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Contribution to the butterfly fauna of Sichuan, China (Hesperioidea, Papilionoidea)

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The results of two Lepidopterological expeditions to Sichuan, China in 2009 and 2010 are presented. All butterfly and skipper species, observed during the expeditions, are recorded per locality and altitude. Some taxa are reviewed for reasons of taxonomy, distribution, or scarcity. In the altitudinal observations we discuss the composition of species of the family-group taxa. The faunal similarity between the different altitudinal classes in Jiuzhaigou is calculated. *Pieris davidina* Oberthür, 1891, syn. n. is synonymized with *Sinopieris venata* (Leech, 1891).

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INTRODUCTION

In 2006 the authors organized an entomological expedition to Yunnan, a province in the southwest of the People's Republic of China. In the gradient between the Oriental and the Palaearctic region many interesting species could be observed (Coene & Vis 2008). We decided to do more research in gradient areas in China and for that reason we mounted another expedition in 2009 in Sichuan, a province north of Yunnan. From June 4 till June 14 we visited Qingcheng Shan, about 65 km northwest of Chengdu. Due to the moderate altitude (700-1200 m) the butterfly fauna here is a mix between Oriental and Palaearctic species. From June 16 till June 21 we investigated in the Jiuzhaigou area, part of the Autonomous Tibetan & Qiang Prefecture Ngawa and situated in the northern part of Sichuan, some 20-30 kilometres from the border of Gansu. This region has a different butterfly fauna and is predominantly of Palaearctic origin. We did random checks here between 1500-2600 m altitudes. The area proved to be excellent for butterflies of the genus *Aporia* (Hübner, 1819). In 2010 we went back to Jiuzhaigou from July 6 till July 12 where we did checks at altitudes between

1500 and 2900 m. The second part of our trip in 2010 we stayed in Kangding (Ta-Tsien-Lou), situated 170 kilometres SW of Chengdu (Fig. 1). Here we did checks between Luding (1400 m) and the Mugecuo Lake (3800 m), from July 14 till July 21.

MATERIAL AND METHODS

All butterfly species mentioned here were observed and/or collected during the periods as indicated in the introduction. Material is kept in the private collections of the authors. No bait or pheromones were used. In the species list (Appendix 1) the localities are arranged in altitudinal order. The genera are arranged in alphabetical order by family-group taxon for convenience of a quick search. For the nomenclature we followed Bozano (1999), Della Bruna *et al.* (2002, 2004), Huang (2001, 2003), Huang & Wu (2003), Huang & Xue (2004), Racheli & Cotton (2010), Tuzov & Bozano (2006), Wang & Fan (2002), Weidenhoffer *et al.* (2004). For the family Pieridae DUPONCHEL, 1835 we consulted the website http://www.euroleps.ch of Heiner Ziegler and for *Hyponephele sifanica* GRUM GRSHIMAILO, 1891 Eckweiler & Bozano (2011). For some species in the genera *Leptidea* BILLBERG,1820 and *Sinopieris* HUANG,1995 male, respective female genitalia were dissected. For the anatomical terms we refer to Appendix 2. We used the following formula for the faunal similarity coefficient (FS) of the butterfly fauna in Jiuzhaigou (De Jong 1976):

FS = (ab)/a+b-(ab), where FS=faunal similarity

a = number of taxa restricted to region A

b = number of taxa restricted to region B

(ab) = number of taxa common to A and B

This formula allows a quick comparison of resemblances between pairs of regions. Here we compare faunas in different altitude classes (see Similarities, page 27).

Figure 1 Map of China and Sichuan with the visited localities. [Jaap van Leeuwen]

DESCRIPTION OF THE LOCALITIES

Qingcheng Shan (600-1400 m)

In this holy Taoist mountain area the climate is subtropical with monsoon influences. Many tourists visit Mount Qingcheng because of the presence of many atmospheric temples. A cable car can transport you up to the Shangging Temple (1030 m) from there it is possible to walk down to the Yuqing Temple (800 m). We found an interesting path from de Tourist Service Centre along a southeast exposed slope with rich subtropical vegetation (Fig. 2). Here *Heliophorus brahma* MOORE 1853 was abundant (Fig. 3). Slopes along a road near Qingcheng Housan, about 30 kilometres to the west were interesting. The forests along the river give a luxuriant impression. Influences of the 2008 earthquake were visible all over.

