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WING MACULATION AND GENITALIC VARIATIONS IN THE TYPE - SPECIES *ARICIA AGESTIS* (DENIS AND SCHIFFERMULLER) (LEPIDOPTERA : LYCAENIDAE)

H. S. ROSE AND A. K. SIDHU
DEPARTMENT OF ZOOLOGY, PUNJABI UNIVERSITY, PATIALA - 147002, INDIA.

The hitherto unrecorded variations in wing maculation of the species, *Aricia agestis* (Denis and Schiffermuller), which is very common in the North-West Himalaya have been recorded in considerable details. In the male genitalia, the ampulla is surprisingly variable and inconsistent in this biological species. However, all constituent parts of the external female genitalia, studied for the first time, are consistent.

INTRODUCTION

The scrunity of relevant literature reveals that the wing maculation variations in the species *Aricia agestis* (Denis and Schiffermuller) have not been adequately discussed (de Niceville, 1890; Bingham, 1907; Evans, 1932; Wynter-Blyth, 1957; Cantlie, 1963). The marginal/submarginal spots have been variably discussed by these workers. The species, under reference, is the type-species of the genus *Aricia* R. L. and is quite common in North-West Himalaya. Stempffer (1937) gave a brief illustrated account of the male genitalia of this type-species. The female genitalia, which has been considered to be taxonomically quite a viable structure in Lycaenidae (Hirowatari, 1986), has not been studied and commented upon, so far. Hence, during the course of present studies, besides making detailed observations on the wing maculation variations, the account of male genitalia, which shows a unique variation has been updated. The female genitalia is figured and described for the first time to fill up the void in the described account of the type-species.

OBSERVATIONS

The authors have examined the wing maculation in as many as fifty - eight individuals, collected from certain habitats in the North-West Himalaya (prevalent in Dhauladhar, Mussoorie and Siwalik ranges). In view of earlier drawbacks, the updated diagnosis of the species is as follows :

Aricia agestis (Denis and Schiffermuller) (Figs. 1-11)

Common name : Orange-bordered Argus or The Brown Argus.

