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RESEARCH ARTICLE

A checklist of Chalcidoidea (Insecta: Hymenoptera) from Kingdom of Saudi Arabia

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ABSTRACT

Chalcidoid or chalcid wasps are one of the most diverse groups among the order Hymenoptera. Their economic importance as pest natural enemies or plant pests is known world widely. In this paper we have listed 87 species spread over to 10 families (Agaonidae, Aphelinidae, Chalcididae, Encyrtidae, Eulophidae, Eupelmidae, Eurytomidae, Ormyridae, Pteromalidae and Torymidae) from kingdom of Saudi Arbia. Note on the current status of Megastigmus asir Ghramh and Shati, 2011 have been discussed. Data pertaining to distribution, host and host plant for each taxa is also provided.

Key words: *Chalcidoidea, checklist, distribution, fauna, Hymenoptera, Saudi Arabia*

INTRODUCTION

The chalcid wasps (Hymenoptera: Chalcidoidea) are very diverse group of insects. They are usually very minute (0.3–17 mm) and characterized by presence of prepectus and occurrence of at most a single complex vein, and absence of any enclosed cells in fore wing. Most Chalcidoidea are parasitoids or rarely, predators of the immature stages of adults of 13 orders of Insecta (Coleoptera, Diptera, Homoptera, Hemiptera, Hymenoptera, Lepidoptera, Neuroptera, Odonata, Orthoptera, Plecoptera, Strepsiptera, Siphonaptera and Thysanoptera), three orders of Arachnida (Araneae, Pseudoscorpionida and Acari), and one family of Nematoda (Anguinidae), while a few chalcidoids are phytophagous, either as gall formers or seed feeders, or as inquilines within the galls of other species (Gibson 1993). There are about 22000 species are recognized from the world (Noyes 2015) spread over to 23 families (Heraty et al. 2013, Noyes 2015). Members of Chalcidoidea are economically very important as biological control agents of insect pests. According to Greathead, 1986 more than 800 chalcids species have so far been used in pest biocontrol programs worldwide.

Chalcidoidea are poorly known in the Middle East including Saudi Arabia. For some families and subfamilies only few species have been recorded in Saudi Arabia. So far only 87 species spread over to 10 families have been recorded from Saudi Arabia which is merely a fraction to the undisclosed faunal wealth of this region. Recently, Hayat et al., 2014 studied family Encyrtidae and described one new genus and fifteen new species and also recorded 23 species for the first time from Saudi Arabia, which shows the immense scope of great abundance of other chalcid group from this region. Saudi Arabia has one of the unique biodiversity countries of the world because of its varied climatic and geographical features. These features provide ample scope to sustain numerous species of insects and host plants. These animal and plant species are spread over high mountains, hot deserts, and sea and along the coasts. Though Saudi Arabia constitutes less than 1% of the total landmass of the world, but only more than 1% of the World's known animal and plant species are found in Saudi Arabia. However, the greater part of Saudi fauna is unexplored. More exploration in future will provide further knowledge of the faunal wealth of this country.

METHODOLOGY

The following checklist is based on data obtained from careful consultation of all available literature from Saudi Arabia, especially consulting of Chalcidoidea database (Noyes, 2015). Data pertaining to valid species recorded from Saudi Arabia are given. The list is arranged alphabetically by Family, followed by genus and species. For each species, the status has been confirmed by Chalcidoidea database and most recent combination followed by the author name). In the distribution section apart from Saudi Arabia all extra limital occurrence included and the reference pertaining only to Saudi Arabian records are kept under a separate reference section.

RESULTS AND DISCUSSION

Family: Agaonidae

1. ***Elisabethiella socotrensis* (Mayr)**
   Distribution: Saudi Arabia (Asir); Ethiopia, Kenya, South Africa, Tanzania, Uganda, Yemen (Socotra), Zambia and Zimbabwe
   Host/Host Plant: Associated with fig tree of *Ficusburkei, Ficusnatalensis, Ficusvasta, Ficuswakefieldii.*
   Reference: Van Noort and Harten (2006).
2. ***Ceratosolen* sp. near *racimosa***
   Distribution: Saudi Arabia (Asir)
   Host/Host Plant: Associated with fig tree of *Ficussalicifolia*.
   Reference: Ghramh and Ahmad (2014).