Jiuzhaigou region (1400-2900m)

Lots of tourists are attracted to the region to visit the Jiuzhaigou Nature Reserve. A park with yellow, green and blue lakes as well as many waterfalls, virgin forests and meadows (Fig. 4). The park has been proclaimed as World Biosphere Reserve by UN, which placed it on the UNESCO's World Heritage List. Outside the Reserve, even within the borders of Jiuzhaigou village itself, we discovered areas rich in insect fauna as well.

Kangding (1400-3800m)

This town can be reached by plane now from Chengdu. The airport is situated at an altitude of 4200 m. and is one of the highest airports in the world. From there it takes nearly two hours by bus to go to Kangding city (2600 m). The city itself is surrounded by very steep mountain slopes of the Daxue Shan with peaks up to 5000 m (Fig. 5). There are hardly side valleys and as a consequence the territory is nearly inaccessible. In July monsoon influences are considerable and the weather is unpredictable. Many rainy and cloudy days limit the possibilities to observe butterflies in July. The slopes are covered with both coniferous and broad-leaved forests.

In Kangding City there is a cable car connection to the temple Paoma Shan (2800 m). A footpath goes down to town. West of Kangding one of the highest lakes in northwestern Sichuan is situated: lake Mugecuo (3800 m). Here, just above the tree line, we found alpine meadows as well as damp fields. The region is only inhabited by some Tibetan people up till now, but touristic facilities are under construction. The vegetation on the meadows and on the more moist parts is very diverse and nearly undisturbed (Fig. 6). The weather here is often rainy or cloudy. Sunny moments are scarce, while temperatures are moderate, even in sunshine. During rainy days in Kangding, we went down in the valleys to Luding (1400 m), about 60 kilometres east of Kangding. There the vegetation is more subtropical, sunny conditions are better and higher temperatures up to 30º Celsius are quite normal in July. Through paths between cultivated fields and kitchen gardens, situated on the slopes of a hill, at the borders of the town we could reach more natural habitats with an insect fauna quite different from that in Kangding.

RESULTS

Species of interest

Some taxa, mentioned in Appendix 1, are reviewed here for reasons of taxonomy, distribution or scarcity. The treatment of the species usually follows the arrangement adopted in the 'Guide of the butterflies of the Palearctic region' (Bozano 1991,1999, 2002, 2004).

Hesperiidae

***Aeromachus stigmata shanda* EVANS, 1949**
(Fig. 7)

Type locality: Kalaw, Shan, Myanmar.

Distribution: Myanmar, Thailand, Laos, Yunnan.

At Luding between kitchen gardens some

specimens were collected. These are the first records for Sichuan. The upperside fore-wings show well-marked discal spots to vein two and a cell spot. On the underside the cell spot is present as well.

Note: According to Evans (1949) there are two seasonal forms: WSF with upperside markings absent or very faint and no cell spot on the underside fore-wings. DSF with all spots well marked and with a cell spot. *A. propinquus hokowensis* Lee, 1962 is a junior synonym of *A. stigmata shanda* and its holotype is illustrated by Huang (2003).

***Carterocephalus houangty jiuzaikouensis* Yoshino, 2001** (Fig. 8a, 8b)

Type locality: Kangding (Ta Tsien Lou), China.

Distribution: Yunnan, Sichuan (China), S E Tibet, Bhutan.

Variation: According to Evans (1949) the following subspecies are known:

ssp. ***houangty* Oberthür, 1886**, Distribution: W China, Kangding area (Ta Tsien Lou)

ssp. ***shoka* Evans, 1914**, Distribution: S E Tibet, Yunnan, China

ssp. ***bootia* Evans, 1949**, Distribution: Bhutan.

