Addenda to the insect fauna of Al-Baha Province, Kingdom of Saudi Arabia with zoogeographical notes

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\textbf{ABSTRACT}

The first list of insects (Arthropoda: Hexapoda) of Al-Baha Province, Kingdom of Saudi Arabia (KSA) was published in 2013 and contained a total of 582 species. In the present study, 142 species belonging to 51 families and representing seven orders are added to the fauna of Al-Baha Province, bringing the total number of species now recorded from the province to 724. The reported species are assigned to recognized regional zoogeographical regions. Seventeen of the species are recorded for the first time for KSA, namely: \textit{Platypleura arabica} Myers [Cicadidae, Hemiptera]; \textit{Cletomorpha} sp.; \textit{Gonocerus juniperi} Herrich-Schäffer [Coreidae, Hemiptera]; \textit{Coranus lateritius} (Stål); \textit{Rhynocoris bipus-tulatus} (Fieber) [Reduviidae, Hemiptera]; \textit{Cantacader iranicus} Lis; \textit{Dictyla poecilla} Drake & Hill [Tingidae, Hemiptera]; \textit{Mantispa scab-ricolis} McLachlan [Mantispidae, Neuroptera]; \textit{Cerocoma schreberi} Fabricius [Meloidae, Coleoptera]; \textit{Platybus paralleus} (Fabricius) [Curculionidae, Coleoptera]; \textit{Zodion cinereum} (Fabricius) [Conopidae, Diptera]; \textit{Ulidia ?ruiceps} Becker [Ulidiidae, Diptera]; \textit{Atherigona reversura} Villeneuve [Muscidae, Diptera]; \textit{Aplymya metallica} (Wiedemann); \textit{Cylindromyia} sp. [Tachinidae, Diptera]; \textit{Messor semirufus} (André); and \textit{Nesomyrmex denticulatus} (Mayr) [Formicidae, Hymenoptera]. Also, the reduviid bug \textit{Dasycnemus sahlbergi} Bergroth, that was questionably recorded from KSA is confirmed herein as occurring in KSA. The generic name \textit{Peirates} (Reduviidae, Hemiptera) and the specific name of \textit{Apis florea} Fabricius (Apidae, Hymenoptera) were inadvertently misspelled in the original list and are corrected here. Zoogeographically, the present study supports the original study conclusion that the insect species composition of Al-Baha Province is strongly affiliated with the Afrotropical Region rather than to the Palaearctic Region or the Eremic Zone. Our insect surveys emphasize the fact that parts of the Arabian Peninsula, including Al-Baha Province, ought to be considered part of the Afrotropical Region rather than in the Palaearctic Region or the Eremic Zone.
Introduction

El-Hawagry et al. (2013) surveyed the insect fauna of Al-Baha Province, Kingdom of Saudi Arabia (KSA), reporting a total number of 582 species belonging to 129 families and representing 17 orders. Since this publication, new collections of insects were made in the province revealing additional insect records, as reported herein.

Al-Baha Province (Figure 1) is situated in the south-western part of KSA between the Holy Makkah and Asir regions (Doha 2009). It is the smallest province in KSA (about 10,362 km²), situated at 41–42° E and 19–20° N. It is characterized by natural tree cover and agricultural plateaus. The province is divided by huge and steep rocky mountains into two main sectors, a lowland coastal plain in the west, known as ‘Tihama’, and a mountainous area with an elevation of 1500–2450 m above sea level at the east, known as ‘Al-Sarat’ or ‘Al-Sarah’ which form a part of Al-Sarawat Mountains range (Ibrahim and Abdoon 2005; Alahmed et al. 2010;
El-Hawagry et al. 2013). For more details on the topography and climate of Al-Baha Province, see our previous study (El-Hawagry et al. 2013).

Al-Baha Province (Figure 2) consists of six main districts, four of which are located in Al-Sarah sector beside downtown ‘Al-Baha’, i.e. Al-Aqiq, Al-Mandaq, Al-Qura, and Baljurashi, while two of the districts are located in Tihama sector, namely Al-Mekhwa including Dhee Ain Village (The Marble Village), and Qelwa (El-Hawagry et al. 2013).

Many authors assume that the Afrotropical Region covers all of Africa south of the Sahara, with the island of Madagascar and the nearby smaller islands, and include parts of the Arabian Peninsula in the region, but there seems to be no agreement as to how much. This may be deduced from the fact that the south-western and southern parts of the Arabian Peninsula including the study area are strongly influenced by a subtropical to tropical climate with spring and summer rains, and are thus dominated by a xeromesic tropical flora of palaeotropical origin, that in fact represents the impoverished northern part of an African flora. Examples of species with this conspicuous distribution pattern, linking south-west Arabia with the other side of the Red Sea, are Acacia spp., Aloe spp., Celosia spp., Celtis spp., Commiphora spp., succulent Euphorbia spp., Grewia spp., Kalanchoe spp., Nuxia spp., Olea spp., Sansevieria spp., and semi-evergreen sclerophyllous woodlands of the montane vegetation. Nevertheless, Mediterranean and northern temperate floristic elements are well represented in the study area with many plant species including Lavandula spp., Nepeta sheilae, Erica arborea, Scabiosa,
Silene, Trifolium, Arabis alpine, Peucedanum and Pimpinella (Ghazanfar and Fisher 1998). Sclater (1858) and Wallace (1876) proposed the classical zoogeographical regions and placed the northern border of the Afrotropics along the Tropic of Cancer. Accordingly, Al-Baha Province was included in the Afrotropical Region, and the northern limit of the Afrotropical Region was placed in Taif area, about 200 km north to Al-Baha (Hölzel 1998). Crosskey (1980) used the northern boundaries of Yemen as the regional boundary between the Afrotropical and Palaearctic parts in the Arabian Peninsula. Extensive sampling of Diptera in the Arabian Peninsula by many authors, especially in Yemen, Oman, the United Arab Emirates and south-western mountains of KSA, have raised some interesting questions in respect to the true extent of the Afrotropical Region in this important transitional zone, indicating that Wallace’s (1876) concept of the extent of the Afrotropical Arabian Peninsula is more accurate than Crosskey’s (1980) limited concept of Yemen alone (Kirk-Spriggs and McGregor 2009). However, Uvarov (1938), Greathead (1980) and Larsen (1984) agreed that the south-western part of KSA including Al-Baha should be united with the central Arabian deserts which are either considered as a part of the Palaearctic or by some authors as an autonomous Eremic Zone (also called the Saharo-Sindian faunal region). The study of El-Hawagry et al. (2013) confirmed that the insect species composition in Al-Baha Province is representative of species typically considered Afrotropical elements, as is the present list.