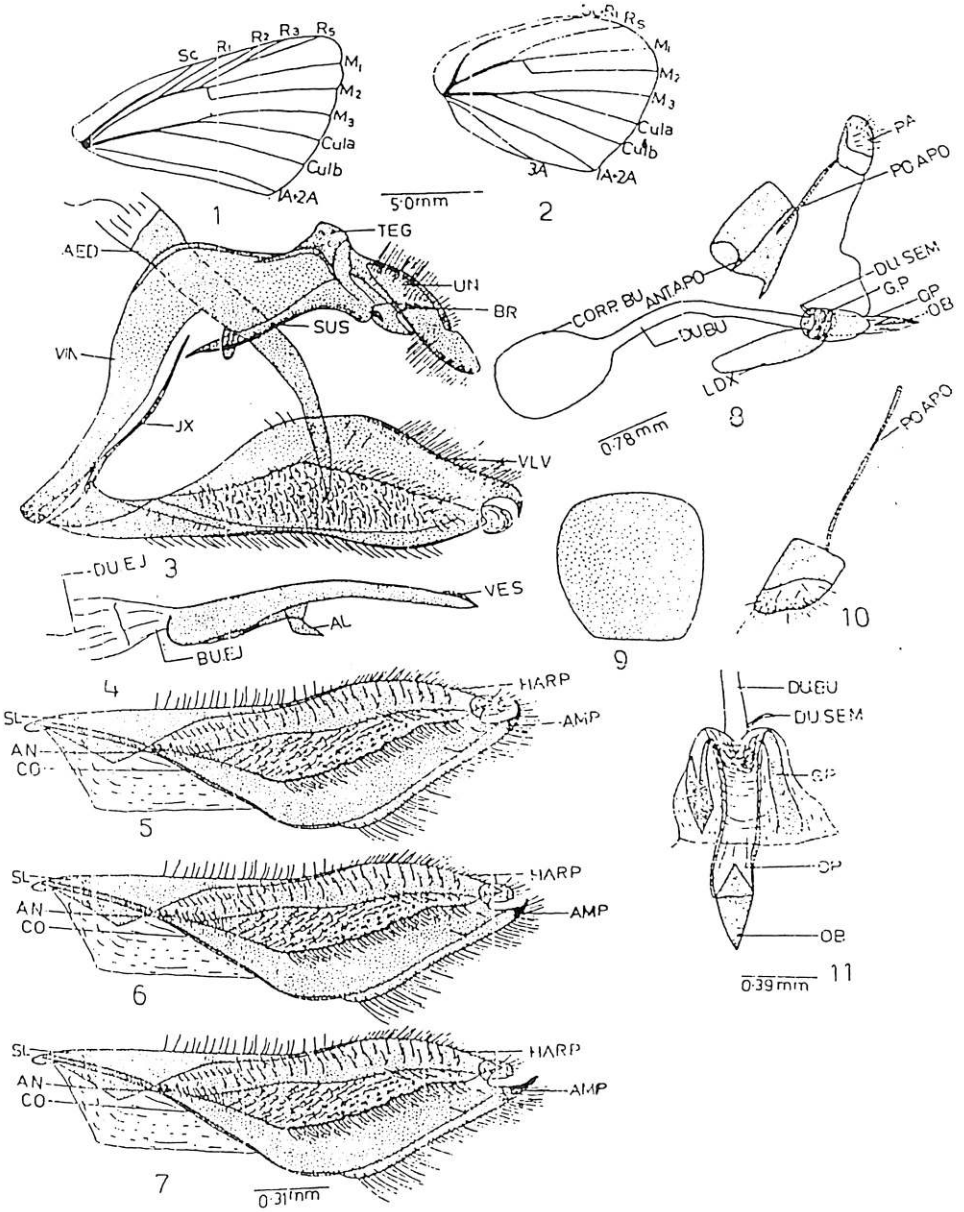
Denis and Schiffermuller, 1775, Ankundung sys. Werkes Schmett. : 184 (*Papilio*).
astrarche Bergstrasser, [1779], Nom. Ins. **3** : 4 (*Papilio*).
amedes Meisner, 1818, Natur. Anz. Allg. Schw. Geg. 1818 : 87 *(Lycaena)*.
nazira Moore, 1865, Proc. zool. Soc. Lond. 1865 (2) : 504 *(Polyommatus)*.
gaafii Snellen, 1867, Vlind. Nederl. Macrolep. : 59 *(Lycaena)*.
albicans Aurivillius, 1888, Nord. Fjaril. : 13 *(Aricia)*.
samatis Grum-Grshimailo, 1890, In Romanoff, Mem. Lep. *4* : 393 *(Lycaena)*.
gallica oberthur, 1910, Etud. Lep. Comp. *4* : 252 *(Aricia)*.
sachalinensis Matsumura, 1919, Thous. Ins. Japan Addit. *3* : 647 *(Lycaena)*.
heliomedon Bryk, 1940, Ark. Zool. *32A* (22) : 23 *(Polyommatus)*.

Eyes smooth; labial palpi with second segment compressed laterally, below dressed with white scales and stiff black hair; antenna with Club well defined, covered dorsally with black scales, a few white scales present at apex, nudum confined to Club; each leg with femur longer than tibia, clothed below with long white hair; forewing costa arched, termen convex, apex rounded, hindwing oval, tornus slightly produced, tailless; forewing with 11 veins, veins Sc and R_1 widely separated; forewing above brown with a bar at end cell, submarginal spots orange, arrangement varies (Table - 1), below dark grey with spot at end cell, series of discal spots from R_5 to Culb, the spot in club variable (Table I), inwardly black edged submarginal spots, a row of black, outwardly white edged marginal spots;

Table I : Showing variations in *Aricia agestis* (Denis and Schiffermuller).

