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Asma Akbar
Department of Zoology,
Hazara University Mansehra,
Khyber Pakhtunkhwa, Pakistan

Sardar Azhar Mehmood
Department of Zoology,
Hazara University Mansehra,
Khyber Pakhtunkhwa, Pakistan

Waheed Ali Panhwar
Department of Zoology,
Hazara University Mansehra,
Khyber Pakhtunkhwa, Pakistan

Shabir Ahmed
Department of Zoology,
Hazara University Mansehra,
Khyber Pakhtunkhwa, Pakistan

Sadia Tabassum
Department of Zoology,
Hazara University Mansehra,
Khyber Pakhtunkhwa, Pakistan

Shahjahan Rajput
Department of Entomology,
University of Agriculture
Faisalabad, Pakistan

Muhsin Ali
Department of Zoology,
Hazara University Mansehra,
Khyber Pakhtunkhwa, Pakistan

Correspondence
Asma Akbar
Department of Zoology,
Hazara University Mansehra,
Khyber Pakhtunkhwa, Pakistan

Collection and identification of genus *Anax* (Odonata, Aeshnidae) from district Swat

Asma Akbar, Sardar Azhar Mehmood, Waheed Ali Panhwar, Shabir Ahmed, Sadia Tabassum, Shahjahan Rajput and Muhsin Ali

Abstract
An extensive field survey was carried out to collect dragonflies of genus *Anax* from Swat during the year 2016-2017. A total of 251 specimens were collected and sorted out into family Aeshnidae genus *Anax* and species *Anax imperator,* Leach, 1815 and *A. parthenope* (Selys, 1839) respectively. Additionally, morphologically characters along with distributional data are provided.

Keywords: *Anax,* odonata, identification, distributional data

Introduction
The fauna of order Odonata of Pakistan has not been much explored
as compare to other countries [1]. Current information of Odonata fauna of Pakistan is very limited and outdated [2] who collected and identified 46 species of anisoptrous dragonflies from various localities of Pakistan. During 1972, 46 species and subspecies belonging to 24 genera of 6 sub families of anisoptera dragon flies were collected and identified from various localities in Pakistan [2]. In the world, more than 1000,000 species described and estimated 5000,000 extant species have been recorded [3]. Insects represent the most diverse animal taxon on earth [4]. According to [5] eight super families, 29 families and some 58 sub-families of dragonflies for approximately 600 genera and 6000 named species have so far been described all over the world [6] With 5,680 extant species, dragonflies are a relatively small order of insects. Their size and color and their diurnal and often conspicuous behavior make them a popular group for both professional and amateur entomologists [7]. Dragonflies have been considered as indicators for the ecosystem health of freshwater wetlands. For the useful functioning of dragonflies as indicators, it is, however, very important to identify species compositions in specific habitats [8]. Family Aeshnidae is regarded as diverse group of Odonates with worldwide distribution. The members of this family comprise of 384 species [9, 10]. Aeshnidae are excellent flies with confluent compound eyes and a prominent ovipositor. Many authors have carried out significant work on the Aeshnids of world including Pakistan i-e [2, 11-22]. Aeshnidae fauna of Swat district is yet unexplored. Therefore the present investigation was carried out for. The collection and identification of genus *Anax* (Odonata, Aeshnidae) from District Swat.

Materials and Methods
Collection and preservation
Aeshnidae were collected by random sampling from five localities of Swat by using aerial nets during the year 2016-2017. The specimens were killed by using potassium cyanide and were pinned, body parts were stretched on stretching board. Dried material was preserved into insect cabinets.

Identification of samples
For the identification of specimens were examined under stereoscopic microscope. Identification was done by using keys provided by (Fraser, 1933-36), [22], and [28].

Results

Anax imperator Leach, 1815

Fig.1

Diagnostic character

The emperor dragonfly (*Anax imperator*) is Britain's largest dragonfly; they were a spectacular sight with their broad wings and powerful flight. After emerging, both sexes were pale green with brownish markings. The legs were brown, becoming yellowish towards the base; the wings had black veins, and take on a yellowish-brown tinge with age. Males developed a bright blue abdomen with a black 'fish-bone' line passing down the centre; the thorax and head were green and the prominent eyes were blue. Females had similar markings to males, but mainly green in colour, becoming brownish on the last few segments of the abdomen. Both sexes possessed appendages at the tip of the abdomen known as 'claspers', which were used in mating; in males these claspers were more robust than in females. The larvae or 'nymphs' were brownish in colour and had stocky bodies with rounded heads that feature very large eyes.

Morphometry: Total body length; 67.19mm, both wings span; 96.44mm.

Habitat and Distribution

The emperor dragonfly breeds in a range of aquatic habitats including large ponds, canals, slow-flowing rivers, lakes, flooded gravel pits, and dykes, but in all cases there must be a plentiful supply of marginal vegetation that emerges from the water. These species had a broad global distribution; it is found in Europe from Portugal to Germany in the north, and extends eastwards to central Asia. It is also known from North Africa and the Middle East. In Britain, it is fairly widespread in southern England and south Wales, but becomes quite scarce in the north Midlands, although there are signs that the species is currently extending northwards. At the present *Anax imperator* reported from five localities including Valley Shawar, Matta, Mingora, Fizaghat and Rahimabad (Table 1).