Material and methods

Insect material for the present study was collected extensively from different localities in Al-Baha Province from 2011 to 2014 by the authors using sweep and aerial nets, bait traps, beating sheets, soil examination, hand picking, light traps, Malaise traps, pitfall traps, sticky traps, tray sifting of debris, and yellow pan traps (Evans 1975; Borr et al. 1989). For more details on the collecting methods for each insect group, see our previous study (El-Hawagry et al. 2013). Some of the specimens collected and deposited in King Saud University Museum of Arthropods were inadvertently not treated in our previous study (El-Hawagry et al. 2013). Literature records of some species are also noted.

All taxa are arranged in alphabetical order. Sites and dates of collection are included for the purpose of mapping distribution and activity periods of species in the study area. Each collection site is followed, between parentheses, by the district to which it belongs in Al-Baha Province. Also, the coordinates of each site are given. Data from ‘Jebel Shada Al A’la’, a protected area situated at the south-western Al-Baha Province, has been excluded from this study and will be published later.

Zoogeographical affiliations of species reported in each of the two main sectors of the province were detected using world catalogues and counted to calculate the percentage of Afrotropical, Palaearctic or Oriental elements in each sector. These percentages give a picture about the extent of zoogeographical affinity in each sector.

Images of newly recorded species were made using a Leica MZ 125 stereo-binocular microscope (Leica Microsystems Ltd, St. Gallen, Switzerland) fitted with a digital camera (Q-imaging Micro Publisher 5.0 RTV; Zerene Systems LLC, Richland, WA, USA) at the Plant Protection Department, College of Food and Agriculture Sciences, King Saud University. Photo automontage was performed by Zerene stacker program version 1.04 (http://zerenesystems.com/cms/stacker).
Many earlier studies were consulted in order to identify species collected or to determine species previously recorded from Al-Baha. These studies include Alahmed et al. (2010), Collingwood (1985), Collingwood and Agosti (1996), Cranston and Judd (1989), Dawah (2011), Dawah and Abdullah (2006), Dawah and Abdullah (2008), Deeming and Al-Dhafer (2012), El-Hawagry and Al Dhafer (2015), Greathead (1980, 1988), Hölzel (1983, 1998), Larsen (1984), Leclercq, Lelej and van Harten (2006), Lis (1999), Mei and Stuke (2008), Merz and Dawah (2005), Morgulis and Freidberg (2014), Moulet et al. (2014), Pape (1996), Setyaningrum and Al Dhafer (2014), Sharaf, Aldhafer, et al. (2014), and Steyskal (1968), Uvarov (1952).

All insect materials are deposited in King Saud University Museum of Arthropods, Riyadh, Saudi Arabia (KSMA).

Results

A total number of 142 insect species (four identified to the subspecies level and 18 identified only to the genus level) belonging to 51 families and representing seven orders are added to the fauna of Al-Baha Province by the present study.

Most species reported here are typical taxa of the Afrotropical Region rather than those associated with the Palaearctic Region or the Eremic Zone. This affinity was slightly greater in Tihama (62%) than in Al-Sarah (58%). The study showed Palaearctic elements comprising 25% or less in both areas. There were a few Oriental elements (6% or less) (Table 1).

All additions and corrections are presented in the following text.

Class INSECTA
Subclass PTERYGOTA
Division EXOPTERYGOTA
Order ORTHOPTERA
Suborder CAELIFERA
Family ACRIDIDAE
Subfamily ACRIDINAE
Tribe Phlaeobini

_Duroniella acuta_ Uvarov, 1952

Qelwa City (Qelwa) 19.949727° N, 41.240745° E: May 2013

| Region          | Tihama sector | Al-Sarah sector |
|-----------------|---------------|-----------------|
| Afrotropical    | 62            | 58              |
| Palaearctic     | 16            | 25              |
| Oriental        | 5             | 6               |
| Undetermined    | 17            | 11              |

Table 1. Zoogeographic affinities of the insect species added to the fauna of Al-Baha Province by this study.
Order **HEMIPTERA**
Suborder **AUCHENORRHYNCHA**
Family **CICADIDAE**
Subfamily **CICADINAE**
Tribe **Platypleurini**
*Platypleura arabica* Myers
(Figure 3)

Al-Mekhwa-Namarah Road (Al-Mekhwa) 19.672591° N, 41.565185° E: June 2011. [First record in KSA].
Qelwa City (Qelwa) 19.949727° N, 41.240745° E, Adhom Road (Qelwa) 19.992703° N, 41.182981° E: November 2012.

Family **CALISCELIDAE**
Subfamily **OMMATIDIOTINAE**
Tribe **Adenissini**
*Adenissus riadicus* Dlabola

Al-Baha (Downtown) 20.018129° N, 41.470771° E: July 2012.

Suborder **HETEROPTERA**
Family **BERYTIDAE**
Subfamily **METACANTHINAE**
*Metacanthus mollis* Stusák

Dhee Ain (Al-Mekhwa) 19.55459° N, 41.26302° E: May 2011.

Family **COREIDAE**
Subfamily **PSEUDOPHLOEINAE**
Tribe **Clavigrallini**
*Clavigralla griseola* (Linnavouri)

Dhee Ain (Al-Mekhwa) 19.55459° N, 41.26302° E: May 2011.

Subfamily **COREINAE**
Tribe **Gonocerini**
*Cletomorpha* sp.
(Figure 4)

Dhee Ain (Al-Mekhwa) 19.55459° N, 41.26302° E: March–May 2011. [First record in KSA].

*Cletus binotulatus obtusulus* Linnavuori

Amadan (Al-Mandaq) 20.144656° N, 41.281698° E, Baljurashi City (Baljurashi) 19.877804° N, 41.571622° E, Ghabet Raghdan (Al-Baha City) 20.00575° N, 41.26974° E: May 2010. Dhee Ain (Al-Mekhwa) 19.55459° N, 41.26302° E: January–October 2012.
Figures 3–8. 3, Platyleura arabica Myers; 4, Cletomorpha sp.; 5, Gonocerus juniperi Herrich-Schäffer; 6, Coranus lateritius (Stål); 7, Rhynocoris bipustulatus (Fieber); 8, Cantacader iranicus Lis.
Ghabet Raghdan (Al-Baha City) 20.00581° N, 41.26811° E: October 2010.

**Gonocerus juniperi** Herrich-Schäffer
(Figure 5)

Ghabet Raghdan (Al-Baha City) 20.00575° N, 41.26974° E: October 2010. [First record in KSA].

**Family CYDNIDAE**
**Subfamily CYDNINAE**
**Tribe Geotomini**
**Aethus hispidulus** (Klug)

Al-Mekhwa City (Al-Mekhwa) 19.770576° N, 41.434293° E: April 2011.