S. No.	Taxonomic Character	Earlier accounts				Present observations
		deNiceville 1890	Bingham 1907	Evans, 1932 Cantlie, 1963	Wynter-Blyth 1957	
1.	Upperside of wings	Spots marginal, red, larger and more prominent in female than in male	Spots subterminal, orange red, not specified in either sex	Spots submarginal, orange, complete in female and more or less so in male	Spots marginal orange, complete in female nearly so in male	The spots should be referred to as submarginal, orange/copper coloured, spots may be prominent (10 males, 7 females) or obscure (27 males, 14 females)
2.	Upperside of forwing	Number of red spots varies from 3 to 6.	Number not specified	Number not specified	Number not specified	Number varies from 0 to 6. i) No spot on both wings : 1 male ii) 3 spots : 3 males, 2 females iii) 4 spots : 4 males, 1 female iv) 5 spots : 7 males, 3 females v) 6 spots : 22 males, 15 females
3.	Underside of forewing	Club spots not mentioned	Not described	Not described	Not described	A pair of spots present in club, may be Geminate (22 males, 11 female) or Diffused (15 males, 10 females)
4.	Underside of hind wing	Basal spot in 3A. Not mentioned	Not mentioned	Not mentioned	Not mentioned	Basal spot in 3A may be absent (13 males, 6 females) or present (24 males, 15 females)

Each value is a mean of 3 replications.



Figs. 1-11: *Aricia agestis* (Denis and Schiffermuler). **1.** Venation of forewing; **2.** Venation of hindwing; **3.** Male genitalia (lateral view); **4.** Aedeagus (lateral view); **5, 6 & 7.** Valvae showing variation in ampulla; **8.** Female genitalia (lateral view); **9.** Lodix; **10.** Papilla analis; **11.** Genital plate. (1A + 2A Vein representing fused first anal vein and second anal vein, AED = Aedeagus, Al = Alula, AMP = Ampulla, AN = Anellifer, ANT. APO = Apophysis anterioris, BR = Brachium, BU.EJ = Bulbus ejaculatorius, CO = Costa, CORP. BU = Corpus Bursae, Cula = First cubital vein, Club = Second cubital vein, DU. BU. = Ductus bursae, DU. EJ = Ductus ejaculatorius, DU. SEM = Ductus seminalis, G.P = Genital plate, HARP = Harpe, JX = Juxta, LDX = Lodix, M_1 = First medial vein, M_2 = Second Medial vein, M_3 = Third medial vein, O.B. = Ostium bursae, O.P. = Ostium pouch, P.A. = Papilla analis, PO.APO = Apophysis posterioris, R_1 = First radial vein, R_2 = Second radial vein, R_3 = Third radial vein, R_5 = Fifth radial vein, Sc = Subcosta, SL = Sacculus, SUS = Suspensorium, TEG = Tegumen, UN = Uncus, VES = Vesica, VIN = Vinculum, VLV = Valva.

hindwing dorsally brown, with black spot at end cell, a row of marginal spots from Rs to Club, inwardly bordered with orange spots, the latter variable (Table I), ventrally dark grey, two basal spots in 1A+2A and club, a basal spot in 3A variable (Table I), a spot in cell, a spot at end cell, a series of discal spots from Rs to 1A+2A, two costal spots in Sc+R_1, a row of orange inwardly black edged submarginal spots, a series of black, outwardly white edged marginal spots.

Owing to above mentioned population variations, fourteen males (Palchan, Kalpa, Killar, Gopeshwar, Mossifalls, Nauni, Chail, Shimla, Tissa) and three females (Chail, Darcha and Mcleodganj) from different localities have been dissected and their genitalia examined.

Male genitalia (Figs. 3-7) : Uncus lobes long, digitate, joined together by narrow ridge, pilose; brachia curved outwards, slender, apices pointed; tegumen band-shaped, from its inner lateral faces arise weakly sclerotized rods-the suspensorium; vinculum moderate; saccus absent; valva spindle-shaped, costa narrow, oblique, sacculus with wedge-shaped fold, ampulla narrowed to a downwardly curved, pointed process, variable (Figs. 5-7), harpe less sclerotized, apex membranous, inner surface of valva with a prominent spinose ridge, densely pilose, margin of valva less pilose; juxta u-shaped, arms narrow; aedeagus short, slender, suprazone larger than subzone, narrower, apex pointed, alulae present at zone, ductus ejaculatorius entering dorso-cephalad.

