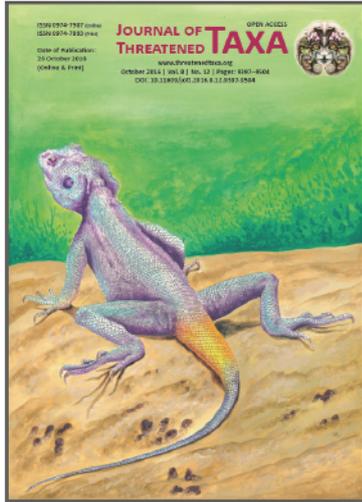


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### SHORT COMMUNICATION

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## RECENT RECORDS OF THE PALE JEZEBEL *DELIAS SANACA SANACA* (MOORE, 1857) (LEPIDOPTERA: PIERIDAE) FROM MUSSOORIE HILLS, WESTERN HIMALAYA, INDIA

Arun P. Singh

Forest Entomology Division, Forest Research Institute, P.O. New Forest, Dehradun, Uttarakhand 248006, India  
singhap@icfre.org, ranoteaps@gmail.com

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**Abstract:** The western Himalayan sub-species, ‘*sanaca*’ of the Pale Jezebel, *Delias sanaca sanaca*, which is intermediate between the pale form *flavalba*, dark form *confusa*, was recently recorded, in the oak forests adjoining Mussoorie hills of Garhwal after a gap of about eight decades. Observations are presented on the past records, specimens, morphological features and sexual dimorphism, ecology, seasonality of the intermediate or normal form of this sub-species *sanaca*, that is generally overlooked.

**Keywords:** Dehradun, *Delias sanaca*, *Dendrophthoe* sp., lopping, moist temperate forest, *Quercus dialata*, *Quercus leucotrichophora*, Tehri Garhwal.

The Pale Jezebel, *Delias sanaca* (Moore, 1857), is known to occur throughout the Himalayan region with its distribution extending to Myanmar. It occurs as four subspecies in the Indian subcontinent. *Delias sanaca sanaca* Moore, 1857 occurs from Kashmir (Banihal Pass) through Himachal Pradesh (Kangra and Shimla) to Uttarakhand (Garhwal and Kumaon). *D.s. oreas* Talbot, 1928, is distributed from W. Nepal to Sikkim and Darjeeling. *D.s. bhutya* Talbot, 1937, is found across Bhutan and Arunachal Pradesh, and *D.s. perspicua* Fruhstorfer, 1910, is found in adjoining northern Myanmar (Gasse 2013).

### The forms of the Pale Jezebel, *D.s. sanaca*

The western Himalayan subspecies of the Pale

Jezebel, *D.s. sanaca*, shows morphological variation and exists in three forms: *flavalba* Marshall, which is pale (Images 1 & 2); *confusa* Talbot, which is dark (<http://www.delias-butterflies.com/groups/species-groups/group-xiv-belladonna-group/delias-sanaca/subspecies-sanaca/>); and a third form that is intermediate between the above two, the ‘normal form’ or ‘*sanaca*’ (Image 3) (Talbot, 1947).

### Past records and specimens

The first account of the presence of *D.s. sanaca* from the western Himalaya comes from Moore (1882), who reported it as *Pieris sanaca* Moore based on the collections made by J.H. Hocking from the hill station of Dharamsala in Kangra District of Himachal Pradesh. Later, Moore (1903–1905) reported several observations on the species. The collection of Colonel A.M. Lang was noted to include the ‘pale form’ *flavalba*. Lang regarded this to be ‘very rare’, obtained near Dharin only in a richly-wooded glen, far in the interior of the western Himalaya where he observed it under horse chestnut trees, *Aesculus indica*, fluttering over the margins of a stream in June. Lang also observed the ‘dark form’ of this species in Mussoorie during May 1868, which he considered to be ‘local’ and an ‘early summer insect’, and recorded the ‘pale form’ in Kunawar (now Kinnaur

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Conflict of Interest: The author declares no competing interests.



