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NOTE

A Taxonomic Note on the Misidentification of *Anemone tschernjaewii* Regel. in Kashmir Himalaya

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ABSTRACT: The correct identification of *Anemone tschernjaewii* Regel. previously misidentified as *A. biflora* DC. in the Kashmir Himalaya, India is reported. In this brief report, a detailed taxonomic description and photo-plates of its diagnostic morphological and anatomical characters are provided to validate this plant record for the region and to facilitate its easier field identification.

KEY WORDS: Anatomy, *Anemone tschernjaewii*, Kashmir Himalaya, Morphology, Ranunculaceae.

INTRODUCTION

The genus *Anemone* L. (Ranunculaceae) consists of 118 species, divided into 15 subgenera (Ziman *et al.*, 2008). *Anemone* L. is one of the most interesting taxa within the family Ranunculaceae Juss., because of its considerable diversity, geographic distribution, delimitation into sub-generic taxa, as well as the taxonomic status of many species have been debatable for long (Hoot *et al.*, 1994; Hoot, 1995; Ziman *et al.*, 1998).

Anemone biflora was first recognized as a taxonomic complex by Juzepchuk (1937), and included it under subsection *Biflora* Juz. within the *Oriba* Spach section of genus *Anemone*. The author further divided this subsection into: *Eubiflorae* Juz. and *Tschernjaewianae* Juz. Ziman *et al.* (1998) retained subsection *Biflora* Popov (described by Popov in 1913) and included 3 series with 2 species in each: *Biflorae* (*A. biflora, A. gortschakowii*), *Buchariceae* (*A. bucharica*, *A. baissunensis*), and *Tschernjaewianae* (*A. tschernjaewii*, *A. serawschanica*). Ehrendorfer *et al.* (2009) were uncertain with respect to the occurrence of *A. biflora s. l.* in Pakistan (Riedl and Nasir, 1990) and Northern India (Rau, 1993), and acknowledged the need for correct determination of plant specimens variably named as *A. biflora* and *A. tschernjaewii* by different authors (Hooker, 1872; Stewart, 1972, Kaul, 1986; Rau, 1993; Polunin and Stainton 1984; Singh and Kachroo, 1994; Singh *et al.*, 2002; Ehrendorfer *et al.*, 2009). It is in this backdrop that the present study was undertaken to resolve the taxonomic status of *Anemone tschernjaewii* Regel. in the Kashmir Himalaya, previously misidentified as *Anemone biflora* DC. (Hooker, 1872; Coventry, 1927; Blatter, 1928; Stewart, 1972; Kaul, 1986; Rau, 1993; Polunin and Stainton 1984; Singh and Kachroo, 1994, Singh *et al.*, 2002; Khuroo *et al.*, 2007).

MATERIALS AND METHODS

The Kashmir Himalaya is situated in the northern fringe of the Indian sub-continent between 33°22’ and 34°50’ N latitudes and 73°55’and 73°33’ E longitudes (Fig. 1), covering an area of *ca.* 16,000 sq. km. During the present study, standard herbarium methods were used for collection, processing and preparation of the herbarium specimens. The specimens collected have been deposited at the University of Kashmir Herbarium (KASH). All the specimens previously deposited under the scientific name *Anemone biflora* have been correctly determined. The micro-characters were analyzed and photographed with the help of trinocular stereo-zoom microscope (Model: Carl Zeiss Discovery V8). Standard anatomical techniques were employed and photographs were taken with the help of Trinocular microscope (Nikon Digital Sight DS-Fi 2).
To count the number of veins of tepals, freshly collected material were kept in 70% ethanol for 4 hours and gently heated for 10 minutes and then dipped in safranin stain, the tepals were then transferred to lactic acid for examination under stereo-zoom microscope.