Yoshino (2001, 2003) described another two subspecies:

ssp. ***jiuzaikouensis* Yoshino**, **2001**, Distribution: Jiuzhaigou valley, Nanping, S E Minshan, N. Sichuan

ssp. ***zorgensis* Yoshino**, **2003**, Distribution: only known from 70 km N W of Songpan, 3500 m, S E Minshan, N Sichuan

According to the figures given by Yoshino our specimen belongs to ssp. *jiuzaikouensis*. The Yoshino figures only show very minor external differences between ssp. *jiuzaikouensis* and ssp. *zorgensis* at both upper- and undersides. So there can be some doubt about the validity of ssp. *zorgensis*. We found this species about 40 km W of Jiuzhaigou (2600 m) at a small open area within a pine forest. The vegetation consisted mainly of high grasses along a cultivated field. Observed together with houangty were *Anthocaris thibetanus* (Oberthür,1884), *Anthocaris bieti* (Oberthür, 1884), *A. goutellei* (Oberthür,1886), *Polyommatus amanda* (Schneider,1792), *Glaucopsyche lycormas* (Butler,1866), *Polyommatus amorata* Alpheraky,1897, *Ochlodes venata* (Bremer & Gray,1853).

Pieridae

***Aporia* Hübner, 1819**

The genus *Aporia* inhabits the whole Palaearctic Region. Only some taxa are distributed in the Oriental Region. 33 species are known, of which 26 species occur only in Southern, Eastern and Western China. Concerning the first instars data are very limited, especially on Chinese species. Most larvae feed chiefly on *Berberidaceae*. Members of the genus seem to be monovoltine (Della Bruna *et al*. 2004).

***Aporia acraea* (Oberthür, 1885)**

Type locality: not stated.

Distribution: W Sichuan and N Yunnan, China.

Near Paoma Shan (2600-2850 m), in Kangding, a few specimens of the nominotypical ssp. were observed along sunny forested slopes. At the sides of a sandy path one male was seen sitting on *Buddleia* flowers. *A. acraea* is a rapid flying insect, gliding along bushes and vegetation, only resting a few moments. In the same area *Apatura iris* Linnaeus, 1758, A. laverna Leech, 1893 and *Tatinga thibetana* (Oberthür, 1876) were present on moist spots at the path side.

Figure 2 The rich subtropical vegetation near Qingcheng Shan. [Ruud Vis]

Figure 3 *Heliophores brahma*, an abundant species at Qingcheng Shan. [Hans Coene]

