

Lepidopterological investigations in Kashmir and Ladakh (India)

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Résumé

Présentation des résultats obtenus en 1984 au cours d'une expédition entomologique au Cachemire et au Ladak (Inde). Brève description de la situation géographique et climatique du Nord-Ouest de l'Himalaya — où se trouvent le Cachemire et le Ladak — et exposé de son rôle possible dans la répartition et la zoogéographie des Lépidoptères (Rhopalocères). Liste des 61 espèces de Rhopalocères observés ou capturés dans différentes localités. Plusieurs espèces ont fait l'objet de commentaires séparés. Les auteurs suggèrent qu'*Aglais ladakensis* MOORE 1878 est une bonne espèce ; ils se basent pour cela essentiellement sur leurs observations de la chenille et de la chrysalide. La position systématique de plusieurs Lycénides du complexe *Polyommatus stoliczkanus* n'est pas claire.

I. Introduction

In 1984 we had the possibility to undertake an entomological expedition to the north of India, the districts Kashmir and Ladakh, in the North-West Himalayas. We started the trip on July 11, accompanied by Mrs. Maris Vis and Isabel and Jean Claude WEISS. On July 13 Nishat Gardens were visited, situated along Dal Lake, some kilometers from Srinagar. From Srinagar, we travelled by jeep or taxi to Leh (3500 m), arriving on July 19. On our way, collecting was possible, mainly on high passes such as Zoji-la (3600 m), Namika-la (3700 m) and Fotu-la (4100 m). We then trekked from Martse-lang, with Nimaling — a glaciervalley at 5000 m — as our aim. Nimaling valley and Gomaru-la could be explored from July 23 till August 2. On our return, two days (August 4 and 5) were spent collecting near Martselang. We left Leh on August 7, and on August 9 another visit was made to Nishat Gardens.

II. North-West Himalaya — geographical situation

The extensive Himalaya system is mostly a Tertiary mountain chain, stretching from Afghanistan to North Burma, together almost 3000 km. The

Himalayas cross several climate-belts. North of the mountain range, the Tibetan plateau stretches at an average elevation of 4800 m above sea-level. In the south we find the great Indian plain, the basin of the river Ganges. The North-West Himalaya is situated between 75° and 78° East, 30° and 36° North (Fig. 1). Compared with the remaining part of the Himalaya, the NW-Himalaya represents a relatively extensive north-south transect. NW-Himalaya is considerably further south than for instance the Alps (46° N). Leh is situated about 34° N, roughly at the latitude of Fès (Maroc).

III. Climatical conditions

The Ladakh-region has a central asiatic affinity : it is part of the same dry belt. As Ladakh is situated just beyond the range of the monsoons, most places receive very little rain. The atmospheric aridity in Ladakh, together with the thin air, high u.v. radiation, low pressure and cold winds, determine this district to be an extreme environment : large parts are bare or scarcely vegetated. The timber-line varies up to 3000 m (Alps 2000 m). Beyond the shrub-belts (*Salix* species), there are alpine prairies and finally one finds semi-arid zones, often with bare slopes up to the snow. The average snow-line in Ladakh is about 5700 m. Great differences in temperature exist : in the shade you may find in July a temperature of 2°C at 5000 m, while in the same area in the sun temperatures between 35° and 40°C are not unusual.

IV. Some zoogeographical aspects

MANI (1962) notes that in NW-Himalaya no rivers pierce the main range, except the Sutlej in the east and the Indus in the western part. However, in the rest of the Himalayas the main range is cut by many rivers and streams, arising from Tibet, north of the so called crestline. This situation might be important for the distribution of insects.

Penetration by both northern and southern faunal elements must be difficult. This provides an explanation for the many endemic taxa there. Of all high altitude insects in this area MANI (1962) notes 60% to belong to endemic forms (Lepidoptera 45%). In the northern part, north of the crestline, for instance in Ladakh and Zaskar, he found the number of endemic forms to be highest.

NW-Himalaya is zoogeographically interesting because of the presence of Palearctic and Oriental elements, in a high altitude fauna. The Himalayas above the timberline is part of the Turkmenian region (MANI 1962). The same author considers NW-Himalaya, Karakorum and the Alai-Pamirs knot to be a separate biogeographical subunit of the Turkmenian (SHIELDS 1981).