**Aethus ostiolatus** Signoret

Al-Mekhwa City (Al-Mekhwa) 19.770576° N, 41.434293° E: April 2012.
Dhee Ain (Al-Mekhwa) 19.55459° N, 41.26302° E: May 2012.

**Alonips intrusus** (Wagner)

Al-Mekhwa City (Al-Mekhwa) 19.770576° N, 41.434293° E: April 2012.

**Geotomus** sp.

Dhee Ain (Al-Mekhwa) 19.55459° N, 41.26302° E: May 2011.

**Macroscytus brunneus** (Fabricius)

Al-Baha (Downtown) 20.018129° N, 41.470771° E: June 2012.

**Family HEBRIDAE**
**Subfamily HEBRINAE**
**Hebrus pusillus arabicus** Linnavouri

Wadi Turabet Zahran (Al-Mandaq) 20.12397° N, 41.17176° E: March 2012.
Madhas Dam (Al-Mandaq) 20.222058° N, 41.274117° E: March 2012.

**Family MESOVELIIDAE**
**Mesovelia vittigera** Horvath

Wadi Turabet Zahran (Al-Mandaq) 20.12397° N, 41.17176° E: October 2010.

**Family NAUCORIDAE**
Subfamily LACCCORINAE

*Heleocoris minusculus* (Walker)
Dhee Ain (Al-Mekhwa) 19.55459° N, 41.26302° E: March 2012.

Family NEPIDAE
Subfamily NEPINAE
Tribe Nepini
*Laccotrephes fabricii* Stål

Wadi Turabet Zahran (Al-Mandaq) 20.12397° N, 41.17176° E: October 2010.

Family NOTONECTIDAE
Subfamily NOTONECTINAE
Tribe Notonectini
*Enithares sobria* (Stål)

Wadi Turabet Zahran (Al-Mandaq) 20.12397° N, 41.17176° E: October 2010.

*Notonecta arabiensis* Hungerford

Wadi Turabet Zahran (Al-Mandaq) 20.12397° N, 41.17176° E: May 2011.

Family REDUVIIDAE
Subfamily HARPACTORINAE
Tribe Harpactorini
*Coranus angulatus* Stål

Al-Baha (Downtown) 20.018129° N, 41.470771° E: May 2011.
Wadi Turabet Zahran (Al-Mandaq) 20.12397° N, 41.17176° E: May 2011.

*Coranus kiritshenkoi* Bergevin

Wadi Jalla: May 2011

*Coranus lateritius* (Stål)
(Figure 6)

Wadi Turabet Zahran (Al-Mandaq) 20.12397° N, 41.17176° E: May 2011. [First record in KSA]

*Rhynocoris bipustulatus* (Fieber)
(Figure 7)

Dhee Ain (Al-Mekhwa) 19.55459° N, 41.26302° E: May 2011. [First record in KSA]

*Cosmolestes pictus* (Klug)

Wadi Turabet Zahran (Al-Mandaq) 20.12397° N, 41.17176° E: May 2011.

Subfamily HOLOPTILINAE
Figures 9–13. 9, Dictyla poecilla Drake & Hill; 10, Mantispa scabricollis McLachlan; 11, Platypus parallelus (Fabricius); 12, Cerocoma schreberi Fabricius; 13, Zodion cinereum (Fabricius).
Tribe Dasycnemini

Dasycnemus sahlbergi Bergroth

Dhee Ain (Al-Mekhwa) 19.55459° N, 41.26302° E: September 2011.

Subfamily PEIRATINAE

Peirates strepitans Rambur

[Inadvertently reported as Pirates in El-Hawagry et al. (2013). Wadi Genouna 19.454706° N, 41.603165° E: May 2012.

Family RHYPAROCHROMIDAE

Subfamily RHYPAROCHROMINAE

Tribe Lethaeini

Lethaeus fulvovarius Puton

Ghabet Raghdan (Al-Baha City) 20.00575° N, 41.26974° E: May 2011.

Family TINGIDAE

Subfamily CANTACADERINAE

Tribe Cantacaderini

Cantacader iranicus Lis

(Figure 8)

Dhee Ain (Al-Mekhwa) 19.55459° N, 41.26302° E: March 2012. [First record in KSA].

Subfamily TINGINAE

Tribe Tingini

Compseuta montandoni Distant

Dhee Ain (Al-Mekhwa) 19.55459° N, 41.26302° E: May–October 2010.

Baljurashi City (Baljurashi) 19.877804° N, 41.571622° E: May 2010.

Phaenotropis cleopatra (Horváth)

Ghabet Raghdan (Al-Baha City) 20.00575° N, 41.26974° E: May 2010.

Plerochila australis (Distant)

Wadi Al-Zarayeb (Al-Mandaq) 20.03601° N, 41.23193° E: May 2014.

Tribe Tingitini

Dictyla nassata (Puton)

Al-Atawla (Al-Qura) 20.523609° N, 41.5954626° E: April 2013.

Dhee Ain (Al-Mekhwa) 19.55459° N, 41.26302° E: March 2012.

Madhas Dam (Al-Mandaq) 20.222058° N, 41.274117° E: March–May 2012.
Dictyla poecilla Drake & Hill  
(Figure 9)

Dhee Ain (Al-Mekhwa) 19.55459° N, 41.26302° E: March 2012. [First record in KSA].
Wadi Turabet Zahran (Al-Mandaq) 20.12397° N, 41.17176° E: March 2013.

Suborder STERNORRHYNCHA  
Family PSYLLIDAE  
Diaphorina citri Kuwayama

Al-Mekhwa City (Al-Mekhwa) 19.770576° N, 41.434293° E: September 2012.

Division: ENDOPTERYGOTA  
Order NEUROPTERA  
Family ASCALAPHIDAE  
Subfamily ASCALAPHINAE  
Ascalaphus festivus (Rambur)

Dhee Ain (Al-Mekhwa) 19.55459° N, 41.26302° E: March 2012.
Wadi Turabet Zahran (Al-Mandaq) 20.12397° N, 41.17176° E: June 2012.

Ascalaphus krueperi (van der Weele)

Wadi Turabet Zahran (Al-Mandaq) 20.12397° N, 41.17176° E: June 2012.

Subfamily HAPLOGLENIINAE  
Tmesibasis larseni Hölzel, 1983

Wadi Turabet Zahran (Al-Mandaq) 20.12397° N, 41.17176° E: June 2012.

Family MANTISPIDAE  
Subfamily MANTISPINAE  
Mantispa scabricollis McLachlan  
(Figure 10)

Dhee Ain (Al-Mekhwa) 19.55459° N, 41.26302° E: March–May 2012. [First record in KSA].
Ghabet Raghdan (Al-Baha City) 20.00575° N, 41.26974° E: May 2011.