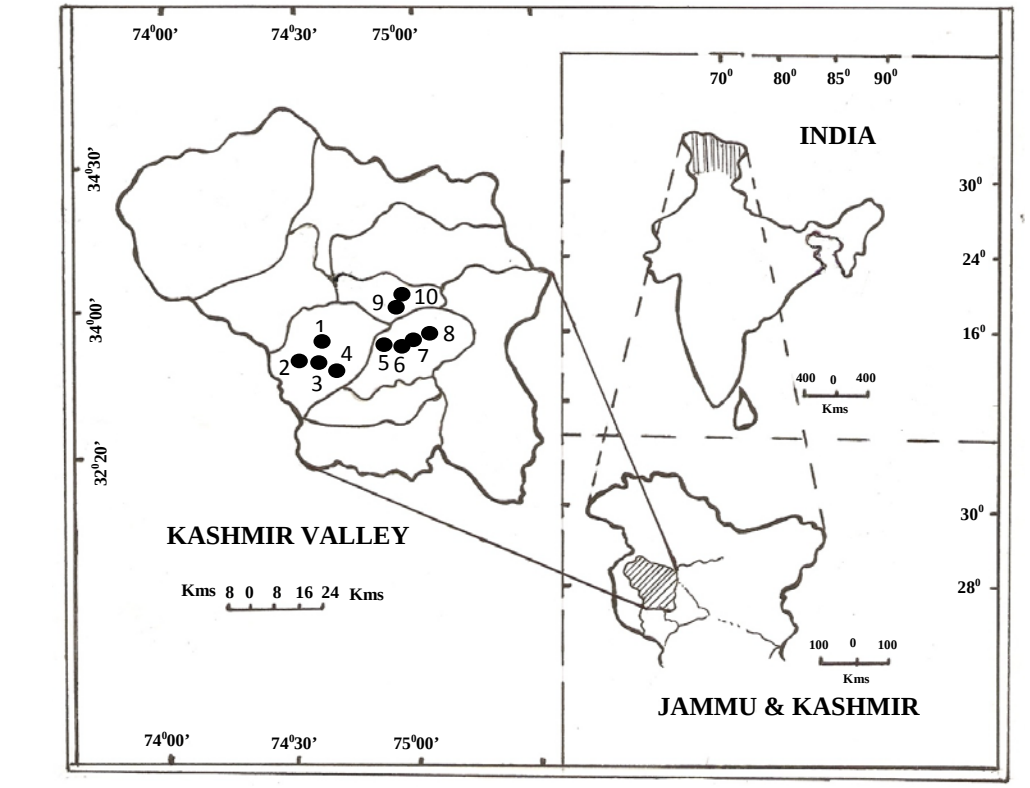
RESULTS

Taxonomic description

Anemone tschernjaewii Regel. Acta Hort. Petropol.8: 690, 1984.

Vernacular name: ‘Tank-e- Bateyn’

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1= Nagam; 2= Char-e -Sharif; 3= Hayatpora; 4= Badipora; 5= Pampore; 6= Chandhara; 7= Latpora; 8= Khrew; 9= Dhara; 10= Shankaracharya

Fig.1: Map of Kashmir Himalaya showing study sites

Perennial herb up to 15cm high, rhizomes tuberous, nearly globose, 0.5 X 1.2 cm, roots white to brownish in colour. Basal leaves solitary; petioles 1.5-4.5 cm long, without stipule-like appendages; blades 3-parted, 1.2–2.2 X 2.5–4.2 cm, basally cuneate to rounded, segments more or less sessile and with 8–15 ultimate lobules, margins crenate-dentate with reddish brown in colour. Scapes 4–15 cm long, glabrous, papillose in upper part, 1–2-flowered. Involucral leaves 3, sessile; blades basally connate, with 5–15 ultimate lobules. Pedicels 2–8 cm long, puberulent. Tepals 5, persistent, elongate-ovoid to lanceolate, with wide bases and apically acuminate, white to pink, purplish or violet, 1–1.7 X 0.8–1.2 cm, with 5–11 basal veins and 5–15 anastomising veins. Stamens 5-10 mm long, with slightly dilated filaments apically narrowed connectives longer than ellipsoid anthers, anthers brick red in colour 2.5-3 X 1 mm. Carpels ovoid, not compressed, 0.5–1 mm long, ovary densely covered with hairs 0.5–1 mm long, straight styles, 1–1.5 mm long, stigmas linear (Fig. 2).

Petiole Anatomy

The petiole anatomical studies revealed that the numbers of vascular bundles are 5, which is a diagnostic feature of *Anemone tschernjaewii* (Fig. 2).

