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### ORIGINAL ARTICLE

## SURVEY AND UPDATING CHECKLIST OF DIPTERAN SPECIES WITH FORENSIC IMPORTANCE

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### ABSTRACT

In the present investigation, 24 adult dipteran species with forensic importance belonging to 13 genera and 8 families that were collected from different localities of Iraq. The specimens were identified by different taxonomical keys; in addition the date and localities of collecting specimens were recorded.

Keywords: Checklist, Diptera, Forensic, Iraq, Survey.

### INTRODUCTION

Forensic entomology is a specific field in the criminalistics which is depended on the knowledge of the invertebrate fauna succession on corpses; the prime objective of this field is to define the interval of death for a human in criminal issues; the application of this field as the most accurate after 72 hours of decomposition (Daněk, 1990). The adults attracted to carcasses and lay their eggs, or larval stage on that animal's natural body openings and their injuries; the larvae fed on the body tissues till it is ready for pupation; this stage takes through three feeding instars, after they finish this stage; they move and seek to adequate place for pupating, they take 15–20 ft away from the carrion before pupated (Price, 1997).

Dipteran species insects are the major forensically important; because it is typically the first forms to colonize animal remains, the most commonly used in the forensic cases is the dipteran life cycle (Smith, 1986; Frost *et al.*, 2010); especially in the estimate of the post-mortem interval of cadavers or carcasses (PMI) (Watson and Carlton, 2003). On the other hand, the flies belong to the families of Calliphoridae, Muscidae and Sarcophagidae are the most crucial carrion, insects and commonly feed on human and animal remains, therefore they are considered forensically important. These families are predominant in early stages of the decomposition animals after death (Al-Qahtnia *et al.*, 2019).

Many insect succession or surveyed investigations about insects that are attracted to corpses or carrions have been conducted in different areas of Iraq. These studies recorded

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many species under the families Calliphoridae, Sarcophagidae, and Muscidae on animal carcasses. The first attempts to survey the dipteran species (larval and adult stages) were made by Abdul-Rassoul *et al.* (2009 a, b); they conducted the experiments on the carcasses of rabbits and fish in Baghdad City; the most abundant are *Calliphora vicina* Robineau-Desvoidy, 1830, *Chrysomya albiceps* (Wiedemann, 1819), *Chrysomya megacephala* (Fabricius, 1794) (Fam.: Calliphoridae); *Sarcophaga* sp. (Fam.: Sarcophagidae) and *Lucilia sericata* (Meigen, 1826) (Fam.: Calliphoridae), respectively in larval stage. While, this study was appeared four families in the adult stage, included Calliphoridae, Muscidae, Sarcophagidae and Fanniidae; where the species of *Musca domestica* Linnaeus, 1758 was the most abundant followed by *Ch. megacephala*; whereas the members of *Pollenia* sp. and *Fannia* sp. were the least abundant species. On the other hand Alboshabaa and Al Musawy (2016) reported *C. vicina*, *Ch. megacephala*, *Ch. albiceps*, *L. sericata*, *Sarcophaga africa* (Wiedemann, 1824) in An-Najaf Province on rabbit carcasses. In addition, Albushabaa (2017) stated the members of Diptera weremore abundant than other faunal insects on rabbit carcasses that placed indoor and outdoor habitats in Al-Kufa City; also, in this investigation, it found that *Ch. albiceps* was the first species attracting to the corpse during the fresh stage, followed by *Musca domestica* (Fam.: Muscidae).

In the current investigation, an attempt was made to survey and revision of the dipteran species; also provide an updated list of the forensically important species in Iraq.

## MATERIALS AND METHODS

**Specimens' collection**

The adult specimens were collected from the various exposed carcasses in different stages of decomposition, including: dogs, cats, cows, sheep and donkeys that died for various reasons from different localities during 2021 at irregular intervals using an aerial net. Specimens were pinned and stored in a special box to identify them later.

**Specimens' identification**

The families, genera and species were diagnosed and identified with the aid of different taxonomical keys such as: Zumpt (1965); Sugiyama (1989); Blackith *et al.* (1997) Rozkošný *et al.* (1997); Mawlood (2001); Drake (2006); Whitworth (2010); Meiklejohn (2012); Meiklejohn *et al.* (2013); Irish *et al.* (2014); Rochefort *et al.* (2015); Alam and Ahmed (2016) and Jones *et al.*, (2019). The specimens were also compared with the diagnosed and preserved specimens in the Iraq Natural Research Center & Museum (INHM), University of Baghdad to confirm their diagnosis. The synonyms are given according to GBIF Secretariat (2021).

