Project Report

STUDY ON THE DIVERSITY OF WASP OF TKM COLLEGE CAMPUS AND VICINITY

Dissertation submitted to the University of Kerala in partial fulfillment of the requirements for the award of the degree of

Bachelor of Science

in

ZOOLOGY

Submitted by

Sl.No	Name of candidates	Candidate code
1	AFNA N	25016142001
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11	RENJITHA S K	25016142012
12	SAYED MOHAMED KASIM K M	25016142044
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14	SULAIKHA S	25016142015

DEPARTMENT OF ZOOLOGY

TKM COLLEGE OF ARTS AND SCIENCE

KOLLAM-5

March - 2019

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CERTIFICATE

This is to certify that the dissertation entitled "**Study on the diversity of wasp of TKM college campus and vicinity"** is an authentic record of the work done by……with Reg. No:……..…..under my supervision as partial fulfillment of the requirements for the Degree of *Bachelor of Science* in Zoology and this report has not been submitted earlier for the award of any degree or diploma or any other similar titles anywhere.

Aseeb A K.
(*Supervisor*)
Asst. Professor
Dept. of Zoology

Certified bona fide:

Head of the Department

EXAMINERS:

1.

2.

DECLARATION

I do hereby declare that this dissertation titled **Study on the diversity of wasp of TKM college campus and vicinity** is a bona fide report of the project work carried out by me, under the supervision and guidance of Aseeb A K, Asst. Professor, Department of Zoology, TKM College of Arts and Science, Kollam as partial fulfillment of the requirements for the award of the Degree of Bachelor of Science in Zoology.

Karicode

Student

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I have got many people to thank for their encouragement and support to accomplish the objectives of my work.

Primarily I would thank the God Almighty for his blessings upon me to complete this project with success. Then I am indebted to the Teacher–in–charge Aseeb A K, Assistant Professor, Department of Zoology for his valuable guidance, constant encouragement and immense motivation which has sustained my efforts at all the stages of this project work.

I am grateful to the Principal of our college Prof. Shajitha S for her support and encouragement.

I would also like to place on record my appreciation and thanks to all my beloved teachers in the college for their great encouragement.

Finally but immensely I remember with sincere gratitude, all my classmates and parents for their cooperation, love and concern without which this work would not have been materialized.

Student

CONTENTS

DEDICATED TO MY PARENTS & TEACHERS....

INTRODUCTION

A wasp is any insect of the order *Hymenoptera* and suborder *Apocrita* that is neither a bee nor an ant. The Apocrita have a common evolutionary ancestor and form a clade; wasps as a group of do not form a clade, but are paraphyletic with respect to bees and ants.

The most commonly known wasps, such as yellow jackets and hornets are in the family Vespidae and are eusocial, living together in a nest with egg laying queen and non reproducing workers. Wasps play many ecological roles. Some are predators or pollinators, whether to feed themselves or to provision their nests. Many, notably the cuckoo wasps are kleptoparasites, laying eggs in the nests of other wasps. Many of the solitary wasps are parasitoidal, meaning they lay egg on in other insects and often provision their own nests with such hosts.

There are more than 30,000 identified species of wasps. They fall into two categories solitary or social. The majorities is solitary and live and operate alone. Examples of solitary wasps are parasitic wasps, which are beneficial insects used in agricultural pest control, and hunting wasps, which hunts spiders and other insects. Some solitary wasps nest in small groups alongside others of their species, but each is involved in caring for its own offspring. Adult solitary wasps spend most of their time in preparing nests and foraging for food for their young. Many species dig burrows in the ground. Mud daubers and pollen wasps construct mud cells in sheltered places.

There are only about 1,000 wasps species are identified as social. Social species are hornets, yellow jackets, and paper wasps, live and work together in colonies. Only the family Vespidae contains social species, primarily in the subfamilies Vespinae and Polistinae .With their powerful stings and conspicuous warning coloration, often in black and yellow. All species of social wasps construct their nest using some form of plant fiber supplemented with mud, plant secretions, and secretions from the wasps themselves.

Predatory wasp species normally subdue their pray by stinging it and nd either lay egg on it, leaving it on place, or carry it back to their nest where an egg may laid on the pray and the nest is sealed, or several smaller pray items may be deposited to feed a single developing larva. Apart from providing food for their offspring, no further maternal care is given.

Like all insects wasps have a hard exoskeleton which protects three main body parts, the head, the mesosoma and the metasoma. There is a narrow waist, the petiole, joining the first and second segments of the abdomen. The two pairs of membranous wings are held together by small hooks and the forewings are larger than the hind ones. In females there is usually a rigid ovipositor, which may be modified for injecting venom, piercing or a swing. In addition to their large compound eyes, wasps have several simple eyes known as ocelli. Wasps possess mandibles adapted for biting and cutting, other mouthparts are formed into a suctorial proboscis, which enables them to drink nectar.

In wasps, as in other Hymenoptera, sex is determined by a haplodiploid system, which means that females are unusually closely related to their

sisters, enabling kin selection to favor the evolution of eusocial behavior. Females are diploid and males called drones have haploid number of chromosomes and develop from an unfertilized egg. Wasps store sperm inside their body and control its release for each individual eggs as it is laid. Therefore under most conditions in most species, wasps have complete voluntary control over the sex of their offspring.

Some species can effectively transport pollen and pollinate several plant species. Pollen wasp in the subfamily Masarinae gather nectar and pollen in a crop inside their bodies, and pollinates flowers of Penstemon and the water leaf family, Hydrophyllaceae. The Agaonidae or fig wasps are the only pollinators of nearly 1000 species of figs. Since the wasps are equally dependent in their fig trees for survival, the coevolved relation is fully mutualistic. Social wasps are considered pests when they become excessively common, or nest close to buildings. People are most often stung in late summer, when wasp colonies stop breeding. Stings are usually painful rather than dangerous, but in rare cases, people may suffer life threatening anaphylactic shock.

Some species of parasitic wasps, especially in the Trichogrammatidaea, are exploited commercially to provide biological control of insect pests. For examples, in Brazil, farmers control sugarcane borers with the parasitic wasp *Trichogramma galloi*. One of the first species to be used was *Encarsia formosa*, a parasitoid of a range of species of white fly. It is used to control pests of tomato and cucumber, aubergine, marigold and strawberry. They are also used to control aphids. *Aphidius matricariae* is used to control the peach potato aphid.

The diversity and distribution of sphecoid wasps at the genus level, with 9 subfamilies and 74 genera are being reported in India. Out of which 8 subfamilies and 35 Genera occur in Kerala. Chalcidoidea is one of the most abundant and species group of highly diverse parasitic Hymenoptera. Chalcidoidea is a family consisting about 90 genera and 500 species in the world. A total of 216 species, 30 Genera and 5 subfamilies [Chalcidinae, Haltichellinea, and Smicromorphinae] have been recorded from India. Of this, 83 species belonging to 21 genera, 6 are exclusively recorded from Kerala. The subfamily Haltichellinae has the largest number of recorded species [8 genera and 39 species]. *Brachymeria* is the predominant genus reported with 23 species from Kerala. *Artocephalus* is the next with 15 species.

