Compilation of canthariphilous insects

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Summary

A list of insects attracted to cantharidin is given. Most canthariphilous insects are found within the hetero­meran beetle family Anthicidae with 190 species in the three subfamilies Anthicinae (184), Lemodiinae (1) and Tomoderinae (5). Further cantharidin baited species are known from the beetle families Endomychidae (5), Cleridae (4), Chrysomelidae (3), and Staphylinidae (1). In the beetle family Pyrochroidae 23 species from the subfamily Pedilinae and 6 species of the Pyrochroinae are canthariphilous. The insect order Diptera is represented by the families Anthomyiidae (3), Cecidomyiidae (2), Ceratopogonidae (22) Chloropidae (1), Platystomatiidae (1) and Sciaridae (5). Many species from the heteropteran family Miridae (29) are known to be attracted by cantharidin, also one species from the families Lygaeidae and Tingidae respectively. Parasites of the hymenopteran family Braconidae (6) show a positive reaction to cantharidin as well as species from the subfamily Diapriinae of the family Diapriidae. Chemical analyses of a fulgorid and a cicadid species revealed that also species of Homoptera may contain cantharidin.

Keywords

cantharidin; canthariphilous insects; Coleoptera; Diptera; Heteroptera; Homoptera

Zusammenfassung

Die durch Cantharidin angezogenen Insekten werden aufgelistet. Die meisten Cantharidin-abhängigen Insekten sind in der Käferfamilie Anthicidae mit 190 Arten in den drei Unterfamilien Anthicinae (184), Lemodiinae (1) und Tomoderinae (5) gefunden worden. Weitere Cantharidin-abhängige Arten sind bekannt aus den Käferfamilien Endomychidae (5), Cleridae (4), Chrysomelidae (3) und Staphylinidae (1). In der Familie Pyrochroidae sind 23 Arten aus der Unterfamilie Pedilinae und 6 Arten aus den Pyrochroinae Cantharidin-beeinflußt. Bei den Dipteren sind dies in den Familien Anthomyiidae (3), Cecidomyiidae (2), Ceratopogonidae (22), Chloropidae (1), Platystomatiidae (1) und Sciaridae (5). Manche Arten der Heteropterenfamilie Miridae (29) sind bekannt wegen des Einflusses von Cantharidin ebenso wie Arten der Unterfamilien Diapriinae der Familie Diapriidae. Chemische Analysen von Arten der Fulgoridae und Cicadidae zeigen, dass auch Arten der Homoptera Cantharidin-abhängig scheinen.

Introduction

Cantharidin, a formal monoterpenic anhydride, is known to humans for its toxic properties for over 2000 years. Applied on the human skin it induces serum filled blisters, which gave blister beetles (Coleoptera: Meloidae) their common name, beside Oedemeridae the only known natural sources of this chemical. Used internally cantharidin acts as diuretic and abortifacient. It may induce priapism, which made cantharidin one of the most well known aphrodisiacs.
In meloid and oedemerid beetles cantharidin is used as an effective haemolymph poison (Cavill & Clark 1971, Capinera et al. 1985, Carrel et al. 1986, Blodgett et al. 1991, Nicholls et al. 1990, Holz et al. 1994), which protects the adults as well as larval stages and eggs.

Another interesting phenomenon in connection with cantharidin is its attractancy on other insects, which perceive this insecticide partly over great distances (Görnitz 1937, Wirth 1980, Young 1984 a, b). Many of these so-called canthariphilous insects ingest cantharidin without any obvious damage.

This paper gives a compilation of insects attracted to cantharidin on species level. Canthariphilous species are known from following orders and families: Coleoptera (Anthicidae, Cleridae, Chrysomelidae, Endomychidae, Pyrochroidae, Staphylinidae), Diptera (Anthomyiidae, Cecidomyiidae, Ceratopogonidae, Chloropidae, Platystomatidae, Sciaridae), Heteroptera (Miridae, Lygaeidae, Tingidae), and Hymenoptera (Braconidae, Diapriidae). Analysis of Homoptera species proved, that cantharidin containing species can also be found in these order of insects.

Possible function of cantharidin in the life cycles of canthariphilous insects

Coleoptera

Most canthariphilous species are found in the beetle family Anthicidae with 190 recorded species. Mostly Notoxus and Aulacoderus species are attracted. Conspicuous in many anthicid genera associated with cantharidin are notches at the tips of the elytra in males which function as test organs. Females bite into these structures and choose their sexual partner by the amount of cantharidin a male has taken up (Schütz & Dettner 1992). Ingested cantharidin is stored in the reproductive organs of the males and transmitted to females during copulation. The nuptial gift is secreted into eggs and thus provides protection for the offspring.