Family: Aphelinidae

3. ***Aphelinus mali* (Haldeman)**
   Distribution: Worldwide.
   Host/Host Plant: Primarily an aphid parasitoid but reported on many other insects. This species is widely used in biological control programme worldwide.
   Reference: Rosen and DeBach (1979), Hafez (1978).
4. ***Aphytis paramaculicornis* DeBach & Rosen**
   Distribution: Egypt, Georgia, India, Iran, Iraq, Israel, Pakistan, Saudi Arabia, South Africa and United States of America
   Host/Host Plant: Parasitoid of armored Scale Insect Pests of Trees and Shrubs (Hemiptera: Diaspididae)
   Reference: DeBach and Rosen (1976).
5. ***Aphytis phoenicis* DeBach & Rosen**
   Distribution: Egypt, Israel, Saudi Arabia
   Host/Host Plant: *Parlatoriablanchardii* on *Phoenix dactylifera*
   Reference: DeBach P., Rosen D. (1976), Rosen DeBach (1979).
6. ***Aphytis riyadhi* DeBach**
   Distribution: Israel, Saudi Arabia, South Africa, United States of America
   Host/Host Plant: *Aonidiellaaurantii, Aonidiellaorientalis, Aspidiotus*nerii on *Citrus* spp.
   Reference: Argov and Rössler (1988), DeBach (1979).
7. ***Encarsia arabica* Hayat**
   Distribution: Israel, Italy, Saudi Arabia, Syria
   Host/Host Plant: *Aleurolobusolivinus, Simplaleurodeshemisphae*rica on *Punicagranatum, Olea* sp. *Phillyrea* sp. and *Ziziphus* sp.
   Reference: Hayat (1989).
8. ***Encarsia citrina* (Craw)**
   Distribution: worldwide

Host/Host Plant: Parasitoid of armored Scale Insect Pests of Trees and Shrubs (Hemiptera: Diaspididae)
Reference: DeBach (1977a), DeBach (1977b).

9. ***Pteroptrix arabica*** **(Ferrière)**
Distribution: Egypt, Saudi Arabia
Host/Host Plant: *Parlatoriablanchardii* on *Phoenix dactylifera*
Reference: Ferrière (1970).

Family: Chalcididae

10. ***Antrocephalus subelongatus*** **(Kohl)**
Distribution: Indonesia, Lebnon, Saudi Arabia
Host/Host Plant: Unknown
Reference: Kohl (1906).
11. ***Cratocentrus decoratus*** **(Klug)**
Distribution: Egypt, Saudi Arabia
Host/Host Plant: Unknown
Reference: Klug (1834).
12. ***Dirhinus wohlfahrtiae*** **Ferrière**
Distribution: Cyprus, Egypt, Iran, Israel, Saudi Arabia, Somalia, Sudan, Yemen
Host/Host Plant: *Muscadomestica*, *Parasarcophagaaegyptiaca*, *Wohlfahrtianuba*
Reference: Dabbour (1983), Dabbour et al. (1981), and Lotfalizadeh et al. (2012).
13. ***Hockeria tamaricis*** **Boucek**
Distribution: Saudi Arabia, India, Pakistan
Host/Host Plant: *Amblypalpisolivierella*, *Tamrix* sp.
Reference: Boucek (1982).
14. ***Lasiochalcidia agilis*** **(Klug)**
Distribution: Saudi Arabia, France
Host/Host Plant: *Myrmeleoninconspicuus*
Reference: Klug (1834).
15. ***Lasiochalcidia pubescens*** **(Klug)**
Distribution: Algeria, Iran, Italy, Lebanon, Morocco, Saudi Arabia
Host/Host Plant: *Eureleonnostras*, *Euroleonnostras*, *Mymeleoninconspicuus*, *Myrmeleoninconspicuus*
Reference: Klug (1834).
16. ***Psilochalcis pumila*** **(Klug)**
Distribution: Saudi Arabia
Host/Host Plant: Unknown
Reference: Klug (1834).