## RESULTS AND DISCUSSION

In this study, there are 24 species collected from different carcasses from different regions of Iraq, these species were reviewed with the design of a diagnostic key to separate their imago stage as follows.

**(A) Family, Calliphoridae****1. Genus, *Calliphora* Robineau-Desvoidy, 1830**

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Synonyms: *Abonesia* Villeneuve, 1927  
*Acronesia* Hall, 1948  
*Acrophaga* Brauer & Bergenstamm, 1891  
*Steringomyia* Pokorný, 1889  
*Stobbeola* Enderlein, 1933

***Calliphora vicina*** Robineau-Desvoidy, 1830

Common name: Blue blowfly

Synonyms: *Calliphora (Calliphora) erythrocephala* (Meigen, 1826)  
*C. insidiosa* Robineau-Desvoidy, 1863  
*C. monspeliaca* Robineau-Desvoidy, 1830  
*C. musca* Robineau-Desvoidy, 1830  
*C. nana* Robineau-Desvoidy, 1830  
*C. ruffifacies* Macquart, 1851  
*C. spitzbergensis* Robineau-Desvoidy, 1830  
*Musca aucta* Walker, 1853  
*M. erythrocephala* Meigen, 1826  
*M. thuscia* Walker, 1849

Material examined (39 specimens): Diyala Province, Al Khalis, 13, 10.x.2021; Baghdad Province, Bab Al Muadham, 8, 2.xi.2021. Wasit Province, Al- Zubaydiyah, 7, 22.xi.2021. Kerbala Province, Kerbala City, 11 specimens, 29.xi.2021.

Distribution: Iraq (Khalaf, 1957); cosmopolitan species (Zumpt, 1965). It is native to the Holarctic; and invasive across the world (Battán-Horenstein *et al.*, 2016).

***Calliphora vomitoria*** De Geer, 1776

Common names: Blue bottle fly, Orange-bearded blue bottle, Bottlebee

Synonyms: *Calliphora affinis* Macquart, 1835  
*C. fulvibarbis* Robineau-Desvoidy, 1830  
*Musca carnivora* Fabricius, 1794

Distribution: Iraq (Khalaf, 1957); Europe, south of Mexico, United States and southern Africa (de Jong *et al.*, 2014).

**2. Genus, *Chrysomya*** Robineau-Desvoidy, 1830

Synonyms: *Achoetandrus* Bezzi, 1927  
*Pycnosoma* Brauer & Bergenstamm, 1894  
*Pycnosomops* Townsend, 1934

***Chrysomya albiceps*** (Wiedemann, 1819)

Common name: Hairy maggot blowfly

Synonyms: *Compsomyia flaviceps* Séguy, 1927  
*C. mascarenhasi* Séguy, 1927  
*L. arcuata* Macquart, 1851  
*L. testaceifacies* Macquart, 1851  
*Musca albiceps* Wiedemann, 1819

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*M. bibula* Wiedemann, 1830  
*M. elara* Walker, 1849  
*M. emoda* Walker, 1849  
*M. felix* Walker, 1853  
*M. himella* Walker, 1849  
*Paracompsomyia verticalis* Adams, 1905  
*Somomyia annulata* Brauer, 1899  
*S. arussica* Corti, 1895  
*S. nubiana* Bigot, 1877

Material examined (49 specimens): Babylon Province, 6, 5.xi.2021. Wasit Province, Badra, 15, 13.iii.2022. Baghdad Province, Bab Al-Mouadham; 3, 7.iv.2021; 9, 11.iv.2022; Abu Ghraib, 16, 17.v.2021

Distribution: Iraq (Derwesh, 1965); this species originated from the old world tropics and widely distributed in: Africa, South America, many parts of Europe, Southwest Asia, East and Northwest India (Laurence, 1981). According to Akbarzadeh *et al.* (2015), this species distributes in Egypt, Israel, Iran, Kuwait, Lebanon, Libya, Oman, Pakistan, Saudi Arabia, Syria, Turkey and UAE; also possible appearance in the Middle East.