From the family Cleridae Pallenothriocera rufimembris is attracted to the terpenoid cantharidin (Hemp et al. 1999b). Also single specimens of other clerid species were collected in cantharidin traps put out in southern Europe. Further clerids were suggested to be canthariphilous (Chandler 1976, Bologna & Havelka 1984) or reported to contain cantharidin (Juanjie et al. 1995, Dettner, in prep.). Gland-like structures on the elytra of male Pallenothriocera rufimembris suggests an analogous cycle as found in anthicids. Specimens of a up to now unidentified clerid species attracted to cantharidin baits near Nairobi, Kenya were observed to remain several hours in the open traps, attacking there other arriving canthariphilous species (mostly Notoxus sp.), killing and feeding on them. Remaining elytra of the preys showed that one clerid often fed more than 10 Notoxus during the day hours.

Canthariphilous pyrochroid beetles show a similar cycle for cantharidin as discussed above for anthicids (Holz et al. 1994, Eisner et al. 1996b). Test organs for cantharidin titres are present on the head of the male in form of grooves (Eisner et al. 1996a). As in anthicid beetles the females bite into these structures to inform themselves about the amount of cantharidin the would-be partner has taken up.

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For all other beetles families (Chrysomelidae, Endomychidae, Staphylinidae) with canthariphilous species only the phenomenon that members are attracted to the natural product cantharidin is known. No investigations have been undertaken up to now to illuminate life cycles and function of cantharidin for these insects.

**Diptera and Heteroptera**

Ceratopogonids are an ever present group as soon as cantharidin is put out. Studies on the function of cantharidin in the biology of canthariphilous ceratopogonids have been made by FRENZEL & DETTNER (1994). Both sexes of the investigated ceratopogonid gnats are attracted to cantharidin, ingesting the terpenoid readily. Maximal concentrations in tissues of ceratopogonids analysed are similar to those detected in the cantharidin producing species of the heteromeran beetle families Meloidae and Oedemeridae. High concentrations of cantharidin in the haemolymph of European ceratopogonids proved to deter Empididae, which prey on these gnats.

As for most beetle families only the phenomenon that dipterans and heteropterans from families like Anthomyiidae, Cecidomyidae, Chloropidae, Platystomatidae, Sciaridae (Diptera) and Miridae, Lygaeidae and Tingidae (Heteroptera) are attracted, is noted.

**Hymenoptera**

Braconids are parasitoids of other insects. Females are capable of sensing their host for egg-deposition via kairomones. This may also be the case in canthariphilous species that are attracted by the cantharidin smell of their hosts as suggested for *Perilitius plumicornis* which is a parasite of the anthicid *Notoxus monoceros* (GÖRNITZ 1937).

List of insects attracted to cantharidin

**Coleoptera**

**Anthicidae**

**Anthicinae**

*Acanthinus scitulus* (LECONTE)  
*Anthicus lutulentus* CASEY  
*Anthicus nanus* LECONTE  
*Anthicus punctulatus* LECONTE  
*Anthicus sonoranus* WERNER

*Chandler 1976, Young 1984a, b*

*Aulacoderus albitarsis* (LAFERTÉ)  
*Aulacoderus apterus* (VAN HILLE)  
*Aulacoderus asymmetricus* (VAN HILLE)  
*Aulacoderus bicoloritarsis* (PIC)  

