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Male Genital Morphology of Certain Hesperiidae Species and the Variations in the Genitalia of *Carcharodus alceae* (Lepidoptera, Hesperiidae)

Erol ATAY[1], Zeynel CEBECİ[2], Yusuf HÜSEYİNOĞLU[3]

[1] Department of Biology, Faculty of Arts and Sciences, Mustafa Kemal University, Hatay, TURKEY
[2] Department of Biometry and Genetics, Faculty of Agriculture, Çukurova University, Adana, TURKEY
[3] Department of Biology, Faculty of Arts and Sciences, Mersin University, Mersin, TURKEY

Sorumlu Yazar: eatay@mku.edu.tr

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Abstract
In order to study their morphological identifications, preparations of male genital organs were made from 9 species including *Ochlodes venatus*, *Gegenes pumilio*, *Pyrgus melotis*, *Pyrgus serratulae*, *Spialia orbifer*, *Spialia phlomidis*, *Erynnis tages*, *Carcharodus orientalis*, *Carcharodus alceae* belonging to Hesperiidae family collected from localities at different altitudes with various vegetations in Hatay province. Male genital organ of *Carcharodus alceae* was compared with those in the literature and the distinctions between their genital organs and those reported from Spain, Netherlands, Afghanistan and France are given here. Photos of male genital organs and the variations of *Carcharodus alceae*'s genital organsa are also included in the paper.
Keywords: Hesperiidae, *Carcharodus alceae*, Male Genital Morphology, Variation

Bazı Hesperiidae Türlerinin Genital Morfolojisi ve *Carcharodus alceae* (Lepidoptera, Hesperiidae)'nin Genital Organ Variyasyonları

Özet
Bu çalışmada, Hatay ilinin farklı yüksekliklerdeki değişik bitki örtüsüne sahip lokalitelerinden toplanan Hesperiidae faimilyasına ait 9 türün (*Ochlodes venatus*, *Gegenes pumilio*, *Pyrgus melotis*, *Pyrgus serratulae*, *Spialia orbifer*, *Spialia phlomidis*, *Erynnis tages*, *Carcharodus orientalis*, *Carcharodus alceae*) erkek genital preparatları hazırlanarak türlerin morfolojileri tarif edilmiştir. Hatmi Zıpzıpının (*Carcharodus alceae*) erkek genital organı İspanya, Hollanda, Afganistan ve Fransa'dan verilen literatür ile karşılaştırıldı. *Carcharodus alceae*'e ait erkek genital organı ve variyasyonlar bu çalışmada verilmiştir.
Anahtar Kelimeler: Hesperiidae, *Carcharodus alceae*, Erkek Genital Morfolojisi, Variyasyon

INTRODUCTION

The genitalia of male butterflies have been the subject of several detailed studies as its morphology can provide the basis for work of taxonomy, systematic as well as phylogenetic analysis (Bonfantti et al., 2013). The genitalia of male butterflies have highly modified sclerites of the 9th and 10th body segments. Genital morphology, particularly of the male, is one of the principal characters used in most taxonomic studies of lepidoptera and in some studies it is the only character used (Goulson, 1993). Recently, several studies on the comparative morphology of male genitalia have been carried out on genital muscles and intraspecific structural variations (Bonfantti et al., 2013).

The basic structures of the male and female genital organs were described; however, except from its obvious functions, the precise mechanisms of its particular parts are relatively less known. The morphology of the female genitalia has been important in less specific levels of taxonomic divisions in lepidoptera, while the male genitalia is commonly used taxonomically in more specific levels such as genus and species (Leite et al., 2011).

Carcharodus alceae (Esper, 1780) is widespread in the Palaearctic region: It lives in areas from the Sahra to Northern Germany and from Portugal to the Altai, Turkestan and Kashmir, from where it penetrates the Oriental region along the southward of the Himalayas to Mussoree. Isolated from its main range this species inhabit Southwestern Arabia too. As ecological factors such as temperature and humidity are spread over wide geographic area, there appears to be a marked geographic variation. This has led to the description of many "subspecies", which are actually climatic or seasonal forms. As undoubtedly a part of the geographic variation of *C. alceae* in size and colour depends on geographic isolations during the Ice Age, the study of the geographic variation of this species is very complex. As known well, the genitalia usually do not react to ecological changes to the same extent as it does to size and colour; in fact normally there is no reaction at all. If there is a geographic variation in the genitalia, this can usually be due to geographic isolation (De Jong, 1974).

