A Study on Some Odonate Species in Hinthada University Campus

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Abstract

The insects, class Insecta are the largest group of organisms on earth and live in every conceivable habitat on land, in fresh water and a few have even invaded the sea. There are 9 major Orders under class Insecta namely, Coleoptera, Diptera, Lepidoptera, Hymenoptera, Hemiptera, Orthoptera, Odonata, Isoptera and Siphonaptera. They are as beneficial insects. This study was to identify the some Odonates and to add more information on damselflies and dragonflies. A total of 14 species of odonates from Hinthada University Campus were collected and identified. The study period lasted from September, 2011 to October, 2013. Two suborders Zygoptera and Anisoptera, four families, 12 genera and 14 species of odonates were recorded. Among these 10 species of family Libellulidae is the large family in this study period. Detail morphological structures such as head, thorax, abdomen, body colour and measurements of high wings and abdomen length had also been described. The percentages of recorded odonate species were 71.42% family Libellulidae, 14.28% family Coenagrionidae and 7.15% of families Platyenemididae and Aeshnidae. The Odonate species are beneficial to man as biological control agents and as food and traditional medicine in some countries.

Key words: Insects, Odonate species, morphological structures, Hinthada University

Introduction

The insects, class Insecta are the largest group of organisms on earth and live in every conceivable habitat on land, in fresh water and a few have even invaded the sea. There are nine major Orders under class Insecta namely, Coleoptera, Diptera, Lepidoptera, Hymenoptera, Hemiptera, Orthoptera, Odonata, Isoptera and Siphonaptera. Among them, the Order Odonata is one of the most primitive of the insect Order with two pairs of transparent flying wings, large, long and slender body, chewing mouth parts and simple metamorphosis. It has been estimated that approximately 5000 species of Odonates are found in the world (Richards and Davies, 1977).

The members of Order Odonata are relatively large and beautiful insects. They occur wherever there is suitable fresh water habitat. The Order Odonata comprises three Suborder Zygoptera (damselflies), Anisoptera (dragonflies) and Anisozygoptera. The latter includes many extinct Mesozoic forms. The Odonates are entirely predacious insects which feed chiefly on Dipterians, Hymenopterans and Coleopterans. During their life cycle, the nymphs are aquatic in habit also feed upon a wide variety of living organisms including tadpoles, small crustaceans larva of mosquitoes and many inhabiting insects. The adults also feed on mosquitoes, moth and other insects, so they are sometime called Entomophagus insects and may be assumed as beneficial insects.

The damselflies and dragonflies are easily differentiated according to their resting position, wing shape, their size and body. They possess four wings; the two pairs of wings in damselflies are approximately of the same size and shape but the hind wings of dragonflies are larger and broader than fore wings.

The identification of insects differs from the identification of other types of organisms. The separation of the families of Order Odonata is based primarily on characters of the wings. The separation of genera and species is based on wing venation, color pattern,

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structure of genitalia and other characters. Many species of Odonata can be recognized in the field by their characteristic size, shape, color or habits (Borror et al., 1964).

The present study has been under taken with following objectives;

- To identify the some Odonates in Hinthada University Campus

- To add more information on damselflies and dragonflies from Hinthada University Campus.

Materials and Methods

Study Area

Hinthada University Campus is situated at the northern part of the Hinthada Township and the total area is 0.37 square kilometers (Figure 1).

Study Period

The study of some odonates species of Hinthada University Campus is commenced from September, 2011 to October, 2013.

Collection of Specimens

The specimens were collected mainly during day time because most of odonates are diurnal in nature and sun lover. But some species were collected at night under light. The ordinary insect net with a long handle was used in collection of specimen. It was conducted around the ponds, lakes and some were collected from places of human habitats with various plants and bushes and stones near fresh water.

Preserving the specimens

The collected specimens were immediately placed in letter-sized envelopes with the wing held in a vertical position above the body. The general coloration of the live specimen with relevant date and collection site were recorded immediately because the color of specimens was changed after death. Then the specimens were killed by chloroform vapour and preserved in 70 percent alcohol.

Identification

Identification of the specimen was based mainly on the morphological criteria by Fraser (1933-1936) and Orr (2005).

Figure (1) Location map of the study area

Results

A total of 14 Odonate species were recorded during study period, among them three species belong to Suborder Zygoptera and the other 11 species under Suborder Anisoptera. Two families, three genera and three species of damselflies (Zygoptera) and nine genera and 11 species of dragonflies (Anisoptera) under two families were recorded.

