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The karyotype and chromosome number of *Polyommatus buzulmavi* (Lycaenidae)

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Summary. The karyotype of *Polyommatus buzulmavi* Carbonell, 1992 from the Dez Valley (Turkey, Hakkari province) is described and figured: the haploid chromosome number $n = 45$ has been determined and several B-chromosomes have been found. This number departs significantly from the number $n = 23$, which has been found in several other species of *Polyommatus* s. str. so far.

Zusammenfassung. Der Karyotyp von *Polyommatus buzulmavi* Carbonell, 1992 aus dem Dez Tal (Türkei, Hakkari Provinz) wird beschrieben und abgebildet. Als haploide Chromosomenzahl wurde $n = 45$ festgestellt und es wurden mehrere zusätzliche B-Chromosomen gefunden. Diese Zahl unterscheidet sich erheblich von der Zahl $n = 23$ bei anderen Arten der Gattung *Polyommatus* s. str.

Résumé. Le caryotype de *Polyommatus buzulmavi* Carbonell, 1992 de la vallée du Dez (Turquie, province de Hakkari), est décrit et figuré: le nombre haploïde de chromosomes $n = 45$ a été déterminé et plusieurs chromosomes surnuméraires ont été trouvés. Ce nombre diffère de façon significative du nombre $n = 23$, qui a été trouvé chez plusieurs autres espèces appartenant au genre *Polyommatus* s. str.

Key words: Lycaenidae, *Polyommatus buzulmavi*, karyotype, Turkey.

Introduction

Carbonell ([1992]: 223–224) described *Polyommatus buzulmavi* after a series collected by himself and a few colleagues in the Dez and Zap Valleys, Hakkari province, Turkey. This butterfly can easily be told apart from the syntopic *Polyommatus icarus* (Rottemburg, 1775), being highly characteristic by its much larger size, its lighter blue colour and the light grey colour on the underside. In the same paper, on pp. 224–226, Carbonell described a distinct subspecies, *Polyommatus buzulmavi narlica*, after six males collected about 10 km N. of Çatak, Van province, Turkey, and list-

ed a series of characters, purported to differentiate the Çatak material from that from the Dez Valley. De Prins & van der Poorten (1993: 12–13) described the female of this species and expressed doubts about the validity of the distinction of *narlica*. They further placed *P. buzulmavi* in the subgenus *Meleageria* de Sagarra, 1925.

Hesselbarth *et al.* (1995: 684–685) were able to examine larger series of *P. buzulmavi* from both Hakkari and Van provinces and found the characters, purported to differentiate *P. buzulmavi narlica*, to fall within the range of variation of nominotypical *buzulmavi*: consequently they established the former name as a junior subjective synonym of the latter one. They further placed this taxon again in subgenus *Polyommatus* Latreille, 1804. Both external and genitalic characters support its placement within last-named subgenus (J.G. Coutsis, pers. comm.).

The biology of this taxon is still unknown, and so was, up to the present, its karyotype and chromosome number.

Material and methods

On 23.VII.1999, the second author of the present publication collected one single topotypical male of *P. buzulmavi* for karyological study. The testes were fixed a few hours after collecting, when the butterfly was still alive and, later on, a slide mount (AO 99173) was prepared by the first author, who also made the photographs reproduced here as Figs 1–3 (methodology followed as described in detail in Olivier *et al.*, 1999). The photo negatives were scanned and processed with Corel Photo Paint. The specimen and the slide mount are deposited in the Vlaamse Lepidoptera Collectie Antwerpen (VLCA).

Karyotype and chromosome number of *Polyommatus buzulmavi*

The testes of the only specimen gave good results. Nine cysts were found that contained spermatocyte divisions. 32 cells were at the *M*-I stage, 2 cells at the *M*-II stage and 11 cells were in the early prometaphase. The chromosomes of 8 *M*-I cells were counted and 4 *M*-I plates were photographed. The karyotype of *P. buzulmavi* is asymmetric (Fig. 1). Bivalents fall into two main groups, that are

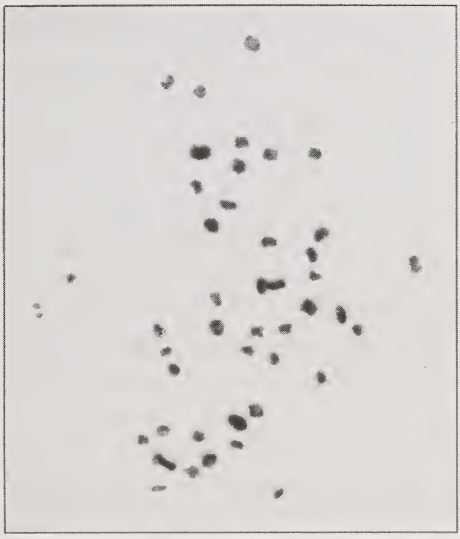

Fig. 1. Karyotype of *Polyommatus buzulmavi*, slide AO 99173, *M*-I, *n* = 45, Turkey, Hakkari province, Dez Valley, 1500–1700 m, 23.VII.1999, leg. A. Olivier (VLCA).

