

# First record of *Temnorhynchus baal* Reiche et Saulcy, 1856 from Sardinia (Italy) (Coleoptera Scarabaeidae Dynastinae)

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## ABSTRACT

*Temnorhynchus baal* Reiche et Saulcy, 1856 (Coleoptera Scarabaeidae Dynastinae) is reported for the first time in Sardinia (Italy) on the basis of three records, one record made in the year 2003 along the coastal areas of Cagliari and the other two, made in the year 2024, in two localities along the South-Eastern coast of the island. The pest status of the species in the eastern Mediterranean basin is briefly discussed as well as the historical expansion of this species in the Palaearctic area.

## KEY WORDS

Possible pest introduction; alien species; West Mediterranean region; coastal dunes.

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## INTRODUCTION

More than 30 taxa are currently ascribed to the genus *Temnorhynchus* Hope, 1837 (Coleoptera Scarabaeidae Dynastinae). These are mainly distributed in tropical Africa and Madagascar (Krell, 1993), with only two species reaching the Palaearctic region, chiefly in the eastern Mediterranean basin and in the Arabian Peninsula: *T. baal* Reiche et Saulcy, 1856 and *T. coronatus* (Fabricius, 1781). *Temnorhynchus baal* is the most widespread species in this genus, whose occurrence in Europe has been reported from Greece, i.e., the Aegean islands and Crete, and from Cyprus (Krell, 1993; Krell, 1994; Krell & Bezděk, 2016). Hitherto, no reports are known from the western Mediterranean basin and indeed, the only known record from the European continent is that of a single alive specimen found in an abandoned sawmill in the town of Södertälje, South of Stockholm in Sweden, in 1988 (Forshage & Krell, 2016).

In the late Spring of 2003, one of the authors (DC) collected a single male specimen of *T. baal* in the metropolitan area of Cagliari, on a narrow sandy strip heavily impacted by anthropic activity. During the following years, further searches in the area did not yield additional specimens, resulting in the original first specimen being considered an occasional passive introduction, probably owing to the proximity of a commercial port to the site.

The recent discovery of this species in two other locations along the South-Eastern coast of Sardinia is also reported in the following work.

## RESULTS

### *Temnorhynchus baal* Reiche et Saulcy, 1856 from Sardinia (Italy)

MATERIAL EXAMINED. ITALY • 1 male; Sardinia, Cagliari, Giorgino beach; 39.18321N, 9.04965 E; 2 Jun. 2003; legit/collection Davide Cillo, Cagliari

(Italy) • 1 male; Sardinia (SU), Notteri, Serr'e Morus beach; 39.11943 N; 9.52165 E; 7 Nov. 2024; legit/collection Daniel Patacchiola, Rome (Italy) • Sardinia (SU), Muravera, Piscina Rei beach; 39.27015 N, 9.58324 E; 8 Nov. 2024; Morus beach; 39.11943 N; 9.52165 E; 7 Nov. 2024; legit/collection Daniel Patacchiola, Rome (Italy).

**BIOLOGY.** The phenology and ecology of the collected Sardinian *T. baal* specimens (Figs. 1, 2, 7) agree with that reported in the literature (Krell, 1993) and with the collecting data of specimens from other countries in the Mediterranean Basin (Gillett & Gillett, 2009; Uliana & Yildirim, 2012). The first Sardinian (and Italian) specimen, dating back to 2003 (locality 1, Fig. 3), was collected in the morning in a narrow man-made strip of sand dunes separating the Tyrrhenian Sea from one of

Cagliari's brackish ponds (Fig. 4). The dune vegetation there consists of halophilous pioneer plants. The two specimens found subsequently were also collected in the morning, alive, and in two separate coastal sites (Fig. 3: locality 2 and 3). These two sites lie some 15 km. apart but share a similar biotope (Figs. 5, 6): sandy shores characterised by the presence of a fairly extensive embryonic dune belt formed by a plant association named *Salsolo kali-Cakiletum maritimae* Costa & Manzanet 1981. The three known localities for *T. baal* in Sardinia delineate an approximately 50 km long arc of coastline in the South-Southeast part of the island. In addition to the two intact specimens found at the Serr'e Morus beach locality near Notteri (SU), on the edge of the embryonic dune in a sandy clearing used as a car park, numerous remains of dead adult individuals were found under stones partially buried



Figures 1, 2. Male specimen of *Temnorhyncus baal* from Giorgino beach, Cagliari (Sardinia, Italy).  
Fig. 1: specimen in lateral view. Fig. 2: detail of epicranial plate in frontal view. Photographs by Guido Sabatinelli.