Out of 3000 species spread over the world, 43 skipper species inhabit Turkey (Baytaş, 2008; Baytaş and Karaçetin, 2008; Gençer et al., 2009). Twenty species of Hesperiidae family, live in Hatay province (Koçak and Kemal, 2006, 2007, 2009; Atay and Yolcu, 2012). With their rather big head, small size and high flying speed, this family is classified into two

main groups as wing spreading skippers and meadow skippers. The former are a bit bigger and have more rounded wing edges, while meadow skippers have narrow long angular wings. Unlike wing spreading skippers, they look like a jet plane with their forewings and hindwings positioned at different angles (Baytaş and Karaçetin, 2008).

In this study, male genital organs of certain skippers inhabiting Hatay province of Turkey were morphologically inspected. Variations in male genital organs of *Carcharodus alceae* (Mallow Skipper) were compared with the findings of studies by other researchers.

MATERIAL and METHODS

Wings of butterflies from localities of different altitudes and habitats in 2012 and 2013 were scanned and their identification was made. Afterwards, they were stored as exhibition material in collection boards. Preparations for male genital organs were made for nine species (*Ochlodes venatus, Gegenes pumilio*, *Pyrgus melotis, Pyrgus serratulae*, *Spialia orbifer, Spialia phlomidis, Erynnis tages, Carcharodus orientalis, Carcharodus alceae*) belonging to Hesperiidae family kept as exhibition material collected for use in identification of butterfly fauna in Hatay (Turkey).

For the preparation of genitalia slides, the abdomen was detached from thorax by applying upward pressure on the end of the abdomen before the abdomen was placed in a glass tube with approx 5 ml of a solution of 10% potassium hydroxide (KOH) (Kansu, 1963; Atay, 2007; Pulido and Andrade, 2008). Then the tube was heated for 5 to 10 minutes in a water-bath close to boiling point. Next, the abdomen was put in a petri dish with water for dissection and cleaning. Subsequently, male genital organ was removed from abdomen using dissecting pins and the last scales and hairs or any other material under the dissecting microscope were taken out. Then genitalia were placed in a petri dish with 70% ethyl alcohol for dissection and cleaning before being placed in a petri dish with 95% ethyl alcohol for the fixation of the staining and dehydration. For permanent slide, the genitalia were placed on a microscope slide with canada balsam or entellan. The slide was kept on a smooth surface and left for several hours at room temperature. The important taxonomic characters were described. The species are now kept in the Biology Department of Mustafa Kemal University.

RESULTS

Family: Hesperiidae

1. *Ochlodes venatus* (Bremer&Grey, 1852)

(Large Skipper) (Figure 1)

Synonyms: *Sylvanus* Esper, 1777, *venatus* Bremer & Grey, 1852 (Koçak and Kemal, 2009).

The length of the forewings is 17 mm. Adults, are on wing from May to August in two generations, spread over Europe, Turkey, Syria, Iran, Irak, Central Asia, Siberia, Mongolia and Korea.

As shown in Figure 1, male of the species has wide brown contour on the surface of orangey brown wings. Small orange spots are noticable underneath the forewing apex, while a stigma is apparent in the centre. The spots on wings of females, looking relatively darker, are larger. There is a discal area of outer pale spots on the bottom of hindwings. Adults inhabit in sparse forests, river banks, and grasslands. They are quite common species in Turkey. Its larvae live on *Poaceae* spp.

Figure 1. *Ochlodes venatus*: Wing upperside of a male imago

Male Genital Morphology of the Species (Figure 2)

As shown in Figure 2, tegumen is rather convex and split, and tegumen arms narrow at the joints with vinculum. Uncus, which is long and tapered towards the apical, consists of four parts; two of which are located on the dorsal are relatively thinner, while those on the

ventral are thicker. Uncus is covered with long sparse hairs. Valva is long and wide; its length is twice longer than its width. Both costa edge and ventral edge are straight and folded on itself between the basal and apical area. Apical edge of valva is rather sclereited and the edge has taken the shape of saw tooth. The surface of the valva is covered with sparse hairs, which become denser towards the apex. Aedeagus, which is 2 mm long, is rather sclereited towards the apical and thickens from the posterior to the apical. There is a long arm nearby the centre of the aedeagus and the tip of this structure has sclereited forming small threads with thick and pointed cornuti located on vesica.

Figure 2. Male genitalia (A) (B aedeagus) of *Ochlodes venatus*

2. *Gegenes pumilio* (Hoffmannsegg, 1804)

(Pygmy Skipper) (Figure 3)

Synonyms: *pumilio* Hoffmannsegg, 1804; *pygmaeus* Cyrilli, 1787; *nec* Fabr., 1775; *aetra* Boisduval, 1840; *lefebvrii* Rambur, 1842; *monochroa* Rebel, 1907 (Koçak and Kemal, 2009).

