



CHECKLIST OF COLEOPTERA FROM THE FOREST HABITATS OF CENTRAL PLATEAU OF MOROCCO

HAMZA HABBAZ^{1,2*}, AMINE SAMIH^{1,2}, LATIFA ROHI¹ AND NOUREDDIN MAATOUF²

¹Laboratory of Ecology and Environment, Faculty of Sciences Ben M'sik, University Hassan II of Casablanca, Avenue Cdt Driss El Harti, P.O. Box 7955, Sidi Othman, 20000 Casablanca, Morocco

²Center for Innovation, Research, and Training, National Agency of Water and Forests, Avenue Omar Ibn Khattab P O Box 763, Agdal-Rabat, 10000 Rabat, Morocco

*Email: hamza96habbaz@gmail.com (corresponding author): ORCID ID 0009-0000-7117-1075

ABSTRACT

Beetles play a crucial role in the functioning of the forest ecosystems, serving as good bioindicators for conservation. However, knowledge about the distribution and conservation status of beetles in Morocco is still limited. To update and supplement existing information, an inventory of beetles in forest habitats of the Central Plateau was carried out over two years (2019 and 2020) using various traps and direct prospecting techniques. This inventory identified 90 species belonging to 32 families. Among these species twelve are endemic and six species are new to Morocco. This study has contributed to the knowledge of the Moroccan entomofauna and revealed the conservation status of this ecosystem.

Key words: Beetles, biodiversity, Central Plateau, cork oak, forest habitats, geographic distribution, holm oak, inventory, Morocco, thuja, checklist, genera, species

Moroccan forests present a great variety of habitats rich in biodiversity (QCN, 2021). These natural spaces, subject to multiple constraints, are threatened and require new approaches to maintain functional and productive forest ecosystems in the long term (Latrémouille, 2008). These new practices should target certain vulnerable faunal groups that represent a priority issue. The forests, of the Moroccan central plateau, composed of cork oaks (*Quercus suber*), holm oaks (*Quercus rotundifolia*), and thuja (*Tetraclinis articulata*), are abundant in significant natural potentials that contribute to the individualization of different forest ecosystems. Located in the northwest of Morocco, the central plateau and its forest habitats provide numerous ecological goods and services to the society. This area contains four Sites of Biological and Ecological Interest (SIBE) according to the study on Protected Areas in Morocco (AEFCS, 1996). Like in most Moroccan forest habitats, information on the beetle populations and their spatial distribution in the central plateau is relatively incomplete. This situation confers upon them a significant an important responsibility for in the conservation of natural heritage in the face of human interventions. The study of certain taxonomic groups of insects, such as beetles, allows for monitoring the evolutionary trends of forest environments (Rossi & Vallauri, 2013). These insects are indeed very sensitive to changes and disturbances (fires, collection of deadwood, overgrazing, etc.),

and their qualitative (rarity) and quantitative study can provide information on the state of conservation and resilience of these environments (Blandin, 1986; Speight, 1989). An inventory of beetles in the forest habitats of the central plateau was conducted for two consecutive years (2019 and 2020), to obtain better understanding of the entomofauna in this area and to assess the biological value of forest formations.

MATERIALS AND METHODS

The study area located in the northwestern part of Morocco, between the Middle Atlas Mountain range and the Atlantic coast of Morocco. The forest habitats in the plateau cover a total area of 106,000 ha (BETAF, 2017). Six sampling stations were selected based on their altitude, bioclimatic zone, and floristic composition: Station 1 (Ain sbit): Cork oak forest, located in (33° 28, 079''N; 06° 29, 310''W), at an elevation of 820 m. Station 2 (EL Harcha): Cork oak forest, located in (33° 29, 951''N; 06° 08, 294''W), at an elevation of 885 m. Station 3 (Oulmes): Cork oak forest, located in (33° 28, 860''N; 06° 07, 387''W), at an elevation of 950 m. Station 4 (Boudarga): Thuja Forest, located in (33° 46, 928''N; 05° 51, 474''W), at an elevation of 384 m. Station 5 (Ain sbit): Holm oak forest, located in (33° 28, 699''N; 06° 28, 587''W), at an elevation of 670 m. Station 6 (EL Harcha): Thuja Forest, located in (33° 31, 845''N; 06° 08, 530''W), at an elevation of 690 m.

Two sampling methods were used: visual monitoring during trap checks controls and a passive sampling system with three types of traps: 1) window trapping (interception traps): The traps consisted of a large transparent plexiglass panel (73 cm x 42 cm) that intercepted the beetles that strike it in flight. The insects were collected in a gutter fixed at the base of the trap, filled with water, mixed with cooking salt and a few drops of dishwashing detergent to reduce surface tension. This trapping method is effective to collect xylophagous and saproxylic species (Ranius and Jansson, 2002; Brustel, 2004; Bouget et al., 2008). Their position was 1.20 m from the ground, in plots where dead wood was present (Bouget and Noblecourt, 2005). 2) Pitfall traps or Barber traps: Plastic cups are pushed into the ground and filled with a preservative liquid (soapy water + salt). The container is then covered with wooden branches to prevent it from being trampled by animals. 3) Attractive traps consisted of yellow-colored bowls with a diameter of 15 cm and a height of 13 cm. They were filled halfway with a preservation mixture (soapy water + salt) and placed at a height of 1.5 m in clearings to attract flower-visitors.

In each station, eight traps were installed and spaced at intervals of 15 to 20 m (six pitfall traps, one yellow-colored trap and one window trap). They were checked every three weeks for a period of nine months (March to November) during the 2019 season, and with only three outings (March, June, and July) during the 2020 season. The specimens collected were first identified at the genus level using specific identification keys for each family. For species confirmation, they were compared to the specimens in the museum's collections of the CIRF (Centre for Innovation, Research, and Training) and the Museum of the Scientific Institute of Rabat (MNHN) (Morocco). The material collected was deposited in the insect collection of the Centre for Innovation, Research, and Training - Rabat (Morocco).

RESULTS AND DISCUSSION

A total of 90 species have been identified, belonging to 32 families. Among these, 12 species are endemic to the region, and 6 species are newly recorded for Morocco. The families and species are presented in alphabetical order. Check list [N] Species newly recorded for Morocco and [E] Endemic species are abbreviations.

Family 1: Anobiidae

Stegobium paniceum (Linnaeus, 1758)

Material examined. MOROCCO – Boudarga, 33° 46, 928'N, 05° 51, 474'W; alt. 384m; 16.VII.2019; H. Habbaz, leg. 2 spec.; yellow-colored trap and window trap; 7.VIII.2019, 1 spec.; Barber trap; Thuja.

Distribution. Europe, Asia, and North Africa (Borowski, 2007).