Family: Encyrtidae

17. ***Achalcerinys lindus*** **(Mercet)**
Distribution: Saudi Arabia, Palearctic region, Oriental region
Host/Host Plant: Wide range of hosts as parasitoids of Pseudococcidae and hyperparasitoids of Encertids.
Reference: Hayat et al. (2014).
18. ***Anagyrus azolus*** **Hayat**
Distribution: Saudi Arabia
Host/Host Plant: Unknown
Reference: Hayat et al. (2014).
19. ***Anagyrus gracilis*** **(Hayat)**
Distribution: Saudi Arabia

Host/Host Plant: Unknown
Reference: Hayat et al. (2014).

20. ***Anagyrus indicus*** **(Subba Rao)**
Distribution: Bangladesh, Ghana, Guam, India, Jordan, Saudi Arabia, Turkmenistan
Host/Host Plant: *Ferrisiavirgata*, *Nipaecoccusviridis*, *Planococcus*sp.and*Pseudococcus* sp.
Reference: Bhuiya et al. (1997), Hoffer (1976), Nalini and Manickavasagam (2011), Noyes and Hayat (1994), Trjapitzin (1989).

21. ***Anagyrus mangicola*** **Noyes**
Distribution: Bangladesh, Benin, Gabon, Ghana, India, Indonesia, Nigeria, Saudi Arabia, Sierra Leone, Togo
Host/Host Plant: Wide range of hosts as parasitoids of Pseudococcidae and hyperparasitoids of Encertids.
Reference: Hayat et al. (2014).

22. ***Anagyrus pseudococci*** **(Girault)**
Distribution: Saudi Arabia, Worldwide
Host/Host Plant: Wide range of hosts as parasitoids of Pseudococcidae and hyperparasitoids of Encertids.
Reference: Trjapitzin (1989).

23. ***Anagyrus raidahensis*** **Hayat**
Distribution: Saudi Arabia
Host/Host Plant: Unknown
Reference: Hayat et al. (2014).

24. ***Anagyrus shahidi*** **Hayat**
Distribution: Saudi Arabia
Host/Host Plant: Unknown
Reference: Hayat et al. (2014).

25. ***Aphycus secundus*** **(Mercet)**
Distribution: Saudi Arabia
Host/Host Plant: Unknown
Reference: Hayat et al. (2014).

26. ***Apoleptomastix bicoloricornis*** **(Girault)**
Distribution: Afrotropical, Australasian and Oriental region, saudi Arabia
Host/Host Plant: Unknown
Reference: Hayat et al. (2014).

27. ***Arabencyrtus qahtanii*** **Hayat**
Distribution: Saudi Arabia
Host/Host Plant: Unknown
Reference: Hayat et al. (2014).

28. ***Bactritopus andalusicus*** **(Mercet)**
Distribution: Canary Islands, Saudi Arabia, Spain
Host/Host Plant: Unknown
Reference: Hayat et al. (2014).

29. ***Callipteroma sexguttata*** **Motschulsky**
Distribution: Afrotropical, Australasian and Oriental region, Palearctic region Saudi Arabia
Host/Host Plant: Wide range of hosts as parasitoids of Pseudococcidae
Reference: Hayat et al. (2014).

30. ***Callipteroma testacea*** **Motschulsky**
Distribution: Afrotropical, Australasian and Oriental region, Palearctic region Saudi Arabia
Host/Host Plant: Wide range of hosts as parasitoids of Pseudococcidae
Reference: Hayat et al. (2014).