The length of the forewings is 14-15 mm. Adults are on wing from April to October in three generations. It is rather a small skipper species with tapered forewing apex and angular hindwing. The surface of wings in males is dark brown, while the female has a few pale spots on the surface of light brown forewings. There is a discal area made up of pale points on the greyish brown bottom of each wing of both males and females as shown in Figure 3. The species inhabits Mediterranean coastal areas, Arabia, Iran, Himalayas, India and Southern Europe. It spreads in Aegean and Mediterranean littoral provinces in Turkey upto 1800 m altitude. It prefers warm rocky regions, dry river bedsand grazings. Larvas live on *Hyparrhenia hirta* (Baytaş 2008; Baytaş and Karaçetin, 2008).

Figure 3. *Gegenes pumilio*: Wing underside of a male imago

Male Genital Morphology of the Species (Figure 4)

As seen in Figure 4, tegumen is relatively straight with thick and strong arms. Uncus is small and splitted at the apical. The edge of each part forms small sclerited projections. There are sparse thin hairs on the surface of uncus. Saccus has a thinner extended shape. Valva is long and large, while costa edge is relatively straight and concave, and the ventral edge is somewhat convex at the median. Apical edge of valva is split and the part which is located on the ventral has a sclerited structure, while the edge has taken the shape of saw teeth. Valva length is 2.67 times as long as its width. Aedeagus, which is 3 mm, has long and

cylindirical shape. On the vesica it has two cornitu, one of which has tapered wide tip, while the other is like a saw tooth.

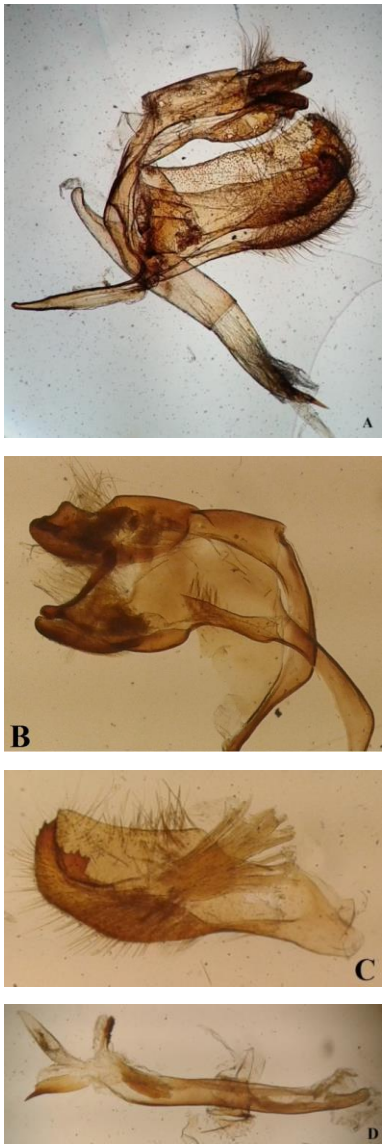

Figure 4. Male genitalia (A) (B uncus, valve, D aedeagus) of *Gegenes pumilio*

3. *Pyrgus melotis* (Duponchel, 1834)

(Aegean Skipper) (Figure 5)

Synonyms: *melotis* Duponchel, 1834; *hypoleucos* Lederer 1853; *jordona* Hemming, 1932 (Koçak and Kemal, 2009).

The length of the forewings is 13-14 mm. Adults are on wing from April to June, and again from July to August in two generations each year.

Pyrgus species are the least distinguishable butterflies from their appearence. This species resembles much *Pyrgus malvae* (Grizzled Skipper). Adults prefer clearings of woodlands, sparse areas in forests and grasslands with flowering plants and the slopes of grasslands. Except the Marmara district in the northwest it is widely spreaded across Turkey. It inhabits Aegean Islands, Turkey, Middle East and the Caucasia.

According to De Jong (1987) there are some variations in the male genitalia *Pyrgus melotis*. The ventral spin of the gnathos is straight or slightly curved. The author shows the distribution of three subspecies of *Pyrgus melotis* in Turkey as follows: *Pyrgus melotis melotis* (Adana, Osmaniye, Hatay and Gaziantep), *Pyrgus melotis ponticus* (Southern, Northern, Eastern and Central Anatolia Regions) and *Pyrgus melotis graecus* (İzmir).