Fig. 2. Karyotype of *Polyommatus buzulmavi*, slide AO 99173, *M*-I, *n* = 45 + B" + 2 B', the arrow indicates the B bivalent, Turkey, Hakkari province, Dez Valley, 1500–1700 m, 23.VII.1999, leg. A. Olivier (VLCA).

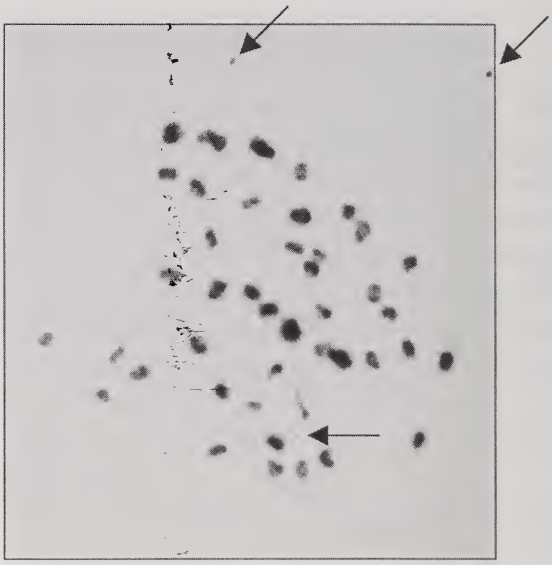

Fig. 3. Karyotype of *Polyommatus buzulmavi*, slide AO 99173, *M*-I, $n = 45 + B'' + 2 B'$, the lower arrow indicates the B bivalent, the two upper arrows point at two additional chromatine elements, Turkey, Hakkari province, Dez Valley, 1500–1700 m, 23.VII.1999, leg. A. Olivier (VLCA).

almost equal in number: one group consists of comparatively large bivalents which show a gradually decreasing series in size, the other group of medium-sized bivalents that are almost equal in size. The largest bivalents are situated more or less close to the center of the metaphase plate, the medium ones usually surrounding these. Besides the large and medium-sized bivalents, one small bivalent is present, which is about half of the size of the smallest medium sized bivalent and which occupies about 1/5 of the largest bivalent area. The two largest bivalents, as well as the smallest one, are distinguishable and hence can serve as the markers for the karyotype. The largest bivalent is rounded, heteropycnotic and usually situated in the center of the metaphase plate. The C-heterochromatin parts are in the centre of the bivalent, the euchromatin parts at the sides. The second large bivalent is dumb-bell shaped and, contrary to the first one, shows more C-heterochromatin at the edges and

much less in the central part of the bivalent. The smallest bivalent in two metaphase plates showed a high degree of contraction and was sharply contrasting in adhesion of dye. It was situated apart from the rest of the bivalents, almost at the edge of the metaphase plate. Both plates observed were in the early metaphase stage. In the rest of the metaphases the smallest bivalent did not show such a dense contraction, although it was usually attached to one large bivalent by telomeric parts. The association of those two bivalents resulted in a V or irregular U shape. It seems likely that the smallest bivalent is the sex bivalent, but in order to establish that with certainty, the karyotype of the female *P. buzulmavi* needs to be studied. The remaining bivalents are rounded or elongated and usually isopycnotic.

Special attention was paid to B-chromosomes, that were found in 6 metaphase plates. Usually, there were two small additional euchromatic univalents attached to A-bivalents. Due to that, A-bivalents had a parachute-like shape. However, two metaphase plates showed another pattern of B-chromosomes. One small, rounded B-bivalent was found, which consists almost entirely of C-heterochromatin and was situated at the edge of the metaphase plate (Fig. 2). Those two plates also had two B-univalents, which were situated rather close to each other. The chromosome number of those two metaphase plates is $n = 45 + B'' + 2\ B'$. One metaphase plate showed an even more complicated pattern. At a short distance from the metaphase plate, two small microelements of C-heterochromatin of bivalent shape and approximately 5 tiny univalent elements were situated: these could be additional B-chromosomes as well (Fig. 3). However, their location rather apart from the main metaphase plate keeps us from including these in the karyotype description of this species. Despite varying numbers of B-chromosomes or chromatin elements, the number of A-bivalents remained constantly at $n = 45$.

Discussion

Interestingly, the chromosome number of *P. buzulmavi* is very different from that of *P. icarus*, *P. juno* Hemming, 1933, *P. eros eros* (Ochsenheimer, 1808), *P. eros yildizae* Koçak, 1977 and

P. menelaos Brown, 1976, that all have a haploid chromosome number of $n = 23$ (Robinson, 1971, 1990 and references therein; Hesselbarth *et al.*, 1995 and references therein; Larsen, 1975; Brown, 1976). It is worth emphasizing that $n = 23$ (–24) appears to be the modal number for the Lycaenidae (including Polyommatines, Lycaenines and "Theclines"), thus conforming to the ancestral condition (Lorković, 1990). Hence *P. buzulmavi* represents a derived character state with regard to chromosome number. Moreover, the approximate doubling of the chromosome number in one of two evidently closely related species is suggestive of chromosome fissions. Further karyological studies on Central Asian *Polyommatus* s. str. species-group taxa appear highly desirable.

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