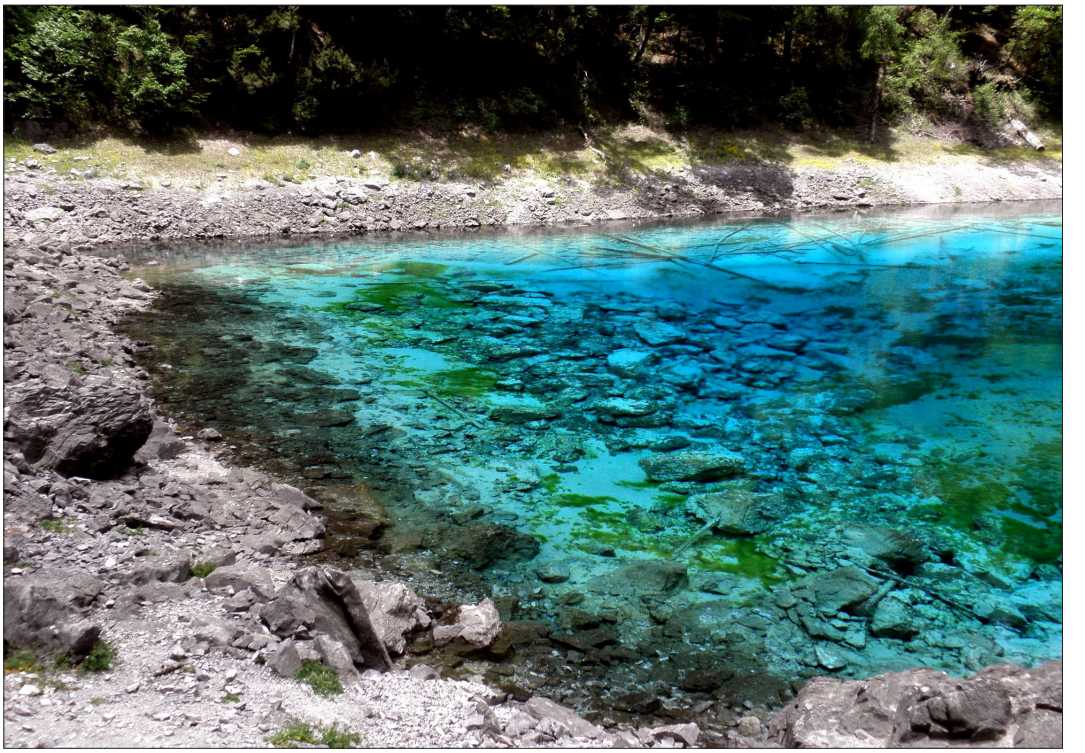


Figure 4 A blue lake in Jiuzhaigou Nature Reserve. [Ruud Vis]

Figure 5 Kangding City, surrounded by steep mountain slopes. [Ruud Vis]

Figure 6 Alpine meadows near Lake Mugecuo (3800 m). [Ruud Vis]

***Aporia delavayi* (OBERTHÜR, 1890)**

Type locality: Yunnan.

Distribution: E Tibet, W .C and N Sichuan, Gansu, China.

A sophisticated pure white species and the only *Aporia* with a forked stripe in the cell of the hind wing underside. In July some specimens were observed in the environments of Jiuzhaigou at open alpine meadows near Tibetan settlements (2400 m) and at a location in Jiuzhaigou at 2050 m. The species was flying some meters above open vegetation. Our specimens belong to subspecies *minshani* BANG-HAAS, 1933.

***Aporia gigantea* KOIWAYA, 1993**

Type locality: Emei Shan, Sichuan, China.

Distribution: NW Yunnan, Sichuan, Shaanxi, Guizhou, China, Taiwan.

This poorly known large *Aporia* is very familiar to *A. largeteaui*. KOIWAYA (1993) suggested *gigantea* as a separate species based on differences in wing shape, design of upper- and undersides of the wings and small differences in male genitalia. The nominate form is only known from a few localities such as, Emei Shan, Qingcheng Shan and Ginfu Shan, all situated in Sichuan. Koiwaya (1993) mentions also Kangding (without altitudes). According to our observations and data this last locality must be doubtful as Kangding is situated at 2600 m and not surrounded by subtropical forests, the habitat of *gigantea*. Ssp. *fanjinenis* YOSHINO, 1997 is known from Mt. Fanjin Shan (Guizhou province). From Taiwan a remarkable ssp. *cheni* HSU & CHOU, 1999 has been described. This is the only locality of *gigantea* outside the Palaearctic Region. In this habitat, specimens remained under the forest canopy. They show a characteristic slow flight and were only met in June in a very small forested area near Qing Shou Shan at 1300 m.

***Aporia goutellei* (OBERTHÜR, 1893)**

Type locality: Tsé-kou (NW Yunnan, China).

Distribution: Tibet, Yunnan and Sichuan, China.

Few data are known about this species. We observed it at 40 km west of Jiuzhaigou in very low numbers flying at an open area between pine forests at 2600 m. Males were in good condition in the first part of July. On June 20 one specimen was collected at 1600 m in an open valley near orchards along the road Jiuzhaigou-Baihe.

***Aporia largeteaui* (OBERTHÜR, 1881)**

Type locality: "Kouy-Tchéou" (Guizhou).

Distribution: W and N E China.

