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Biogeographia - The Journal of Integrative Biogeography

Title

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Permalink

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Journal

Biogeographia - The Journal of Integrative Biogeography, 30(1)

ISSN

1594-7629

Author

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Publication Date

2011

DOI

10.21426/B630110551

Peer reviewed

Studies of tiger beetles. CLXXVI. The sicilian *Lophyra* populations (Coleoptera, Cicindelidae)

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Key words: Cicindelidae, Sicily, *Lophyra*, possibly different species.

SUMMARY

Two different “forms” (*sardea* and *circumflexa*) of a Mediterranean species, *Lophyra flexuosa*, apparently coexist in Sicily without any overlapping or interbreeding. A similar situation probably exists in Tunisia. It is suggested that the two “forms” could well represent different species, instead of morphs or subspecies, and such an hypothesis should be tested in the future through better field work and behavioural observations as well as mitochondrial DNA analysis.

Cicindela flexuosa Fabricius, 1787 is one of the oldest known tiger beetle species of the world. In fact, it was one of the only 50 species of this beetle family which were early described in 18th Century (Fabricius, 1787; Pearson and Cassola, 2005). Later on, it was included by Rivalier (1948, 1950) in the genus *Lophyra*, firstly created by Motschulsky (1859) for *Cicindela catena* Fabricius, 1775, from India. *Lophyra (Lophyra) flexuosa* is one of the few world’s tiger beetle species whose male exhibits a “penicillum” under the 4th antennomere, a character which induced Ganglbauer (1892) to create for it a special genus (*Chaetostyla*) which today appears to just be a junior synonym of *Lophyra* (Rivalier, 1948; Cassola, 1983).

L. flexuosa is a mainly West-Mediterranean species, known to inhabit the whole of northern Africa from Morocco to Egypt (Bedel, 1895; Horn and Roeschke, 1891; Horn, 1926; Cassola, 1973; Korell and Cassola, 1987; Wiesner, 1992), the Iberian peninsula (Jeanne and Zaballos, 1986; Serrano, 1986; Serrano, 2003), the French Atlantic coasts up to the estuary of River Loire (Bonadona, 1971), southern France (Provence) (Bessonnat, 1973) and a few Mediterranean Islands such as the Balears (Jeannel, 1941). The species’ oc-

currence in Corsica, from where there were several old records in the entomological literature (Beuthin, 1890, 1892; Bonadona, 1971), and despite the doubtful statements by Jeannel (1941) and Cassola (1972), was definitely confirmed by Antoine (1979), from two localities at least, with specimens which apparently are identical to those of southern France. The occurrence of *flexuosa* in the eastern Mediterranean area (Egypt to Israel), can also definitely be confirmed. Schatzmayr (1936) reported it from Ismailia and Gebel Asfar in Egypt, while I hold in my own collection specimens from the Cairo area (Meadi, 14.XI.1957, J. Putawski leg.; Dahschour, 16.V.1958, J. Putawski leg.) and Sinai (1 km E Bardawil rd., 31°02.9N-33°14.8E, 24.V.2007, D. Brzoska leg.). Moreover, Nussbaum (1987) recorded *L. flexuosa* from several localities in Israel. The larvae (1st, 2nd and 3rd instars) and the pupa of *L. flexuosa* were described by Serrano (1991, 1995).

In Italy *L. flexuosa*, despite two puzzling old records (most probably erroneous) from Latium (Luigioni, 1899; Cassola, 2003) and Liguria (Magistretti, 1968), is positively known only from Sardinia and Sicily (Magistretti, 1965; Cassola, 1970, 1972; Cassola and Brouerius van Nidek, 1984; Vigna Taglianti, 2005). Unlike the Corsican specimens, the Sardinian populations are quite distinctive because of the wider, more rounded, flattened body and the often interrupted humeral band, and they are usually considered (Cassola, 1972) to be a separate subspecies, *sardea* Dejean, 1825, which had been described as a distinct species (*Cicindela sardea*) (Dejean, 1831).