Figure 5. *Pyrgus melotis*: Wing upperside of an imago

Male Genital Morphology of the Species (Figure 6)

As shown in Figure 6, tegumen is wide as well as split and is thicker and stronger when compared to Olive skipper (*Pyrgus serratulae*). Uncus is long, convex and tapered towards the apical. It is covered with sparse relatively thin hairs. Tip of uncus resembles a hook. Gnathos, formed in pairs, looking like a horn extends to dorsal and ventral, where it bends taking the form of a hook. Valva is long and thin. It is two and a half times as long as than its width. While costa edge is relatively smooth, and slightly convex at the median,

ventral edge is convex at the median. Its costa process is rather long and flattened near the apical. Costa process widens at the bottom forming a small hard projection. Valva is covered with sparse thin short hairs. Saccus has extended towards the anterior. Aedeagus is 1.8 mm long, cylindirical and smooth.

Figure 6. Male genitalia of *Pyrgus melotis*

4. *Pyrgus serratulae* (Rambur, 1839)

(Olive Skipper) (Figure 7)

Synonyms: *serratulae* Rambur, 1839; *caecus* Freyer, 1846; *occidentalis* Lucas, 1910; *nec* Skinn, 1906; *planorium* Verity, 1925; *magnagallica* Verity, 1931; *plurisignata* Silbernagel, 1946; *arvernensis* Picard, 1948 (Koçak and Kemal, 2009).

The length of the forewings is 17 mm. The adults are on wing in July and August.

Subspecies including *Pyrgus serratulae major* and *Pyrgus serratulae balcanicus* inhabit Turkey. The subspecies *Pyrgus serratulae major* have more spots and are more noticable when compared with its European cousin *Pyrgus serratulae serratulae*. The spots on the subspecies *Pyrgus serratulae balcanicus* are smaller. There are big white round spots on the oil green bottom of the hindwing. These spots are seperated by the wing streaks.

A thin white marginal line beneath both forewings and hindwings helps identify this butterfly.

Except the Aegean region in the west, this species is wide spread in Turkey, and also in Spain, Mid Europe, Balkans, Caucasia, Southern and Central Siberia. They live in clear areas and grasslands with flowering plants, humid clear areas in the forests as well as in dry bushy regions in lower elevations. Their larvae feed on *Potentilla* spp.

Figure 7. *Pyrgus serratulae*: Wing upperside of an imago

Male Genital Morphology of the Species (Figure 8)

Tegumen, wide and split, has shorter and relatively thin arms when compared with Olive Skipper (*Pyrgus serratulae*). Uncus, shorter and thinner than that of Olive Skipper, is tapered towards the apical, Its surface is covered with sparse long thin hairs, which grow as a pile. Tip of the uncus looks like a hook as seen in Figure 8. Gnathos formed in pairs is flat. It extends to ventral and twists strongly at the median turns towards the dorsal. Gnathos forms a number of thorns like projections near the apical. Valva, which is long and wide, has a length almost three times as long as its width. Costa edge, relatively smooth, is concave at the ventral base, but convex after the median. Costa process is rather long, cylindiric and thin when compared with Olive Skipper and tapers towards the tip. Costa process having widened at the bottom, forms a small hard projection, which is relatively shorter than that of Olive Skipper. Valva is covered with sparse thin long hairs. Saccus has grown longer towards the anterior. Aedeagus, which measures 2.1 mm long, is long cylindirical and is somewhat smooth.

Figure 8. Male genitalia (A) (B Aedeagus) of *Pyrgus serratulae*

5. *Spialia orbifer* (Hübner, 1823)

(Red Underwing Skipper) (Figure 9)

Synonyms: *orbifer* Hübner, 1823; *tesselloides* Herrich-Schaffer, 1845 (Koçak and Kemal, 2009).

The length of the forewings is 12-14 mm. The adults are on the wing in April and September in two generations. The species is one of the most frequently seen skipper and inhabits densely almost all regions in Turkey. Spring adults are bigger than those of the summer ones. Their larvae feed on *Sanguisorba* spp. Adults inhabit clear areas in forests and open areas abundant with flowering plants.

The spots forming the upper design of the wings are relatively smaller. Wing design resembles Persian Skipper (*Spialia phlomidis*), lowersurface of the forewing are ornamented with white spots.

Figure 9. *Spialia orbifer*: Wing upperside of an imago

Male Genital Morphology of the Species (Figure 10)

Tegumen is long, wide and single piece as seen in Figure 10. Tegumen arms are relatively wider. Uncus, rather long, is tapered towards the apical. Upper surface of it is covered with sparse short and thin hairs. Valva is wide and 1.97 times longer than its width. It is rather different from Persian Skipper (*Spialia phlomidis*) with its longer and more oval body form. Costa edge is strongly convex and curved in shape. Costa process is extremely hardened and widens at the apical, which is lined with threads on the edges. Saccus is short. Aedeagus, which measures 1.65 mm, is long and cylindiric.