***Chrysomya megacephala*** (Fabricius, 1794)

Common names: Oriental blue fly, Oriental latrine fly

Synonyms: *Chrysomya duvaucelii* Robineau-Desvoidy, 1830

*Ch. gratiosa* Robineau-Desvoidy, 1830  
*Lucilia macquartii* Rondani, 1875  
*Musca bata* Walker, 1849  
*M. combrea* Walker, 1849  
*M. dux* Eschscholtz, 1822  
*M. megacephala* Fabricius, 1794  
*M. remuria* Walker, 1849  
*Pollenia basalis* Smith, 1876  
*Somomyia cyaneocincta* Bigot, 1888  
*S. pfefferi* Bigot, 1877  
*Somomyia cyaneocincta* Bigot, 1888  
*S. dives* Bigot, 1888  
*S. saffrana* Bigot, 1877

Material examined (68 specimens): Wasit Province, Al- Zubaydiyah, 4, 25.iii.2021; Al-Aziziyah, 10, 19.vii.2022. Baghdad Province, Bab Al-Mouadham: 6, 2.iv.2021; 11, 11.iv.2021; 14, 23.iv.2014; Al-Mada'in: 17 specimens, 3.v.2021; Diyala Province, Al-Muqdadiya, 6, 20.vi.2021.

Distribution: Worldwide distribution including: Australasian, Asia-Pacific, Latin America, and North America (Wells, 1991), and was introduced to Brazil from Old World (Guimarães *et al.*, 1979).

***Chrysomya putoria*** (Wiedemann, 1830)

Common name: Tropical African latrine blowfly

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Synonyms: *Chrysomyia ethiopyga* Lehrer, 2007

*Musca putoria* Wiedemann, 1830

Material examined (3 specimens): Wasit Province, Badra, 1, 13.iii.2021. Kerbala Province, Kerbala, 2, 13.v.2021.

Distribution: Iraq (Mahmood and Kareem, 2019); Old World (Baumgartner and Greenberg, 1984); widely distributed across the central and southern regions of the African continent, also this species distributes in Zambia, Ethiopia, and Madagascar (Irish *et al.*, 2014).

### 3. Genus, *Lucilia* Robineau-Desvoidy, 1830

Synonyms: *Acrophagella* Ringdahl, 1942

*Bufolucilia* Townsend, 1914

*Caesariceps* Rohdendorf, 1926

*Chaetophaenicia* Enderlein, 1936

*Dasylocilia* Rohdendorf, 1926

*Francilia* Shannon, 1924

*Lucilla* Gimmerthal, 1842

*Phaenicia* Robineau-Desvoidy, 1863

*Phenicia* Coquillett, 1910

#### *Lucilia sericata* (Meigen, 1826)

Common names: Common green bottle fly, Sheep blow fly

Synonyms: *Chrysomya capensis* Robineau-Desvoidy, 1830

*Lucilia barberi* Townsend, 1908

*L. capensis* Robineau-Desvoidy, 1830

*L. flavipennis* Macquart, 1843

*L. frontalis* Brauer & Bergenstamm, 1891

*L. giraulti* Townsend, 1908

*L. lagyra* Walker, 1849

*L. latifrons* Schiner, 1861

*L. nobilis* (Meigen, 1826)

*L. pruniosa* Meigen, 1838

*L. sayi* Jaennicke, 1867

*Musca lagyra* Walker, 1849

*M. nobilis* Meigen, 1826

*M. sericata* Meigen, 1826

*M. tegularia* Wiedemann, 1830

*Phaenicia concinna* Robineau-Desvoidy, 1863

*Ph. sericata* (Meigen, 1826)

Material examined (32 specimens): Baghdad: Bab Al-Mouadham 6, 25.iii.2021; 4, 27.iv.2021. Saladin Province, Balad, 8, 2.v.2021; Al Ishaqi, 8, 11.v.2022. Babylon Province, Al Musayab, 2, 11.vi.2021. Basra, 4, 17.viii.2021.

Distribution: Iraq (Derwesh, 1965); this species distributes throughout the world, especially in the Holarctic region, also commonly distributed in Australia and several South and Central American countries (Rueda *et al.*, 2010).

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**(B) Family, Ephydriidae**

**Genus, *Schema*** Becker, 1907

Synonym: *Pelignus* Cresson, 1926

***Schema acrosticale*** (Becker, 1903)

Synonym: *Atissa acrosticale* Becker, 1903

Material examined: (4 specimens), Kerbala, Al-Hussainya district, 4.xi.2021

Distribution: Iraq; UAE, UK (GBIF Secretariat, 2021).