Image 1. *Delias sanaca sanaca f. flavelba*, male, Mussoorie, western Himalaya (NFIC, Forest Research Institute, Dehradun)



Image 2. *Delias sanaca sanaca f. flavelba*, female, Shimla, western Himalaya (NFIC, Forest Research Institute, Dehradun)

District of Himachal Pradesh). Moore (1903–1905) also mentioned P.W. Mackinnon collecting this species in openings of Moru Oak (*Quercus dilatata*) forest below Nag Tibba, north of Mussoorie town at 5,000ft (1,520m). Mackinnon also observed this species in the latter half of May and the beginning of June at Tehri Garhwal north of Mussoorie town at 8,500ft (2,590m). Moore (1903–1905) also made an observation on a female specimen collected at Mussoorie by Capt. T. Hutton, which was later deposited in the British Museum (now the Natural History Museum, London), and that one specimen of the ‘pale form’ was present in ‘Hewitson’s cabinet’. There are also reports of specimens of *D.s. sanaca* being ‘plentiful’ during the month of May during 1888, 1894

& 1895 in Mussoorie where they were collected by Mackinnon (Mackinnon & de Nicéville, 1899). Talbot (1947) reported a dead female specimen of *D. s. sanaca* being collected from the ground in Mussoorie in May 1916 at 5,500ft (1,676m), and that the species was commonly seen from April to June at about 5,000ft (1,520m) in Mussoorie. Talbot (1947) regarded both forms *flavalba* and *confusa* as rare. O.C. Ollenbach collected specimens of *D.s. sanaca* (form *flavelba*) from Mussoorie (male, 05.06.1916, Image 1) and also from Shimla (female, 08.09.1910, Image 2), which are now housed in the National Forest Insect Collection (NFIC), Forest Research Institute, Dehradun (author’s personal observation). *D.s. sanaca* was later recorded during



Image 3. *Delias sanaca sanaca* male and female normal form (reproduced from Moore 1903–1905).

June 1929 at Mussoorie (Ollenbach 1930) and also less frequently in June from the 'Kufri hills' around Shimla, Himachal Pradesh, just before the rainy season (De Rhenphile, 1931). It was last reported by Wynter-Blyth (1940) as being collected at 'Bishop Cotton School', Shimla at 6,500ft (1,950m). There have been no site specific records of *D.s. sanaca* from Garhwal, or the western Himalaya in general since 1930 (Uniyal 1998; Thakur et al. 2002; Singh 2008; Thakur 2011; Smetacek 2012; Bhardwaj et al. 2012; Qureshi 2014; Singh & Sondhi 2016). The species is currently protected under Schedule I, Part IV of the Indian Wildlife (Protection) Act, 1972.

#### Morphology and sexual dimorphism in *D. s. sanaca*

Talbot (1947) gave a detailed morphological description of the Pale Jezebel and this, together with the illustration (Image 3) in Moore (1903–1905), are still relevant for identification of the 'normal form' 'sanaca' of this taxon and for the distinction between the sexes, which is not given in recent field guides. In subspecies

*D.s. sanaca*, as identified by Talbot (1947), the upperside of the male has well-developed white markings and the forewing submarginal spots are large and triangular. The submedian stripe is also broad and very distinct in this subspecies. The upperside ground colour of the female is paler brown than in the male. The hindwing of the male has a broad white cell-stripe, pointed proximally and distally, sometimes dusky in the basal half. The submarginal spots in cells 2–6 [currently referred to as cells  $CuA_2$ ,  $CuA_1$ ,  $M_3$ ,  $M_2$  &  $M_1$  (Scott 1986)] are large and, excepting anteriormost one, somewhat rounded; the inner part is pale yellow over the distal half or less, the proximal half is white, only slightly darkened at the base. The hindwing also has yellow discal spots prominently edged with white; the patch in cell 1c below vein 2 (or currently referred to cell  $CuA_2$  below vein  $CuA_2$ , i.e. space between vein 1A+2A and vein  $CuA_2$  (Scott 1986) entirely white; the yellow anal spot never entirely separated from the inner yellow area; fold in cell 1c not, or weakly, scaled black distally. The hindwing in the female has more extended white markings than in the male. The inner area distally is yellow white; only distinctly yellow, and then paler than in the male, along the fold in 1c (cell  $CuA_2$ ). The fringe is black in both sexes. Wing expanse of male: 69–94mm; female: 84–96mm.

#### Ecology

The larval food plants of *D. sanaca* are believed to be *Dendrophthoe* spp. and other mistletoes of the family Loranthaceae (Kehimkar 2008). Hence, the species may prefer Moru Oak forest due to the presence of these mistletoes, which are epiphytic on this oak in the 'moist temperate forest zone' (Seth 1968) of the western Himalaya. Horse chestnut trees also grow with the Moru Oak and produce panicles of white and yellow flowers during April–May in Mussoorie and provide nectar for this species.

#### Present records

The author during the course of his surveys in Garhwal recorded *D.s. sanaca* (normal form *sanaca*) on three occasions. An account of these observations is presented below.

