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TO INVESTIGATE THE PREVALENCE & DISTRIBUTION OF PREDATORY INSECT, HIERODULA PATELLIFERA A PROMINENT SPECIES OF PRAYING MANTIS (INSECTA: MANTODEA) IN QUETTA AND PISHIN DISTRICTS OF BALOCHISTAN, PAKISTAN.

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Abstract:

A field study was conducted in order to investigate the Prevalence and Distribution of predatory insect, Praying mantis (Insecta: Mantodea) in Quetta and Pishin Districts (Balochistan) during peak seasons, in the months of April to September repeatedly over a period of two years (2010-2011). Specimens of Praying mantis were collected from six major areas of district Quetta (Urak valley, Hanna village, Chashma Achozai, Kuchlak, Hazar Ganji national park and University of Baluchistan), where as in Pishin district and its interior (Pishin town) and other sites namely Bostan, Khanozai, Saranan, Mughtiyan and Bershore as well. The identification of mantis specimens collected showed that one prominent genus belonging to same tribe Mantodea and single family Mantidae prevailed in these areas. The identified species was Hierodula patellifera which is first time recorded from Balochistan. Which is, therefore, fresh addition to the mantid fauna of Balochistan, Pakistan. A large number of specimens were collected from Pyrus malus, alfalfa as well as Brassica campestris, and the majority of them were observed feeding on Homopterans such as aphids, scale insects, leaf hoppers and whiteflies.

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INTRODUCTION:

The praying mantis or mantids (Insecta: Mantodea) is one of the most important entomophagous insects worldwide and play a vital role in the natural control as well as one of the significant economic value insect used in agriculture. It is also known from another common name is "Praying mantis" (Watkins & Bessin 2003) showing prayers like posture and grooming behavior. Their colors vary from green to pinks with many being pea-green to brown depending on the environment they are living in (Hurd, 2003). They make use of protective coloration and camouflage in order to blend in with foliage and even mimic to leaves, sticks, as well as blades of grass, ground and even flowers to protect themselves from their enemies (predators). Members of the sub-order mantodea are notable for their generally large size for insects, ranging from one centimeter (0.4inches) to more than 17 centimeters (6.7inches) (Grzimek et al,2004). Females are generally known to be larger having twice the size of males (Grzimek et al,2004). Like all insects, Mantids have a three-segmented body with head, thorax, and abdomen. They are characterized by having raptorial forelegs, ultrasound ear on metathorax and posses one ear located on the ventral midline of meta-thoracic legs.

It has a remarkable sense that almost can hear the noise up to 60 feet away. Leathery forewing, irregular male genitalia as well as eggs in spume enclosed ootheca (Tol, 2003). The abdomen has ten segments and surrounded by two pairs of wings while some mantises are wingless, head in most species of mantis is triangular and can be turned within 180 degrees because of elastic collar muscles, having two large compound eyes three simple eyes, stretched out, segmented antennae are present in majority of genus in other species antenna is feathery (Grzimek et al, 2004).

In addition to these characters, mantis has defense mechanisms against predators in that they pinch or bite or use a frightening demonstration, including propelling forelegs, moving wings, as well as mouth opening to scare predators (Grzimek et al, 2004).

Mantises are extensively found in tropical, subtropical as well as in moderate regions of the world; no mantises are found in tundra type of weather. (Grzimek et al, 2004). Many species found in different areas such as South Africa, Europe, the Southern parts of Asia, North and South America and some parts of Australia (Daniels and Hedge, 1985). There are approximately 2300 described mantises species divided into eight (Beier 1968; Preston Mafham, 1990) to fifteen families (Ehrmann, 2002). Mantidae is a major family. Praying mantis mate in autumn. The male of the species is much smaller than the female. Mantises have Hemi metabolic system, while in young stages they are alike to adults (Balderson, 1991).Mantises in the immature stage have no wing as well as reproductive system, nymph increases in size, changing its external body casing by strong, elastic exoskeleton as well as molting while required. The process repeats from five to ten times, and differ from species to species. In last molt complete wings appear on its body. Some species have no wings in females. In most species, the female lays 10 to 400 eggs (Beckman, and Hurd, 2003). Ootheca is a hard protective shell for survival during winter. The young mantis emerges during spring and their first meal is of their own siblings. One generation develops each season. It takes an entire summer for a mantis to mature into adulthood (Elgar and Nash 1988). Females exhibit foraging strategy to increase fecundity, so in this way, it beheads males while copulating, even cannibalized male keep on mating with no head (Grzimek et al, 2004). Numerous hypotheses are anticipated to elucidate *the* development of sexual cannibalism as adaptive foraging tactic, which provides female energy to improve productiveness (Elgar and Nash 1988).

