

REVISION OF THE GENUS *DIARSIA* HÜBNER (LEPIDOPTERA: NOCTUIDAE: NOCTUINAE) WITH A NEW SPECIES FROM PAKISTAN AND CLADISTIC RELATIONSHIP

SHAHEEN NAZ¹ AND SYED KAMALUDDIN²

¹APWA Government Girls Higher Secondary School, Liaquatabad, Karachi-Pakistan

²Federal Urdu University of Arts, Sciences and Technology, Gulshan-e-Iqbal Campus, Karachi-Pakistan
Corresponding author e-mail: shaheennaz11@hotmail.com

Abstract

The genus *Diarsia* Hübner of the subfamily Noctuinae of the family Noctuidae is revised from Pakistan. A new species is accommodated with reference to its components of head, venation of fore and hind wings and male and female genital components. The cladistic relationship of the genus and included species are also briefly discussed.

Introduction

The genus *Diarsia* Hübner included thirty four species but only one species, *D. serrata* Holloway, recorded from Pakistan. Hardwick (1950) studied the Rosaria group of the genus *Diarsia* and included a sub-species from British Columbia into the Pacific North West of the United States and from the coast of British Columbia east through the northern coniferous forest zone to the coast of Labrador with reference to well defined male genitalic differences. Patric and Archibald (1988) used the light trap at Owaba South Otago and gave a list of 124-lepidopterous taxa which included only one species *Diarsia intermixta* (Guenee) of the family Noctuidae.

Herczig *et al.* (1990) gave an annotated list of 335-species of the family Noctuidae from NE caucasus with some important comments on their faunistic and Zoogeography including three species of the genus *Diarsia* Viz. *D. mendica*, *D. dahlii* and *D. rubi* of the sub-family Noctuidae. Hashmi and Tashfeen (1992) in their check list Lepidoptera of Pakistan listed only one species *D. dahlii* (Hübner). Nikolaevich and Vjatcheslavovna (2002) gave a complete list of the Noctuidae of Daghestan Republic Russia comprising 343 species including three species *D. mendica* (Fabricius), *D. dahlii* (Hübner) and *D. rubi* (Vieweg) of the sub-family Noctuinae.

Landolt *et al.* (2007) collected 76-Noctuid moths by using of chemical feeding attractant and included three species of the genus *Diarsia* Viz. *D. dislocata*, *D. esurialis* and *D. rosaria* from Alaska. Stajanovic and Curcic (2011) studied the faunistic and zoogeographical analysis of the family Noctuidae from Sibaria and presented a list of total 564- species, 231- genera and 23 sub-families which includes five species of the genus *Diarsia* Viz. *D. mendica*, *D. dahlii*, *D. brumea*, *D. rubi* and *D. florida* of the sub-family Noctuinae.

Materials and Methods

The representatives of the genus *Diarsia* were collected from Malir, Karachi with light trap and identified with the help of literature at hand and internet information. These specimens were mounted and body parts as well as genital components were examined. Dissection and finalization were made with routine procedure following Kamaluddin and Fatima (1995) and Kamaluddin (2002).

Results

Genus: *Diarsia* Hübner 1821

Diarsia Hübner, 1821; *Verz. bek.*, Schmett, (14): 222.

Oxira Walker, 1865: *List. Spec. Lepid. Insects. Colln. Br: Mus.* 32:656.

Diagnostic feature: Body generally light brown with dark brown patches except the white lobes on costal median area, head with frons sub-convex vertex raised, palpi well developed, basal segment shorter than 2nd, 3rd segment shortest, proboscis highly coiled, fore wings longer than hind wings, anterior margin sinuated, apical margin crenulated with apical angle sub-rounded, veins R₃ and R₄ stalked, one anal vein present, hind wings with anterior margin sinuated or convex, posterior margin convex, apical angle sub- rounded, veins Rs and M₁ anastomosing or slightly apart and originating from upper angle of cell, two anal veins present.

In males tegumen elongated, uncus large and straight with apex pointed, gnathos longer than uncus, saccus well developed, paramere very large, apex of inner margin beset with large thick hairs, membranous conjunctival lobe large with thorn-like cornuti. In females papillae anales very large bean-shaped, apophyses

well developed about equal in size, ductus bursae tubular, large, corpus bursae irregular in shape with wrinkled cornuti.

Comparative note: The genus *Diarsia* Hübner is most closely related to *Aabagrotis* (Smith) in having body usually cylindrical, and palpi usually long but it can easily be separated from the same in having palpi with 3rd segment short less than 1/3rd the length of 2nd segment, usually antero-laterally directed and by the other characters as noted in the key and description.

