACTERIZATION AND IDENTIFICATION OF PUPARIA OF *HYDROTAEA* ROBINEAU-DESVOIDY, 1830 (DIPTERA: MUSCIDAE) FROM FORENSIC AND ARCHAEOLOGICAL CONTEXTS

G. Giordani ^{1,2}, S. Vanin^{1,2}

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Diptera puparia, because of the very resistant physical and chemical composition of their cuticle, represent a big fraction of the insect remains that can be found on old cadavers. Puparia identification is still a problematic topic due to the lack of identification keys and in several cases lack in the description of the diagnostic features. Despite some larval characters are maintained on the puparium others, because the harnesses process, differ in the two stages and others, like the oral sclerites, are not always found among the empty puparia remains, especially in the archaeological context. A better description of the puparia and their diagnostic features is the “*conditio sine qua non*” for their identification. Among the Diptera in the family Muscidae collected from nowadays and funerary-archaeological contexts, *Hydrotaea* puparia are the most difficult to be identify because their superficial homogeneity of characters and because a lack of literature.

The genus *Hydrotaea* Robineau-Desvoidy, 1830, has a cosmopolitan distribution with more than one hundred of described species mainly from warmer regions. Larvae develop in situation of high bacteria fermentation with saprophagous blowflies (Calliphoridae), flesh flies (Sarcophagidae) and some Muscinae (eg. *Muscina* spp.). Despite collected from exposed human cadavers or animal carrions, where it seems to arrive during the ammoniacal fermentation, species of the genus were reported from the early stage of the decomposition. In addition the genus is considered among the specialized flies able to colonized buried remains where it can be present with high number of specimens.

Four species, *Hydrotaea capensis*, *Hydrotaea ignava*, *Hydrotaea aenescens* and *Hydrotaea dentipes*, collected from different European and South American forensic and archaeological contexts are detailed and illustrated. Posterior spiracles, anal plate and intersegmental spines have been considered as good diagnostic characters for the identification of these puparia.

THE CONTRIBUTION OF MOLECULAR AND PHYLOGENETIC ANALYSES TO THE STUDY OF ANCIENT PUPARIA COLLECTED FROM THE CRIPT OF ROCCAPELAGO (XV-XVII CENTURY), ITALY

Tuccia F.^{1,2}, Giordani G.^{1,2}, Bortolini S.^{2,3}, Vanin S.^{1,2}

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The study of insects collected from archaeological contexts can provide information about the “history” of the cadaver. The species identification is crucial in order to better understand the season of death, the estimation of the corpse exposure duration, taphonomy of the grave, delayed burial, grave reopening and other aspects concerning the mummification process. The efficiency of the morphological analyses can be affected by the lack of the physical integrity of the ancient samples and or by their state of preservation. Because of this, the molecular approach can be required as the only applicable method of analysis or in order to confirm the morphological observations. However, in ancient samples the DNA, if any is still preserved, is present in small amounts and it has a bad quality, i.e. it is often highly fragmented, so that the standard protocols have to be modified according to the archaeological nature of the samples. Furthermore, molecular data can be supported by computational and phylogenetic analyses especially if the examined species is poorly studied.

The combination of the above mentioned approaches of analyses has been applied on three set of samples composed of 5, 10 and 20 puparia collected from the archaeological Italian site of Roccapelago. The observation of the main morphological features of the puparia revealed that the samples belonged to *Hydrotaea capensis* (Diptera: Muscidae). After performing the DNA extraction, the barcoding region of the mitochondrial gene COI, commonly used in arthropods phylogenetic studies, has been chosen as target for the PCR. In order to avoid the failure of the PCR due to the overlong size of the “universal” region (658 bp), two set of primers specific for *Hydrotaea* sp have been designed *ex novo* so that the resulting amplicons are 228 bp long on average and partially overlap. Merging analyses of the short fragments allowed for the reconstitution *in silico* of a minigene covering the full original length of the barcoding region. The phylogenetic tree resulting by including the three obtained minigenes and *Hydrotaea* sp sequences available on data base show that the minigenes share the common ancestor with *H. capensis* confirming the previous morphological data.

The results demonstrate the efficiency of combining the morphological, molecular and phylogenetic approaches in order to get the correct species identification. Moreover, it comes to light that *in silico* analysis is a good strategy to apply on ancient DNA sequences since the highly fragmented issue of ancient DNA is overcome and a great support to the experimental data can be provided, especially if little is known about a certain species.

**THE PUTRIDARIUM OF THE FRANCISCAN MONASTERY
IN AZZIO (VARESE, NORTHERN ITALY)**

Rossetti C.