Several studies support some of these predictions about cannibalism (Elgar and Fahey, 1996). Sexual cannibalism enhanced productiveness of female Praying mantis (Grzimek et al, 2004). Mantises are considered as desirable insects too numerous farmers predator to several injurious pests. Many farmers avoid chemical pesticides always persuade mantises in order to check pest population biologically as well as naturally (Beebe and Crane, 1952). Mantises egg cases are sold in some garden stores for this purpose. (Sinensis, 1990). Especially, these mantises widely used as a natural check to detrimental insects, in China people used mantises for games, prayerful appearance used to understood as assistance for travelers to find out their way to home. (Grzimek et al, 2004).

MATERIAL AND METHOD:

Area of study

Two districts of Balochistan province i.e. Pishin and Quetta were selected for sampling and documentation of Praying mantis or mantid (Mantidae) so that, to describe the distribution as well as a number of species in selected localities.

Survey

The survey was conducted during summer seasons 2009 to 2011 to collect Praying mantis from various localities of the said districts. Each locality was repeatedly sampled from April to October to ensure

that the overall landscape of that locality is represented.

Statistical Application

A t-test was applied using statistical tools and methods for the statistical analysis of data.

A total of 380 specimens were collected from various floras among which 79 were sampled only from *Pyrus malus, alfalfa as well as Brassica campestris* plants.

Several methods were used to collect Praying mantis depending on the type of habitats sampled, however, in some localities, more than one method was used for insect sampling (Fleming, 2000). Adult specimens were collected using aspirator sweep-net, and simply by hand picking (Stoll, 2003 and M. H Soomro *et al*, 2006). After that, they were pulled in the bottles with some leaves of plants so that they may handle themselves easily with the leaves in the bottle (Mukherjee *et al*, *1993*) and brought to the laboratory for further detailed investigation. After collecting the insects they were killed by using cotton made spheres dipped as well as afterward pressed in ethyl acetate liquid than in polythene bags or by introducing ethyl acetate and cyanide either in the killing bottle (Beier, 1968). Subsequent to killing the mantises were pinned/ hardened, stretched and placed in insect collecting box (Soman *et al*, 2000) and their photographs were taken by digital camera. Insects were placed in a desiccator for softening of the specimen, then in Petri dishes and were identified from Keys, relevant literature and with the help of a supervisor and an external Professor Dr. Saeed Ahmed Wagon from Department of Zoology, University of Sindh Jamshoro, Pakistan.

Keys used for identification

1. Key to Praying mantis in New Zealand by Ramsay GW-1984.
2. Dichotomous Key to Species of mantids by Blanchard, Florida.
3. Praying mantis Key: The mantids impact on Arthropoda population organization. Magazine of animal ecology, 53 (03).269-283**.**
4. Key to Praying mantis (Insecta: Mantodea) proceedings of entomological society of Washington (Beutel, 2000).
5. Key to the families of Praying mantids found within Sindh by N. M Soomro, M. H Soomro, and M.S Wagon, 1995.

Desiccator used in the study of Praying mantises

Figure. 1. indicates the presence of *praying mantis* in Desiccator for softening of body parts in order to identify the various physical characteristics of Hierodula *patellifera* species of *praying mantis.*

Table.1. Indicates the total number of collected specimens of various species of praying mantises from different localities of district Pishin.