Order COLEOPTERA  
Suborder POLYPHAGA  
Family CURCULIONIDAE  
Subfamily PLATYPODINAE  
Tribe Platypodini  
Platypus parallelus (Fabricius)  
(Figure 11)

Dhee Ain (Al-Mekhwa) 19.55459° N, 41.26302° E: March–May 2011. [First record in KSA].
Family MELOIDAE
Subfamily MELOINAE
Tribe Cerocomini
*Cerocoma schreberi* Fabricius
(Figure 12)

Ghabet Shahba (Al-Baha City) 20.02723° N, 41.28565° E: May–June 2012. [First record in KSA].

Family SCARABAEIDAE
Subfamily CETONIINAE
*Pachnodia fasciata* Fabricius

Aqabet Al-Baha-Tihama 20.00000° N, 41.43758°E: March 2012.

Order LEPIDOPTERA
Suborder RHopalocera
Family LYCAENIDAE
Subfamily THECLINAE
Tribe THECLINI
*Deudorix livia* (Klug)

Aqabet Al-Baha-Tihama 20.00000° N, 41.43758°E: March 2012.

*Hypolycaena pachalica* Butler

Aqabet Al-Baha-Tihama 20.00000° N, 41.43758°E: March 2012.

*Iolaus nursei* Butler

Aqabet Al-Baha-Tihama 20.00000° N, 41.43758°E: March 2012.

Family NYMPHALIDAE
Subfamily NYMPHALINAE
Tribe Junoniini
*Junonia orithya here* Lang

Aqabet Al-Baha-Tihama 20.00000° N, 41.43758°E: March 2012.

*Precis limnoria* (Klug)

Aqabet Al-Baha-Tihama 20.00000° N, 41.43758°E: March 2012.

Subfamily SATYRINAE
*Ypthima asterope* (Klug)

Aqabet Al-Baha-Tihama 20.00000° N, 41.43758°E: March 2012.
Suborder HETEROCERA
Family SPHINGIDAE
Subfamily SMERINTHINAE
Tribe Smerinthini
_Pseudoclanis molitor subviridis_ Talbot

Dhee Ain (Al-Mekhwa) 19.55459° N, 41.26302° E: March 2010.

Family ZYGAENIDAE
Subfamily ZYGAENINAE
_Reissita simonyi yemenicola_ (Tremewan)

Ghabet Raghdan (Al-Baha City) 20.00575° N, 41.26974° E: May 2010.
Ghabet Shahba (Al-Baha City) 20.02723° N, 41.28565° E: June 2010.

Order DIPTERA
Suborder NEMATOCERA
Family BIBIONIDAE
_Dilophus tridentatus_ Walker

Wadi Turabat Zahran (Al-Mandaq) 20.12397° N, 41.17176° E: March 2013.

_Dilophus sp._

Al-Dhafeer (Al-Baha City) 20.010225° N, 41.468368° E: May 2013.

Family CERATOPOGONIDAE
_Culicoides (Avaritia) imicola_ Kieffer

Al-Baha (Al-Baha City) 20.018127° N, 41.470755° E: July 2012.

Family CHIRONOMIDAE
Subfamily CHIRONOMINAE
_Tribe Chironomini
_Chironomus calipterus_ Kieffer

Al-Mekhwa City (Al-Mekhwa) 19.770576° N, 41.434293° E: November 1980.

_Chironomus callichirus_ Kieffer

Al-Baha (Al-Baha City) 20.018332° N, 41.470578° E: August 1984.

_Polypedilum (Pentapedilum) alticola_ Kieffer

Al-Baha (Al-Baha City) 20.018332° N, 41.470578° E: July 1981.

Subfamily TANYPODINAE
_Larsia rutshuruiensis_ (Goetghebuer)
Al-Mandaq (Al-Mandaq) 20.113122° N, 41.2854791° E: April 1980.

Subfamily ORTHOCLADIINAE
Paratriochocladius micans (Kieffer)

Dhee Ain (Al-Mekhwa) 19.55459° N, 41.26302° E: August ?.

Suborder BRACHYCERA
Family ASILIDAE
Subfamily APOCLEINAE
Promachus sp.

Al-Mekhwa City (Al-Mekhwa) 19.770576° N, 41.434293° E: February–March 2012.

Family BOMBYLIIDAE
Subfamily BOMBYLIINAE
Tribe Bombyliini
Bombylella delicata (Wiedemann)

Ghabet Shahba (Al-Baha City) 20.02723° N, 41.28565° E: May–June 2012.

Bombylis discoidea Fabricius

Ghabet Shahba (Al-Baha City) 20.02723° N, 41.28565° E: May–June 2012.

Subfamily ANTHRACINAE
Tribe Exoprosopini
Exoprosopa linearis Bezzi

Al-Mekhwa City (Al-Mekhwa) 19.770576° N, 41.434293° E: March 2012.

Exoprosopa minos (Meigen)

Aqabet Al-Baha-Tihama 20.00000° N, 41.43758° E: April–May 2012.

Family DOLICHOPODIDAE
Subfamily DIAPHORINAE
Asyndetus albifacies Parent

Al-Mekhwa City (Al-Mekhwa) 19.770576° N, 41.434293° E: April 2012.

Family HYBOTIDAE
Subfamily TACHYDROMIINAE
Platypalpus sp.

Al-Mekhwa City (Al-Mekhwa) 19.770576° N, 41.434293° E: April–May 2012.
Family **TABANIDAE**
Subfamily **EXORISTINAE**
*Gonia bimaculata* Wiedemann

Ghabet Shahba (Al-Baha City) 20.02723° N, 41.28565° E: April 2012.

Suborder **CYCLORRHAPHA**
Section **ASCHIZA**
Family **SYRPHIDAE**
Subfamily **SYRPHINAE**
Tribe **Paragini**
*Paragus* sp.

Ghabet Shahba (Al-Baha City) 20.02723° N, 41.28565° E: May 2012.

Tribe **Syrphini**
*Asarkina* sp.

Ghabet Shahba (Al-Baha City) 20.02723° N, 41.28565° E: February 2012.

Section **SCHIZOPHORA**
Subsection **ACALYPTRATAE**
Family **CARNIDAE**
*Carnus hemapterus* Nitzsch

Al-Mekhwa City (Al-Mekhwa) 19.770576° N, 41.434293° E: April–May 2013.

*Meoneura nitidiuscula* Collin

Al-Mekhwa City (Al-Mekhwa) 19.770576° N, 41.434293° E: April–May 2013.