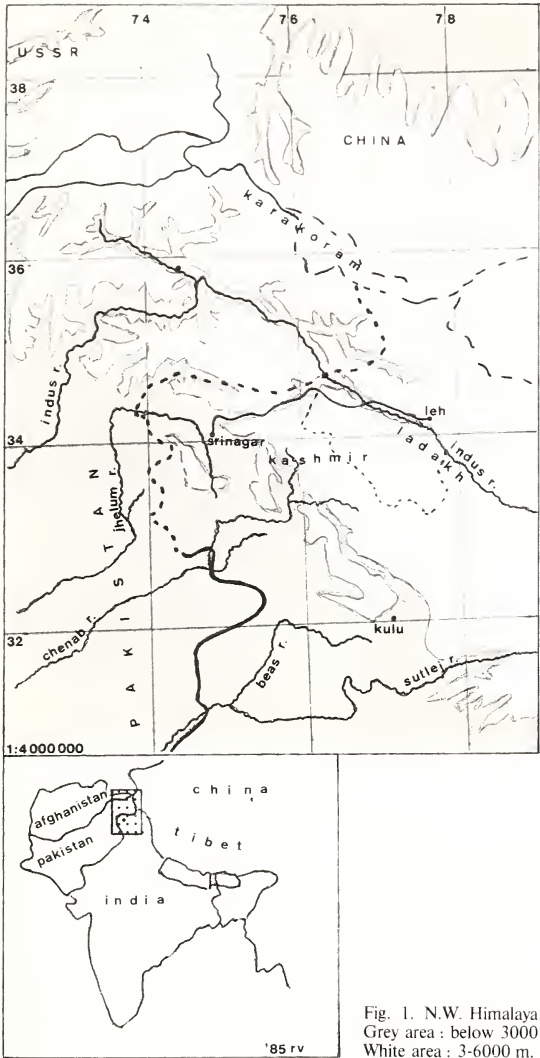


Fig. 1. N.W. Himalaya.
Grey area : below 3000 m.
White area : 3-6000 m.

Some elements of the Mediterranean fauna have been noticed in the Kashmir (valley) and Punjab up to the gorges of Sutlej. Southern elements from the Indian plains penetrate up to the southern slopes of the Himalayas (Fig. 2).

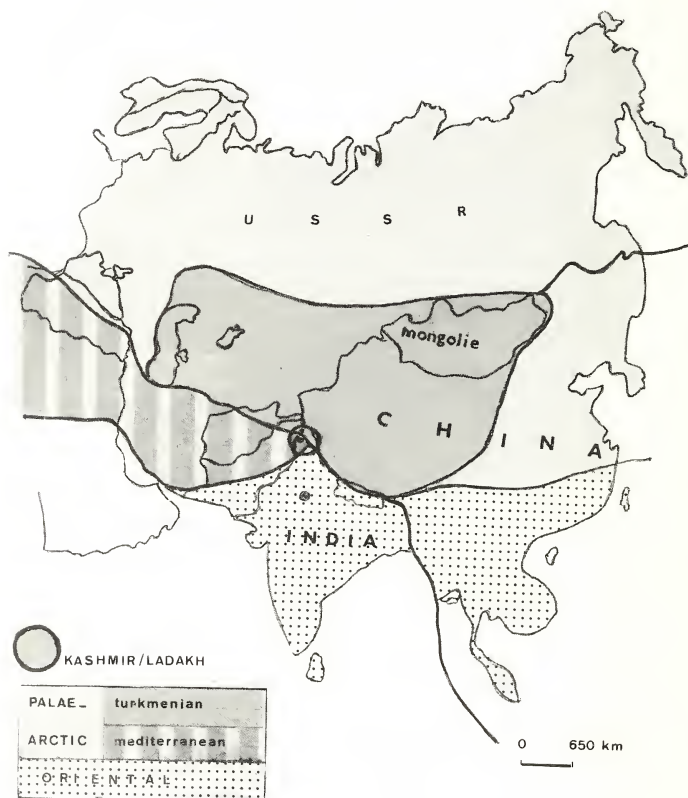


Fig. 2. The zoogeographical regions of Asia, showing their convergence in Kashmir and Ladakh (after MANI).

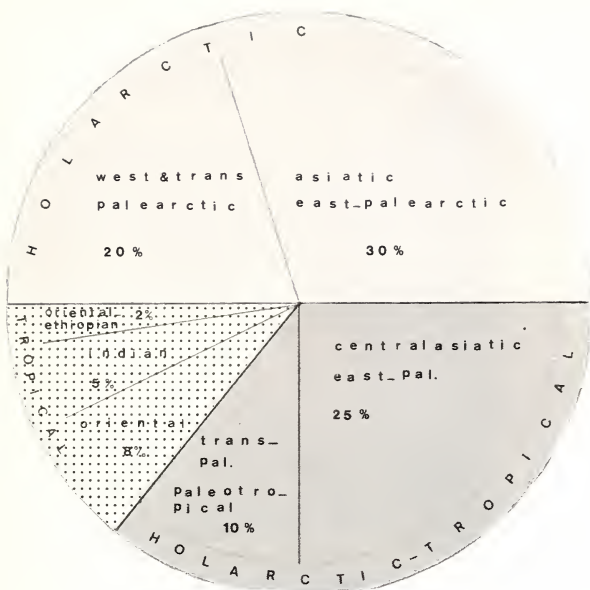


Fig. 3. Analysis of the zoogeographical elements of the observed Rhopalocera in Kashmir and Ladakh, 1984.

Following the zoogeographical classification of KOSTROWICKI (1969), we found that 50% of the observed and/or collected Rhopalocera ⁽¹⁾ in Kashmir and Ladakh belong to the Holarctic element. Of these, 60% are of central asiatic and eastern Palearctic origin, e.g. *Parnassius acdestis* GRUM-GRSHIMAILO, *P. epaphus* OBERTHUR, *P. simo* GRAY, *Colias eogene* FELDER, *C. ladakensis* FELDER, *Baltia butleri* MOORE, *Lasiommata menava* MOORE and *Lycaeides christophi* STAUDINGER. Another 35% of the species belong to the Holarctic-tropical element, of which 75% have central and eastern Palearctic roots. Species like *Parnassius charltonius* GRAY, *P. acco* GRAY, *P. stoliczkanus* FELDER, *Aulocera brahminus* BLANCHARD, *Hyponephele pulchra* FELDER and *Thersamonia solskyi* ERSCHOFF are elements of this character. Finally,

⁽¹⁾ Based on 50 species. The other species, including the Hesperidae, are not treated by Kostrowicki in his check-list.