The richness and abundance of invertebrate species provide a vast information base to assist in biodiversity conservation and forest reserve management (Pyle et al., 1981, Lewinsohn *et al*., 2005). Among insects, wasps (either social, solitary or parasitoids) exhibit great variations in structure, physiology and behaviour and are of special interest for conservation, as they are considered predominant predators in terrestrial ecosystems, as they control the populations of several other organisms (Lasalle and Gauld, 1993, Cirelli and Penteado-Dias, 2003). Lawton (1983) and Santos et al. (2007) have shown that environments with a more complex structure make the establishment and survival of more species of social wasps possible.

The relevant role in terrestrial ecosystems played by wasps makes any effort to know and preserve them highly justifiable (Amarante, 1999). In

this context, biological inventories are basic tools for the initial survey of biological biodiversity, as well as for monitoring changes in different components of this biodiversity, whether under different environmental conditions in response to impacts of natural processes or human activities.

This work aimed to determine the richness and abundance of the wasp in TKM college campus and nearby vicinities.

ECOLOGICAL IMPORTANCE

Wasps have great ecological importance as predators, parasitoids of many insect larvae. By their predatory and parasitoid habits they destroy a large number of insect pests of agricultural crops and they have been utilized in different parts of the world as effective measures to control some of these pests. They also play a significant role as pollinators in the environment.

ROLE AS PARASITOIDS

Most solitary wasps are parasitoids. As adults, those that do feed typically only take nectar from flowers. Parasitoid wasps are extremely diverse in habits, many laying their eggs in inert stages of their host (egg or pupa), sometimes paralysing their prey by injecting it with venom through their ovipositor. They then insert one or more eggs into the host or deposit them upon the outside of the host. The host remains alive until the parasitoid larvae pupate or emerge as adults.

ROLE AS PREDATORS

Many wasp lineages, including those in the families Vespidae, Crabronidae, Sphecidae, and Pompilidae, attack and sting prey items that they use as food for their larvae; while Vespidae usually macerate their prey and feed the resulting bits directly to their brood, most predatory wasps paralyze their prey and lay eggs directly upon the bodies, and the wasp larvae consume them. Apart from collecting prey items to provision their young, many wasps are also opportunistic feeders, and will suck the body fluids of their prey. Although vespid mandibles are adapted for chewing and they appear to be feeding on the organism, they

are often merely macerating it into submission. The impact of the predation of wasps on economic pests is difficult to establish.

Some species of parasitic wasp, especially in the Trichogrammatidae, are exploited commercially to provide biological control of insect pests. For example, in Brazil, farmers control sugarcane borers with the parasitic wasp *Trichogramma galloi*.

REVIEW OF LITERATURE

The taxonomy and systematic of aculeate families were well studied by the enthusiasts and taxonomists. Most of the research has been inclined towards the taxonomy and behavioral studies, however, in recent time molecular study also contributing to substantial extent so as to understand the taxonomy, evolution and behavior of aculeate wasps. The first contributions to the study of aculeate wasp fauna in the World date back to the late eighteenth century and early nineteenth century. Fabricius (1775) in his first volume on Systema Entomologiae described 12 species of true scoliids, 18 species of vespids and 6 species of spider wasps. After a period of 25 years of complete neglect, the study of aculeate wasps began to attract naturalists and taxonomists across the world, which significantly increased the knowledge of this species rich group. Latrielle (1802) studied the wasps of Hawaiian Islands. This work on Hawaiian was pursued by Williams (1921, 1927), Weber (1948), Yoshimoto (1959), Willink (1972) and Yamane et al. (1996). Smith (1858) in his catalog of hymenopteran insects had given good coverage on wasps of Borneo, Malacca and Singapore region. The most comprehensive monographic work on wasps of France was carried out by Saussure (1853-1858). Noteworthy contributions to the taxonomic studies on aculeate wasps were given by Gribodo (1982), Dalla Torre (1889, 1894, 1904), and Cameron (1898, 1900). Ashmead (1902) focused the outline classification of the fossorial, predaceous and parasitic wasps of the superfamily Vespoidea. Brethes (1903), Ducke (1904, 1905, 1907). and William and Ashmead (1904) contributed to the taxonomy of aculeate wasps of South America. Neotropical Polistinae

species were studied by many workers in the lights of taxonomy, phylogeny and biology and behavior. Noteworthy contributors are Bequaert (1933, 1937, 1943); Zikan (1935, 1949); Windsor (1972); Richards (1941, 1943, 1945, 1971, 1978); Gorton (1978); Silva & Rodriguez (1987); Carpenter & Wenzel (1988); Silva (1988); Starr (1988); Silva & Oliveira (1989); Queller et al. (1992); O'Donnell (1992, 1999); London & Jeanne (1996); Cooper (1996a, 1996b). Zalat et al. (1992) studied eumenine of Egypt and accounted 35 species and furnished the keys for genera and species. Yamane and Yamane (1979) has given an account of 16 polistine species from Nepal. Baltazar (1966) in his catalogue of Philippine Hymenoptera had given detailed information on synonyms and distribution of species across the Philippine Islands. Carpenter and Cumming (1985) explained the character analysis of potter wasps. Carpenter (1986) had given the synonymic generic checklist of the Eumeninae. Carpenter and Day (1988) supervised nomenclature of Polistinae of the World and supplied for certain genus-group names for paper wasps. Yamane (1990) reviewed the Eumenine fauna of Japan enumerating 54 species with description of new 5 species. Carpenter (1996, 2001, & 2004) in his work on aculeate wasps: cataloged the species of genus Polistes, proposed the generic synonymy of Stenogastrinae mentioning seven genera worldwide, and described one new species of hover wasp, from northern Vietnam. Carpenter et al. (1996) synonymised the genus Occipitalia Richards, 1978 and merged it to the Clypearia Saussure, 1854. Carpenter (1999) documented taxonomic details on paper wasps of the world. Kojima and Carpenter (1997) had given a catalog of