Systematic position of the studied Odonate species

Phylum - Arthropoda
Class - Insecta
Order - Odonata
Suborder - Zygoptera
Family - Platycnemididae
Genus - *Copera* Kirby, 1890
Species - *C. marginipes* Rambur, 1842

Family - Coenagrionidae
Genus - *Ceriagrion* Selys,1876
Species - *C. coromandelianum* Fabricius,1798

Genus - *Pseudagrion*
Species - *P. rubriceps* Selys,1876

Suborder - Anisoptera
Family - Libellulidae
Genus - *Orthetrum* Drury, 1770
Species - *O. sabina* Drury, 1770
Species - *O. glaucum* Brauer, 1865

Genus - *Diplacodes* Kirby, 1889
Species - *D. trivialis* Rambur, 1842

Genus - *Neurothemis* Brauer, 1867
Species - *N. tullia* Drury, 1773
Species - *N. fulvia* Drury, 1773

Genus - *Pantala* Hagen, 1861
Species - *P. flavescens* Fabricius,1798

Genus - *Tholymis* Hagen, 1867
Species - *T. tillarga* Fabricius, 1798

Genus - *Brachythemis* Brauer, 1868
Species - *B.contaminata* Fabricius, 1793

Genus - *Zyxomma* Rambur, 1842
Species - *Z. petiolatum* Rambur, 1842

Genus - *Rhyothemis* Hagen, 1867
Species - *R. phyllis* Sulzer, 1776

Family - *Aeshnidae*
Genus - *Heliaeschna* Selys, 1882
Species - *H. uninervulata* Martin, 1909

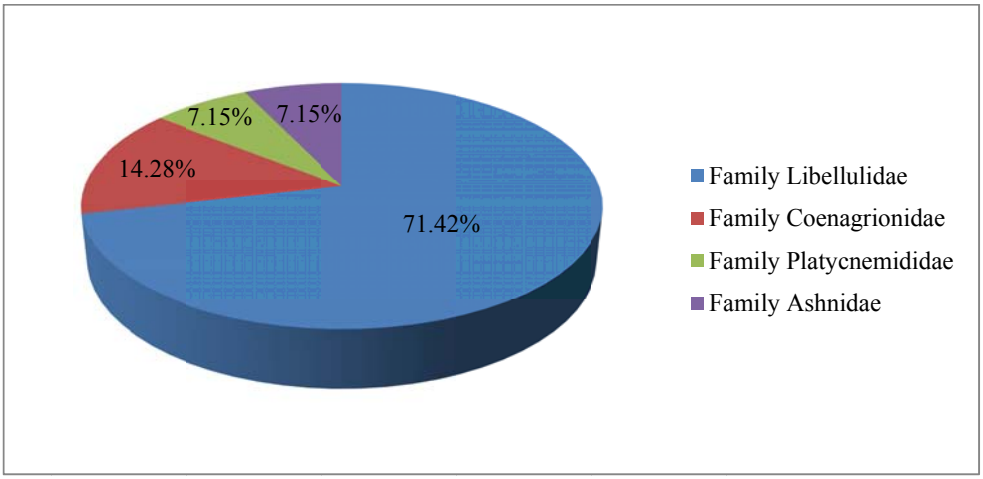


Figure (2) Percentage of Odonate species composition by Families

Diagnostic characters of the Order Odonata

Predaceous insects with biting mouth parts with very large and prominent eyes. Antennae are very short and filiform. Two equal and unequal pairs of elongate membranous wings, each wing with a complex reticulation of small cross veins and conspicuous pterostigma present or absent. Abdomen is long and slender with 10 segments. Wings usually held closed together on thorax and abdomen vertically when at rest in damselflies and wings held horizontally outwards or even deflected strongly downwards when at rest in dragonflies.

Key to Sub-orders of Odonata

1. Fore and hind-wings narrowed at base; similar in size and shape; abdomen slender; usually the wings are kept closed over the body ---------- Zygoptera
2. Hind-wings broader than the fore-wings; abdomen stout; the wings are held perpendicular to the body ---------- Anisoptera

Discussion

The present study is the studies of some Odonates species in Hinthada university campus. During study period, various locations including near the freshwater ponds, temporary streams and human habitats were chosen as collection sites, from which 14 species of Odonates were collected for identification and presented in this work.

The Order Odonata includes both the dragonflies and damselflies, separated into three Suborders, namely Anisoptera (dragonfly – 8 living families), Zygoptera (damselfly – 17 living families) and Anisozygoptera (10 extinct families). About 5,500 species have been described and they are distributed from the tropics, where the greatest numbers and diversity occur, to the tree-line in Polar Regions (Williams & Feltmate, 1992).