31. ***Cerchysiella arabia*** **Hayat**
Distribution: Saudi Arabia
Host/Host Plant: Unknown
Reference: Hayat et al. (2014).
32. ***Cerchysiella azeeza*** **Hayat**
Distribution: Saudi Arabia
Host/Host Plant: Unknown
Reference: Hayat et al. (2014).
33. ***Cerchysius ugandensis*** **Kerrich**
Distribution: Afrotropical, Saudi Arabia
Host/Host Plant: *Cacoxenusperspicax*, *Gitonidesperspicax.*
Reference: Hayat et al. (2014).
34. ***Cheiloneurus arabiacus*** **Hayat**
Distribution: Saudi Arabia
Host/Host Plant: Unknown
Reference: Hayat et al. (2014).
35. ***Cheiloneurus elegans*** **(Dalman)**
Distribution: Afrotropical, Australasian and Oriental region, Palearctic region Saudi Arabia
Host/Host Plant: Wide range of hosts as parasitoids of Diptera and Hemiptera
Reference: Hayat et al. (2014).
36. ***Cheiloneurus quadricolor*** **(Girault)**
Distribution: Australasian and Oriental region, Palearctic region Saudi Arabia
Host/Host Plant: *Pyrillaperpusilla*, and hyperparasitoids of Hemiptera.
Reference: Hayat et al. (2014).
37. ***Coelopencyrtus krishnamurtii*** **(Mahdihassan)**
Distribution: India, Saudi Arabia
Host/Host Plant: *Xylocopatenuiscapa*
Reference: Hayat et al. (2014).
38. ***Comperiella aspidiotiphaga*** **Subba Rao**
Distribution: India, Pakistan, Saudi Arabia
Host/Host Plant: *Aonidiellaorientalis*, *Aspidiotus* sp.
Reference: Hayat et al. (2014).
39. ***Comperiella lemniscata*** **Compere & Annecke**
Distribution: Afrotropical, Australasian and Oriental region, Palearctic region Saudi Arabia
Host/Host Plant: parasitoids of Diaspididae.
Reference: Hayat et al. (2014).
40. ***Copidosoma floridanum*** **(Ashmead)**
Distribution: Afrotropical, Australasian and Oriental region, Palearctic region Saudi Arabia
Host/Host Plant: Wide range of hosts as parasitoids of Diptera and Hemiptera, Coleoptera and Lepidoptera
Reference: Hayat et al. (2014).
41. ***Habrolepis obscura*** **Compere & Annecke**
Distribution: Afrotropical, Saudi Arabia
Host/Host Plant: Parasitoids of Diaspididae
Reference: Hayat et al. (2014).
42. ***Habrolepis rouxi*** **Compere**
Distribution: Afrotropical, Australasian and Oriental region, Palearctic region Saudi Arabia
Host/Host Plant: Wide range of hosts as parasitoids of Diaspididae
Reference: Hayat et al. (2014).

43. ***Helegonatopus formosus*** **(Mercet)**
Distribution: Paelarctic region, Saudi Arabia
Host/Host Plant: Unknown
Reference: Hayat et al. (2014).

44. ***Homalotylus flaminius*** **(Dalman)**
Distribution: Afrotropical, Australasian and Oriental region, Palearctic region Saudi Arabia
Host/Host Plant: Wide range of hosts as parasitoids of Hemiptera and Coleoptera
Reference: Hayat et al. (2014).

45. ***Lamennaisia ambigua*** **(Nees)**
Distribution: Oriental region, Palearctic region Saudi Arabia
Host/Host Plant: Wide range of hosts as parasitoids of Hemiptera and Coleoptera
Reference: Hayat et al. (2014).

46. ***Lamennaisia nobilis*** **(Nees)**
Distribution: Saudi Arabia
Host/Host Plant: Unknown
Reference: Hayat et al. (2014).

47. ***Leptomastideaabyad*** **Hayat**
Distribution: Saudi Arabia
Host/Host Plant: Unknown
Reference: Hayat et al. (2014).

48. ***Leptomastix dactylopii*** **Howard**
Distribution: Afrotropical, Australasian and Oriental region, Palearctic region Saudi Arabia
Host/Host Plant: Parasitoids of Diaspididae and Pseudococcidae
Reference: Hayat et al. (2014).

49. ***Leptomastix tsukumiensis*** **Tachikawa**
Distribution: Afrotropical, and Oriental region, Palearctic region Saudi Arabia
Host: Parasitoids of Pseudococcidae
Reference: Hayat et al. (2014).

50. ***Mahencyrtus asirensis*** **Hayat**
Distribution: Saudi Arabia
Host/Host Plant: Unknown
Reference: Hayat et al. (2014).

51. ***Mayridia pulchra*** **Mercet**
Distribution: Oriental region, Palearctic region Saudi Arabia
Host/Host Plant: Parasitoids of Pseudococcidae
Reference: Hayat et al. (2014).