15% are of tropical origin. Among these species are representatives of the Oriental-Ethiopian fauna, e.g. *Tarucus theophrastus* FABRICIUS, all-Oriental elements such as *Pieris canidia* SPARRMAN, *Rapala melampus* CRAMER and *Pseudozizeeria maha* KOLLAR, and Indian elements : *Metaporia leechi* RÖBER and *Polyommatus devanica* MOORE (Fig. 3).

The conclusion is that at least 55% of the observed species are of (central) asiatic and eastern Palaearctic origin. Interesting is the difference in origin of species in the investigated Kashmir area (Nishat Gardens, Zoji-la) : Holarctic 32%, Holarctic-tropical 41% and tropical 26%. The (central) asiatic and eastern Palaearctic affinity here is about 40%. In Ladakh this faunal element increases while the tropical elements decrease.

V. The collecting grounds

1. Nishat Gardens (1800 m).

These gardens have been constructed at the foot of mountain slopes along Dal Lake, a complex of lakes, north of Srinagar.

A total of 15 species of Rhopalocera were observed, among which were species of both the Palaearctic and Oriental regions, e.g. *Pieris canidia* SPARRMAN, *Rapala melampus* CRAMER, *R. epyarbas* MOORE and *Parnara guttatus* BREMER. The gardens were visited on July 13 and August 9.

2. Zoji-la (3600 m)

The first high pass on the road from Srinagar to Leh is the Zoji-la. The pass is covered with low, moist grassland vegetation and is free of snow in July, August and September. Nomads graze their goats and sheep here. The meadows are not rich in butterflies. However, on the slopes around the pass the original flora is preserved, but during our stay on the pass, between July 14 and 16, only 15 species were seen.

3. Fotu-la (4100 m)

The highest pass on the road to Leh, situated in Ladakh. The area is quite different from the Zoji-la region ; it is a barren landscape like a desert and the vegetation is very scarce. Along the slopes there are isolated clumps of a yellow *Corydalis* species, the foodplant of *Parnassius charltonius* GRAY in Ladakh. From July 17 to 19 we found 9 butterfly species ; among them were some males of the very local Lycaenid *Thersamonis solskyi* ERSCHOFF. Another Lycaenid, *Albulina omphisa* MOORE, was exclusively found here on thorn-bushes. On some higher slopes, covered with alpine grass vegetation,

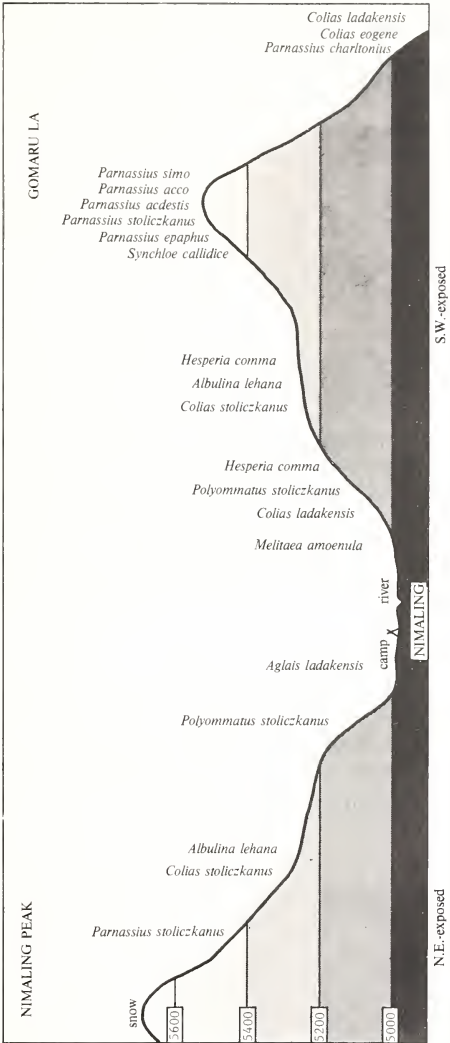


Fig. 4. Section drawing of Nimaling valley with its characteristic Rhopalocera in the last week of July 1984.

flew *Hyponephele pulchella* FELDER and *Karanasa huebneri* FELDER, the first rather numerous, the second in modest numbers.

4. Gomaru-la (5500 m)

The Gomaru-la is a pass at about 5500 m which separates the Hemis and Nimaling valleys. The slopes and summit of this pass consist of scree of schistose material. The southern slopes flow gradually to the more overgrown lower levels of Nimaling valley.

Even in summer snow and winds can exert their influences. The snow blizzards may drop the snow-level from about 6000 m to below 5000 m in Nimaling valley. The extreme climatological conditions of Ladakh is demonstrated here most clearly. Frosts are frequent in July. Very little vegetation is present.

