

A rare example of animal writing with characteristic graphic signs in insects of the genus *Platycerus* (Coleoptera: Lucanidae)

Daide Scaccini¹, Paul Hendriks², Enzo Moretto³

¹Via A. Moro, 26839 Zelo Buon Persico, Lodi, Italy; ²Hoofdstraat 243, 9828PC, Oostwold (gem. Westerkwartier), the Netherlands; ³Museum Esapolis Padova Province, Kheprica and Butterfly Arc

Introduction

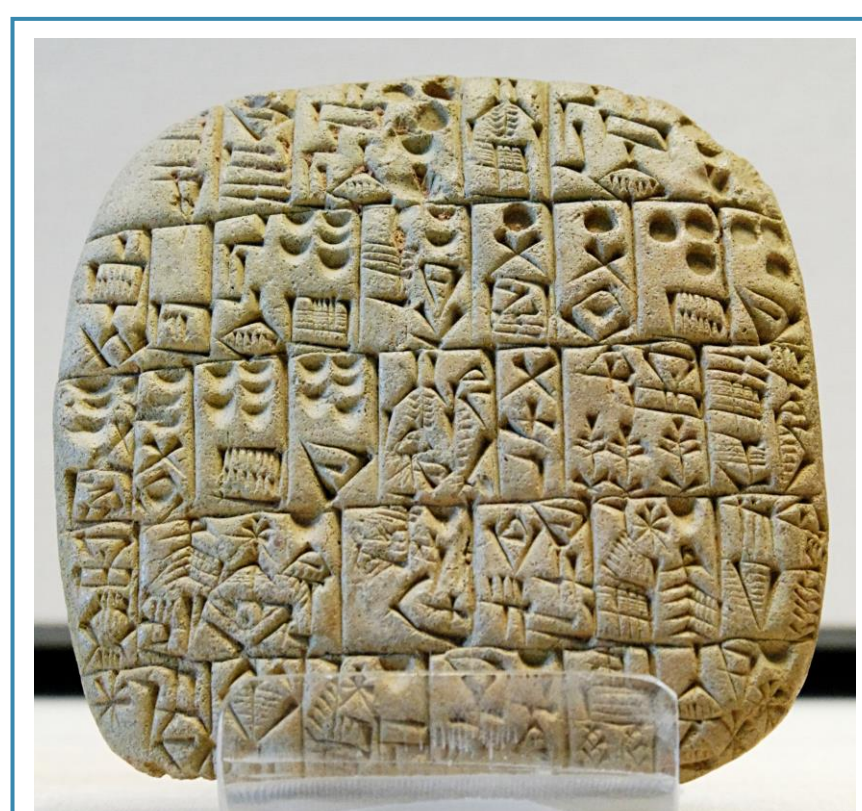
Platycerus species (Coleoptera: Lucanidae) are stag beetles that develop in decaying wood with fungi and microorganisms. Italy hosts two species: *Platycerus caprea* and *Platycerus caraboides*, typically found in cold forests on rather thin, soft, humid logs (Scaccini, 2022). *Platycerus* females gnaw scars on deadwood during the oviposition. The “typical” oviposition scar group is “OOD”, with the “O-symbol” hosting an egg, covered with chewed wood fragments and thus hidden. Other scars with slightly different shapes and sizes can be also found (Scaccini, 2016). *Platycerus* oviposition scars are more frequently found on humid parts of decaying wood and seem to be recognized by conspecifics.



Examples of habitats colonised by *Platycerus* spp. Photos: E. Moretto and D. Scaccini

Aim

We aim to highlight the distinctive oviposition signs of *Platycerus* spp., encouraging other scientists to explore this intriguing example of insect “writing” through physical representation, which fascinates us for its sequence and its resemblance to characters in ancient human writing.



Pre-cuneiform script. Sumerian contractm, selling of a field and a house. Shuruppak, c. 2600 BC. Louvre, Department of Oriental Antiquities. Photo: Marie-Lan Nguyen (2005)



Platycerus oviposition scars. Photo: D. Scaccini



Platycerus caprea, male. Photo: D. Scaccini

Materials and Methods

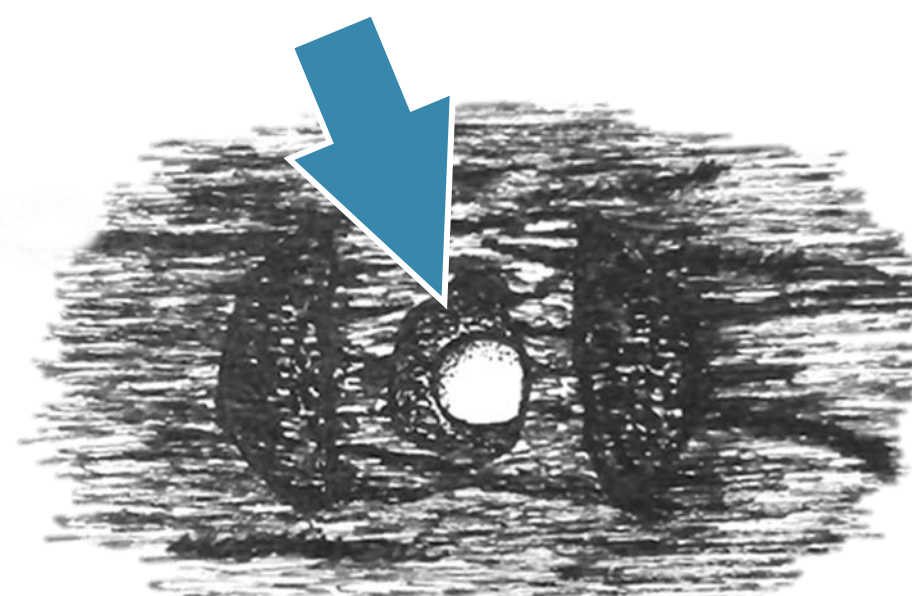
To investigate the oviposition scars by *P. caprea* and *P. caraboides*, several rotten branches and trunks were collected in forest areas in several places in northern Italy and in the Netherlands from 2011 to 2024. Logs with oviposition scars were also observed in the Euganean Hills Regional Park (Veneto region, northern Italy). *Platycerus* found inside the decaying wood were identified by using available keys (Franciscolo, 1997; Ballerio et al., 2013).

