

## TWO NEW SPECIES OF THE GENUS *SPILOSOMA* CURTIS (LEPIDOPTERA: ARCTIIDAE: ARCTIINAE) RECORDED FROM PAKISTAN

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### ABSTRACT

Two new species of the *spilosoma* Curtis viz. *S.poswali* and *S.saleemi* have been recorded from Donga-gali, Pakistan and described in detail with special reference to its head, venation of fore and hind wings, male and female genitalia. The cladistic relationships are also briefly discussed.

**Key words:** New species, *S. poswali* and *S.saleemi*, Lepidoptera, Arctiidae, Pakistan, Cladistic relationship.

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### INTRODUCTION

Curtis (1825) and Stephens (1820) described the genus *Spilosoma* under the family Arctiidae. Westwood (1854) illustrated three species of the genus *Spilosoma* with their english names i.e., Great Ermine, Dingy white and water ermine and stated that these are common in the month of June. Walker (1855) redescribed *Spilosoma* as *Aepenus* under the family Arctiidae. Butler (1875) redescribed genus *Spilosoma* as *Spilarctia* under the family Arctiidae. Moore (1879) redescribed the genus *Spilosoma* as *Chall*. Cotes and Swinhoe (1887) in their catalogue of the moths of India, listed genus *Spilosoma* along with six species recorded from Sikkim, Java, Bornoe, E. India and Darjiling. Hampson (1894) described briefly seven species from Oriental region of the genus *Spilosoma* under the family Arctiidae recorded from Sikkim and Nagas. Seitz (1913) also redescribed genus *Spilosoma* under the family Arctiidae recorded from Nagas. Chaudhry *et al.* (1966) in their final technical report, reported only one species under the genus *Spilosoma* synonymised as *Diacrisia* recorded from Peshwar. Watson *et al.* (1980) in the generic names of the Moths of the world listed the genus *Spilosoma* under the family Arctiidae. Helgard (1991) described genus *Spilosoma* with *S.luteum* and *S.lubricipeda* under the family Arctiidae and stated that caterpillars reach full growth in the autumn when they are often seen hurrying across roads in search of pupation site. Hashmi and Tashfeen (1992) gave a checklist of moths and listed species of the genus *Spilosoma* under the family Arctiidae recorded from Northern areas of Pakistan. Kirstensen (1999) redescribed *Spilosoma* alongwith only one species *S.dubia*. Picker *et al.* (2002) discussed genus *Spilosoma* with only one species *S.lutescens* under the family Arctiidae as Ermine moth and stated that larvae are typical woolly bears and feed on a range of plants including Lucerne and Maize.

### MATERIAL AND METHOD

The adult specimens of *S.poswali* and *S.saleemi*, were collected with the help of light trap from Donga Gali, Pakistan and were identified with the help of literature as mentioned in the references. For the study of sex genital complex the abdomen was excised at the base and boiled in 10% KOH solution for about 5-minutes and then washed with tap water. The genitalia were removed from the abdomen for detail examination and later individual elements of the genitalia and the associated structures were removed as required and examined. Ocular grid Leitz weitzler dissection microscope. Diagrames were made on a graph paper, which later were transferred on drawing sheet and finalized with Pelican ink. All the diagrams are to the given scale.

### Diversity:

Both species are recorded from Donga-gali, at the range of 2400m above sea level, the population is very high during July and August and very less recorded in December and January. The temperature varies during summer 17°C and in winter 1°C, while average annual temperature is 12°C. Amount of precipctation between 1300-1400 mm or sometimes to about 1450mm, average relative humidity (mean) at 1200 UTC 61%

**Genus: *Spilosoma* Curtis**

*Spilosoma curtis*, 1825, *Br. Ent.* 2:3; Stephens., 1829, *III. Brit. Ent., Haust.* 2:74.  
 Hampson, 1894, *Faun. Brit. Ind.* 2:3; Watson *et al.*, 1980, *Brit. Mus. (Nat. Hist.)* 2:182;  
 Goodger and Watson, 1995, *Nat. Hist.* 1:7.  
*Aepenus* Walker, 1855, *Cat.* 3:686  
*Spilarctia* Butler, 1875, *Cist. Ent.* 2:39  
*Challa* Moore, 1879, *Proc. Zool. Soc. Lond.* :298

