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Revision of some taxa of the *Polyommatus* (*Agrodiaetus*) *transcaspicus* group with description of a new species from Central Anatolia (Lepidoptera: Lycaenidae)

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Samenvatting. Revisie van enkele taxa behorend tot de *Polyommatus* (*Agrodiaetus*) *transcaspicus* groep met beschrijving van een nieuwe soort uit Centraal-Anatolië (Lepidoptera: Lycaenidae)

De huidige problematiek rond de afbakening van supraspecifieke groepen binnen het subgenus *Polyommatus* (*Agrodiaetus*) wordt besproken: deze is grotendeels te herleiden tot de grote variabiliteit van de taxa zelf welke behoren tot de soortengroep, alsook tot de soms minieme verschillen tussen deze onderling, samen met het ogenschijnlijk volledig ontbreken van bruikbare morfologische kenmerken voor een eventuele cladistische studie. In deze bijdrage worden enige taxa van de *Polyommatus* (*Agrodiaetus*) *transcaspicus* (Heyne, [1895]) soortengroep behandeld, nl. *P.* (*A.*) *guezelmavi* sp. n., *P.* (*A.*) *theresiae* Schurian, van Oorschot & van den Brink, 1992 sp. rev., *P.* (*A.*) *larseni* (Carbonell, 1994) stat. rev., *P.* (*A.*) *elbursicus* (Forster, 1956) en *P.* (*A.*) *damonides* (Staudinger, 1899).

Een karyologische studie van materiaal behorende tot de collectieve soort *P.* (*A.*) *theresiae* toonde aan dat topotypisch materiaal (Turkije, provincie Adana, omgeving Saimbeyli) $n > 59$ heeft, terwijl materiaal uit de provincie Konya, omgeving Taşkent, $n = 41–42$ heeft, alsook een verschillend karyotype. Op basis hiervan, alsook van kleine doch niet constante verschillen in de uiterlijke morfologie van beide populaties, wordt laatstgenoemde beschreven als nieuwe soort. Voor het Libanese taxon *P.* (*A.*) *larseni* werd $n = 25$ bevestigd bij twee onderzochte exemplaren: het karyotype wordt hier voor het eerst beschreven en afgebeeld. Na studie van het lectotype ♂ van *P.* (*A.*) *damonides*, alsook van 3♂, 2♀ paralectotypes in het Museum für Naturkunde der Humboldt-Universität zu Berlin, en een enkel ♂ in coll. Vlaamse Lepidoptera Collectie Antwerpen, en vergelijking met materiaal van *P.* (*A.*) *ninae* (Forster, 1956) en *P.* (*A.*) *elbursicus*, kan de mogelijke conspecificiteit met eerstgenoemd taxon weerlegd worden. Daarentegen lijken *P.* (*A.*) *damonides* en *P.* (*A.*) *elbursicus* sprekend op elkaar doch, aangezien het chromosoomaantal noch het karyotype van *P.* (*A.*) *damonides* gekend zijn, lijkt elke speculatie omtrent de conspecificiteit van beide taxa voorbarig.

Kandul & Lukhtanov (1997) en Lukhtanov *et al.* (1998) hebben voorgesteld dat *P.* (*A.*) *dama* (Staudinger, 1892) en *P.* (*A.*) *theresiae* mogelijk slechts ondersoorten zijn vanwege hun verondersteld gelijk chromosoomaantal en hun allopatrisch voorkomen. Deze hypothese van conspecificiteit wordt hier weerlegd, daar beide taxa sympatrisch blijken voor te komen en bovendien sterk verschillen in uiterlijke morfologische kenmerken en in chromosoomaantal. In subgenus *Agrodiaetus* blijkt soortvorming vaak gepaard te gaan met nogal drastische wijzigingen in chromosoomnummer en in karyotype. Deze laatste eigenschappen blijken taxonomisch erg betrouwbaar bij de identificatie van verschillende soorten. Daarentegen is er tot op heden geen aanwijzing voor enige bruikbaarheid van deze kenmerken voor fylogenetische reconstructies.

Résumé. Révision de certains taxa appartenant au groupe de *Polyommatus* (*Agrodiaetus*) *transcaspicus* et description d'une nouvelle espèce d'Anatolie centrale (Lepidoptera: Lycaenidae)

La problématique actuelle concernant la délimitation de groupes supraspécifiques à l'intérieur du sous-genre *Polyommatus* (*Agrodiaetus*) est discutée: celle-ci se résume en grande partie en l'importante variabilité même des taxa du groupe-espèce, ainsi qu'en des différences parfois minimales existant entre ceux-ci, de pair avec l'apparente absence totale de caractères morphologiques utiles à toute étude cladistique. Dans la présente étude, les auteurs traitent certains taxa du groupe d'espèces de *Polyommatus* (*Agrodiaetus*) *transcaspicus* (Heyne, [1895]), à savoir *P.* (*A.*) *guezelmavi* sp. n., *P.* (*A.*) *theresiae* Schurian, van Oorschot & van den Brink, 1992 sp. rev., *P.* (*A.*) *larseni* (Carbonell, 1994) stat. rev., *P.* (*A.*) *elbursicus* (Forster, 1956) et *P.* (*A.*) *damonides* (Staudinger, 1899).

Une étude caryologique du matériel appartenant à l'espèce collective *P.* (*A.*) *theresiae* a révélé que le matériel topotypique (Turquie, province d'Adana, environs de Saimbeyli) possède $n > 59$, tandis que le matériel de la province de Konya, aux environs de Taşkent, possède $n = 41–42$, ainsi qu'un caryotype différent. Sur cette base, complétée de quelques légères différences de morphologie extérieure non constantes il est vrai, cette dernière population est décrite comme nouvelle espèce. En ce qui concerne le taxon libanais *P.* (*A.*) *larseni*, $n = 25$ a été confirmé après étude de deux exemplaires: son caryotype est décrit et figuré pour la première fois. Après étude du lectotype ♂ de *P.* (*A.*) *damonides* et de 3♂, 2♀ paralectotypes supplémentaires, déposés au Museum für Naturkunde der Humboldt-Universität zu Berlin, et d'un seul ♂ ex coll. Vlaamse Lepidoptera Collectie Antwerpen, et comparaison avec du matériel de *P.* (*A.*) *ninae* (Forster, 1956) et de *P.* (*A.*) *elbursicus*, la conspécificité éventuelle avec le premier peut être écartée dés à présent. Parcontre, *P.* (*A.*) *damonides* et *P.* (*A.*) *elbursicus* se ressemblent énormément: toutefois, en l'absence de toute information quant au nombre de chromosomes et au caryotype de *P.* (*A.*) *damonides*, toute spéculation concernant la conspécificité de ces deux taxa semble prématurée.

Kandul & Lukhtanov (1997) et Lukhtanov *et al.* (1998) ont proposé que *P.* (*A.*) *dama* (Staudinger, 1892) et *P.* (*A.*) *theresiae* pourraient n'être que sous-espèces, en se basant sur le nombre de chromosomes supposé identique ainsi que sur la distribution allopatrique des taxa dont question. Cette hypothèse de conspécificité est ici invalidée, vu que les deux entités sont apparemment sympatriques et, de surcroît, diffèrent sensiblement tant par leur aspect extérieur que par leur nombre de chromosomes. Il apparaît que, à l'intérieur du sous-genre *Agrodiaetus*, le processus de spéciation est souvent accompagné de changements assez radicaux tant du nombre de chromosomes que du caryotype. Les nombres de chromosomes et les caryotypes offrent des caractères d'une grande valeur taxinomique pour l'identification d'espèces distinctes. Parcontre, il n'y a aucune évidence à présent que tel soit le cas lors d'une reconstruction phylogénétique éventuelle.

Abstract. Revision of some taxa of the *Polyommatus* (*Agrodiaetus*) *transcaspicus* group with description of a new species from Central Anatolia (Lepidoptera: Lycaenidae)

Current problems with the delimitation of supraspecific groups within the subgenus *Polyommatus* (*Agrodiaetus*) are dealt with: the main reason therefore lies in the great variability of the species group taxa themselves and the sometimes minute differences among these, together with the seemingly complete lack of useful morphological characters allowing any cladistic analysis. In the present study, the authors treat some taxa of the *Polyommatus* (*Agrodiaetus*) *transcaspicus* (Heyne, [1895]) species group, i.e. *P.* (*A.*) *guezelmavi* sp. n., *P.* (*A.*) *theresiae* Schurian, van Oorschot & van den Brink, 1992 sp. rev., *P.* (*A.*) *larseni* (Carbonell, 1994) stat. rev., *P.* (*A.*) *elbursicus* (Forster, 1956) and *P.* (*A.*) *damonides* (Staudinger, 1899).

A karyological study of material of the collective species *P.* (*A.*) *theresiae* revealed that topotypical material (Turkey, Adana province, vic. Saimbeyli) has $n > 59$, while material from Konya province, vic.Taşkent, has $n = 41–42$ and a different karyotype. On these grounds, as well as on small, though inconstant, morphological differences between both populations, the latter one is described as a new species. For the Lebanese taxon *P.* (*A.*) *larseni*, $n = 25$ was confirmed in two specimens examined: its karyotype is described and figured for the first time. After study of the lectotype ♂ of *P.* (*A.*) *damonides* and a further 3♂, 2♀ paralectotypes, deposited in the Museum für Naturkunde der Humboldt-Universität zu Berlin, as well as a single ♂ in coll. Vlaamse Lepidoptera Collectie Antwerpen, and comparison with series of *P.* (*A.*) *ninae* (Forster, 1956) and of *P.* (*A.*) *elbursicus*, conspecificity with the former taxon can be discounted. On the other hand, *P.* (*A.*) *damonides* and *P.* (*A.*) *elbursicus* look strikingly similar but, as the chromosome number and karyotype of *P.* (*A.*) *damonides* remain unknown, any speculation on the conspecificity of these two taxa seems premature.

Kandul & Lukhtanov (1997) and Lukhtanov *et al.* (1998) have suggested that *P.* (*A.*) *dama* (Staudinger, 1892) and *P.* (*A.*) *theresiae* could possibly be subspecies because of their apparently similar chromosome number and their allopatric distribution. This hypothesis of conspecificity is invalidated here, as both taxa are in fact sympatric, differ markedly in external morphology and have a different chromosome number. It appears that, within the subgenus *Agrodiaetus*, speciation is often accompanied by rather radical changes in chromosome number and karyotype. Chromosome numbers and karyotypes offer quite reliable taxonomic characters for the identification of distinct species. On the contrary, there is no current evidence for any usefulness of these features for phylogenetic reconstructions.

Zusammenfassung. Revision einiger Taxa der *Polyommatus* (*Agrodiaetus*) *transcaspicus* Artengruppe mit Beschreibung einer neuen Art aus Zentralanatolien (Lepidoptera: Lycaenidae)

Es werden aktuelle Probleme bei der Bildung supraspezifischer Gruppen innerhalb des Subgenus *Polyommatus* (*Agrodiaetus*) besprochen. Diese liegen hauptsächlich in der großen Variabilität der einzelnen Taxa und den manchmal nur geringfügigen Unterschieden zwischen ihnen begründet, sowie dem anscheinend völligen Fehlen jeglicher für eine kladistische Analyse geeigneter morphologischer Merkmale. In dieser Arbeit werden einige Taxa der *Polyommatus* (*Agrodiaetus*) *transcaspicus* (Heyne, [1895]) Artengruppe behandelt, i.e. *P.* (*A.*) *guezelmavi* sp. n., *P.* (*A.*) *theresiae* Schurian, van Oorschot & van den Brink, 1992 sp. rev., *P.* (*A.*) *larseni* (Carbonell, 1994) stat. rev., *P.* (*A.*) *elbursicus* (Forster, 1956) und *P.* (*A.*) *damonides* (Staudinger, 1899).

Bei einer karyologischen Untersuchung von Material des Artenkollektivs *P.* (*A.*) *theresiae* kam zum Vorschein, daß der Chromsomensatz topotypischen Materials (Türkei, Provinz Adana, Umg. Saimbeyli) $n = 59$ ist, während Material aus der Umgebung von Taşkent (Konya Provinz) lediglich $n = 41–42$ Chromosomen und einen unterschiedlichen Karyotyp besitzt. Deswegen und wegen geringfügiger, wenngleich inkonstanter morphologischer Unterschiede zwischen beiden Populationen wird die letztere als eine neue Art beschrieben. Für das libanesische Taxon *P.* (*A.*) *larseni* konnte anhand zweier untersuchter Individuen ein Chromosomensatz von $n = 25$ bestätigt werden: sein Karyotyp wird hier erstmals beschrieben und abgebildet. Nach dem Studium des Lektotyps (♂) von *P.* (*A.*) *damonides* und weiteren Paralektotypen (3♂, 2♀) aus der Sammlung des Museums für Naturkunde der Humboldt-Universität zu Berlin, sowie eines einzelnen ♂ in der Sammlung der Vlaamse Lepidoptera Collectie Antwerpen und dem Vergleich mit Serien von *P.* (*A.*) *ninae* (Forster, 1956) und von *P.* (*A.*) *elbursicus* kann die Annahme einer Konspezifität mit der erstgenannten Art abgelehnt werden. Auf der anderen Seite sehen sich die Taxa *P.* (*A.*) *damonides* und *P.* (*A.*) *elbursicus* auffallend ähnlich, aber da die Chromosomenzahlen und der Karyotyp von *P.* (*A.*) *damonides* bislang nicht bekannt sind, erscheint die Annahme einer Konspezifität beider Taxa als verfrüht.

