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New data on the ecology of 8 taxa of *Agrodiaetus* HÜBNER, 1822 from Greece and Spain: hostplants, associated ants and parasitoids

(Lepidoptera, Lycaenidae. Hymenoptera. Diptera)

by

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Abstract: New data on the larval hostplants, associated ants and parasitoids of 8 taxa of *Agrodiaetus* HBN. studied in Southern Spain and in Greece are presented here: 11 new larval hostplants, 23 new records of associated ants [7 for *A. ripartii* (FREYER, 1830), 5 for *A. admetus* (ESPER, 1785), 5 for *A. aroaniensis* (BROWN, 1976), 2 for *A. violetae* (GÓMEZ-BUSTILLO, EXPÓSITO & MARTÍNEZ, 1979), 3 for *A. f. subbaeticus* (GIL-T. & GIL-UCEDA, 2005) and 1 for *A. nephohiptamenos* (BROWN & COUTSIS, 1978)] and the first records of parasitoids (5 species) for *Agrodiaetus* HBN.

Zusammenfassung: Von acht *Agrodiaetus* HBN.-Taxa werden über die Raupenfutterpflanzen, mit diesen assoziierten Ameisenarten und Parasiten, die in Spanien und Griechenland untersucht wurden, neue Erkenntnisse mitgeteilt: 11 neue Raupenfutterpflanzen, 23 neue Meldungen über Ameisenarten, die mit den Raupen assoziiert sind [sieben für *A. ripartii* (FREYER, 1830), fünf für *A. admetus* (ESPER, 1785), fünf für *A. aroaniensis* (BROWN, 1976), zwei für *A. violetae* (GÓMEZ-BUSTILLO, EXPÓSITO & MARTÍNEZ, 1979), drei für *A. f. subbaeticus* (GIL-T. & GIL-UCEDA, 2005) und eine für *A. nephohiptamenos* (BROWN & COUTSIS, 1978)], dazu fünf Erstmeldungen über Parasiten (fünf Arten) an *Agrodiaetus* HBN.

Introduction: We consider *Agrodiaetus* HBN. as a genus, following the arrangement of KANDUL et al. (2004). Despite its strong homogeneity (habitats, larval hostplants, life cycle) this genus has been recently treated by several authors as a subgenus within *Polyommatus* LATREILLE, 1804.

The Mediterranean genus *Agrodiaetus* HBN. has been the subject of several recent chromosomic and genetic studies leading to the discovery of new cryptic species. However, various aspects of their biology and ecology are still unknown or very incomplete. 8 taxa of brown *Agrodiaetus* HBN. have been studied, in Greece by the first and third authors and in Southern Spain by the second author. The study has included observations of the larval stage in the wild and the rearing of more than 120 caterpillars belonging to 4 taxa in Greece and about 55 caterpillars of two taxa in Spain. This paper presents the first results with new data on the larval hostplants, the associated ants and the parasitoids.

The following taxa of brown *Agrodiaetus* HBN. have been more or less intensively studied: *Agrodiaetus admetus* (ESPER, 1785), *A. ripartii* (FREYER, 1830), *A. nephohiptamenos* (BROWN & COUTSIS, 1978), *A. orphicus* (KOLEV, 2005) and *A. aroaniensis* (BROWN, 1976) in Greece; *A. violetae* (GÓMEZ-BUSTILLO, EXPÓSITO & MARTÍNEZ, 1979), *A. fabressei subbaeticus* (GIL-T. & GIL-UCEDA, 2005) and *A. fabressei fabressei* (OBERTHÜR, 1910) in Spain.

The final taxonomic status of some of these 8 taxa is provisional pending a molecular study:

- *A. orphicus* (KOLEV, 2005) (Fig. 1) was described as a subspecies of *Polyommatus dantchenkoi* LUKHTANOV & WIEMERS, 2003, both with identical haploid number (n=41-42). KOLEV (pers. comm., 2006) regards *orphicus as* „very probably specifically distinct from *dantchenkoi*".