*VAN HILLE 1954*

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| Species                                      | Reference                  |
|---------------------------------------------|----------------------------|
| Aulacoderus bilineatus                      | VAN HILLE 1984a            |
| Aulacoderus bonadonai                       | FORCHHAMMER 1985           |
| Aulacoderus bradfordi                       | VAN HILLE 1984a            |
| Aulacoderus brevicornis                     | VAN HILLE 1984b            |
| Aulacoderus bryanti                         |                           |
| Aulacoderus canariensis                     | SCHÜTZ & DETTNER 1992     |
| Aulacoderus canthariphilus                  | VAN HILLE 1984a            |
| Aulacoderus cecileae                        | VAN HILLE 1985             |
| Aulacoderus chappuisi                       | HEMP et al. 1999a          |
| Aulacoderus cierii                          | VAN HILLE 1984a            |
| Aulacoderus colletti                        |pers. comm. 3              |
| Aulacoderus dorsalis                        |                           |
| Aulacoderus flavitarsis                     | VAN HILLE 1984a            |
| Aulacoderus flavipictus                     | VAN HILLE 1954, 1984a      |
| Aulacoderus forchhameri                     | VAN HILLE 1985             |
| Aulacoderus formicomisternus                | VAN HILLE 1984a            |
| Aulacoderus forsythi                        | VAN HILLE 1984a            |
| Aulacoderus fragilis                        |                           |
| Aulacoderus govenderi                       | VAN HILLE 1984b            |
| Aulacoderus halleyi                         | VAN HILLE 1988             |
| Aulacoderus inopinans                       | HEMP et al. 1999a          |
| Aulacoderus kochi                           | VAN HILLE 1985             |
| Aulacoderus macbryei                        | VAN HILLE 1984a            |
| Aulacoderus martini                         | VAN HILLE 1984a            |
| Aulacoderus mediofasciatus                  | VAN HILLE 1984a            |
| Aulacoderus milleri                         | VAN HILLE 1984b            |
| Aulacoderus mogatoensis                     | VAN HILLE 1984a            |
| Aulacoderus multidenticulatus                | VAN HILLE 1984a            |
| Aulacoderus munroi                          | VAN HILLE 1984a            |
| Aulacoderus mutatus                         | VAN HILLE 1984a            |
| Aulacoderus orangensis                      | VAN HILLE 1984a            |
| Aulacoderus pedester                        | VAN HILLE 1984a            |
| Aulacoderus permucida                       | VAN HILLE 1971, 1984a      |
| Aulacoderus poweri                          | VAN HILLE 1984a            |
| Aulacoderus rambhodi                        | VAN HILLE 1984a            |
| Aulacoderus recognitus                      | VAN HILLE 1984a            |
| Aulacoderus reverendus                      | VAN HILLE 1984a            |
| Aulacoderus rotundipennis                   | VAN HILLE 1971             |
| Aulacoderus scydmaenoides                   | HEMP 1994 6                |
| Aulacoderus serowensis                      | VAN HILLE 1985             |
| Aulacoderus sibayensis                      | VAN HILLE 1971, 1984a      |
| Aulacoderus simoni                          | VAN HILLE 1954, 1984a      |
| Aulacoderus smithersi                       | VAN HILLE 1984a            |
| Aulacoderus techowi                         | VAN HILLE 1985, pers. observ. 8 |
| Cordicomus instabilis                       |pers. comm. 9              |
| Cyclodinus basilenskyi                      |pers. comm. 10             |

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Endomia tenuicollis (ROSSI)

Formicella munda (LECONTE)

Formicomus caeruleus (THUNBERG)
Formicomus canalicularis LAFERTÉ
Formicomus chappuisi PIC
Formicomus consil LA FERTÉ
Formicomus gestroi PIC

Formicomus lacustris KREK.
Formicomus linnavouri VAN HILLE
Formicomus millerianus PIC
Formicomus opaculus KOLBE
Formicomus pedestris (ROSSI)

Formicomus rubricollis LAFERTÉ

Formicomus sp. (lewisi MARSEUL?)
Formicomus spatulatus VAN HILLE
Formicomus tropicalis KREK.

Hirticomus biplagiatus (LAFERTÉ)
Hirticomus hispidus (ROSSI)
Hirticomus quadriguttatus (ROSSI)

Mecynotarsus balsasensis WERNER
Mecynotarsus casperi PIC
Mecynotarsus falcatus CHANDLER
Mecynotarsus lacustris VAN HILLE
Mecynotarsus nevemannii WERNER
Mecynotarsus nigronotatus PIC
Mecynotarsus obliquemaculatus MARSEUL
Mecynotarsus obliteratus PIC
Mecynotarsus serricornis (PANZER)
Mecynotarsus vagépictus FAIRMAIRE

Microhoria aspelia (TRUQUI)
Microhoria anbei (LA FERTÉ)
Microhoria bianriculatus (PIC)
Microhoria calliger (MARESEUL)
Microhoria choberti (PIC)
Microhoria cinctuta (MARSEUL)

Microhoria fairmairei (BRISOUT)
Microhoria fasciata (CHEVROLAT)
Microhoria fasciata (CHEVROLAT) codinai PIC