Figure 3. Maps of South Sardinia (Italy) with collecting sites numbered 1 to 3.

among the Mediterranean maquis. At this locality, whilst excavating the ground to approximately 10-15 cm. depth, eight scarab beetle larvae were collected alive. These larvae are morphologically consistent with the pre-imaginal stages of the sub-family Dynastinae and are currently being reared and studied to verify their identity.

## DISCUSSION

Dynastinae is a large and diverse subfamily of Scarabaeidae, whose larvae mainly feed either upon plant roots or decomposing wood and other vegetation. These beetles are able to adapt to a variety of ecological niches, thereby being a group prone to potential passive transportation by humans through the global trade in plants and timber. During the last 30 years numerous taxa belonging to the genus *Temnorhynchus* Hope, 1837 have been recorded from numerous parts the globe that lie outside their primary range of distribution. For example, *Temnorhynchus retusus* (Fabricius, 1781), a widespread species in southern Africa, has been recorded from many locations in Australia (Allsopp, 1987; Krell & Hangay, 1998), demonstrating considerable adaptability. Because the larvae of *Temnorhynchus* sp. feed on roots, this suggests that the

success of this invasion has been due to trade in exotic plants from southern Africa. During the last 40 years, there have been numerous reports or confirmations of *T. baal* in the Palaearctic region: Krell (1994) confirmed its presence in Cyprus, where it occurs together with the congener *Temnorhynchus coronatus* (Fabricius, 1781); in 2009 its presence was confirmed on the island of Naxos (Gillet & Gillet, 2009) and most recently in 2012, the species was reported from the nearby Turkish coasts of İzmir Province (Uliana & Yildirim, 2012). The biogeographical origin of *T. baal* populations in the eastern Mediterranean area as proposed by Krell (1996) is based on two distinct historical expansion phases. A first phase began by slow climatic changes (28.000 -18.000 years ago) in which populations of this species tended to expand from the Ethiopian region northwards through Sudan and the natural corridor of the Nile valley to the Middle East. The second and more recent phase, is attributable to the expansion of sugarcane, *Saccharum officinarum* L. (Poaceae), cultivation into the eastern Mediterranean and the Hellenic area (Crete, Cyprus) that lasted from 8th until at least to the 16th century. In addition to the two historical expansive phases mentioned (Krell, 1996), one must also consider an even more recent one, certainly more accidental or unintentional than the previous ones. This

third phase has been caused by modern increased human trade in plants or wood of subtropical and tropical origin, which due to the species remarkable adaptability, especially in environments with sandy soil, can give rise to stable populations of this species in many areas (not only in the Mediterranean Basin). Because its larvae feed on roots, *T. baal*, like many of its congeners, is a potential pest of many crops. For example, in Egypt, the species is considered a key pest of strawberry crops and is

controlled through the use of EPN (entomopathogenic nematodes) (Shehata et al., 2019). The Mediterranean basin, and in particular Italy, owing due to its central position there, is a hotspot for maritime trade. Consequently, it is also a potential nucleus for the introduction of alien species. The presence of *T. baal* in the South of Sardinia must be further investigated, in order to confirm its establishment and to better understand its autoecology, as well as other external factors (climatic and an-



Figures 4-7. Collecting sites of *Temnorhynchus baal* in Sardinia (Italy). Fig. 4: sand strip of Giorgino beach, Cagliari (photograph by Luca Fancello, Dec. 2024). Fig. 5: embryonic dunes of Serr'e Morus beach near Notteri (SU) (photograph by D. Patacchiola, Nov. 2024). Fig. 6: collecting site in Piscina Rei near Muravera (SU) (photograph by D. Patacchiola, Nov. 2024). Fig. 7: live specimen of *T. baal* collect in Serr'e Morus beach (photograph by D. Patacchiola, Nov. 2024).

thropic) that could drive its rapid expansion in this area and in other regions of the western Mediterranean with similar climate and environments (e.g., the southern Peninsular Italian regions, the Mediterranean coastal districts of Spain, France and north-western Africa).

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