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NOTE

ON THE DISTRIBUTION OF *AESHNA PETALURA* MARTIN, 1908 (ODONATA: ANISOPTERA: AESHNIDAE) IN THE INDIAN SUBCONTINENT

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On the distribution of *Aeshna petalura* Martin, 1908 (Odonata: Anisoptera: Aeshnidae) in the Indian subcontinent

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A total of 31 species of the genus *Aeshna* is known from the world (Schorr & Paulson 2015), but only three species of the genus have been recorded from India, namely, *Aeshna juncea mongolica* Bartenef, 1929, *Aeshna mixta* Latreille, 1805, and *Aeshna petalura* Martin, 1908 (Subramanian 2014). A montane species *Aeshna petalura* was originally described by Martin (1908) based on two females taken from India, from the Darjeeling and Khasi hills. Further, Fraser (1933, 1936) stated that "there is a female in the British Museum from Phulloth, Sandakhpurna, Sikkim alt. 11,500 ft., taken by Mr. C.M. Inglis on October, Martin gives Inde, Darjeeling and the Khasia Hills as localities, but the altitude at which Mr. Inglis took his specimens rather suggests that Sikkim and Thibet are more probably its habitat".

Later on Schmidt (1968) studied specimens taken from Aus der Provinz Kameng (presently in Arunachal Pradesh, India), seven females from Phutang (2,300m), on October, 1961 and three males and two females from Moshing (2,900m), collected on October 1961. Subsequently, Asahina (1983) examined materials from Nepal, Bhutan, India (Darjeeling and Schmidt's collections from Kameng) collected between the year 1963 to 1981 (August to November), but most of the specimens were collected during the month of October. In addition, he stated that the majority are females (28 examples) whereas only five were males and all the materials were collected between 2,200–3,000 m. He also studied the larval specimens from Nepal and India. Interestingly, he found out a dimorphism in the cercal structure, i.e., the great majority of the female specimens examined have very broadly foliated cerci, 6–7 mm in length, whereas a few have very short, ca. 2mm ones, which are somewhat twisted and apparently rather reduced in structure.

Asahina (1938) described *Aeshna taiyal* as a new species from the Northern High Peaks, Taiwan. All the specimens were collected between 1,970–3,200 m. Later Asahina (1983) revised it and stated as a subspecies of *Aeshna petalura* (i.e., *Aeshna petalura taiyal* Asahina). It was recorded from various places in Taiwan (Matsuki & Lien 1991). Later Schorr et al. (2004) stated this taxon as a synonym of *Aeshna petalura.* This is accepted by some researchers (e.g., Wilson 2005), but not by others (e.g., Dow 2009). Hence further studies should be focused to compare the specimens of both taxa; it may reveal the validity of subspecies *A. petalura taiyal*.

After Asahina (1983), any *A. petalura* specimens has not been recorded or collected from India. After a gap of more than 25 years a single ovipositing female

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of this species was collected by the second author from the Tawang Region of Arunachal Pradesh but it slightly varies from Fraser's (1936) description. Due to the unavailability of more specimens, it is tentatively confirmed that the specimen belongs to *Aeshna petalura* Martin until further collections. The studied specimen is deposited at the Zoological Survey of India, Kolkata.

***Aeshna petalura* Martin, 1908 (Image 1, Figs. 1a & 1b)**

Aeshna petalura Martin (1908), Cat. coll. Selys (Aeschnines), fasc. XVIII pp. 78–79, 84; Laidlaw (1922), Rec. Indian Mus., 22: 87, 89; Fraser (1922), J. Bombay nat. Hist. Soc., 28: 111; Laidlaw (1923), Proc. US nat. Mus., 62(21) : 18–19; Needham (1932), Rec. Indian Mus., 34: 215; Fraser (1933), J. Bombay nat. Hist. Soc., 36: 463–464; Fraser (1936), Fauna of British India - Odonata, 3: 128–130; Schmidt (1968), Tombo, 11(1–2): 5–6; Asahina (1983), Tombo, 26(1–4): 2–11; Vick (1989), Opusc. Zool. Flumin., 43: 9; Sasamoto & Ushijima (2000), Aeschna, 37: 5; Wilson (2005), Int. J. Odonatology, 8(1): 114; Mitra (2008), Fraseria, 7(1-2): 105–107.

Material examined: ZSI Reg. No. 4870/H13, 1 female (ovipositing), 27.x.2007, Arunachal Pradesh: Tawang: 5km before Ghusela Village on the way to Bumla, 27.691274^{0}N & 91.848840^{0}E, elevation 4,255m, coll. G. Srinivasan.