BOLOGNA & HAVELKA 1984

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Microhoria ghilianii (LAFÉTÉ)
Microhoria insignis (LUCAS) 22
Microhoria insignis (LUCAS) var. panousei (PIC) 23
Microhoria obscuripes (PIC) 24
Microhoria plagifer (KREKICH)
Microhoria syrensis (PIC)
Microhoria terminata (SCHMIDT)

Microhoria tortiscelis (MARSEUL) 27
Microhoria venusta (VILLA)

Notoxus allansoni VAN HILLE
Notoxus alluai Pic
Notoxus amaculatus VAN HILLE
Notoxus anchora HENTZ
Notoxus bifasciatus (LECONTE)
Notoxus britoni VAN HILLE
Notoxus buraensis UHMANN
Notoxus calearatus HORN
Notoxus candatus FALL
Notoxus cavicornis LECONTE
Notoxus celatus CHANDLER
Notoxus conformis LECONTE
Notoxus constrictus CASEY
Notoxus cornutus THUNBERG
Notoxus cucullatus LAFÉTÉ
Notoxus cumanensis LAFÉTÉ
Notoxus daressalaemensis UHMANN
Notoxus decorus VAN HILLE
Notoxus demudatus HORN
Notoxus desertus CASEY
Notoxus filicornis CASEY
Notoxus fraternus CHAMPION
Notoxus guttulatus BUCK
Notoxus hageni CHANDLER
Notoxus hiltoni VAN HILLE
Notoxus hirsutus CHAMPION
Notoxus hirsutus Pic
Notoxus hirtus LAFÉTÉ
Notoxus holmi UHMANN
Notoxus intermedius FALL
Notoxus lateralis CHANDLER
Notoxus lesnei Pic
Notoxus lunulifer Pic
Notoxus marginatus LECONTE
Notoxus mauritanicus LAFÉTÉ
Notoxus mexicanus CHAMPION
Notoxus mkuziensis VAN HILLE

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BOLOGNA & HAVELKA 1984
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YOUNG 1984b
VAN HILLE 1985
HEMP et al. 1999a
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CHANDLER 1982
CHANDLER 1977a
CHANDLER 1977a, 1982
CHANDLER 1977a, YOUNG 1984a
ABDULLAH 1964
VAN HILLE 1971
CHANDLER 1977a
HEMP et al. 1999a
SCHÜTZ & DETTNER 1992, HEMP et al. 1999a
CHANDLER 1982
CHANDLER 1977a, 1982, YOUNG 1984a
YOUNG 1984b
CHANDLER 1977a
ABDULLAH 1964, pers. comm. 28
CHANDLER 1982
VAN HILLE 1971
CHANDLER 1977a, 1982
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BOLOGNA & HAVELKA 1984
VAN HILLE 1985
CHANDLER 1982
CHANDLER 1977a
pers. comm. 29
VAN HILLE 1971, HEMP et al. 1999a
CHANDLER 1976, 1977a, 1982
ABDULLAH 1964, YOUNG 1984a
CHANDLER 1976, 1977a
VAN HILLE 1971
Notoxus monoceros (LINNÉ)
Notoxus monodon (FABRICIUS)
Notoxus montanus CASEY
Notoxus murnipennis (LECONTE)
Notoxus namibianus UHMANN
Notoxus nevadensis CASEY
Notoxus nuperus HORN haustrus CHANDLER
Notoxus nuperus HORN
Notoxus opacus CHAMPION
Notoxus ornatus VAN HILLE
Notoxus photus CHANDLER
Notoxus pictus CASEY
Notoxus planicornis LAFERTÉ
Notoxus pretiosus VAN HILLE
Notoxus pygidialis CHANDLER
Notoxus reavelli VAN HILLE
Notoxus recticornis VAN HILLE
Notoxus robustus CASEY
Notoxus roebri UHMANN
Notoxus rothschildii PIC
Notoxus rufomaculatus PIC
Notoxus seminole CHANDLER
Notoxus serratus (LECONTE)
Notoxus sparsus LECONTE
Notoxus spatulifer CASEY
Notoxus talpa LAFERTÉ
Notoxus tansanianus UHMANN
Notoxus toltonorum CHANDLER
Notoxus vanhillei UHMANN
Notoxus whartonii CHANDLER
Notoxus walteri VAN HILLE
Notoxus youngi CHANDLER
Notoxus zapotecorum CHANDLER