Meyer (2009) stated that 29 families of Order Odonata were found in the world. Among these, the three major families of dragonflies are Aeshnidae, Libellulidae and

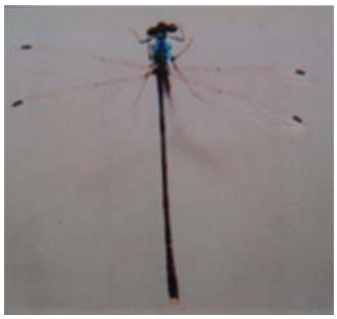
Gomphidae. The family Libellulidae is the largest family in these orders. It contains many species with dark spots on the wings. In damselflies, the major families are Calopterygidae, Coenagrionidae and Lestidae.

Mg Myaing (1966) recorded that 15 species of dragonflies from Mandalay Area, except only one species, all species were under family Libellulidae. In 1973, he also recorded 23 species of Zygoptera damselflies and 50 species of Anisoptera dragonflies from Myanmar. Of which 36 species of family Libelluidae were recorded.

The total of 53 odonate species, including 32 dragonflies species and 21 damselflies species were recorded from the Mandalay division and the Shan state. Among 32 dragonfly's species, 29 species belong to family Libellulidae and the remaining three species are family Aeshnidae. In damselflies, 12 species of family Agriidae and nine species of Coenagriidae were observed. With respect to relative numbers of genera and species confined to the dragonfly of the family Libellulidae and the damselfly of family Agriidae are predominant among Odonate species (Thuzar, 2005).

(A) *Copera marginipies*

(B) *Ceriagrion coromandelianum*



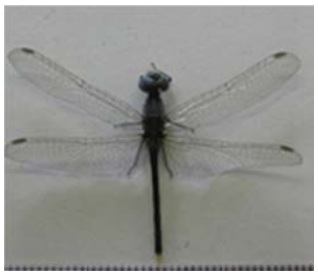
(C) *Pseudag rionrubriceps*

(D) *Orthetrum sabina*

(E) *O. glaucum*

(F) *Neurothemistullia*

(G) *N.fulvia*



(H) *Diplocodestrivialis*

Plate I. Recorded Odonate species of Families Coenagrionidae, platycnemididae and Libellulidae

(A) *Pantala flavesum*

(B) *Tholymis tillarga*

(C) *Brachythemis contaminate*

(D) *Zyxomma petiolatum*

(E) *Rhyothemis phyllis*

(F) *Heliaeschna uninervulata*

Plate II. Recorded Odonate species of families Libellulidae and Aeshnidae

In this study, a total of 14 species of Odonates were collected from the study area. In these, three species are damselflies and the other 11 species are dragonflies. The two species of damselflies belong to the family Coenagrionidae and the remaining one species is the family Platycnemididae. All 11 species of the dragonflies, 10 species are under family Libellulidae and the species *Heliaeschna uninerbuta* belongs to the family Aeshnidae. In this study, the dragonfly of family Libellulidae is predominant in the study area and similar to that of the above findings.

The sizes categories of odonates are classified into three types depending on their length of abdomen. The abdomen length with 10-25mm is small and the medium with 26-40mm and the large size is greater than 40mm (Subramanian, 2005).

In this study, among the total of 14 species, the only one large size of species *H. univervulata* with 50mm of abdomen length, the median size of seven species and the six species of small size were recorded.

The odonates have also been used in traditional medicine in Japan and China. In some parts of the world they are used as food source, eaten either as adults or larvae; in Indonesia, for example, they are caught on poles made sticky with birdlime, then fried in oil as delicacy (Anonymous, 2013).