Description: Abdomen 58mm including anal appendages; Anal appendages: 9mm; Hindwing 48mm. Head: Labium bright ocherous; labrum dark olivaceous with darker anterior border; face and frons dull olivaceous; upper surface of the frons bright ocherous changing to brownish-black at the base. Eyes bluish green when alive. Prothorax dark brown. Synthorax pale brown or reddish brown marked with yellowish-green stripes: curved antehumeral stripes broadening below, converging above; a broad stripe on the middle of mesepimeron and the whole of metepimeron. Legs black. Wings hyaline, very palely enfumed throughout with yellowish-brown except a space anterior to the node to posterior corner of the wingpassing through the distal side of discoidal cell. Pterostigma dark blackish-brown covering 2½ cells, and braced. Discoidal cell in hindwing is much shorter and broader than the forewing; the base of discoidal cell in the hindwing is more than 2/3 the length of costal side but half the length of costal side of forewing. Discoidal cell five celled in forewing and four celled in hindwing, basal cells divided into two cells; hypertrigone traversed three times in forewing and twice in hindwing; 12 cells in anal loop; 6–7 cubital nervure in forewings and five in hindwings.

$$\text{Nodal index: } \frac{\text{12-19/19-12}}{\text{13-12/13-13}}$$

Abdomen cylindrical, blackish-brown to black marked with yellowish-green; segment 1 with an oval shaped spot on the dorsum at basal end and a greenish-blue mark with black spots at apical end; segment 2 with mid-dorsal stripe extending from the base nearly to the apex tapering towards the latter, a pair of linear spots on apical side of jugal suture and a pair of greenish-blue apical lunulae; segments 3–7 with a mid-dorsal basal triangular spot and a pair of apical lunulae; segment 8 with a pair of apical lunulae only; segment 3–7 with a latero-basal spot on each side; segment 9 with a lateral oval spot on each side and 10 unmarked. Anal appendages dark brown shaped like the broad paddle of canoe, flat and laminate; ovipositor very robust.

Distribution: India: Arunachal Pradesh—Kameng: Phutang and Moshing (Schmidt 1968; Asahina 1983); West Bengal—Darjeeling: Phalut, Sandakphu (Fraser

Image 1. *Aeshna petalura* Martin, 1908 - Female

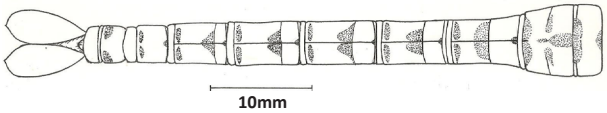

Figure 1a. Dorsal view of abdominal markings and anal appendages of female *Aeshna petalura*

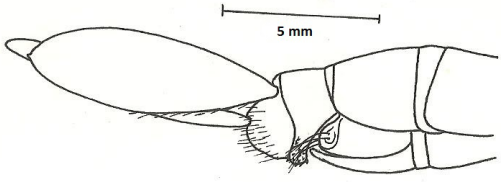

Figure 1b. Right lateral view of anal appendages and ovipositor

Image 2. Collection locality and habitat of *Aeshna petalura*

Image 3. *Aeshna petalura* Martin, 1908 - Egg laying on the short vegetation in the water body