Results and Discussion

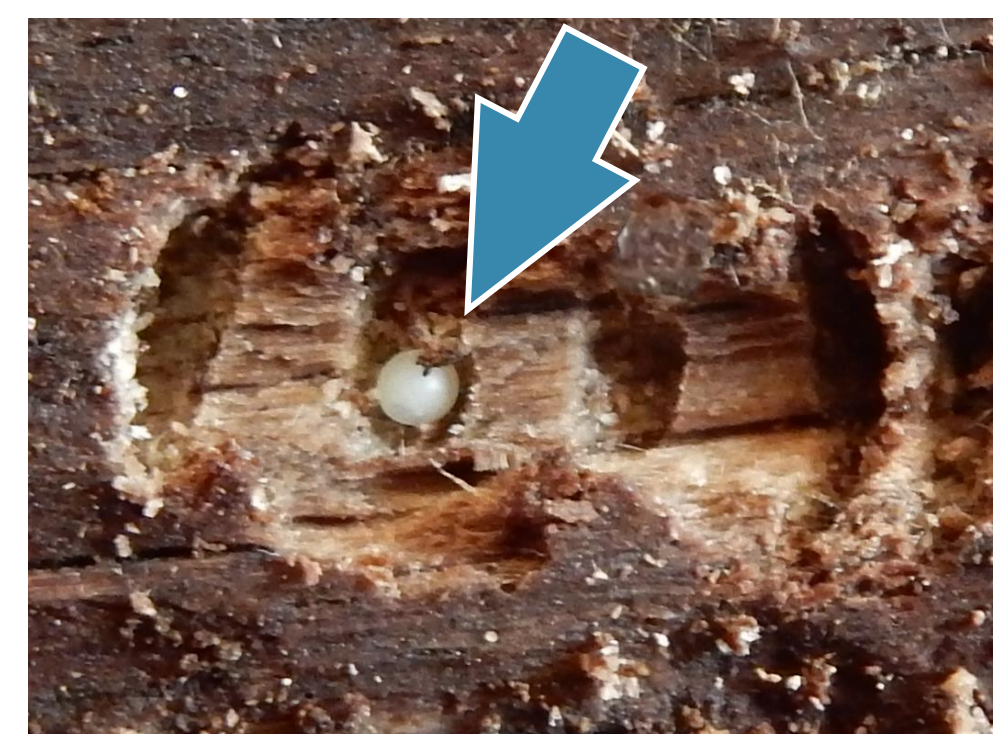
Platycerus caprea and *P. caraboides* oviposition scars are suggested as a possible interpretation of animal writing with characteristic graphic signs. Females gnaw oviposition scars mainly in white-rot wood with an adequate moisture content, in advanced stage of decay, in logs with no bark and with the main axis perpendicular to the wood length (Scaccini, 2016).

Oviposition scars are known for other *Platycerus* spp. (e.g., Ikeda, 1987; Imura, 2010), as well as for other stag beetle genera (e.g., Adachi, 1987; Araya, 1987; 1989; 1991).

The egg is laid in the O-shaped scar in the middle of the sequence, and the female seals it with fine wood splinters, potentially reducing exposure to severe weather conditions and predators. Hypotheses about oviposition scars include enhancing humidity retention, deterring other females to control egg density, and potentially transmitting symbionts to the offspring (Araya, 1989; Scaccini, 2016), as observed in other Coleoptera, i.e., Cerambycidae and Erotylidae (e.g., Anbutsu and Togashi, 1997; 2000; Toki et al., 2012; 2013; Toki and Togashi, 2013; Miyazaki and Toki, 2020).



Drawing of a “typical oviposition scars group” of *Platycerus* spp. on a deadwood. The O-shaped scar contains an egg (arrow). Credits: D. Scaccini



Open view of oviposition scars made by *P. caraboides* on a dead log, with the egg in the O-shaped scar (arrow). Photo: P. Hendriks



A female of *Platycerus* gnawing an oviposition scar. Photo: D. Scaccini



Platycerus caraboides, third instar larva. Photo D. Scaccini

Conclusions

The understanding of the significance of *Platycerus* oviposition scars is important. Observing female behavior in the natural and artificial scars, under various environmental conditions, and with different perceptual abilities, could reveal if this behavior is linked to a visual or tactile form of animal “proto-writing”. Additionally, this code could be used to test numerical or other cognitive abilities.

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Contact information:

Museum Esapolis, via dei Colli 28 –
enzo@micromegamondo.com



Associazione Kheprica APS e Butterfly Arc Srl Presso Esapolis, Museo della Provincia di Padova



Radboud University Nijmegen