

The Genital Morphology and Major Taxonomic Characteristics of *Zerynthia deyrollei* (Oberthür, 1869) and *Zerynthia cerisyi* (Godart, 1822) (Lepidoptera: Papilionidae: Zerynthiinae)

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Abstract.- An investigation was conducted in 2009-2010 in order to study the butterflies in the province of Hatay in view of faunistic, ecological and zoogeographic aspects. Species *Zerynthia deyrollei* and *Zerynthia cerisyi*, belonging to Papilionidae family caught during the study, were remarkably alike on account of their wing patterns. This was the first study to look through the species, *Zerynthia deyrollei* and *Zerynthia cerisyi* from the point of male genital organ morphology and their remarkable wing patterns. Meanwhile; major taxonomic differences which help distinguish them from each other were photographed and the related information was given accordingly.

Key Words. *Zerynthia deyrollei*, *Zerynthia cerisyi*, Lepidoptera, Papilionidae, Zerynthiinae.

INTRODUCTION

Genital organs, particularly those of male are often used for the identification of insect species as the structure of their genital organs are specific to them. The shape, structure and metric dimensions of such parts of genital organs as valve, uncus, juxta, vinculum and aedeagus count as the major parameters. Even if there happen to be significant morphologic similarities between the species of a given genus, the morphological structure and metric dimensions of these organs differ. Such taxonomic characteristic differences are also essential for species identification (Önder, 1998; Kiyak, 2000).

Genital structure has been one of the most important sources of characteristic information in Lepidoptera systematics. Taxonomists often use differences in genital morphology to distinguish between species. Homogeneous similarities have provided characteristic clues for defining higher categories in Lepidoptera classification (Miller, 1988; Goulson, 1993; Arikawa and Suyama, 1997).

The genus *Zerynthia* Ochseneimer, 1816, which contains only six species throughout the world including *Zerynthia ruminata* (Linnaeus, 1758); *Z. polyxena* (Denis and Schiffermüller,

1775); *Z. cerisyi* (Godart, 1822); *Z. cretica* (Rebel, 1904); *Z. deyrollei* (Oberthür, 1869); *Z. caucasica* (Lerderer, 1864) in the world (Karsholt and Razowski, 1996), is represented by *Z. polyxena*, *Z. cerisyi*, *Z. deyrollei*, *Z. caucasica* in Turkey (Koçak and Kemal, 2006, 2007, 2009), *Z. (Allancastris) louristana* (Le Cerf, 1908) (Nazari and Sperling, 2007).

Z. deyrollei and *Z. cerisyi* are remarkably alike in body size and wing pattern. These species, which are widespread in Turkey, are mistaken for each other by butterfly systematists as well as by amateur butterfly watchers. These two species which are among those under first level threat in Turkey (Özkol, 2006; Kayci, 2007; Seven, 2010) are referred to in low Critical Level in their study so called "The Red List of Butterflies in Turkey" (Karaçetin and Welch, 2011; Karaçetin *et al.*, 2011).

Z. cerisyi is widespread in the world including Albania, Bosnia, Cyprus, Croatia, Poland, Turkey, Macedonia, Greece, Bulgaria, Yugoslavia (Karsholt and Razowski, 1996; Van Swaay and Warren, 1999); Iran, Iraq, Israel, Cyprus, Lebanon, North-Eastern Europe (Tekin, 2007); Adana, Ankara, Antalya, Aydın, Balıkesir, Bilecik, Bolu, Burdur, Bursa, Çanakkale, Edirne, Eskişehir, Hatay, Isparta, Mersin, İstanbul, Konya, Kütahya, Manisa, Kahramanmaraş, Muğla, Niğde, Tekirdağ, Osmaniye (Tekin, 2007; Koçak and Kemal, 2009) in Turkey.

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Z. deyrollei is also widespread in the world including Jordan (Katbeh-Bader *et al.* 2003), Iran, Israel, Turkey (Nazari and Sperling, 2007; Koçak and Kemal, 2009).

This study will help both amateurs and entomologists involved in butterfly systematics to readily distinguish between species *Z. deyrollei* and *Z. cerisyi*.