**Diagnostic feature:**

Body generally fuscus or hyaline with some patches, eyes moderate, palpi long and pored and passing beyond frons, proboscis short, fore wings long and moderately narrowed, all the radius veins not stalked to each other, hind wings with veins M2 and M3 originating from lower angle of cell, in males tegumen with a dorsal distal process, parameres with inner margin bilobed, aedeagus with theca tubular having prominent thecal appendage, membranous conjunctival appendage large with bunches of small and large spine-like cornuti, in females both apophyses are well developed, corpus bursae large and ballon-shaped.

**Comparative note:**

This genus is most closely related to *Amsacta* Walker and *Estigmene* Hubner in having fore wings with all the radius veins not stalked to each other and in males membranous conjunctiva lobed with cornuti but it can easily be separated from the same in having eyes moderate, in males paramere with inner margin bilobed and in females with well developed both apophyses in contrast eyes short, in males parameres with inner margin trilobed or tetralobed and in females with reduced or ill-developed apophyses in *Amsacta* and *Estigmene* and by the other characters as noted in the description.

**Type species:**

*Bombyx menthastri* (Denis & Schiffer 1775)

**Distribution:**

Nearctic, Palaearctic, Ethiopian, Australian and Oriental regions.

**Key to the species of the genus *Spilosoma* Curtis**

1. Fore wings brown with large number of oval-shaped pale patches, abdomen elongated, in males a truncated process present at the base of uncus, gnathos large, lobed about equal to the length of uncus, parameres narrowed, much longer than uncus, two processes present at inner margin.....*S. impleta* Walker  
 .....Fore wings fuscous with reddish brown patches, abdomen broad, moderate, in males a lobe-like or acute process present at the base of uncus, gnathos absent or reduced, parameres broad, shorter than uncus, only one process is present at inner margin.....2
2. Fore wings fuscous with oblique patches, maxillary palpi obliquely produced, apex of uncus blunt, inner process of parameres sharply produced, theca bilobed, membranous, conjunctiva with two bunch of small spine-like cornuti.....*S. subfascia* Walker  
 ....Fore wings yellow with reddish brown vertical patches maxillary palpi anteriorly produced, apex of uncus acute, inner process of parameres blunt, theca unilobed, membranous conjunctiva with one bunch of small or large spine-like cornuti.....3
3. Fore wings hyaline with oblique series of spots, veins R1 and R2 stalked, tegumen with a thumb-like dorsal process, membranous conjunctival appendage with vertical rows of small cornuti .....  
 .....*S. stigmata* Moore  
 ....Fore wings yellow with a large number of brownish patches, veins R1 and R2 separated not stalked, tegumen with an acutely produced process, membranous conjunctival appendage with bunches of small and large spine-like cornuti.....4

4. Head and frons covered by large hairs, fore wings with veins R2, R3, R4 and R5 originate from upper angle of cell, hind wings with veins M2, M3, and Cu1 originate from lower angle of cell .....5  
 .....Head and frons covered by small hairs, fore wings with veins R2, R3, and R4 originate from upper angle of cell, hind wings with veins M2 and M3 originate from lower angle of cell.....6
5. Fore wings with M1 and M2 separated, two anal veins 1A and 2A are present, hind wings with Cu1 originate from lower angle of cell, two anal veins 1A and 2A are present, apex of parameres broad, tegumen with a sickle-sharp inner process.....*S. poswali* (Sp.n)  
 .....Fore wings with M1 and M2 shortly stalked, only one anal vein 1 is present, hind wings with veins M2, M3 and Cu1 anastomosing and originate from lower angle of cell, three anal veins 1A to 3A are present, apex of paramere sub-acutely produced, tegumen with a truncated inner process.....*S. melanostigma* Eversmann
6. Fore wings with margin oblique, veins R2 and R3 moderately stalked, hind wings with veins Rs and M1 stalked and originate from upper angle of cell, two anal veins 1A and 2A are present, paramere largely bilobed, outer lobe elongated, thorn-like, membranous conjunctival appendage with two bunches of cornuti.....*S. bifurca* Walker  
 .....Fore wings with outer margin sinuated, veins R2 and R3 largely stalked, hind wings with veins Rs and M1 anastomosing not stalked and originating from upper angle of cell, three anal veins 1A to 3A are present, paramere apically bilobed, outer lobe short rounded, membranous conjunctival appendage with one bunch of cornuti.....*S. saleemi* (Sp.n)