As far as Sicily is concerned, the situation seems to be somewhat more intricate. The Sicilian specimens (Vitale, 1912) are usually regarded as forming a separate subspecies, *circumflexa* Dejean, 1831, also described as a distinct species (*Cicindela circumflexa*: Dejean, 1831), supposedly restricted to Sicily only (Cassola, 1973). However the validity of such a "race" seemed to be questionable to several authors (Magistretti, 1963, 1967; Cassola, 1970; Cassola and Brouerius van Nidek, 1984), also because, as a matter of fact, many Sicilian specimens appear to be practically undistinguishable from *sardea*. For this reason, Aliquò (1981) stated that in Sicily both forms (*sardea* and *circumflexa*) appear to be mixed together and don't have, in this island at least, any subspecific value. According to this author, *circumflexa* is to be found in several localities near the Sicilian northern coast (Balestrate, Altavilla Milicia, River Torto, Montemaggiore, mouth of River Pollina, Troina) but also in localities on the south-western side of the island (mouth of River Platani, Porto Empedocle, mouth of River Salso or southern Imera, Biviere Marsh near Gela). Moreover, there is an old record of *circumflexa* from Linosa (Luigioni, 1929), which however was not confirmed later (Gridelli, 1960; Vigna Taglianti, 1995) and the population may well be extinct there. Magistretti (1965) recorded it from the mouth of River Simeto on the eastern

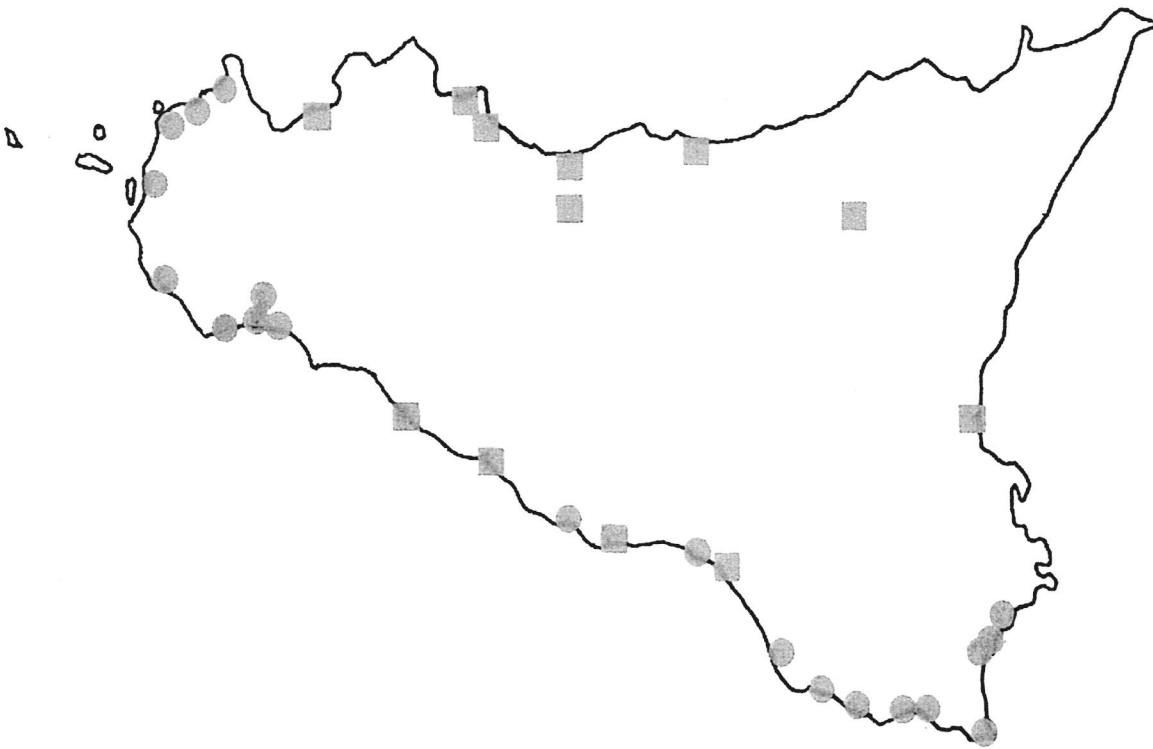


Fig. 1 - The known situation of Sicilian *Lophyras*. Solid squares and circles represent, respectively, the “forms” *circumflexa* and *sardea*.

coast as well, and while Aliquò (1981) marked this locality with a question-mark I was able to recently personally collect *circumflexa* there. All other specimens and localities recorded by Aliquò (1981, 1992) and Arnone (1994) refer to the “morpho” *sardea*, which apparently is the most commonly encountered one in Sicily (Aliquò and Castelli, 1991). However, both *sardea* and *circumflexa* appear to occur in different localities, although sometimes quite close to each other, as the only data indicating their co-occurrence in the very same locality are just old poorly checked records by Palumbo (1890) from Selinunte, and a record of *sardea* by Vitale (1912) from Altavilla, a locality where just *circumflexa* is apparently known from instead (Aliquò, 1981).