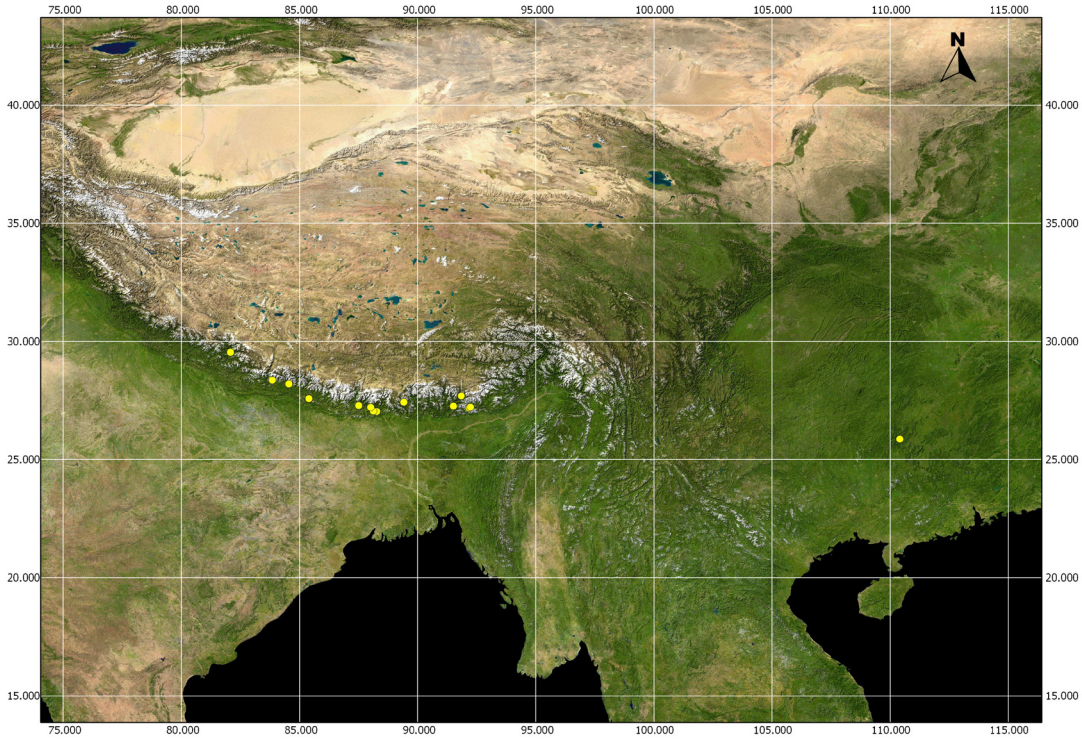

Image 4. Distributional range (yellow dots) of *Aeshna petalura* Martin in South and Southeast Asia

1933), Darjeeling (Martin 1908; Asahina 1983). Bhutan: Paro (Asahina 1983), Yongphula (Mitra 2008). China: Guangxi Zhuang Region (Wilson 2005). Nepal: western, mid-western, central, eastern (Asahina 1983), Kathmandu Valley (Sasamoto & Ushijima 2000). A subspecies of *Aeshna petalura* (*Aeshna petalura taiyal* Asahina) is distributed in Taiwan (Asahina 1938 & 1983).

Habitat and flight period: The habitat of this species appears to be the stagnant water of small ponds, marshes or lakes in mountains (2,100–4,255 m) (Image 2). The male patrols above the water. The female oviposits singly on the ground close to the water covered with short vegetation (Image 3). The flight season is fairly long from July to November.

Discussion: From the earlier records (Martin 1908; Schmidt 1968; Asahna 1983; Sasamoto & Ushijima 2000; Wilson 2005; Mitra 2008) it shows that all the specimens of *A. petalura* were collected between 2,100–3,500 m but, not recorded from above 3,500m. This species is reported for the first time from the higher elevation of the eastern Himalaya above 4,000m and it is also a new record to the Tawang Region of Arunachal Pradesh.

As per Fraser (1933 & 1936), the female specimen deposited in the British Museum was collected from Phulloth, Sandakhpurna, Sikkim, but from this study based on the species distribution map using a GIS revealed that the specimens of *A. petalura* collected by Mr. Inglis were probably from Phalut, Sandakphu (3,493m), which is situated at the edge of the Singalila National Park in Darjeeling District on the West Bengal-Sikkim border.

From the literature it is revealed that, this species has not been collected from Meghalaya till date. Lahiri (1987) only listed this species based on the earlier literature (Martin 1908). The analysis of distribution reveals that all the specimens of this species are collected from 2,100 m and above. There are no specimens collected below 2,100m. As stated by Fraser (1936), the distribution of this species in the Khasi Hills, Meghalaya is doubtful. The type locality of this species is only from Darjeeling District, West Bengal. It is a widely distributed species known from northeastern India (West Bengal and Arunachal Pradesh), Bhutan, Nepal and China, but this species is distributed only between the 25–30 latitude (Image 4). Within Indian limits this species is more probably distributed in Sikkim also. The subspecies *A. petalura taiyal* is distributed in Taiwan.

Mahato & Edds (1993) recorded the larvae of *A. petalura* from downstream of Gandaki River near Phulbari (540m), Gulmi, Nepal. They collected them from a very low elevation but there have been no other records below 2,100m altitude so far. Hence the record of *A. petalura* from Phulbari, Gulmi is doubtful and further studies are required to find out the identity of the species.

Due to variation in thorax color, basal length of discoidal cell, number of cells in anal loop, abdominal markings and length of anal cerci, further inventorization should be focused to collect more male and female specimens from the higher altitudes of eastern Himalaya particularly from Bumla, Tawang Region of Arunachal Pradesh, India which would reveal the exact status of the presently studied specimen.

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