52. ***Metaphycus albidus*** **Hayat**
Distribution: Saudi Arabia
Host/Host Plant: Unknown
Reference: Hayat et al. (2014).

53. ***Metaphycus asterolecanii*** **(Mercet)**
Distribution: Paelarctic, Afrotropical and Saudi Arabia
Host/Host Plant: Parasitoids of Asterolecaniidae and Coccidae
Reference: Hayat et al. (2014).

54. ***Microterys axonis*** **Hayat**
Distribution: Saudi Arabia
Host/Host Plant: Unknown
Reference: Hayat et al. (2014).

55. ***Neastymachus bolus*** **Hayat**
Distribution: Saudi Arabia

Host/Host Plant: Unknown
Reference: Hayat et al. (2014).

56. *Neastymachus ceelus* Hayat
Distribution: Saudi Arabia
Host/Host Plant: Unknown
Reference: Hayat et al. (2014).

57. *Ooencyrtus likinis* Hayat
Distribution: Saudi Arabia
Host/Host Plant: Unknown
Reference: Hayat et al. (2014).

58. *Ooencyrtus seronis* Hayat
Distribution: Saudi Arabia
Host/Host Plant: Unknown
Reference: Hayat et al. (2014).

59. *Prochiloneurus aegyptiacus* (Mercet)
Distribution: Afrotropical, and Oriental region, Palearctic region Saudi Arabia
Host/Host Plant: Wide range of hosts as parasitoids of Hemipteran and Coleoptera
Reference: Hayat et al. (2014).

60. *Prochiloneurus pulchellus* Silvestri
Distribution: Afrotropical, and Oriental region, Palearctic region Saudi Arabia
Host/Host Plant: Wide range of hosts as parasitoids of Hemiptera
Reference: Hayat et al. (2014).

61. *Rhopus nigroclavatus* (Ashmead)
Distribution: Afrotropical, and Oriental region, Palearctic region, USA and Saudi Arabia
Host/Host Plant: Wide range of hosts as parasitoids of Hemiptera
Reference: Hayat et al. (2014).

62. *Syrphophagus aphidivorus* (Mayr)
Distribution: Afrotropical, and Oriental region, Palearctic region, Nearctic region and Saudi Arabia
Host: Wide range of hosts as parasitoids of Diptera, Hemiptera and hymenoptera
Reference: Hayat et al. (2014).

63. *Zaomma astera* Hayat
Distribution: Saudi Arabia
Host/Host Plant: Unknown
Reference: Hayat et al. (2014).

Family: Eulophidae

64. *Acrias arabiensis* Narendran & Zubair
Distribution: Saudi Arabia
Host/Host Plant: Unknown
Reference: Narendran and Zubair (2013).

65. *Aprostocetus hagenowii* (Ratzeburg)
Distribution: Afrotropical, Australasian and Oriental region, Palearctic region Saudi Arabia
Host/Host Plant: Wide range of hosts as parasitoids of Coleoptera and Dictioptera
Reference: Domenichini (1966).

66. *Arabiola bouceki* Narendran
Distribution: Saudi Arabia
Host/Host Plant: Unknown
Reference: Narendran and Zubair (2013).

67. *Hemiptarsenus varicornis* (Girault)
Distribution: Afrotropical, Australasian and Oriental region, Palearctic region Saudi Arabia
Host/Host Plant: Wide range of hosts as parasitoids of Agromyzidae
Reference: Boucek (1988).

68. *Meruacesa arabica* Narendran & Zubair Ahmad
Distribution: Saudi Arabia
Host/Host Plant: Unknown
Reference: Narendran et al. (2012).

69. *Neotrichoporoides szelenyii* (Erdös)
Distribution: Paelarctic region, Saudi Arabia
Host/Host Plant: Unknown
Reference: Oilb (1971).

70. *Tamarixia radiata* (Waterston)
Distribution: Afrotropical, Oriental region, Palearctic region Saudi Arabia
Host/Host Plant: Wide range of hosts as parasitoids of Hemiptera
Reference: Zuparko et al. (2011).