In Sichuan we found this butterfly flying in June along riversides. The behaviour of this large species was curious: they always crept away in dense bushes at the shadow side. They obviously avoid sunny places. As a result most specimens were more or less damaged. At another locality (1400 m) in July, *largeteaui* visited flowers of *Buddleia* along cultivated fields. In the surroundings *Berberis* was not found. Our specimens belong to the nominotypical subspecies.

***Aporia potanini* ALPHÉRAKY, 1892**

Type locality: Qingling Mts., Gansu, China.

Distribution: Sichuan, Gansu, Shaanxi, China.

In the environment of Jiuzhaigou, Sichuan we found ssp. *potanini* with its remarkable dark suffusion only at altitudes about 1500m. Specimens were seen on a meadow with *Berberis* bushes, sometimes flying 2-5 meters above vegetation. Near a riverside both males and females were observed visiting *Buddleia* bushes. From time to time numbers of both sexes flew vigorous around the

flowers. No specimens were seen puddling on wet grounds or in congregations. Species observed in the same area are, *Niphanda fusca* (Bremer & Grey, 1853), *Ochlodes ochracea* (Bremer, 1886) and *Ochlodes venatus* (Bremer & Grey, 1853), *Lycaena svenhedini* Nordström, 1935 and several taxa of the genus *Satyrium* Scudder, 1876.

***Aporia procris* Leech, 1890**

Type locality: "Ta-chien-lou" [Kangding, Sichuan, China] and Ni-tou.

Distribution: E.Tibet, Yunnan, Sichuan, Qinghai, Gansu, China.

At Paoma Shan at 2700 m close to the city of Kangding a few specimens of ssp. *procris* were observed on cultivated small fields surrounded by bushes.

***Aporia signiana* Sugiyama, 1994**

Type locality: N-Mt. Signiang, Sichuan, China.

Distribution: N Sichuan, China.

Up till 2004 *signiana* was treated as a subspecies of *tsinglingica*. Della Bruna *et al.* (2004) considered *signiana* as good species, based on morphological differences. It seems to be an endemic of Northern Sichuan (restricted from Barkam to the valley of Nanping). Both taxa are not known flying together. But in Jiuzhaigou the species was common on a meadow at 2050m where it was flying sympatrically with *A. tsinglingica*. This observation supports the full species status of *signiana*.

***Aporia tsinglingica* (Verity, [1911])**

Type locality: "Monts Tsingling" [Qin Ling Mts, Shaanxi, China].

Distribution: Qinghai, Gansu, Shaanxi and N Sichuan, China.

During our visits on a meadow (2050 m) near Jiuzhaigou we found incidentally a few specimens of this species. This meadow is surrounded by broad-leaved forests. The specimens were in fresh condition in the second part of June. Both sexes are bigger than *signiana* and show remarkable light markings on the wings. Other *Pieridae* at the same meadow were *Aporia bieti lihsieni* Bang-Haas,1933, *Gonepteryx amintha murayamae* Nekrutenko 1973, *Colias fieldi chinensis* Verity, 1908, *Leptidia morsei ommani* Lorkovic 1950, *Leptidia serrata* Lee, 1956, *Pieris canidia* (Sparrman, 1767), *Sinopieris venata* (Leech, 1891) and *Sinopieris davidis* (Oberthür, 1876).

***Leptidea amurensis* Ménétriés ,1859**

Type locality: 'des Bords de l'Amour, montagnes de Chingan, jusqu'à Pakhale' (Amur basin, Khingan Mts in Pakhale).

Distribution: N E Kazachstan, Altai, S Siberia, Mongolia, Korea, Japan, NE China, Korea, Japan.