Figure 10. Male genitalia (A) (B Aedeagus) of *Spialia orbifer*

6. *Spialia phlomidis* (Herrich-Schaffer, 1845)

(Persian Skipper) (Figure 11)

Synonyms: *phlomidis* Herrich-Schaffer, 1845; *eupator* Hemming, 1932; *kiki* Higgins, 1974 (Koçak and Kemal, 2009).

The length of the forewings is 13-15 mm. Adults are on the wing in June and August in one generation. In Turkey the species is well known in Southeastern Anatolia, Eastern Meditterranean, Central Anatolia and the Marmara Region. The species spreads in Albania, Macedonia, Greece, Southhern Russia, Turkey and Iran.

As shown in Figure 11, on the top surface of forewings are a number of white spots, a submarginal line, postdiscal line and discal ocelli. There is a basal ocelli in the cell. Grayish scales are arranged along the basal half of the forewing costa edge. On the hindwing is a basal ocelli, a submarginal line of white points and there is a discal line with a rectangular spot in the middle of the wing. Lower surface of the forewing has a similar design.

Figure 11. *Spialia phlomidis*: Wing upperside of an imago

Male Genital Morphology of the Species (Figure 12)

Tegumen, which is long and wide, consists of a single structure as seen in Figure 12. It has wide strong arms. Uncus, which is long and tapered towards the apical, is covered with sparse short and thin hairs. It is shorter when compared to Rede Underwing Skipper (*Spialia*

orbifer). Valva, which is wide and relatively oval, is 1.40 times as long as its width. Costa edge, which is rather convex and wide, hardens at the tip, forming a sclerotic projection (costa process) lined with threads on the contour. Ventral edge of valva resembles the costa edge. The upper surface of valva is covered with long quite dense hairs. Saccus is short. Aedeagus, which measures 3 mm, is long, cylindiric and twisted at the anterior and the posterior in opposition direction to each other.

Figure 12. Male genitalia (A) (B aedeagus) of *Spialia phlomidis*

7. *Erynnis tages* (Linnaeus, 1758)

(Dingy Skipper) (Figure 13)

Synonyms: *tages* Linnaeus, 1758; *morio* Scopoli, 1763; *geryon* Rottemburg, 1775; *subclarus* Verity, 1921 (Koçak and Kemal, 2009).

The length of the forewings is 15 mm. Adults are on the wing from May to August in two generations. Larval host plants are *Eryngium*, *Lotus*, *Coronilla*, *Medicago*, *Hippocrepis* (Gutierrez et al., 1999; Baytaş, 2008). It is widespread in Turkey. It lives all over Europe and

Asia. It can be seen upto an altitude of 2000 m and prefers bare areas in the forests and grasslands. The species is wide spread and collected from all localities visited in Hatay province.

Figure 13. *Erynnis tages*: Wing upperside of an imago

Male Genital Morphology of the Species (Figure 14)

Tegumen is long and large; tegumen arms are big and strong as shown in Figure 14. Uncus, which is small and relatively convex, narrows and tapers towards the apical. Gnathos, made up of a pair, widens towards the apical, where it becomes round and is covered with a number of small threads. Valva is long and large. Its costa edge is rather convex while ventral edge is convex at the median. Valva has narrowed and lengthened at the apical. Apical edge of valva is comprised of a number of threads. Costa edge of valva has formed a long projection (costa process) nearby apical. The widened tip of costa process has small hard protrusions. Costa process, which has a reverse position, helps grabbing the abdomen of the female during copulation. Valva length is 2.57 times as long as its width. Saccus is short and coils upward. Aedeagus, which is 1.85 mm long, has cylindirical shape.

Figure 14. Male genitalia (A) (B valve, C aedeagus) of *Erynnis tages*

8. *Carcharodus orientalis* Reverdin, 1913)

(Oriental Marbled Skipper) (Figure 15)

Synonyms: *orientalis* Reverdin, 1913; *centralanatolica* Pfeiffer, 1927; *aestatis* Verity, 1928; *postorientalis* Verity, 1928; *maccabaeus* Hemming, 1932 (Koçak and Kemal, 2009).

The length of the forewings is 14–15 mm. Adults are on wing from May to September in two generations (Alberti, 1964; Baytaş, 2008). Inhabits Montenegro, Albania, Macedonia, Romania, Bulgaria and Greece, Eastern Asia Minor, Northern Iran, Ukraine, the Caucasus Kazakhstan and Turkmenistan. There is an isolated population in Northern Hungary. In the south it also lives in Wadi Al Hisha of Jordan and Israel.