Family 2: Anthicidae

Cyclodinus constrictus constrictus (Curtis, 1838)

Material examined. MOROCCO – Boudarga, 33° 46, 928'N, 05° 51, 474'W; alt. 384m; 26.IV.2019; H. Habbaz, leg. 1 spec.; Barber trap. Thuja.

Distribution. Europe, North Africa, Jordan, and Turkey (Chandler et al., 2008; Chavanon, 2018).

Family 3: Attelabidae

Attelabus variolosus (Fabricius, 1801)

Material examined. MOROCCO – El Harcha, 33° 29, 951'N, 06° 08, 294'W; alt. 885m; 28.VI.2019; H. Habbaz, leg. 2 spec.; yellow-colored trap and window trap. Cork oak.

Distribution. Spain, Algeria, and Morocco (Alonso-Zarazaga, 2011; Benyahia, 2016; Chavanon, 2018).

Family 4: Bruchidae

Bruchidius meleagrinus (Gene, 1839)

Material examined. MOROCCO – Oulmes, 33° 28, 860'N, 06° 07, 387'W; alt. 950m; 16.VII.2019; H. Habbaz, leg. 3 spec.; Barber trap. Cork oak.

Distribution. Europe, Algeria, Morocco, and Tunisia (Anton, 2010; Benyahia, 2016).

Family 5: Buprestidae

Acmaeodera bipunctata kureimatica Escalera, 1914

Material examined. MOROCCO – El Harcha, 33° 29, 951'N, 06° 08, 294'W; alt. 885m; 28.VI.2019; H. Habbaz, leg. 2 spec.; yellow-colored trap. Cork oak and Thuja. Boudarga, 33° 46, 928'N, 05° 51, 474'W; alt. 384m; 28.VI.2019; H. Habbaz, leg. 8 spec.; Barber trap. Thuja.

Distribution. Algeria and Morocco (Volkovitsh, 2006).

Acmaeoderella adspersula (Illiger, 1803)

Material examined. MOROCCO – El Harcha, 33° 29, 951'N, 06° 08, 294'W; alt. 885m; 28.VI.2019; H. Habbaz, leg. 2 spec.; Barber trap. Cork oak. Oulmes, 33° 28, 860'N, 06° 07, 387'W; alt. 950m; 16.VII.2019; H. Habbaz, leg. 2 spec.; Barber trap. Cork oak.

Distribution. Europe, Asia, Morocco, Algeria, and Tunisia (Volkovitsh, 2006; Benyahia, 2016).

Acmaeoderella discoidea (Fabricius, 1787)

Material examined. MOROCCO – El Harcha, 33° 29, 951'N, 06° 08, 294'W; alt. 885m; 16.VII.2019; H. Habbaz, leg. 1 spec.; Barber trap. Cork oak.

Distribution. Europe, North Africa, Syria, and Israel (Volkovitsh, 2006; Chavanon, 2018).

Acmaeoderella lanuginosa (Gyllenhal, 1817)

Material examined. MOROCCO – El Harcha, 33° 29, 951'N, 06° 08, 294'W; alt. 885 m; 16.VII.2019; H. Habbaz, leg. 1 spec.; Barber trap. Cork oak.

Distribution. Europe, Morocco, Algeria, Tunisia, Sinai, and Israel (Volkovitsh, 2006; Chavanon, 2018).

Agrilus viridis (Linnaeus, 1758)

Material examined. MOROCCO – El Harcha, 33° 29, 951'N, 06° 08, 294'W; alt. 885m; 28.VI.2019; H. Habbaz, leg. 3 spec.; yellow colored trap. Cork oak. Boudarga, 33° 46, 928'N, 05° 51, 474'W; alt. 384m; 28.VI.2019; H. Habbaz, leg. 1 spec.; Barber trap. Thuja. Oulmes, 33° 28, 860'N, 06° 07, 387'W; alt. 950m; 16.VII.2019; H. Habbaz, leg. 12 spec.; yellow colored trap, window trap and Barber trap; 7.VIII.2019, 1 spec.; Barber trap. Cork oak.

Distribution. Europe, Asia, and North Africa (Jendek, 2006).

Anthaxia ignipennis Abeille de Perrin, 1882 [N]

Material examined. MOROCCO – Ain Sbit, 33° 28, 699'N, 06° 28, 587'W; alt. 670m; 25.V.2019; H. Habbaz, leg. 1 spec.; Barber trap. Holm oak. Boudarga, 33° 46, 928'N, 05° 51, 474'W; alt. 384 m; 16.VII.2019; H. Habbaz, leg. 2 spec.; Barber trap. Thuja.

Distribution. France, Portugal, and Spain (Bily, 2006).

Anthaxia mendizabali cobos, 1965

Material examined. MOROCCO – Oulmes, 33°

28, 860'N, 06° 07, 387'W; alt. 950m; 16.VII.2019; H. Habbaz, leg. 2 spec.; yellow colored trap. Cork oak. El Harcha, 33° 29, 951'N, 06° 08, 294'W; alt. 885m; 11.VI.2020; H. Habbaz, leg. 5 spec.; yellow colored trap, and window trap. Cork oak.

Distribution. Europe, Algeria, Morocco, Tunisia, and Syria (Bily, 2006).

Family 6: Cantharidae

Malthinus flaveolus (Herbst, 1786) [N]

Material examined. MOROCCO – Ain Sbit, 33° 28, 699'N, 06° 28, 587'W; alt. 670m; 25.V.2019; N. Maatouf, leg. 5 spec.; yellow colored trap. Holm oak. Boudarga, 33° 46, 928'N, 05° 51, 474'W; alt. 384m; 25.V.2019; N. Maatouf, leg. 1 spec.; yellow colored trap. Thuja. El Harcha, 33° 29, 951'N, 06° 08, 294'W; alt. 885m; 26.IV.2019; N. Maatouf, leg. 3 spec.; yellow colored trap. Cork oak. Oulmes, 33° 28, 860'N, 06° 07, 387'W; alt. 950m; 16.VII.2019; N. Maatouf, leg. 1 spec.; yellow colored trap. Cork oak.

Distribution. Europe (Kazantsev & Brancuçi, 2007).

Family 7: Carabidae

Asaphidion curtum curtum (Heyden, 1870)

Material examined. MOROCCO – Boudarga, 33° 46, 928'N, 05° 51, 474'W; alt. 384m; 16.VII.2019; N. Maatouf, leg. 1 spec.; yellow colored trap. Thuja.

Distribution. Europe, Algeria, and Morocco (Marggi et al., 2003; Benyahia, 2016).

Carabus faminii favieri Fairmaire, 1859 [E]

Material examined. MOROCCO – Oulmes, 33° 28, 860'N, 06° 07, 387'W; alt. 950m; 15.X.2019; N. Maatouf, leg. 2 spec.; Barber trap. Cork oak. El Harcha, 33° 31, 845'N, 06° 08, 530'W; alt. 690m; 15.X.2019; N. Maatouf, leg. 1 spec.; Barber trap. Thuja.