species in the polistine tribe Ropalidiini, which comprises 225 species of Old World. They have also designated lectotypes of 14 species described by Cameron (1900) in the Zoologisch Museum. Carpenter (2004) Synonymised the genus Marimbonda Richards, 1978, with Leipomeles Möbius, 1856. Among important works on aculeate diversity and taxonomy in recent past were that of Jun-ichi Kojima (2001) studied Ropalidia wasps of New Guinea, Carpenter and Christopher (2000) described new genus Chalogaster using cladistic analysis. Carpenter and Nguyen (2003) given illustrated keys to genera of social wasps of south-east Asia, Bartalucci (2004, 2006, 2008) and Brown (2005) contributed to the knowledge of family Tiphiidae. Libor (2006) on range extension of Vespa orientalis in Mexico. Saito and Nguyen (2006) on hover wasps, Buck et al. (2008) furnished comprehensive information in atlas of vespidae from the northeastern Nearctic region, Ebrahim and Carpenter (2008) compiled a catalog of Iranian vespoid wasps with illustrated keys to all species. Gusenleitner and Gusenleitner (2010) invented two eumenine species and enlisted 116 species from Kenya. Landolt et al. (2010) described new species of genus Vespula and also 16 reported Vespa crabo first time from Guatemala (USA), Nguyen et al. (2011) studied the species group of genus Polistes Latreille 1802 from the mountainous areas of northern Vietnam. Gusenleitner and Mad (2012) specified taxonomic account on Ethiopia vespidae. Khalid et al. (2012) studied the vespidae fauna of Pakistan; Nugroho et al. (2013) dealt with eumenine fauna of Indonesia. Effective use of vespoid wasps as bio-control agents in agriculture has been discussed by Lee (1984), Lee et al. (1986) and Grissel

(2007). Social wasps are used to study the evolution of multifaceted phenomenon of social life in animals. Gadagkar et al. (1982) and Chandrashekara and Gadagkar (1990) studied the division of labour, communication among colony members. Similar work of the kind was that of Carpenter (1991), Robert and Hunt (1992), Hunt et al. (1995), Carpenter et al. (1996), London (1996), Hunt (1999), London and Jeanne (2000), Adam et al. (2001), Robert and Gonzalez (2004) and Buschini and Buss (2010). 2.2 National The Fauna of British India series on Hymenoptera by Bingham (1897) has been a first consolidated record of aculeate hymenoptera besides mentioning some other hymenoptera groups also. A few years later Bingham (1903) yet again contributed to taxonomy of Ants and Cuckoo wasps through his second volume of Fauna of British India series on Hymenoptera. However, prior to Bingham's laudable contributions, Horne (1870) had studied the Vespidae and Apidae of north-east India. Studies on systematics and diversity of Vespoidea group have long been pursued by researchers of India and overseas. Betrem (1928) brought out a monograph on Indo-Australian Scoliidae. Van der Vetch (1968) while describing the Rhynchium species of Philippines discussed the taxonomy of Indian eumenine taxa. Later, Chhotani & Ray (1975) studied the aculeate fauna of Rajasthan. The monograph of Krombein (1978) on the Scoliidae of southern India and Ceylonese (now Sri Lanka) can be considered as the key-stone in the taxonomy of hairy wasps. This commendable and comprehensive biosystematics work has given detailed taxonomic information on true scoliids, raising several new taxa, re-describing and synonymysing the existing ones. Roy and Kundu (1985) has

studied the wasps of 17 Namdhapa Wildlife Sanctuary, Arunachal Pradesh and contributed about ‘a gap of hundred years’ to aculeate systematic of north east India. Krombein (1991) in his notes on Ceylonese wasps (now Sri Lanka) has given valuable inputs on natural history of families like Vespidae, Pompilidae and Crabonidae of south India. A preliminary study of the hymenopteran fauna of Silent valley national park, Kerala has been carried out by Binoy et al. (1999). Das and Gupta (1983) put forth a detailed Catalogue of subfamilies Stenogastrinae and Vespinae for Indian subcontinent. Das and Gupta (1989) contributed immensely to the comprehension of Indian vespids through a monograph on social wasps of India and adjacent countries. This monograph furnished the detail account on diversity, taxonomy of social wasps with new descriptions and synonymy of existing taxa of Indian subregion. Jonathan and Gupta (1999a, b) studied the hairy wasps of family Scoliidae in the state fauna series of West Bengal and Meghalaya state respectively. Ray (2000, 2003) has studied the diversity of aculeate wasps of Tripura and Sikkim respectively as a result highlighted the diversity of aculeate wasps in northern India. A consolidated account on Scoliidae fauna of India and adjacent countries has given by Jonathan and Gupta (2003a) in fauna of India series of Zoological Survey of India. They have accounted total 79 species under 13 genera, among them 8 species and 5 subspecies were new to science. Jonathan and Gupta (2003b) further studied the scoliids of Sikkim. Lambert and Narendran (2002) and Lambert (2004) described two new species of eumenine genus, Antepipona Saussure from South India. Subsequent additions to the knowledge of Vespidae of India is enriched by Lambert

(2005) on three new species of genus Ropalidia from south India and Lambert et al. (2007, 2008) on potter wasps India. Later, Gupta (2007) studied the diversity of aculeates from western Doon Shivaliks. Gusenleitner (1987, 1988, 1996, 2001, 2006, 2007, 2008, 2010, and 2011) contributed immeasurably to the taxonomy of family Vespidae in general and potter wasps in particular from of Indian subregion and world as well. Kundu et al. (2010) first time studied the vespidae of Uttarakhand and given taxonomic account on 34 species along with key and diagnosis for each species. The systematic study of scoliids wasps of Jaldapara Wildlife Sanctuary, West Bengal has been documented by Bhattacharjee et al. (2010). 18 Furthermore the knowledge on Indian Vespoids is highlighted by many workers like Srinivasan and Girish (2009a, 2009b, 2010, and 2013). Several workers contributed to range extension of Vespoids throughout the country. Shareef et al. (2013a, b) given the new distributional record of potter wasp, *Pseudozumia indica* from Peninsular India and paper wasp, *Polistes (Gyrostoma) rothneyi krombeini* from Malabar Wildlife Sanctuary, Kerala. Lambert et al. (2012) reported *Polistes (Polistella) strigosus Bequaert* first time from south India. Recently, Lambert et al. (2014) described the new species *Ropalidia narendrani* Lambert Kishore, Mohammed Shareef and Girish Kumar, 2014 from Southern Western Ghats, Kerala, India. Works on Vespoidea taxonomy owed much to the contributions by Girish Kumar. His numerous papers on range extension, re-description and descriptions of new taxa which dealt mainly with Vespidae and Scoliidae thoroughly documented the diversity of Indian Vespoids. Of his several notable contributions in this regards are:

Girish Kumar and Kazmi (2008) on range extension of *Megacampsomeris prismatica*; Girish Kumar (2009a, b, c) a checklist of Scoliidae of India, range extension of *Megascolia azuria christiana* in north India; scoliids of Andhra Pradesh respectively. Moreover the other contributions are, Girish Kumar (2010) on distribution of *Polistes (Gyrostoma)* in Indian subcontinent, Girish Kumar and Srinivasan (2010) on hornet wasps of India, Girish and Kishore (2010) on new records of *Polistes (Polistes)* from Indian subregion, Girish Kumar and Nguyen (2010) on nocturnal wasp from India, Girish and Kishore (2011) on redescription of *Xenorhynchium nitidulum* from India, Girish Kumar (2011a, b) on distribution of *Scolia (Discolia) binotata binotata* in north India and on re-description of *Orumenoides edwardsii* from India. In addition Girish Kumar (2012a, b, c, d) contributed to scoliid wasps of India in ENVIS newsletter, redescription of genus *Omiocroides* from India, review on Delta dimidiatipenne and re-description of *Delta esuriens* from India respectively. *Girish Kumar and Sharma* (2012) have given a review of genus *Orancistrocerus* from Indian subcontinent. Important contributions made by Girish Kumar are: Girish and Kishore (2012), Girish Kumar et al. (2012a, b), Girish Kumar (2013a, b, c), Girish Kumar et al. (2013a, b, c, d), Girish Kumar and Sharma (2013a, b), Girish Kumar and Carpenter (2013). In recent times, Girish Kumar and Sharma (2014a) studied the 19 aculeate wasps of Nayachar Island of west Bengal; Girish Kumar and Sharma (2014b) studied Vespidae of Rajasthan; Girish Kumar et al. (2014a, b, c) gave the additional information on eumenine genus *Apodynerus* from Indian subcontinent, review of the genus *Paraleptomenes* from Indian subcontinent and review

of the genus *Epsilon* from India respectively. As regards systematic and diversity studies on Vespoidea fauna of Maharashtra state, is inadequately known. Important early attempt is by Girish Kumar and Kazmi (2012), with enumeration of 10 species of scoliids from Maharashtra. Recently, Jadhav et al. (2014) reported a scoliid wasp, *Scolia (Discolia) fasciatopunctata dunensis* Betrem, 1928 first time from Western Ghats of India as well as peninsular India. Earlier, the distribution of this species was restricted to states of north-east India. Subsequently, Jadhav and Gaikwad (2014) documented the range extension of scoliid wasp, *Megacampsomeris cochinensis* Betrem, 1928 from the Northern Western Ghats. Both these reports constitute as a new report for the state Maharashtra.

2.3 Reviews on Molecular Phylogeny

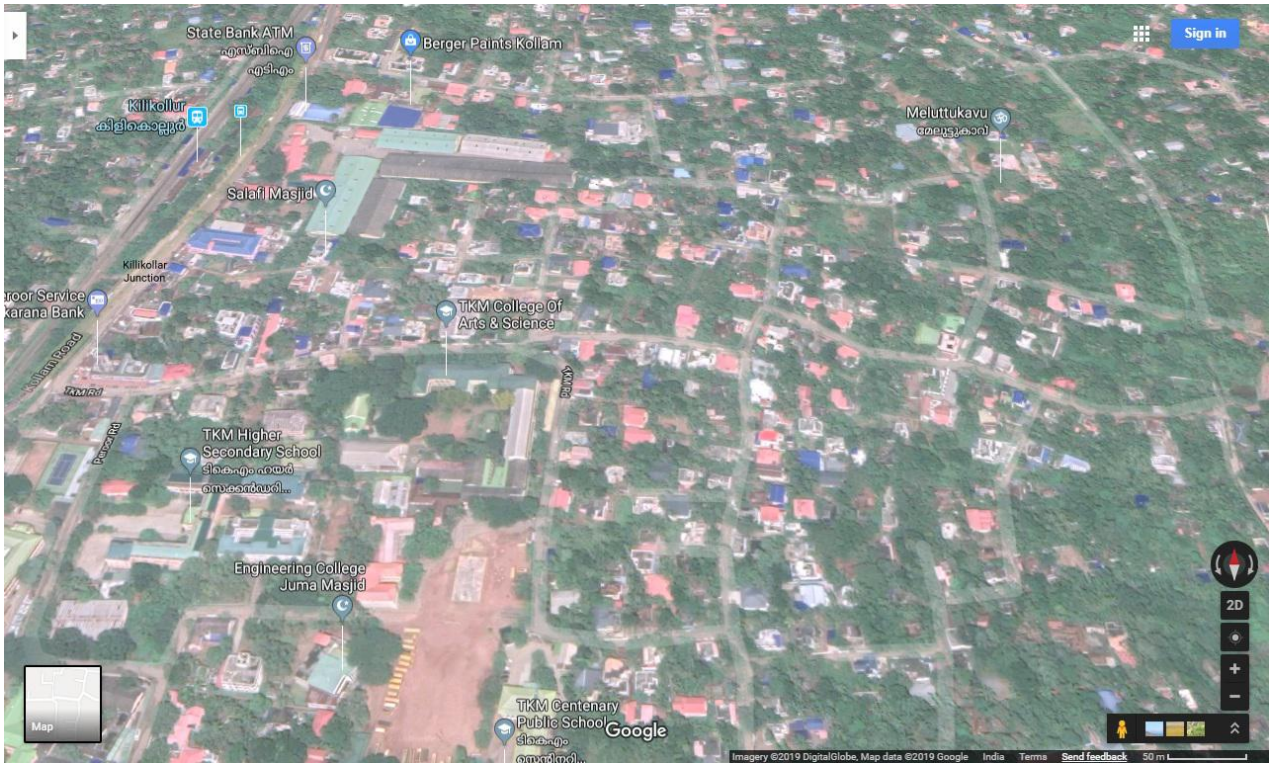
The spider wasps across the world are well studied as regard of their diversity and complex taxonomy. The multifarious taxonomy of this diverse family is studied by many workers in neartic region. Earlier phenomenal attempts were made by Brothers (1975). He studied the phylogeny of Mutillidae. Later, Brothers (1999) studied the phylogenetic aspects of Vespoidea and Apoidea. Brother and Carpenter (1993) experimented on the interrelation among aculeate families using phylogenetic analysis. Shimizua (1994) studied classification of Pompilidae exclusively based upon molecular phylogenetics. Noteworthy contribution of Pitts et al. (2007) on preliminary morphogenesis analysis on spider wasps revealed the relationship among families of spider wasps. A phylogenetic study on spider wasps of Fiji has been studied in detail by

Pitts and Wilson (2007). The inputs on family level divergence of spider wasps of USA have been contributed by Wilson et al. (2012).

De Saussure (1853) provided the higher classification of the super family Vespoidea. He divided vespid wasps often called as diplopterus wasps (doubled wings = wings folded longitudinally at rest) into three tribes viz., Masarien, Eumenienes and Vespiens. Smith (1857) divided Diploptera into three families Masaridae, Eumenidae and Vespidae. Dalla Torre (1894, 1904) also considered Vespidae as a family of Diploptera. Bingham (1897) classified Diploptera as a tribe under Aculeata and recognized two families (Eumenidae and Vespidae). Bingham (1897) studied extensively on the fauna of British India. Later Eumenidae considered as a subfamily known as Eumeninae under the family Vespidae. Das & Gupta (1989) published a monograph on social vespids of Indian region namely “The social wasp of India and the adjacent countries”.