Global distribution

Tajikistan, Uzbekistan, Turkmenistan, Afghanistan, Pakistan (doubtful) and now Kashmir Himalaya (India)

Specimens examined

INDIA, Jammu & Kashmir, Budgam: Char-e-Sharif, 07-03-2014, *Aijaz, Bilal & Khuroo 99991*; Hayatpora, 07-03-2014, *Aijaz, Bilal & Khuroo 99992*; Nagam, 07-03-2014, *Aijaz, Bilal & Khuroo 99993*; Badipora, 07-03-2014, *Aijaz, Bilal & Khuroo 99994*. Pulwama: Pampore, 10-03-2014, *Aijaz, Bilal & Khuroo 09901*; Chandhara, 10-03-2014, *Aijaz, Bilal & Khuroo 09902*; Latpora, 10-03-2014, *Aijaz, Bilal & Khuroo 09903*, Khrew, 10-03-2014, *Aijaz, Bilal & Khuroo 09904*. Srinagar: Dhara,; Shankaracharya, 10-03-2014; *Aijaz, Bilal & Khuroo 89901*, 11-03- 2014 (All the specimens deposited at KASH).

Additional specimens examined (Determination of specimens deposited at KASH)

After critical examination of the previous herbarium specimens deposited at Kashmir University Herbarium (KASH) over a period of time, it was found that many specimens of *A. tschernjaewii* were misidentified as *A. biflora*. The details of these herbarium specimens are given as under:

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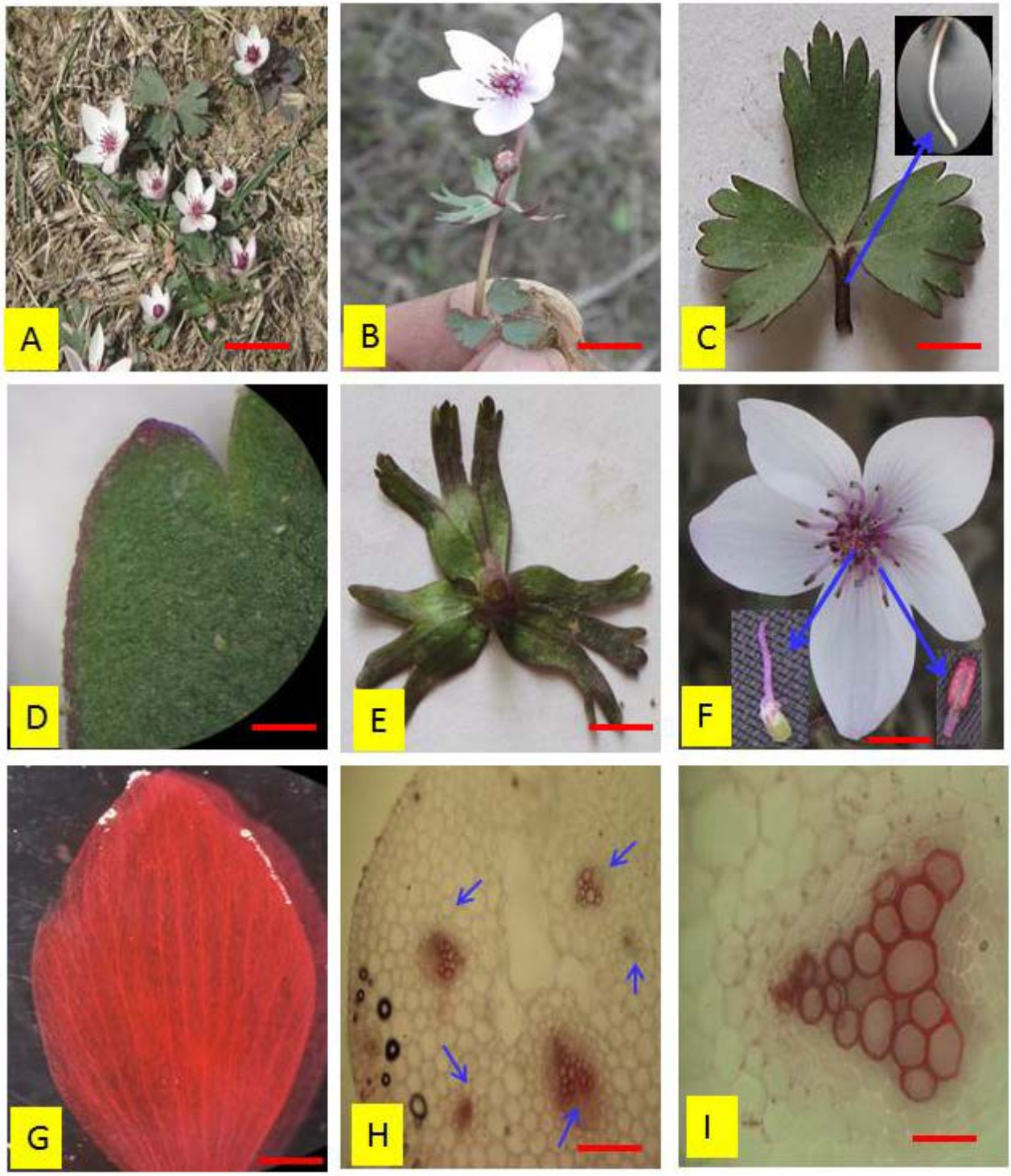