In spite of this apparently inhospitable environment, the southern slopes appear to create favourable conditions, mainly for Parnassiidae. When the sun shines, several species fly rapidly at low level over the heated slopes. The insects immediately creep away between the stones, as soon as the sun disappears. They appear again only after at least ten minutes of full sunshine. Apart from *Parnassius*, some specimens of *Synchlora callidice* ESPER and one *Colias elwesi* RÖBER were also observed. On the north side of the pass, towards Hemis valley, we came across two specimens of *Parnassius charltonius* GRAY, some *Colias ladakensis* FELDER and one *C. eogene* FELDER, but the habitat there was no longer comparable with the environment outlined above (Fig. 4).

5. Nimaling valley (5000 m)

This glacier valley is bordered by a number of high peaks to the north-east, with Gomaru-la as the most important pass. The south-west side of the valley is dominated by Nimaling Peak (6000-6300 m), a summit with permanent snow and ice. The orientation of the valley is about south-east/north-west. The valley may be separated into several altitude-zones, each of them inhabited by characteristic Lepidoptera (Fig. 4).

a. Valley bottom (5000 m)

Along the river and its grassy banks very few butterflies were observed. We saw some *Colias stoliczkanus* MOORE on sand- and gravelbanks, obviously having wandered from higher slopes. On a ridge, exposed to the south, we found a small population of *Melitaea amoenula* FELDER. Somewhat higher, on the west side, we discovered sturdy species of nettle (*Urtica* sp.), with both caterpillars and chrysalids of *Aglais ladakensis* MOORE. Some of the chrysalids emerged on the spot and the rest on the way back.

b. *Juniperus* slopes above the riverbed (5000-5200 m)

The steep slopes on the north side of the riverbed are overgrown with thorny, creeping and evergreen shrubs, probably belonging to the genus *Juniperus*. They form a dense, rough vegetation and provide refuge for the insect fauna. This shrubzone is the habitat of *Colias ladakensis* FELDER and here the butterfly is almost exclusively met with. Between the bushes and along animal paths some other species flew : members of the *Polyommatus stoliczkanus* complex ; a few *Albulina lehana* MOORE, as well as *Hesperia comma* LINNAEUS, probably ssp. *shandura* EVANS (SAKAI, 1978). The south side of the valley has the same *Juniperus* belt, but that slope is exposed north and is less rich in species and individuals. In fact *Colias ladakensis* FELDER and *Hesperia comma* LINNAEUS were totally absent here.

c. The plains ("yakzone"), (5200-5400 m)

These prairies with their gentle slopes are used in summer as pastures for horses, sheep, goats and yaks. In spite of this extensive grazing, the original vegetation is intact. The meadows go on up to the scree of Gomaru-la.

Hesperia comma LINNAEUS was active here as well as higher up. We found *Colias stoliczkanus* MOORE, a small orange Clouded Yellow, in areas sheltered against strong winds. Among the females beautiful transitional forms from orange-yellow to whitish were observed. Here we found again *Albulina lehana* MOORE. Close to the scree, on the highest parts of the meadows, *Parnassius stoliczkanus* FELDER was seen, flying down from the scree, its real habitat.

6. Martselang (3400 m)

This tiny village is situated at the entry to Hemis valley. In the vicinity of the village there is a semi-cultivated landscape with small fields and plots of hayland, surrounded by ruderal areas, partly planted with *Salix* bushes. The area is irrigated by small, man-made ditches.

On this ruderal ground we found a rich population of a Lycaenid, belonging to the complex of *Polyommatus stoliczkanus* FELDER. The males are brilliant blue, like *Polyommatus eroides* FRIVALDSKY and are not very variable at least on the upperside. However, the females differ quite remarkably from each other, both in markings and in the colour of the upperside of the wings. The taxonomic status of this Lycaenid is not clear. Species of the *stoliczkanus*-group are confusingly variable in size, colour and markings, which caused many descriptions of (sub) species and forms, many of which are probably synonyms. In fact this group ought to be revised and we hope to work it out in future.

In the same biotope *Lycaeides christophi* STAUDINGER flew in small numbers. This is a less striking species that may be overlooked very easily. Finally, it is worth mentioning the presence of some specimens of *Hyponephele davendra brevistigma* MOORE, which closely resembles *H. tenuistigma* MOORE of Baluchistan and Chitral.

VI. Systematic part

Pieridae

Metaporia leechi MOORE, 1904 (Fig. 5 : 1)

Metaporia is a diverse genus, mainly Oriental, but it is also found in the eastern parts of the Palaearctic region. *M. leechi* is distributed from Baluchistan up to Chitral and also in Ladakh. It is similar to *leucodice* EVERSMAAN and *soracta* MOORE 1857.

On the upperside, the species can be recognized by the broader black bands on the fore- and hindwings. Also the apex is more pointed. The complete postdiscal band is striking. The veins in the discal- and apical area are brown-blackish. The black cellular spot extends to the costa of the forewing. The blackish post-discal "chevrons" on the upperside of both wings, and the underside of the hindwings are also characteristic. *M. leechi* is smaller than both *leucodice* and *soracta* (35 mm).

The species has been recorded from 3000-3700 m. Its flight is rapid and reminds one of *Synchlora callidice* ESPER. In the middle of July we only found one worn female in one of the valleys north of the Zoji-la at 3700 m.