- The populations of *A. f. subbaeticus* (GIL-T. & GIL-U.) (SE. Spain: Sierra de la Sagra, Sierra de Cazorla, Sierra de Alcaraz), with n=90, equal to *A. ripartii* (FREYER) and *A. fabressei* (OBERTHÜR) s. str. (see LUKHTANOV et al., 2006), were regarded incorrectly by some authors as identical to *A. violetae* (GOMEZ-BUSTILLO et al.) s. str. from its type locality (S. Spain: Sierra de la Almijara), being mentioned either as "*A. fabressei violetae*" or as "*A. violetae*". *A. violetae* (GOMEZ-BUSTILLO et al.) was rediscovered (GIL-T. & GIL-UCEDA, 2005) at its type locality 26 years after the description of the imago and its morphology was compared for the first time with *A. subbaeticus* (BROWN & COUTSIS) (Fig. 2). The imagos of *A. violetae* (GOMEZ-BUSTILLO et al.) (Fig. 3 and 4) show clear differences with regard to the previous taxon: on the underside, the black spots, if not vestigial or absent, are of a smaller diameter and the background colour is different particularly in ♀♀. Its ecology and biology was unknown (description of its preimaginal stages: Gil-T., in prep.). An interesting unpublished molecular study based on mtDNA, COI, COII- (in prep., several authors) will determine the final taxonomic status and the phylogenetic relationships of *A. fabressei* (OBERTHÜR) (s. str.), *A. subbaeticus* (BROWN & COUTSIS) and *vA. ioletae* (GOMEZ-BUSTILLO et al.).

Flight-time and nectar sources: Butterflies usually start to hatch mid or late June at low and submontane levels (*admetus, ripartii, fabressei, subbaeticus, aroaniensis*) and only early or mid-July at subalpine and alpine levels. On Mt Rhodope in 2006, the first to emerge was *A. orphicus* (KOLEV), followed by *A. ripartii* (FREYER) and distinctly later by *A. aroaniensis* (BROWN) (or recently described *A. eleniae* COUTSIS & DE PRINS, 2005). Duration of the flight-time varies according to the species, being shorter for the mountain species (*nephohiptamenos, orphicus, violetae*), at around a month, and longer for those flying at lower altitude (in the Northern Peloponnese: it lasts 3 full months for *A. ripartii* (FREYER) and *A. aroaniensis* (BROWN) (Fig. 5) and even more for *A. admetus* (ESP.) which has been observed as late as 29.IX.2004). In Greece imagos feed on a large range of flowers but 3 are especially favoured: *Eryngium amethystinum* L. (Umbelliferae), *Carlina corymbosa* LINNAEUS (Compositae) and *Origanum vulgare* LINNAEUS (Labiatae). Other Labiatae are also often visited, especially *Satureja montana* L. and *Mentha* spp. Locally, *A. ripartii* (FREYER) has been found very attracted to *Sambucus ebulus* L. (Caprifoliaceae), which is one of the flowers most favoured by butterflies, and to *Lotus corniculatus* LINNAEUS (Leguminosae). *A. orphicus* (KOLEV) has been seen nectaring on *Melilotus albus* MEDIKUS (Leguminosae) and *Euphrasia pectinata* TENORE (Scrophulariaceae). In Southern Spain imagos show a main preference for several species of Compositae but to a lesser extent Liliaceae.

Habitats: In Greece, we have found biotopes with *A. admetus* (ESP.) at 400-1500m, *A. ripartii* (FREYER) at 600-1500m (with a small isolated colony at 2000m in Central Greece), *A. nephohiptamenos* (BROWN & COUTSIS) at 1200-2100m and *A. aroaniensis* (BROWN) at 700-1500m. Single individuals of *A. ripartii* (FREYER) and *A. aroaniensis* (BROWN) found very occasionally early September much lower (200 m) in the Northern Peloponnese were probably coming from the known breeding sites on the mountains just above to feed in flowery areas. Other butterflies from similar origins [*Chazara briseis* (LINNAEUS, 1794), *Hyponephele lupina* (O. COSTA, 1836)] exhibit the same behaviour. Imagos of *A. admetus* (ESP.), are more regularly found in the same

