

**Short scientific note**Submitted: April 28<sup>th</sup>, 2019 - Accepted: May 15<sup>h</sup>, 2019 - Published: May 31<sup>st</sup>, 2019***Psammoecus trimaculatus* Motschulsky, 1858, new to the Italian fauna (Cucujoidea: Silvanidae)**Livio MOLA<sup>1,\*</sup>, Takahiro YOSHIDA<sup>2</sup><sup>1</sup> Via Madonna del Boschetto 16, I-25030 Castel Mella (BS), Italy - livio.mola@gmail.com<sup>2</sup> Entomological Laboratory, Faculty of Agriculture, Ehime University - Tarumi 3-5-7, Matsuyama, 790-8566 Japan  
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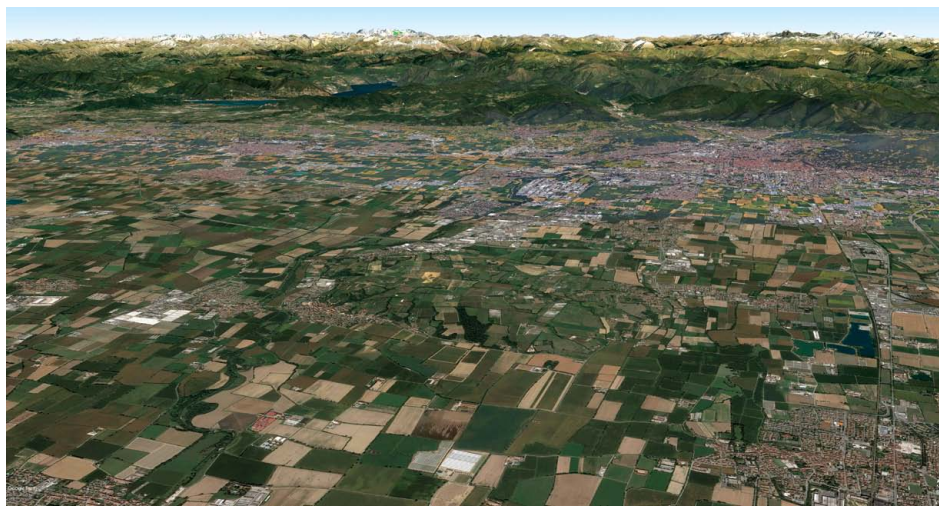
**Abstract**This paper reports for the first time *Psammoecus trimaculatus* Motschulsky, 1858 (Silvanidae) for the Italian fauna. The species, previously known for Europe from the Caucasian region only, was collected in Brescia province (Lombardy, N Italy).**Key words:** Silvanid flat bark beetles, *Psammoecus* spp., distribution, Europe, northern Italy.**Introduction**

The genus *Psammoecus* Latreille, 1829 (Coleoptera Silvanidae) includes about 80 species of silvan flat bark beetles, and most species are distributed in tropical or subtropical zones (Yoshida & Hirowatari 2014). Two species are known for the European subcontinent: *P. bipunctatus* (Fabricius, 1792) and *P. trimaculatus* Motschulsky, 1858 but, so far, only *P. bipunctatus* had been recorded in Italy (Ratti 2007). During the studies carried out by one of us (L. M.) on the Monte Netto hill (Italy, Lombardy, Brescia province) in 2018, leaf litter was searched and many specimens belonging to the genus *Psammoecus* were collected

in a small area of the Colombero wood (Fig. 3), in the municipal territory of Capriano del Colle. In this material the presence of *P. trimaculatus* was ascertained.

**Description of the area**

The Monte Netto hill (coordinates: 45°26'54.95"N 10°8'56.84"E) is a plateau isolated in the plains of Capriano del Colle, Flero and Poncarale municipalities (Figs 1, 2). It is located ca. 10 km south-west from Brescia; its maximum altitude is ca. 133 m a.s.l., rising about 30 m above the surrounding plains (Tira et al. 2010). The Colombero wood is



**Fig. 1** – The Monte Netto hill (Italy, Lombardy, Brescia province; (after *Google Earth*, modified).

a private area on the southern slope of the hill, with an extension of about 15 ha. It is a residual woodland of an ancient forest, which once covered the plains in the Po Valley (Prandelli 2005).

### Sampling method, collection data, identification

During 2018 a total of 155 *Psammoecus* specimens were collected between the end of October and mid-November,