Kandul & Lukhtanov (1997) und Lukhtanov *et al.* (1998) nehmen an, daß *P.* (*A.*) *dama* (Staudinger, 1892) und *P.* (*A.*) *theresiae* wegen ihrer scheinbar ähnlichen Chromosomenzahlen und allopatrischen Verbreitung lediglich Subspezies derselben Art darstellen. Diese Hypothese wird von uns verworfen, da beide Taxa tatsächlich sympatrisch vorkommen, sich deutlich in externen morphologischen Merkmalen unterscheiden und unterschiedliche Chromosomenzahlen besitzen. Es scheint, daß innerhalb des Subgenus *Agrodiaetus* Artbildung oft mit ziemlich drastischen Änderungen der Chromosomenzahl und des Karyotyps einhergeht. Chromosomenzahlen und Karyotypen bieten ziemlich zuverlässige Merkmale zur Artunterscheidung. Andererseits gibt es momentan keinerlei Hinweise, daß diese Merkmale irgendeinen Nutzen für phylogenetische Analysen besitzen.

Key words: Lycaenidae – new species – *Polyommatus* (*Agrodiaetus*) *transcaspicus* group – *Polyommatus* (*Agrodiaetus*) *guezelmavi* sp. n. – *Polyommatus* (*Agrodiaetus*) *theresiae* sp. rev. – *Polyommatus* (*Agrodiaetus*) *larseni* stat. rev. – *Polyommatus* (*Agrodiaetus*) *elbursicus* – *Polyommatus* (*Agrodiaetus*) *damonides* – karyotypes – Turkey – Lebanon – Iran.

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1. Introduction

One of the aims of the field trip to Turkey in 1997 by three of us (WDP, AO, DVP) was to get material of the legendary *Polyommatus* (*Agrodiaetus*) *dama* (Staudinger, 1892) in order to try to confirm its karyotype. This had already been done by de Lesse (1959) but, as they found no trace of any material referred to by de Lesse in the collection of the Muséum National d'Histoire Naturelle, Paris, Schurian & Eckweiler (1997) questioned the correct determination of this material.

We were able to get material of *P.* (*A.*) *dama* near Malatya, its type locality. We further collected topotypical material of *P.* (*A.*) *theresiae* Schurian, van Oorschot & van den Brink, 1992 near Saimbeyli, Adana province, anticipating to confirm a haploid chromosome number of $n = 41–42$ for both nominal taxa. Our expectations were met with the former taxon, but one single specimen of the latter taxon surprisingly revealed $n = 65–66$, while $n = 41–42$ had previously been established for specimens from Taşkent, Konya province (Kandul & Lukhtanov 1997), thus suggesting distinct species status for both populations. In July 1998, we decided to check our results and therefore, three of us

(WDP, DVP, MW) collected and fixed material attributed to *P.* (*A.*) *theresiae* in both Adana and Konya provinces. At about the same time, one of us (AO) collected and fixed topotypical material of *P.* (*A.*) *larseni* (Carbonell, 1994), initially described as a subspecies of *P.* (*A.*) *theresiae*, at Les Cèdres [El Arz] in Lebanon. The results of our studies on both last-named taxa are dealt with in the present note, while *P.* (*A.*) *dama* will be treated in a separate paper. We also discuss *P.* (*A.*) *elbursicus* (Forster, 1956) and *P.* (*A.*) *damonides* (Staudinger, 1899).

2. Material and methods

Male imagines were used for karyological preparations. Testes were taken from collected, fresh butterflies when still alive and immediately placed in small vials in which a freshly mixed solution of 3 parts 96% ethanol and 1 part 100% acetic acid was kept. The individual fixations were given a code number which was also noted on the paper in which the donor butterfly was kept. The vials were immediately put into a thermos filled with icy water in order to keep the fixations at a low temperature of 0–4°C. The whole operation was done in the field or slightly later, in the early evening. After the expedition, the vials were put into a regular refrigerator at 4°C, where they were kept for a couple of months.

The fixation mixture was removed and changed by the fresh one two times. The testes were stained in 2% acetic orcein for 48–72 hours. Then a stained testis was placed on a numbered slide in a drop of 45% acetic acid solution and thoroughly macerated using fine micropins. The preparations were made under the binocular microscope at a 28× enlargement. The solution of 45% acetic acid was replaced and changed two or three times letting the cells of testes tissue slowly spread on a slide for 1–2 minutes. Thereupon the preparation was covered by a coverslide and vertically squashed. The excess of acetic acid solution was removed with filter paper.

The chromosomes were observed during meiotic divisions I and II, meiotic prometaphase, diakinesis, anaphase and gonial mitosis. Haploid chromosome numbers were determined in metaphase I (*M* I) and in metaphase II (*M* II) of spermatogenesis. Photomicrographs were taken using Opton Research light microscope under polarized light. Negatives and photographs of the studied preparations are kept at the Vlaamse Lepidoptera Collectie Antwerpen (VLCA).

Table 1. Chromosome numbers of the studied taxa

Taxon	**Code number of specimen**	**Haploid chromosome number (*n*)**	**Number and stage of cells examined**
Polyommatus (*Agrodiaetus*) *guezelmavi* sp. n.	98031	$n = 41$	8 *M* I, 2 *M* II
	98032	$n = 42$	4 *M* I
Polyommatus (*Agrodiaetus*) *theresiae* Schurian, van Oorschot & van den Brink, 1992 sp. rev.	MW98240	$n > 59$	2 *M* I
		$n = 63$	1 *M* I
	MW98241	$n > 59$	2 *M* I
	MW98243	$n = 63$	2 *M* II
Polyommatus (*Agrodiaetus*) *larseni* (Carbonell, 1994) stat. rev.	AO98016	$n = 25$	4 *M* I
	AO98020	$n = 25$	4 *M* I

3. Current problems with the delimitation of supraspecific groups within subgenus *Agrodiaetus*

While the delimitation of subgenus *Agrodiaetus* is still contentious (see Häuser & Eckweiler 1997 and references therein for further discussion), such is even more the case with the division in several "groups", as will be seen with the various assemblages to which the taxa dealt with here have been placed by different authors. The main reason lies in the great variability of the species group taxa themselves and the sometimes minute differences between these, together with the seemingly complete lack of useful morphological characters allowing any cladistic analysis. Several authors have put a different emphasis on some kind of characters in preference to others, e.g. Forster (1956, 1960–1961) and Carbonell (1993, 1994) relied on external morphology while Lukhtanov and colleagues (Lukhtanov, Dantchenko & Kandul 1997; Kandul 1997; Dantchenko 1997; Kandul & Lukhtanov 1997; Lukhtanov *et al.* 1998) place some species group taxa together on similarity in karyotype. There is little hope that either morphological or karyological data will very much improve our knowledge on the phylogenetic relationships within *Agrodiaetus*, unless perhaps used in conjunction with other — biochemical and molecular — data. The latter type of data may prove most appropriate for a delimitation of and assessment of interrelationships between various supraspecific assemblages within *Agrodiaetus*.

Hesselbarth, van Oorschot & Wagener (1995) have attempted at delimiting various groupings within the present subgenus. We follow these authors in ascribing the taxa revised here to the *Polyommatus* (*Agrodiaetus*) *transcaspicus* (Heyne, [1895]) species group (they do not formally list *P.* (*A.*) *damonides* in this group), considering this a sound working hypothesis, as all taxa treated in the present study do indeed look very much alike. For a further review of the species group taxa associated with the *P.* (*A.*) *transcaspicus* assemblage one is referred to Lukhtanov (1989), Carbonell (1993, 1994), Hesselbarth, van Oorschot & Wagener (1995) and Eckweiler & Häuser (1997).

4. The nominal taxa

We arrange the taxa reviewed here according to their geographical proximity, dealing resp. with the Tauric, Levantine and East Anatolian/Iranian population groups. While all look very similar externally, they differ markedly in both their chromosome number and karyotype. Only one single taxon, i.e. *P.* (*A.*) *damonides*, remains unknown in this respect. The first taxon will be described at length, for the subsequent ones only differentiating characters will be discussed.

4.1. *Polyommatus* (*Agrodiaetus*) *guezelmavi* sp. n.

ILLUSTRATIONS. Plates 1 & 2, fig. 1 (holotype ♂), figs. 2–3 (paratypes ♂), figs. 13–14 (paratypes ♀); text figs. 3–4 (karyotype).

TYPE MATERIAL. **Holotype** ♂ with printed white label "TURKEY St. 1993 | Konya 1500–1600 m | Palaz Dağı, Taşkent | 20–21.VII.1994 | H. v. Oorschot, H. v.d. | Brink, D. v.d. Poor- | ten, W. De Prins"; printed orange label "*Polyommatus* (*Agrodiaetus*) | *guezelmavi* sp. n. | HOLOTYPUS ♂", in coll. Instituut voor Systematiek en Populatiebiologie, Zoölogisch Museum Amsterdam.

Paratypes 265♂ 100♀: 6♂, Turkey, St. 126, Konya 1500–1600 m, Palaz Dağı, Taşkent, 4–5.VIII.1981, leg. B. van Oorschot, H. Coene, J. Lucas & V. Kılınç; 23♂ 12♀, Turkey, St. 74, Konya 1500–1600 m, Palaz Dağı, Taşkent, 10.VIII.1982, leg. B. van Oorschot; 2♂ 2♀, Turkey, St. 276, Konya 1500–1600 m, Palaz Dağı, Taşkent, 31.VII.1985, leg. B. van Oorschot & W. De Prins; 31♂ 9♀, Turkey, St. 1993, Konya 1500–1600 m, Palaz Dağı, Taşkent, 20–21.VII.1994, leg. H. van Oorschot, H. van den Brink, D. van der Poorten & W. De Prins, all in coll. Instituut voor Systematiek en Populatiebiologie, Zoölogisch Museum Amsterdam.

♂, Turkey, St. 126, Konya 1500–1600 m, Palaz Dağı, Taşkent, 4–5.VIII.1981, leg. B. van Oorschot, H. Coene, J. Lucas & V. Kılınç; 4♂ 3♀, Turkey, St. 276, Konya 1500–1600 m, Palaz Dağı, Taşkent, 31.VII.1985, leg. B. van Oorschot & W. De Prins; 11♂, Turkey, St. 1745, Konya 1500–1600 m, Palaz Dağı, Taşkent, 25.VII.1991, leg. W. De Prins, D. van der Poorten & A. Riemis; 18♂ 7♀, Turkey, St. 1993, Konya 1500–1600 m, Palaz Dağı, Taşkent,

20.VII.1994, leg. H. van Oorschot, H. van den Brink, W. De Prins, D. van der Poorten & K. Larsen; 12♂ 3♀, Turkey, St. 2450, Konya 1500–1600 m, Palaz Dağı, Taşkent, 4.VIII.1998, leg. D. van der Poorten & W. De Prins, all in coll. VLCA.
5♂ (no. 293-297) ♀ (no. 301) (dried wings & testes fixations of all samples and remaining bodies stored in 96% ethanol for DNA analysis), Turkey, Konya 1450 m, Palaz Dağı, Taşkent, 4.VIII.1998 leg. M. Wiemers, all in coll. M. Wiemers.
19♂ 2♀, Turkey, Konya, 1 km E Taşkent, Palaz Dağı, 1500 m, 24–25.VII.1992, leg. et coll. J.-P. Borie; ♂ 8♀, Turkey, Konya, 1 km E Taşkent, Palaz Dağı, 1500 m, 26.VII.1997, leg. et coll. J.-P. Borie.
5♂ 4♀, Turkey, Konya, Taşkent, 1400–1600 m, 18–19.VII.1993, leg. K. Schurian; 2♀, Turkey, Konya, Taşkent, 1400–1600 m, 16.VII.1994, leg. K. Schurian; 17♂ 1♀, Turkey, Konya, Palaz Daglari, Taşkent, 1300–1400 m, 26.VII.1995, leg. W. Eckweiler, all in coll. W. Eckweiler.
14♂, Turkey, Konya, 1500 m, Taşkent, 20–21.VII.1994, leg. et coll. K. Larsen.
♂, Turkey, St. 276, Konya 1500–1600 m, Palaz Dağı, Taşkent, 31.VII.1985, leg. B. van Oorschot & W. De Prins, in coll. A. Riemis.
71♂ 42♀, Turkey, Konya, vic. Taşkent, 1400–1600 m, 18–19.VII.1993, leg. K. Schurian; 20♂ 4♀, Turkey, Konya, vic. Taşkent, 1400–1600 m, 16.VII.1994, leg. K. Schurian; 3♂, Turkey, Konya, vic. Taşkent, 1400–1600 m, 26.VII.1995, leg. K. Schurian, all in coll. K. Schurian.
♂, Turkey, St. 1745, Konya 1500–1600 m, Palaz Dağı, Taşkent, 25.VII.1991, leg. W. De Prins, D. van der Poorten & A. Riemis, in coll. S. Wagener.

[All forementioned material collected before 1992 bears an original red label "PARATYPUS | Polyommatus | (Agrodiaetus) | theresiae sp. nov. | Schurian/Oorschot/ | Brink 1992"].