valleys at 80-200 m from late June to September, and probably belong to small breeding colonies dependant on annual *Onobrychis* at low altitude. The only species to be found in large numbers is *A. ripartii* (FREYER). However *A. admetus* (ESP.) is widespread but rarely abundant and *A. aroaniensis* (BROWN) is local and we have never seen it in good numbers. In 6 years we have found 65 sites for both *A. aroaniensis* (BROWN) and *A. admetus* (ESP.) and only 24 for the group *aroaniensis-eleniae*. On Mt Phalakron, *A. eleniae* COUTSIS & DE PRINS can be seen mud-puddling in quite large numbers. On the Greek side of Mt. Rhodope orphicus is definitely scarce in its single known locality (own observations and L. PAMPERIS, pers. comm.).

Two types of habitats are especially important for *Agrodiaetus* spp. in Greece : poorly grazed or recently abandoned clearings and bushy grasslands with sparse trees at montane level (700-1300 m) and open grasslands above tree-line (1600-2100 m). As *Onobrychis* are very palateable to sheep, heavy grazing limits the growth and expansion of *Onobrychis*, sometimes leading to the extinction of the plant. We could compare two areas at the same altitude (800-1000 m) in the same mountain in Epirus, near the Albanian border only a few kilometers apart. One is grazed irregularly and hosts a colony of *Onobrychis alba* with a strong population of *A. admetus* (ESP.) and another specialist of perennial *Onobrychis*: *Leptidea duponcheli* STAUDINGER. The other site is grazed very regularly by a resident flock of sheep: the butterfly fauna is very rich but there is no *Onobrychis* and both *Agrodiaetus* and *L. duponcheli* STGR. are absent. On Mt Phalakron (North-Eastern Greece), the number of sheep has dramatically decreased since 2000, replaced by cattle. The expansion of *Onobrychis alba* in the extensive subalpine grasslands has been very fast. On the other hand abandonment of sheep grazing in Mt Rhodope (150 000 sheep in the early 1900's, none a century later but only a few herds of cattle) has confined the scarce populations of *Onobrychis alba* to a few roadsides and very small clearings. These very limited and fragile sites host up to 3 *Agrodiaetus* species including the scarce endemic *A. orphicus* (KOLEV). The future of various endemic species of *Agrodiaetus* in Europe is strongly dependent on keeping open dry clearings at montane-subalpine levels. This is the case for *A. orphicus* (KOLEV) and *A. aroaniensis* (BROWN) in Greece but even more so for *A. humedasae* Toso & BALLETTO and *A. exuberans* VERITY in North-Western Italy.

Life-cycle: ♂♂ look for ♀♀ by patrolling the breeding areas in a low level flight. We have not observed courtship but we guess that pheromons released by the androconia play an important role in the recognition of the mates, as visual stimuli would be problematic in places where 2 or 3 similar-looking *Agrodiaetus* fly together.

Eggs are laid singly after examination of the stem by the antennae. ♀♀ butterflies lay eggs on the dry flower-stems of the hostplant, usually in the axil of a bract, either when the fruit is still there or when it has already fallen on the ground. In Southern Spain (dry and hot habitats) ova are laid on leaves and fruiting stems. Eggs hatch in August and September, in Greece also in October. However two eggs brought home [one of *A. admetus* (ESP.) from Central Greece and one of *A. ripartii* (FREYER) from North-Eastern Greece] did not hatch before the next spring. This may be because we live at sea-level where the autumn is drier and warmer than in the habitats where these eggs had been collected. The possibility of a winter diapause at egg stage theoretically allows these butterflies to live on annual *Onobrychis* which dries out in June and germinates in February, and this is probably also the case at low altitude in the Northern Peloponnese.

In rearing experiments caterpillars entered diapause and hibernated in the 1st or the 2nd instar (Bolognesi, 2000). They start to feed again in spring on leaflets, leaving only the veins and margins, and move later (L3 or L4) on to the flower spikes to eat buds and flowers where they benefit from good camouflage. In Greece, caterpillars of *Agrodiaetus* are active all day long but in hot sunny days they are more numerous in mid- and late afternoon. Growth is completed in 5 instars. The pupa is free in the litter. Pupal stage last 16-27 days in natural conditions for the Greek *Agrodiaetus*, being longer in *A. aroaniensis* (BROWN) and *A. nephohiptamenos* (BROWN & COUTSIS) than in *A. admetus* (ESP.) and *A. ripartii* (FREYER).

