

A locust *Acanthacris ruficornis* (Fabricius, 1787) in a flower shop of Tübingen, Germany (Acrididae: Cyrtacanthacridinae)

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Summary

A young female of *Acanthacris ruficornis* (Fabricius, 1787) was found in a flower shop of Tübingen (Germany) at the beginning of May 2013. It sat in a bunch of roses enveloped with plastic foil, apparently imported from Kenya via the Netherlands. In the following two months the locust laid three egg-pods with 70, 120, and 145 eggs each, from which no hatching occurred in this time. The relatively small female had a body length of 55 mm, whereas most other morphometric parameters averaged within the species. This is the first record of this locust species to be imported to Germany.

Zusammenfassung

In einem Tübinger Blumenladen fand sich Anfang Mai 2013 in einem in Plastikfolie eingewickelten Rosenstrauß ein junges Weibchen von *Acanthacris ruficornis* (Fabricius, 1787), das vermutlich aus Kenia über die Niederlande eingeschleppt wurde. Das gehälterte Weibchen produzierte im Laufe von zwei Monaten drei Gelege mit jeweils 70, 120 und 145 Eiern, aus denen in dieser Zeit aber keine Larven schlüpften. Das relativ kleine Weibchen hatte eine Körperlänge von 55 mm, während die meisten Körpermaße im Artdurchschnitt lagen. Es ist der erste Fall dieser nach Deutschland eingeschleppten Art.

Introduction

In addition to an increasing active invasion of insect species into Germany, there are also reports for a considerable number of species and individuals that are passively imported by chance. Inspections between 1990 and 1995 of vegetable products, transported in shipping containers arriving in the port of Hamburg, revealed the importation of more than 80 insect species/genera of 11 orders from the worldwide tropics, most of them Coleoptera (SCHLIESKE 1998). The considerable importations of fruits, vegetables and flowers since the end of the 19th century have also resulted in several cases of imported Orthoptera to Germany. Summarizing these from the Hamburg Museum collections (1892-1967), a total of 21 species (13 Ensifera and 8 Caelifera) were listed, including the Cyrtacanthacridinae with three *Anacridium* species and *Schistocerca americana*. From 1900 until now, *Anacridium aegyptium* occurred more or less regularly, with 34 individuals (29 ♀♀, 5 ♂♂) mentioned from Hamburg alone (WEIDNER 1981). This species was often imported with Mediterranean fruits and vegetables and also found in other areas throughout Germany, so that it is mentioned in the Orthoptera faunas of several federal states of Germany, such as Rhineland-

Palatinate (NIEHUIS & PFEIFER 2011, here short summary). More recent discoveries concerned an individual on a lemon tree in a DIY market in Saxony (KÜTTNER & EICHHORN 1995), in Bremen in 2010 a female at a service point in a car return-ing from the lake Garda/Italy (Adaschkiewitz, in litt.), and another adult in a store-room of a factory in Rastede/Niedersachsen (KLEINEKUHLE 2013). To date, no published records seem to exist of *Acanthacris* imported to Germany.

Locality

On 03.05.2013, a female *Acanthacris ruficornis* (Fig. 1) was detected in the flower shop "Blumen und mehr" (M. Funke-Karowski) in Tübingen (Baden-Württemberg) by the shop owners and handed over to K.R.. The locust was found in a bunch of roses enveloped with plastic foil, which had arrived the same day from an interim storage in the Dutch Aalsmeer, the world-greatest auctioning house of flowers, to where they were delivered and packed from either Kenya or Columbia. Because this genus resp. species is of African distribution, the roses were certainly coming from Kenya and perhaps had been enveloped there already.

The genus and species were determined using the keys of African Cyrtacanth-acridinae in DIRSH (1965, 17 genera) and JOHNSEN (1990, with a figure of a female), despite the fact that these and the genus revision of *Acanthacris* by MUNGAI (1987) are mainly based on male characteristics. According to DIRSH (1965) in *Acanthacris* the well-developed prosternal process, typically for the whole subfamily, is curved backwards almost touching the mesosternum (Fig. 2).

Locust characteristics

The locust was likely a very recently moulted female, because the colours were still fresh and shiny and neither wings, nor the spines on the posttibiae showed any sign of wear (Fig. 1). Because of a strong adhesion power it was very difficult to remove it from the vegetation or the cage walls. Morphometric parameters of the fresh dead female (a week after the third egg-laying) were as follows: length of body - 55 mm (already dried), antennae - 18.3 mm, pronotum - 13.9 mm, tegmina - 54.9 mm, postfemora - 32.2 mm, posttibiae - 28.8 mm, and width of head - 7.9 mm, and pronotum - 9.1 mm. The spines on the posttibiae were up to 3 mm long. In the literature female body length is given with 52-65 mm (ANONYMOUS 1982, JOHNSEN 1990), and 71 mm to the apices of the folded wings (as in our female), whereas forewings with 56 mm and postfemora with 32-35 mm (DE VILLIERS 1989, MUNGAI & RITCHIE 1990). According to this, the female is relatively small in body and postfemora length but average in wing lengths (Fig. 1).