Family **CHLOROPIDAE**
Subfamily **CHLOROPINAE**
*Metopostigma sabulona* Becker

Wadi Turabet Zahran (Al-Mandaq) 20.12397° N, 41.17176° E: March–April 2012.

*Mepachymerus baculus* Speiser

Al-Dhafeer (Al-Baha City) 20.010225° N, 41.468368° E: October 2012.

*Pachylophus pellucidus* Becker

Al-Mekhwa City (Al-Mekhwa) 19.770576° N, 41.434293° E: May 2012
**Pachylophus proximus** Adams

Wadi Turabet Zahran (Al-Mandaq) 20.12397° N, 41.17176° E: March–April 2012.

**Subfamily OSCINELLINAE**

**Anatrichus pygmaeus** Lamb

Al-Mekhwa City (Al-Mekhwa) 19.770576° N, 41.434293° E: April 2012.

**Scoliophthalmus micantipennis** Duda

Al-Mekhwa City (Al-Mekhwa) 19.770576° N, 41.434293° E: April 2012.

**Scoliophthalmus trapezoides** Becker

Al-Mekhwa City (Al-Mekhwa) 19.770576° N, 41.434293° E: April 2012.

**Family CONOPIDAE**
Subfamily **MYOPINAE**
Tribe **Zodionini**
*Zodion cinereum* (Fabricius)
(Figure 13)

Ghabet Shahba (Al-Baha City) 20.02723° N, 41.28565° E: May–June 2012.
[First record in KSA].

Family **DIOPSIDAE**
*Diopsis collaris* Westwood

Al-Mekhwa City (Al-Mekhwa) 19.770576° N, 41.434293° E: February–March 2012.
Dhee Ain (Al-Mekhwa) 19.55459° N, 41.26302° E: February–March 2012.

Family **EPHYDRIDAE**
Subfamily **DISCOMYZINAE**
*Psilopa nilotica* (Becker)

Al-Mekhwa City (Al-Mekhwa) 19.770576° N, 41.434293° E: February–March 2013.

Subfamily **HYDRELLIINAE**
*Notiphila ignobilis* Loew

Al-Mekhwa City (Al-Mekhwa) 19.770576° N, 41.434293° E: April 2012.

Family **LONCHAEIDAE**
Subfamily **LONCHAEINAE**
Tribe **Lonchaeini**
*Silba virescens* Macquart

Al-Mekhwa City (Al-Mekhwa) 19.770576° N, 41.434293° E: February–March 2013.

Family **MILICHIIDAE**
Subfamily **MADIZINAE**
*Leptometopa rufifrons* Becker

Aqabet Al-Baha-Tihama 20.00000° N, 41.43758° E: April–May 2013.

Subfamily **MILICHIINAE**
*Enigmilichia dimorphica* Deeming

Al-Mekhwa City (Al-Mekhwa) 19.770576° N, 41.434293° E: April 2012.

Family **TEPHRITIDAE**
Subfamily **DACINAE**
Tribe **Dacini**
*Bactrocera cucurbitae* (Coquillet)
Al-Mekhwa City (Al-Mekhwa) 19.770576° N, 41.434293° E: February–April 2012.

Subfamily TEPHRITINAE
_Dioxyna_ sp.

Ghabet Shahba (Al-Baha City) 20.02723° N, 41.28565° E: April–June 2012.

Family ULIDIIDAE
Subfamily ULIDIINAE
Tribe Ulidiini
_Physiphora alceae_ (Preyssler)

Al-Mekhwa City (Al-Mekhwa) 19.770576° N, 41.434293° E: February–May 2013.

_Ulidia_ ?_truficeps_ Becker

Al-Mekhwa City (Al-Mekhwa) 19.770576° N, 41.434293° E: April–May 2013. [First record in KSA]

Subsection CALYPTTRATAE
Family ANTHOMYIIDAE
Subfamily ANTHOMYIINAE
Tribe Hydrophoriini
_Delia_ sp.

Wadi Turabet Zahran (Al-Mandaq) 20.12397° N, 41.17176° E: March–April 2013.

Family CALLIPHORIDAE
Subfamily CALLIPHORINAE
_Cordylobia anthropophaga_ (Blanchard)

Dhee Ain (Al-Mekhwa) 19.55459° N, 41.26302° E: May 2012.

_Pericallimyia greatheadi_ Zumpt

Al-Baha (Downtown) 20.018129° N, 41.470771° E: August 2012.

Subfamily CHRYSOMYINAE
_Chrasomya bezziana_ Villeneuve

Ghabet Shahba (Al-Baha City) 20.02723° N, 41.28565° E: April–May 2013.

_Chrasomya marginalis_ (Wiedemann)

Dhee Ain (Al-Mekhwa) 19.55459° N, 41.26302° E: May 2012.
Wadi Jalla: May.
Wadi Turabet Zahran (Al-Mandaq) 20.12397° N, 41.17176° E: May 2013.
Subfamily **LUCILIINAE**

*Lucilia cuprina* (Wiedemann)

Al-Mandaq (Al-Mandaq) 20.113607° N, 41.2854624° E: May–July 2012.
Dhee Ain (Al-Mekhwa) 19.55459° N, 41.26302° E: October 2011.
Ghabet Raghdan (Al-Baha City) 20.00575° N, 41.26974° E: May–June 2012. Wadi Jalla: May 2011.
Wadi Turabet Zahran (Al-Mandaq) 20.12397° N, 41.17176° E: May 2012.

Subfamily **POLLENIINAE**

*Pollenia dasypoda* Portschinsky

Wadi Turabet Zahran (Al-Mandaq) 20.12397° N, 41.17176° E: May 2013.

*Pollenia rudis* (Fabricius)

Dhee Ain (Al-Mekhwa) 19.55459° N, 41.26302° E: April–June 2012.

Wadi Jalla: May 2011.
Wadi Turabet Zahran (Al-Mandaq) 20.12397° N, 41.17176° E: May–June 2012.

Subfamily **RHINIINAE**

*Cosmina arabica* Robineau-Desvoidy

Dhee Ain (Al-Mekhwa) 19.55459° N, 41.26302° E: May–June 2012.
Wadi Jalla: May 2012.
Wadi Turabet Zahran (Al-Mandaq) 20.12397° N, 41.17176° E: May–June 2012.

*Isomyia terminata* (Wiedemann)

Wadi Turabet Zahran (Al-Mandaq) 20.12397° N, 41.17176° E: May 2012.

*Rhinia apicalis* (Wiedemann)

Dhee Ain (Al-Mekhwa) 19.55459° N, 41.26302° E: May and November.
Wadi Jalla: May 2012.

*Stomorhina lunata* (Fabricius)

Wadi Turabet Zahran (Al-Mandaq) 20.12397° N, 41.17176° E: May 2012.

