

Taxonomic position of Order Diptera in Egypt

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ABSTRACT

According to the changes occurred in the classification of the categories of the order Diptera due to the recent studies which based on modern taxonomy methods, using molecular characters, phylogeny and cladistic analysis, the present work presenting the taxonomic position and higher classification of order Diptera in Egypt based on the most recent investigation made with modern methods, together with morphological characters, to update and correct the Egyptian list of the order Diptera.

Key Words: Diptera, Classification, Diopsidae, Egypt.

INTRODUCTION

Order Diptera (True flies) is one of the major and most important orders of insect, comprising nearly 240.000 species distributed all over the world except in the Antarctica. The order includes many familiar fly species of highly economic importance as pests of plants and or vectors of dangerous diseases for man and Animal. The earliest fly fossil was known from the Upper Triassic of the Mesozoic geological period, some 225 million years ago (Evenhuis, 1995). Since that time they have diversified to become one of the largest groups of organisms. There have been about 150,000 species of flies formally described by scientists; thus about 1 in every 10 animals described is a fly. A greater number of species await description and most of these will be found in environments that remain to be studied intensively, such as tropical forests.

Many authors in different parts of the world worked on the various aspects of the order, including comparative morphology, taxonomy, biology....etc. Of the famous works, Verrall (1901 and 1909), Mc Alpine *et al.* (1981-1987), Oldroyd *et al.* (1949), Hindel (1928, 1936-37), Lindner (1924-74), Curran (193), Cole (1969), Courtney (1995), Friedrich and Tautz (1997), and Wiegmann *et al.*

In Egypt the order Diptera as listed and classified by Steyskal and El-Bialy (1967) is represented by 1339 species belonging to 64 families. The classification of the order in particular the higher categories was a matter of change a long with the classification history of the order.

The present work aimed at presenting the most recent taxonomic position and higher classification of the order based on most recent taxonomic studies to update and correct the Egyptian list of Diptera.

MATERIALS AND METHODS

The theoretical part of this study depended mainly upon reviewing the literature, text books and taxonomic catalogues of order Diptera, together with recent investigations that concern with the higher classification of the order. On the other hand the practical part was carried out by examining the referral insect collections in Egypt, i.e. the available Dipterous collections such as: Ministry of Agriculture

Collection, Dokki, Giza (M.), the Faculty of Science, Cairo University Collection, Giza, (F.), the Faculty of Science, Ain Shams University Collection, Cairo, (A.S.), the Entomological Society of Egypt Collection, Cairo, (S.), and the Faculty of Agriculture, Al-Azhar University Collection, Cairo, (AZ). To revise and record the representative families of this order in Egypt. Data concern with the classification and updated taxonomic position of the higher categories of the order Diptera are presented in a table including super families and families of the palearctic region, referring to the representative families in Egypt.

RESULT AND DISCUSSION

The Diptera are divided into two suborders, the Nematocera and Brachycera. The Nematocera include generally small, delicate insects with long antennae such as mosquitoes, crane-flies, midges and their relatives. The Brachycera includes more compact, robust flies with short antennae. In older classifications two Divisions were recognised in the Brachycera, the Orthorrhapha and Cyclorrhapha. The "Orthorrhapha" includes brachyceran flies with a simple, obtect pupa, such as horse flies and robber flies, and the Cyclorrhapha comprise brachyceran flies with a pupa enclosed in a hardened puparium. The Cyclorrhapha are further divided into two groups based on the presence or absence of the ptilinum and associated fissure on the head. The ptilinum is a sac which is everted during the emergence of the adult fly to assist in breaking free of the puparium. The Aschiza lack the ptilinum whereas it is present in the Schizophora. The following table showing palearctic families of order Diptera according to their taxonomic status.