Distribution. Morocco (Bousquet et al., 2003; Benyahia, 2016).

Dixus chlypeatus (P. Rossi, 1790)

Material examined. MOROCCO – El Harcha, 33° 31, 845'N, 06° 08, 530'W; alt. 690m; 16.VII.2019; N. Maatouf, leg. 6 spec.; Barber trap. Thuja.

Distribution. Europe, Algeria, Morocco, Tunisia, and Turkey (Kataev et al., 2003; Chavanon, 2020).

Harpalus attenuatus Stephens, 1828

Material examined. MOROCCO – El Harcha, 33° 29, 951'N, 06° 08, 294'W; alt. 885m; 25.V.2019; N. Maatouf, leg. 2 spec.; Barber trap. Cork oak. Boudarga, 33° 46, 928'N, 05° 51, 474'W; alt. 384m; 26.IV.2019; N. Maatouf, leg. 1 spec.; Barber trap. Thuja.

Distribution. Europe, Asia, and North Africa (Kataev et al., 2003; Chavanon, 2018).

Notiophilus quadripunctatus Dejean, 1826

Material examined. MOROCCO – Oulmes, 33° 28, 860'N, 06° 07, 387'W; alt. 950m; 16.VII.2019; N. Maatouf, leg. 1 spec.; Barber trap. Cork oak.

Distribution. Europe, Algeria, Morocco, and Tunisia (Bousquet & Barševskis, 2003; Benyahia, 2016).

Orthomus maroccanus Chaudoir, 1873 [E]

Material examined. MOROCCO – Boudarga, 33° 46, 928'N, 05° 51, 474'W; alt. 384m; 26.IV.2019; N. Maatouf, leg. 2 spec.; Barber trap. Thuja.

Distribution. Morocco (Bousquet, 2003; Benyahia, 2016; Chavanon, 2018).

Platyderus calathoides (Dejean, 1828)

Material examined. MOROCCO – El Harcha, 33° 29, 951'N, 06° 08, 294'W; alt. 885m; 28.VI.2019; N. Maatouf, leg. 5 spec.; Barber trap. Cork oak. Oulmes, 33° 28, 860'N, 06° 07, 387'W; alt. 950m; 26.IV.2019; N. Maatouf, leg. 1 spec.; Barber trap. Cork oak.

Distribution. Algeria and Morocco (Bousquet, 2003; Benyahia, 2016; Chavanon, 2018).

Family 8: Cerambycidae

Agapanthia annularis (Olivier, 1795)

Material examined. MOROCCO – El Harcha, 33° 29, 951'N, 06° 08, 294'W; alt. 885m; 11.III.2020; A. Samih, leg. 1 spec.; sight hunting. Cork oak.

Distribution. Spain, Portugal, and North Africa (Sama, 2010; Benyahia, 2016; Chavanon, 2018).

Anaglyptus mysticus (Linnaeus, 1758) [N]

Material examined. MOROCCO – Oulmes, 33° 28, 860'N, 06° 07, 387'W; alt. 950m; 28.VI.2019; A. Samih, leg. 1 spec.; sight hunting. Cork oak.

Distribution. Europe and Turkey (Sama, 2010).

Certallum ebulinum (Linnaeus, 1767)

Material examined. MOROCCO – El Harcha, 33° 29, 951'N, 06° 08, 294'W; alt. 885m; 11.VI.2020; A. Samih, leg. 2 spec.; sight hunting and window trap. Cork oak.

Distribution. Europe, Asia, and North Africa (Sama, 2010; Chavanon, 2018).

Opisognathus forficatus (Fabricius, 1798) [E]

Material examined. MOROCCO – Ain Sbit, 33° 28, 699'N, 06° 28, 587'W; alt. 670m; 16.VII.2019; N. Maatouf, leg. 3 spec.; sight hunting and window trap.

Distribution. Morocco (Drumont & Komiya, 2010).

Xystrocera globosa (Olivier, 1795) [N]

Material examined. MOROCCO – El Harcha, 33° 31, 845'N, 06° 08, 530'W; alt. 690m; 16.VII.2019; A. Samih, leg. 1 spec.; Barber trap. Thuja.

Distribution. Egypt and Asia (Sama, 2010).

Family 9: Chrysomelidae

Cryptocephalus politus sindonicus Marseul, 1875

Material examined. MOROCCO – Ain Sbit, 33° 28, 699'N, 06° 28, 587'W; alt. 670m; 7.VIII.2019; A. Samih, leg. 1 spec.; Barber trap. Holm oak. Boudarga, 33° 46, 928'N, 05° 51, 474'W; alt. 384m; 16.VII.2019; A. Samih, leg. 1 spec.; Barber trap. Thuja.

Distribution. Algeria and Morocco (Lopatin et al., 2010; Chavanon, 2018).

Cryptocephalus rugicollis Olivier, 1791

Material examined. MOROCCO – Oulmes, 33° 28, 860'N, 06° 07, 387'W; alt. 950m; 11.VI.2020; A. Samih, leg. 2 spec.; yellow colored trap. Cork oak.

Distribution. Europe, North Africa, Jordan, and Turkey (Lopatin et al., 2010; Chavanon, 2018).

Pachybrachis azureus Suffrian, 1848

Material examined. MOROCCO – Oulmes, 33° 28, 860'N, 06° 07, 387'W; alt. 950m; 16.VII.2019; A. Samih, leg. 2 spec.; yellow colored trap. Cork oak.

Distribution. France, Portugal, Spain, and Morocco (Lopatin et al., 2010).

Psylliodes napi (Fabricius, 1792)

Material examined. MOROCCO – Ain Sbit, 33° 28, 699'N, 06° 28, 587'W; alt. 670m; 25.V.2019; A. Samih, leg. 1 spec.; Barber trap. Holm oak.

Distribution. Europe, Algeria, Morocco, Kazakhstan, Turkey, and Russia (Doberl, 2010).

Timarcha generosa mesatlantica Kocher, 1951 [E]

Material examined. MOROCCO – Oulmes, 33° 28, 860'N, 06° 07, 387'W; alt. 950m; 28.VI.2019; A. Samih, leg. 1 spec.; sight hunting. Cork oak.

Distribution. Morocco (Gomez-Zurita & Kippenberg, 2010; Chavanon, 2018).

Family 10: Clambidae

Clambus minutus complicans Wollaston, 1864

Material examined. MOROCCO – Boudarga, 33° 46, 928'N, 05° 51, 474'W; alt. 384m; 30.III.2019; A. Samih, leg. 1 spec.; Barber trap. Thuja.

Distribution. Europe, North Africa, Israel, and Lebanon (Löbl, 2006).

Family 11: Coccinellidae

Coccinella algerica Kovář, 1977

Material examined. MOROCCO – El Harcha, 33° 29, 951'N, 06° 08, 294'W; alt. 885m; 28.VI.2019; A. Samih, leg. 1 spec.; yellow colored trap. Cork oak.