Name of collection sites	**Number of specimens captured**
Pishin town	24
Bostan	35
Khanozai	27
Saranan	23
Mughtiyan	17
Bershore	19
	Total: 145

Table.2. Indicates the total number of collected specimens of various species of praying mantises from different localities of district Quetta.

Name of collection sites	**Number of specimens captured**
Urak valley	46
Hanna village	18
Chashma Achozai	48
Kuchlak	35
Hazarganji National park	56
University of Balochistan Quetta	32
	Total: 235

Table .3. Indicates the Praying mantis *Hierodula patellifera* and its host plants in various localities of district Quetta and Pishin of province Balochistan.

S.No	**Insect Species**	**Host plants**
1	*Hierodula patellifera.*	*C.dictylon Grasses , Brassica campestris, Prunus armeniaca, Medicago sativa, Zea mays, Solanum lycopersicum, Pyrus malus, Alfalfa , Halanthus* sp *,Peganum harmala, Triticum aestivum, Helianthus annuus, pissum sativum , Acacia nilotica, Vitis vinifera,Pistacia khanjak, Rosa indica*

RESULTS AND DISCUSSION:

Status of prevalence and study of *Hierodula patellifera* in Balochistan

No comprehensive work has been done on the prevalence and distribution of praying mantises of Balochistan and Pakistan. Information on the said subject matter on praying mantis is meager but some work is available from Sindh province (Soomro N.M; M.S Wagan and M.H Soomro 2000) and there are no reports on prevalence and distribution of praying mantis in Balochistan province. The only genera reported during the present investigations include following genera. This is the first attempt conducted for the search of praying mantis from Quetta and Pishin districts of Baluchistan. During the present study six species belonging to one tribe, one family and six different genera were recorded and one of them, *Hierodula patellifera* is described here.

Figure. 2. Indicates the presence of collected and identified species of *Hierodula patellifera in* Petri dish for measurement and identification of various body parts of above Praying mantis.