Omonadus bottegoi PIC

Pseudoleptalus unifasciatus (DESBR.)
Pseudonotoxus testaceus (LA FERTÉ)

Sapintus javanus (MARSEUL)
Sapintus malayensis (PIC) 36
Sapintus pleciítes (PIC)
Sapintus pollockii UHMANN
Sapintus tavetanus (PIC)

Tenricomus babaulti (PIC)

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CHANDLER 1982
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van HILLE 1984b
pers. comm. 32
CHANDLER 1982, YOUNG 1984a
van HILLE 1985, pers. comm. 33
HEMP et al. 1999a
HEMP et al. 1999a
YOUNG 1984a, b
CHANDLER 1977a, 1982
CHANDLER 1977a, 1982, YOUNG 1984a
CHANDLER 1982
CHANDLER 1976, 1977a
HEMP et al. 1999a
CHANDLER 1977a
HEMP et al. 1999a
CHANDLER 1982
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CHANDLER 1982
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FORCHHAMMER 1985, HEMPEL et al. 1999a
van HILLE 1985
YOUNG 1984b, pers. comm. 35
GÖRNITZ 1937
YOUNG 1984b
pers. comm. 36
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**Tenuicomus barnevillei** (PIC)

**Tenuicomus pumilus** (BAUDI) 38

**Vacusus infernus** (LA FERTÉ)

**Lemodiinae**

**Trichananca aptera** LEA

**Tomoderinae**

**Tomoderus** sp.

**Tomoderus alluaudi** PIC

**Tomoderus brevicornis** CHAMPION

**Tomoderus congoanus** PIC

**Tomoderus kolbei** PIC

**Endomychidae**

**Aphorista laeta** (LECONTE)

**Aphorista vittata** (FABRICIUS)

**Danae testacea** (ZIEGLER)

**Lycoperdina ferruginea** LECONTE

**Xenomycetes morrisoni** HORN

**Cleridae**

**Cymatodera** sp.

**Pallenothriocera rufimembris** PIC

**Gen. sp.**

**Cleridae sp.**

**Chrysomelidae**

**Aristobrotica angulicollis** (ERICHSON)

**Barombiella** (Bonesioides) **vicina**

**Barombiella** (Bonesioides) ssp.

**Pyrochroidae**

**Pedilinae**

**Anisotria shoeki** YOUNG

**Pedilus abnormis** (HORN)

**Pedilus hardi** (HORN)

**Pedilus canaliculatus** (LECONTE)

BOLONA & HAVELKA 1984

GÖRNITZ 1937, ABDULLAH 1964, YOUNG 1984a

CHANDLER 1976

pers. observ. 39

CHANDLER 1976, YOUNG 1984b

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pers. observ. 40

HEMP et al. 1999a

HEMP et al. 1999a

YOUNG 1984b

YOUNG 1984b

YOUNG 1984b

YOUNG 1984b

YOUNG 1984a

HEMP et al. 1999a

HEMP et al. 1999a

YOUNG 1989, DETTNER 1997

YOUNG 1984b

YOUNG 1984b

YOUNG 1989, DETTNER 1997

CHANDLER 1976

HEMP et al. 1999a, HEMP et al. 1999b

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MAFRA-NETO & JOLIVET 1994

HEMP et al. 1999a

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YOUNG 1984a

YOUNG 1981

YOUNG 1981

YOUNG 1981

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Pedilus cavatus FALL  
Pedilus collaris (SAY)  
Pedilus crochi (HORN)  
Pedilus elegans (HENTZ)  
Pedilus impressus (SAY)  
Pedilus inconspicuus (HORN)  
Pedilus joanae YOUNG  
Pedilus johnsonorum YOUNG  
Pedilus labiatus (SAY)  
Pedilus lewisii (HORN)  
Pedilus longilobus FALL  
Pedilus lugubris (SAY)  
Pedilus monticolus (HORN)  
Pedilus oregonus FALL  
Pedilus picipennis FALL  
Pedilus punctulatus LECONTE  
Pedilus serratus FALL  
Pedilus sp. nov.  
Pedilus terminalis (SAY)  

Pyrochroinae  
Neopyrochroa femoralis (LECONTE)  
Neopyrochroa flabellata (FABRICIUS)  

Pyrochroa coccinea LINNÉ  
Pyrochroa serraticornis (SCOPOLI)  

Schizogtus cervicalis NEWMANN  
Schizogtus pectinicornis LINNÉ  

Staphylinidae  
Eusphalerum minutum (F.)  