Larval hostplants: The biology of the European *Agrodiaetus* studied is very similar, their life-cycle and behaviour appears to be almost the same. They are strictly linked to a single genus in Europe: *Onobrychis* (Leguminosae). These plants are found in xerophile and meso-xerophile habitats from sea-level to the high mountains, either very open (grasslands, steppes) or with bushes and trees (scrub, clearings, woodland margins, open woodlands).

Of the 12 *Onobrychis* species recorded with certainty from mainland Greece, at least 5 are used by *Agrodiaetus*. With the exception of *A. admetus* (ESP.), found several times on the annual *O. aequidentata* in the Northern Peloponnese, all our other records concern perennials. As there is usually no more than two species of perennial *Onobrychis* growing together, and generally only one, it often hosts in Greece more than one species of *Agrodiaetus*. Up to 4 species are found together in North-Eastern Greece and we know several sites in the Northern Peloponnese, in Central and in Northern Greece where the larvae of 2 or 3 different *Agrodiaetus* feed on a single patch of foodplant. Good sites of perennial *Onobrychis* are usually rich in Polyommatinae which also live on these plants: *Lampides boeticus* (L.), *Cupido osiris* (MEIGEN), *Glaucopsyche alexis* (PODA), *Polyommatus thersites* (CHAPMAN). All the known sites are on calcareous substrates and derivates (conglomerate, flysch) and serpentine.

	admetus	*ripartii*	*orphicus*	*nepho-hiptamenos*	*aroaniensis*	*fabressei*	*subbaeticus*	*violetae*
O. aequidentata SIBTH. & SM.	L							
O. alba WALDST. & KIT.	O, L	L	O	L				
O. arenaria KIT.	L	L						
O. ebenoides BOISS. & SPRUN.	O, L	O, L			O, L			
O. montana scardica GRISEB.				L				
O. viciifolia SCOP.						L		
O. argentea argentea BOISS.							O, L	
O. argentea hispanica (SIRJ.)								O, L

Table 1: Hostplants (*Onobrychis* spp.) recorded as ovum (O) and/or larva (L).

The larval foodplant of *A. violetae* (GÓMEZ-BUSTILLO et al.) in its type locality (Sierra de la Almijara, Southern Spain) is *Onobrychis argentea argentea* BOISS., an endemic plant from Southern Iberian Peninsula and North Africa. The description of *Onobrychis viciifolia* and *O. peduncularis* in TOLMAN & LEWINGTON (1997) is certainly incorrect for the following reasons: *A.*

violetae (GÓMEZ-BUSTILLO et al.) was rediscovered for the first time 26 years after its description by GIL-T. & GIL-UCEDA (2005) and its hostplant, as other data on its ecology, was unkown until the current paper; the only hostplant used by *A. violetae* (GÓMEZ-BUSTILLO et al.) in its type locality is *O. argentea argentea*. In TOLMAN & LEWINGTON (1997) the imagos of *A. violetae* (GÓMEZ-BUSTILLO et al.) illustrated appear to be *A. fabressei subbaeticus* (GIL-T. & GIL-UCEDA, 2005) (South-Eastern Spain: Sierra de la Sagra, Sierra de Cazorla, Sierra de Alcaraz). The latter taxon uses *O. argentea hispanica* (Sirj.), an Iberian endemism (Fig. 6), as hostplant.

Myrmecophily (associated ants): We have found 13 species (Table 2) of ants associated with *Agrodiaetus* larvae in Greece and Spain. Ants have been caught in the following areas: Greece: Northern Peloponnese (1100-1200 m); Mt Smolikas (North-Western Greece) (1200-1300 m); Mt Orvilos (North-Eastern Greece) (1600-1800 m). Spain: Sistema Iberico (Teruel province); Sierra de Cazorla and Sierra de la Sagra (South-Eastern Spain); Sierra Almijara (Southern Spain).