*Spilosoma poswali* (Sp.novum)  
(Figs. 1-8)

**Colouration:**

Head (fig.1) and thorax dull white except a black spot on collar.

**Head:**

Eyes (fig.2) moderate, frons well developed, sub-acutely produced with hairs, maxillary palpi large, anteriorly produced, second segment more than  $2\frac{1}{2}$  X the length of third, proboscis short and coiled.

**Fore wings:**

Fore wings (fig.3) moderate, apex sub-acute, outer margin obliquely sinuated, dull white except dark brown median broad vertical band and large patches on costal and anal area and small Patches and apical margins, veins R2 and R3 largely stalked, further moderately stalked with R4 and anastomosing with R5 and originate from upper angle of cell, M1 originates slightly above lower angle of cell, M2 originates from lower angle of cells and M3 originates from slightly below lower angle of cell, two anal veins 1A and 2A are present.

**Hind wings:**

Hind wings (fig.4) short, oval-shaped, outer margin sinuated, apex broadly convex, hyaline except brown apical margin, a large basal and a large sub-costal spot, veins Rs anastomosing with M1 and originate from upper angle of cell, M2 and M3 anastomosing and originate just above lower angle of cell, Cu1 originates from lower angle of cell, two anal veins 1A and 2A are present. Body size 32 – 34 mm with wing expansion.

**Male genitalia:**

Tegumen (figs.5 and 6) narrowed, flask-shaped, sclerotized, saccus somewhat circular with sub-rounded base, without process, uncus large, broad, outer margin convex, inner margin slightly concave, apex acutely produced curved inwardly, an acute process present at dorsal basal portion of uncus, gnathos reduced, juxta somewhat rectangular, distally sinuated, parameres large, distally rounded, thumb-like inner process, aedeagus (fig.7) with thumb-like thecal appendage associated with dentated thecal appendage, and a plate-like thecal appendage, membranous conjunctival appendage with small bunch of cornuti.