Diptera  

Anthomyiidae  
Anthomyia benguellae MALLOCH  
Anthomyia pluvialis (LINNÉ)  

Delia (Hylemyia) trispinosa KARL  

Cecidomyiidae  
Gen. sp. Cecidomyiinae  
Gen. sp. Lestremiinae  

Ceratopogonidae  
Atrichopogon brunipes MEIGEN  
Atrichopogon downesi WIRTH  

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Atrichopogon epicautae WIRTH
Atrichopogon favri WIRTH
Atrichopogon geminus BOESEL
Atrichopogon illiesi HAVELKA
Atrichopogon levis (COQUILLETT)
Atrichopogon lindneri WIRTH
Atrichopogon lucorum (MEIGEN)
Atrichopogon maculosus EWEN
Atrichopogon melangeus KIEFFER
Atrichopogon mittmanni HAVELKA
Atrichopogon oedemerarum STORA
Atrichopogon rostratus (WINNERTZ)
Atrichopogon ruediiger HAVELKA
Atrichopogon setosipennis KIEFFER
Atrichopogon sp.
Atrichopogon sp. near websteri (COQUILLETT)
Atrichopogon trifasciatus KIEFFER
Atrichopogon websteri (COQUILLETT)
Culicoides obsoletus MEIGEN
Forsipomyia crinita SAUNDERS
Chloropidae
Goniopsita spec.
Platystomatidae
Peltacanthina near mythodes HENDEL
Sciaridae
ssp.
Gen. sp.
Bradyisia optata
Heterosciara sp.
Schwenkfeldina sp.
Scythropochroa sp.

WIRTH 1980
YOUNG 1984b
BOLOGNA & HAVELKA 1984
YOUNG 1984b
WIRTH 1980
BOLOGNA & HAVELKA 1984, FRENZEL et al. 1992
YOUNG 1984b
WIRTH 1980, BOLOGNA & HAVELKA 1984 pers. observ. 43
FRENZEL et al. 1992, FRENZEL & DETTNER 1994
YOUNG 1984b
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Heteroptera

Lygaeidae

Dieuches sp.

Miridae

Caulotops ssp.

Cryptocapsus paraensis (CARVALHO)
Cryptocapsus sp.
Cyrtocapsus caliginens (STAL)
Eurychilella sp. near pallida REUTER

Hadronema bispinosa KNIGHT
Hadronema breviata KNIGHT
Hadronema militaris UHLER
Hadronema princeps UHLER
Hadronema sp.
Hadronema uhleri VANDUZEE
Hadronema uniformis KNIGHT

Halticotoma nicholi KNIGHT
Halticotoma sp.
Halticotoma valida TOWNSEND

Neuleucon sulinus (CARVALHO)

Pachymeroästa pilosus (CARVALHO)

Pycnoderes quadrimaculatus (GUERIN-MELNEVILLE)
Pycnoderes sp.
Pycnoderes vanduzeei REUTER

Sixeonotus brevirostris KNIGHT
Sixeonotus insignis REUTER
Sixeonotus sp.
Sixeonotus sp. near brevirostris KNIGHT
Sixeonotus tenebrosus (DISTANT)

Sysinas fulvicollis (FABRICIUS)
Sysinas linearis DISTANT
Sysinas signaticollis (REUTER)

Thentecoris sp.
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Tingidae

sp.