71. *Tetrastichus heeringi* Delucchi
Distribution: Palearctic region Saudi Arabia
Host/Host Plant: Wide range of hosts as parasitoids of Hemiptera, Coleoptera and Orthoptera
Reference: Oilb (1971).

Family: Eupelmidae

72. *Eupelmus gelechiphagus* Gibson & Fusu
Distribution: Iran, Israel and Saudi Arabia
Host: *Amblypalpisolivierella* on *Tamarixaphylla*
Reference: Gibson and Fusu (2016).

Family: Eurytomidae

73. *Bruchophagus arabicus* (Zerova & Dawah)
Distribution: Saudi Arabia
Host/Host Plant: Cecidomyiidae
Reference: Zerova et al. (2003).

74. *Bruchophagus suaedae* (Zerova & Dawah)
Distribution: Saudi Arabia
Host/Host Plant: Cecidomyiidae
Reference: Zerova et al. (2003).

Family: Ormyridae

75. *Ormyrus desertus* Zerova & Dawah
Distribution: Saudi Arabia
Host/Host Plant: Cecidomyiidae
Reference: Zerova et al. (2003).

Family: Pteromalidae

76. *Anisoptero maluscalandrae* (Howard)
Distribution: Worldwide
Host/Host Plant: Primarry parasitoid of Coleoptera, Hymenoptera and Lepidoptera.
Reference: Ahmed (1996).

77. *Notoglyptus scutellaris* (Dodd & Girault)
Distribution: Worldwide
Host/Host Plant: Unknown
Reference: Boucek (1976).

78. *Otitesella longicauda* van Noort
Distribution: Ivory Coast, Saudi Arabia, South Africa, Tanzania
Host/Host Plant: *Ficusingens*
Reference: Van Noortand Harten (2006).

79. *Otites ellarotunda* van Noort
Distribution: Cameroon, Ethiopia, Ivory Coast, Malawi, Saudi Arabia, South Africa, Tanzania
Host/Host Plant: *Ficusingens*, *Ficuscordata*
Reference: Van Noortand Harten (2006).

80. *Otitesella* sp. near *digitata* Westwood
Distribution: Saudi Arabia
Host/Host Plant: *Ficussalicifolia*
Reference: Ghramh and Ahmad (2014).

81. *Pachyneuron muscarum* (Linnaeus)
Distribution: Afrotropical, Paelarctic, Oriental and Saudi Arabia
Host/Host Plant: Parasitoids of Coleoptera, diptera, hymenoptera and lepidoptera
Reference: Oilb (1971).

82. *Philotrypesis* near *breviventris* Abd. & Joseph
Distribution: Saudi Arabia
Host/Host Plant: *Ficussalicifolia*
Reference: Ghramh and Ahmad (2014).

83. *Pteromalus puparum* (Linnaeus)
Distribution: Afrotropical, Nearctic, Paelarctic, Oriental and Saudi Arabia
Host/Host Plant: Parasitoids of Coleoptera, diptera, hymenoptera and lepidoptera
Reference: Abu Yaman (1973).

84. *Spalangia nigroaenea* Curtis
Distribution: Afrotropical, Nearctic, Paelarctic, Oriental and Saudi Arabia
Host: Parasitoids of Diptera, Lepidoptera
Reference: Dabbour (1983).

85. *Sycoscapter* sp. Near *amplissima* Narendran
Distribution: Saudi arabia
Host/Host Plant: *Ficussalicifolia*
Reference: Ghramh and Ahmad (2014).

86. *Trichilogaste rarabica* Ferrière
Distribution: Saudi Arabia
Host/Host Plant: *Acacia* sp.
Reference: Gahan and Ferrière (1947).

Family: Torymidae

87. *Megastigmus asir* Ghramh & Shati*
Distribution: Saudi Arabia
Host/Host Plant: Juniperusprocera
Reference: Ghramh and Shati (2011).*Note: This species was listed as unavailable name in Chalcidoidea database. The types of this species have been deposited in Zoological Museum at Zoology Department, Aligarh Muslim University, Aligarh, UP, India. Further type material has been sent to ZooBank in compliance to latest ICZN rules. Hence the status of these taxa is revived.

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