(Suborder: Nematocera – Long horned Flies Including Orthorrhapha in part)

Infraorder	Superfamily	Family	Alternative Name
Tipulomorpha	Tanyderoidea	Tanyderidae	tandydrid flies
	Tipuloidea	*Tipulidae	crane flies
Blephariceromorpha	Blephariceroidae	Blephariceridae	net winged midges
	Deuterophlebioidea	Deuterophlebiidae	mountain midges
	Nymphomyioidea	Nymphomyiidae	nymphomyiid flies
Axymyiomorpha	Axymyioidea	Axmyiidae	axmyiid gnats
Bibionomorpha	Pachyneuroidea	Pachyneuridae	Pachyneurid-gnats
	Bibionoidea	*Bibionidae	march flies
	Sciaroidea	*Mycetophilidae	fungus gnats
		*Sciaridae	root gnats
		*Cecidomyiidae	gall gnats
Psychodomorpha	Psychodoidea	*Psychodidae	sand flies
	Trichoceroidea	Trichoceridae	winter crane flies
	Anisopodoidea	Anisopodidae	wood gnats
	Scatopsoidea	*Scatopsidae	minute black scavenger flies
		Synneuridae	synneurid gnats
Ptychopteromorpha	Ptychopteroidea	Ptychopteridae	phantom crane flies
Culicomorpha	Culicoidea	Dixidae	dixid midges
		Chaoboridae	phantom midges
		*Culicidae	mosquitoes
	Chironomoidea	Thaumaleidae	solitary midges
		*Simuliidae	buffalo gnats
		*Ceratopogonidae	biting midges
		*Chironomidae	midges

Suborder: Brachycera – Short horned Flies (Including Cyclorrhapha and Orthorrhapha in part)

Infraorder	Superfamily	Family	Alternative name	
Tabanomorpha	Tabanoidea	Pelecorrhynchidae	chid flies	
		*Tabanidae	horse flies	
		Athericidae	athericid flies	
		*Rhagionidae	snipe flies	
		Xylophagidae	xylophagid flies	
Asilomorpha	Stratiomyoidea	Xylomyidae	xylomyid flies	
		*Stratiomyidae	Soldier flies	
		*Therevidae	stiletto flies	
		*Scenopinidae	window flies	
		Vermileonidae	worm lions	
	Asiloidea	*Mydidae	Apioceridae	flower loving flies
			*Asilidae	grass flies
			*Acroceridae	small headed flies
			*Nemestrinidae	tangle veined flies
			*Bombyliidae	bee flies
Bombylioidea		Hilarimorphidae	hilarimorphid flies	
		Empidoidea	*Empididae	dance flies
			*Dolichopodidae-	long legged flies
			Lonchopteridae-	spear winged flies
			Muscomorpha (1) Division Aschiza	Lonchopteroidea
*Phoridae	humpbacked flies			
*Syrphidae	flower flies			
*Pipunculidae	big headed flies			
(2) Division Schizophora	(a) Section Acalyptratae	Conopoidea		
		Nerioidea	Cypselosomatidae-	cypselosomatid flies
			*Micropezidae	stilt legged flies
		Diopsoidea	Neriidae	cactus flies
			Tanypezidae	tanypezid flies
Tephritoidea	Opomyzoidea	Strongylophthalmyiidae	strongylophthalmyiid flies	
		*Psilidae	rust flies	
		*Diopsidae	stalk eyed flies	
		*Lonchaeidae	lonchaeid flies	
		*Otitidae	picture winged flies	
		*Platystomatidae	picture winged flies	
		*Pyrgotidae	pyrgotid flies	
		*Tephritidae	fruit flies	
		Richardiidae	richardiid flies	
		Pallopteridae	flutter flies	
		*Piophilidae	skipper flies	
		Clusiidae	clusiid flies	
		Acartophthalmidae	acartophthalmid flies	
		*Odiniidae	odiniid flies	
		*Agromyzidae	leaf miner flies	
Opomyzidae	opomyzid flies			
Anthomyzidae-	anthomyzid flies			
Aulacigastridae	aulacigastrid flies			