Type species: *Noctua dahlia* Hübner, 1813

Distribution: World wide.

***Diarsia serrata* Holloway (Figs. 1-5)**

Material examined: Two females, Pakistan: Karachi, Malir, 15-04-2010 on light, leg. Shaheen Naz, lodged at Kamaluddin's collection.

Comparative note: This species is most closely related to *Diarsia spinosus* (sp.n.) in having palpi with 3rd segment short less than 1/3rd the length of 2nd segment and usually antero-laterally directed but it can easily be separated from the same in having palpi with 2nd segment about 5X the length of 3rd segment, hind wings with veins Rs and M₁ anastomosing and originating from upper angle of cell, corpus bursae large, irregularly bilobed and by the other characters as noted in the key and description.

Diarsia serrata Holloway, 1976, *Moths, Borneo Kinabalu*, 7: 56-57.

Colouration: Body generally brown except dark tinged, hind wings pale at base, other area fuscus.

Wing expansion (Fig. 1): Body size 26-30mm with wing expansion.

Head (Fig. 2): Vertex raised, frons sub-convex, palpi well developed, basal segment about 2/3rd of the 2nd segment later about 0.5X the 3rd, proboscis large highly coiled.

Fore wings (Fig. 3): Anterior and posterior margin sinuated, apical margin crenulated with apical angle sub-rounded, veins Sc widely separated and parallel to R₁, R₂ originates from above upper angle of cell, R₃ and R₄ largely stalked and anastomosing with R₅ and originating from upper angle of cell, M₁ originates from below lower angle of cell, M₂ and M₃ wide-apart M₃ originates from lower angle of cell, two cubital veins present, only one anal vein (1A) present.

Hind wings (Fig. 4): Hind wings with anterior margin sinuated and posterior margin convex, apical margin sinuated with apical angle sub-rounded veins Sc+R₁ confluent to Rs at base, Rs anastomosing with M₁ and originating from upper angle of cell, M₂ and M₃ slightly apart and M₃ originates from lower angle of cell, one cubital vein present, two anal veins (1A and 2A) present.

Female genitalia (Fig. 5): Papillae anales large bean-shape, besets with thick and large hairs, apophyses posteriors and anteriors about equal in size, apophyses posterior twisted with pointed apex, apophyses anteriors straight and blunt apex, ductus bursae, long tubular, corpus bursae very large irregular shape, dot-like cornuti all over.

***Diarsia spinosus* (Sp.n.) (Figs. 6-12)**

Material examine: Two males, Pakistan: Karachi, 20-04-2010, on light, leg. Shakira lodged at Kamaluddin's collection.

Comparative note: This species is most closely related to *Diarsia serrata* Holloway in having, palpi with 3rd segment short less than 1/3rd of the length of 2nd segment and usually antero-laterally directed but it can easily be separated from the same in having palpi with 2nd segment about 4X the length of third, hind wing with veins Rs originates just above upper angle of cell, aedeagus with membranous conjunctival lobe besets with clusters of large and small cornuti and by the other characters as noted in the key and description.

Colouration: Body generally brown in colour, dark brown patch all over, hind wings pale at base.

Wing expansion (Fig.6): Body size 46-48mm with wing expansion.