**(C) Family, Fanniidae**

**Genus, *Fannia*** Robineau-Desvoidy, 1830

Synonym: *Steinomia* Malloch, 1912

***Fannia canicularis*** (Linnaeus, 1758)

Common names: Lesser house fly, Little house fly

Synonyms: *Aminta rivularis* Robineau-Desvoidy, 1830

*Anthomyia canicularis* Cobbold, 1879

*A. constantina* Macquart, 1844

*A. fulvomaculata* Roser, 1840

*Fannia lateralis* (Linnaeus, 1758)

*F. socio* (Harris, 1780)

*F. sociominor* (Harris, 1780)

*Homalomyia fraxinea* Hutton, 1901

*H. fucivorax* Kieffer, 1898

*H. prunivora* Walsh, 1870

*Musca canicularis* Linnaeus, 1761

*M. canicularis* Curtis, 1849

*M. lateralis* Linnaeus, 1758

Material examined (3 specimens): Baghdad Province, Al-Shaab, 5.x.2021

Distribution: Iraq (Khalaf and Al-Omar, 1974); England (Land and Collett 1974); Germany (Zeil, 1986); California (Mandeville *et al.*, 1988); Algeria (Perez-Eid and Mouffok, 1999); China (Wang *et al.*, 2007); Poland (Grzywacz, 2019).

**(D) Family, Muscidae**

**1. Genus, *Hydrotaea*** Robineau-Desvoidy, 1830

Synonyms: *Alloeonota* Schnabl, 1911

*Hydrotaeoides* Skidmore, 1985

*Hydrothaea* Rondani, 1856

*Hydrotoea* Macquart, 1843

***Hydrotaea aenescens*** (Wiedemann, 1830)

Common name: American black dump fly

Synonyms: *Anthomyia aenescens* Wiedemann, 1830

*Anthomyia aenescens* Wiedemann, 1830

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*Crossopalpus aenescens* (Wiedemann, 1830)

*Ophyra trochanterata* Malloch, 1932

Material examined (1 specimen): Kerbala Province, Kerbala City, 13.v.2021.

Distribution: America (Sabrosky, 1949); Argentina (Patitucci *et al.*, 2010); Iraq (Al-Ashbal *et al.*, 2020a); Egypt, Morocco, Lebanon, Tunisia, Britain and Ireland (Pont *et al.*, 2007); Turkey (Vikhrev, 2008); Portugal (Prado *et al.*, 2012).

*Hydrotaea albuquerquei* Lopes, 1985

Common name: Black dump fly

Synonyms: *Hydrotaea oides* Skidmore, 1985

*Ophyra albuquerquei* Lopes, 1985

Material examined (11 specimens): Babylon Province, Alexandria, 4, 29.x.2021. Kerbala Province, Kerbala City, 7, 20.iii.2021.

Distribution: Iraq (Al-Ashbal *et al.*, 2020a); Brasil (Costa *et al.*, 2000); Neotropical Region (de Carvalho *et al.*, 2005); South America (de Carvalho and Mello-Patiu, 2008).

**2. Genus, *Musca*** Linnaeus, 1758

Synonyms: *Byomya* Robineau-Desvoidy, 1830

*Eumusca* Townsend, 1911

*Plaxemya* Robineau-Desvoidy, 1830

*Musca domestica* Linnaeus, 1758

Common name: House fly

Synonyms: *Musca contigua* Walker, 1853

*M. cuthbertsoni* Patton, 1936

*M. determinata* Walker, 1853

*M. gymnosomea* Rondani, 1862

*M. multispina* Awati, 1916

*M. soror* Robineau-Desvoidy, 1830

Material examined: (100 specimens), Baghdad Province, Bab Al-Muadham, 40, 3.iii.2021. Kerbala Province, Al-Husaynyia, 30, 5.iv.2021; Basra Province, Al-Khura, 20, 5.v.2021. Wasit Province, Al-Suwaira, 10, 2.v.2021.

Distribution: Worldwide distribution (Hewitt, 2011), this species was listed in Iraq by Patton (1919).

*Musca sorbens* Wiedemann, 1830

Common names: Bazaar fly, Eye-seeking fly

Synonyms: *Byomya alba* Malloch, 1929

*Musca dichotoma* Bezzi, 1911

*M. eutaeniata* Bigot, 1888

*M. exalbida* Stein, 1913

*M. humilis* Wiedemann, 1830

*M. mediana* Wiedemann, 1830

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- M. primitiva* Walker, 1849  
*M. promisca* Awati, 1916  
*M. spectanda* Wiedemann, 1830  
*M. stuckenbergi* Zielke, 1971

Material examined (5 specimens): Baghdad, Al Shaab, 15.iv.2021.

Distribution: Iraq (Khalaf, 1957); Egypt (Hafez and Attia, 1958); Gambia (Emerson *et al.*, 2000); Africa and Asia (Ramesh *et al.*, 2016); Gambia and Ethiopia (Robinson *et al.*, 2020). Australia, Bangladesh, Chad, China, Gambia, Ghana, Guam, India, Italy, Japan, Kenya, Korea, Madagascar, Malaysia, Mozambique, Saudi Arabia, Sierra Leone, Senegal, South Africa, Spain, Sudan, Tanzania, Thailand, Uganda, USA (GBIF Secretariat, 2021).