Distribution. Italy and North Africa (Kovar, 2007); (Mahbob, 2021) and (El Harche et al., 2022).

Family 12: Curculionidae

Brachycerus barbarus (Linnaeus, 1758)

Material examined. MOROCCO – Boudarga, 33° 46, 928'N, 05° 51, 474'W; alt. 384m; 26.IV.2019; A. Samih, leg. 1 spec.; Barber trap. Thuja. El Harcha, 33° 31, 845'N, 06° 08, 530'W; alt. 690m; 26.IV.2019; A. Samih, leg. 1 spec.; Barber trap. Thuja.

Distribution. Spain, France, Italy, Tunisia, and Morocco (Colonnelli, 2011; Benyahia, 2016; Chavanon, 2018).

Brachycerus muricatus Olivier, 1790

Material examined. MOROCCO – El Harcha, 33°

31, 845'N, 06° 08, 530'W; alt. 690m; 26.IV.2019; H. Habbaz, leg. 1 spec.; Barber trap. Thuja.

Distribution. Europe, Algeria, Morocco, Tunisia, and Turkey (Colonnelli, 2011; Chavanon, 2018).

Brachyderes pubescens Boheman, 1833

Material examined. MOROCCO – El Harcha, 33° 29, 951'N, 06° 08, 294'W; alt. 885m; 26.IV.2019; H. Habbaz, leg. 3 spec.; yellow colored trap and Barber trap; 25.V.2019 H. Habbaz, leg. 2 spec.; Barber trap. Cork oak and thuja. Boudarga, 33° 46, 928'N, 05° 51, 474'W; alt. 384m; 28.VI.2019; H. Habbaz, leg. 1 spec.; window trap. Thuja. Oulmes, 33° 28, 860'N, 06° 07, 387'W; alt. 950m; 16.VII.2019; H. Habbaz, leg. 1 spec.; Barber trap. Cork oak. Ain Sbit, 33° 28, 079'N, 06° 29, 310'W; alt. 820m; 15.IX.2019; H. Habbaz, leg. 7 spec.; Barber trap. Cork oak and holm oak.

Distribution. Spain, Portugal, France, Italy, Algeria, and Morocco (Pelletier, 2013; Benyahia, 2016; Chavanon, 2018).

Hypera arator (Linnaeus, 1758)

Material examined. MOROCCO – Oulmes, 33° 28, 860'N, 06° 07, 387'W; alt. 950m; 15.X.2019; H. Habbaz, leg. 1 spec.; Barber trap. Cork oak.

Distribution. Europe, Tunisia, Morocco, and Asia (Skuhrovec, 2013; Chavanon, 2018).

Hypera nigrirostris (Fabricius, 1775)

Material examined. MOROCCO – Boudarga, 33° 46, 928'N, 05° 51, 474'W; alt. 384m; 26.IV.2019; H. Habbaz, leg. 1 spec.; Barber trap. Thuja.

Distribution. Europe, Morocco, and Asia (Skuhrovec, 2013; Benyahia, 2016; Chavanon, 2018).

Sphenophorus venatus vestitus Chittenden, 1904

Material examined. MOROCCO – Ain Sbit, 33° 28, 699'N, 06° 28, 587'W; alt. 670m; 30.III.2019; H. Habbaz, leg. 1 spec.; Barber trap. Holm oak.

Distribution. France, Spain, Morocco, Russia, Japan, Qatar, and Taiwan (Lyal, 2011).

Tychius cuprifer (Panzer, 1799)

Material examined. MOROCCO – El Harcha, 33° 29, 951'N, 06° 08, 294'W; alt. 885m; 26.IV.2019; H. Habbaz, leg. 1 spec.; Barber trap. Cork oak.

Distribution. Europe, Algeria, Morocco, and Asia (Caldara, 2013).

Family 13: Dasytidae

Dasytes nigroaeneus Küster, 1850

Material examined. MOROCCO – El Harcha, 33° 29, 951'N, 06° 08, 294'W; alt. 885m; 26.IV.2019; N. Maatouf, leg. 1 spec.; Barber trap. Cork oak. Oulmes, 33° 28, 860'N, 06° 07, 387'W; alt. 950m; 26.IV.2019; N. Maatouf, leg. 1 spec.; Barber trap. Cork oak. Boudarga, 33° 46, 928'N, 05° 51, 474'W; alt. 384m; 26.IV.2019; N. Maatouf, leg. 7 spec.; Barber trap. Thuja.

Distribution. Europe, Syria, Algeria, and Morocco (Mayor, 2007a; Benyahia, 2016; Chavanon, 2018).

Dasytes terminalis Jacquelin du Val, 1863

Material examined. MOROCCO – El Harcha, 33° 29, 951'N, 06° 08, 294'W; alt. 885m; 11.III.2020; N. Maatouf, leg. 5 spec.; yellow colored trap and window trap. Cork oak. Oulmes, 33° 28, 860'N, 06° 07, 387'W; alt. 950m; 11.VI.2020; N. Maatouf, leg. 2 spec.; Barber trap. Cork oak.

Distribution. France, Portugal, Spain, Algeria, and Morocco (Mayor, 2007a; Benyahia, 2016; Bellifa & Rousset, 2021).

Psilothrix viridicoerulea (Geoffrey, 1785)

Material examined. MOROCCO – Ain Sbit, 33° 28, 079'N, 06° 29, 310'W; alt. 820m; 25.V.2019; N. Maatouf, leg. 1 spec.; yellow colored trap. Cork oak.

Distribution. Europe, North Africa, and Turkey (Mayor, 2007a; Amokrane et al., 2020; Chavanon, 2018).

Family 14: Dermistidae

Anthrenus pimpinellae (Fabricius, 1775)

Material examined. MOROCCO – El Harcha, 33° 29, 951'N, 06° 08, 294'W; alt. 885m; 11.VI.2020; N. Maatouf, leg. 3 spec.; yellow colored trap and window trap. Cork oak.

Distribution. Europe, Asia, Egypt, and Morocco (Hava, 2007; Benyahia, 2016).

Attagenus trifasciatus (Fabricius, 1787)

Material examined. MOROCCO – El Harcha, 33°

29, 951'N, 06° 08, 294'W; alt. 885m; 28.VI.2019; N. Maatouf, leg. 2 spec.; yellow colored trap. Cork oak.

Distribution. Europe, North Africa, and Israel (Hava, 2007; Benyahia, 2016).