Description. ♂ Forewing length 16.0–19.5 mm (holotype 18.0 mm). Upperside sky blue with a violet tinge, often more so than in *P.* (*A.*) *theresiae* sp. rev., but there is much overlap, marginally with brownish scaling that varies in extension; fringes black basally, white distally; veins as a rule blackened distally, especially on hindwing; forewing with an extensive and conspicuous androconial patch. Underside light grey, with hardly noticeable yellowish green basal suffusion; spotting reduced, especially on hindwing, spots black with white ocellation; white streak on hindwing always discernible, but hardly contrasting with background, rarely well defined; submarginal row of markings very weakly expressed, almost of the ground-colour.

♀ Forewing length 16.5–18.0 mm. Upperside brown, discoidal spot on forewing clearly visible; hindwing occasionally with reduced to moderately developed blue basal suffusion; submarginal lunules on hindwing well developed, at least some traces on forewing. Underside light brown, spotting more developed than in ♂, white streak on hindwing always well defined; submarginal row of markings very weakly expressed and almost of ground-colour on hindwing, slightly more reddish on forewing.

Chromosome number and karyotype. Kandul & Lukhtanov (1997) described and figured the karyotype of *P.* (*A.*) "*theresiae*" [recte *guezelmavi* sp. n.] and counted from 41 to 42 bivalents in the stage *M*1, that form a series that gradually decreases in size. In July 1998 additional material was fixed (WDP, DVP, MW), whereby a karyotype carrying a haploid chromosome number of $n = 41$ was confirmed. The size of bivalents in the stage of metaphase I of spermatogenesis varies from relatively large ones ($0.917 \pm 0.257\ \mu m^2$) to small ones ($0.165 \pm 0.066\ \mu m^2$). The karyotype contains 10 large bivalents and 7 small ones. The other bivalents are of relatively medium size and form a gradient series. The position of the large bivalents is in the center of the metaphase plate I, while the smallest bivalents as a rule are situated at the edge of the plate.

Distribution. So far only known from the vicinity of Taşkent, Konya province, Turkey.

Bionomics. In limestone areas, biotopes especially on small, open rocky plateaus on steep hillsides, that are quite humid in spring, but dried out at the time of emergence of the butterflies, also on humid spots on sandy roadsides, at altitudes between 1500 and 2000 m. Adults from mid-July to mid-August. Larval host-plant and early stages unknown.

Derivatio nominis. The name *guezelmavi* means "nice blue" (güzel = nice, mavı = blue in Turkish).

4.2. *Polyommatus* (*Agrodiaetus*) *theresiae* Schurian, van Oorschot & van den Brink, 1992 sp. rev.

"*Polyommatus* (*Agrodiaetus*) *theresiae* sp. nov." Schurian, K.G., van Oorschot, H. & van den Brink, H., 1992. *Polyommatus* (*Agrodiaetus*) *poseidon* (H.-S.) und *Polyommatus* (*Agrodiaetus*) *theresiae* sp. nov. aus der Türkei (Lepidoptera: Lycaenidae). — *Nachr.ent.Ver.Apollo*, N.F. **12**(4): 227–231, col. pl., figs. 1–4. Locus typicus restrictus: Turkey, Adana province, 6–18 km N. Saimbeyli, 1600–1750 m **[restricted here Olivier, Puplesiene, van der Poorten, De Prins & Wiemers].** Type material: holotype ♂, Turkey, Adana, 6–18 km N. Saimbeyli, 1600–1750 m, 27–28.VII.1983, St. 121, leg. H. van Oorschot, H. van den Brink & H. Wiering, in coll. Instituut voor Systematiek en Populatiebiologie, Zoölogisch Museum Amsterdam; paratypes 186♂ 27♀, in colls. Instituut voor Systematiek en Populatiebiologie, Zoölogisch Museum Amsterdam; Nationaal Natuurhistorisch Museum, Leiden; The Natural History Museum London, Vlaamse Lepidoptera Collectie Antwerpen; K.G. Schurian; H. van Oorschot; S. Wagener; A. Reif; W. Eckweiler; R. Leestmans; K. Rose; J.-P. Borie; P. Hofmann, J.-C. Weiss.

ILLUSTRATIONS. Plates 1 & 2, figs. 4–6 (♂), 16–17 (♀); text figs. 5–6 (karyotype).
MATERIAL EXAMINED. 85♂ 16♀; as follows:
Holotype ♂ with printed white label "8–18 km N of | SAIMBEYLI | 1600–1750 m St. 121 | 27–28 VII 1983"; printed white label "TURKIYE Adana | H. v. Oorschot, | H. v.d. Brink & | H. Wiering"; printed orange yellow label with handwritten (P. S. Wagener) "Abgebildet in Hesselbarth, | van Oorschot & Wagener | Tagfalter der Türkei: | Tafel *118* Figur *30*"; printed orange label "HOLOTYPUS | Polyommatus | (Agrodiaetus) | theresiae sp. nov. | Schurian/Oorschot/ | Brink 1992", in coll. Instituut voor Systematiek en Populatiebiologie, Zoölogisch Museum Amsterdam.
Paratypes: 24♂ 3♀, Turkey, Adana, 6–18 km N. Saimbeyli, 1600–1750 m, 27–28.VII.1983, St. 121, leg. H. van Oorschot, H. van den Brink & H. Wiering; 33♂ 12♀, Turkey, Adana, 6–18 km N. Saimbeyli, 1600–1750 m, 26.VII.1984, St. 196, leg. B. van Oorschot & V. Kılınç; 2♂, Turkey, Adana, 6–16 km N. Saimbeyli, 1300–1550 m, 1–2.VIII.1988, coll. Nr. 245, leg. K. G. Schurian, all in coll. Instituut voor Systematiek en Populatiebiologie, Zoölogisch Museum Amsterdam.

Further material:
♂ ♀, Turkey, Adana, vic. Saimbeyli, 1500–1600 m, 13.–14.VIII.1993, leg. K. G. Schurian; 2♂, Turkey, St. 2094, Adana, 6–18 km N. Saimbeyli, 1600 m, 25.VII.1995, leg. W. De Prins & D. van der Poorten; ♂, Turkey, St. 2382, Adana, 8 km N. Saimbeyli, 1600 m, 6.VIII.1997, leg. W. De Prins, A. Olivier & D. van der Poorten; 16♂, Turkey, St. 2439, Adana, 5 km N. Saimbeyli, 1600 m, 28.VII.1998, leg. D. van der Poorten & W. De Prins, all in coll. VLCA.
4♂ (no. 240-243), (dried wings & testes fixations of all samples and remaining bodies stored in 96% ethanol for DNA analysis), Turkey, Adana, 5–10 km N. Saimbeyli, 1300–1750 m, 29.VII.1998, leg. M. Wiemers, all in coll. M. Wiemers.
♂, [Turkey, Adana province], Hadjin [Saimbeyli], [leg. Manissadjian?], ex coll. Püngeler, in coll. Museum für Naturkunde der Humboldt-Universität zu Berlin.

Description. ♂ Upperside as in *P.* (*A.*) *guezelmavi* sp. n., but often slightly less vividly coloured, blackening of veins tends to be slightly more developed as in *P.* (*A.*) *guezelmavi* sp. n., in some specimens more so than in any *P.* (*A.*) *guezelmavi* sp. n. specimen. Underside hindwing warmer, more brownish grey than in *P.* (*A.*) *guezelmavi* sp. n.; white streak often better defined and more sharply contrasting with background as in *P.* (*A.*) *guezelmavi* sp. n. None of these differences appear absolutely constant, however. ♀ as *P.* (*A.*) *guezelmavi* sp. n., but in material examined never blue basal suffusion on upperside hindwing.

Chromosome number and karyotype. In 1997, only one single specimen was collected. The testes were prepared by Mr. Zdravko Kolev, who found a haploid chromosome number of $n = 65–66$ (prep. nr. 97025). No photograph of this preparation is available for the present study, but Kolev (pers. comm.) confirms that there were excellent plates to substantiate this count. In July 1998, one of us (MW) fixed the testes of four specimens, but only three of them (nos. 240, 241 & 243) yielded successful preparations. One of them gave a quite unclear picture with $n > 59$; the other specimens, however, gave a picture that appeared clear enough to reveal unequivocally $n = 63$. The structure of the karyotype resembles the structure of *Polyommatus* (*Agrodiaetus*) *guezelmavi* sp. n. However, the haploid chromosome number differs greatly. The observations of preparations nos. 240, 241 and 243 revealed that the karyotype of *Polyommatus* (*Agrodiaetus*) *theresiae* sp. rev. carries $n = 63$. The karyotype contains 8 relatively large bivalents ($1.043 \pm 0.293\ \mu m^2$) and 9 of median size ($0.574 \pm 0.160\ \mu m^2$). The remaining bivalents are very small and situated at the edge of the metaphase plate.

Distribution.So far only known from the area immediately to the north of Saimbeyli, Adana province, Turkey.

Bionomics. In biotopes along sandy roadsides where the butterflies often sit on the humid soil (Obruk Ormani), higher up often in clearings in pine woods (*Pinus nigra*), the males flying in the open, while the females often hide in the shade under the pine trees, at altitudes between 1300 and 1750 m. Schurian (*in* Schurian, van Oorschot & van den Brink 1992) observed oviposition on an *Astragalus* species, that grew mainly in the shade of large pine trees. Adults from mid-July till August. Larval host-plant and early stages unknown.

Notes

1. The large difference in chromosome number between *P. theresiae* sp. rev. and *P. guezelmavi* sp. n. supports the specific distinctness of both taxa. Therefore, all previous literature records (including paratype designations) dealing with material from Taşkent presumably apply to the new species.

2. Recently, *P.* (*A.*) "*theresiae*" (including both Adana and Konya populations) has been ascribed to the "*dama* group" by Eckweiler & Häuser (1997), a species group with "(...) well developed androconial patches on the forewing upperside (...)" [there is no androconial patch at all in *P.* (*A.*) *dama*, however!], while Kandul & Lukhtanov (1997) and Lukhtanov *et al.* (1998) went even further suggesting that both taxa could possibly be subspecies, because of their similar chromosome number and allopatric distribution. Especially in the light of the new information now available, it appears quite improbable that *P.* (*A.*) *dama* would be conspecific with *P.* (*A.*) "*theresiae*" (see also below): the latter taxon **always** has both a white streak on underside hindwing and a striking androconial patch on male upperside forewing, both features **always lacking** in *P.* (*A.*) *dama* that, the more, is a quite different insect with a distinct wing shape and colour. On the contrary, *P.* (*A.*) *theresiae* sp. rev. and *P.* (*A.*) *guezelmavi* sp. n. have a significantly different karyotype, while being impossible to distinguish on a constant basis phenotypically.

3. Staudinger (1892, 1899) mentions under "*Lycaena Poseidon* Led. var. *Mesopotamica*" two males from "Hadjin" [now Saimbeyli] that are somewhat larger, with a slightly different blue on the upperside and a darker brownish underside and that, according to Schurian, van Oorschot & van den Brink (1992), refer to *P.* (*A.*) *theresiae*. During a visit to the Museum für Naturkunde der Humboldt-Universität zu Berlin by one of us (AO), quite unexpectedly, one specimen of *P.* (*A.*) *dama* was found that bears a

label "Hadjin / [18]84 Man.[issadjian]". It bears no Staudinger's "Origin." label though placed immediately after the type series of "*Lycaena Dama*", so it is best not considered part of the syntype series of that taxon, the more so as Staudinger (1892) does not mention this locality in his description of the species. A few days later, Dr. Y. P. Nekrutenko (pers. comm.) also found a genuine *P.* (*A.*) *theresiae* specimen from "Hadjin" in the Püngeler collection at the Museum für Naturkunde der Humboldt-Universität zu Berlin. These discoveries confirm the sympatry and hence specific distinctness of *theresiae* and *dama*!

4. Hesselbarth, van Oorschot & Wagener (1995) report both *P.* (*A.*) *dama* and *P.* (*A.*) *theresiae* from "Umgebung Kahramanmaraş, 600–900(1000) m" in the collection of the Zoologische Staatssammlung München, the latter species also from "10 km E. Kahramanmaraş, 1000 m", leg. et coll. W. Eckweiler: they illustrate 2♂, 2♀ on plate 118 (resp. figs. 37, 39, 56 and 62) as "*Polyommatus* (*Agrodiaetus*) *theresiae* SCHURIAN et al., 1992" that obviously belong to *P.* (*A.*) *poseidon* (Herrich-Schäffer, [1851])! Eckweiler (pers. comm.) confirms that all his material from forementioned locality is referable to *P.* (*A.*) *poseidon* as well. It thus appears that *P.* (*A.*) *theresiae* has not been observed from this area at all so far. One ♂ from Turkey, Gaziantep province, 11 km SSW. Büyük Araplar, TV-Station, 1300 m, leg. et coll. Junge, illustrated by Hesselbarth, van Oorschot & Wagener (1995, plate 118, fig. 38) as "*P.* (*A.*) *theresiae*", also belongs to *P.* (*A.*) *poseidon*.

4.3. *Polyommatus* (*Agrodiaetus*) *larseni* (Carbonell, 1994) stat. rev.