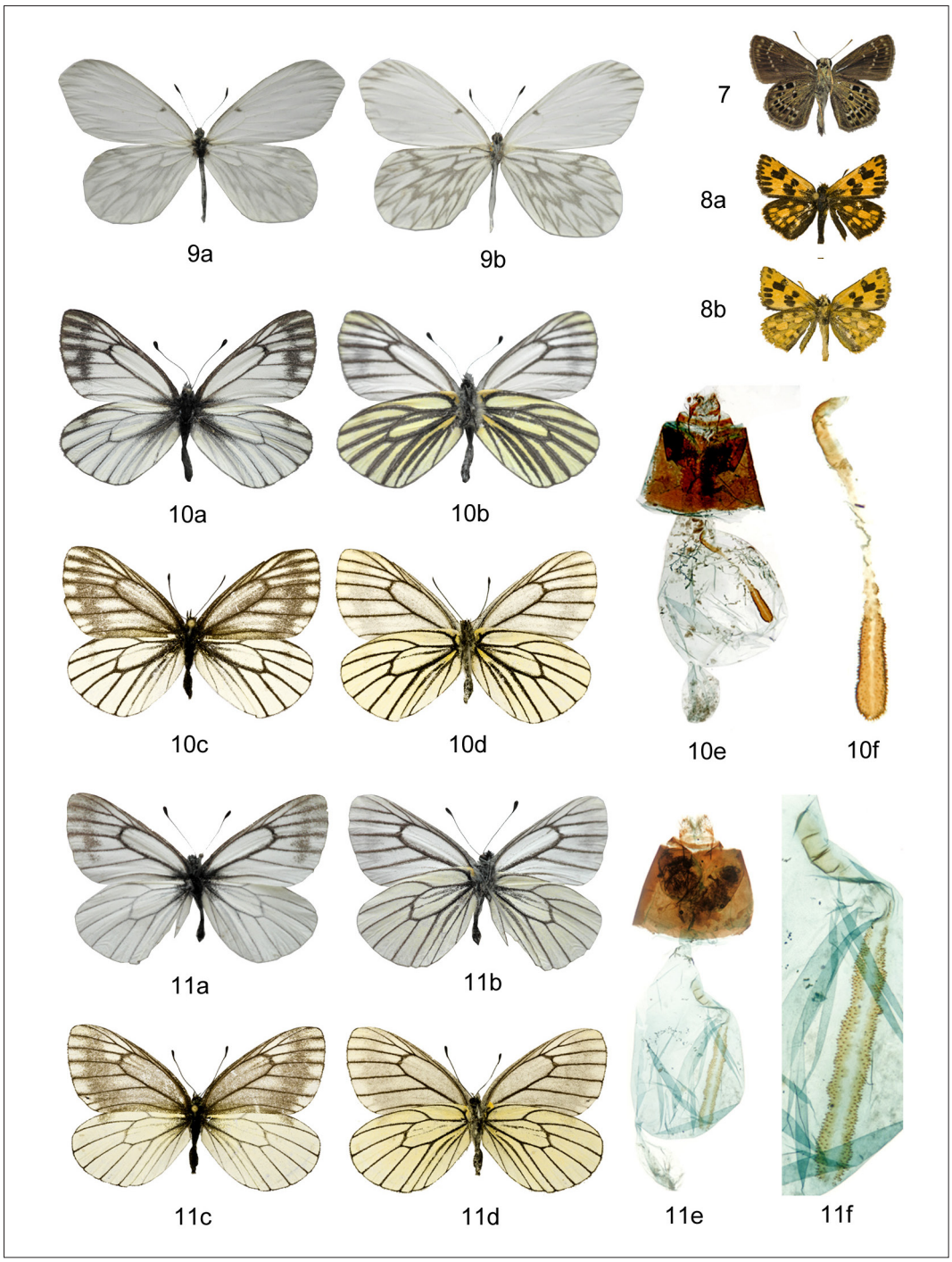
In Northern Sichuan (2010) we found *amurensis* in limited numbers at a dry meadow surrounded by forests (2000 m) in the region of Jiuzhaigou. Genital dissections confirmed our identification. The species was flying in the same habitat as *L. morsei* (Fenton, 1881). Up till recently the species was only known from N E China. The distribution of *amurensis* can be extended to Sichuan. Its powerful flight makes it easy to identify from other species of *Leptidea*.

***Leptidea morsei* (Fenton, 1881)**

Type locality: Yesso, Japan

Distribution: S and E Europe, Turkey, E Kazakhstan, Mongolia, NE, NW, C and E China, Korea, Japan (Hokkaido).