*Stomorhina rugosa* (Bigot)

Dhee Ain (Al-Mekhwa) 19.55459° N, 41.26302° E: March–May 2012.
Wadi Turabet Zahran (Al-Mandaq) 20.12397° N, 41.17176° E: March–June 2012.
Family **MUSCIDAE**  
Subfamily **ATHERIGONINAE**  
Tribe **Atherigonini**  
*Atherigona laevigata* (Loew)

Wadi Turabet Zahran (Al-Mandaq) 20.12397° N, 41.17176° E: March–May 2012.

*Atherigona orientalis* (Schiner)

Al-Mekhwa City (Al-Mekhwa) 19.770576° N, 41.434293° E: February 2013.

*Atherigona reversura* Villeneuve  
(Figure 14)

Al-Mekhwa City (Al-Mekhwa) 19.770576° N, 41.434293° E: February 2013. [First record in KSA].

Subfamily **MYDAEINAE**  
*Graphomya maculata* (Scopoli)

Wadi Turabet Zahran (Al-Mandaq) 20.12397° N, 41.17176° E: April 2012.

Family **SARCOPHAGIDAE**  
Subfamily **SARCOPHAGINAE**  
*Sarcophaga destructor* Malloch

Al-Baha (Downtown) 20.018129° N, 41.470771° E: May 2012.

Family **TACHINIDAE**  
Subfamily **EXORISTINAE**  
Tribe **Eryciini**  
*Aplomya metallica* (Wiedemann) [First record in KSA]

Ghabet Raghdan (Al-Baha City) 20.00575° N, 41.26974° E: June 2012.

Tribe **Exoristini**  
*Exorista xanthaspis* (Wiedemann)

Al-Mekhwa City (Al-Mekhwa) 19.770576° N, 41.434293° E: June 2012.

Tribe **Goniini**  
*Gonia bimaculata* Wiedemann

Ghabet Shahba (Al-Baha City) 20.02723° N, 41.28565° E: May–July 2012.

Subfamily **TACHININAE**  
*Mintho praeceps* (Scopoli)

Baljurashi City (Baljurashi) 19.877804° N, 41.571622° E: March 2013.
Subfamily **PHASIINAE**  
Tribe **Cylindromyiini**  
* *Cylindromyia* sp.  
(Figure 15)

Al-Mekhwa City (Al-Mekhwa) 19.770576° N, 41.434293° E: February–March 2012. [First record in KSA].

Tribe **Phasiini**  
? *Phasia* sp.

Wadi Turabet Zahran (Al-Mandaq) 20.12397° N, 41.17176° E: May 2012.

Order **HYMENOPTERA**  
Suborder **APOCRITA**  
Family **APIDAE**  
Subfamily **APINAE**  
Tribe **Apini**  
*Apis florea* Fabricius

[The specific epithet was inadvertently written as *florae* in the original study (El-Hawagry et al. 2013)].

Al-Mekhwa City (Al-Mekhwa) 19.770576° N, 41.434293° E: February–March 2011.

Wadi Jalla: May–September 2011.

Wadi Turabet Zahran (Al-Mandaq) 20.12397° N, 41.17176° E: May–October 2011.

Dhee Ain (Al-Mekhwa) 19.55459° N, 41.26302° E: May–August 2011.

Tribe **Anthophorini**  
*Amegilla* sp.

Al-Mekhwa City (Al-Mekhwa) 19.770576° N, 41.434293° E: February 2012.

Tribe **Eucerini**  
*Tetraloniella* sp.

Al-Mekhwa City (Al-Mekhwa) 19.770576° N, 41.434293° E: February 2012.

Tribe **Melectini**  
*Thyreus* sp.

Al-Mekhwa City (Al-Mekhwa) 19.770576° N, 41.434293° E: March 2012.

Subfamily **XYLOCOPINAE**  
Tribe **Ceratinini**  
*Ceratina* sp.

Al-Mekhwa City (Al-Mekhwa) 19.770576° N, 41.434293° E: February–April 2012.
Tribe *Xylocopini*

*Xylocopa pubescens* Spinola

Al-Dhafeer (Al-Baha City) 20.010225° N, 41.468368° E: May 2012.
Dhee Ain (Al-Mekhwa) 19.55459° N, 41.26302° E: January 2011.
Wadi Turabet Zahran (Al-Mandaq) 20.12397° N, 41.17176° E: March 2013.

Family *FORMICIDAE*

Subfamily *DOLICHODERINAE*

*Technomyrmex setosus* Collingwood, 1985

Wadi Turabet Zahran (Al-Mandaq) 20.12397° N, 41.17176° E: March 2011.
Al-Qamh (Baljurashi) 19.807666° N, 41.705947° E: May 2010.

Subfamily *FORMICINAE*

*Camponotus atlantis* Forel

Al-Mandaq (Al-Mandaq) 20.113607° N, 41.2854624° E: May 2010.

*Camponotus ilgii* Forel

Dhee Ain (Al-Mekhwa) 19.55459° N, 41.26302° E: May 2010.

Subfamily *MYRMICINAE*

*Cardiocondyla emeryi* Forel

Al-Mandaq (Al-Mandaq) 20.113607° N, 41.2854624° E: May 2012, Dhee Ain (Al-Mekhwa) 19.55459° N, 41.26302° E: May 2011, Wadi Turabet Zahran (Al-Mandaq) 20.12397° N, 41.17176° E: May 2011.

*Carebara arabica* (Collingwood & Van Harten)

Dhee Ain (Al-Mekhwa) 19.55459° N, 41.26302° E: May 2011.

*Messor semirufus* (André)

(Figure 16)

Al-Mandaq (Al-Mandaq) 20.12163° N, 41.13906° E: May 2010. [First record in KSA].

*Messor ebeninus* Santschi

Wadi Kheira (Al-Mandaq) 20.063572° N, 41.398428° E: May 2010.

*Monomorium venustum* (Smith)

Dhee Ain (Al-Mekhwa) 19.55459° N, 41.26302° E: September 2011.

*Monomorium phoenicum* Santschi
Dhee Ain (Al-Mekhwa) 19.55459° N, 41.26302° E: May 2010.

*Nesomyrmex denticulatus* (Mayr)  
(Figure 17)

Ghabet Shahba (Al-Baha City) 20.02723° N, 41.28565° E: May 2010. [First record in KSA].

*Strumigenys arnoldi* Forel

Dhee Ain (Al-Mekhwa) 19.55459° N, 41.26302° E: May 2011.

*Tetramorium depressiceps* Menozzi

Wadi Turabet Zahran (Al-Mandaq) 20.12397° N, 41.17176° E: May 2011.