While the surface resembles the Tufted Marbled Skipper (*C. flocciferus*), background of the forewings are lighter brown especialy on many individuals of summer generations. This species is widespread across Turkey. Several members of broad-beans including *Phlomis, Ballota, Marrubium* are its host plants.

Figure 15. *Carcharodus orientalis*: Wing upperside of an imago

Male Genital Morphology of the Species (Figure 16)

As shown in Figure 16, tegumen is long and wide. Its arms, which are long and quite thick form an angular point where they join the vinculum, which is long and thick. Uncus, rather thin and long, becomes thinner and convex towards the apical. The surface of uncus is covered with sparse long thin hairs. Valva is relatively wide; costa edge, which strongly extends to inner side folds on itself forming a jagged appearence. Valva narrows at the apical; ventral edge of valva has relatively a convex shape; surface of valva is covered with long sparse hairs towards the apical. Its length is 1.91 times as long as its width. Aedeagus, 2 mm long, is slim and bent nearby the centre and the apical.

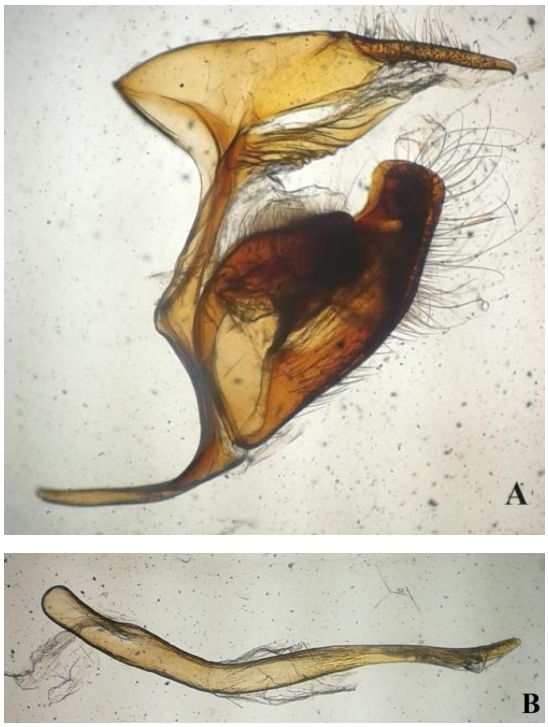

Figure 16. Male genitalia (A) (B aedeagus) of *Carcharodus orientalis*

9. *Carcharodus alceae* (Esper, 1780)

(Mallow Skipper) (Figure 17)

Synonyms: *alceae* Esper, 1780; *malvae* Hufnagel, 1766; *nec* Linn., 1758; *malvarum* Hoffmannsegg, 1804; *magnaustralis* Verity, 1924; *corsicus* Picard, 1948 (Koçak and Kemal, 2009).

The species *Carcharodus alceae* was originally described as "*Papilio alceae*" by Esper in 1780 from Erlangen, South Germany. It became the typical species of the genus *Carcharodus* Hübner, 1819 by ICZN's opinion number 270 of 1954 (Benyamini, 2005).

The length of the forewings is 14–15 mm. Adults are on wing from March to November in two generations. This species is widespread and was collected from all localities visited in Hatay province. As shown in Figure 17, like the discoidal spot on forewings, the whitish marks on the upper surface of wings are small and narrow. Individuals, which are on the wing in spring, have a darker wing background with pale spots, while summer generations have brighter brown hind wings. This species is widespread across Turkey. It inhabits coastal areas between March and November where the climate is

convenient, while they live in other areas from May to August. Adults are on the wing from March to November in two generations.

Malvaceae, e.g. *Alcea rosea*, *Malva sylvestris*, *M. moschata* or *Lavatheria thuringiaca*. On *Sinai peninsula* they are found on Euphorbiaceae.

The species can be seen on road sides and river banks, on grasslands as well as in bare areas of forests.

Figure 17. *Carcharodus alceae*: Wing upperside of an imago

Male Genital Morphology of the Species (Figures 18, 19, 20)

As shown in Figure 18, tegumen is long and convex at the dorsal. Tegumen arms are long, thick and curly. Uncus, which is also long, becomes slender towards the apical and a bit curly towards the ventral. Uncus widens where it combines with the tegumen. There is a pinch of dense long hairs. As shown in Figure 19, valva is wide and has a triangular form, while costa edge is rather convex at the distal. Costa edge forms wide plates at the apical creating pleats. There is a thorn-like scleroted structure in reverso position. The shape of this projection was compared with the genital organs reported by De Jong (1974) (Figure 21) as well as by Martin (http://www.carcharodus.ch/Welcome.html) (Figure 22) and their differences were determined. Saccus is relatively long. As shown in Figure 20, aedeagus, which is 2 mm long, is curved and widens towards the vesica.