"*Agrodiaetus theresiae larseni* n. ssp." Carbonell, F., 1994. Le complexe d'*Agrodiaetus poseidon* HERRICH-SCHÄFFER (1851) en Turquie et au Liban. Description d'une nouvelle sous-espèce d'*A. theresiae* (*Lepidoptera: Lycaenidae*). — *Linn.belg.* **14**(6): 295–297, col. pl., figs. [8–9], [17–18]. Locus typicus: Lebanon, Les Cèdres [El Arz], 2000 m. Type material: **holotype** ♂, Lebanon, Les Cèdres [El Arz], 2000 m, 29.VI.1972, leg. H. & Y. Stempffer, in coll. Stempffer in Muséum National d'Histoire Naturelle, Paris; **paratypes** 26♂ 5♀: ♂, Lebanon, Beirut, 1920–1936, leg. L. & J. de Joannis, in coll. Stempffer in Muséum National d'Histoire Naturelle, Paris; 2♂, Lebanon, Faraya, 1220 m, 27.VI.1972, leg. H. & Y. Stempffer, in coll. Stempffer in Muséum National d'Histoire Naturelle, Paris; 4♂, Lebanon, Les Cèdres [El Arz], 2000 m, 25.VI, 4–5.VII.1972, leg. H. & Y. Stempffer, in coll. Stempffer in Muséum National d'Histoire Naturelle, Paris; ♂, Lebanon, Les Cèdres [El Arz], 2.VIII.1930, leg. R.E. Ellison, in coll. Stempffer in Muséum National d'Histoire Naturelle, Paris; ♂, Lebanon, Les Cèdres [El Arz], 2000 m, 29.VII.1972, leg. T.B. Larsen, in coll. Stempffer in Muséum National d'Histoire Naturelle, Paris; ♂, Lebanon, Antilebanon, Nabi Sbat, 1500 m, 25.VI.1972, leg. H. & Y. Stempffer, in coll. Stempffer in Muséum National d'Histoire Naturelle, Paris; ♂, Lebanon, Les Cèdres [El Arz], 2000 m, 29.VII.1972, leg. T.B. Larsen, in coll. Larsen in The Natural History Museum, London; ♂, Lebanon, Les Cèdres [El Arz], 2000 m, 22.VII.1974, leg. T.B. Larsen, in coll. K.G. Schurian; ♂, Lebanon, Antilebanon, Nabi Sbat, 1600 m, 25.VI.1972, leg. T.B. Larsen, in coll. Larsen in The Natural History Museum, London; ♂ ♀, Lebanon, Natural Bridge, Faraya, 1800 m, 24.VII.1963, leg. R.E. Lewis, in coll. J.-C. Weiss; ♂, Lebanon, Natural Bridge, Faraya, 1800 m, 24.VII.1963, leg. R.E. Lewis, in coll. W. Eckweiler; ♂, Lebanon, Les Cèdres [El Arz], 16.VIII.1931, leg. R.E. Ellison, in coll. W. Eckweiler; 1 ♂, Lebanon, Beirut, in coll. Eckweiler; 2♂ ♀, Lebanon, Bcharré, 1.VIII.1971, leg. T.B. Larsen, in coll. K. Rose; ♂, Lebanon, Jabal Kesrouan, 2100 m, 25.VIII.1972, leg. T.B. Larsen, in coll. K. Rose; ♂, Syria, "Ghazir", in coll. Stempffer in Muséum National d'Histoire Naturelle, Paris; 5♂ 3♀, Syria, Antilebanon, Bludan, 1600 m, 27.VII–5.VIII.1981, leg. M. Dietz, in coll. W. Eckweiler.

ILLUSTRATIONS. Plates 1 & 2, figs. 7–8 (♂), 15 (♀); text fig. 1 (♂) and 7 (karyotype).
MATERIAL EXAMINED. 52♂ 12♀, Lebanon, Mohafazat Bcharré, Les Cèdres [El Arz] (1950–2000 m), 17.VII.1998, leg. A. Olivier, in coll. VLCA; 36♂ 12♀, idem, but 18.VII.1998; 21♂ 6♀, idem, but 20.VII.1998; 2♀, Lebanon, Mohafazat Baalbek, Nabi Sbat (1500 m), 21.VII.1998, leg. A. Olivier, in coll. VLCA; ♀, Lebanon, Mohafazat Jbail, Laqloûq (1650 m), 23.VII.1998, leg. A. Olivier, in coll. VLCA; ♂, "Libanon" [Lebanon], [18]97, Crem.[ona leg.], ex coll. Staudinger, in coll. Museum für Naturkunde der Humboldt-Universität zu Berlin (text fig. 1, cf. Staudinger 1899: 139).

Fig. 1. *Polyommatus* (*Agrodiaetus*) *larseni* (Carbonell, 1994) stat. rev. ♂, "Libanon" [Lebanon], [18]97, Crem.[ona leg.], ex coll. Staudinger, in coll. Museum für Naturkunde der Humboldt-Universität zu Berlin (specimen referred to by Staudinger 1899: 139 as "*Lycaena Damone*") — a) upperside; b) underside; c) labels.

Description. ♂ Upperside light sky blue, lighter and without the violet tinge found in *P.* (*A.*) *guezelmavi* sp. n. and *P.* (*A.*) *theresiae* sp. rev., only single darker specimens overlapping with the lightest ones of both last-mentioned species, blackening of veins as a rule more extensive as in these species. Underside much like *P.* (*A.*) *theresiae* sp. rev., of a warmer, more brownish grey than in *P.* (*A.*) *guezelmavi* sp. n., also on forewing, with reduced bluish green basal suffusion; reduction of the blue colour in s7 under the costal vein; white streak always present, as a rule well defined and moderately to sharply contrasting with background.

♀ Upperside lighter brown than in *P.* (*A.*) *guezelmavi* sp. n. and *P.* (*A.*) *theresiae* sp. rev., without any blue basal suffusion on hindwing, submarginal lunules more extensive, especially on forewing. Underside light coffee brown, of a warmer tinge than in both last-mentioned taxa, submarginal row of markings better developed, slightly reddish, especially on forewing.

Chromosome number and karyotype. Larsen (1975) studied material (referred to by him as "*Agrodiaetus poseidon* ? *mesopotamica* Staudinger") from Lebanon (Faraya, Les Cèdres [El Arz], Faraya Natural Bridge) and noted: "Many cells in a number of specimens

studied showed $n = 25$. A single specimen from the Cedar Mountain unequivocally had $n = 26$, another had one cell of $n = 25$ with a supernumerary chromosome". He did not describe nor figure the karyotype, however. In July 1998, topotypical material was fixed (AO). The variability in chromosome number was not found in two examined specimens, nor was the absence or presence of a supernumerary element. All 8 metaphase I plates of both specimens showed 25 bivalents. All the bivalents form a gradient series, where the first bivalent distinguishes to be somewhat bigger ($1.254 \pm 0.129\ \mu m^2$) than the next in a row ($1.232 \pm 0.152\ \mu m^2$).

Distribution. Lebanon, moderately widespread in the Lebanon range (El Arz (Les Cèdres), Hadet ej Jobbé, Laqloûq, Jabal Kesrouan, Faraya, Jabal Sannine) as well as in the Antilebanon range both in Lebanon (Nabi Sbat) and in the adjacent part of Syria (Bludan) (Ellison & Wiltshire 1939; Forster 1961; Larsen 1974, 1975; Carbonell 1994; Olivier unpubl.). Old material labelled "Beyrouth" certainly comes from the Lebanon range.

Bionomics. In grassy, sometimes swampy, spots in limestone areas, especially common at the type locality, where it was found mainly in the vicinity of the Cedar Grove, adults often visiting flowers of mint (*Mentha* sp.) as well as an unidentified yellow Asteraceae species, that attracted good numbers of it, along with *P.* (*A.*) *alcestis* (Zerny, 1932); at Laqloûq and Nabi Sbat, single specimens were observed on mint (Olivier, pers. obs.). At night it congregates in communal roosts with several other lycaenid species on grasses and *Achillea sulphurea* (Larsen 1973). The butterfly is usually encountered in subalpine and montane areas at altitudes between 1500 and 2100 m, but there is a single report from as high as the very summit of the Cedar Mountain at about 3000 m (Ellison & Wiltshire 1939). Adults usually from mid-July through August, in the Antilebanon (and occasionally in the Lebanon range) from late June onwards. Carbonell (1994) reports it till early October, which seems doubtful. Larval host-plant and early stages unknown.

Note. This species has been ascribed to many different (groups of) taxa by different authors. Staudinger (1899) saw one single ♂ (illustrated here on text fig. 1) stating "steht der typischen *Damone* näher als der var. *Damonides*" while Staudinger & Rebel (1901) ascribed it to "*Lycaena Damone* v. *Damonides* ?Libanon var.?": its upperside ground-colour indeed recalls very much *P.* (*A.*) *damonides* (see below) as well as *P.* (*A.*) *elbursicus*, as noted by Carbonell (1994). Subsequent authors ascribe it to *P.* (*A.*) *poseidon* (Elwes *in* Nicholl 1901; Fountaine 1902; Graves 1910; Zerny 1932; Ellison & Wiltshire 1939) or, more precisely, *P.* (*A.*) *poseidon mesopotamica* (Staudinger, 1892) (Forster 1961; Larsen 1973, 1974, 1975). It was formally described by Carbonell (1994) as a subspecies of *P.* (*A.*) *theresiae*, based on phenotypical similarity, a combination which was repeated by both Hesselbarth, van Oorschot & Wagener (1995) and Eckweiler & Häuser (1997): the former authors, however, seriously question that status, while placing it in the "*P.* (*A.*) *transcaspicus*" species group, the latter authors situate it in the "*P.* (*A.*) *dama* group". Kandul & Lukhtanov (1997) use the combination "*P. poseidon larseni*" and place the Lebanese taxon in the "second subgroup", along with *P.* (*A.*) *poseidon krymaeus* (Sheljuzhko, 1928) and *P.* (*A.*) *poseidon* ssp. from Ağrı (NE Turkey), based on its comparable chromosome number. For a similar reason, however, as well as purported agreement in colour and wing shape, Dantchenko (1997), Lukhtanov, Dantchenko & Kandul (1997) and Lukhtanov *et al.* (1998) associate it rather with *P.* (*A.*) *damocles* (Herrich-Schäffer, [1844]). Dantchenko (1997) for the first time used the binomen *Polyommatus larseni*. After comparison with good numbers of *P.* (*A.*) *guezelmavi* sp. n., *P.* (*A.*) *theresiae* sp. rev., *P.* (*A.*) *elbursicus*, *P.* (*A.*) *poseidon* (including

material from near Malatya, the type locality of "*mesopotamica*", currently considered a synonym of nominotypical *poseidon*, cf. Schurian, van Oorschot & van den Brink 1992; Hesselbarth, van Oorschot & Wagener 1995), small series of both *P.* (*A.*) *damocles* and *P.* (*A.*) *damonides* and one single *P.* (*A.*) *poseidon krymaeus*, we have no hesitation in placing it in the *P.* (*A.*) *transcaspicus* group, nearest to *P.* (*A.*) *guezelmavi* sp. n., *P.* (*A.*) *theresiae* sp. rev., *P.* (*A.*) *elbursicus* and *P.* (*A.*) *damonides*, but as a distinct species. It differs from these other four taxa by (nearly) constant, be it subtle, differences in the external phenotype, as well as, when known, in its chromosome number and karyotype.

4.4. *Polyommatus* (*Agrodiaetus*) *elbursicus* (Forster, 1956)

"*A.*[*grodiaetus*] *transcaspica elbursica* ssp. nov." Forster, W., 1956. Bausteine zur Kenntnis der Gattung *Agrodiaetus* Scudd. (Lep. Lycaen.) I. — *Z.wien.ent.Ges.* **41**: 74–76, pls. 10 & 11, figs. 3, 4. Locus typicus: Persia sept. [northern Iran], Elburs mts. c., Kendevan pass, 2800–3000 m. Type material: holotype ♂, Persia sept., Elburs mts. c., Kendevan pass, 2800–3000 m, 22–27.VII.1936, leg. Pfeiffer, in Zoologische Staatssammlung München; allotype ♀, same data as holotype; remaining paratypes 55♂, 12♀: 23♂ 4♀, same data as holotype; 10♂ ♀, Persia sept., Elburs mts. c., Kendevan pass, 2900 m, end VII.1937, leg. Forster & Pfeiffer, in Zoologische Staatssammlung München; 2♂, Persia sept., Elburs mts. c., Tacht i Suleiman, Särdab Valley, Vandarban, 1900–2200 m, 10–14.VII.1937, leg. Forster & Pfeiffer, in Zoologische Staatssammlung München; 12♂, Persia sept., Elburs mts. c., Tacht i Suleiman, Särdab Valley, Vandarban, 2500–2700 m, 14–16.VII.1937, leg. Forster & Pfeiffer, in Zoologische Staatssammlung München; 4♂ 5♀, Iran, Elburs mts., Nissa, 2500–3000 m, 5–10.VII.1936, leg. F. Brandt, in coll. Naturhistoriska riksmuseet, Stockholm; ♂, Persia, Elburs mts., Pelur, 2000 m, 27–28.VII.1936, leg. Schwingenschuss (Slg. Pfeiffer), [mus.?]; ♂, Persia sept., Elburs, Rehne, Demavend, ca. 2700–3600 m, 20–27.VII.1936, leg. F. Wagner, in coll. Naturhistorisches Museum, Wien; ♂ ♀, [Iran], Elburs, Lar Valley, 8000 ft., 5–13.VII.1939, leg. Wiltshire, in coll. The Natural History Museum, London; ♂ ♀, [Iran], Demavend, Haschtar above 2500 m, VII.1935, leg. Fusek, in coll. The Natural History Museum, London.