Colias stoliczkanus MOORE, 1878

This high-mountain species was described from the Chang-la (5300 m). Specimens are known only from Kashmir, Ladakh and Sikkim (ssp. *miranda* FRUHSTORFER). This is a remarkably discontinuous distribution, but recently a link has been discovered in Nepal : ssp. *cathleenae* EPSTEIN 1979.

In Nimaling valley, *C. stoliczkanus* flies on grassy slopes from 5200-5400 m. The males move rapidly just above the vegetation. The females are much less active and hide in the vegetation. In its habitat, the insect is not rare, but difficult to follow because of the strong winds. The single generation flies in July ; at the beginning of August most specimens are damaged. Like most high altitude butterflies in Ladakh, the species is not on the wing before eleven o'clock in the morning, or after 14.00 h. Among the females were nice *helice*-like specimens : f. *alba* VERITY.

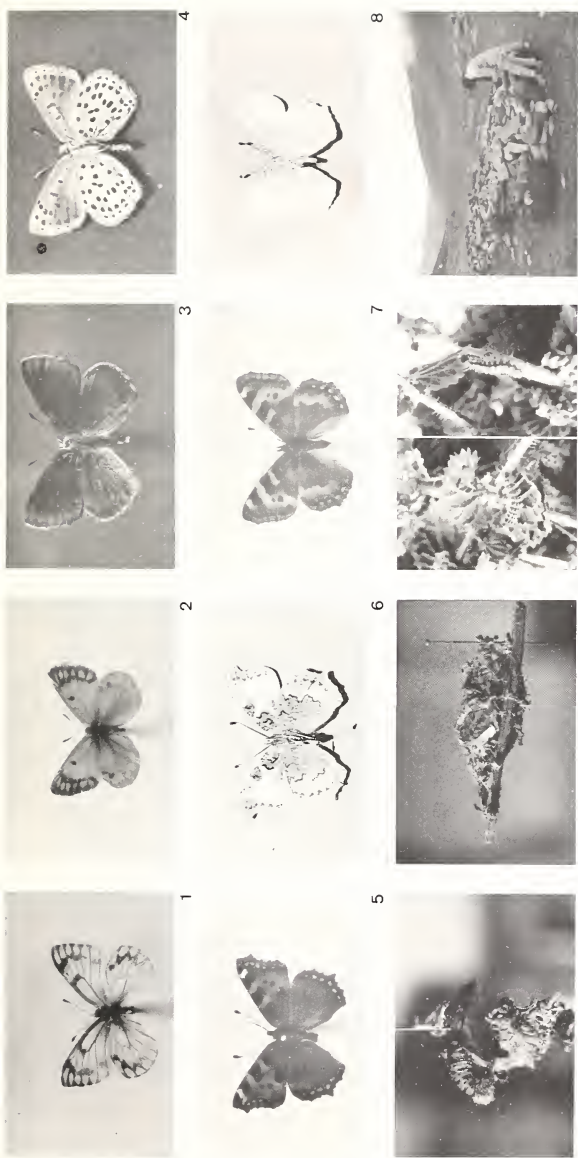


Fig. 5. 1. *Metaporia leechi* MOORE, India, Ladakh, Zoji-la, 3600 m, 15.7.1984.
2. *Colias elwesi* RÖBER, India, Ladakh, Nimaling, 5200 m, 23.7/2.8.1984.
3. *Thersamonia solskyi* ERSCHOFF, India, Ladakh, Fotu-la, 4000 m, 17-19.7.1984.
4. *Thersamonia solskyi* ERSCHOFF, idem, underside.
5. *Aglais urticae* LINNAEUS, Holland, Rotterdam, 6.9.1960.
6. *Aglais urticae* LINNAEUS, idem, underside.

7. *Aglais ladakensis* MOORE, India, Ladakh, Nimaling, 5000 m, 27.7/2.8.1984.
8. *Aglais ladakensis* MOORE, idem, underside.
9. *Aglais ladakensis* MOORE, idem, chrysalid.
10. *Aglais ladakensis* MOORE, idem, pupal spinning.
11. *Aglais ladakensis* MOORE, idem, caterpillar.
12. Biotope *A. ladakensis*; the foodplant (*Urtica* sp.) growing between Mani-stones (Ladakh, Nimaling-valley, 5000 m).

Colias ladakensis C. and R. FELDER, 1865

This striking canary-yellow Pierid is known from between Kashmir and Kumaon, and was collected for the first time in Nepal by EPSTEIN (1979) : Kali Kandaes Valley, 3900 m. *Ladakensis* is a typical high-altitude species with a restricted distribution. It occurs at altitudes from 3800 to more than 5000 m. According to KOSTROWICKI (1969), the species is a Tibetan fauna element of the eastern Palaearctic.

The butterfly frequents slopes overgrown with *Juniperus* (dwarf form) and may be locally found there in numbers. It is only occasionally seen outside this habitat. It is mainly on the wing in July and also flies only between 11.00 and 14.00 h. Some females were flushed with a warm orange-yellow. In Nimaling the species was to be found exclusively on sunny slopes between 5000-5200 m.