	admetus	*ripartii*	*nephohiptamenos*	*aroaniensis*	*fabressei*	*subbaeticus*	*violetae*
C. aethiops (LATREILLE)	X	X		X			
C. laconicus EMERY		X		X			
C. oetzeni FOREL	X	X		X			
C. gestroi EMERY		X					
C. piceus (LEACH)	X	X			X	X	
C. cruentatus (LATREILLE)							X
P. pygmaea (LATREILLE)	X	X		X		X	X
P. prox. schmitzii FOREL				X			
P. vindobonensis LOMNICKI		X	X				
Cr.gaster sordidula (NYL.)		X		X		X	
L. melas EMERY		X					
T. simrothi KRAUSSE		X					
Lasius paralenius SEIFERT		X					

Table 2: Ants species recorded with *Agrodiaetus* larvae.

For the reason given above ('Larval hostplants' section), the mention of *Camponotus piceus* attending caterpillars of *A. violetae* (GÓMEZ-BUSTILLO et al.) in TOLMAN & LEWINGTON (1997) is incorrect and this record has been repeated recently by FIEDLER (2006). We have found larvae of *A. violetae* (GÓMEZ-BUSTILLO et al.) associated only with *Camponotus cruentatus* (LATR.) and *Plagiolepis pygmaea* (LATR.).

The subfamily Formicinae (*Camponotus, Lepisiota, Plagiolepis* and *Lasius* genera) is the most rich in associated species with 11 of a total of 13. *Camponotus* is the genus associated with most taxa (6). Only one species of Myrmicinae (*Crematogaster*) and one Dolichoderinae (*Tapinoma*) have been recorded so far.

Camponotus cruentatus, a large ant, is an exclusive species of Southern France, the Iberian peninsula and North Africa. In the last years, this species has been recorded as very active in mutualistic interactions with larvae of various species of Lycaenidae, some of them rare and very local such as *Iolana iolas* OCHS. (GIL-T., 2004) and *Plebejus pylaon hespericus* (RAMBUR, 1839).

The proportion of caterpillars attended by ants is definitely higher in the Northern Peloponnese (93 % of 263) than on Mt Smolikas at same level (1100-1300 m) where only 27 larvae out of 40 were found in the company of ants. The lowest number of attending ants was found in the grasslands above tree-line (1600-2100 m) on Mts Orvilos and Phalakron where only 2 out of 14 larvae were attended by ants (a single ant in each case). Ants seemed scarce on Mt Orvilos but were present on Mt Phalakron, even on the *Onobrychis* but none was seen with the 3 caterpillars found there. It is perhaps worthy of note that the abundance and diversity of Polyommatinae is the highest in the Northern Peloponnese (16 species in the surveyed site) and the lowest on Mt Orvilos above tree-line.

Observations on the larvae in the Northern Peloponnese have shown a great fidelity in the relationship between caterpillars and ants. Of 51 larvae found at least twice with ants, 44 were attended by the same species of ant (86%). This probably only reflects the geographical location of the ant nests as they were all areas where all the caterpillars of Polyommatinae (not only *Agrodiaetus*) were attended by *Camponotus aethiops* and other areas where the caterpillars were all with *Crematogaster sordidula* (colour plate 7: 7). We could find only 2 larvae attended by 2 species of ants at the same moment, in both cases by *C. aethiops* and *C. laconicus*.

In South-Eastern Spain [*A. fabressei subbaeticus* (GIL-T. & GIL-UCEDA, 2005)], 75-80% of the larvae (32) were attended by ants of three different species. Several times we have found a single larva associated with a good number (7 to 15) of *Plagiolepis pygmaea*. In Southern Spain, 60% of 20 larvae of *A. violetae* (GÓMEZ-BUSTILLO et al.) were attended by ants : *P. pygmaea* (only 1 to 3 ants) is associated mainly with larvae in L3 and L4, whilst *C. cruentatus* seems to prefer grown larvae (L4 and mainly L5). In Greece also the number of attending ants is in inverse ratio to the size of the ant species : there is always only one *Camponotus laconicus*, the largest ant, with a caterpillar but up to 3 ants of *Camponotus aethiops* (colour plate 7: 8) which is slightly smaller and up to 11 ants of the very small *Plagiolepis pygmaea*.