= "*Agrodiaetus elbursica zapvadi* n. ssp." Carbonell, F., 1993. Contribution à la connaissance du genre *Agrodiaetus* HÜBNER (1822): le complexe ultraspécifique d'*A. transcaspica* STAUDINGER (1899) (*Lepidoptera*: *Lycaenidae*). — *Linn.belg.* **14**(2): 94–103, col. pl. II, figs. [1–3], [10–12], text figs. 1H, 2H, 3H, 4H, 5H. Locus typicus: Turkey, Van province, near Güzelsü (= Hoşap), 2100 m. Type material: holotype ♂, Turkey, Van province, near Güzelsü (= Hoşap), 2100 m, 10.VIII.1956, leg. de Lesse, in coll. Muséum National d'Histoire Naturelle, Paris; allotype ♀, Turkey, Hakkari province, Zap Valley, 1100–1400 m, 10.VII.1991, leg. Carbonell, in coll. Muséum National d'Histoire Naturelle, Paris; remaining paratypes 86♂ 8♀ (16♂ ♀, in coll. Muséum National d'Histoire Naturelle, Paris, remainder in individual collector's collections): 23♂, Turkey, Hakkari province, Zap Valley, 1100–1400 m, 30.VI–1.VII.1987, 31.VII.1988, 15–22.VI.1989, 22.VI–1.VII.1990, 11.VII.1991, leg. F. Carbonell; 2♂, Turkey, Hakkari province, E. Suvarihalil geçidi, 1800 m, 1.VIII.1988, 1.VII.1990, leg. F. Carbonell; 17♂, Turkey, Hakkari province, Zap Valley, 1100–1400 m, 17–23.VI.1989, 11.VII.1991, leg. Mollet; 2♂, Turkey, Hakkari province, Zap Valley, 1100–1400 m, 17–23.VI.1989, leg. Flutsch: ♂, Turkey, Hakkari province, 20 km N. Başkale, 2100 m, 9.VII.1990, leg. de Freina; 7♂, Turkey, Van province, near Güzelsü (= Hoşap), 2100 m, 10.VIII.1956, leg. de Lesse; 25♂ 8♀, Turkey, Van province, N. Güzelsü (= Hoşap), 1900 m, 10–12.VII.1991, 11–12.VIII.1992, leg. Carbonell & Mollet; ♂, Turkey, Bitlis province, Resadiye, 1600 m, 30.VII.1988, leg. Carbonell; ♂, Turkey, Bitlis province, Kuzgunkıran geçidi W., 2100–2200 m, 9.VII.1991, leg. Carbonell; ♂, Turkey, Van province, Kurubaş geçidi, 2100 m, 24.VI.1989; 5♂, Turkey, Van province, 10–30 km N. Çatak, 1850–2000 m, 7–9.VII.1991, leg. Carbonell & Mollet. — Junior subjective synonym of *A.*[*grodiaetus*] *transcaspica elbursica* Forster, 1956 (Hesselbarth, van Oorschot & Wagener 1995: 736).

ILLUSTRATIONS. Plates 1 & 2, figs. 10–12 (♂), 18 (♀).

MATERIAL EXAMINED. 70♂ 10♀

2♂, Iran, Tehran, Resteh Ye Alborz, Fasham, 2000–2200 m, 30.VI–3.VII.1973, leg. W. L. Blom; ♂, Iran, Elburs, Dizin, E. Gatschar, 2400–2600, 28.VI–11.VII.1975, leg. K. Rose; ♂, Iran, Elburs, Dizin, Gajerch, 2200 m, 21.VII.1979, leg. K. G. Schurian; ♂, Turkey, Van, Kuzgunkiran Geçidi, 2100–2300 m, 13–14.VII.1982, leg. A. Hofmann; 2♂, Turkey, Van, 50 km S. Çatak, 15–26.VII.1985, 2000 m, leg. W. Siepe; ♂, Turkey, St. 495, Bitlis, Kuzgunkiran Geçidi, 2000–2900 m, 2.VIII.1988, leg. B. van Oorschot, W. De Prins, A. Riemis & V. Kılınç; 4♂, Turkey, St. 498, Van, 30–33 km NE Çatak, 2000–2400 m, 5.VIII.1988, leg. B. van Oorschot, W. De Prins, A. Riemis & V. Kılınç; ♂, Turkey, St. 612, Hakkari, Sidevalley Zap, Talı Valley, 13 km SW. Hakkari, 1600 m, 9.VII.1990, leg. H. van den Brink & W. De Prins; 2♂, Turkey, St. 615, Van, Zernek Barajı, 65 km N. Başkale, 1900–2000 m, 11.VII.1990, leg. H. van den Brink & W. De Prins; ♂, Turkey, St. 1811, Hakkari, Sidevalley Zap, Talı Valley, 13 km SW. Hakkari, 1400–1700 m, 2.VII.1992, leg. W. De Prins & D. van der Poorten; ♂, Turkey, St. 1852, Van, Kurubaş Geçidi, 2100 m, 24.VII.1992, leg. W. De Prins & D. van der Poorten; 2♂, Turkey, St. 1857, Van, 32 km NE. Çatak, 2100–2200 m, 28.VII.1992, leg. H. van Oorschot & H. van den Brink; 12♂, Turkey, St.

1859, Van, Zernek Barajı, 65 km N Başkale, 1900–2200 m, 29.VII.1992, leg. H. van Oorschot & H. van den Brink; all in coll. Instituut voor Systematiek en Populatiebiologie, Zoölogisch Museum Amsterdam.
♂, Iran, Tehran, Resteh Ye Alborz, Fasham, 2000–2200 m, 30.VI–3.VII.1973, leg. W.L. Blom; ♂, Iran, Elburs, Dizin, E. Gatchsar, 2400–2600 m, 28.VI–11.VII.1975, leg. K.G. Schurian; ♂, Iran, Elburs, Kendevan region, 3 km N. Kendevantunnel, 2500 m, 2–11.VII.1975, leg. K. G. Schurian; 2♂ ♀, Iran, Tehran, Fasham, 2200m, 4.VII.1997, leg. G. Rahmani; 5♂ 2♀, Iran, Elburs, Dizin, 2000 m, 5.VIII.1997, leg. G. Rahmani; ♂, W.-Iran, Qotor, 2000 m, 1.VIII.1997, leg. G. Rahmani; ♂, Turkey, Van, 17 km N. Çatak, 16.VII.1989, leg. J.-P. Borie; ♂, Turkey, Van, 33 km N. Çatak, 2100 m, 21.VII.1989, leg. J.-P. Borie; ♂, Turkey, St. 603, Van, 40 km N. Çatak, 1800 m, 2–5.VII.1990, leg. H. van den Brink, W. De Prins, & D. van der Poorten; 3♂, Turkey, St. 615, Van, Rd. Hakkari–Van, 67 km N. Baskale, 1900–2000 m, 11.VII.1990, leg. H. van den Brink & W. De Prins; 5♂ 2♀, Turkey, St. 1942, Van, 10–33 km NE. Çatak, 2000–2200 m, 22–28.VII.1993, leg. D. van der Poorten & J.-P. Borie; 5♂ 4♀, Turkey, St. 1943, Van, Zernek Barajı, 65 km N. Başkale, 2000 m, 29.VII.1993, leg. D. van der Poorten & J.-P. Borie; 3♂, Turkey, St. 2330, Van, 30–33 km NE. Çatak, 2000–2100 m, 5.VIII.1996, leg. W. De Prins, A. Olivier & D. van der Poorten; ♀, Turkey, St. 2331, Van, Zernek Barajı, 65 km N. Başkale, 2000 m, 6.VIII.1996, leg. W. De Prins, A. Olivier & D. van der Poorten; ♂, Turkey, St. 612, Hakkari, Sidevalley Zap, Oğul valley, 13 km SW. Hakkari, 1600 m, 9.VII.1990, leg. H. van den Brink & W. De Prins; 4♂, Turkey, St. 1811, Hakkari, Sidevalley Zap, Talı valley, 13 km SW. Hakkari, 1400–1700 m, 2.VII.1992, leg. W. De Prins & D. van der Poorten; all in coll. VLCA.
3♂, Iran, Tehran, mountain pass between Zangan and Gilvan, loc. 90, 2200 m, 2.VII.1973, leg. Wagener & Schmitz; ♂, Iran, Tehran, 1 km NE. Gatschar, 2300 m, 19.VII.1996, leg. W. ten Hagen; all in coll. S. Wagener.

Description. ♂ Upperside light sky blue, much as in *P.* (*A.*) *larseni*, to sky blue with a violet tinge, though hardly ever as bright as in some *P.* (*A.*) *guezelmavi* sp. n.; blackening of veins as a rule even more accentuated as in *P.* (*A.*) *larseni*; androconial patch distinctly less extensive and conspicuous as in *P.* (*A.*) *guezelmavi* sp. n., *P.* (*A.*) *theresiae* sp. rev. and *P.* (*A.*) *larseni* stat. rev. Underside cold grey, much darker than in the previous three taxa, spotting and submarginal row of markings more prominent and always clearly visible; hindwing with reduced bluish basal suffusion, white streak on hindwing always sharply contrasting with background.

♀ Upperside tends to be darker brown than in the other taxa studied, occasionally with reduced blue basal suffusion on hindwing, submarginal lunules vestigial on hindwing, absent on forewing. Underside darker brown than in the other taxa studied, submarginal row of markings rather well developed, though without any reddish tinge.

Chromosome number and karyotype. The haploid chromosome number of topotypical *P.* (*A.*) *elbursicus* was established as $n = 16, 17$ by de Lesse (1963), who also figured its karyotype (fig. 3e, f). Material of "*A. poseidon* ssp. de Van", now known to be referable to *P.* (*A.*) *elbursicus* (cf. Carbonell 1993; Hesselbarth, van Oorschot & Wagener 1995), as already implicitely suggested by de Lesse (*loc. cit.*) himself, has $n = 18–19$ and recently, material originating from Turkey, Van, Zernek Barajı, 1900–2000 m, showed $n = 17, 18$ (Lukhtanov *et al.* 1998). The latter authors further state "An intraindividual variability in the number of chromosomes was found, ranging from $n = 18$ to $n = 19$. In metaphase-I, all bivalents form a gradient series. The karyotype shows no extraordinary large or small bivalents". Unfortunately they do not figure the karyotype.

Distribution. Known from the western and central Elburs in northern Iran and from SE. Turkey, Bitlis, Van and Hakkari provinces (Forster 1956; de Lesse 1963; Carbonell 1993; Hesselbarth, van Oorschot & Wagener 1995; Wagener, pers. comm.). The so-called record from Turkmenistan by Tshikolovets (1998: 112) is based on the erroneous identification by the author of a ♂ specimen pictured by Carbonell (1993: 111–112, pl. I, L.1), that in fact belongs to *P.* (*A.*) *transcaspicus*.

Bionomics. In the Elburs (Iran), at the mountain pass between Zangan and Gilvan, at the Kendevan pass and in the area of Tacht i Suleiman, butterflies occur along humid gullies, at altitudes between 1900 and 3000 m, on the Demavend as high as 3600 m, in

July. In SE. Turkey in similar biotopes, but at altitudes from 1100 to 2200 m, from late June till the second week of August (Forster 1956; Carbonell 1993; Hesselbarth, van Oorschot & Wagener 1995; Wagener, pers. comm.). Larval host-plant and early stages unknown.

Notes

1. This taxon cannot be mistaken for any of the preceding taxa reviewed, differing constantly both phenotypically and in karyotype. Though originally described as a subspecies of *P.* (*A.*) *transcaspicus*, and still considered as such by de Lesse (1963), while Lukhtanov (1989) lists it as a subspecies of *P.* (*A.*) *aserbeidschanus* (Forster, 1956), it was finally elevated to species rank by Carbonell (1993). *P.* (*A.*) *transcaspicus* has a haploid chromosome number of n = 52–53 and an entirely different karyotype (de Lesse 1963), thus precluding conspecificity with *P.* (*A.*) *elbursicus*. The latter taxon differs significantly from *P.* (*A.*) *ninae* (Forster, 1956) as well, that has n = 33–37, $2n$ = 66, 68 (de Lesse 1960, 1963, but see Carbonell 1993; Lukhtanov 1989; Olivier, De Prins & van der Poorten, unpublished data; Carbonell in litt., 31.XII.1998). Karyological differences with *P.* (*A.*) *aserbeidschanus aserbeidschanus* (with n = 22–23 sensu Lukhtanov 1989) and especially *P.* (*A.*) *aserbeidschanus turcicolus* (Koçak, 1977) (with n = 19–20, cf. de Lesse 1960; Lukhtanov *et al.* 1998) are far less pronounced, but the latter taxon is syntopic and synchronous with *P.* (*A.*) *elbursicus* in SE. Turkey (e.g. at the Zernek Barajı in Van province, cf. Lukhtanov *et al.* 1998), from which it can be distinguished by external features (see Hesselbarth, van Oorschot & Wagener 1995). These data compel us to conclude, on karyological evidence, that *P.* (*A.*) *aserbeidschanus turcicolus* cannot be conspecific with *P.* (*A.*) *ninae* as suggested by Hesselbarth, van Oorschot & Wagener (1995): its current status, as established by Lukhtanov (1989), Carbonell (1993) and Lukhtanov *et al.* (1998) seems to be the most appropriate solution for the time being.

2. Wagener (pers. comm.) found both *P.* (*A.*) *elbursicus* and *P.* (*A.*) *?aserbeidschanus* together at the mountain pass between Zangan and Gilvan, in the western Elburs.