MATERIALS AND METHODS

The material of this study included species *Z. deyrollei* and *Z. cerisyi*, which were collected during the site work in the Amanos Mountains in the province of Hatay in Eastern Mediterranean Region during 2009-2010. Butterflies were collected at intervals with insect net from different elevations with various vegetation, placed in killing jars and then transported to the laboratory in Petri dish. Later, butterflies were stretched wide with their wings and transferred to collection boards, where identification work was carried out with the help of Borror *et al.* (1989), Ecevit (2000), Demirsoy (2003), Baytaş and Karaçetin (2008), Koçak and Kemal (2009) and Karaçetin and Welch (2011). *Z. deyrollei* and *Z. cerisyi* were dissected in the laboratory for preparation of male genital organ and fore and hind wings were also prepared. The major taxonomic characters were described. The butterfly specimens were stored in the Biology Department of Mustafa Kemal University.

RESULTS

Z. deyrollei and *Z. cerisyi* closely resemble each other in size, colour and wing patterns and morphology of their male genital organs. At the same time they also considerably differ from each other.

Zerynthia deyrollei (Oberthür, 1869) Eastern Steppe
Festoon
(Fig. 1A-E)

Original Reference: *Thais deyrollei* Oberthür, 1869, Pet. Nouv. Ent. (2): 7 (Özkoç, 2006; Kayci, 2007; Seven, 2010).

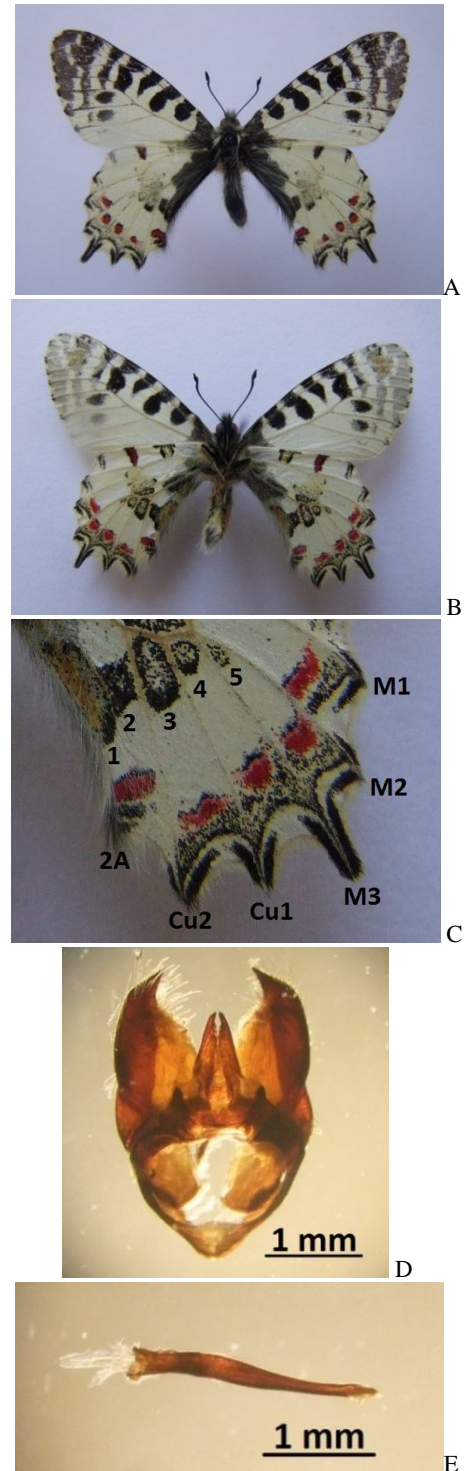


Fig. 1. *Zerynthia deyrollei*; A, male (dorsal view); B, male (ventral view); C, hindwing underside patterns; D, male genitalia and E, aedeagus.

Synonyms: *deyrollei* Oberthür, 1869; *eisneri* Bernardi, 1970; *tycaoniae* Eisner and Wagener, 1974; *flavomaculata* Verity, 1905; *ochracea* Verity, 1905; *obscurior* Verity, 1905; *subflava* Schultz, 1908; *deflexa* Schultz, 1908; *charis* Schultz, 1908; *separata* Sheljuzhko, 1927 (Özkol, 2006; Kayci, 2007; Koçak and Kemal, 2009; Seven, 2010).

Material examined

Kızıldağ-Hatay (900-1200 m), 15.V.2009 2 male (♂), 1 female (♀); 11.VI.2010 2 male (♂).

Samples were caught on mountain sides, low lands and river beds vegetated with flowering herbaceous plants, and sparsely populated bush like red oaks and pinus trees.