Dermestes frischi Kugelann, 1792

Material examined. MOROCCO – Oulmes, 33° 28, 860'N, 06° 07, 387'W; alt. 950m; 7.VIII.2019; N. Maatouf, leg. 7 spec.; Barber trap. Cork oak. El Harcha, 33° 31, 845'N, 06° 08, 530'W; alt. 690m; 16.VII.2019; N. Maatouf, leg. 3 spec.; Barber trap. Thuja and cork oak. Boudarga, 33° 46, 928'N, 05° 51, 474'W; alt. 384m; 28.VI.2019; N. Maatouf, leg. 1 spec.; Barber trap. Thuja. Ain Sbit, 33° 28, 699'N, 06° 28, 587'W; alt. 670m; 16.VII.2019; H. Habbaz, leg. 1 spec.; Barber trap. Holm oak.

Distribution. Europe, Asia, and North Africa (Hava, 2007; Benyahia, 2016; El Harche et al., 2022).

Dermestes lanarius Illiger, 1801

Material examined. MOROCCO – El Harcha, 33° 29, 951'N, 06° 08, 294'W; alt. 885m; 25.V.2019; N. Maatouf, leg. 1 spec.; Barber trap. Cork oak.

Distribution. Europe, Asia, Morocco, and Tunisia (Hava, 2007).

Family 15: Drilidae

Drilus mauritanicus Lucas, 1842

Material examined. MOROCCO – Ain Sbit, 33° 28, 079'N, 06° 29, 310'W; alt. 820m; 26.IV.2019; A. Samih, leg. 2 spec.; Barber trap. Cork oak.

Distribution. Spain, Algeria, and Morocco (Bocák, 2007; Benyahia, 2016).

Family 16: Elateridae

Cardiophorus rufipes (Goeze, 1777)

Material examined. MOROCCO – El Harcha, 33° 29, 951'N, 06° 08, 294'W; alt. 885m; 25.V.2019; N. Maatouf, leg. 1 spec.; window trap. Cork oak.

Distribution. Europe, Asia, and North Africa (Cate, 2007).

Dicronychus haematopus (Candèze, 1860)

Material examined. MOROCCO – Oulmes, 33° 28, 860'N, 06° 07, 387'W; alt. 950m; 25.V.2019; H.

Habbaz, leg. 1 spec.; window trap. Cork oak. El Harcha, 33° 29, 951'N, 06° 08, 294'W; alt. 885m; 28.VI.2019; H. Habbaz, leg. 1 spec.; yellow colored trap. Cork oak.

Distribution. Algeria and Morocco (Cate, 2007; Chavanon, 2018).

Ectinus aterrimus (Linnaeus, 1761) [N]

Material examined. MOROCCO – Oulmes, 33° 28, 860'N, 06° 07, 387'W; alt. 950m; 16.VII.2019; H. Habbaz, leg. 1 spec.; yellow colored trap. Cork oak.

Distribution. Europe and Russia (Cate, 2007).

Family 17: Endomychidae

Lycoperdina rifensis Franz, 1979 [E]

Material examined. MOROCCO – El Harcha, 33° 29, 951'N, 06° 08, 294'W; alt. 885m; 30.III.2019; H. Habbaz, leg. 1 spec.; Barber trap. Cork oak. Ain Sbit, 33° 28, 699'N, 06° 28, 587'W; alt. 670m; 30.III.2019; A. Samih, leg. 1 spec.; Barber trap. Holm oak.

Distribution. Morocco (Rücker et al., 2007).

Family 18: Geotrupidae

Geotrupes douei Gory, 1841

Material examined. MOROCCO – Boudarga, 33° 46, 928'N, 05° 51, 474'W; alt. 384m; 28.VI.2019; H. Habbaz, leg. 5 spec.; Barber trap. Thuja.

Distribution. Italy, Malta, Algeria, Morocco, and Tunisia (Löbl et al., 2006).

Thorectes trituberculatus (Reitter, 1892)

Material examined. MOROCCO – El Harcha, 33° 29, 951'N, 06° 08, 294'W; alt. 885m; 26.IV.2019; H. Habbaz, leg. 6 spec.; Barber trap. Cork oak and thuja. Boudarga, 33° 46, 928'N, 05° 51, 474'W; alt. 384m; 28.VI.2019; H. Habbaz, leg. 3 spec.; Barber trap. Thuja. Oulmes, 33° 28, 860'N, 06° 07, 387'W; alt. 950m; 15.IX.2019; H. Habbaz, leg. 2 spec.; Barber trap. Cork oak. Ain Sbit, 33° 28, 079'N, 06° 29, 310'W; alt. 820m; 15.X.2019; H. Habbaz, leg. 2 spec.; Barber trap. Cork oak.

Distribution. Algeria and Morocco (Löbl et al., 2006; Chavanon, 2018).

Family 19: Glaphyridae

Eulasia goudoutii (Laporte, 1840) [E]

Material examined. MOROCCO – El Harcha, 33° 29, 951'N, 06° 08, 294'W; alt. 885m; 11.III.2020; H. Habbaz, leg. 10 spec.; yellow colored trap. Cork oak. Oulmes, 33° 28, 860'N, 06° 07, 387'W; alt. 950m; 11.VI.2020; H. Habbaz, leg. 2 spec.; yellow colored trap, and window trap. Cork oak.

Distribution. Morocco (Nikodym & Bezdek, 2006; Chavanon, 2018).

Family 20: Histeridae

Margarinotus merdarius (Hoffmann, 1803)

Material examined. MOROCCO – El Harcha, 33° 29, 951'N, 06° 08, 294'W; alt. 885m; 25.V.2019; H. Habbaz, leg. 2 spec.; Barber trap. Cork oak.

Distribution. Europe, Algeria, Morocco, and Iran (Mazur, 2004).

Onthophilus globulosus (Olivier, 1789)

Material examined. MOROCCO – Oulmes, 33° 28, 860'N, 06° 07, 387'W; alt. 950m; 15.X.2019; H. Habbaz, leg. 2 spec.; Barber trap. Cork oak.

Distribution. France, Portugal, Spain, Italy, Algeria, Morocco, Tunisia, and Libya (Mazur, 2004; Chavanon, 2018).

Family 21: Meloidae

Alosimus robustus (Escalera, 1914) [E]

Material examined. MOROCCO – Oulmes, 33° 28, 860'N, 06° 07, 387'W; alt. 950m; 25.V.2019; H. Habbaz, leg. 1 spec.; Barber trap. Cork oak. El Harcha, 33° 29, 951'N, 06° 08, 294'W; alt. 885m; 11.VI.2020; H. Habbaz, leg. 1 spec.; Barber trap. Cork oak.

Distribution. Morocco (Bologna, 2008).

Meloe affinis apivorus Reitter, 1895 [E]

Material examined. MOROCCO – Oulmes, 33° 28, 860'N, 06° 07, 387'W; alt. 950m; 30.III.2019; H. Habbaz, leg. 1 spec.; Barber trap. Cork oak.

Distribution. Morocco (Bologna, 2008).

Family 22: Melyridae

Axinotarsus pulicarius (Fabricius, 1777)

Material examined. MOROCCO – El Harcha, 33° 29, 951'N, 06° 08, 294'W; alt. 885m; 28.VI.2019; A.