(i) A male (Image. 4) was photographed at 13:04h on 3 June 2007 at ~2,200m between Buranskhanda and Dhanaulty in Tehri Garhwal district, 20km east of Mussoorie town (Site 1; Image 5). The individual was mud puddling on the ground beside a hand pump along the road in a 'mixed moist temperate forest' of Moru Oak, Deodar and Blue Pine (*Pinus wallichiana*).

(ii) On 22 May 2016, about 9km east of the point of



Image 4. *Delias sanaca sanaca*, male, normal form, near Dhanaulty (2,200m), Tehri Garhwal, east of Mussoorie, Uttarakhand, 3 June 2007 at 13:04hr.



Image 5. Site 1: Mixed moist temperate forest near Dhanaulty (2,200), Tehri Garhwal, Uttarakhand, 3 June 2007.



Image 6. Site 2: Mixed oak forest (2,000m), between Suwakholi and Rotu-ki-Beli, Tehri Garhwal, Uttarakhand, 28 May 2016.

first record, three individuals were recorded together in flight and then mud puddling on wet sand. The habitat (Site 2; Image 6) was a mixed patch of Moru Oak-Deodar forest at ~2000m. The butterflies (Images 7 & 8) were recorded during afternoon (12:30h-14:00h) along a 'nullah' with running water on a steep hillside. This locality is 3km north of Suwakholi, on the road to Rotu-ki-beli. Suwakholi is 15km east of Mussoorie Town.

(iii) On 28 May 2016, 20+ individuals were recorded at Site 2, mostly females, but with at least two males, all of the 'normal form *sanaca*' (Images 9 & 10). A few individuals remained perched on oak trees (Images 11) and a few were flying with several Great Black Vein, *Aporia agathion caphusa* Moore. They were also seen basking in the canopy of Ban Oak (*Quercus leucotrichophora*), *Machilus odoratissima*, *M. duthiei* and flowering horse chestnut trees. Courtship displays were observed with pairs chasing each other around the canopy in cloudy weather at 14:00hr. The species came to the wet ground only during bright sunshine; otherwise the species preferred to fly in shaded ravines along the hillside. Flight times were recorded from 11:00–16:00 hr. This site was visited again on 25 June 2016 to record this species, but they were not observed.

#### CONCLUSION

The present findings confirm the occurrence of *D.s. sanaca* in the western Himalaya in India after a gap of



Image 7. *Delias sanaca sanaca*, female, normal form, near Suwakholi (~2000m), Uttarakhand, 22 May 2016 (close-up view of upperside).

about eight decades. *D.s. sanaca* occurs more commonly as the normal form 'sanaca' rather than as the 'pale' or 'dark' forms, which are rare. It was observed that in the forested habitats from where *D.s. sanaca* has been recorded, the oak trees are currently suffering



Image 8. *Delias sanaca sanaca*, female, normal form, near Suwakholi (~2000m), Uttarakhand, 22 May 2016 at 13:23hr.



Image 9. *Delias sanaca sanaca*, male, normal form, near Suwakholi (~2000m), Uttarakhand, 28 May 2016 at 13:56hr.

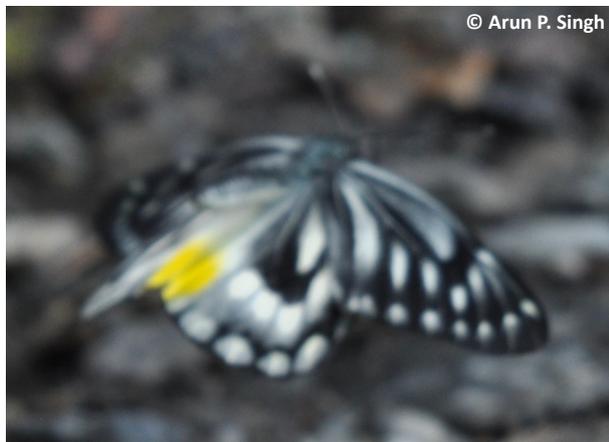


Image 10. *Delias sanaca sanaca*, female, normal form in flight near Suwakholi (~2000m), Uttarakhand, 28 May 2016.



Image 11. *Delias sanaca sanaca* perched on ban oak, *Quercus leucotrichophora*, high above a stream.

moderate to heavy lopping by local villagers for fodder, which consequently results in removal of the putative food plant of this species, which is epiphytic on these oaks. The study suggests the need for conservation and protection of forested habitats of the Pale Jezebel, *D.s. sanaca*, in Garhwal, as well as the need to gather more data on this butterfly from the western Himalayan region in general to correctly assess its conservation status.

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