		Perisclididae-	perisclidid flies
		* Asteiidae	astiid flies
		*Milichiidae	milichiid flies
		Carnidae	carnid flies
		*Braulidae	bee lice flies
	Sciomyzoidea	Coelopidae	seaweed flies
		Dryomyzidae	dryomyzid flies
		*Sciomyzidae	march flies
		Ropalomeridae	ropalomerid flies
		*Sepsidae	black scavenger flies
	Lauxanioidea	*Lauxaniidae	lauxanid flies
		* Chamaemyiidae	aphid flies
	Sphaeroceroidea	*Heleomyzidae	heleomyzid flies
		*Thixoscelididae	trixoscelidid flies
		*Chyromyidae	chyromyid flies
		Rhinotoridae	rhinotorid flies
		*Sphaeroceridae	small dung flies
	Ephydroidea	*Curtonotidae	curtonotid flies
		*Drosophilidae	small fruit flies
		Diastatidae	diastatid flies
		Camillidae	camillid flies
		*Ephydriidae	shore flies
		*Chloropidae	grass flies
		Cryptochetidae	cryptochetid flies
		*Tethinidae	tethinid flies
		*Canacidae	beach flies
(b)Section Calyptratae	Muscoidea	*Anthomyiidae	anthomyiid flies
		*Muscidae	house flies, face flies, horn flies, tsetse flies
		*Stomoxiinae	stomoxi flies
		*Phaoniinae	Phaon flies
		*Gasterophilidae	sheep flies
		*Oestridae	warble flies and bot flies
		*Calliphoridae	meat flies
		Rhinophoridae	rhinophorid flies
		*Sarcophagidae	sarcophagid flies
		*Tachinidae	tachinid flies
	Hippoboscidea	*Hippoboscidae	louse flies
		*Nycteribiidae	bat flies
		*Streblidae	bat flies

* The families which found and recoded in Egypt

** The family new recorded in Egypt

Generally there are two accepted suborders of Diptera, the Nematocera which are usually recognized by their elongated bodies and feathery antennae and the Brachycera tend to have a more roundly proportioned body and very short antennae. A more recent classification has been proposed, in which, the Nematocera is split into two suborders, the Archidiptera and the Eudiptera, but this has not yet gained widespread acceptance among dipterists.

1. Suborder Nematocera (24 families, 14 of them are recorded in Egypt) characterized by having long antennae, pronotum distinct from mesonotum. In Nematocera, larvae are either eucephalic or hemiccephalic and often aquatic.
2. Suborder Brachycera (81 families, 51 of them are recorded in Egypt) characterized by having short antennae, the pupa is inside a puparium formed from the last larval skin. Brachycera are generally robust flies with larvae having reduced mouthparts.

3. Infraorders Tabanomorpha and Asilomorpha comprise the majority of what was the Orthorrhapha under older classification schemes. The antennae are short, but differ in structure from those of the Muscomorpha.
4. Infraorder Muscomorpha (largely the Cyclorrhapha of older schemes) have 3-segmented, aristate (with a bristle) antennae and larvae with three instars that are acephalic (maggots). Most of the Muscomorpha are further subdivided into the Acalyptratae and Calyptratae based on whether or not they have a calypter (a wing flap that extends over the halteres).

From the later we can clearly that, the rather changes in classification and position of Dipterous families occurred up on the Steyskal list, (1967) this changes either adding as 10 Infraorder (Tipulomorpha, Blephariceromorpha, Axymyiomorpha, Bibionomorpha, Psychodomorpha, Ptychopteromorpha, Culicomorpha, Tabanomorpha, Asilomorpha, Muscomorpha), or changes positions of families as followed:

Suborder Nematocera

- Family Trichoceridae transfered from superfamily Tipuloidea to superfamily Trichoceroidea.
- Family Tanyderidae transfered from superfamily Psychodoidea to superfamily Tanyderoidea.
- Family Ptychopteridae transfered from superfamily Psychodoidea to superfamily Ptychopteroidea under infraorder Ptychopteromorpha.
- Family Nymphomiidae transfered from superfamily Psychodoidea to superfamily Nymphomyioidea under infraorder Blephariceromorpha.
- Family Blephariceridae transfered from superfamily Culicoidea to superfamily Blephariceroidea under infraorder Blephariceromorpha.
- Family Thaumaleidae transfered from superfamily Culicoidea to superfamily Chironomoidea under infraorder Culicomorpha.
- Family Ceratopogonidae transfered from superfamily Culicoidea to superfamily Chironomoidea under infraorder Culicomorpha.
- Family Simuliidae transfered from superfamily Culicoidea to superfamily Chironomoidea.
- Family Sciaridae transfered from superfamily Mycetophiloidea to superfamily Sciaroidea under infraorder Bibionomorpha.
- Family Scatopsidae transfered from superfamily Mycetophiloidea to superfamily Scatopsoidea.
- Family Cecidomyiidae transfered from superfamily Mycetophiloidea to superfamily Sciaroidea under infraorder Bibionomorpha.

Suborder Brachycera

- Some families are add to this suborder as families Athericidae, Vermileonidae, Apioceridae and Camidae in addition to three infraorder (Tabanomorpha, Asilomorpha and Muscomorpha)
- Family Nemestrinidae transfered from superfamily Asiloidea to superfamily Bombylioidea under infraorder Asilomorpha.
- Families Acroceridae, Bombyliidae transfered from superfamily Asiloidea to superfamily Bombylioidea under infraorder Asilomorpha.
- Family Conopidae Transfered from superfamily Syrphoidea to superfamily Conopioidea under division Schizophora, section Acalyptratae.
- Families Cypselosomatidae, Micropezidae and Neriidae transfered from superfamily Micropezoidea to superfamily Nerioidae under division of Schizophora, section Acalyptratae.

- All families under superfamily Tanypezoidea (Diopsidae, Megamerinidae, Tanypezidae, Strongylophthalmiidae and Psilidae) are transferred to superfamily Diopdidae under section Acalyptratae.

- Family (Piophilidae, Lonchaeidae and Panopteridae) transferred from superfamily Opomyzoidea to superfamily Tephritoidea.

In addition to the Family Diopsidae which add to number of Egypt families which recorded in Steyskal list to exceeded the number of families from 64 to 65 Families.

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ARABIC SUMMARY

الوضع التقسيمي لرتبة ذات الجناحين في مصر

أيمن محيي الدين ابراهيم

معهد بحوث وقاية النباتات – قسم بحوث الحصر والتصنيف

يعتمد الباحثين في مصر خاصة العاملين بتصنيف الحشرات و تحديدا في رتبة ذات الجناحين على القائمة التي وضعها George C. Steyskal & Saad El- Bialy سنة ١٩٦٧ والتي شملت وضع التصنيف والمراتب التصنيفية العليا لرتبة ذات الجناحين بشكل كامل و مفصل وطبقا للتقسيمات العالمية المطبقة في ذلك الوقت. ونتيجة للدراسات الحديثة والتي تعتمد على النشأة والتحليل الشجري و استخدام الصفات الجزيئية Molecular characters كان من الضروري إضافة بعض التعديلات على الوضع التقسيمي لرتبة ذات الجناحين في مصر بناء على الكتلوجات والمراجع والأبحاث القديم منها والحديث في العالم مع فحص المجموعات الحشرية المرجعية المصرية المختلفة لتسجيل الفصائل الممثلة للرتبة في مصر و قد أثمرت هذه الدراسة عن :

تم جدولة رتبة ذات الجناحين بناء على أحدث التقسيمات العالمية و التي ذكرت هذه الدراسة أهمها وقد أشتمل الجدول على رتبة Suborder وتحت رتبة Infraorder و فوق فصيلة أو الفصيلة العليا Superfamily والفصائل التابعة لها و التي تتواجد في منطقة ال Palearctic مع الإشارة الى الفصائل الممثلة في مصر.

وقد كشفت الدراسة عن أنتقال الكثير من العائلات لفصائل عليا أخرى غير التي كانت عليها في قائمة Steyskal وقد ذكرت تفصيلا في البحث.