**Scent brush:**

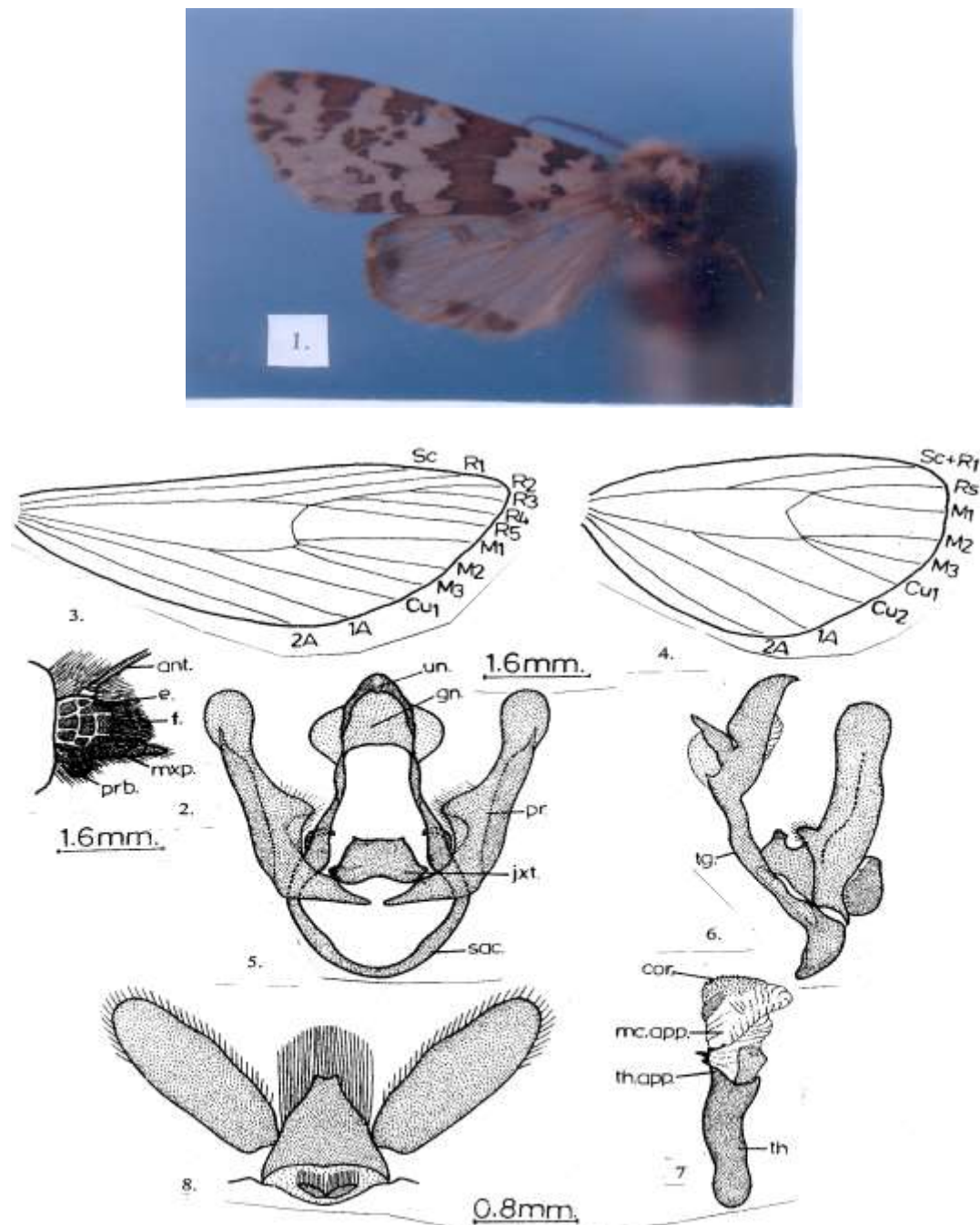
Scent brush (fig.8) consists of a pair of posterior abdominal brush located on outer margin of 8<sup>th</sup> segment, each brush has moderate sized tuft of scales. The median gland consists of large flipper-like lateral and truncated median cuticular flaps, lateral flaps with small hairs on posterior and inner margin, the median flap with large hairs on posterior margin.

**Material examined:**

Holotype male, Pakistan: Dong-gali, 6.8.2001, Syed Viqar Ali, on light, lodged at authors collection.

**Comparative note:**

This species is almost closely related to *S.melanostigma* Eversmann in having head and frons covered by large hairs, fore wings with veins R2, R3, R4 and R5 originating form upper angle of cell, hind wings with veins M2, M3, and Cu1 originating from lower angle of cell but it can easily be separated from the same in having fore wings with M1 and M2 separated, two anal veins present, hind wings with Cu1 originating from lower angle of cell, tegumen with a sickle-shaped inner process and by the other characters s noted in the keys and description.

