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New records of Carabidae (Insecta: Coleoptera) from Tunisia.

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Abstract: We reviewed the distribution of the Carabidae (Coleoptera) in Tunisia. The present data deal with four interesting species from the zoogeographical point of view, since they are subject of new records from Tunisia: *Calathus opacus* Germar, 1842, *Cryptophonus litigiosus litigiosus* Dejean, 1829, *Acinopus haroldi* Schaum, 1863, *Acinopus grassator* Coquerel, 1858 and *Brachinus (s. str.) efflans* Dejean, 1830, the latter already cited with doubts but now confirmed.
Key words: Coleoptera, Carabidae, New records, Biogeography, Tunisia.

Resumen: Nuevos registros de Carabidae (Insecta: Coleoptera) de Túnez. Se revisa la distribución de Carabidae (Coleoptera) en Túnez. Los datos presentados tratan cuatro especies muy interesantes desde un punto de vista zoogeográfico, ya que son objeto de nuevas citas para Túnez: *Calathus opacus* Germar, 1842, *Cryptophonus litigiosus litigiosus* Dejean, 1829, *Acinopus haroldi* Schaum, 1863, *Acinopus grassator* Coquerel, 1858 y *Brachinus (s. str.) efflans* Dejean, 1830, este último ya citado con ciertas dudas pero ahora confirmado.
Palabras clave: Coleoptera, Carabidae, nuevas citas, biogeografía, Túnez.

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Introduction

Tunisia is located in North Africa, on the southern part of the Mediterranean basin. The northern region includes two mountain ranges: the Tell (Kroumir and Mogods mountains) and the Dorsale (the Châambi range, reaching the Cap Bon peninsula) (Ben Ayed, 1993). The climate of Tunisia ranges from humid to desertic (Saharan); the humid area is restricted to the Kroumir Mountains (Zielhofer & Faust, 2008). Annual rainfall is irregularly distributed and decreases from north to south, where precipitations are more important in winter (Ben Jemaa *et al.*, 1998). Although Tunisia is a hotspot area, some taxonomic groups are less known and an important diversity of species has been partially investigated (Quéinnec & Ollivier, 2012). The fauna of Carabidae of Tunisia is rather unknown in comparison to that from Europe as well as other zoogeographical areas. Only a few studies have covered the topic of group beetles from Tunisia, so far, Bedel (1895), Normand (1933) or more recently Guéorguiev (2012) and Quéinnec & Ollivier (2012), leading to the discovery of some new species. This survey aims to update the Carabidae checklist of Tunisia, in order to get a better knowledge of the ground beetles in this North African country.

Material and methods

Study area

The materials for this study were collected between the years 2012 and 2013, from only four locations in Northern Tunisia described below and marked in the Map 1.

Site 1.- Rimel Forest (27°15'2.30"N 9°54´09.66"E, altitude: 5 m).

Located in the northern part of Tunisia, only 2 km to the south-east of the city of Bizerte, between the sea and the main road n°8 Tunis-Bizerte. The vegetation is characterized by stone pines (*Pinus pinea* L., 1753), Aleppo pines (*Pinus halepensis* Mill., 1768), maritime pines (*Pinus pinaster* Aiton, 1789), Canary Island pines (*Pinus canariensis* L., 1753), as well as eucalyptus (*Eucalyptus* sp. L'Her, 1789). It offers a housing environment for the fauna and contributes to the enrichment of the biological diversity.

Site 2.- Sidi Nsir (36°53'671"N 009°26'648"E, altitude: 218 m).

Located in the northern part of Tunisia, in wheat crops (*Triticum aestivum* L., 1753) on the main road Beja / Mateur, crossed by a permanent water course.

Site 3.- El Feidja (36°46'09.17"N 8°39'00.14"E; altitude: 571 m).

The El Feidja National Park is located in the north-west of Tunisia, 100 km to the south of Mediterranean Sea, near the frontier with Algeria. The park is the natural environment of the Kroumirie which is the wettest region of Tunisia. The soil is rich in humus and slightly acid and the most important component of vegetation are *Quercus faginea* Lam., 1785, *Ilex aquifolium* L., 1753, *Celtis australis* L., 1753, *Salix pedicellata* Desf., 1799, *Ficus carica* L., 1753 and *Populus alba* L., 1753 (Rossler, 1996).

Site 4.- Ichkeul National Park (37'08'51.31"N 9°40'03.18"E, altitude: 46 m).

Situated in the north of Tunisia, 25 km to the south-east of Bizerte and 15 km from the cities of Menzel Bourguiba and Mateur, it surrounds a wetland, with lake Ichkeul in the middle, occupying an area of 150 km^2 and being one of the most important bird sanctuaries of north Africa. Vegetation of the park is characterized mainly by *Olea europaea* L., 1753.

Sampling procedure

Ground beetles were sampled by several pitfall traps (diameter 10 cm, height 12 cm), collected by hand, installed in different fields, buried in the ground, under stones, under leaves, in plant debris, under trees and in fragments of vegetation. Each pot was filled with acetic acid diluted at 30% to kill and preserve samples.

The specimens were mounted in entomological cards with water-soluble glue, stored in the collection of the first author in the Faculty of Sciences of Bizerte, University of Carthage, Tunisia.

Results

Calathus opacus Germar, 1842

Material examined. Site 1: 3 specimens, 22 May 12.