Fig 1: *Anax imperator*

Anax parthenope (Selys, 1839)

Fig. 2

Diagnostic character

Head was depressed, broad and rounded in appearance, its hind angles low and broadly rounded, with hind margin between them slightly concave. Eyes markedly flattened dorsally, longer than wide, their posterior margins almost straight, with inner corner elongated and tapering. Third antennal segment was longest of all segments. Labium with its hinge reaching the meta-coxae, its prementum three times longer than its basal width (excluding labial palpi); median lobe bordered with a fringe of hair and its closed cleft with open end; lateral lobes narrowly elongated, with very strong, curving movable hooks, which had a line of fine spinules on its upper surface (when seen under high magnification), their ends truncate and terminate in an inner robust tooth, their inner and front sides having minute, granular reddish-brown dents. Prothorax was narrower than hind margin of head. Wing-pads were not divergent. Legs were long and slender, with apices of tibiae having tridentated setae. Abdomen Elliptical, lateral spines on segments 7-9 increasing in size posteriorly, those of 9th almost reaching the end of lateral sides of 10th, caudal appendages slightly longer than the total dorsal length of segments 8-10, epiproct shorter than paraprocts, carinated dorsally and rectangularly notched at tip, paraprocts and lateral spines with sharp black tips, cerci less than half the length of paraprocts.

Morphometry: Total body length; 59.4mm, both wings span; 78.05mm.

Habitat and Distribution

These dragonflies were collected from stagnant water and water running very slow with small vegetation. These were strong flier difficult to collect from open area but can be collected when coming out through dense vegetation. This species had also been reported from Throughout the Oriental, Australian regions, Pacific islands India, Thailand, Gilgit, Shigar, Shingrilla and Skardu. At the present *Anax parthenope* reported from five localities including Valley Shawar, Matta, Mingora, Fizaghat and Rahimabad (Table 1).

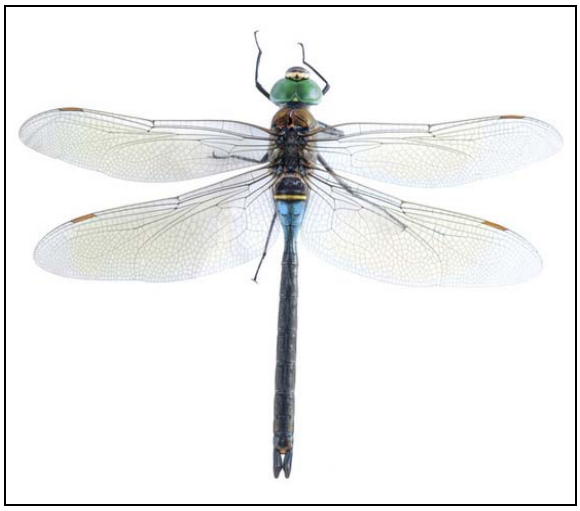

Fig 2: *Anax parthenope*

Discussion

During the present study 251 specimens of dragonflies were collected form five localities of Swat district during year 2016-2017. The materials were sorted out into family Aeshnidae with single genus *Anax* with two species i-e *Anax imperator* and *Anax parthenope.* [2] Sampled and identified 64 and species and subfamilies pertaining to 06 subfamilies and 24 genera from different localities of West Pakistan. [24] Collected and identified 162 species of Odonatan fauna from Western Himalaya. [25] Collected 1349 specimens of Odonata belonging to 05 families, 39 genera and 65 species from

Pakistan during the year (2005 – 2009), his study indicates that the family belonging to the family Aeshnidae and Libellulidae were distributed throughout the Pakistan. [26] Collected 19 species of odonata from district Poonch Azad Jammu Kashmir Pakistan. [27] identified 6 species of Anisoptera (Odonata) from district Mansehra. [27] reported 22 dragonfly species from Murree hills. [20] collected and identified 318 specimens 11 species and 3 families from district lower Dir, Khyber Pakhtunkhwa, Pakistan. Therefore, Aeshnidae (Dragonflies) are considered to be an important for the present study due to their huge biodiversity. Hopefully, present study will be a base line for the future researchers connected with Aeshnid fauna.

Table 1: Showing the Number Aeshnids of samples collected during the year 2016-2017

Localities	*Anax imperator*	*A. parthenope*	Total(n=251)	%
Mingora	35	22	57	23%
Fizaghat	30	20	50	19.9%
Shawar	35	15	50	19.9%
Rahimabad	25	20	45	17.9%
Matta	30	19	49	19.5%

Conclusion

Family Aeshnidae with genus *Anax* and species *Anax imperator,* Leach, 1815 and *A .parthenope* (Selys, 1839) have been studied. Finding of present study provide a base line for future researchers concerned with this group.

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