**3. Genus, *Muscina*** Robineau-Desvoidy, 1830

***Muscina stabulans*** (Fallén, 1817)

Common name: False stable fly

Synonyms: *Cyrtonevra australis* Macquart, 1847

- Musca prodeo* Harris, 1780  
*M. tibialis* Walker, 1836  
*Muscina grisea* Robineau-Desvoidy, 1830  
*M. picaena* Robineau-Desvoidy, 1830  
*M. prodeo* (Harris, 1780)  
*Mydaea vomiturionis* Robineau-Desvoidy, 1849

Material examined (20 specimens): Baghdad Province, Al-Taji, 10, 5.iii.2021; Najaf Province, Najaf City, 5 specimens, 4.iv.2021; Kerbala Province, Kerbala City 5.v.2021. Distribution: Iraq (Khalaf, 1957); United States (Fatchurochim *et al.*, 1989); Egypt (El-Shazly *et al.*, 1996); Germany (Benecke and Lessig, 2001); Spain (Arnaldos *et al.*, 2005); India (Shivekar *et al.*, 2008); Argentina (Patitucci *et al.*, 2010); Brazil (Duarte *et al.*, 2013); Pakistan (Sarwar, 2015); United Kingdom (Gunn, 2016); China (Wang *et al.*, 2019).

**(E) Family, Phoridae**

**Genus, *Megaselia*** Rondani, 1856

Synonyms: *Aphiochaeta* Brues, 1903

- Megaselida* Leonard, 1928

***Megaselia scalaris*** Loew, 1866

Common name: Humpbacked fly, Coffin fly, Scuttle fly

Synonyms: *Aphiochaeta banski* Brues, 1909

- A. circumsetosa* Meijere, 1911  
*A. ferruginea* Brunetti, 1912  
*A. fissa* Becker, 1908  
*A. repicta* Schmitz, 1915  
*A. xanthina* Speiser, 1908  
*Lioyella plusiivorax* Enderlein, 1929  
*Megaselia forticapilla* Beyer, 1959



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*Phora scalaris* Loew, 1866

Material examined (4 specimens): Kerbala Province, Kerbala City, 4, 5.vi.2021, Diyala Province, Al Khalis, 2, 10.x.2021.

Distribution: Iraq (Al Ashbal, 2020); Argentina, Australia, Bolivia, Brazil, Cameroun, Canada, China, Colombia, Costa Rica, France, Gabon, Japan, Ecuador, Finland, Germany, Honduras, India, Iran, Italy, Korea, Kuwait, Panama, Peru, Saudi Arabia, South Africa, Spain, Mexico, Netherlands, New Zealand, USA, Venezuela, Vietnam (GBIF Secretariat, 2021).

**(F) Family, Piophilidae**

**Genus, *Allopiophila*** Hendel, 1917

*Allopiophila flavipes* (Zetterstedt, 1847)

Common name: Yellow-legged Cheese Fly

Synonyms: *Parapiophila flavipes* (Zetterstedt, 1847)

*Piophila flavipes* Zetterstedt, 1847

*P. staegeri* Duda, 1924

Material examined (4 specimens): Kerbala Province, Kerbala City. 19.iv.2021

Distribution: Iraq (Al-Ashbal, 2020); Australia, Belarus, Canada, Chinese Taipei, Denmark, Finland, Germany, Indonesia, Madagascar, Netherlands, Sweden, South Africa, UK, USA (GBIF Secretariat, 2021).

**(G) Family, Sarcophagidae**

**Genus, *Sarcophaga*** Meigen, 1826

Synonyms: *Bulbostyla* Giroux and Wheeler, 2010

*Caledonicesa* Koçak and Kemal, 2010

*Devriesia* Lehrer, 1995

*Erichsonia* Robineau-Desvoidy, 1863

*Heteronychia* Brauer and von Bergenstamm, 1889

*Lehrera* Koçak and Kemal, 2009

*Listeria* Robineau-Desvoidy, 1863

*Pierretia* Robineau-Desvoidy, 1863

*Sarcophaga africa* (Wiedemann, 1824)

Common name: Common flesh fly

Synonyms: *Bellieria miniticauda* Zumpt, 1953

*Bercaea agilis* Robineau-Desvoidy, 1863

*B. agraria* Robineau-Desvoidy, 1863

*B. cruenta* (Meigen, 1826)