Parasitoids: Records of parasitoids of *Agrodiaetus* sp. are mentioned here for the first time. We have found 5 species of parasitoids (Table 3) from larvae and pupae of 5 taxa of *Agrodiaetus*: 1 species of Diptera and 4 species of Hymenoptera (2 Braconidae and 2 Ichneumonidae). The parasitoids were collected in the following areas: Greece : Northern Peloponnese (*H. notatus, I. exilicornis*), Mt Smolikas (Diptera and Braconidae spp.), Mt Phalakron and Mt Orvilos (*I. exilicornis*); South-Eastern Spain: Sierra de la Sagra (*I. exilicornis*).

Aplomya confinis parasitizes the larval stage and does not kill the host until it has pupated. It has been recorded on many species of Lycaenidae from Western Europe to Japan and occasionnally on *Agriopis bajaria* (D. & S.) (Geometridae).

Cotesia tenebrosa has been recorded previously as a parasitoid of *S. orion* (PALL.), *P. argus* (L.), *P. icarus* (L.), *P. bellargus* (Rott.) and *P. coridon* (Poda) (SHAW et al., in press).

Cotesia astraches has been recorded previously as a parasitoid of *C. minimus* (FUESS.), *A. agestis* (D. & S.), *A. artaxerxes* (F.) and *P. thersites* CHAPMAN (SHAW et al., in press).

The *Cotesia* (Microgastrinae, almost universally specialized parasitoids of Lepidoptera) are koinobiont (the host continues to develop for at least some time following parasitization),

endoparasitoids (killing the larval stage of the host) and gregarious (a brood of two or more insects develops from one host). Our *Cotesia* pupated in small cocoons on the dying body of the caterpillars. Both *Cotesia* were obtained from *A. admetus* (ESP.) in the same site on Mt Smolikas; a caterpillar died with 3 cocoons of *C. astraches* and another one with 10 cocoons of *C. tenebrosa*, both hatched 7-10 days after pupation.

Hyposoter notatus (Campopleginae, koinobiont, endoparasitoid, solitary) has been recorded as a parasitoid of *C. osiris* (MEIG.), *A. agestis* (D. & S.), *A. artaxerxes* (F.), *P. icarus* (L.), (SHAW et al., in press), *S. orion* (PALL.), *A. eumedon* (ESP.), *P. hispana* (H.-S.) (HORSTMANN et al., 1997) and *P. pylaon hespericus* (RAMB.) (GIL-T., 2003). *Hyposoter notatus* kills the caterpillar at the beginning or the middle of the last instar. The parasitoid larva pupates within the mummified body of its host (dead and dry caterpillar). The wasps hatched 12-13 days after the death of the caterpillar. In Greece, parasitism seems to vary greatly (rate of parasitized caterpillars, identity of the parasitoids) in the different areas. *Hyposoter notatus* was the only parasitoid found in the best surveyed area in the Northern Peloponnese : the 3 caterpillars (of a total of 52 reared) which produced this parasitoid in 2006 had been found all with the small ant *Crematogaster sordidula*, respectively with 1, 1 and 2 ants. This is less than the average (3 ants) found on 5th instar caterpillars. As we could observe several times, large ants of the genus *Camponotus*, which attend 60 % of the *Agrodiaetus* larvae on this site, are nervous and agressive to other insects coming close to the caterpillar. They were also often trying to bite the ruler we used to measure the caterpillars. They can probably protect efficiently caterpillars from parasitoids which is perhaps not the case for smaller ants especially if in small number. Further studies on this site will perhaps help to understand the scarcity of parasitoids in the reared samples.

	admetus	*ripartii*	*aroaniensis*	*nephohiptamenos*	*subbaeticus*
Diptera: Tachinidae					
Aplomya confinis FALLEN	X				
Hymenoptera: Braconidae					
Cotesia astraches (MARSHALL)	X				
Cotesia tenebrosa (WESMAEL)	X				
Hymenoptera: Ichneumonidae					
Hyposoter notatus (GRAVENHORST)		X	X		
Ichneumon exilicornis WESMAEL	X			X	X

Table 3: Parasitoids of *Agrodiaetus* sp.