Female genitalia (Figs. 8-11) : Lodix longer than broad; genital plate in the form of small membranous pouch with two lateral sclerotized plates; ductus seminalis entering near base of ductus bursae just above genital plate; ductus busae slender, opening into ostium pouch, the latter membranous with fusiform well sclerotized plate at apex; corpus bursae guttiform; apophysis anterioris sharp; apophysis posterioris thin, narrow; papilla analis subtriangular, pilose.
Wing expanse, Half, Male : 14.5 - 15.0 mm.
Female : 14.5 - 15.0 mm.

Material examined : H.P. 1♂, 29.V.92, Kasauli, Solan; 4♂♂, 5♀♀, 26.V.92, Nauni, Solan; 2♂♂, 3♀♀ 12.VI.92, Shimla; 5♂♂, 3♀♀, 14.VI.92, Chail, Shimla; 1♂, 27.V.92, Rajgarh, Sirmaur; 3♂♂, 7.VI.92, Dal Lake, Mcleodganj, Kangra; 1♂, 2.V.92, Sarkaghat, Mandi; 5♂♂, 2♀♀, 19.VI.93, Katrain, Kullu; 1♂, 2♀♀, 27.VII.92, 1♂, 1♀, 17.VI.93, Manali, Kullu; 2♂♂, 21.VII.93, Manikaran, Kullu; 3♂♂, 18.VI.93, 1♀, 27.VII.92, Palchan, Manali, Kullu; 1♂, 19.IX.92, Kalpa, Kinnaur; 1♂, 12.VI.91, Karian, Chamba; 3♂♂, 20.VII.92, Killar, Chamba; 2♂♂, 19.VI.92, Tissa, Chamba; 1♀, 20.VII.92; Dharwas, Chamba; 1♂, 1♀, 25. VII.92, Darcha, Lahaul & Spiti.
U.P. : 1♂, 10.VI. 92, Gopeshwar, Chamoli; 3♂♂, 2♀♀, 2. VI. 93-7. VI.93, Mussoorie, Dehradun; 2♀♀, 8. VI. 93, Dhanolti, Dehradun.

Old distribution : Chitral - Kashmir, Ladak, Lahaul, Pangi.

REMARKS

The structures such as the corpus bursae, ductus bursae and the genital plate are consistant in the female genitalia. Contrary to this, barring other genitalic components, the valva in the male genitalia shows variation in the structure of the ampulla. In ten individuals, the ampullar process is moderately long and arched downward(Figs. 3 & 5), whereas, it is small and straight in two individuals (Fig. 7) and two individuals have this spine intermediate between these two extremes (Fig. 6). On the basis of present studies, it is being suggested that the structure of the ampulla be cautiously used taxonomically for proving the conspecificity of different individuals of this biological species. Such type of variation has not been seen in any of the sixty - three species, presently examined. However, Evans (1955) has recorded some variations in the male genitalia of *Tarucus nara* (Kollar). Smiles (1982) has remarked that the male and the female genitalia find little assistance in the taxonomy of the genus *Polyura* Billberg. Recently, David (1993) has stated that the genitalia are extremely useful taxonomic characters though they diverge rapidly during speciation in some cases. According to him, the most variable portions of the male genitalia are the distal and dorsal margins of the valvae, as has been observed in a satyrid species, *Maniola jurtina* (Linnaeus). The species, under reference, also shows this type of variation.

On the basis of well developed ostium bursae and weakly sclerotized genital plate in the female genitalia of this type-species, the genus *Aricia* R.L. goes nearer to *Polyommatus* Latreille, *Albulina* Tutt. *Chilades* Moore and *Freyeria* Courvoisier. Owing to closeness in the male genitalic structures, Eliot (1973) has already considered these genera belonging to one group/section, *Polyommatus*.

The correct nomenclature of the species is *Aricia agestis* (Denis Schiffermuller) (Cantlie, 1963; Stempffer, 1937; Bridges, 1988) and not *Lycaena medon* Hunagel (de Niceville, 1890), *Lycaena astrarche* (Bingham, 1907) and *Polyommatus astrarche* (Evans, 1932; Wynter-Blyth, 1957).

As per present survey (1991-1993), the species is very common in the North-West Himalaya.

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