3. We agree with Hesselbarth, van Oorschot & Wagener (1995) that the taxon "*Agrodiaetus elbursica zapvadi*" cannot be separated morphologically from *P.* (*A.*) *elbursicus* and there is no support neither from the karyological point. Therefore we agree with the synonymy as established by these authors.

4. *P.* (*A.*) *poseidon* is not known at all from Bitlis, Van and Hakkari provinces (cf. Hesselbarth, van Oorschot & Wagener 1995: map 199), though this was assumed to be the case due to the erroneous report of *P.* (*A.*) *elbursicus* by de Lesse (1963) as "*A. poseidon* ssp. de Van".

4.5. *Polyommatus* (*Agrodiaetus*) *damonides* (Staudinger, 1899)

"*Lycaena Damone* Ev. var. *Damonides*" Staudinger, O., 1899. Ueber die Arten und Formen der *Lycaena Damon*-Gruppe. — *Dt.ent.Z.Iris* 12: 138–139. Locus typicus restrictus: "Ordubad" [Azerbaijan, Nachichevan, Ordubad] (Forster 1961: 13). Type material: lectotype ♂, [Azerbaijan, Nachichevan], Ordubad, 10.VI.1881, leg. Christoph, in coll. O. Staudinger in Museum für Naturkunde der Humboldt-Universität zu Berlin; paralectotypes 3♂ 2♀, [Azerbaijan], Nachichevan, Ordubad, 10.VI.1881, 22.VI.1881, 25.VI.1881, [leg. Christoph], in coll. O. Staudinger in Museum für Naturkunde der Humboldt-Universität zu Berlin.

ILLUSTRATIONS. Plates 1 & 2, fig. 9 (♂); lectotype ♂: text fig. 2.

MATERIAL EXAMINED. **Lectotype** ♂ with white handwritten label (Staudinger) "v. Damonides | Stg."; green handwritten label "Ordubat | Chr.[istoph]"; faded handwritten label (unknown hand) "L. Iphigenia ? | Ordubad 10.6.[18]81"; pink printed label "Origin."; pale yellow printed label "Zool. Mus. | Berlin"; white label, handwritten (Forster) on printed form "*Agrodiaetus* | *poseidon* ♂ | *damonides Stgr.* det. W. Forster *1948*"; white handwritten label (Forster) "Cotypus | Lycaena | damone | damonides Stgr."; pink handwritten label (Forster) "Lectotypus | Lycaena | damone | damonides Stgr. | W. Forster 1948"; pink printed label with handwritten inscriptions (P. S. Wagener) "Abgebildet in Hesselbarth | van Oorschot & Wagener: | Tagfalter der Türkei. | Tafel *121* Figur *67*".

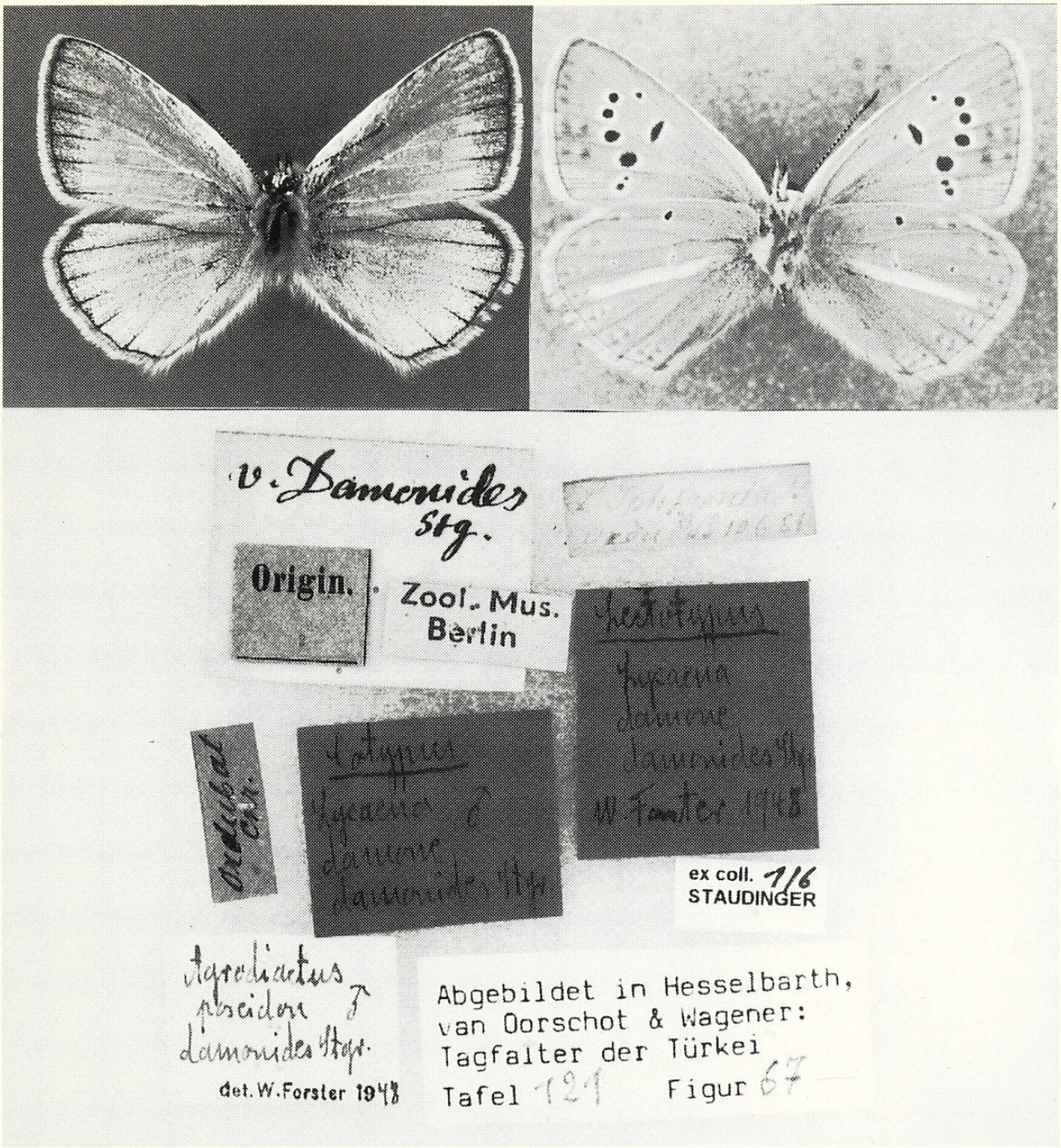


Fig. 2. *Polyommatus* (*Agrodiaetus*) *damonides* (Staudinger, 1899), lectotype ♂, [Azerbaijan, Nachichevan], Ordubat [recte Ordubad], 10.VI.[18]81, Chr.[istoph leg.], ex coll. Staudinger, in coll. Museum für Naturkunde der Humboldt-Universität zu Berlin (also figured in colour in Hesselbarth, van Oorschot & Wagener 1995: Taf. 121, fig. 67 and in Eckweiler & Häuser 1997: 138, pl. 5). — a) upperside; b) underside; c) labels.

Paralectotypes: 3♂ 2♀, all with circles of the same as locality label green paper, ♂ bearing also handwritten (unknown hand) label "Ordub.[ad] 22.6.[18]81" and pink printed label "Origin."; ♂ with handwritten label "Ordub.[ad] 25.6.[18]81"; ♀ bearing also handwritten (unknown hand) label "Ordub.[ad] 22.6.[18]81"; ♀ bearing also handwritten (unknown hand) label "Ordub.[ad] 10.6.[18]81".
Further material: ♂ Azerbaijan, Nachichevan, Ordubad, 18.VI.1985, ex coll. L. Mets, in coll. VLCA.

Description. ♂ and ♀ as *P.* (*A.*) *elbursicus* from northern Iran.

Chromosome number and karyotype. Unknown.

Distribution. Only known with certainty from the type locality.

Bionomics. Known material was collected in June. No further data.

Notes

1. Staudinger (1899) described this taxon from "In den Gebirgen Nordpersiens, besonders bei Hadschyabad und Schahkuh, sowie in südöstlichen Transcaucasien (bei Ordubad, auch bei Kasikoporan)" and, most probably, as his description suggests, his material covers more than one taxon (see also Forster 1956: 77). Among the "cotypes" that appear heterospecific, Forster designated formally only one male specimen as lectotype, thus restricting the type locality to Ordubad. This specimen has recently been figured both by Hesselbarth, van Oorschot & Wagener (1995: pl. 121, fig. 67) and by Eckweiler & Häuser (1997: 138, pl. 5).

2. We have seen one male specimen in coll. VLCA, while one of us (AO), during a visit to the Museum für Naturkunde der Humboldt-Universität zu Berlin, compared short series of *P.* (*A.*) *elbursicus* and *P.* (*A.*) *ninae* (both from coll. VLCA), as well as the VLCA specimen of *P.* (*A.*) *damonides*, to the lectotype of the latter species, as well as a further 3♂, 2♀ paralectotypes **[designated here Olivier, Puplesiene, van der Poorten, De Prins & Wiemers]** in that museum bearing an original label "Ordubat". We recognize the striking similarity with material of *P.* (*A.*) *elbursicus* (see also de Lesse 1960: 187!). Lukhtanov (*in* Hesselbarth, van Oorschot & Wagener 1995: 735) suggested that *damonides* is probably identical to *elbursicus*, while Hesselbarth, van Oorschot & Wagener (op. cit.: 735) consider the possibility of conspecificity between *damonides* and *ninae*, an alternative we at present discount with no hesitation. As the chromosome number and karyotype of material from Ordubad is unknown at present, and considering the great variation in this group in this respect, we consider it unjustified to speculate on the conspecificity of *damonides* and *elbursicus*. The wisest approach seems to maintain *damonides* as a distinct species for the time being. In any case, the name *damonides* would become the oldest available name (unless it would prove to be conspecific with *P.* (*A.*) *transcaspicus*, what seems very unlikely).

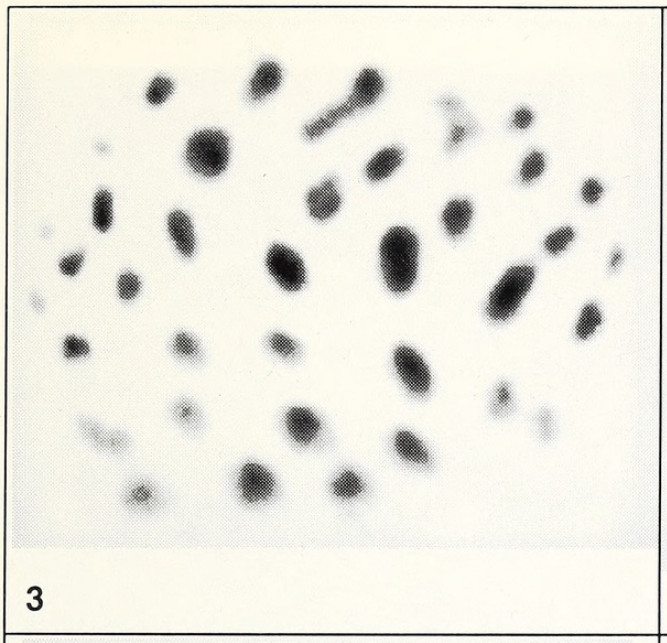
Fig. 3. Karyotype of *Polyommatus* (*Agrodiaetus*) *guezelmavi* sp. n., paratype ♂, prep. 98031, *M* I, n = 41, Turkey, Konya province, Palaz Dağı, Taşkent, 1500–1600 m, 4.VIII.1998, leg. D. van der Poorten & W. De Prins, in coll. VLCA. 5 μ = 17 mm.

Fig. 4. Karyotype of *Polyommatus* (*Agrodiaetus*) *guezelmavi* sp. n., paratype ♂, prep. 98032, *M* I, n = 41, Turkey, Konya province, Palaz Dağı, Taşkent, 1500–1600 m, 4.VIII.1998, leg. D. van der Poorten & W. De Prins, in coll. VLCA. 5 μ = 17 mm.

Fig. 5. Karyotype of *Polyommatus* (*Agrodiaetus*) *theresiae* Schurian, van Oorschot & van den Brink, 1992 sp. rev. ♂, prep. 241, *M* I, *n* > 59, Turkey, Adana province, Saimbeyli, 1200–1500 m, 29.VII.1998, leg. M. Wiemers, in coll. VLCA (specimen in coll. M. Wiemers). 5 μ = 17 mm.

Fig. 6. Karyotype of *Polyommatus* (*Agrodiaetus*) *theresiae* Schurian, van Oorschot & van den Brink, 1992 sp. rev. ♂, prep. 243, *M* II, *n* = 63, Turkey, Adana province, Saimbeyli, 1200–1500 m, 29.VII.1998, leg. M. Wiemers, in coll. VLCA (specimen in coll. M. Wiemers). 5 μ = 17 mm.

Fig. 7. Karyotype of *Polyommatus* (*Agrodiaetus*) *larseni* (Carbonell, 1994) stat. rev. ♂, prep. AO 9816, *M* I, *n* = 25, Lebanon, Mohafazat Bcharré, Les Cèdres [El Arz], 1950–2000 m, 17.VII.1998, leg. A. Olivier, in coll. VLCA. 5 μ = 17 mm.