Fig. 2. (A) Population of *A. tschernjaewii* Regel. [Scale = 0.6cm], (B) An individual plant [Scale = 0.9 cm], (C) Basal leaf without petiole appendage [Scale = 2.2cm], (D) Basal leaf margins [Scale = 10cm], Involucral leaf with basally connate blades [Scale = 2.7cm], (F) Flower, Carpel with pubescent ovary (left) and brick red coloured stamen (right) [Scale = 2.5 cm], (G) Tepal with basal and anastomosing veins [Scale = 6.5cm], (H) T. S. of petiole with 5 scattered vascular bundles [Scale = 10 μm] (I) A single vascular bundle [Scale = 20 μm].

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INDIA, Kashmir: Upper Munda, 08-04-2000, *G. H. Khandey 847*; Zig Saidwara, 08-04-2001, *G. H. Khandey 1171*; Zig Upper slopes, 1880m, 08-04-2001, *G. H. Khandey 792*; Hiller Nar, 1780m, 10-04-2001, *G. H. Khandey 1171*; Goochan, 02-03-2001, *G. H. Khandey 1172*; Badurmoon, 1800m, 26-03-2011, *G. H. Khandey 1174*; Pampore, 08-03-2007, *Z. S. Khan 1523*.

Local distribution: During the present study, the plant species was collected from Budgam, Srinagar and Pulwama districts of the Kashmir Himalaya (Fig. 1). Previously, the species has been also reported from districts Anantnag and Baramulla of this region, although incorrectly identified as *A. biflora*.

Altitudinal range: 1580 – 1880m asl

Flowering period: March-April.

Ethno-medicinal uses: During the present study, it was recorded from the local herbalists (*Hakims*), that the powder of bulb is mixed with mustard oil or clarified butter (‘ghee’) and the mixture is used to cure skin infection, itching and also to heal wounds and burns.

DISCUSSION

Historically, the earliest scientific record of *Anemone biflora* from the Kashmir Himalaya dates back to Hooker (1872). After a century, the species was again reported by Stewart (1972) from this region. Following the previous workers, Polunin and Stainton (1984) reported the occurrence of *A. biflora* from entire Himalaya. Kaul (1986) reported A. biflora growing as a weed in Kashmir Valley. Rau (1993), while revising genus *Anemone* in the *Flora of India*, repeated the misidentification of this species as *A. biflora*. Singh and Kachroo (1994) reported this species from Pir Panjal Range of Kashmir Himalaya. While revising the Flora of *Jammu and Kashmir state*, Singh *et al.* (2002) again reported *A. biflora*. Even recently, Khuroo *et al.* (2007) reported *A. biflora* from Kashmir Himalaya. However, Ehrendorfer *et al.* (2009) were doubtful about the correct taxonomic identification of *A. biflora* from Pakistan, Northern India, including Kashmir Himalaya, and emphasized on the correct determination of plant material that has been identified as *A. biflora* from Northern India. To bring resolution to this centuries-old taxonomic confusion, the present study for the first time established the correct identification of *A. tschernjaewii*, previously misidentified as *A. biflora* in Kashmir Himalaya. The occurrence of *A. tschernjaewii* in Kashmir Himalaya is confirmed on the basis of distinguishing morphological characters such as absence of stipule-like appendages in the petioles of basal leaves, white to pink flower colour, with large number of basal (up to 11) and anastomosing (up to 15) veins and diagnostic anatomical character, i.e. the petiole with 5 vascular bundles (Fig.2). In contrast, the number of vascular bundles in other species of *A. biflora* complex is typically 7 (Ziman *et al.*, 1998).

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