Diagnosis. Body length 8.5-11 mm. Brown insect, dark reddish appendixes. Corselet with straight posterior angle, fine stria, flat intervals, on the third stria there are four discal pores, thick antennae, and the third present additional seta scattered towards the extremity clearly visible in the male.

Habitat. Forest insect, found in a shaded area under the feet of trees (*Acacia cyanophylla* Lindl, 1839) in the leaf litter. In Morocco, common in the mountains at medium altitudes, especially in the Middle Atlas; rarer in plain (Antoine, 1955). In Algeria, the species is collected in the forest of Teniet-eI-Had; gardens of Chellala and Gouraya, it is considered a special, uncommon species in the Barbary (Bedel, 1895).

Distribution: Endemic for North Africa, mainly found in Algeria and Morocco (Bedel, 1895; Machard, 1993; Löbl & Smetana, 2003; Ruiz-Tapiador & Zaballos, 2001). First record from Tunisia.

Cryptophonus litigiosus litigiosus Dejean, 1829

Material examined. Site 1. 3 specimens, 11 April 2012; Site 4: 2 specimens, 16 January 2013.

Diagnosis. Body length 8-9 mm. Black insect. Pronotum widest usually at middle of pronotal sides with one slightly setigerous pore before the middle, roundly or almost rectilinearly converging in posterior half, basal margin shorter than or equal to elytral base between humeral angles, Basal edge glabrous, the surface is rather coarsely punctuated. Elytra characterized by one short row of setigerous pores at the apex of the eighth interval. Mentum and submentum are separated by transverse suture. Transverse pronotum not narrowed at the base. Subparallel sides, curved back to the posterior corners that are straight but very rounded. Elytra are slightly convex, with angular shoulders and sinuate apical margin.Ventral segments hairless. Some points aligned on the termination of the eighth interstria.

Habitat. The specimens were collected under a stone and under plant debris.

Distribution. Palaearctic region. North Africa: Algeria, Egypt. Europe: Spain, Italy, France, Portugal. Asia: Turkey, Syria, Palestine (Bedel, 1895; Löbl & Smetana, 2003; Serrano, 2003), so the newly recorded presence in Tunisia is not surprising and is coherent with the known distribution.

Brachinus (s. str.) efflans Dejean & Boisduval, 1829

Material examined. Site 2: 4 specimens, 08 Mars 2012; 2 specimens, 11 April 2012.

Diagnosis. Body length 4.3-7.5 mm, long elytra, blue purplish, slightly convex intervals with dense punctuation extended to the head, slightly convex eyes, and corselet a little longer than wide, Posterior angles are right.

Habitat. The species was collected only from one locality, Sidi Nsir, where it was found under a stone near an agriculture field and a permanent watercourse.

Distribution: Mediterranean element. North Africa: Western Morocco (from Casablanca to Tangier and the Middle Atlas), Algeria, Tunisia. Europe: Bulgaria, Italy, Portugal, Spain (Machard, 1993; Ruiz-Tapiador & Zaballos, 2001; Löbl & Smetana, 2003). The former records of *B. efflans* from Tunisia are included as a variety of *Brachinus crepitans* Linné, 1758 (Bedel, 1895) from Haïdra and under the synonym *Brachinus etslans* Dejean, 1830 in 2003 (Löbl & Smetana, 2003). However the new record confirms the presence of this elusive species.

Acinopus haroldi Schaum, 1863

Material examined. Site 4: 3 specimens, 16 January 2013.

Diagnosis. Body length 10.5-12 mm, the insect has black color with a big head, transverse corselet, sinuosity postangular rather strong, substraight posterior angles, rounded in the extremity; wide marginal gutter, punctuated and widened behind the postangular field which is depressed. The elytra are short and wide and the body is finely striated perfectly flat intervals. At the end, the terminal internal protibial spur was very long, as long as the first four articles of the corresponding tarsus.

Habitat: Specimens were collected from a wet field under stones.

Distribution: Endemic for North Africa, where it was discovered for the first time in Morocco (Atlantic coast, from Tanger to Agadir) (Antoine, 1955). First record from Tunisia.

Acinopus grassator Coquerel, 1858

Material examined. Site 4: 5 specimens, 16 January 2013.

Diagnosis. Body length 11-12 mm, rather slim, very convex with a medium-sized head, sinuate mandible, strongly concave epistome, clear, well marked frontal impression net. It is characterized by a slightly transverse corselet, with slightly arched sides and obtuse posterior angles. Elytra are rounded, short and parallel, with smooth surface, sometimes finely punctuated and a deep preapical sinuosity

Habitat: The species was collected in a sandy-clayish ground under stones.

Distribution: North Africa: Morocco (Melilla) (Antoine, 1955), Algeria (Oran) (Bedel, 1895). First record from Tunisia.

Discussion

Tunisian Carabidae list is enriched by five new elements represented in low numbers and populating relatively protected areas and little frequented, which explains partially their absence in the ancient citations. This rarity was attributed to the phenology of these insects for their emergence and reproductive cycle as well as their adaptive ethology. These species also showed a distribution variation between prospected sites related to their ecological affinities and their dispersal capacities to new habitats. The knowledge updating on the entomofauna requires regular surveys covering emergence periods of different stages of species development, other heterogeneous localities spread across all bioclimatic Tunisian zones.

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Map 1.- Detail of the Northern Region of Tunisia showing the sampling stations: Rimel Forest (1), Sidi Nsir (2), El Feidja National Park (3), Ichkeul National Park (4).