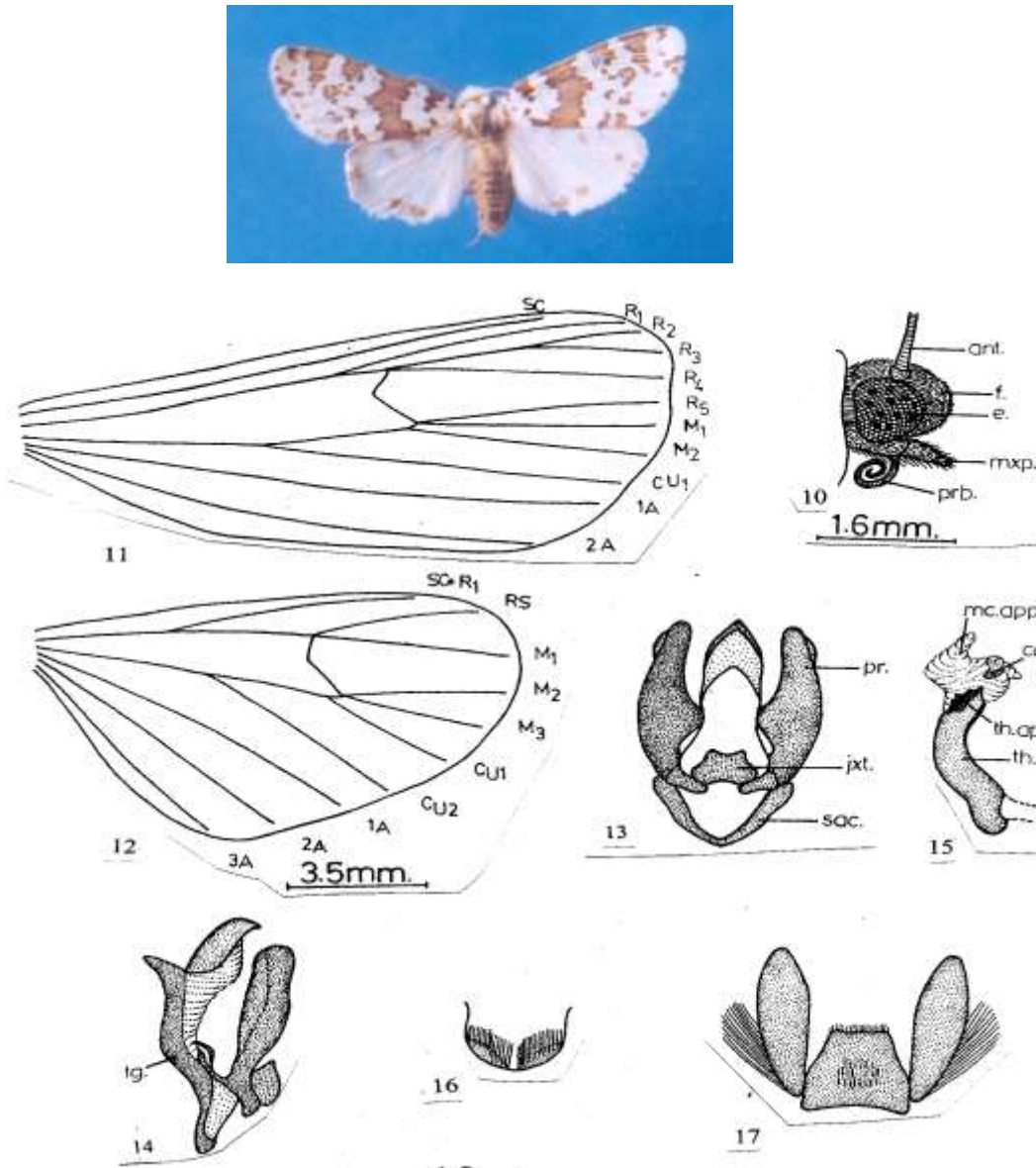


Figs.1-8. *Spilosoma poswali*: 1. Adult, entire, dorsal view; 2. head, lateral view; 3. fore wing, Dorsal view; 4. hind wing, dorsal view; 5. tegumen, ventral view; 6. same lateral view; 7. aedeagus, lateral view; 8. scent brush.

*Spilosoma saleemi* (Sp.novum)  
(Figs. 9-17)

**Colouration:** Head and thorax (fig.9) dull pale except black spot on color.

**Head:** Eyes (fig.10) large, frons roundly produced, palpi long and pectinate with 2<sup>nd</sup> segment about 2X the length of 3<sup>rd</sup>, proboscis moderate and coiled.



Figs.9-17.*Spilosoma saleemi*: 9. Adult,entire,dorsal view; 10.head,lateral view; 11.fore wing, dorsal view; 12.hind wing, dorsal view; 13.tegumen,ventral view; 14.same,lateral view; 15.aedeagus, lateral view; 16 &17.scent brush.