Hymenoptera

Braconidae

Blacus ruficornis (NEES) Young 1984b

Perilitus plumicornis Ruthe Görnitz 1937

Streblocera near pubillicorinis Walley & Mackay Young 1984b

Syrribius agilis (Cresson) Young 1984b

Microtonus sp. Dettner 1997

Melittobia sp. Bologna 1991

Diapriidae

Gen. sp. (Diapriinae) Dettner 1997

1 Anthicus albitarsis in Van Hille 1954
2 Anthicus bicoloritarsis in Van Hille 1954
3 collected by Dr. Pollock at cantharidin in Australia (pers. comm UHMANN)
4 Anthicus flavopectus in Van Hille 1954 and 1984a
5 Expedition of the Museum Berlin to southern Africa (pers. comm UHMANN)
6 attracted to cantharidin on the canary island Tenerife
7 Anthicus simoni in Van Hille 1954 and 1984a
8 Expedition of the Museum Berlin to southern Africa (pers. comm UHMANN)
9 collected by Dr. Schawaller in Nepal, feeding on meloids
10 collected by Dr. T. Wagner at cantharidin in Uganda, East Africa
11 attracted to cantharidin bait in March 1999 at the Tanzanian coast near Pangani
12 attracted to cantharidin bait on the Mediterranean island Mallorca 7.90
13 attracted to cantharidin at the Mediterranean island Mallorca 7.90
14 Expedition of the Museum Berlin to southern Africa (pers. comm UHMANN)
15 collected at cantharidin by C. Koch in Cyprus
16 Anthicus anbei in Görnitz 1937, Abdullah 1964 and Young 1984a
17 Anthicus biawircatus in Görnitz 1937, Abdullah 1964 and Young 1984a
18 collected at cantharidin bait by Dr. W. Arens in Greece, Olympia
19 Anthicus chobartii in Görnitz 1937, Abdullah 1964 and Young 1984a
20 Anthicus cinusterus in Görnitz 1937, Abdullah 1964, Bologna & Havelka 1984 and Young 1984a
21 Anthicus fairmairei in Görnitz 1937, Abdullah 1964 and Young 1984a
22 Anthicus insignis in Görnitz 1937 and Young 1984a
23 Anthicus panouses in Young 1984a
24 Anthicus obscipenes in Abdullah 1964 and Young 1984a
25 at cantharidin on the Mediterranean island Mallorca, July 1990
26 collected at cantharidin by C. Koch in Cyprus
27 Anthicus tortiuscius in Young 1984a
28 Expedition of the Museum Berlin to southern Africa (pers. comm UHMANN)
29 Expedition of the Museum Berlin to southern Africa (pers. comm UHMANN)

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Expedition of the Museum Berlin to southern Africa (pers. comm UHMANN)

personal communication with Prof. CHANDLER, USA

around 150 specimens at cantharidin in December 1998 and April 1999 in the suburb Karen of Nairobi, Kenya

Expedition of the Museum Berlin to southern Africa (pers. comm UHMANN)

collected at cantharidin by Prof. CHANDLER in the Philippines, Cebu, Inayagan and Naga

Anthicus malayensis in GÖRNITZ 1937

collected at cantharidin by Dr. POLLOCK, Australia (pers. comm UHMANN)

Anthicus pumilus in GÖRNITZ 1937, ABDULLAH 1964 and YOUNG 1984a

specimen labeled „at cantharidin“, coll. POLLOCK, Australia

baited with cantharidin, southeast, Dominican Republic, 1.95

in December 1998 about 50 specimens of a up to now not identified clerid species were attracted to cantharidin baits from a piece of indigenous Olea-forest at Karen near Nairobi, Kenya

Kempia brunnipes in GÖRNITZ 1937

new species from Tanzania, Kilimanjaro, mentioned in FRENZEL et al. (1998), species description by HAVELKA, in prep.; listed in HEMP et al. 1999a under Arrichopogon spec. 1

ew species from Tanzania, Kilimanjaro, mentioned in FRENZEL et al. (1998), species description by HAVELKA, in prep.; listed in HEMP et al. 1999a, under Arrichopogon spec. 2

3 males were collected at Mistelbach/Bayreuth (August 90) at cantharidin

21 males and 2 females were collected at Bayreuth (June 1991) at cantharidin. According to MENZEL & MOHRIG (1997) Heterosciara is a synonym of Scatopsiara

1 male was collected at Bayreuth (June 1991) at cantharidin

4 males and 1 female were collected at Mistelbach/Bayreuth (August 1990) at cantharidin

attracted to cantharidin in savannah grassland at 1400 m near Mt. Kitumbeine, Tanzania (11/99)

attracted to cantharidin in coastal grassland near Pagani, Tanzania (1/00)

attracted to cantharidin in coastal grassland near Pagani, Tanzania (3/00)

attracted to cantharidin in savannah grassland near Mt. Kitumbeine, Tanzania (11/99)

attracted to cantharidin in savannah grassland near Mt. Kitumbeine, Tanzania (11/99)

Homoptera

First results in analysing cantharidin contents in fulgorids suggest, that there are also members in the order Homoptera associated with cantharidin. The latern fly Lycorma delicatula proved to contain cantharidin, which probably was taken up by host plants (FENG et al. 1988, DETTNER 1997). There was also suggested the Cicadidae species Huechys sanguinea (DE GEER) would contain cantharidin (JUANJIE et al. 1995).

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