1. STUDY AREA

Karicodu is a neighborhood of Kollam city in Kerala, India. It is about 5 kilometers away from Kollam City centre. It is the 23rd ward in Kollam Municipal Corporation Council. TKMCAS campus and vicinity is at latitude 8° 54′N and longitude 76° 37′ E. Study of wasp diversity was done in the botanical garden maintained in the campus, other areas inside campus, Kilikollur Railway station vicinity and abandoned stretches of land around 'Pandarakulam', Karicodu.



2. OBJECTIVES

1. To study the diversity of wasps in Karicodu.
2. To identify the common, uncommon and rare species of wasps in Karicodu

MATERIAL AND METHODS

The specimens were collected from TKM college campus. The collected specimens were studied and photographed by using a Leica Stereo microscope with LAS software version 3.6.0. All the studied specimens were registered and kept at ZSIK (Zoological Survey of India, Kozhikode.)

The study area

TKM college campus and nearby areas is taken for studying the diversity of wasps.

Collection and preservation of specimens

Specimens for this study is collected by employing various standard insect collecting gadgets as mentioned below

Sweep Net: The main advantage of net sweeping is that we get plenty of specimens with high diversity in a short period of time while comparing with other techniques for collection. The insect net used for collection is a modified type of Noyes, 1982

Malaise Trap: It is a tent like device made with terelene cloth, which work on the basis of the positive phototactic and negatively geotropic behaviour of insects.

Yellow Pan Trap: It works on the principle that insects get attracted to yellow color. These are yellow coloured plastic pans filled with water, along with a few drops of surfactant.

The specimens collected is narcotized in killing jars with ethyl acetate and later stored in vials containing 70% alcohol. The specimens is pinned by standard entomological pins and observed under high resolution

stereoscopic binocular microscope (Model Leica M205 A). Multi focal stacking Imaging of the specimens is done with camera (Model DFC 500) attached with the same microscope.

The following abbreviations used in the text for the terms: H = Head; M = Mesosoma; S = Abdominal sterna; T = Abdominal terga.

SYSTEMATIC LIST

Family VESPIDAE

Subfamily POLISTINAE

Genus ***Polistes*** Latrielle, 1802

Subgenus *Polistella* Ashmead, 1904

1. *Polistes (Polistella) stigma tamulus* (Fabricius, 1798)
2. Polistes (Polistella) strigosus atratus Das & Gupta

Genus ***Ropalidia*** Guérin-Méneville, 1831

3. *Ropalidia brevita* Das & Gupta, 1989
4. *Ropalidia jacobsoni* (du Buysson, 1908)

Subfamily EUMENINAE

Tribe **Eumenini**

Genus ***Delta*** de Saussure, 1855

5. *Delta conoideum* (Gmelin, 1790)

Tribe **Odynerini**

Genus ***Allorhynchium*** van der Vecht, 1963

6. *Allorhynchium metallicum* (de Saussure, 1852)

Genus ***Paraleptomenes*** Giordani Soika, 1970

7. *Paraleptomenes hubertianus* (de Saussure, 1867)

Genus ***Subancistrocerus*** de Saussure

8. *Subancistrocerus sichelii* (de Saussure, 1856)

Family SPHECIDAE

Genus ***Chalybion*** **Dahlbom, 1843**

9. *Chalybion bengalense.* (Dahlbom, 1845)

Family AMPULICIDAE

Genus ***Ampulex*** Jurine, 1807

10. *Ampulex compressa* (Fabricius, 1782)

Family CRABRONIDAE

Genus ***Trypoxylon*** Latrielle

11. *Trypoxylon prominence* Tsuneki, 1979

RESULT & DISCUSSION

1

Family VESPIDAE

1. *Polistes (Polistella) stigma tamulus* (Fabricius, 1798)

1798. *Vespa tamula* Fabricius, 263. Type ♀, "in India Orientali, Dom Daldorff" (ZMUK).

1996. *Polistes (Polistella) stigma tamulus*; Carpenter, 16.

Diagnosis: ♀. S1 without distinct margin at base; T1 about as long as wide; median groove of propodeum shallow, with close fine transverse striations; forewing with subapical fuscous cloud.

Colour description: ♀. Body predominantly reddish with some black markings and following yellow markings: clypeus; mandible; broad line along inner orbit up to lower half of ocular sinus; line on temple bordering eye margin; malar space; basal and apical margin of pronotum narrowly; line on scutellum and metanotum at base; mark on subtegular area; elongate mark on mesepisternum at top and another at middle of apico-lateral margin in front of metapleuron; raised ventral margin of mesepisternum and ventral metapleuron; mark on dorsal metapleuron; two lines on mesosternum; two broad curved marks on propodeum; apical valvula; fore coxa in front; marks on mid coxa in front and two lines on hind coxa below; T1 except broad reddish mark at base; apical broad band on T3 and S3; fourth gastral segment almost entirely; S1 and narrow band on T2 apically.

Body length (H+M+T1+T2): ♀, 10-11 mm.

Material examined: INDIA: Kerala: Kollam district, Tkm college campus, 3 ♀, Coll. Aseeb Ak & party, 1.i.2019-31.iii.2019, ZSIK Regd. No. Zsi Inv.12306-12308

Distribution: India: Bihar, Chhattisgarh, Delhi, Himachal Pradesh, Jharkhand, Karnataka, Kerala, Maharashtra, Meghalaya, Odisha, Pondicherry, Rajasthan, Sikkim, Tamil Nadu, Uttarakhand, Uttar Pradesh, West Bengal. *Elsewhere*: Pakistan; Sri Lanka.

2. *Polistes (Polistella) strigosus atratus* Das & Gupta

1989. *Polistes (Polistella) strigosus atratus* Das & Gupta, female, male, 81. Holotype female, Tripura: Belonia (NZSI).

Diagnosis: ***Female.*** Head wider than high and narrower than thorax; clypeus wider than long; mandible, vertex behind posterior ocelli, temple and malar space with scattered punctures; pronotum ribbed.

Colour: Body reddish brown with black and yellow marks. Blackish parts: supraclypeal area; a band on vertex; flagellum dorsally; posterior margin of clypeus; basal margin of mandible; a line along posterior margin of pronotum; antero-lateral margin of mesoscutum; a mark on each posterio-lateral corner of mesoscutum; outer margin of tegula; propodeum with two marks laterally and one median mark; dorsal metapleuron; lower half of ventral metapleuron; a mark on mesepimeron along dorsal metapleuron;

epicnemium almost entirely; T1 except medially; T3 and T4 almost entirely. Yellowish region: T2 almost entirely.

Size: Female, body length: 12 – 15 mm; fore wing length: 13 – 14 mm.