Colias elwesi RÖBER, 1907 (Fig. 5 : 2)

TALBOT (1939) treated this poorly known *Colias* as a ssp. of *Colias cocandica* ERSCHOFF 1874 : ssp. *thrasibulus* FRUHSTORFER 1910. We found one male of *elwesi* flying on the slopes of Gomaru-la at 5450 m. In spite of looking for many hours, no other specimens were seen. It was collected on very barren steep slopes, where several *Parnassius*, but no other *Colias*, were seen.

The other *Colias* species seen in the Nimaling region were found either in grassy meadows or near *Juniperus* bushes. Because of the lack of data on *elwesi*, we give here a short description :

The upperside ground-colour is greenish-yellow with a prominent black discocellular spot on the forewings ; there is no spot on the hindwings. In contrast to *cocandica*-specimens of Afghanistan and Pamir, and those of Kirghizia (USSR), the hindwings are not dusky, but clear yellow as in *Colias ladakensis* FELDER. Black markings similar to those of *C. ladakensis*. The underside is greenish-white, the veins are not darker. Expanse of the male : 36 mm.

Nymphalidae

Aglais ladakensis MOORE, 1878

The Palaearctic genus *Aglais* HÜBNER, 1818, is represented in Ladakh by the taxa *ladakensis* MOORE and *cashmirensis* KOLLAR, 1844. The status of *ladakensis* is rather unclear. While SEITZ (1909) and SAKAI (1980) treat the butterfly as a high altitude form of *urticae* LINNAEUS 1758, TALBOT (1939) and WYNTER-BLYTH (1957) consider *ladakensis* to be a good species. The insect occurs in NW-Himalaya up to Ladakh and is also known from

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Fig. 6. *Aglais urticae* L. Holland. Male genitalia, prep. nr. 751.

Fig. 7. idem, processus superior.

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Fig. 8. *Aglais ladakensis* M. India, Ladakh, Nimaling 5000 m. Male genitalia, prep. nr. 727.

Fig. 9. idem, processus superior.

Karakorum, West Tibet and Nepal. Specimens have been found up to 5400 m. *Cashmirensis* however, has usually been accepted as a good species, occurring from North India to Tibet, Sikkim and Bhutan.

During our stay in Nimaling we found on a nettle (*Urtica* sp.) many caterpillars in various stages of development and also some chrysalids. The chrysalids were hidden in rolled up and spun leaves of the foodplant : a species with a very strong and persistent 'sting' (Fig. 5 : 9-12). In contrast to the chrysalids of *urticae*, those of *ladakensis* are dull black. The caterpillar is also different : the head is black with tiny black hairs on both sides. The segments are set with one row of dorsal- and three rows of lateral, branched, black and yellowish thorns. The body is black with some reddish tinge. The underside is strikingly paler and of a brownish colour. There are two dorsal and two sublateral rows of yellow spots.

Clear differences between the adults of *ladakensis* and *urticae* also exist (Fig. 5 : 5-8) :

Upperside forewing : In general, smaller and darker. Spot in space 8 less white. No blue markings in submarginal area. Between the costal black spots the yellow is paler. The inner margin spot in spaces 1a, 1b and 2 is more hazy, stretching to the median vein of the cell. The outer margin is less dentate, with no tooth near vein 6.

Upperside hindwing : The dark basal area extends further in the direction of the outer margin. Consequently the postdiscal margin is narrower and often paler yellow. The outer margin is less dentate with a small tooth only near vein 4.

Underside : Less contrasted, especially in the postdiscal- and submarginal areas ; more grey-brown.

Male genitalia (Fig. 6-9) : the most significant and constant difference is in the shape of the processus superior, a process at the upper edge of the valve.

Taking into account all these facts we conclude that *ladakensis* is a bona species.

Melitaea amoenula C. and R. FELDER, 1867

This very small species is endemic to Ladakh and Kema above 3500 m (HIGGINS, 1982). It is closely related to *M. arcesia* BREMER, 1864, occurring in Central Asia (Kukunor, Sajon and Kentei Mts.).

In Nimaling valley we discovered a small population on a grassy and moist part of the riverbed. The butterflies were flying just above the vegetation and

recalled the behaviour of *Mellicta asteria* FREYER, 1828, known from the Central Alps.

Satyridae

Karanasa huebneri C. and R. FELDER, 1867

The distribution of the genus *Karanasa* MOORE, 1891, is limited around the Pamir knot. Western representatives have been recorded from Afghanistan, while species are also known from Tien Shan. AVINOFF and SWEADNER (1951) suggested a classification of the various forms, based on geographical distribution, altitude and reproductive barriers. They distinguished about 20 species. MUNROE (1961) reduced this number to 7 in his critical review.

One of the groups is the so called “*huebneri*-group”, mainly distributed in the Hindukush and in the Karakorum area. Within this complex two types may be recognised :

- forms with a strongly contrasting wing pattern, present in the Hindukush (Afghanistan).
- pale forms with faint wing markings, known from NW-Himalaya, so including Zanskar and Ladakh.

During our expedition a few specimens were noticed on a slope of the Fotu-la, overgrown with stiff grasses. *Huebneri* is adapted excellently to its surroundings. The butterflies are extremely difficult to see when they are sitting on the ground. Our specimens belong to the form *expressa* AVINOFF and SWEADNER, 1951, seeming characteristic for Ladakh between 3500-5000 m.