*B. crventata* Kano, Field & Shinonaga, 1967

*B. haemathura* Robineau-Desvoidy, 1863

*B. haematura* Verves, 1986

*B. meditata* Robineau-Desvoidy, 1863

*B. oralis* Robineau-Desvoidy, 1863

*Mesothisia madagascariensis* Enderlein, 1928

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*Musca africa* Wiedemann, 1824  
*Myophora albidula* Robineau-Desvoidy, 1863  
*M. blondeli* Robineau-Desvoidy, 1830  
*M. commendata* Robineau-Desvoidy, 1863  
*M. nitida* Robineau-Desvoidy, 1863  
*M. squalida* Robineau-Desvoidy, 1830  
*M. villica* Robineau-Desvoidy, 1830  
*Robineauella interrupta* Enderlein, 1928  
*R. tiesleri* Enderlein, 1928  
*Sarcophaga aequpalpis* Tiensuu, 1938  
*S. aequipalpis* Thomson, 1869  
*S. africana* Villeneuve, 1929  
*S. consobrina* Rondani, 1861  
*S. creuntata* Coupland & Baker, 1994  
*S. crientata* Schembri, Gatt & Schembri, 1991  
*S. cruenta* Pandellé, 1896  
*S. crustata* Hagen, 1881  
*S. dionysii* Böttcher, 1913  
*S. distinguenda* Rondani, 1873  
*S. fulvipalpis* Robineau-Desvoidy, 1863  
*S. inclyta* Robineau-Desvoidy, 1863  
*S. iners* Robineau-Desvoidy, 1863  
*S. meigenii* Robineau-Desvoidy, 1863  
*S. nurus* Rondani, 1861  
*S. pabulorum* Robineau-Desvoidy, 1863  
*S. sejungenda* Rondani, 1873  
*S. tultschensis* Böttcher, 1913  
*S. zetterstedtii* Robineau-Desvoidy, 1863  
*Scaligeria fugax* Robineau-Desvoidy, 1863  
*Sc. praeceps* Robineau-Desvoidy, 1863  
*Stephomygia latigena* Zumpt, 1953  
*Theria flavidula* Bigot, 1880  
*Thyrsotetradius friederichsianus* Enderlein, 1928

Material examined (19 specimens): Wasit Province, Zurbatiyah, 6, 13.iii.2021. Baghdad Province: Bab Al-Mouadham, 1, 22.iii.2021; Kadhumyia, 3, 13.iv.2021. Kerbala Province, Kerbala, 4, 2.iv.2021; 2, 19.iv.2022; 1, 13.v.2021. Al- Najaf Province, Najaf, 2, 27.vi.2021. Distribution: Cosmopolitan (Verves *et al.*, 2018). In Iraq, this species recorded by Pape (1996).

***Sarcophaga albiceps*** Meigen, 1826

Synonyms: *Parasarcophaga (Parasarcophaga) albiceps* (Meigen, 1826)

*Parasarcophaga colchica* Guzhabidze, 1966

*Sarcophaga cyathisans* Pandellé, 1896

*S. cyathissans* Villeneuve, 1907

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*Sarcophaga hypopygium* Park, 1977

*Sarcophaga pauciseta* Kramer, 1905

*Sarcophaga privigna* Rondani, 1861

*Sarcophaga zethus* Curran, 1936

Material examined (4 specimens): Kerbala Province, Kerbala City, Al Basateen, 1, 13.v.2021. Diyala Province, Muqdadiyah, 3, 22.vi. 2021.

Distribution: cosmopolitan species (Delfinado and Hardy, 1975; Nandi, 2002; Meiklejohn *et al.*, 2013). Iraq (Al-Hadidi, 2005); Georgia (Japoshvili *et al.*, 2022).

*Sarcophaga altitudinis* Rondani, 1989

Synonyms: *Bellieria rohdendorfi* Grunin, 1964

*Sarcophaga altitudinis* Sugiyama, 1989

Material examined (10 specimens): Kerbala Province, Kerbala City, 6, 16.iii.2021. Najaf Province, Najaf City, 4, 4.iv.2022.

Distribution: Iraq (Al-Ashbal, 2020); Mongolia (Blackith *et al.*, 1997).

*Sarcophaga carnaria* (Linnaeus, 1758)

Common name: Common flesh fly

Synonyms: *Musca carnaria* Linnaeus, 1758

*Sarcophaga camaria* Villeneuve, 1905

*S. carnaria* Doleschall, 1858

*S. carinaria* Suzuki, 1915

*S. carnaria* f. *vulg* Rohdendorf

*S. carnaria* f. *vulgaris* (Rohdendorf, 1937)

*S. dolosa* Lehrer, 1967

*S. mehriina* Enderlein, 1928

*S. schulzi* Müller, 1922

*S. schultzi* Draber-Moňko, 1971

*S. vulgaris* Rohdendorf, 1937

Material examined (24 specimens): Baghdad Province, Bab Al- Muadham 3, 23.iii.2021; Jariya, 9, 18.iv.2022; Babil Province, Musayyib, 11, 20.v.2021. Diyala Province, Muqdadiyah, 1, 22.vi. 2021.