***Material examined*:** INDIA: Kerala: Kollam district, Tkm college campus, 2 ♀, Coll. Aseeb Ak & party, 1.i.2019-31.iii.2019, ZSIK Regd. *No.* Zsi - Inv.12 309 & 12310

Distribution: India (Assam, Bihar, Delhi, Kerala, Manipur, Sikkim, Tripura, Uttarakhand & West Bengal).

3. Ropalidia brevita Das & Gupta, 1989

1989. *Ropalidia (Anthreneida) brevita* Das & Gupta, 121. Holotype ♂, Delhi: University ridge (NZC).

2007. *Ropalidia brevita*; Kojima *et al*., 380.

Diagnosis: ♀. T1 proportionally wider with its maximum width in dorsal view nearly half as wide as that of T2; propodeum with paired, longitudinal basal carinae, with weak transverse striations and scattered shallow punctures between basal carinae; striations lateral to carinae weak; propodeal orifice narrow.

Colour description: ♀. Body red with following yellow portions: antennal scape below; band on clypeus at apex; mandible (except at tip); inner orbit below ocular sinus; pronotum anteriorly; two marks on

metanotum; two enlarged marks on apical half of propodeum; faint mark on sides of mesosternum; fore and middle coxae in front; line on lateral side of hind coxa; tarsal segments of all legs; narrow apical band on T1 and broad apical band on T2. In some portions black patches are mixed with reddish body.

♂: Similar to female in size and general appearance. Clypeus, supraclypeal area, inter antennal space, inner orbit below ocular sinus are completely yellow. Male terminal antennal flagellomeres less strongly curved and bluntly pointed at apex, approximately twofold as long as its basal width; aedeagus not spatulate apically.

Body length (H+M+T1+T2): ♀ & ♂, 12 mm.

Material examined: INDIA: Kerala: Kollam district, Tkm college campus, 1 ♀, 8♂, Coll. Aseeb Ak & party, 1.i.2019-31.iii.2019, ZSIK Regd. No. Zsi- Inv.12297- 12305

Distribution: India: Assam, Chhattisgarh, Delhi, Goa, Gujarat, Haryana, Himachal Pradesh, Karnataka, Kerala, Odisha, Rajasthan, Sikkim, Tamil Nadu, Uttarakhand, Uttar Pradesh, West Bengal. *Elsewhere*: Pakistan.

4. *Ropalidia jacobsoni* (du Buysson, 1908)

1908. *Icaria jacobsoni* du Buysson, 123. Type ♀, Java: Djakarta (= Batavia) (NMNH).

2007. *Ropalidia jacobsoni*; Kojima et al., 386.

Diagnosis: ♀. Median furrow of propodeum distinct; T1 in lateral view with dorsal margin more strongly convex in posterior half, highest slightly posterior to level of posterior margin of the sternum.

Colour description: ♀. Body reddish brown with yellow and black markings. Yellow: mandible except at tip and at base brown, clypeus except the characteristic black mark, mark on inter antennal space, inner orbit up to ocular sinus broadly, ventral side of antenna, narrow line along pronotal carina, basal and lateral margin of scutellum broadly, two large marks on metanotum, small mark on upper part of mesopleuron just below subtegular area, two broad marks on propodeum separated by broad black line along median groove, inner side of tegula, fore and mid coxae in front, line on hind coxa laterally, another line below fore femur, small mark on middle femur laterally, narrow line on all tibiae above, fore and mid basi-tarsi above, T2 with large mark on each side at base and broad apical band on T2 and S2, become narrow towards middle on S2. Black: mark on clypeus at base, supraclypeal area, large circular spot above each antennal socket, mark around each ocellus, occiput, basal area of anterior face of pronotum, margins of mesoscutum narrowly but apical margin towards scutellum broadly, narrow vertical line on scutellum up to one-third from base, propleuron, dorsal metapleuron, ventral metapleuron apically towards mesopleuron broadly, mesosternum, broad median line separating two yellow marks and basal and apical margin of propodeum narrowly. Wings transparent hyaline with apical half of radial cell brown, stigma yellow.

Size (H+M+T1+T2): ♀, 6-7 mm.

Material examined: INDIA: Kerala: Kollam district, Tkm college campus, 1 ♀, Coll. Aseeb Ak & party, 1.i.2019-31.iii.2019, ZSIK Regd. No.Zsi- Inv 12311

Distribution: India: Arunachal Pradesh, Assam, Chhattisgarh, Delhi, Gujarat, Karnataka, Kerala, Maharashtra, Meghalaya, Nagaland, Rajasthan, Tamil Nadu, Uttarakhand, Uttar Pradesh, West Bengal. *Elsewhere*: Indonesia: Bangka, Java, Lombok, Sulawesi, Sumatra; Myanmar.

5. *Delta conoideum* (Gmelin, 1790)

2006. *Delta conoideum*; Gusenleitner, 694.

Diagnosis: ♀. Head above antenna and mesosoma closely and lightly punctured; clypeus pyriform, its apex truncate; metasoma smooth and shining with surface minutely aciculate.

Colour description: ♀. Head yellow except mandibles and antenna reddish, broad transverse band across apex between tops of eyes black, black mark extends behind vertex to occiput; mesosoma dark red with black patches on mesoscutum, metapleuron and median area of propodeum, propleuron entirely black; legs pale reddish; metasoma dark red with base of T2 and short transverse medially interrupted band on its middle above black; forewing basally flavohyaline and apically fuscohyaline, with slight purplish reflection.

Body length (H+M+T1+T2): ♀, 23-26 mm; ♂, 16-18 mm.

Material examined: INDIA: Kerala: Kollam district, Tkm college campus, 1 ♀, Coll. Aseeb Ak & party 1.i.2019-31.iii.2019, ZSIK Regd. No**.** Zsi Inv.12313

Distribution: India: Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Chhattisgarh, Diu, Gujarat, Jharkhand, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Meghalaya, Odisha, Pondicherry, Rajasthan, Sikkim,

Tamil Nadu, Telangana, Tripura, Uttar Pradesh, West Bengal. *Elsewhere*: Arabia, Bhutan; China, Laos, Malaysia, Myanmar, Nepal, Pakistan; Sri Lanka, Thailand, Vietnam.

6. *Allorhynchium metallicum* (de Saussure, 1852)

1963. *Allorhynchium metallicum*; van der Vecht, 1963: 60 (list).

Diagnosis: ♂. Median area of clypeus not strongly punctate, diameter of punctures almost equal or less than the distance between punctures, interspaces not carinate; T1 and T2 with very small, sparse and very thin punctures except at lateral and apical portions strongly punctured.

Colour description: Body entirely black except a yellow line in between antennal toruli and inner eye margin; tarsal claws blackish brown; wings fusco-hyaline, broadly dark fuscous with purplish reflections along costal margin of forewing.