Hyponephele pulchella C. and R. FELDER, 1867

In Ladakh, *pulchella* is the most common of the several species of the genus *Hyponephele* MUSCHAMP, 1915, which occur in that area. On the Namika-la (3500 m), a pass on the road to Leh between Zoji-la and Fotu-la, we found *pulchella* on rather barren slopes with a deep-brown soil, together with *H. davendra* MOORE, 1865. On the Fotu-la, at about 3800 m, *pulchella* was considerably more numerous on open, windy, rough and steppe-like ground. A comparison of series from the Namika-la and Fotu-la only showed slight differences in the ocelli ; colour differences were barely noticeable.

Hyponephele coenonympha C. and R. FELDER, 1867

This species is distributed in Pakistan, Kohistan and Kashmir. It was just emerging in mid July on the Zoji-la (only males). The species preferred overgrown ridges along steep, rocky slopes.

Paralasa kalinda MOORE, 1893

The genus *Paralasa* MOORE, 1891, closely related to *Erebia*, is distributed in the higher mountains of central Asia (NW-Himalaya, Szechwan, East Tibet, Karakorum, Pamir, Tien Shan, Hindukush). In 1973, *Paralasa* material was collected from NW-Nepal by MARTENS. The material was studied by PAULUS (1982), who realised that the species was new and described it as *P. nepalica*. *Nepalica* represents the most eastern species of the genus *Paralasa* known in the Himalaya. *Paralasa* is represented by only two species in Kashmir and Ladakh: *mani* de NICEVILLE, 1880, and *kalinda*. *P. kalinda* is only distributed in India north of Kashmir and Kumaon. *P. mani* is mainly distributed in East Afghanistan and in the border-area between USSR and China.

Like other *Paralasa* species, *kalinda* prefers the pine forest belt and the insect may occur there in numbers. Along the road to the Zoji-la, the species was not rare at 3000 m on south-facing slopes. At the beginning of August *kalinda* was even more common here. On the pass itself the species was seen at 3600 m, far above the pine forest!

Lycaenidae

Thersamonia solskyi ERSCHOFF, 1874 (Fig. 5 : 3, 4)

The genus *Thersamonia* VERITY, 1919, is represented in Ladakh only by the taxon *solskyi* ERSCHOFF, 1874. It is a species which is distributed in the Afghanistan-Pamir-Alai-Ladakh region. Only a few records are known; the species seems to be especially rare and local in Ladakh (SCHURIAN and HOFMANN, 1982). The form *aditya* MOORE, 1874, was described from the Drass valley (Ladakh). The underside of the hindwings of *aditya* is more yellow and the black borders of the wings are narrower. According to SCHURIAN and HOFMANN (1982), this form is found in Afghanistan as well. However, some males and females of *aditya* from Afghanistan figured by SAKAI (1980) in colour, do not agree with our specimens:

- the groundcolour of the underside of the forewings is orange-yellow,
- the underside of the hindwings is the same pale yellow as SAKAI's specimens, but the fringes are not white but grey and the ocelli are more elongated,
- the orange band on the underside of the hindwings is more pronounced.

We may conclude that our specimens do not agree completely with *aditya*, as described by MOORE in 1874. Our males are of the size of ssp. *solskyi* (in fact 31 mm), while the male figured by MOORE seems to be much larger (SCHURIAN and HOFMANN, 1982).

We found some specimens on both the south and north sides of the pass Fotu-la (4100 m). On the south side at 3800 m we noticed two males, resting in thorn bushes in the evening. Several *Lycaenids* were seen on the same bushes, i.e. *Albulina omphisa* MOORE, *Polyommatus stoliczkanus* FELDER, *Polyommatus devanica* MOORE. On the north side of the pass at 4100 m two males were observed in a small dry and very hot valley with deep brown soil with only some *Artemisia* plants. These plants were the resting place of the butterflies.

As no other material of *aditya* from Ladakh seems to be illustrated or available, the upper- and underside of a male is figured here.

Hesperiidae

Pyrgus cashmirensis MOORE, 1874

This species was only seen on the Zoji-la at about 3500-3600 m. DE JONG (1979) investigated the distribution of *cashmirensis*. It runs from the Hissar Mts to central Hindukush and through Pamir and Kashmir up to Kumaon. Striking is the isolated (?) appearance in Bhutan. Three subspecies are recognized. Our specimens belong to the nominate ssp. *cashmirensis*, the distribution of which stretches from Baltistan through Ladakh, Lahoul, Kulu to Kumaon and furthermore Bhutan.