*Tetramorium juba* Collingwood, 1985

Wadi Jalla: April 2011.

*Tetramorium caespitum* (Linnaeus)

Wadi Kheira (Al-Mandaq) 20.063572° N, 41.398428° E: May 2011.

*Tetramorium khyarum* Bolton

Dhee Ain (Al-Mekhwa) 19.55459° N, 41.26302° E: September 2011.

Family **HALICTIDAE**  
Subfamily **HALICTINAE**  
Tribe **Halictini**  
*Lasioglossum gibber* (Vachal)

Al-Mekhwa City (Al-Mekhwa) 19.770576° N, 41.434293° E: March 2012.

Tribe **Sphecodini**  
*Sphecodes* sp.

Al-Mekhwa City (Al-Mekhwa) 19.770576° N, 41.434293° E: March 2012.

Subfamily **NOMIINAE**  
*Pseudapis* sp.

Al-Mekhwa City (Al-Mekhwa) 19.770576° N, 41.434293° E: February–April 2012.

Family **MEGACHILIDAE**  
Subfamily **MEGACHILINAE**  
Tribe **Anthidiini**  
*Anthidium waltii* Spinola

Al-Mekhwa City (Al-Mekhwa) 19.770576° N, 41.434293° E: February 2012.
Icteranthidium ferrugineum (Fabricius)

Al-Mekhwa City (Al-Mekhwa) 19.770576° N, 41.434293° E: March 2012.

Tribe Megachilini
Chalicodoma sp.

Al-Mekhwa City (Al-Mekhwa) 19.770576° N, 41.434293° E: February 2012.

Family MUTILLIDAE
Subfamily DASYLABRINAE
Tribe Dasylabrin
Tricholabiodes niloticus Suárez

Baljurashi City (Baljurashi) 19.877804° N, 41.571622° E: May 2010.

Subfamily MUTILLINAE
Tribe Trogaspidiini
Trogaspidia floralis (Klug)

Baljurashi City (Baljurashi) 19.877804° N, 41.571622° E: May 2010.

Dhee Ain (Al-Mekhwa) 19.55459° N, 41.26302° E: October 2010.

Subfamily MYRMILLINAE
Omotilla conjuncta (Klug)

Baljurashi City (Baljurashi) 19.877804° N, 41.571622° E: May 2010.

Subfamily PSEUDOPHOTOPSIDINAE
Pseudophotopsis continua (Fabricius)

Baljurashi City (Baljurashi) 19.877804° N, 41.571622° E: May 2010.

Discussion

The Arabian Peninsula is considered by many authors to include three zoogeographical regions, the Afrotropical, the Palaearctic, and the Oriental (Hölzel 1998). Many authors include the south-western part of the Arabian Peninsula in the Afrotropical Region, but there appears to be no agreement as to the extent of this region of the Peninsula (El-Hawagry et al. 2013).

Al-Baha Province, like other areas in the south-western part of KSA, contains montane woodlands and evergreen shrub lands, with strong Afromontane affinities (Bussmann and Beck 1995), predominantly rich in Juniperus spp., Acacia spp., Olea spp., introduced cactus species and many other Afrotropical trees, including Nuxia oppositifolia, Maesa lanceolata and Celtis africana that grow in well-watered gullies, and mixed with some Mediterranean and northern temperate elements (Ghazanfar and Fisher 1998).
Considering the insect fauna of Al-Baha Province as listed by El-Hawagry et al. (2013) and these additional taxa listed herein, it is concluded that Al-Baha Province has an extraordinarily complex and interesting insect fauna. This may be attributed to its geographical position at the junction of the Afrotropical Region with its Afrotropical vegetation and the Palaeartic Region with its Mediterranean and temperate floristic elements (Bussmann and Beck 1995; Hözel 1998). Sharaf, Fisher, et al. (2014) studied the ants in the south-western mountains of KSA and showed that ants in this region have considerable affinities with the Afrotropical fauna. The insect species listed in this study also support the assumption of El-Hawagry et al. (2013) and Sharaf, Fisher, et al. (2014) that the insect fauna of Al-Baha Province is strongly related to the Afrotropical Region, rather than to the Palaeartic Region or the Eremic Zone. These results emphasize the fact that parts of the Arabian Peninsula, including Al-Baha Province, should be included in the Afrotropical Region rather than in the Palaeartic Region or the Eremic Zone. Other studies have confirmed the Afrotropical faunal affinities in south-western mountains of the Arabian Peninsula (Eig 1938; Bolton 1994; Aldawood et al. 2011; Sharaf and Aldawood 2011, 2012; Sharaf et al. 2012a, 2012b; Sharaf and Aldawood 2013; Sharaf, Fisher, et al. 2014).

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References

Alahmed AM, Kheir SM, Al Khereiji MA. 2010. Distribution of _Culicoides latreille_ (Diptera: Ceratopogonidae) in Saudi Arabia. J Entomol. 7:227–234.

Aldawood AS, Sharaf MR, Taylor B. 2011. First record of the myrmicine ant genus Carebara Westwood, 1840 (Hymenoptera: Formicidae) from Saudi Arabia with description of a new species, _C. abuhurayri_ sp. n. ZooKeys. 92:61–69.
Bolton B. 1994. Identification guide to the ant genera of the world. Cambridge (MA): Harvard University Press.

Borror DJ, Triplehorn CA, Johnson NF. 1989. An introduction to the study of insects. 6th ed. Philadelphia (PA): Saunders College Publishing.

Bussmann RW, Beck E. 1995. The forests of Mount Kenia (Kenya), a phytosociological synopsis. Phytocoenologia. 25:467–560.

Collingwood CA. 1985. Hymenoptera, Fam. Formicidae of Saudi Arabia. Fauna Saudi Arabia. 7:230–301.

Collingwood CA, Agosti D. 1996. Formicidae of Saudi Arabia (part 2). Fauna Saudi Arabia. 15:300–385.

Cranston PS, Judd DD. 1989. Diptera, Fam. Chironomidae of the Arabian Peninsula. Fauna Saudi Arabia. 10:236–289.

Crosskey RW. 1980. Catalogue of the Diptera of the Afrotropical region. London: British Museum (Natural History).

Dawah HA. 2011. Some Tachinidae (Diptera: Calyptrata) from South-Western Saudi Arabia. J Jazan Univ Appl Sci Branch. 1:28–38.

Dawah HA, Abdullah MA. 2006. The Ephydridae (Diptera: Brachycera: Muscomorpha) of south-western Saudi Arabia. Fauna Saudi Arabia. 21:383–394.

Dawah HA, Abdullah MA. 2008. First records of the stalk-eyed flies (Diopsidae: Cyclorrhapha), a pest of Poaceae, from South-Western Saudi Arabia. King Khalid Univ J Nat Med Tech Sci. 4:86–95.