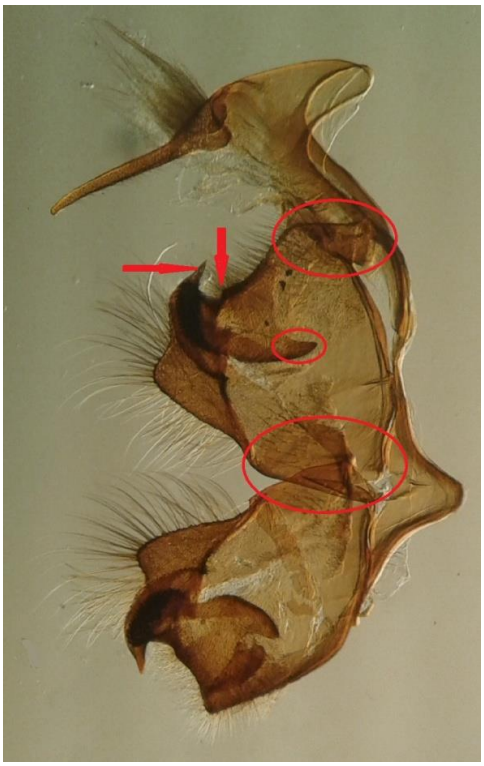

Figure 18 Genital organ of *Carcharodus alceae* and its variations in Hatay, Turkey

Figure 19. Examined three valvae (inside) of *Carcharodus alceae* in Hatay, Turkey

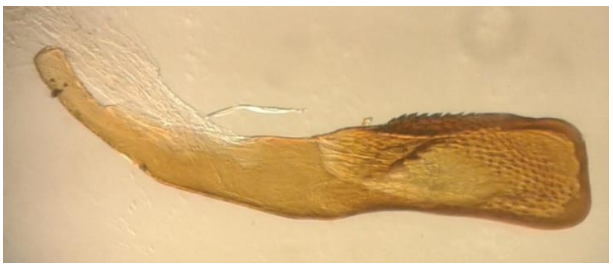

Figure 20. Aedeagus of *Carcharodus alceae* in Hatay, Turkey

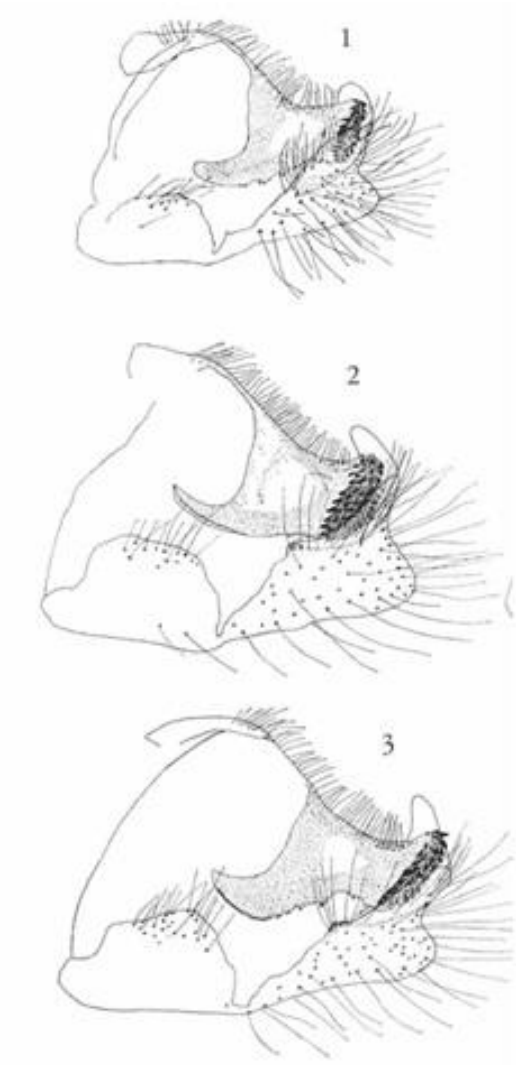

Figure 21. Right valve (inside) of *Carcharodus alceae.* 1-3 *alceae* type. 1, N. Spain, Tarragona ; 2, Netherlands, Dordrecht; 3, Afghanistan, Kabul (De Jong, 1974)