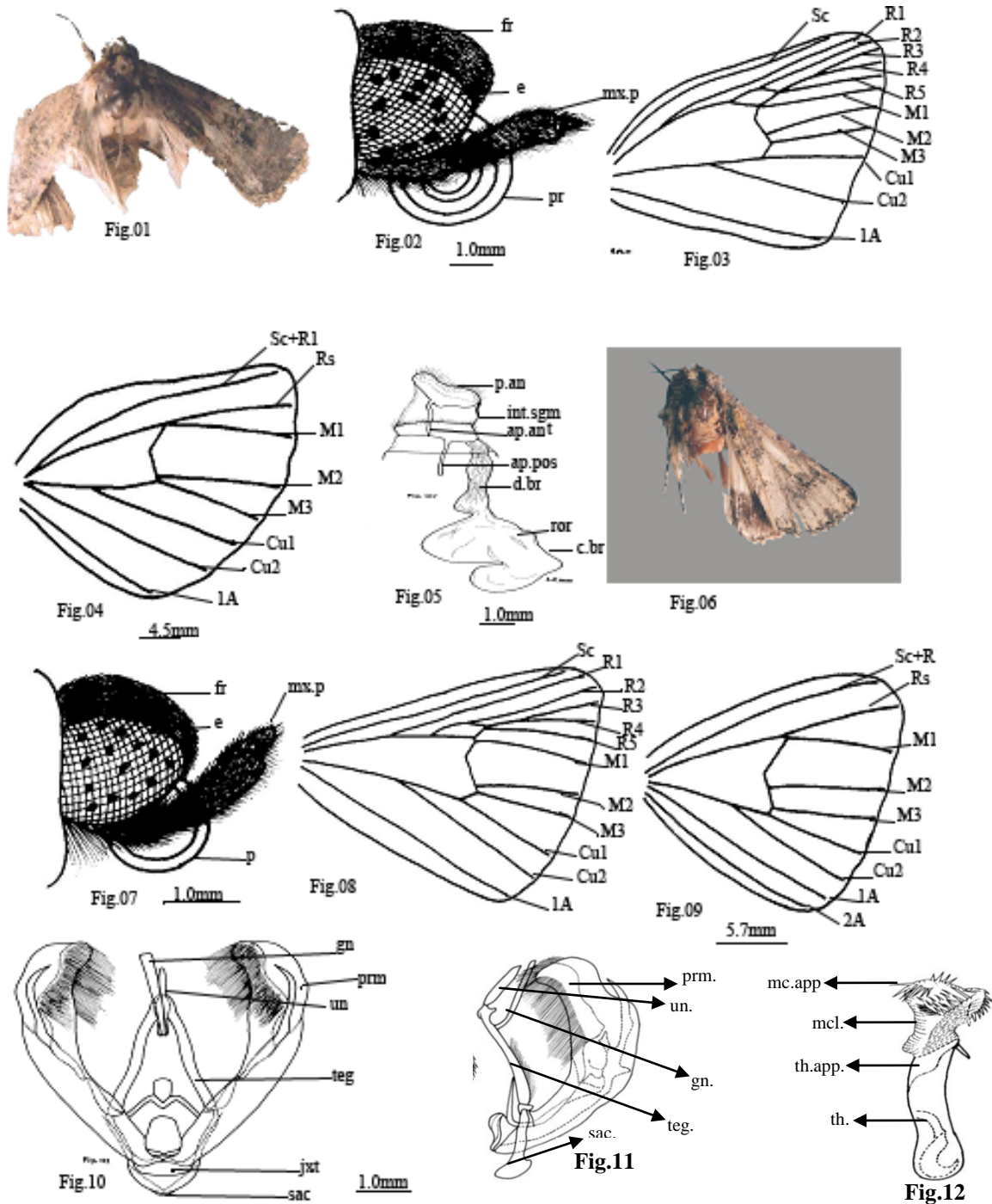


Illustration of Figures

Figs. 1-5 *Diarsia serrata* : 1 entire, dorsal view , 2 head, lateral view ; 3 fore wing; dorsal view; 4. hind wing; dorsal view ; 5 female genitalia; lateral view. Fig. 6-12 *Diarsia spenosus* (sp.n) : 6. entire dorsal view, 7. Head, lateral view, 8. fore wing dorsal view,9. hind wing, dorsal view, 10. tegumen ventral view, 11. Same lateral view, 12. Aedeagus, lateral view.

Key to the laterings: e. (eye), mx. P. (maxillary palp), pr.(proboscis), f. (frons), Sc. (sub- costal vein), R1-R5.(radius veins first to five), M1-M3. ,(median veins first to third),Cu1-Cu2. (cubitus veins first to second),1A-2A. (first to second anal veins), p. an. (papillae anales), ap. post.(apophyses posteriors), ap. ant.(apophyses anteriors), d.b.,(ductus bursae), c.b. (corpus bursae), cor.(crnuiti), int. seg. (inter segmental membrane), gn. Gnathos, un. (uncus), prm. (Paramere), teg. (Tegumen), jxt. (Juxta), sac. (Saccus), mc. app. (membranus conjunctival appendage), mcl. (membranus conjunctival lobes), th. app. (thecal appendage), th. (theca).

Head: (Fig.7): Vertex raised, frons convex, palpi well developed slightly turned, basal segment about 2/3rd of the 2nd segments later about 4X the 3rd segment, proboscis coiled.

Fore wings (Fig.8): Fore wings with anterior and posterior margins slightly convex, apical margin crenulated with apical angle sub-acute, vein Sc widely separated and parallel to R₁, R₂ originates from above upper angle of cell, R₃ and R₄ largely stalked later anastomosing with R₅ and originating from upper angle of cell, M₁, M₂ and M₃ wide -apart somewhat parallel, M₃ originates from lower angle of cell, Cu₁ and Cu₂ widely separated, only one anal vein (1A) present.