Samih, leg. 3 spec.; yellow colored trap. Cork oak. Boudarga, 33° 46, 928'N, 05° 51, 474'W; alt. 384m; 26.IV.2019; A. Samih, leg. 3 spec.; Barber trap. Thuja.

Distribution. Europe, Algeria, and Morocco (Mayor, 2007b).

Family 23: Mordellidae

Mordellistena episternalis Mulsant, 1856

Material examined. MOROCCO – Oulmes, 33° 28, 860'N, 06° 07, 387'W; alt. 950m; 16.VII.2019; A. Samih, leg. 2 spec.; Barber trap. Cork oak.

Distribution. Europe, Asia, Algeria, and Morocco (Horak, 2008).

Family 24: Nitidulidae

Meligethes aeneus (Fabricius, 1775)

Material examined. MOROCCO – Ain Sbit, 33° 28, 699'N, 06° 28, 587'W; alt. 670m; 25.V.2019; A. Samih, leg. 1 spec.; Barber trap. Holm oak. El Harcha, 33° 29, 951'N, 06° 08, 294'W; alt. 885m; 25.V.2019; A. Samih, leg. 9 spec.; yellow colored trap. Cork oak.

Distribution. Europe, Asia, and North Africa (Jelinek & Audisio, 2007).

Nitidula rufipes (Linnaeus, 1767) [N]

Material examined. MOROCCO – Oulmes, 33° 28, 860'N, 06° 07, 387'W; alt. 950m; 16.VII.2019; A. Samih, leg. 2 spec.; yellow colored trap. Cork oak.

Distribution. Europe and Asia (Jelinek & Audisio, 2007).

Family 25: Oedemeridae

Oedemera marmorata Erichson, 1841

Material examined. MOROCCO – Boudarga, 33° 46, 928'N, 05° 51, 474'W; alt. 384m; 25.V.2019; H. Habbaz, leg. 2 spec.; sight hunting and window trap. Thuja.

Distribution. Portugal, Spain, Algeria, Morocco, and Tunisia (Švihla, 2008; Chavanon, 2018).

Family 26: Ptinidae

Dignomus gibbicollis (Lucas, 1846)

Material examined. Boudarga, 33° 46, 928'N, 05°

51, 474'W; alt. 384m; 26.IV.2019; A. Samih, leg. 2 spec.; window trap. Thuja.

Distribution. Portugal, Spain, Algeria, and Morocco (Borowski, 2007; Chavanon, 2018).

Ptinus obesus Lucas, 1846

Material examined. MOROCCO – Ain Sbit, 33° 28, 699'N, 06° 28, 587'W; alt. 670m; 28.VI.2019; A. Samih, leg. 1 spec.; Barber trap. Holm oak. Ain Sbit, 33° 28, 079'N, 06° 29, 310'W; alt. 820m; 26.IV.2019; A. Samih, leg. 1 spec.; Barber trap. Cork oak.

Distribution. Europe, North Africa, and Cyprus (Borowski, 2007; Benyahia, 2016).

Family 27: Rhynchitidae

Auletobius maroccanus Hoffmann, 1953

Material examined. MOROCCO – Boudarga, 33° 46, 928'N, 05° 51, 474'W; alt. 384m; 26.IV.2019; N. Maatouf, leg. 1 spec.; Barber trap; 16.VII.2019, 1 spec.; yellow colored trap. Thuja.

Distribution. Spain and Morocco (Alonso-Zarazaga, 2011; Chavanon, 2018).

Family 28: Scarabaeidae

Anthoplia floricola (Fabricius, 1787)

Material examined. MOROCCO – El Harcha, 33° 29, 951'N, 06° 08, 294'W; alt. 885m; 11.III.2020; N. Maatouf, leg. 2 spec.; yellow colored trap. Cork oak. Oulmes, 33° 28, 860'N, 06° 07, 387'W; alt. 950m; 11.III.2020; N. Maatouf, leg. 1 spec.; yellow colored trap. Cork oak.

Distribution. Portugal, Spain, Algeria, Morocco, Tunisia, and Libya (Smetana, 2006; Chavanon, 2018).

Copris hispanus (Linnaeus, 1764)

Material examined. MOROCCO – Oulmes, 33° 28, 860'N, 06° 07, 387'W; alt. 950m; 26.IV.2019; H. Habbaz, leg. 1 spec.; sight hunting. Cork oak.

Distribution. France, Italy, and North Africa (Löbl et al., 2006; Chavanon, 2018).

Hoplia Africana Escalera, 1914

Material examined. MOROCCO – El Harcha, 33° 29, 951'N, 06° 08, 294'W; alt. 885m; 11.VI.2020; N. Maatouf, leg. 4 spec.; yellow colored trap. Cork oak.

Distribution. Algeria, Morocco, and Tunisia (Smetana, 2006; Chavanon, 2018).

Onthophagus vacca (Linnaeus, 1767)

Material examined. MOROCCO – El Harcha, 33° 31, 845'N, 06° 08, 530'W; alt. 690m; 16.VII.2019; N. Maatouf, leg. 1 spec.; Barber trap; 15.IX.2019; N. Maatouf, leg. 1 spec.; Barber trap. Thuja and cork oak. Boudarga, 33° 46, 928'N, 05° 51, 474'W; alt. 384m; 28.VI.2019; N. Maatouf, leg. 7 spec.; Barber trap. Thuja. Oulmes, 33° 28, 860'N, 06° 07, 387'W; alt. 950m; 16.VII.2019; N. Maatouf, leg. 3 spec.; Barber trap. Cork oak.

Distribution. Europe, Asia, and Morocco (Löbl et al., 2006; Benyahia, 2016; Chavanon, 2018).

Oxythyrea funesta (Poda, 1761)

Material examined. MOROCCO – El Harcha, 33° 29, 951'N, 06° 08, 294'W; alt. 885m; 11.III.2020; H. Habbaz, leg. 8 spec.; yellow colored trap. Cork oak.

Distribution. Europe, North Africa, and Asia (Smetana, 2006; Zemouri et al., 2021; El Harche et al., 2022; Benyahia, 2016; Chavanon, 2018).

Protaetia (Netocia) morio heyrovskyi (Balthasar, 1935)

Material examined. MOROCCO – El Harcha, 33° 29, 951'N, 06° 08, 294'W; alt. 885m; 28.VI.2019; N. Maatouf, leg. 1 spec.; Barber trap. Cork oak. Oulmes, 33° 28, 860'N, 06° 07, 387'W; alt. 950m; 16.VII.2019; N. Maatouf, leg. 1 spec.; Barber trap. Cork oak.

Distribution. Algeria, Morocco, and Tunisia (Smetana, 2006; Chavanon, 2018).