VIII. List of Lepidoptera, observed and/or collected during our entomological expedition to Kashmir and Ladakh (India) from July 11 to August 11, 1984

	1	2	3	4	5	6	remarks
Papilionidae							
<i>Parnassius epaphus</i> OBERTHÜR, 1879				x			
<i>Parnassius stoliczkanus</i> FELDER, 1865				x			+ Nimaling peak
<i>Parnassius maharaja</i> AVINOFF, 1916							leg. J. C. WEISS near location 4
<i>Parnassius simo</i> GRAY, 1852				x			
<i>Parnassius acco</i> GRAY, 1852				x			
<i>Parnassius charltonius</i> GRAY, 1852		x	x	nsx			+ Namika-la, 3500 m
<i>Parnassius accestis</i> GRUM-GRSHIMAILO, 1891				x			
<i>Papilio machaon</i> LINNAEUS, 1758							Paskyum, Namika-la
Pieridae							
<i>Baltia butleri</i> MOORE, 1882					x		leg. J. C. WEISS
<i>Metaporia leechi</i> MOORE, 1904		x					
<i>Pieris brassicae</i> LINNAEUS, 1758	x						+ 10 km E. of Dras
<i>Pieris rapae</i> LINNAEUS, 1758						x	+ Saspul, Paskyum
<i>Pieris canidia</i> SPARRMAN, 1768	x						
<i>Synchlœ callidice</i> ESPER, 1805				x	x		
<i>Pontia daplidice</i> LINNAEUS, 1758	x					x	

	1	2	3	4	5	6	remarks
<i>Pontia chloridice</i> HÜBNER, 1808			x				
<i>Catopsilia crocale</i> CRAMER, 1775	x						
<i>Colias ehwesi</i> RÖBER, 1907				x			
<i>Colias erate</i> ESPEY, 1808						x	+ 10 km E. of Dras 8 km W. of Kargil
<i>Colias eogene</i> C. and R. FELDER, 1865		x		nsx	x		
<i>Colias stoliczkanus</i> MOORE, 1878					x		
<i>Colias fieldi</i> MENÉTRIÉ, 1855	x	x					Sonmarg ; 10 km E. of Dras
<i>Colias ladakensis</i> C. and R. FELDER, 1865				nsx	x		
<i>Gonepteryx rhamni</i> LINNAEUS, 1758							10 km E. of Dras
Nymphalidae							
<i>Vanessa cardui</i> LINNAEUS, 1758	x						
<i>Aglais cashmirensis</i> KOLLAR, 1844	x	x					
<i>Aglais ladakensis</i> MOORE, 1878					x		caterpillars and chrysalids
<i>Fabriciana adippe</i> SCHIFFERMÜLLER, 1775		x					
<i>Fabriciana niobe</i> LINNAEUS, 1758			x	x			observed by J. C. WEISS
<i>Boloria pales</i> SCHIFFERMÜLLER, 1775		x					
<i>Melitaea amoenula</i> C. and R. FELDER, 1867					x		
Satyridae							
<i>Lasiommata menava</i> MOORE, 1865	x	x					
<i>Hyponephele pulchella</i> FELDER, 1867			x				+ Namika-la
<i>Hyponephele pulchra</i> FELDER, 1867		x					
<i>Hyponephele coenonympha</i> FELDER, 1867		x					
<i>Hyponephele davendra</i> MOORE, 1865			x			x	
<i>Hipparchia parisatis</i> KOLLAR, 1850							Khalsi
<i>Pseudochazara lehana</i> MOORE, 1878							Namika-la, Hemis- valley
<i>Karanasa huebneri</i> FELDER, 1867			x				
<i>Aulocera brahminus</i> BLANCHARD, 1844		x					
<i>Paralasa kalinda</i> MOORE, 1893		x					
Lycaenidae							
<i>Rapala melampus</i> CRAMER, 1775	x						
<i>Rapala epyarbas</i> MOORE, 1857	x						
<i>Lycaena phlaeas</i> LINNAEUS, 1761		x					
<i>Thersamonota solskyi</i> ERSCHOFF, 1874			x				
<i>Rapsidia kasyapa</i> MOORE, 1865		x					observed by Weiss
<i>Lampides boeticus</i> LINNAEUS, 1767	x						
<i>Tarucus theophrastus</i> FABRICIUS, 1793	x						
<i>Pseudozizeeria maha</i> KOLLAR, 1848	x						
<i>Celastrina argiolus</i> LINNAEUS, 1758							Paskyum, 10 km E. of Dras, 8 km W. of Kargil
<i>Lycaeides christophi</i> STAUDINGER, 1874						x	
<i>Everes argiades</i> PALLAS, 1771	x						
<i>Albulina lehana</i> MOORE, 1878				x	x		
<i>Albulina galathea</i> BLANCHARD, 1844		x					
<i>Albulina omphisa</i> MOORE, 1874			x				
<i>Albulina leela</i> NICÉVILLE, 1883		x					
<i>Polyommatus devanica</i> MOORE, 1874			x				
<i>Polyommatus stoliczkanus</i> FELDER, 1865	x?	x?	x?		x	x?	

	1	2	3	4	5	6	remarks
Hesperiidae							
<i>Pyrgus cashmirensis</i> MOORE, 1874		x					
<i>Hesperia comma</i> LINNAEUS, 1758			x		x		
<i>Parnara guttatus</i> MOORE, 1865	x						
Number of species per locality	15	18	11	12	10	6	Total number of species : 61

Key to localities

- 1 – Nishat gardens (Srinagar), 1800 m.
- 2 – Zoji-la, 3500 m.
- 3 – Fotu-la, 4100 m.
- 4 – Gomaru-la, 5500 m.
- 5 – Nimaling valley, 5000/5400 m.
- 6 – Martselang, 3400 m.
- ns – north side

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