Measurements

Length ♂ 20 mm, ♀ 17 mm; wingspan ♂ 44 mm, ♀ 43 mm.

Forewing broad and triangle shaped, twice as long as its width. Hindwing broad, 1.57 times as long as its width.

There are five different patterns between M2-M3-Cu1-Cu2-2A veins underneath the hindwings of both male and female butterflies. These patterns are small and have yellow core (Fig. 1C).

Male genitalia

In male genitalia of *Z. deyrollei* (Fig. 1D) all the organs are strongly sclerotized. Valve; long and broad, 2.54 times as long as its width. The costa margin of the valve is rather straight upto the first half, but strongly convex right to apex. The apex of the valve is strongly pointed. The ventral margin of the valve is short and convex in the middle. The costa margin, ventral margin and the apex of the valve have sparse long hair. Uncus is split and strongly sclerotized. Its apex is pointed, its length 0.55 times as long as valve length. Saccus is rather short with its apical part narrowly rounded. Juxta is thin and long, narrow V-shaped. Aedeagus is thin and long, almost straight, its length being 9.50 times as long as its width (Fig. 1E).

Zerynthia cerisyi (Godart, 1822) Eastern Festoon (Fig. 2A-E)

Synonyms: *cerisyi* Godart, 1822; *cerisy* Godart, 1824; *martini* Fruhst, 1906; *speciosa* Stichel, 1907; *destrigata* Schultz, 1908; *caeca* Shelj, 1927; *mysiniensis* Eisn.&Wag., 1974; *koroneii* Katt.&Kouts., 1978; *sami* Schmidt, 1989 (Koçak and Kemal, 2009).

Material examined

Kızıldağ-Hatay (900-1200 m), 20.IV.2009 2 male (♂); 15.V.2009 1 male (♂), 1 female (♀); 11.VI.2010 1 male (♂); 25.VI.2010 4 male (♂).

Samples were caught on mountain sides and river beds vegetated with flowering herbaceous plants, and sparsely populated bush like red oaks and pinus trees.

Measurements

Length ♂ 23 mm, ♀ 19 mm; wingspan ♂ 57 mm, ♀ 53 mm.

Forewing broad and triangle shaped, its length being 2.20 times as long as its width. Hindwing broad, 1.60 times as long as its width.

There are five different patterns between M2-M3-Cu1-Cu2-2A wing veins underneath the hindwings of both male and female butterflies. These patterns are large and have black cores (Fig.2C).

Male genitalia

In male genitalia of *Z. cerisyi* (Fig. 2D) all the organs are strongly sclerotized. Valve; long and broad, its length: 3.23 times as long as its width. The costa margin of the valve is rather straight upto the first half, but strongly convex right to apex. The apex of the valve is strongly pointed. The ventral margin of the valve is short convex in the middle. The costa margin, ventral margin and apex of the valve have sparse long hair. Uncus is split and strongly sclerotized. Its apex is pointed, its length: 0.48 times as long as valve length. Saccus is rather short, its apical part broadly rounded. Juxta is thin and long, narrow V-shaped. Aedeagus is thin and long, almost straight, its length being 15 times as long as its width (Fig. 2E).