Scarabaeus laticollis Linnaeus, 1767

Material examined. MOROCCO – Boudarga, 33° 46, 928'N, 05° 51, 474'W; alt. 384m; 25.V.2019; N. Maatouf, leg. 4 spec.; Barber trap; 15.X.2019; N. Maatouf, leg. 3 spec.; Barber trap. Thuja. Oulmes, 33° 28, 860'N, 06° 07, 387'W; alt. 950m; 26.IV.2019; H. Habbaz, leg. 1 spec.; Barber trap. Cork oak.

Distribution. Europe, Algeria, and Morocco (Löbl et al., 2006; Benyahia, 2016; Chavanon, 2018).

Sisyphus schaefferi (Linnaeus, 1758)

Material examined. MOROCCO – El Harcha, 33° 29, 951'N, 06° 08, 294'W; alt. 885m; 28.VI.2019; N.

Maatouf, leg. 11 spec.; Barber trap. Cork oak. Oulmes, 33° 28, 860'N, 06° 07, 387'W; alt. 950m; 16.VII.2019; N. Maatouf, leg. 2 spec.; Barber trap. Cork oak.

Distribution. Europe, Asia, Algeria, Morocco, and Tunisia (Bezdek, 2006; Benyahia, 2016; Chavanon, 2018).

Tropinota squalida pilosa Brullé, 1832

Material examined. MOROCCO – Oulmes, 33° 28, 860'N, 06° 07, 387'W; alt. 950m; 11.III.2020; N. Maatouf, leg. 6 spec.; yellow colored trap. Cork oak. El Harcha, 33° 29, 951'N, 06° 08, 294'W; alt. 885m; 11.III.2020; N. Maatouf, leg. 3 spec.; yellow colored trap. Cork oak.

Distribution. Asia and North Africa (Smetana, 2006; Chavanon, 2018).

Family 29: Silphidae

Silpha tristis Illiger, 1798

Material examined. MOROCCO – Oulmes, 33° 28, 860'N, 06° 07, 387'W; alt. 950m; 25.V.2019; H. Habbaz, leg. 1 spec.; Barber trap. Cork oak. El Harcha, 33° 31, 845'N, 06° 08, 530'W; alt. 690m; 28.VI.2019; H. Habbaz, leg. 1 spec.; Barber trap. Thuja and cork oak.

Distribution. Europe, Asia, Russia, and Morocco (Rozicka & Schneider, 2004); (Egorov et al., 2020) and (El Harche et al., 2022).

Family 30: Staphylinidae

Micropeplus staphylinoides Marsham, 1802

Material examined. MOROCCO – Oulmes, 33° 28, 860'N, 06° 07, 387'W; alt. 950m; 26.IV.2019; H. Habbaz, leg. 3 spec.; Barber trap and window trap. Cork oak. Boudarga, 33° 46, 928'N, 05° 51, 474'W; alt. 384m; 26.IV.2019; H. Habbaz, leg. 1 spec.; Barber trap. Thuja.

Distribution. Europe, Algeria, and Tunisia (Smetana, 2004), Morocco (Benyahia, 2016).

Ocyopus olens olens (Muller, 1764)

Material examined. MOROCCO – Ain Sbit, 33° 28, 699'N, 06° 28, 587'W; alt. 670m; 25.V.2019; H. Habbaz, leg. 1 spec.; Barber trap. Holm oak. Oulmes, 33° 28, 860'N, 06° 07, 387'W; alt. 950m; 16.VII.2019; N. Maatouf, leg. 1 spec.; Barber trap. Cork oak. El Harcha, 33° 31, 845'N, 06° 08, 530'W; alt. 690m;

15.X.2019; H. Habbaz, leg. 1 spec.; Barber trap. Thuja.

Distribution. Europe, Asia, and North Africa (Smetana, 2004) and (El Harche, et al., 2022; Chavanon, 2018).

Oxytelus sculptus Gravenhorst, 1806

Material examined. MOROCCO – Boudarga, 33° 46, 928'N, 05° 51, 474'W; alt. 384m; 26.IV.2019; H. Habbaz, leg. 3 spec.; window trap. Thuja.

Distribution. Europe, Asia, and Morocco (Smetana, 2004).

Xantholinus linearis (Olivier, 1795)

Material examined. MOROCCO – El Harcha, 33° 29, 951'N, 06° 08, 294'W; alt. 885m; 11.VI.2020; H. Habbaz, leg. 3 spec.; Barber trap. Cork oak. Oulmes, 33° 28, 860'N, 06° 07, 387'W; alt. 950m; 11.VI.2020; H. Habbaz, leg. 2 spec.; Barber trap. Cork oak.

Distribution. Europe, Asia, and North Africa (Smetana, 2004; Chavanon, 2018).

Family 31: Tenebrionidae

Alphasida (Glabrasida) annamariae hantzi Antoine, 1937 [E]

Material examined. MOROCCO – Boudarga, 33° 46, 928'N, 05° 51, 474'W; alt. 384m; 30.III.2019; H. Habbaz, leg. 2 spec.; Barber trap. Thuja. El Harcha, 33° 31, 845'N, 06° 08, 530'W; alt. 690m; 15.X.2019; H. Habbaz, leg. 2 spec.; Barber trap. Thuja and cork oak. Oulmes, 33° 28, 860'N, 06° 07, 387'W; alt. 950m; 25.V.2019; H. Habbaz, leg. 2 spec.; Barber trap. Cork oak.

Distribution. Morocco (Löbl et al., 2008).

Alphasida (Machlasida) segonzaci Escalera, 1914 [E]

Material examined. MOROCCO – Ain Sbit, 33° 28, 699'N, 06° 28, 587'W; alt. 670m; 25.V.2019; H. Habbaz, leg. 1 spec.; Barber trap. Holm oak.

Distribution. Morocco (Löbl et al., 2008).

Dichillus laevicornis (Reitter, 1886) [E]

Material examined. MOROCCO – Oulmes, 33° 28, 860'N, 06° 07, 387'W; alt. 950m; 16.VII.2019; H. Habbaz, leg. 1 spec.; Barber trap. Cork oak.

Distribution. Morocco (Löbl et al., 2008).

Heliotaurus ruficollis tangerianus Escalera, 1922 [E]

Material examined. MOROCCO – El Harcha, 33° 29, 951'N, 06° 08, 294'W; alt. 885m; 15.VII.2020; A. Samih, leg. 5 spec.; yellow colored trap and window trap. Cork oak.

Distribution. Morocco (Novac & Pettersson, 2008).

Isomira melanophthalma (Lucas, 1846)

Material examined. MOROCCO – El Harcha, 33° 29, 951'N, 06° 08, 294'W; alt. 885m; 28.VI.2019; H. Habbaz, leg. 3 spec.; yellow colored trap and window trap. Cork oak.

Distribution. Portugal, France, Italy, Croatia, Bosnia, Algeria, and Morocco (Novak & Pettersson, 2008).