Distribution: Iraq (Khalaf, 1957); Palaearctic Region (Pape, 1996; Verves *et al.*, 2018); Gorgia (Japoshvili *et al.*, 2022).

*Sarcophaga haemorrhoea* Meigen, 1826

Common name: Lesser Red- tailed Flesh fly

Synonyms: *Erichsonia ambulatrix* Robineau-Desvoidy, 1863

*E. anxia* Robineau-Desvoidy, 1863

*E. arborea* Robineau-Desvoidy, 1863

*E. ardeacea* Robineau-Desvoidy, 1863

*E. campestris* Robineau-Desvoidy, 1863

*E. chetalis* Robineau-Desvoidy, 1863

*E. claripennis* Robineau-Desvoidy, 1863

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*E. contigua* Robineau-Desvoidy, 1863  
*E. flavinervis* Robineau-Desvoidy, 1863  
*E. fuliginosa* Robineau-Desvoidy, 1863  
*E. inconstans* Robineau-Desvoidy, 1863  
*E. labialis* Robineau-Desvoidy, 1863  
*E. musca* Robineau-Desvoidy, 1863  
*E. oralis* Robineau-Desvoidy, 1863  
*E. pilosa* Robineau-Desvoidy, 1863  
*E. procax* Robineau-Desvoidy, 1863  
*E. rustica* Robineau-Desvoidy, 1863  
*E. umbripennis* Robineau-Desvoidy, 1863  
*E. valida* Robineau-Desvoidy, 1863  
*E. varinervis* Robineau-Desvoidy, 1863  
*Heteronychia fugitiva* Povolný, 2001  
*H. haemorrhoea* (Meigen, 1826)  
*H. incontans* Verves, 1986  
*Lioplacella helicivora* Verves, 1986  
*L. helicivorax* Enderlein, 1933  
*Myophora aestivalis* Robineau-Desvoidy, 1830  
*M. albicans* Robineau-Desvoidy, 1830  
*M. contempta* Robineau-Desvoidy, 1830  
*M. riparia* Robineau-Desvoidy, 1830  
*Sarcophaga haemorrhoea* Baranov, 1929  
*S. haemorrhoea* Jacentkovsky, 1934  
*S. helicivoris* Baranov, 1942  
*S. sanguinolenta* Macquart, 1835

Material examined (4 specimens): Kerbala Province, Kerbala, Al Basateen 2, 13.v.2021.

Distribution: Iraq (Al-Hadidi, 2005); Austria, Croatia, Czech Republic, France, Germany, Hungary, Italy, Serbia, Slovakia, Spain, Sweden, Ukraine (Whitmore, 2011).

***Sarcophaga ruficornis*** Fabricius, 1794

Common name: Red horned meat fly

Material examined: (4specimens) from dog carcass, Kerbala, 26.iii.2021.

Distribution: Iraq (Al-Ashbal, 2020); Nearctic: Canada, USA; Neotropical: Brazil, Panama; Palaearctic: Saudi Arabia; Afrotropical: Botswana, Madagascar, Socotra, South Africa, Zaire and Oriental Region: Bangladesh, Bhutan, China, India (Pape, 1996). Iran (Fakoorziba *et al.*, 2017).

***Sarcophaga vagans*** Meigen, 1826

Synonyms: *Heteronychia vagans* (Meigen, 1826)

*Sarcophaga detrita* Zetterstedt, 1845

*S. frenata* Pandellé, 1896

*S. nepos* Rondani, 1861

*S. vulnerata* Schiner, 1861

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Material examined: (12 specimens), Diyala Province, Muqdadia, 16.iv. 2021

Distribution: Iraq (previously recorded as *Sarcophaga frenata* Pandelle, 1896, by Al-Hadidi, 2005); Palaearctic Region (van Emden, 1954; Bei-Bienko and Steyskal, 1988).