Identified Body parts

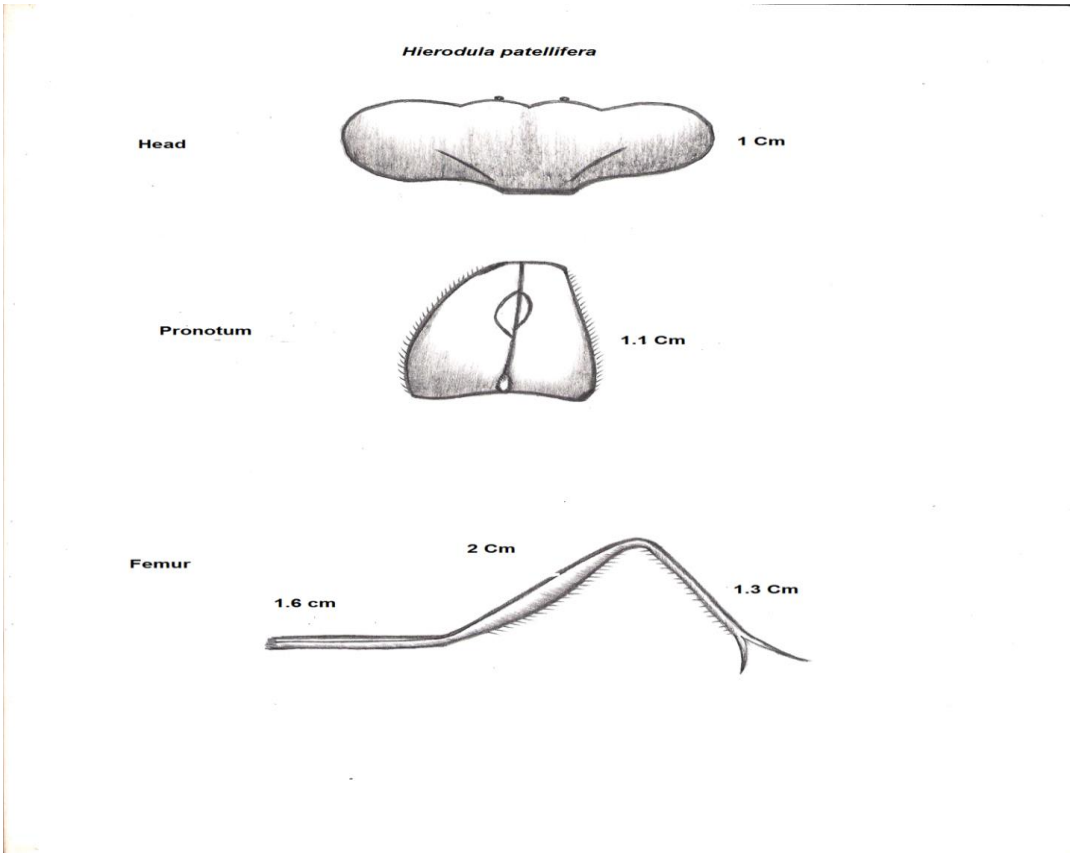

Figure. 2. Indicates the three prominent identified body parts including Head, Pronotum, and Femur, showing their accurate measurements of body parts *Hierodula patellifera.*

The genus *Hierodula* was reported by Burmeister (1838). *Hierodula patellifera* was described by Servile, (1839). It also named Giant Asian Mantis. The same species according to Servile (1839) is also

reported from China, Africa, Tokyo, central India, Vietnam, Korean states, and Manila. The colors of this mantis fluctuate by green to brown. This species is created in South Asia as well as is one of the largest mentis in size. Their usual size is about 10 centimeters (3.9 in), excluding extended forelegs (Ghate and Ranade, 2002. Biodiversity of mantids, Insecta).

Similar to other insects praying mantis has an exoskeleton (Servile, 1839). Molting is a common factor in mantises they continue this process during growth to reach maturity stage (Prete, 1999). In the molting process mantises restrict their movement for safety purpose (Beier et. al, 1935). These mantises reproduce sexually but with rare parthenogenesis capability (Serville, 1839). Gender female is easily recognized by male due to its larger abdomen has six segments, whereas males have eight (Mohammad and Ehrmann, 2011). *H. patellifera* has a much larger abdomen (Mukherjee et. al, 1992). An adult female usually lay numerous eggs called ootheca (Burmeister, 1930). Accordingly, 130 to 150 nymphs are produced within eight weeks time period (Serville, 1839).

In the present studies *Hierodula patellifera* was recognized on the basis of the head (1cm) and pronotum (1.1cm) as well as the key used in studies. It was found in all localities of district Pishin (Table .1) selected in the present study (Pishin town, Bostan and Bershore) and the same species was also found in the localities of Quetta district (Urak valley, Kuchlak and Hazarganji Park) as shown in (Table .2). This species was found on a wide range of vegetation such as *Pyrus malus*, *Brassica campestris*, *Solanum melongena*, *Prunus persica*, *Morus Negra Pistacia khanjak*, bushes and weeds (Table.3). It was also recorded that, it is an aphidophagous Praying mantis feeding voraciously on aphids but also having cannibalistic behavior.

CONCLUSION:

During the study, a total of this species was reported from said localities belonging to one tribe Mantodea, one family Mantidae and one genus i.e. *Hierodula patellifera*. The result of the present study for the occurrence and distribution of Praying mantis (Insecta: Mantodea) revealed that *Hierodula patellifer* was recorded for the first time from Balochistan. Previously, Uvarov (1929) reported a new praying mantis species *Microthespis transit* which was collected by Evans, (1929) at Quetta and given to the British Museum, described as a single male having 30mm length from Balochistan which was not collected in the present studies. This is the first-ever study on Praying Mantis in Pishin and Quetta districts of Balochistan. The areas surveyed in this study include Pishin town, Bostan, Khanozai, Saranan, Mughtiyan, and Bershore, of the Pishin district and Urak valley, Hanna village, Chashma Achozai, Kuchlak, Hazar Ganji national park and the University of Baluchistan, of Quetta district. The major species recorded from these localities were *Hierodula patellifera*. It was found from all selected localities in large number on a greater range of vegetations.

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