**Fig. 2** – Localization of the Monte Netto hill in Italy (star); (after Google Earth, modified).



**Fig. 3** – The Colombere wood: into the white rectangle, the research area; (after Google Earth, modified).

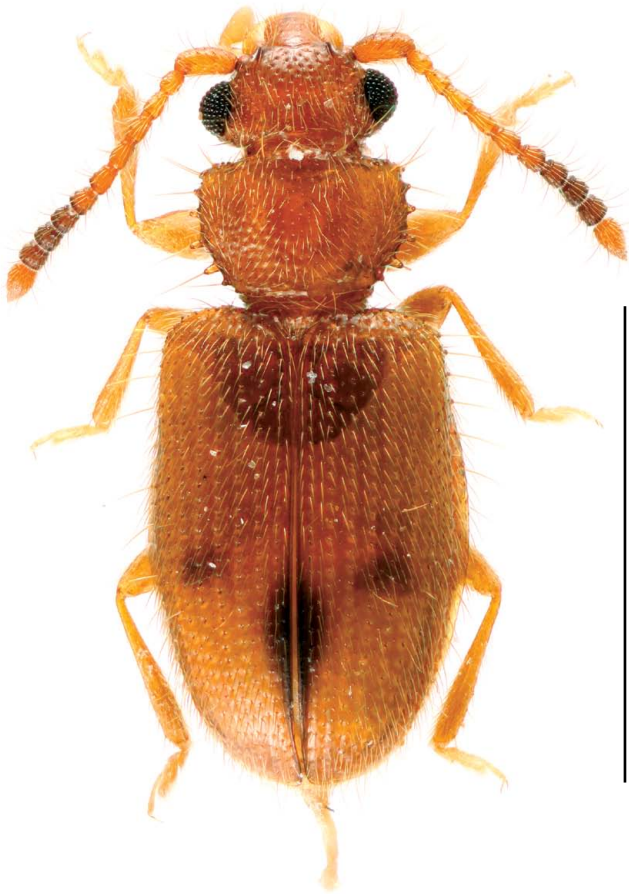
by using a litter-reducer. Leave litter was collected in a site dominated by oak trees (*Quercus robur* L., 1753) and moss was collected from an oak tree recently fallen due to wind: 22 specimens were collected on October 22<sup>nd</sup>, 119 on November 3<sup>rd</sup>, 7 on November 4<sup>th</sup> and 7 on November 18<sup>th</sup>. After 18<sup>th</sup> November, no further research has been carried out. Dissections were performed by one of us (T. Y.) under a microscope (Nikon SMZ1270) according to the methods of Yoshida & Hirowatari (2014). A photo image of the habitus (Fig. 4) was taken using a digital camera (Canon EOS 7D) with a macro lens (Canon MP-E 65 mm). A photo of the male genitalia (Fig. 5) was taken using a digital camera (Olympus E-5) attached to a microscope (Olympus BX43). Composite images were produced using the image processing software Combine ZM. Images were retouched using Photoshop 6.0 (Adobe Systems Inc.).

### Results and discussion

All the dissected males (5 specimens), identified by examining genitalia, belong to *P. trimaculatus*. These specimens are similar to *P. bipunctatus*, but can be distinguished by having longer teeth on the lateral margins of the pronotum (Fig. 4). Only male genitalia, however, provide reliable diagnostic characters for the discrimination of *P. trimaculatus* from the closely related species *P. triguttatus* Reitter, 1874 and *P. labyrinthicus* Yoshida & Hirowatari, 2014, because external characters are variable among conspecific individuals (Yoshida & Hirowatari 2014; Yoshida et al. 2018). The shape of parameres is the most distinct diagnostic character; *P. trimaculatus* can be distinguished from the other two species by the larger basis of the parameres (see Yoshida & Hirowatari 2014, and Fig. 5). The examination of the aedeagus therefore allowed to determine the specimens as *P. trimaculatus* and revealed the presence of this species in Italy for the first time. Because all of the five dissected male specimens had been randomly selected from the 155 individuals collected, the remaining specimens also likely belong to *P. trimaculatus*.

Probably future studies of Italian *Psammoecus* will find other unrecorded species of this genus or will find that *P. trimaculatus* is more widely distributed in Italy than currently recognized. However, examination of the genital structures of males is necessary for identification.

Kovalev (2016) recorded *P. trimaculatus* from the Caucasian region (Russia, Krasnodar territory, Chvizhepse village), which is the first record of this species from Europe. Therefore, our record is the second for the subcontinent, and the locality is far from the first one (Fig. 6). *Psammoecus trimaculatus* is a species cosmopolitan or sub-cosmopolitan in distribution: it is present in Australia, Brazil, Bhutan, India, Italy (new record), Japan, Madagascar, Malaysia, Myanmar, Nepal, New Guinea, Réunion (Mauritius, France), Russia, South Africa, Sri Lanka, Taiwan, Tanzania, Uganda (Pal 1985; Thomas & Yamamoto 2007;



**Fig. 4** – Habitus of an examined male of *Psammoecus trimaculatus*; scale bar: 1 mm; (photo: Takahiro Yoshida).



**Fig. 5** – Parameres of a male examined; scale bar: 0,1 mm; (photo: Takahiro Yoshida).



**Fig. 6** – Distribution of *P. trimaculatus* in Europe. Star: new record; circle: bibliographic record. (after *d-maps.com*, modified).