Ichneumon exilicornis (colour plate 7: 9) -solitary endoparasitoid- does not kill the caterpillar and pupates within the pupa of its host. Our 5 specimens from North-Eastern Greece and 2 specimens from South-Eastern Spain hatched 18-22 days after the caterpillar pupated. In Greece, ♀♀ are identical to those found in Central Europe but ♂♂ differs in the shape of the tyloids and the darker colour of the 2nd and 3rd gastral tergites (HORSTMANN, pers. comm. to SHAW). In South-Eastern Spain (1500-1800 m), where larvae of the taxon subbaeticus are normally attended by a good number of ants, only few larvae are parasitized by *I. exilicornis* (only 2 on 32

reared caterpillars). In the Northern Peloponnese, where caterpillars are rarely found without attending ants, only one (on more than 75 reared) proved to be parasitized by this *Ichneumon*. In North-Eastern Greece, where *Agrodiaetus* caterpillars were poorly attended by ants, *I. exilicornis* seems to be a common parasitoid of *A. nephohiptamenos* (BROWN & COUTSIS) –colour plate 7: 10- (4 on 17 reared caterpillars) even as high up as 2100 m.

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Colour plate 7 (page 313)

Fig. 1: *Agrodiaetus orphicus* (KOLEV, 2005), ♀, Mt Rhodope, Macedonia, Greece.

Fig. 2: *Agrodiaetus fabressei subbaeticus* (GIL-T. & GIL-UCEDA, 2005), ♂, Sierra de la Sagra, SE. Spain.

Fig. 3: *Agrodiaetus violetae* (GÓMEZ-BUSTILLO, EXPÓSITO & MARTÍNEZ, 1979), ♂, Sierra Almijara, S. Spain.

Fig. 4: *Agrodiaetus violetae* (GÓMEZ-BUSTILLO, EXPÓSITO & MARTÍNEZ, 1979), ♀, Sierra Almijara, S. Spain.

Fig. 5: *Agrodiaetus aroaniensis* (BROWN, 1976), ♀, N. Peloponnese, Greece.

Fig. 6: Larva of *Agrodiaetus fabressei subbaeticus* (GIL-T. & GIL-UCEDA, 2005) on its hostplant *Onobrychis argentea hispanica*.

Fig. 7: Larva L5 of *Agrodiaetus admetus* (ESPER, 1785) on *Onobrychis ebenoides* with ants of *Crematogaster sordidula*.

Fig. 8: Larva of *Agrodiaetus ripartii* (FREYER, 1830) L5 with an ant of *Camponotus aethiops*, N. Peloponnese, Greece.

Fig. 9: *Ichneumon exilicornis*, parasitoid of A. nephohiptamenos, *A. admetus* (ESPER, 1785) and *A. fabressei subbaeticus* (GIL-T. & GIL-UCEDA, 2005).

Fig. 10: *Agrodiaetus nephohiptamenos* (BROWN & COUTSIS, 1978) ♂, Mt Phalakron, Macedonia, Greece.