ENTOMOLOGICAL ANALYSES IN THE SCIENTIFIC RECOGNITION OF SAINT LEOPOLDO MANDIC (1866-1942)

Porzionato A.¹, Macchi V.¹, Tabarin L.¹, Gusella F.², Vanin S.³, De Caro R.¹

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In 2015, a scientific recognition was performed on the body of Saint Leopoldo Mandic (1866-1942), at the Friary of the Capuchins in Padua, also for temporary translation of the body to Rome in occasion of the 2016 Extraordinary Jubilee of Mercy. The body showed natural mummification. During the recognition and following conservative treatments, a series of entomological samples were taken, some of which were sampled from the abdominal cavity through small tissue defects in the abdominal wall. Some 5-10 mm-long cocoons were sampled. They were externally covered by excrements and insect portions. Cocoons were cut and opened. The internal surfaces showed sericeous aspect. The cocoons were empty, apart from some fragments of cuticle and cephalic capsules. On the basis of the characteristics of the above structures, it was possible to identify the cocoons as belonging to the species *Tineola bisselliella* (Lepidoptera, Tineidae). The species of the genus *Tineola*, also known as clothes moths, can derive nourishment from many different kinds of food, such as vegetable and animal fibers. *T. bisselliella* and *T. pellionella* have been reported among insects of the VIII wave of colonization of human rests, when tissues are completely dry. They prefer dark and moist environment and they show developmental periods of 4-6 months, with two generations per year. The above species are active along all the year, but mainly in summer and autumn. In the present case, the colonization of the body probably occurred during one of preceding recognitions, which were performed in two different occasions. In conclusion, entomological analyses may give further information about the preservation conditions of mummified bodies and even about conditions of previous recognitions.

**ARCHAEOENTOMOLOGY AND THE INVESTIGATION OF A SCENE OF
INDIGENOUS CONFLICT: PRELIMINARY RESULTS FROM NUNALLEQ,
ALASKA**

Forbes V.^{1,2}, Huchet J.B.^{1,3,4}, Masson-Maclean E.², McManus E., Knecht R.²

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This paper presents the preliminary results of the EU-funded Marie Curie project ‘Insects as Silent Witnesses to Prehistoric Warfare: Forensic Archaeoentomology as a Novel Approach to the Study of Conflict’. The aim of the project is to develop an approach that will allow the events and circumstances that preceded, defined and ensued past episodes of violence to be reconstructed from insect subfossils and other material evidence recovered at conflict sites. The project focuses on Nunalleq, a pre-contact (15-18th centuries AD) indigenous (Yup’ik) village in southwestern Alaska, which was the stage of a massacre during a period referred to by local oral historians as ‘the Bow and Arrow Wars’ (Fienup-Riordan & Rearden, 2016). The permafrost-preserved archaeology at the site includes the remains of a large sod structure, the final floor layers of which are burnt and overlain by charred roof sods strewn with projectile points and shafts. Excavations have also recovered the remains of several of the conflict victims, including a few complete skeletons and many skulls and other disarticulated limb bones. Multiple samples of insect remains recovered from the house floors and human corpses are currently being analysed. In this talk, we will present and discuss our preliminary interpretations of the spatial distribution and forensic significance and of the blowflies, lice and fleas we have identified from the site. This archaeoentomological data will form the basis for building a series of possible scenarios that will be scrutinised in light of other artefactual and biological evidence available at the site. Our project is a ‘proof-of-concept’ study, which we hope will demonstrate that it is possible to reconstruct detailed and compelling narratives of past episodes of violence from the integrated analysis of diverse categories of material evidence from conflict sites.

Fienup-Riordan, A. & Rearden, A. (2016) *Anguyiim Nalliini/Time of Warring. The History of Bow-and-Arrow Warfare in Southwest Alaska*. The University of Alaska Press, Fairbanks.

**ARCHAEOENTOMOLOGICAL SURVEY OF WW1 SOLDIER BURIALS
FROM THE WESTERN FRONT (BOULT-SUR-SUIPPE, FRANCE)**

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The archaeological site of Boulton-sur-Suippe, recently excavated by a French team led by B. Duchêne (INRAP), is located on the Western Front, not far from Reims. It comprises an important corpus of single and collective burials, including at least 530 soldiers who were either killed on the battlefield of the Champagne Front or died later at the hospital located on-site. The location where the soldiers died influenced the way in which they were buried. Indeed, individuals who passed away on the battlefield were buried in their tent canvas with their military equipment, while those who expired at the hospital were buried in pajamas.

In the course of the excavation, a huge quantity of insect remains (mainly fly puparia and beetles) associated with the soldier remains were recovered. In view of the fact that most information regarding the soldiers' identity and date of death could be traced by the archaeologists, we decided to conduct a 'blind archaeoentomological study', in which the only information that was provided to us by archaeologists was the reference number of burials excavated. This allowed us to confront the theoretical results and interpretations of our archeoentomological study with the archaeological data. This short talk will be a nice opportunity to present our first results.

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**“REST IN PIECES! RECOVERY AND IDENTIFICATION OF WWI SOLDIERS
FROM THE ALPINE FRONT”**

Nicolis F.