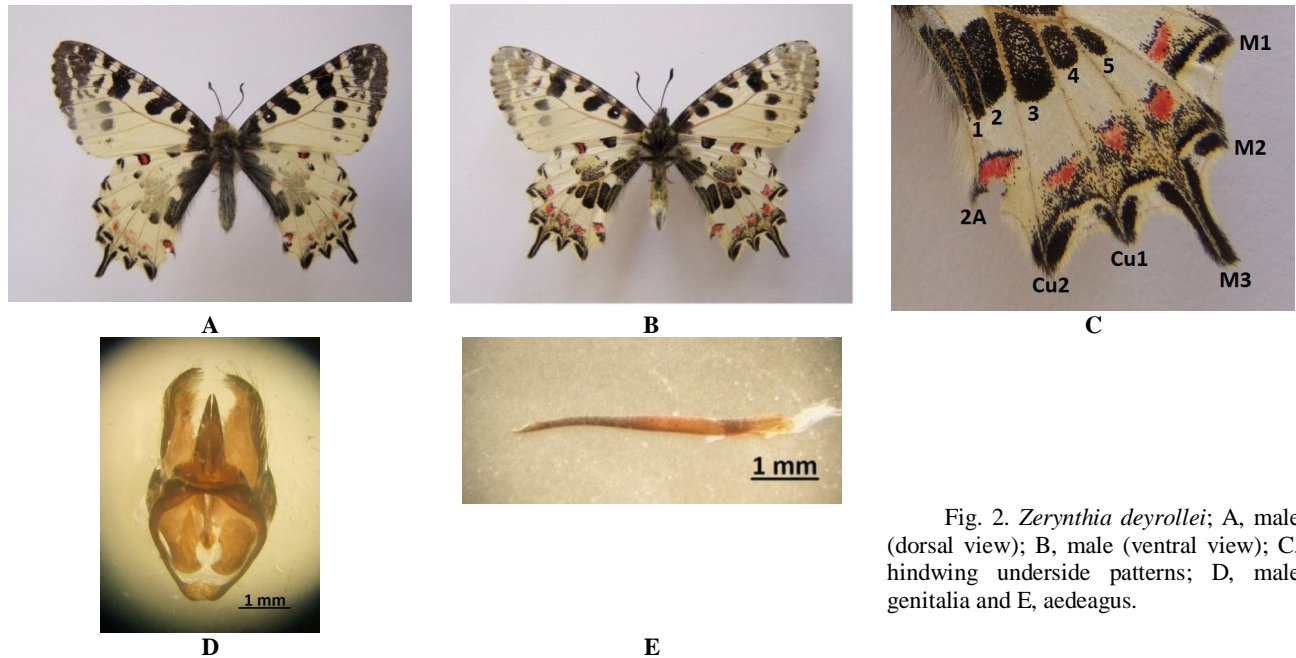


Fig. 2. *Zerynthia deyrollei*; A, male (dorsal view); B, male (ventral view); C, hindwing underside patterns; D, male genitalia and E, aedeagus.

KEY TO SPECIES BASED ON EXTERNAL CHARACTERS AND GENITALIA

- 1 (2). Size: medium (Length 17-20 mm, wingspan 43-44 mm). Patterns are small and with yellow core underneath the hindwing and between the M2-M3-Cu1-Cu2-2A wing veins. Wing tail formed by the M3 vein on the hindwing is short. Valve length in male genital organ is 2.54 times as long as its width; saccus narrowly rounded; aedeagus thin and long, almost straight, 9.50 times as long as its width *Z. deyrollei*
- 2 (1). Size: large (Length 19-23 mm, wingspan 53-57 mm). Patterns are large and have black core underneath the hindwing and between the M2-M3-Cu1-Cu2-2A wing veins. Wing tail formed by M3 vein on the hindwing is long. Valve length in the male organs 3.23 times as long as its width; saccus broadly rounded; aedeagus thin and long, almost straight, with its length 15 times as long as its width *Z. cerisyi*

DISCUSSION

Z. cerisyi is very similar to *Z. deyrollei* while being longer and larger. These two species were caught in various habitats between 900-1200 meters altitudes in the Kızıldağ region of the Amanos Mountains. *Z. cerisyi* was often met in rocky areas, and river beds with ample flowering herbaceous plants and shrubs. On the other hand *Z. deyrollei* was sampled more in low lands, and hill sides

vegetated with flowering herbaceous plants and river beds as well as in open pine forests. The large rectangular patterns occurring between M2-M3-Cu1-Cu2-2A wing veins underneath the hindwings of *Z. cerisyi* are covered with black scales. On the other hand, the same patterns on *Z. deyrollei* are relatively smaller and have yellow scales. Pattern number two is relatively longer in *Z. cerisyi* while it is more in square form in *Z. deyrollei*. The wing tail formed by the M3 vein on the hind wing is relatively longer in *Z. cerisyi*. When it comes to male genital organs of both species, *Z. cerisyi*'s is bigger than that of *Z. deyrollei*. Belonging to genus *Zerynthia*, which has 4 species in Turkey, *Z. polyxena* and *Z. caucasica* exhibit several differences in wing patterns not only within their genus but also when compared with *Z. cerisyi* and *Z. deyrollei*. These two species were not studied here since they do not exhibit any similarities in wing patterns.

This study will help both amateur butterfly watchers and entomologists working in butterfly systematics to distinguish between *Z. cerisyi* and *Z. deyrollei*.

The study will also contribute to the collection of data for genital organs of butterflies in

Turkey, which has been missing so far.

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