Deeming JC, Al-Dhafer HM. 2012. Chloropidae from the Arabian Peninsula (Diptera: Cyclorrhapha). Zool Middle East. 58:3–88.

Doha SA. 2009. Phlebotomine sand flies (Diptera, Psychodidae) in different localities of Al-Baha province, Saudi Arabia. Egypt Acad J Biol Sci. 1:31–37.

Eig A. 1938. Taxonomic studies on the Oriental species of the genus Anthemis. Palest J Bot. 1:161–224.

El-Hawagry MS, Al Dhafer HM. 2015. Five new records of bee flies (Bombyliidae, Diptera) from Saudi Arabia with zoogeographical remarks. ZooKeys. 489:125–133.

El-Hawagry MS, Khalil MW, Sharaf MR, Fadl HH, Aldawood AS. 2013. A preliminary study on the insect fauna of Al-Baha Province, Saudi Arabia, with descriptions of two new species. ZooKeys. 274:1–88.

Evans LJ. 1975. An improved aspirator (pooter) for collecting small insects. Proc Brit Entomol Nat Hist Soc Trans. 8:8–11.

Ghazanfar SA, Fisher M. 1998. Vegetation of the Arabian Peninsula. Geobotany. 25:1–362.

Greathead DJ. 1980. Diptera, Fam. Bombyliidae. Fauna Saudi Arabia. 2:291–337.

Greathead DJ. 1988. Diptera, Fam. Bombyliidae of Saudi Arabia (part 2). Fauna Saudi Arabia. 9:90–113.

Hölzel H. 1983. Insects of Saudi Arabia. Neuroptera, Fam. Ascalaphidae. Fauna Saudi Arabia. 5:235–239.

Hölzel H. 1998. Zoogeographical features of Neuroptera of the Arabian Peninsula. Acta Zool Fenn. 209:129–140.

Ibrahim AA, Abdoon MA. 2005. Distribution and Population Dynamics of Phlebotomus Sandflies (Diptera, Psychodidae) in an Endemic Area of Cutaneous leishmaniasis in Asir Region, Southwestern Saudi Arabia. J Entomol. 2:102–108.

Kirk-Spriggs AH, McGregor G. 2009. Disjunctions in the Diptera (Insecta) fauna of the Mediterranean Province and southern Africa and a discussion of biogeographical considerations. Trans R Soc S Afr. 64:32–52.

Larsen TB. 1984. Butterflies of Saudi Arabia and its neighbours. London: Stacey International.

Lelej AS, van Harten A. 2006. A review of the Mutillidae (Hymenoptera) of Yemen. Zootaxa. 1226:1–50.

Lis JA. 1999. Burrower bugs of the Old World – a catalogue (Hemiptera: Heteroptera: Cydnidae). Int J Invert Tax Genus. 10:165–249.
Mei M, Stuke J. 2008. Remarks on Zodion nigritarsis (Strobl, 1902) and other European species of Zodion Latreille, 1796, with a revised key (Diptera, Conopidae). Tijdschr Entomol. 151:3–10.

Merz B, Dawah H. 2005. Fruit flies (Diptera, Tephritidae) from Saudi Arabia, with descriptions of a new genus and six new species. Rev Suisse Zool. 112:983–1028.

Morgulis E, Freidberg A. 2014. The Ulidiini (Diptera: Tephritoidea: Ulidiidae) of Israel, with a key to the world species of Ulidia and description of five new species. Zootaxa. 3780:201–247.

Moulet P, Kment P, Linnavuori RE, Carapezza A. 2014. Order Hemiptera, suborder Heteroptera, Infraorder Cimicomorpha, family Reduviidae. Fauna of the UAE. 5:28–91.

Pape T. 1996. A catalogue of the Sarcophagidae of the world (Insecta: Diptera). Mem Entomol Internat. 8:1–558.

Sclater PL. 1858. On the general geographical distribution of the members of the class Aves. J Proc Linn Soc Zool. 2:130–136.

Setyaningrum H, Al Dhafer HM. 2014. The Calliphoridae the blow flies (Diptera: Oestroidea) of Kingdom of Saudi Arabia. Egypt Acad J Biol Sci. 7:49–139.

Sharaf MR, Aldawood AS. 2011. Monomorium dryhimi sp. n., a new ant species (Hymenoptera, Formicidae) of the M. monomorium group from Saudi Arabia, with a revised key to the Arabian species of the group. ZooKeys. 106:47–54.

Sharaf MR, Aldawood AS. 2012. A new ant species of the genus Tetramorium Mayr, 1855 (Hymenoptera, Formicidae) from Saudi Arabia, including a revised key to the Arabian species. PLoS ONE. 7:e30811.

Sharaf MR, Aldawood AS. 2013. First occurrence of the Monomorium hildebrandti-group (Hymenoptera: Formicidae), in the Arabian Peninsula, with description of a new species M. kondratieffi n. sp. Proc Entomol Soc Wash. 115:75–84.

Sharaf MR, Aldwood AS, El-Hawagry MS. 2012a. A new ant species of the genus Tapinoma (Hymenoptera, Formicidae) from Saudi Arabia with a key to the Arabian species. ZooKeys. 212:35–43.

Sharaf MR, Aldwood AS, El-Hawagry MS. 2012b. First record of the ant subfamily Aenictinae (Hymenoptera, Formicidae) from Saudi Arabia, with the description of a new species. ZooKeys. 228:39–49.

Sharaf MR, Aldhafer H, Aldwood AS. 2014. First record of the Myrmicine ant genus Meranoplus Smith, 1853 Hymenoptera: Formicidae) from the Arabian Peninsula with description of a new species and notes on the zoogeography of southwestern Kingdom Saudi Arabia. PLoS ONE. 9: e111298.

Sharaf MR, Fisher BL, Aldwood AS. 2014. Notes on ants of the genus Strumigenys F. Smith, 1860 (Hymenoptera: Formicidae) in the Arabian Peninsula, with a key to species. Sociobiology. 61:293–301.

Steyskal G. 1968. Notes & descriptions of Egyptian acalyptate Diptera (Ephydridae, Milichiidae, Otitidae). Bull Soc Entomol Egypte, 1966. 50:109–125.

Uvarov BP. 1938. Ecological and biogeographical relations of Eremian Acrididae. Mem Soc Biog Paris. 6:231–273.

Uvarov BP. 1952. Studies in the Arabian Orthoptera III. New genera, species and subspecies collected by the Anti-Locust Missions. Zool J Linn Soc. 42:176–194.

Wallace AR. 1876. The geographical distribution of animals. London: Mac Millan.