From the beginning of May until mid-July, the locust was kept in a terrarium (K.R.), with leaves of several plants offered as food. Of those, blackberry (*Rubus*) and cherry (*Prunus cerasus*) were eaten, whereas - if blackberry was available - leaves of hawthorn (*Crataegus*), European cornel (*Cornus mas*) and dog rose (*Rosa spec.*) were left undamaged. They were, however, eaten if the blackberry leaves were finished. Henceforth, the female was fed with blackberry all the time, and leaves were changed every 7 to 10 days. In the days following oviposition food was more quickly consumed.



Fig. 1:
Adult female of *Acanthacris ruficornis* in captivity in Tübingen, climbing on *Rubus* as food-plant. (Foto: Tobias Gerlach)



Fig. 2:
In the genus *Acanthacris*, the well-developed prosternal process, typically for Cyrtacanthacridinae, is strongly curved backwards, nearly touching the mesosternum (Foto: Tobias Gerlach)

Three ovipositions took place on approximately the following dates: 18.05. - 70 eggs (into cage), around 20.06. - 120 eggs, and around 03.07. - 145 eggs (both into moist sand-soil mixture). These variable clutch sizes are in the lower range of the known spectrum given with 70-200 (ANONYMOUS 1982), 136 (87-179) (DE VILLIERS 1989) and 138 (38-180) eggs per pod (MUNGAI & RITCHIE 1990). Because the probably unmated female was killed long before its normal life span of several months only three pods were laid by this female. Under lab conditions mated females produced an average of 13.6 egg pods (DE VILLIERS 1989). The egg-pods were placed again in a moist sand-soil mixture and kept in an environmental chamber at 25 °C. No eggs hatched in the next two months till 11 July, either they were unfertilized or the temperature was too low. According to DE VILLIERS (1989, South Africa), egg development is continuously without a diapause and completed within a months at a constant 32.5 °C. Variable incubation periods between 25 and 92 days at different temperatures (28-34 °C) are mentioned by MUNGAI & RITCHIE (1990). In our female, the eggs were middle brown, 6 mm long and 1 mm wide.

After more than two months, on 11 July 2013, the observations were abandoned, and the female was killed by placing her in a freezer (-20 °C). The dead female was measured and stored in 70% ethyl alcohol until January 2014, when it was dissected and prepared for the dry collection (G.K.). The crop was found to be completely filled, but no ovarian structures were seen, instead a more or less decomposed brown mass filled the abdomen.

Discussion

Four species of the African genus *Acanthacris* are known, clearly separated by male genitalia, with three regionally distributed species: *A. deckeni* (Gerstaecker, 1869) - Kenya and Zanzibar; *A. elgonensis* Sjöstedt, 1932 – Uganda; *A. aithioptera* Mungai, 1987 – Zambia. Only *A. ruficornis* (Fabricius, 1787) is a widespread species, distributed across the whole continent south of the Sahara and in Morocco (DIRSH 1965, MUNGAI 1987). Since UVAROV (1924) two subspecies are distinguished, with *A. r. citrina* in the savannas of Western Africa and isolated in Morocco, and *A. r. ruficornis* in a small coastal area of West Africa, but mainly in Eastern and Southern Africa, including Kenya. Both subspecies differ by colour: *citrina* is light brown, has pale and striped eyes, and the hind tibiae are flushed with pink; *ruficornis* is dark brown, has uniformly black eyes (as our female), and the hind tibiae are bluish or grayish. In addition, putative hybrid populations between these two subspecies were found to exist in Ethiopia (ANONYMOUS 1982, MUNGAI 1987, MUNGAI & RITCHIE 1990 – here distribution map).

The polyphagous locust *Acanthacris ruficornis* is also of some economic importance, and characterized as a potential or minor pest, attacking crops as different as cotton, sugar cane, grape, tea, tobacco and many others, also rose (ANONYMOUS 1982, with 46 references to this species). In addition to cultivated crops it also occurs on very different biotopes from grassland (here often on bushes) to woodland, including tree and bush savannas (ANONYMOUS 1982, JOHNSEN 1990). Obviously, it also occurs in the rather recent flower fields of Kenya, and so far can be exported by chance to Europe. But the species is also well able to fly, ever over great distances, as observations of single females (ssp. *citrina*) are known from ships near Las Palmas and the African West coast (WEIDNER 1969). In Southern Africa the life cycle is univoltine with development in the rainy season from October to March (ANONYMOUS 1982) and adult peaks from February/March until May (DE VILLIERS 1989). This is in accordance with the occurrence of a just recently moulted adult *ruficornis* in Kenyan roses at the end of April. In Botswana adults were collected from February to June and again from September to December (JOHNSEN 1990).

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