Size (H+M+T1+T2): ♂, 10-12 mm.

***Material examined*:** INDIA: Kerala: Kollam district, Tkm college campus, 1♂, Coll. Aseeb Ak & party, 1.i.2019-31.iii.2019, ZSIK Regd. No**.** Zsi- Inv 12312

Distribution: India: Andhra Pradesh, Assam, Chhattisgarh, Delhi, Gujarat, Himachal Pradesh, Jharkhand, Karnataka, Kerala, Lakshadweep Islands, Madhya Pradesh, Maharashtra, Manipur, Odisha, Pondicherry, Rajasthan, Sikkim, Tamil Nadu, Uttarakhand, Uttar Pradesh, West Bengal. *Elsewhere*: Indonesia (Borneo, Moluccas), Maldives Islands, Malaysia (Sarawak), Myanmar, Nepal, Pakistan,

7. *Paraleptomenes humbertianus* (de Saussure, 1867)

(figure-)

1867. *Odynerus humbertianus* de Saussure, 13, ♀, ♂ (in subgenus *Leionotus* division *Epsilon*), "Insula Ceylone" (MHN).

1991. *Paraleptomenes humbertianus*; Krombein, 8 (Nest, prey and associates).

Diagnosis: ♀. Punctation very coarse and thick, especially on T1, T2 & S2; T2 with three broad humps, one at middle and two at sides pre apically; maximum width of T1 1.25x its median length; scutellum convex; metanotum oblique; clypeus long and pyriform, margined off by a carina on each side and longitudinally rugose striate between carinae.

Colour description: ♀. Black with following yellow markings: base of mandibles, transverse spots on each side of clypeus at base, vertical spot above clypeus in interantennal space, at emargination of eyes, line behind them, ventral side of scape, two spots on dorsal side of pronotum, spot anteriorly and another posteriorly on tegula, parategula, two spots on either sides of metanotum, transverse band on apical margin of T1, T2 & S2; legs reddish brown or black variegated with yellow. Pointed lamella of submarginal carina of propodeum and propodeal valvula transparent. Wings hyaline, stigma fuscous.

Size (H+M+T1+T2): ♀, 6-7 mm.

***Material examined*:** INDIA: Kerala: Kollam district, Tkm college campus, 1 ♀, Coll. Aseeb Ak & party, 1.i.2019-31.iii.2019, ZSIK Regd. *No.*zsi Inv.12314

Distribution: India: Andhra Pradesh, Karnataka, Kerala, Odisha, Tamil Nadu. *Elsewhere*: Sri Lanka.

8. *Subancistrocerus sichelii* (de Saussure, 1856)

(Figure-)

1855. *Odynerus sichelii* de Saussure, 206, male, Indes Orientales (MNHN).

1965. *Subancistrocerus sichelii* : Iwata, 105.

Diagnosis: *Female*: Size (H+M+T1+T2) 6.75 mm. Body black with pale yellowish white and brown colouration. Pale yellowish white colouration as follows: mandible towards base, a curved line on the clypeus at base, a spot between the antennae, a thick line on the scape ventrally, a small spot on the ocular sinus, a spot behind the eye on upper surface of temple, two small spots on pronotum dorsally, rarely two spots on tegula, parategula, a small spot on pointed apical lamella of sub marginal carina of propodeum, a transverse band on the apical margin of the T1, a slightly broader band on the apical margin of T2 and S2. Brown colouration as follows: mandible except basal area, pedicel and flagellar segments ventrally; wings hyaline. Clypeus with moderately deep punctures; frons closely, strongly and rugosely punctured; anterior face of pronotum with

two close set but well separated deeply impressed fovea at middle; T1 with two transverse carinae, both carinae close together at crest of declivity, the space between them laterally depressed, smooth, shining and marked with stout keels, both carinae strongly pronounced.

Material examined: INDIA: Kerala: Kollam district, Tkm college campus, 2♀, Coll. Aseeb Ak & party, 7.vii.1984, ZSIK Regd. No. Zsi -Inv. 12315 &12316.

Distribution: India: Andaman & Nicobar Islands, Arunachal Pradesh, Assam, Bihar, Karnataka, Maharashtra, Meghalaya, Odisha, Sikkim, Tripura, Uttarakhand, West Bengal. *Elsewhere*: Bangladesh, Myanmar, Sri Lanka, Thailand.

Family SPHECIDAE

9. ***Chalybion bengalense*** (Dahlbom, 1845)

(Figure-)

1949. *Chalybion bengalense*; Krombein, 3869, Gilbert Is.

***Diagnosis*:** *Female* (Figure 1): Clypeus sparsely rather finely punctate, apically with five lobes; frons densely coarsely punctate to rugose punctate (Figure 2); pronotal collar with anterior vertical part laterally with smooth furrow, which not sharply delimited anteriorly, but fades gradually; scutellum without median impressed line; propodeum (Figure 4) medially transversely strigose, with shallow punctures, laterally rugose-punctate;

third submarginal cell anteriorly 1.3-2.9x as wide as second (Figure 3); petiolus weakly curved, nearly as long as hind basitarsus; S4 at most anteriorly with small patch of micro pubescens.

Colour description: Integument blue to greenish blue; antennae black; legs largely violaceous; wings light brownish hyaline with apical third lightly infuscated. Propodeum with apico-lateral spots of white tomentum.

Length (H+M+T1+T2):14-18 mm

Male: (Figures 5, 6). Clypeus apically with three small teeth; antenna with placoids on fifth or sixth to ninth flagellomere; S8 with slender apical process; aedeagus with teeth along outer ventral margin. Length (H+M+T1+T2): 10.5-16 mm.

***Material examined*:** INDIA: Kerala: Kollam district, Tkm college campus, 3 ♀, 3♂, Coll. Aseeb Ak & party 1.i.2019-31.iii.2019, ZSIK Regd. *No.* Zsi - Inv. 12318-12323

Distribution: India: Andhra Pradesh (New Record), Arunachal Pradesh (New Record), Assam , Chhattisgarh (New Record), Delhi , Gujarat (New Record), Jharkhand (New Record), Karnataka, Kerala, Maharashtra, Madhya Pradesh (New Record), Meghalaya, Odisha, Punjab (New Record),

Sikkim, Tamil Nadu, Tripura,Uttarakhand, Uttar Pradesh, West Bengal. *Elsewhere*: Widely distributed.

Family AMPULICIDAE

10. ***Ampulex compressa*** **(Fabricius,1782)**

(Figure-)

Diagnosis: Female: Length: 15-22 mm. Body and legs shining metallic blue, abdomen sometimes purplish, mid and hind femora light red, antennae and mandible black, wings slightly infumated, vestiture whitish. Head with temple narrow, not thickened and angulate beneath posteriorly, eyes converging above, least interocular distance equal to length of second flagellar segments; face with narrow median area delimited below by a strong carina from antennal tubercle extending upward, becoming evanescent above where it passes behind fore ocellus; frontal punctures moderately large, more separated on median area than laterally; vertex with moderately large, subcontiguous punctures and a short median grove; occiput with fine, close punctuation; first flagellar segment 0.9 times combined length of second and third segments.