Opatroides punctulatus punctulatus Brullé, 1832

Material examined. MOROCCO – El Harcha, 33° 31, 845'N, 06° 08, 530'W; alt. 690m; 16.VII.2019; H. Habbaz, leg. 3 spec.; Barber trap. Thuja.

Distribution. Greece, Italy, Malta, Asia, and North Africa (Iwan & Löbl, 2008; Chavanon, 2018).

Pimelia subbris Koch, 1941 [E]

Material examined. MOROCCO – Ain Sbit, 33° 28, 699'N, 06° 28, 587'W; alt. 670m; 25.V.2019; H. Habbaz, leg. 1 spec.; Barber trap. Holm oak. Boudarga, 33° 46, 928'N, 05° 51, 474'W; alt. 384m; 30.III.2019; H. Habbaz, leg. 1 spec.; Barber trap. Thuja. El Harcha, 33° 29, 951'N, 06° 08, 294'W; alt. 885m; 28.VI.2019; H. Habbaz, leg. 8 spec.; Barber trap. Cork oak and thuja. Oulmes, 33° 28, 860'N, 06° 07, 387'W; alt. 950m; 25.V.2019; H. Habbaz, leg. 9 spec.; Barber trap. Cork oak

Distribution. Morocco (Löbl et al., 2008).

Scaurus gigas Waltl, 1835

Material examined. MOROCCO – El Harcha, 33° 31, 845'N, 06° 08, 530'W; alt. 690m; 7.VIII.2019; H. Habbaz, leg. 4 spec.; Barber trap; Thuja. Ain Sbit, 33° 28, 079'N, 06° 29, 310'W; alt. 820m; 26.IV.2019; H. Habbaz, leg. 1 spec.; Barber trap. Cork oak.

Distribution. Spain, Portugal, Algeria, and Morocco (Löbl et al., 2008; Chavanon, 2018).

Tenebrio obscurus Fabricius, 1792

Material examined. MOROCCO – El Harcha, 33° 29, 951'N, 06° 08, 294'W; alt. 885m; 25.V.2019; H. Habbaz, leg. 2 spec.; Barber trap. Cork oak and thuja.

Distribution. Europe, Asia, and North Africa (Löbl et al., 2008; Chavanon, 2018).

Tentyria grossa grossa Besser, 1832

Material examined. MOROCCO – El Harcha, 33° 31, 845'N, 06° 08, 530'W; alt. 690m; 16.VII.2019; H. Habbaz, leg. 6 spec.; Barber trap. Thuja. Oulmes, 33° 28, 860'N, 06° 07, 387'W; alt. 950m; 15.X.2019; H. Habbaz, leg. 2 spec.; Barber trap. Cork oak.

Distribution. Greece, Italy, Malta, Spain, Algeria, Morocco, and Tunisia (Löbl et al., 2008).

Family 32: Trogidae

Trox fabricii Reiche, 1853

Material examined. MOROCCO – Boudarga, 33° 46, 928'N, 05° 51, 474'W; alt. 384m; 15.X.2019; H. Habbaz, leg. 3 spec.; Barber trap. Thuja. El Harcha, 33° 31, 845'N, 06° 08, 530'W; alt. 690m; 15.IX.2019; H. Habbaz, leg. 1 spec.; Barber trap. Thuja. Oulmes, 33° 28, 860'N, 06° 07, 387'W; alt. 950m; 15.X.2019; H. Habbaz, leg. 2 spec.; Barber trap. Cork oak

Distribution. Spain, Portugal, Italy, and North Africa (Pittino, 2006; Benyahia, 2016; Chavanon, 2018).

These results complement the data on the region provided by other researchers (Mahari, 1992; Villemant and Fraval, 1993; El Alami Idrissi, 2013; El Hrache et al., 2022), and provide useful additional information. The population diversity of beetles varied among the studied stations (Fig. 1). Species richness was higher in stations 2 and 3, followed by stations 4, 6, 5, and 1. This variation is attributed to biotic factors such as

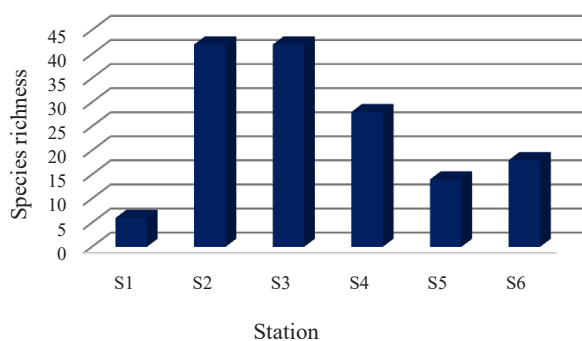


Fig. 1. Species richness of beetles

the type of forest species, trophic resource availability, and human activity, as well as abiotic factors such as climatic conditions. Out of the 90 sampled species, 12 species were endemic, accounting for 13% of the studied species. Among these, 5 species belonged to the Tenebrionidae family, which is one of the families with the highest endemism rate in Morocco (Chavanon, 2003; Benyahia et al., 2015). This category of species is characterized by a limited distribution range, and it constitutes a distinct category of rare species (Gaston, 1994), even though they may be locally abundant. Endemic taxa are highly sensitive to variations in biotic and abiotic factors; they occupy well-defined areas, and often have specific trophic requirements (Brustel and Noblecourt, 2019). The presence of endemic species within the forest habitats of the Central Plateau is an indication of the high heritage value of the site, and this should alert managers to the need for protection and conservation of beetles. Furthermore, this sampling allowed the identification of six new records for Morocco, according to the catalog of beetle distribution in the Palearctic region (Löbl and Smatana, 2003; 2004; 2007; 2008; 2010; 2011; 2013); (El Alami Idrissi, 2013); (Benyahia, 2016); (Chavanon, 2018) and (El Hrache et al., 2022). The intense anthropogenic pressures exerted on the Maamora forest may have created favorable conditions for certain species, but the risk is that they may compete with more fragile species. This study highlights the ecological and heritage value of beetles in the forest habitats of the Central Plateau of Morocco. Studies conducted in the same region, based on available data, have shown the presence of 54 species according to El Hrache et al. (2022), 15 species according to El Alami Idrissi (2013), 63 species according to Villemant and Fraval (1993), and 34 species according to Idrissi (1982). These findings will contribute to the knowledge of entomological fauna at the national level and will guide researchers in future studies.

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AUTHOR CONTRIBUTION STATEMENT

Conceptualization: H H, N M, L R. Data curation: H H. Formal analysis: H H, A S. Funding acquisition: H.H. Investigation: H H, A S. Methodology: H H, A S. Resources: H H, A S. Supervision: N M, L R. Project administration: L R, N M. Validation: N M, L R. Visualization: N M, L R. Writing – original draft: H H, A S. Writing – review and editing: H H, N M, L R, A S.

CONFLICT OF INTEREST

No conflict of interest.

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