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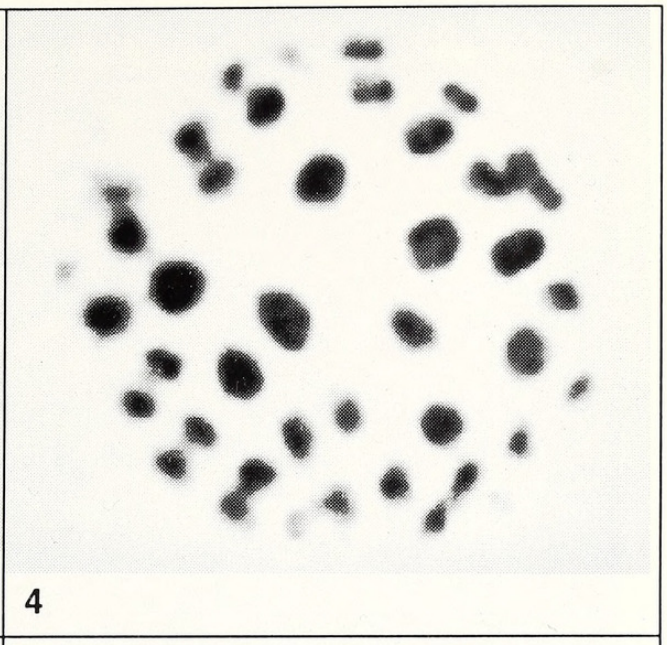

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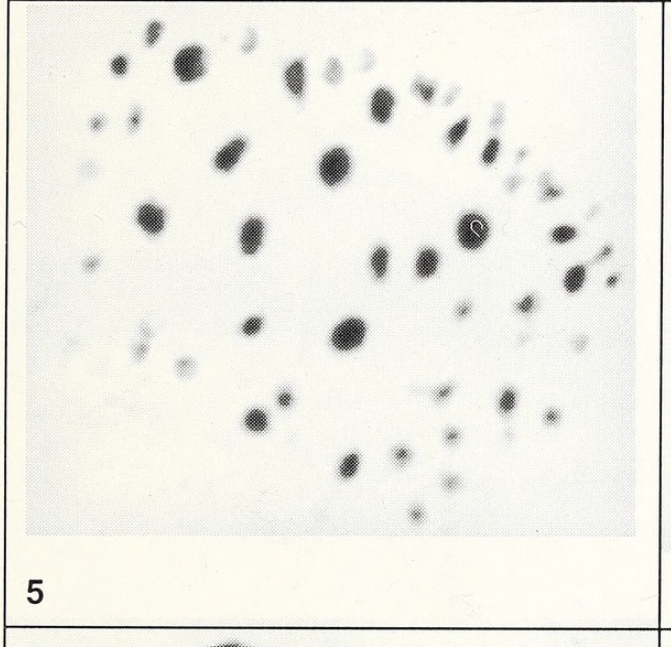

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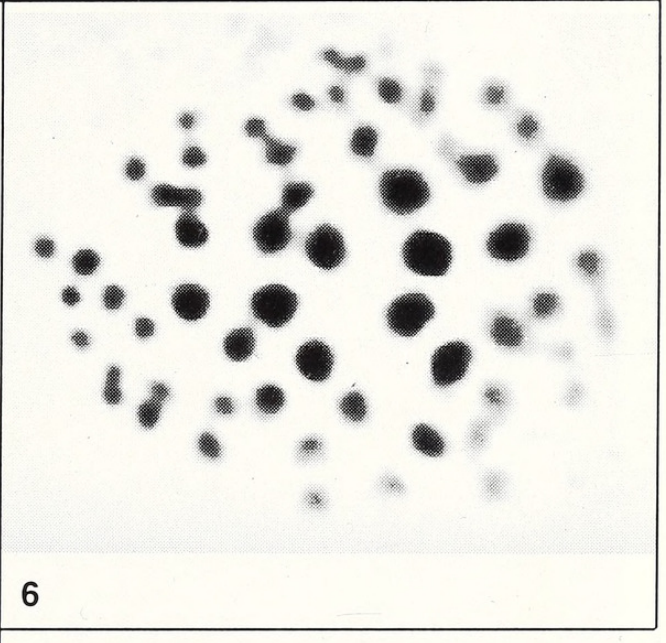
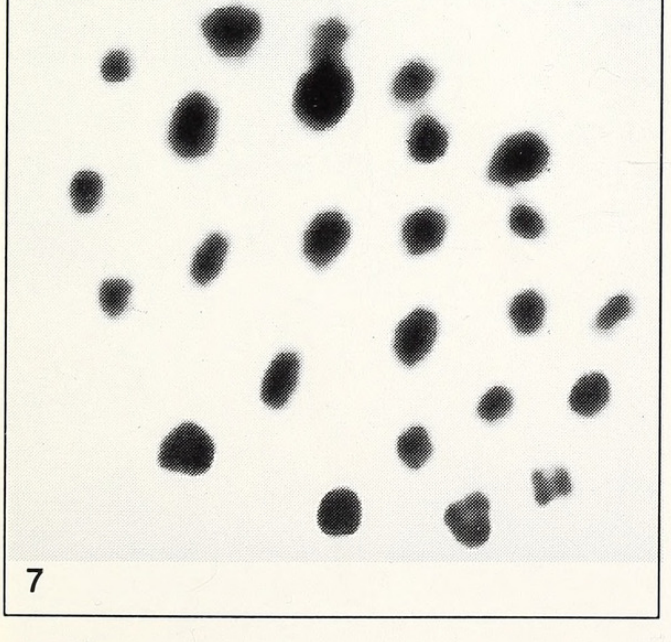


6



7

Plate 1

Plate 2

Legend of plates 1 (uppersides) and 2 (undersides)

1–3: *Polyommatus* (*Agrodiaetus*) *guezelmavi* sp. n.

1. Holotype ♂, Turkey, Konya province, Palaz Dağı, Taşkent, 1500–1600 m, St. 1993, 20–21.VII.1994, leg. H. van Oorschot, H. van den Brink, D. van der Poorten, W. De Prins, in coll. Instituut voor Systematiek en Populatiebiologie, Zoölogisch Museum, Amsterdam.
2. Paratype ♂, same data as 1, but in coll. VLCA.
3. Paratype ♂, same data as 1, but in coll. VLCA.

4–6: *Polyommatus* (*Agrodiaetus*) *theresiae* Schurian, van Oorschot & van den Brink, 1992 sp. rev.

4. ♂, Turkey, Adana province, 8 km N. Saimbeyli, 1500 m, St. 2382, 6.VIII.1997, leg. W. De Prins, A. Olivier & D. van der Poorten, in coll. VLCA [specimen karyologically examined by Mr. Zdravko Kolev, nr. 97025].
5. ♂, Turkey, Adana province, 5 km N. Saimbeyli, Obruk Ormani, 1200 m, St. 2439, 28.VII.1998, leg. D. van der Poorten & W. De Prins, in coll. VLCA.
6. ♂, same data as 5.

7–8: *Polyommatus* (*Agrodiaetus*) *larseni* (Carbonell, 1994) stat. rev.

7. ♂, Lebanon, Mohafazat Bcharré, Les Cèdres [El Arz], 1950–2000 m, 20.VII.1998, leg. A. Olivier, in coll. VLCA.
8. ♂, same data as 7.

9: *Polyommatus* (*Agrodiaetus*) *damonides* (Staudinger, 1899)

9. ♂, Azerbaijan, Nachichevan, Ordubad, 18.VI.1985, ex coll. L. Mets, in coll. VLCA.

10–12: *Polyommatus* (*Agrodiaetus*) *elbursicus* (Forster, 1956)

10. ♂, Turkey, Van province, Zernek Barajı, 65 km N. Başkale, 2000 m, St. 1851, 23.VII.1992, leg. D. van der Poorten & W. De Prins, in coll. VLCA.
11. ♂, Turkey, Van province, 30–33 km NE. Çatak, 2000–2100 m, St. 2330, 5.VIII.1996, leg. W. De Prins, A. Olivier & D. van der Poorten, in coll. VLCA.
12. ♂, Iran, Elburs Mts., Dizin, E. Gatchsar, 2400–2600 m, 28.VI.–11.VII.1975, leg. K.G. Schurian, in coll. VLCA.

13–14: *Polyommatus* (*Agrodiaetus*) *guezelmavi* sp. n.

13. Paratype ♀, same data as 1, but in coll. VLCA.
14. Paratype ♀, same data as 1, but in coll. VLCA.

15: *Polyommatus* (*Agrodiaetus*) *larseni* (Carbonell, 1994) stat. rev.

15. ♀, same data as 7.

16–17: *Polyommatus* (*Agrodiaetus*) *theresiae* Schurian, van Oorschot & van den Brink, 1992 sp. rev.

16. ♀, Turkey, Adana province, vic. Saimbeyli, 1500–1600 m, 13–14.VIII.1993, leg. K.G. Schurian, in coll. VLCA.
17. Paratypus ♀, Turkey, Adana province, 8–18 km N. Saimbeyli, 1600–1750 m, St. 196, 26.VII.1984, leg. B. van Oorschot, in coll. VLCA.

18: *Polyommatus* (*Agrodiaetus*) *elbursicus* (Forster, 1956)

18. ♀, Turkey, Van province, Zernek Barajı, 65 km N. Başkale, 2000 m, St. 2331, 6.VIII.1996, leg. W. De Prins, A. Olivier & D. van der Poorten, in coll. VLCA.

Table 2. Differentiating phenotypical characters of *Polyommatus* (*Agrodiaetus*) *guezelmavi* sp. n., *P.* (*A.*) *theresiae* Schurian, van Oorschot & van den Brink, 1992 sp. rev., *P.* (*A.*) *larseni* (Carbonell, 1994) stat. rev. and *P.* (*A.*) *elbursicus* (Forster, 1956). *P.* (*A.*) *damonides* (Staudinger, 1899) is not listed as it appears to be indistinguishable from *P.* (*A.*) *elbursicus*.

	guezelmavi	*theresiae*	*larseni*	*elbursicus*
upperside ♂	-ground-colour sky blue with a violet tinge -veins as a rule blackened distally, especially on hindwing -androconial patch on forewing extensive and conspicuous	-ground-colour sky blue with a violet tinge, as a rule less vivid than in *guezelmavi* -blackening of veins as a rule slightly more developed than in *guezelmavi* -androconial patch on forewing extensive and conspicuous	-ground-colour light sky blue -blackening of veins as a rule even more extensive as in *guezelmavi* and *theresiae* -androconial patch on forewing extensive and conspicuous	-ground-colour light sky blue to sky blue with a violet tinge -blackening of veins as a rule even more accentuated as in *larseni* -androconial patch on forewing distinctly less extensive and conspicuous as in *guezelmavi*, *theresiae* and *larseni*
underside ♂	-ground-colour light grey -spotting reduced, especially on hindwing -white streak on hindwing rarely well defined and hardly contrasting with background -submarginal row of markings very weakly expressed, almost of ground-colour	-ground-colour brownish grey, warmer then in *guezelmavi* -spotting reduced, especially on hindwing -white streak on hindwing better defined as in guezelmavi, more sharply contrasting with background -submarginal row of markings very weakly expressed, almost of ground-colour	-ground-colour brownish grey, warmer then in *guezelmavi* -spotting reduced, especially on hindwing -white streak on hindwing as a rule well defined, moderately to sharply contrasting with background -submarginal row of markings very weakly expressed, almost of ground-colour	-groundcolour cold grey, much darker than in *guezelmavi*, *theresiae* and *larseni* -spotting more prominent as in *guezelmavi*, *theresiae* and *larseni*, always clearly visible -white streak on hindwing well defined, always sharply contrasting with background -submarginal row of markings more prominent as in *guezelmavi*, *theresiae* and *larseni*, always well visible
upperside ♀	-ground-colour brown -hindwing occasionally with reduced to moderately developed blue basal suffusion -submarginal lunules well developed on hindwing, at least some traces on forewing	-ground-colour brown -hindwing never with any blue basal suffusion -submarginal lunules well developed on hindwing, at least some traces on forewing	-ground-colour brown, lighter than in *guezelmavi* and *theresiae* -hindwing never with any blue basal suffusion -submarginal lunules more extensive as in *guezelmavi* and *theresiae*, especially on forewing	-ground-colour darker brown than in *guezelmavi*, *theresiae* and *larseni* -hindwing occasionally with reduced blue basal suffusion -submarginal lunules vestigial on hindwing, absent on forewing
underside ♀	-ground-colour light brown -submarginal row of markings very weekly expressed and almost of groundcolour on hindwing, slightly more reddish on forewing	-ground-colour light brown -submarginal row of markings very weekly expressed and almost of groundcolour on hindwing, slightly more reddish on forewing	-ground-colour light coffee brown, of a warmer tinge than in *guezelmavi* and *theresiae* -submarginal row of markings better developed than in *guezelmavi* and *theresiae*, slightly reddish, especially on forewing	-ground-colour darker brown than in *guezelmavi*, *theresiae* and *larseni* -submarginal row of markings rather well developed, though without any reddish tinge

5. Discussion

The present study has shown that taxa believed to be conspecific, i.e. *P.* (*A.*) *guezelmavi* sp. n., *P.* (*A.*) *theresiae* sp. rev. and *P.* (*A.*) *larseni*, and that are sometimes hardly distinguishable phenotypically, appear to have a quite different chromosome number and karyotype. Other analogous cases are known in the subgenus *Agrodiaetus*, where taxa appearing very similar while at the same time sharing a characteristic phenotype (and therefore likely to form a monophyletic group), exhibit great differences in chromosome number and karyotype. One such instance occurs in the group of *P.* (*A.*) *antidolus* (Rebel, 1901), *P.* (*A.*) *kurdistanicus* (Forster, 1961) and *P.* (*A.*) *morgani* (Le Cerf, [1910]), that have resp. n = 39–42, n = ca. 56–62 and n = 25–26 (de Lesse 1961; Hesselbarth, van Oorschot & Wagener 1995; Lukhtanov *et al.* 1998). We therefore cannot agree with Lukhtanov and colleagues when they group taxa, that obviously look quite dissimilar phenotypically, solely on similarity in karyotype. It is clear for us that, for instance, *P.* (*A.*) *dama* is not conspecific with or even most closely related to any of the taxa treated in the present study, nor that *P.* (*A.*) *larseni* is very closely related to and possibly conspecific with *P.* (*A.*) *damocles*, a taxon from the southern Ural in Russia (also biogeographically quite unparallelled in any other group). We would rather consider that the following general tendencies occur in the subgenus *Agrodiaetus*:

- groups of closely related taxa often remain relatively similar in external phenotype;
- on the contrary, speciation is often accompanied by rather radical changes in chromosome number and karyotype: the role of fusion or fission is still an unresolved matter (Lorković 1990);
- chromosome numbers and karyotypes are quite reliable taxonomic characters for the identification of distinct species. On the contrary, there is no current evidence for any usefulness of these features for phylogenetic reconstructions;
- in supposed absence of reliable morphological characters enabling the application of cladistic methods, the pragmatic grouping on phenotypical similarity seems to be the most useful method of classification so far;
- biochemical and molecular techniques appear worthy of large attention if one is to hope that we will ever improve our insights into the interrelationships between "natural groups" among "difficult" higher taxa like *Agrodiaetus*.