Table (1) Some morphological characteristics of collected odonate species

Sr. No.	Scientific name	Body colouration				Wings	Pterostigma
		Head	Thorax	Abdomen	legs		
1	*Ceriagrion coromandelium*	Pale yellow	Olive-reen,beneath thinly pruinosed white	Citron-yellow without marking	Yellow with black spines	hyaline	Golden yellow
2	*Pseudagrion rubriceps*	Bright orange	Azure blue	black	Yellow with black	hyaline	Reddish brown
3	*Copera marginipies*	Pale brown	Bronze black, lower border pale yellow	Black, segment eight to the end bluish-white	Bright orange	hyaline	brown
4	*Orthetrum sabina*	Yellowish green	Greenish yellow with black stripes	Green with black rings	black	Hyaline, hind wings tinted with yellow	Reddish brown
5	*O.glaucaum*	black	Dull blue black	Bulged at segment 1 to 3, pale blue in segments 1to8, the remaining black	black	Hyaline, base tinted with dark amber yellow	Dark reddish brown
6	*Neurothemis tullia*	black	Black with yellow stripe	Black with creamy white stripe	Black with pale yellow	Basal half opaque blue-black bordered by milky white, tip transparent	Dull brown
7	*N.fulvia*	Reddish brown	Reddish brown without marking	Slightly dilated at base, tapered at the end, reddish brown	Dark reddish brown	Opaque dark reddish brown with irregular triangular at tip	Dark reddish brown
8	*Diplocodes trivialis*	Pale azure blue	Yellow with black suture	black	Greenish yellow	hyaline	Brownish yellow
9	*Pantala flavescens*	Golden yellow	Olivaceous ,with fine yellowish hairs	Bright reddish brown,	black	Hyaline, base of hind wings with amber yellow	Bright reddish brown
10	*Tholymis tillarga*	olivaceous	Golden yellow	Bright red	Reddish brown	Hyaline, golden brown patch with white bordered on the hind wings	Reddish brown between dark veins
11	*Brachythemis contaminata*	Reddish ocherous	Pale greenish yellow	Reddish colour with brown stripe	Dark brown	Hyaline, bright orange colour with reddish venation	Rust red with brown border
12	*Zyxomma petiolatum*	Pale olivaceous	brown	Swollen from segment one to three, slim to the end, dark reddish brown	Reddish brown	Transparent, the tips of four wings with dark brown patch	Dark black
13	*Rhyothemis phyllis*	Dark metallic green	Dark metallic green	black	black	Palely yellow, all apices with blackish brown, at the base of hind wings with yellow and brown bars	Blackish brown
14	*Heliaeschna uninervulata*	Pale olivacerous	Dark green with azure blue spots	Dark brown with azure blue , constricted base	black	Hyaline,basal half of hind wings with pale yellow tinted	Dark reddish brown

Table (1) Some morphological characteristics of collected odonate species (continued)

Sub-order	Family	Genus	Species	Abodomen Length (mm)	Hind wing length (mm)	Common name
	Coenagrionidae	*Ceriagrion*	*C. coromandelium*	29	19	Yellow waxtail
Zygoptera	Platycnemididae	*Pseudagrion*	*P. rubricep*	29	18	Orange-faced sprite
		Copera	*C. marginipies*	32	17	Yellow featherleg
		Orthetrum	*O. sabina*	30	32	Green skimmer
Anisoptera	Libellulidae		*O. glaucrum*	24	16	Asian-skimmer
		Neurothemis	*N. tullia*	18	19	Pied paddy skimmer
			N. fulvia	22	28	Fulvous forest skimmer
		Diplacodes	*D. trivialis*	19	22	Ground skimmer
		Pantala	*P. flavescens*	29	38	Wandering Glider
		Tholymis	*T. tillarga*	30	33	Foggy-winged Twister
		Brachythemis	*B. contaminata*	19	20	Ditch jewel
		Zyxomma	*Z. petiolatum*	37	32	Dingy Duskflyer
		Rhyothemis	*R. phyllis*	23	32	Yellowstripe Flutters
	Aeshnidae	*Hliaeschna*	*H. uninervulata*	50	45	Swamp darner

Table (2) The different sizes of collected species depend on their abdomen length (according to Subramanian, 2005)

Collected odonate species	Abodomen Length (mm)	Small 10-25 (mm)	Median 26-40(mm)	Large ≥40(mm)
Ceriagrion coromandelium	29		✓	
Pseudagrion rubricep	29		✓	
Copera marginipies	32		✓	
Orthetrum sabina	30		✓	
O. glaucrum	24	✓		
Neurothemis tullia	18	✓		
N. fulvia	22	✓		
Diplocodes trivialis	19	✓		
Pantala flavescens	29		✓	
Tholymis tillarga	30		✓	
Brachythemis contaminata	19	✓		
Zyxomma petiolatum	37		✓	
Rhyothemis phyllis	23	✓		
Heliaeschna uninervulata	50			✓

Subramanian (2005) stated that the odonates are beneficial for man. The life history of odonates is closely linked with water bodies. They use a wide range of flowing and stagnant water for egg laying and their larval stage. Odonates, being predators both at larval and adult stages, play a significant role in the wetland ecosystem. Adult odonates feed on mosquitoes, blackflies and other blood sucking flies and act as an important biological agent of these harmful insects. In the urban areas of Thailand, larvae of the container breeding dragonfly, granite ghost (*Bradinopyga geminate)* was successfully used to control of Aedes mosquitoes, an important vector of the dengue fever. Many species of odonates inhabiting in agro ecosystems play a crucial role of controlling pest populations.

In this study, the granite ghost dragonfly species was not found in the study period but all odonate species are beneficial for man. Thus, they may probably be effective in controlling the pest of harmful insects as biological control agent and also use as food and medicine. Therefore the conservation of odonates species is very important factor.

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