Key to the laterings

ant. (antenna), e. (eye), fr. (frons), gn. (gnathos), jxt. (juxta), mcl.(membranous conjunctival appendage), mx.p. (maxillary palpi), pr.(paramere), sac.(saccus), tg. (tegumen), th. (theca), th.app. (thecal appendage), un.(uncus), 1A - 3A. (anal vein 1, 2 and 3), Cu1 & Cu2 (cubital vein 1 and 2), M1-M3 (median vein 1 to 3), R1-R5 (radius vein 1 to 5), Rs.(radio-suctorial vein), Sc.(sub-costal vein), Sc+R1(sub-costal and radius vein 1).

**Fore wings:**

Fore wings (fig.11) large, apically broad, apical margin sinuated, white with irregular patches all over the wing reddish brown, veins R2 and R3 largely stalked anastomosing with R4 and originating from upper angle of cell, R5 and M1 anastomosing and originates from lower angle of cell, M2 originates just below lower angle of cell, Cu1 originates below lower angle of cell, three anal veins 1A and 3A are present.

**Hind wings:**

Hind wings (fig.12) small, broad, apex broadly rounded, white with two costal and four marginal spots reddish brown, veins Rs and M1 anastomosing and originating from upper angle of cell, M2 and M3 anastomosing and originating from lower angle of cell, Cu1 originates below lower angle of cell, three anal veins 1A to 3A are present. Body size 30-32 mm with wing expansion.

**Male genitalia:**

Tegumen (figs.13 and 14) conical shaped, semi sclerotized, saccus somewhat V-shaped without process, uncus beak-shaped with outer margin convex with thumb-like sclerotized outgrowth and inner margin distinctly sinuated with sharply pointed incurved apex, gnathos reduced membranous, juxta somewhat rectangular shaped, apically narrowed and bilobed, parameres moderate, outer margin sinuated, apically rounded, inner margin produced into blunt lobe, aedeagus (fig.15) moderate, tubular curved with tetra-dentate thecal appendage, membranous appendage trilobed, median lobe semisclerotized without cornuti.

**Scent brush:**

Scent brush consists of a pair of posterior abdominal brush (fig.16) located on Outer margin of 8<sup>th</sup> segment, each with moderate sized tuft of scales. The median gland (fig.17) consists of flapper-like lateral and rectangular-shaped median cuticular flaps, the lateral flaps with a tuft of brush on anterior-outer margin and median flap beset with small hairs on posterior margin and a bunch of small hairs.

**Material examined:**

Holotype male, Pakistan: Donga-gali, 6.8.2001, Syed Viqar Ali, on light, lodged at authors collection.

**Comparative note:**

This species is most closely related to *S.bifurca* Walker in having fore wings with veins R2, R3 and R4 originating from upper angle of cell, hind wings with veins M2 and M3 originating from lower angle of cell, but it can easily be separated from the same in having fore wings with veins R2 and R3 largely stalked, hind wings veins Rs and M1 anastomosing not stalked and originating from upper angle of cell, in males membranous conjunctival appendage with one bunch of cornuti and by the other characters as noted in the description.

**DISCUSSION**

The representatives of the genus *Spilosoma* Curtis are distributed throughout the world except Neotropical region. This genus appears to play sister group relationship with *Diacrisia* Hubner by their synapomorphies fore wings with either 3 horizontal fascia, vertical fascia or spotted and in females the corpus bursae are without cornuti and isolated by its autapomorphies like eyes moderate, in males parameres with inner margins bilobed and in females apophyses well developed.

Among the representatives of the genus only seven species are recorded from the areas included in Pakistan Northern areas viz., *saleemi*, *bifurca*, *melanostigma*, *poswali*, *stigmata*, *subfascia*, and *impleta*. The species *impleta* plays out group relationships with others. In rest of the species the *subfascia* plays out group relationships with *saleemi*, *bifurca*, *melanostigma*, *poswali* and *stigmata* which plays sister group relationship with each other. Among these the *stigmata* plays out group relationship with each other. Among these the *stigmata* plays out group relationships with the rest of the four species which play sister group relationship to each other. The *melanostigma* and the *poswali* play sister relationship to each other and out group relationship with *saleemi* and *bifurca*, which further play sister group relationship to each other.

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