Hind wings (Fig.9): Hind wings with anterior and posterior margins convex, apical margin sinuated, with apical angle sub-rounded, veins Sc+R₁ parallel to Rs, Rs originates just above upper angle of cell, M₁ originates from upper angle of cell, M₂ and M₃ wide -apart and only M₃ originates from lower angle of cell, two cubital veins present, two anal veins (1A and 2A) present.

Male genitalia (Figs.10-12): Tegumen (Figs.10 and 11) elongated, saccus broad V-shaped, uncus broad straight, knife-like, apex pointed, gnathos large longer than uncus, paramere long, broad, apically sub-rounded, besets with long thick hairs on inner margin, a pointed curve process present on median sub-apical margin, aedeagus (Fig.12) tubular at distal margin with one thecal appendage, membranous conjunctival lobe moderate, distally a group of thorn-like appendages and proximally a group of small cornuti.

Discussions

The representative of the genus *Diarsia* Hübner are represented throughout the world. In Pakistan only three species including a new species are distributed. The genus *Diarsia* plays sister group relationship with *Xestia* Hübner and out group relationship by its aut apomorphies like palpi with third segment short less than 1/3rd the length of second and usually antero laterally dilated.

The present study concerned with detail taxonomic study of two species of the genus *Diarsia* viz. *Diarsia serrata* Holloway and *Diarsia spinosus* as a new species first time from Pakistan. Both species play sister group relationship to each other by their synapomorphies like palpi with 3rd segment short less than 1/3rd the length of 2nd segment and usually antero-laterally directed. Among the above species *Diarsia serrata* plays outgroup relationship by its autapomorphies like palpi with second segment about 5X the length of 3rd segment, hind wing with veins Rs and M₁ anastomosing and originating from upper angle of cell, papillae anales very large kidney shaped and corpus bursae large irregularly bilobed where as *Diarsia spinosus* also plays outgroup relationship by its autapomorphies like palpi with second segment about 4th the length of 3rd segments, hind wings with vein Rs originates just above upper angle of cell, M₁ originates from upper angle of cell, uncus shorter than gnathos, paramere very large apically broad and aedeagus with membranous conjunctival lobe with clusters of large and small cornuti.

References

- Hardwick, D.F. (1950). A study of the Rosaria group of the genus *Diarsia* (Lepidoptera: Phaleanidae) with special reference to the structure of the male genitalia. *The Canadian Entomologist* 82(2): 25-33
- Hashmi, A.A. and Tashfeen, A. (1992). Lepidoptera of Pakistan. *Proc. Pakistan Congr. Zool.* 12: 171-206.
- Herczig, B., Ronkay, L., Bathiev, A.M., Keroli, T.S., Meszaros, Z., Szeoke, K., Tochiev, T.Y., Uherkovich, A. and Uzahov, D.I. (1990). Contribution of the knowledge of the Noctuidae (Lepidoptera) fauna of the NE Caucasus. *Anns. hist. nat. Mus. Natn. Hung* 82: 163-174.
- Kamaluddin, S. (2002). *Ancara obliterans* Walker (Lepidoptera: Noctuidae: Trifinae) from Pakistan with its relationship. *Pakistan J. Entomol. Karachi* 17: 17-20.
- Kamaluddin, S. and Fatima, G. (1995). Redescription of *Cuculia albescens* Moore (Lepidoptera: Noctuidae: Trifinae) from Pakistan with special reference to its male and female genitalia. *Proc. Pakistan Congr. Zool.* 15: 29-33.
- Landolt, P.J., Pantoja, A., Hagerty, A., Carbo, L. and Green, D. (2007). Moths trapped in Alaska with feeding attractant lures and the seasonal flight patterns of potential agricultural pests. *Can. Entomol.* 139: 278-291.
- Nikolaevitch, P.A. and Vjatcheslova, I.E. (2002). The Noctuidae (Lepidoptera) of the Daghestan Republic (Russia). *Phegea* 30(1): 11-36.
- Patric, B.H. and Archibald, R.D. (1988). Lepidoptera light-trapped at Owaka, South Otago *New Zealand Entomologist* 11: 70-73.
- Stojanovic, D.V. and Curcic, S.B. (2011). The diversity of Noctuid moths (Lepidoptera: Noctuidae) in Serbia. *Acta. Zool. bulg.* 63(1): 47-60.