The value of chromosome numbers as absolute proof of complete reproductive isolation, and thus as a valid criterion for recognising specific distinctness, has been questioned on more than one occasion (e.g. Hesselbarth, van Oorschot & Wagener 1995; Eckweiler & Häuser 1997). We consider that allopatric populations are not conspecific if the geographical differences in chromosome number (and karyotype) considerably exceed the level of variability inside each form.

The chromosome numbers are fixed in the great majority of Lepidoptera: however, in 13% of the recorded species, numerical inconsistencies do occur (Robinson 1971, 1990). Intrapopulational variation is rather frequent in Lycaenidae and in *Polyommatus* (*Agrodiaetus*) in particular (de Lesse 1959, 1962, 1963; Lukhtanov 1989, 1993; Kandul 1997; Kandul & Lukhtanov 1997; Lukhtanov *et al.* 1997, 1998). The numerical inconsistence in the karyotypes of *Polyommatus* (*Agrodiaetus*) served as the argument in the discussion, which is basically: genetic isolation based on chromosomal rearrangements or the differentiation of the taxa based on geographical or ecological isolation, resulting subsequently in the fixation of one or another karyotype (Lorković 1990; Lukhtanov 1993). It was revealed that in *Polyommatus* (*Agrodiaetus*) the intrapopulational variability up to 1–4 pairs of chromosomes is a normal phenomenon and could be commonplace in populations. The progressive changes in chromosome number are based on gradual change in their frequencies with the following elimination of rare

and unadapted karyotypes and the forming of the species with great differences in chromosome numbers (Lukhtanov 1993).

We consider that the difference in 22 elements between the karyotypes of *Polyommatus* (*Agrodiaetus*) *guezelmavi* sp. n. and *Polyommatus* (*Agrodiaetus*) *theresiae* sp. rev. is the evident argument in favour of two species, since in the opposite case the conjugation of bivalents in meiosis cannot take place. While observing the preparations of *Polyommatus* (*Agrodiaetus*) *theresiae* sp. rev. nos. 240, 241 and 243, no disruptions in the course of meiosis were found.

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7. References

Carbonell, F., 1993. Contribution à la connaissance du genre *Agrodiaetus* HÜBNER (1822): le complexe ultraspécifique d'*A. transcaspica* STAUDINGER (1899) (*Lepidoptera*: *Lycaenidae*). — *Linn.belg.* **14**(2): 89–116, 12 figs., 1 tab., 2 pls. coul.

Carbonell, F., 1994. Le complexe d'*Agrodiaetus poseidon* HERRICH-SCHÄFFER (1851) en Turquie et au Liban. Description d'une nouvelle sous-espèce d'*A. theresiae* (*Lepidoptera*: *Lycaenidae*). — *Linn.belg.* **14**(6): 291–302, 3 cartes, 1 tab., 4 figs., 1 pl. coul.

Dantchenko, A. V., 1997. Notes on the biology and distribution of the *damone* and *damocles* species-complexes of of [sic] the subgenus *Polyommatus* (*Agrodiaetus*) (Lepidoptera: Lycaenidae). — *Nachr.ent.Ver.Apollo* **(Suppl.)16**: 23–42, 2 col. pls.

Eckweiler, W. & Häuser, C. L., 1997. An illustrated checklist of *Agrodiaetus* Hübner, 1822, a subgenus of *Polyommatus* Latreille, 1804 (Lepidoptera: Lycaenidae). — *Nachr.ent.Ver.Apollo* **(Suppl.)16**: 113–166, 11 col. pls.

Ellison, R. E. & Wiltshire, E. P., 1939. The Lepidoptera of the Lebanon: with notes on their season and distribution. — *Trans.R.ent.Soc.Lond.* **88**: 1–56, 1 pl.

Forster, W., 1956. Bausteine zur Kenntnis der Gattung *Agrodiaetus* Scudd. (Lep. Lycaen.) I. — *Z.wien.ent.Ges.* **41**: 42–61, 70–89, 118–127, Taf. 8–13.

Forster, W., 1960–1961. Bausteine zur Kenntnis der Gattung *Agrodiaetus* Scudd. (Lep. Lycaen.) II. — *Z.wien.ent.Ges.* **45**: 105–142, Taf. 10–14; **46**: 8–13, 38–47, 74–79, 88–94, 110–116, Taf. 10–15.

Fountaine, M. E., 1902. A few notes on some of the butterflies of Syria and Palestine. — *Entomologist* **35**: 60–63, 97–101.

Graves, P. P., 1910–1911. A contribution to the fauna of Syria. — *Entomologist's Rec.J.Var.* **22**: 271–273; **23**: 31–37.

Häuser, C. L. & Eckweiler, W., 1997. A catalogue of the species-group taxa in *Agrodiaetus* Hübner, 1822, a subgenus of *Polyommatus* Latreille, 1804 (Lepidoptera: Lycaenidae). — *Nachr.ent.Ver.Apollo* **(Suppl.)16**: 53–112.

Hesselbarth, G., Oorschot, H. van & Wagener, S., 1995. *Die Tagfalter der Türkei unter Berücksichtigung der angrenzenden Länder.* — Selbstverlag Sigbert Wagener, Bocholt, 1354 S., 21 Tab. 75 Abb., 2 Farbkarten, 36 Farbtaf. (mit 306 Abb.) (Bd. 1 & 2) + 847 S., 128 Farbtaf., 13 Taf., IV + 342 Verbreitungskarten (Bd. 3).

Kandul, N. P., 1997. The karyology and the taxonomy of the blue butterflies of the genus *Agrodiaetus* HÜBNER, [1822] from the Crimea (Lepidoptera: Lycaenidae). — *Atalanta(Würzburg)* **28**(1/2): 111–119, 1 tab., 11 figs.

Kandul, N. P. & Lukhtanov, V. A., 1997. Karyotype Variability and Systematics of Blue Butterflies of the Species Groups *Polyommatus* (*Agrodiaetus*) *poseidon* and *Polyommatus* (*Agrodiaetus*) *dama* (Lepidoptera, Lycaenidae). — *Zool.Zh.* **76**: 63–69, 2 figs. [in Russian] (*Ent.Rev.* **77**: 256–262, 2 figs. [English translation]).

Larsen, T. B., 1973. Communal Roosting among Butterflies in the Lebanon. — *Ent.scand.* **4**: 299–301.

Larsen, T. B., 1974. *Butterflies of Lebanon.* — National Council for Scientific Research (C.N.R.S.), Beirut. Distrib. E.W. Classey, Faringdon, Berks., XVI + 256 p., 5 tab., 9 figs., 16 col. pls.

Larsen, T. B., 1975. Chromosome Numbers and Notes on Testicular Morphology of some Lebanese Rhopalocera (Insecta: Lepidoptera). — *Ent.scand.* **6**: 253–260.

Lesse, H. de, 1959. Sur la valeur spécifique de deux sous-espèces d'*Agrodiaetus* (Lep. Lycaenidae) récemment décrites. — *Bull.mens.Soc.linn.Lyon* **28**(10): 312–315, 5 figs.

Lesse, H. de, 1960. Spéciation et variation chromosomique chez les Lépidoptères Rhopalocères. — *Annls Sci.nat., Zool.* (sér.12) **2**(1): 1–223, 222 figs. (Thesis).

Lesse, H. de, 1961. Les nombres de chromosomes chez *Agrodiaetus dolus* Hübner et les espèces voisines [Lycaenidae]. — *Alexanor* **2**(2): 57–63, (3): 72, pl. III, figs. 1–6.

Lesse, H. de, 1962. Variation chromosomique chez *Agrodiaetus actis* H.S. et *A. altivagans* Forst. [Lep. Lycaenidae]. — *Revue fr.ent.* **29**(1): 66–77, 2 tab., 6 figs.

Lesse, H. de, 1963. Variation chromosomique chez les *Agrodiaetus* [Lep. Lycaenidae]. — *Revue fr.Ent.* **30**(3): 182–189, 4 figs.

Lorković, Z., 1990. The butterfly chromosomes and their application in systematics and phylogeny. — *In*: Kudrna, O. (ed.), *Butterflies of Europe. Vol. 2: Introduction to Lepidopterology.* Aula Verlag, Wiesbaden, p. 332–396, 36 figs., 2 diagr., 2 col. pls.

Lukhtanov, V. A., 1989. Karyotypes of some blue butterflies of the *Agrodiaetus* species groups (Lepidoptera, Lycaenidae). — *Suomen hyönt.Aikak.* (*Annls ent.fenn.*) **55**: 137–144, 6 text figs.

Lukhtanov, V. A., 1993. A possible mechanism of the origin of the great differences in chromosome numbers in the close species of the Lepidoptera (Insecta). — *Karyosystematics of the invertebrate animals* II. St. Petersburg, p. 28–32 [in Russian].

Lukhtanov, V. A., Dantchenko, A.V. & Kandul, N. P., 1997. Die Karyotypen von *Polyommatus* (*Agrodiaetus*) *damone damone* und *P.* (*A.*) *damocles rossicus* nebst einigen Problemen bei *Agrodiaetus* (Lepidoptera: Lycaenidae). — *Nachr.ent.Ver.Apollo* **(Suppl.)16**: 43–48, 1 Taf., 1 Abb.

Lukhtanov, V. A., Kandul, N. P., Prins, W. O. De & Poorten, D. van der, 1998. Karyology of species of *Polyommatus* (*Agrodiaetus*) from Turkey: new data and their taxonomic consequences (Lepidoptera: Lycaenidae). — *Holarctic Lepid.* **5**(1): 1–8, 1 tab., 15 figs.

Nicholl, M. de la Beche, 1901. Butterflies in the Lebanon. — *Entomologist's Rec.J.Var.* **13**: 169–173, 205–209.

Robinson, R., 1971. *Lepidoptera genetics.* — Pergamon Press, Oxford, Braunschweig. 687 p., 63 tabs., 16 figs.

Robinson, R., 1990. Genetics of European butterflies. — *In*: Kudrna, O. (ed.), *Butterflies of Europe. Vol. 2: Introduction to Lepidopterology.* Aula Verlag, Wiesbaden, p. 234–291, 3 tab., 6 figs.

Schurian, K. G. & Eckweiler, W., 1997. Wiederfund von *Polyommatus* (*Agrodiaetus*) *dama* Staudinger, 1892 in der Türkei (Lepidoptera: Lycaenidae). — *Nachr.ent.Ver.Apollo* **(Suppl.)16**: 49–52.

Schurian, K. G., Oorschot, H. van & Brink, H. van den, 1992. *Polyommatus* (*Agrodiaetus*) *poseidon* (H.-S.) und *Polyommatus* (*Agrodiaetus*) *theresiae* sp. nov. aus der Türkei (Lepidoptera: Lycaenidae). — *Nachr.ent.Ver.Apollo*, N.F. **12**: 217–232, 1 Farbtaf., 2 Abb.

Staudinger, O., 1892. Neue Arten und Varietäten von Lepidopteren des paläarktischen Faunengebiets. — *Dt.ent.Z.Iris* **4**(1891): 224–339, 4 Taf., 5 Abb.

Staudinger, O., 1899. Ueber die Arten und Formen der *Lycaena Damon*-Gruppe. — *Dt.ent.Z.Iris* **12**: 137–155.

Staudinger, O. & Rebel, H., 1901. *Catalog der Lepidopteren des palaearctischen Faunengebietes. 1 Theil: Famil. Papilionidae–Hepialidae.* — R. Friedländer & Sohn, Berlin, XXXII + 411 S.

Tshikolovets, V. V., 1998. *The butterflies of Turkmenistan.* — V. V. Tshikolovets, Kiev, Brno, 237 p., 24 col. pls., 10 b/w pls., 4 + 157 maps.

Zerny, H., 1932. Lepidopteren aus dem nördlichen Libanon. — *Dt.ent.Z.Iris* **46**: 157–191.