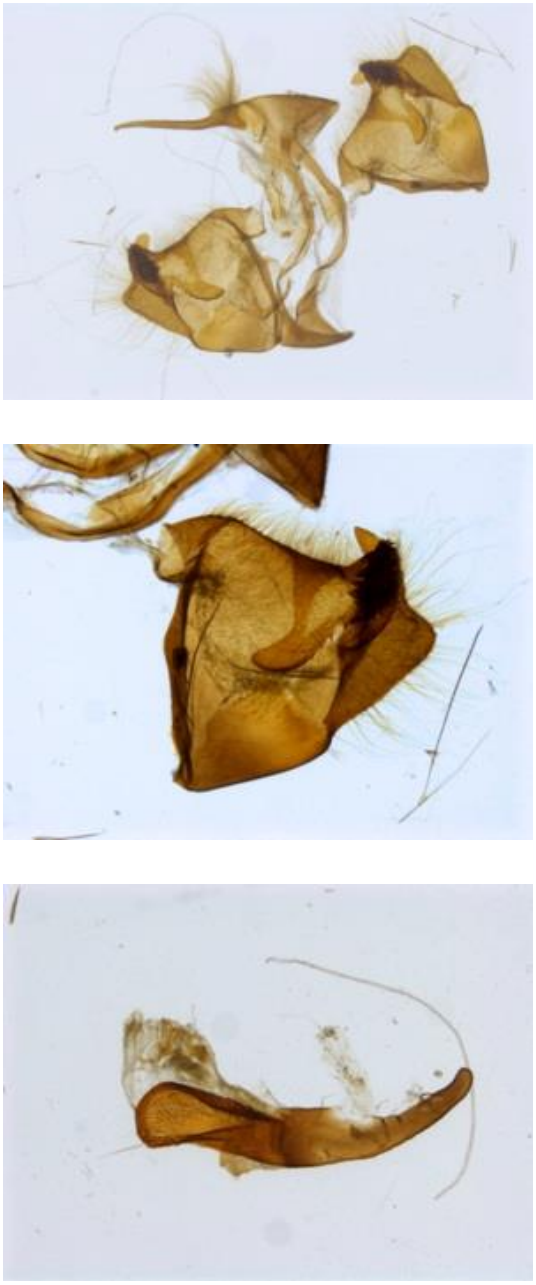

Figure 22. The genital organ of *Carcharodus alceae* caught in France by Martin Albrecth (http://www.carcharodus.ch/Welcome.html)

DISCUSSION

In a series of their works on systematics carried out over the years, Koçak and Kemal (2006, 2007, 2009) reported the number of Rhopalocera species in Turkey as 405 species belonging to nine families. According to the their Works, 508 Lepidoptera species have been identified in Hatay province in total and 377 of those are moths (Heterocera), while 131 species are butterflies.

Male genital organs of nine Hesperiidae species (*Ochlodes venatus*, *Gegenes pumilio*, *Pyrgus melotis*, *Pyrgus serratulae*, *Spialia orbifer*, *Spialia phlomidis*, *Erynnis tages*, *Carcharodus orientalis, Carcharodus alceae*) mentioned in this study were prepared for identifying genital organ morphologies. The species discussed in this study is referred to as Least Concern (LC) in the International Union for the Conservation of Nature (IUCN) Red List (Karaçetin and Welch, 2011).

During the study, when the male genital organs of *Carcharodus alceae* were compared with those reported by De Jong (1974) and Martin Albrecth, certain variations were determined. De Jong (1974), in his research, compared the male genital organ of the species *alceae* which inhabit several geographies, and demonstrated the variations in several formations. De Jong (1974) particularly referring to the variations in the valvas of the samples from Spain, Netherlands and Afghanistan, drew the right valva to show variations on several samples. Genital organs of eight male individuals from *C.alceae* caught during our site work in Hatay province of Turkey, were examined and three of them were photographed. The results were compared with those of the De Jong's and the variations which we identified were marked on the photo. In addition, Martin Albrecth (http://www.carcharodus.ch/Welcome.html) shared in his web site the genital organ of *Carcharodus alceae* caught in France. Certain variations are noticable when compared with this sample. Particularly the difference in the position of harpen on the valva and the projection of the costa edge on the apical are considerably different. It is known in butterfly studies that designs on the wings are not the sole criterion forthe identification of species and it might lead to certain errors.

Amateur butterfly observers may conclude their estimations on the butterfly species with the marks and colour tones of upperside-andunderside of wings. On the other hand,

scientists working on the systematics for butterflies reach a decisive conclusion for identifying species unfailingly by making preparations from male genital organs.

When we identify species during the work on butterfly systematics, morphological definitions and photographs of male genitalorgans could contribute to the research and would shed light on identification of geographic variations.

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