Pronotal disk with a median furrow, some delicate transverse rugulae on anterior two-thirds, a low, rounded anterolateral tubercle and a stronger narrower median tubercle on posterior margin; mesopleuron without sternaulus; forwing with three submarginal cells.

Abdominal petiole short, extending two-thirds distance to apex of hind coxa; most of disk of second tergum with scattered small punctures, dense fine punctures only on narrow lateral strip.

***Material examined**:* INDIA: Kerala: Kollam district, Tkm college campus, 1 ♀, Coll. Aseeb Ak & party, 1.i.2019-31.iii.2019, ZSIK Regd. *No.* Zsi-Inv 12324

Distribution: INDIA: Kerala, West Bengal, Meghalaya, Maharashtra, Andaman and Nicobar Islands, Philippines, Sri Lanka, China, India, Moluccas, Borneo, Singapore, Sumatra, Java, Sulawesi, and Ambon, (southern Arabia, Saudi Arabia);

Family CRABRONIDAE

11. ***Trypoxylon prominence*** Tsuneki1979

(Figure)

Diagnosis: Female: 12-13 mm. Black A1, 2 and sometimes A13 pale brown at apex, mandible ferruginous, at base black and at apex brown, palpi, knee, basal half of tibia in front and tarsus except brown patch on T3 of fore leg, base of tibia, T1 and 2 of mid leg and bases of tibia and T1 of hind leg and all tibial spars whitish ochre yellow; apices of all tibiae, mid T3 and 4, articulations of hind tarsus, claws and their attaching areas of all legs pale brown; all arolia dark brown to black, posterior part of collar half discolored, castaneous brown, tegula transparent pale yellowish brown, gaster from apical area of petiole to base of G4 reddish ferruginous, wing veins dark brown, hairs silvery, on clypens at base convergent towards

medial line.HW,HL,I0Dv,A3,P=100,48,23,24,152, 00D,0d,P0D=l,3,2, IODs=3:2(lO:6.7), A3= *AWX5.5,* Frontal elevations moderately high, median furrow moderately deep, SAT low nasifom, anteriorly flattened, with apical margin transversely roundly curved and acutely edged, ASR highly raised, anteriorly bicarinate, surface transversely striate, PAF deep, flat-bottomed, the structure seen vertically: occipital carina complete, not depressed nor weakened behind buccal cavity. Collar nearly straightly raised towards middle and tuberculate there, seen from above considerably incrassate laterally, lamina on side triangularly produced; subalar area normal, outer margin of its posterior part acutely edged and carinate, but not expanded; propodeum without lateral carinae, area dorsalis with very weak lateral furrows, area apicalis not completely enclosed with carina, its lateral carinae weaker forwards, on dorsal part ob olete, roundly raised, with the marginal area narrowly discolored; petiole flask-shaped, P,Ma,Mi,2(Ma),3(Ma)=100,18,6,32(22),33(30), in fore wing RC C-type, R1 short, CVl=CV2x5-6, TCV weakly sinuate, TCV:CV2=5:3 angle at the comer roughly about 90°.

Frons distinctly micro reticulate and fairly closely superimposed with small shallow punctures, PIS=PDXl-2, mesoscutum with fairly strong plumbeous shine, punctures not very fine, somewhat sparse, mostly PIS=PDX2-3, propodeum with distinct lateral series of striae, median and lateral furrows of area dorsalis transversely striate, posterior inclination posteriorly transversely rugosostriate, sides scattered sparsely

with very fine hair-points, mixed posteriorly with weak sparse striae.

Male: 9.5 mm, Generally similar to Female, but fore tibia only at base yellowish white, mid tarsus wholly dark brown except apices of each joint where somewhat pale, claws brown to dark brown, G2-3 broadly blackish above. Hairs on clypeus parallel. RC of fore wing intermediate between C- and B- types, on side above of propodeum with a trace of lateral carina, feebly defined in certain light.

HW,HL,I0Dv,A3,A13,P=100,50,25,l6,22,130, 00D,0d,P0D=l,3,2, A3=AW, RC C-type, but near to B-type, R1 short, TCV weakly sinuate, angle about 90 degree , Punctuation similar to that of female.

Material examined: *INDIA:* Kerala: Kollam district, Tkm college campus, 1 ♀, 2♂, Coll. Aseeb Ak & party, 1.i.2019-31.iii.2019, ZSIK Regd. No. Zsi - Inv 12325-12327

Distribution: India, Laos, Malaya, Vietnam

In the present study eleven species of wasps in nine genera representing four families (Vespidae, Sphecidae, Ampulicidae and Crabronidae) were recorded. The family Vespidae recorded eight species under six genera. The family Sphecidae, Ampulicidae, and Crabronidae recorded with one species under one genera each

Sl No	Family	Genera	Species
1	Vespidae	**1.** *Polistes* **2.** *Ropalidia* **3.** *Delta* **4.** *Allorhynchium* **5.** *Paraleptomenes* **6.** *Subancistrocerus*	**1.** *Polistes (Polistella) stigma tamulus* (Fabricius, 1798) **2.** *Polistes (Polistella) strigosus atratus* Das & Gupta **3.** *Ropalidia brevita* Das & Gupta, 1989 **4.** *Ropalidia jacobsoni* (du Buysson, 1908) **5.** *Delta conoideum* (Gmelin, 1790) **6.** *Allorhynchium metallicum* (de Saussure, 1852) **7.** *Paraleptomenes humbertianus* (de Saussure, 1867) **8.** *Subancistrocerus sichelii* (de Saussure, 1856)
2	Sphecidae	**7.** *Chalybion*	**9.** *Chalybion bengalense* (Dahlbom, 1845)
3	Ampulicidae	**8.** *Ampulex*	**10.** *Ampulex compressa* (Fabricius,1782)
4	Crabronidae	**9.** *Trypoxylon*	**11.** *Trypoxylon prominence* Tsuneki1979

CONCLUSIONS

Wasps have to be catalogued because of their economic importance. In determining the fauna of a country, faunistical studies on small regions is very important because individual habitats and the micro climate in a small region plays an important role on the distribution of insects. These wasps are mainly feared by humans due to their overrated stinging powers and their close association with human habitats results in the destructions of nests by humans. These wasps perform many ecological roles as predators, pollinators, bio control agents and biodiversity indicators (Gayubo *et al*., 2000). Present study has revealed valuable information on the wasps of TKM Campus and nearby areas and future studies may result in further elaboration of the diversity of wasp species. Also studies on the ecology of these diverse wasps need to be carried out.

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