Karner 2012; Karner 2014; Yoshida & Hirowatari 2014; Kovalev 2016; Yoshida et al. 2018). It is the most common and widespread species of the Indian *Psammoecus* (Pal 1985; Sengupta & Pal 1996) and also common in Japan (Yoshida & Hirowatari 2014). The accidental passive dispersion by man might have caused this species to have such a wide distribution. Little is known on the presence of this species in products made from natural materials as is the case for other species of the genus *Psammoecus*. The *Psammoecus* species are not mentioned in much of the literature on stored products pests (e.g. Gorham 1991; Hagstrum & Subramanyam 2009; Hagstrum et al. 2013). Lu & Han (2006) reported the presence of *P. triguttatus* in wet blue leather and its packaging imported into Yangzhou, China; Hayashi (1992) hypothesized that the whole genus can be linked to damage of food. However, since Lu & Han (2006) identified the specimens by external characters (and not based on male genitalia), the attribution to *P. triguttatus* should be considered doubtful. It seems likely that specimens of *P. trimaculatus* are present in European collections and may have been erroneously determined as *P. bipunctatus* or may be still undetermined. Future research will allow to establish the actual geographic distribution of *P. trimaculatus* in the Italian and European territory and its possible pest status.

**Acknowledgements** – We are very grateful to Rinaldo Nicoli Aldini (Catholic University of the Sacred Heart, Institute of Entomology and Plant Pathology, Piacenza, Italy) for all his precious suggestions and critical reading of this manuscript, and to Sönke Hardersen for the English correction of the text. We would like to express our most cordial thanks to Toshiharu Mita (Entomology Laboratory, Faculty of Agriculture, Kyushu University, Fukuoka, Japan) for permission to use the laboratory equipment to photograph the male genitalia. We thank Adriano Prandelli for having kindly sent us his degree thesis. Many thanks to the own-

ers of the Colombero wood for having allowed access to their respective properties: Lanfranco Cirillo and Marinella Spagnoli, Giorgio Montini, Giulio Montini, Elisabetta Montini Luzzago and Lodovica Temponi Luzzago. Furthermore, thanks to Pierangelo Lanzanova for the complete and generous logistic collaboration during all the researches.

## References

- Gorham J.R. (Ed.) 1991. Insect and mite pests in food. An illustrated key. United States Department of Agriculture and United States Department of Health and Human Services, Agriculture Handbook No. 655, Washington, vol. 1: pp. viii + 1–310; vol. 2: pp. 311–768.
- Hagstrum D.W., Klejdysz T., Subramanyam B., Nawrot J. 2013. Atlas of stored-product insects and mites. AACC International, St. Paul, Minnesota, pp. viii + 590.
- Hagstrum D.W., Subramanyam B. 2009. Stored-product insect resource. AACC International, St. Paul, Minnesota, pp. x + 1–510.
- Hayashi N. 1992. Illustrations for identification of larvae of the superfamily Cucujoidea (Coleoptera) found in mouldy stored foods in Japan. House and Household Insect Pests, 14(2): 102–131. [In Japanese, with English title]
- Karner M. 2012. A revision of African *Psammoecus* (Coleoptera, Silvanidae) and descriptions of two new species from the collection of the Musée royal de l’Afrique centrale. European Journal of Taxonomy, 17: 1–31.
- Kovalev A. V. 2016. New records of adventive species of Corylophidae and Silvanidae (Coleoptera: Cucujoidea) from the Western Caucasus. Zoosystematica Rossica, 25 (2): 273–276.
- Lu Y., Han Z. 2006. Five narrowly distributed species of Silvanidae from Yangzhou captured in wet blue leather and packages. Chinese Bulletin of Entomology, 43 (3): 398–400. [In Chinese, with English title]
- Prandelli A. 2005. Inquadramento dendrometrico-strutturale di un bosco planiziale in località Capriano del Colle (BS). Degree thesis, University of Padua, 97 pp.
- Pal T.K. 1985. A Revision of Indian *Psammoecus* Latreille (Coleoptera Silvanidae). Record of the Zoological Survey of India, Calcutta. Occasional Paper, 71: 1–54.
- Ratti E. 2007. I Coleotteri Silvanidi in Italia (Coleoptera Cucujoidea Silvanidae). Bollettino del Museo Civico di Storia Naturale di Venezia, 58: 83–137.
- Sengupta T., Pal T.K. 1996. Fauna of India and The Adjacent Countries. Clavicornia: Coleoptera Family Silvanidae. Zoological Survey of India, Calcutta, 272 pp.
- Thomas M.C., Yamamoto P.T. 2007. New records of Old World Silvanidae in the New World (Coleoptera: Cucujoidea). Coleopterists Bulletin, 61 (4): 612–613.
- Tira M., Tiboni M., Pezzagno M., Confortini C., Docchio S., Richiedi A., Collivignarelli C., Vaccari M., Prandini F., Clerici A., Barzaghi F., Bara G. 2010. Parco Regionale del Monte Netto. Sintesi non tecnica, 81 pp.
- Yoshida T., Hirowatari T. 2014. A revision of Japanese species of the genus *Psammoecus* Latreille (Coleoptera, Silvanidae). ZooKeys, 403: 15–45. doi: 10.3897/zookeys.403.7145
- Yoshida T., Karner M., Hirowatari T. 2018. A revision of Taiwanese species in the genus *Psammoecus* Latreille (Coleoptera, Silvanidae). Zoological Studies, 57: 18. doi:10.6620/ZS.2018.57-18.