**(H) Family, Sepsidae**

**Genus, *Sepsis*** Fallén, 1810

Synonym: *Threx* Gistel, 1848

*Sepsis lateralis* Wiedemann, 1830

Common name: Black scavenger fly

Synonyms: *Meroplius melitensis* Rondani, 1874

*M. schembrii* Rondani, 1874

*Nemopoda algira* Macquart, 1844

*N. lateralis* Macquart, 1844

*N. senegalensis* Bigot, 1886

*Sepsis astuta* Bezzi, 1908

*S. astutis* Adams, 1905

*S. bombokaensis* Vanschuytbroeck, 1963

*S. complicata* Wiedemann, 1830

*S. curiosa* Ozerov, 1996

*S. definita* Brunetti, 1929

*S. fragilis* Becker, 1903

*S. hyalipennis* Macquart, 1851

*S. immaculata* Macquart, 1844

*S. inpunctata* Macquart, 1839

*S. kwanzaensis* Vanschuytbroeck, 1963

*S. lutea* Duda, 1926

*S. migeriensis* Vanschuytbroeck, 1963

*S. rufa* Macquart, 1851

*S. unicoloripes* Brunetti, 1929

Material examined: (20 specimens were collected from decaying carcasses); Baghdad, 4♂♂, 5♀♀, 12.v.2021; Babylon, 7♂♂, 4♀♀, 29.iv.2021.

Distribution: Iraq (Khalaf and Al-Omer, 1974); Japan (Iwasa, 1980); Afrotropical, Oriental and Australasian regions (Pont and Meier, 2002); Afrotropical: Angola, Cameroon, Ethiopia, Madagascar, Namibia, Swaziland, Zimbabwe; Asia: Afghanistan, Turkey, Syria; North Africa, Egypt, Tunisia, Libya; Oriental; India, Pakistan (Ozerov, 2005); Philippines (Letana, 2014).

**(I) Family, Sphaeroceridae**

**Genus, *Limosina*** Macquart, 1835

Synonyms: *Scotophilella* Duda, 1918

*Trichogaster* Liroy, 1864

*Limosina heteroneura* Haliday, 1835

Synonyms: *Leptocera heteroneura* (Haliday)

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*Leptocera opaca* Aldrich, 1932

*Limosina jeanneli* Bezzi, 1911

*Pullimosina heteroneura* Haliday, 1836

Material examined (7 specimens): Babylon Province, Alexandria, 3, 29.x.2021. Kerbala Province, Kerbala, Al Basateen, 4, 3.iv.2021.

Distribution: In Iraq, the species is recorded by Al-Ashbal *et al.* (2020b) under the synonym species *Pullimosina heteroneura* Haliday, 1836. Also it distributes in: Australia, Argentina, Taiwan, Afghanistan, Algeria, Andorra, Austria, Belgium, Bulgaria, Canada, Canary Is., Cyprus, Czech Republic, Denmark, Ecuador, Egypt, Estonia, Finland, France, Greece, Hawaii, Hungary, Iceland, Ireland, Italy, Japan, Latvia, Lebanon, Lithuania, Macedonia, Malta, Mexico, Morocco, Netherlands, New Zealand, Norway, Poland, Portugal, Romania, Russia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Tajikistan, Tunisia, UAE and Uganda (Marshall *et al.*, 2011). Belarus, China, Germany, Pakistan, Russia, South Africa, USA (GBIF Secretariat, 2021).

CONCLUSION

We conclude from the results of the current study, and based on what was mentioned in previous studies, the need to classify the essential or primary adult fly species whose life cycle that associated to the stages of decomposition of animal carcasses (first group), whereas the other species mentioned in this study are considered visitors to the carrion or carcasses and their life cycle is not related to their decomposition stages (second group), as they are attracted for the purpose of feeding only on natural openings and their secretions or fluids that produce in the later stages of decomposition of carcasses. The purpose of this is to clarify confusing the concept of forensic insects.

The species recorded during the current investigations, in addition to previous studies in Iraq, the species that put within the first group include the species belonging to the families: Calliphoridae, Sarcophagidae and Muscidae (restricted on *M. domestica*) respectively. The adult fly species that collected in this study and not mentioned in the first group, they are classified within the second group (visitors of carcasses). Therefore, this study gave an update detailed description of the forensically species of the Dipteran group, to serve as a basis for future studies.

CONFLICT OF INTEREST STATEMENT

"The authors have no conflicts of interest to declare".

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مسح وتحديث قائمة حشرات ثنائية الاجنحة ذات الاهمية الجنائية

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الخلاصة

اشار المسح الى بيان 24 نوعا من رتبة ثنائية الاجنحة ذات الاهمية الجنائية تعود الى 13 جنسا وثمانية عوائل . النماذج شخضت تبعا الى العديد من المفاتيح التشخيصية ، وسجل مكان و تاريخ جمع العينات الحشرية.