Colour plate 7/ Farbtafel 7

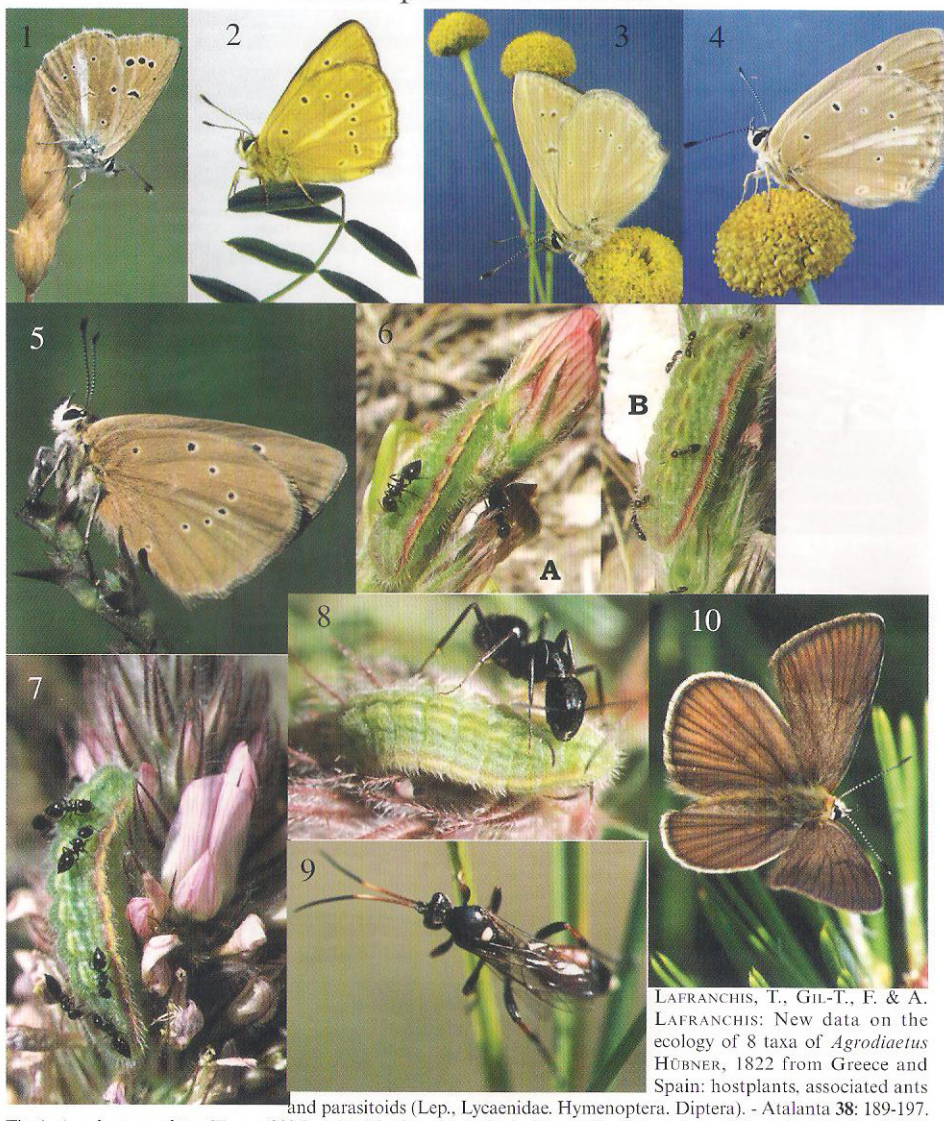

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Fig. 1: *Agrodiaetus orphicus* (KOLEV, 2005), ♀, Mt Rhodope, Macedonia, Greece. **Fig. 2**: *Agrodiaetus fabressei subbaeticus* (Gil-T. & Gil-Uceda, 2005), ♂, Sierra de la Sagra, SE. Spain. **Fig. 3**: *Agrodiaetus violetae* (Gómez-Bustillo et al., 1979), ♂, Sierra Almijara, S. Spain. **Fig. 4** *Agrodiaetus violetae* (Gómez-Bustillo et al., 1979), ♀, Sierra Almijara, S. Spain. **Fig. 5**: *Agrodiaetus aroaniensis* (BROWN, 1976), ♀, N. Peloponnese, Greece. **Fig. 6**: Larva of *Agrodiaetus fabressei subbaeticus* (GIL-T. & GIL-UCEDA, 2005) on its hostplant *Onobrychis argentea hispanica*. **Fig. 7**: Larva L5 of *Agrodiaetus admetus* (ESPER, 1785) on *Onobrychis ebenoides* with ants of *Crematogaster sordidula*. **Fig. 8:** Larva of *Agrodiaetus ripartii* (FREYER, 1830) L5 with an ant of *Camponotus aethiops*, N. Peloponnes, Greece. **Fig. 9**: *Ichneumon exilicornis*, parasitoid of *A. nephohiptamenos*, *A. admetus* (ESPER, 1785) and *A. fabressei subbaeticus* (GIL-T. & GIL-UCEDA, 2005). **Fig. 10**: *Agrodiaetus. nephohiptamenos* (BROWN & COUTSIS, 1978) ♂, Mt Phalakron, Macedonia, Greece.