Since this appeared to be a rather curious situation, I wished to deeply re-examine the whole question, based on Dejean’s (1831) original descriptions too. Therefore, I examined again the few *circumflexa* specimens of my own collection (FCC), *i.e.* two specimens collected by my father, M. Cassola, on 8.IV.1965, at the mouth of River Imera, on the north coast east of Palermo, five specimens from the mouth of River Platani, west of Agrigento (11.IV.1965, M. Cassola leg.), and five specimens collected by R. Mignani at Balestrate, west of Palermo, on 2.V.1971. Quite recently, as stated above, I had the opportunity of collecting nine additional specimens near Catania, on 11-13.X.2008, at the mouth of River Simeto, thus definitely confirming that only *circumflexa*

occurs there. As a matter of fact, all these specimens obviously differ from all other many Sicilian specimens in my collection – from localities such as Capo Passero near Pachino (23.III.1967, F. Tassi leg.), Porto Palo near Selinunte (3.V.1969, V. Aliquò leg.), the mouth of River Modione near Selinunte (23.IV.1973, F.P. Romano leg.), the mouth of River Ippari, west of Ragusa (30.V.1975, M. Cassola leg.; 3.VI.1977, F. Cassola leg.), Pantano Longarini near Pachino (3.VI.1977, F. Cassola leg.), Vendicari near Noto on the eastern Sicilian coast (2-3.VI.1977, F. Cassola leg.; 13-14.VII.1979, F. Cassola leg.; 25.III.1989, A. Zilli leg.; 19.IV.2002, P. Audisio leg.), the mouth of River Belice near Selinunte (25.VII.1978, M. Cassola leg.), another locality near Vendicari (Cala Mosche, 4.VI.1977, F. Cassola leg.), Marina di Màcari, north of Trapani and south-west of San Vito Lo Capo (7.VI.1979, M. Cassola leg.), Pantano Cuba near Pachino (25.III.1989, A. Zilli leg.) and again Vendicari near Noto (12.X.2008, F. and P. Cassola leg.), which all are almost identical to my specimens from Sardinia (Cassola, 1972) and thus obviously belong to *sardea* as well – because of subtle but consistent characters, *i.e.* the narrower, proportionally longer, more convex and more parallel-sided elytra, and the elytral markings which constantly include a continuous marginal band from the middle band down to the apex. Moreover, in *circumflexa* the pronotal pubescence is apparently more developed than in *sardea* and it consists of white recumbent hairs which are distributed especially at the sides but also more sparsely on disc. In contrast, most *sardea*-like Sicilian specimens have practically glabrous head and pronotum, as well as more flattened and rounded elytra with a wider marginal gutter and all the markings well apart from each other (except for the humeral lunule which is continuous in most specimens). Interestingly, in Tunisian NW coast a similar situation is found, with specimens (for instance, from Tabarka) being almost identical to *ssp. sardea* while others (from southernmore and inland localities) clearly belong to *flexuosa*. Anyway, in contrast to many statements in the entomological literature, *sardea* seems to be less distant from *flexuosa* (for instance from southern France or northern Africa) than *circumflexa*.

However, no further well-founded morphological differences were detected between the two Sicilian forms, in particular as far as male aedeagi and female coupling sulci are concerned. Consequently, no specific, sound, distinguishing body characters can apparently be found. In spite of this, as all specimens from same localities are very consistent with each other, the two “forms” appear to behave as distinct species and do not apparently interbreed (Aliquò, 1981). Further field study is thus needed, in order to ascertain the actual situation in the various localities and if actually there are some kind of eco-ethological barriers which avoid any interbreeding. Also molecular study of the various populations of, respectively, *circumflexa* and *sardea* would be important. It could well turn

out that both forms are actually different species other than *flexuosa*, as firstly supposed by Dejean (1831), possibly only recently evolved from it. Such a problem seems well to be worthy to be pinpointed and made known to all Sicilian entomologists.

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