This species occurs in open areas as well as dry meadows. We found it common in the



Figures 7-11f Hesperiidae, Pieridae of Sichuan: **7**. *Aeromachus stigmata shanda* EVANS, 1949, verso, ♂, Luding, 1400 m. 15-07-2010. **8a**, **8b**. *Carterocephalus houangty jiuzaikouensis* YOSHINO, 2001, recto and verso, ♂, 40 km W of Jiuzaigou (2600 m), 11-07-2010. **9a**, **9b**. *Leptidea serrata* LEE, 1956, recto and verso, ♂. Jiuzhaigou surrounding, 2400 m, 08-07-2010. **10a**, **10b**. *Sinopieris davidis davidis* (OBERTHÜR), 1876, recto and verso, ♂. Kangding, Lake Mugecuo (3800 m), 19-07-2010. **10c**, **10d**. idem, recto and verso, ♀, same locality. **10e**, **10f**. idem, ♀, genitalia complete and genitalia detail with signum. **11a**, **11b**. *Sinopieris stoetzneri* (DRAESEKE, 1924), recto and verso, ♂, Kangding, Lake Mugecuo (3800 m), 19-07-2010. **11c**, **11d**. Idem, recto and verso, ♀, same locality. **11e**, **11 f**. Idem, ♀, genitalia complete and genitalia detail with signum. Specimens shown at 90% of natural size. [Frans Slieker]

environments of Jiuzhaigou at altitudes up to 2000 m. Seasonal dimorphism is expressed in a substantial weaking of the hindwing coloration in the summer generation. In some colder regions as Sakhalin only one brood is known (Gorbunov & Kosterin 2003). It is possible to suppose one generation is normal in Northern Sichuan.

Note: From Gansu and Shaanxi *L. lactea* LORKOVIC, 1950 has been described. We found some specimens that agree very well with the pictures given by Lorkovic (1950).

However, genital dissections of these specimens confirm they belong to *L .morsei*. It is very difficult to identify lactea by external characteristics only.

***Leptidea serrata* LEE, 1956** (Figs. 9a, 9b)

Type locality: Tsi-Pai-Shan (Tsingling Mountains).

Distribution: Tsingling Mountains, Shaanxi, W China.

From *L. serrata* almost no data are known. According to the original description, specimens seem to be collected in the first part of June 1944.

Its exact distribution as well as its habits is unknown. During our visits in 2009 and 2010 this species was observed incidentally in the environments of Jiuzhaigou (2000-2400 m).

They flew in open meadows together with *Leptidea morsei*, *Colias fieldi chinensis*, *Melanargia asiatica* OBERTHÜR & HOULBERT, 1922, *Aphantopus arvensis* OBERTHÜR, 1876, *Argynnis xipe niraea* OBERTHÜR, 1912 and others. Specimens were in good condition both in June and in the beginning of July.

***Sinopieris* HUANG, 1998**

Note: In 1998 Huang described *Sinopieris*, based on characteristics in female genitalia. Seven species are included now. Still the taxonomic status of *Pieris davidina* OBERTHÜR, 1891 is unclear. We will discuss this matter under *Sinopieris venata* (LEECH, 1891). Dissections of female genitalia in *Sinopieris stoetzneri*, *davidis* and *venata* show differences of the signa in the bursa copulatrix. Both shape as well as the form and arrangement of spines of the signa are characteristic for each of the taxa. Special attention is drawn to the little bags under the bursa copulatrix of *stoetzneri* and *davidis*. In the genitalia of *venata* this bag is present as well but not protruded (Fig. 12f). Besides external differences in veins and coloration of the hind wing undersides these findings support the status of *stoetzneri*, *davidis* and *venata* as good species in *Sinopieris*.

***Sinopieris davidis davidis* (OBERTHÜR, 1876)** (Figs. 10a, 10b, 10c, 10d, 10e, 10f.)

Type locality: Mou-Pin, China.

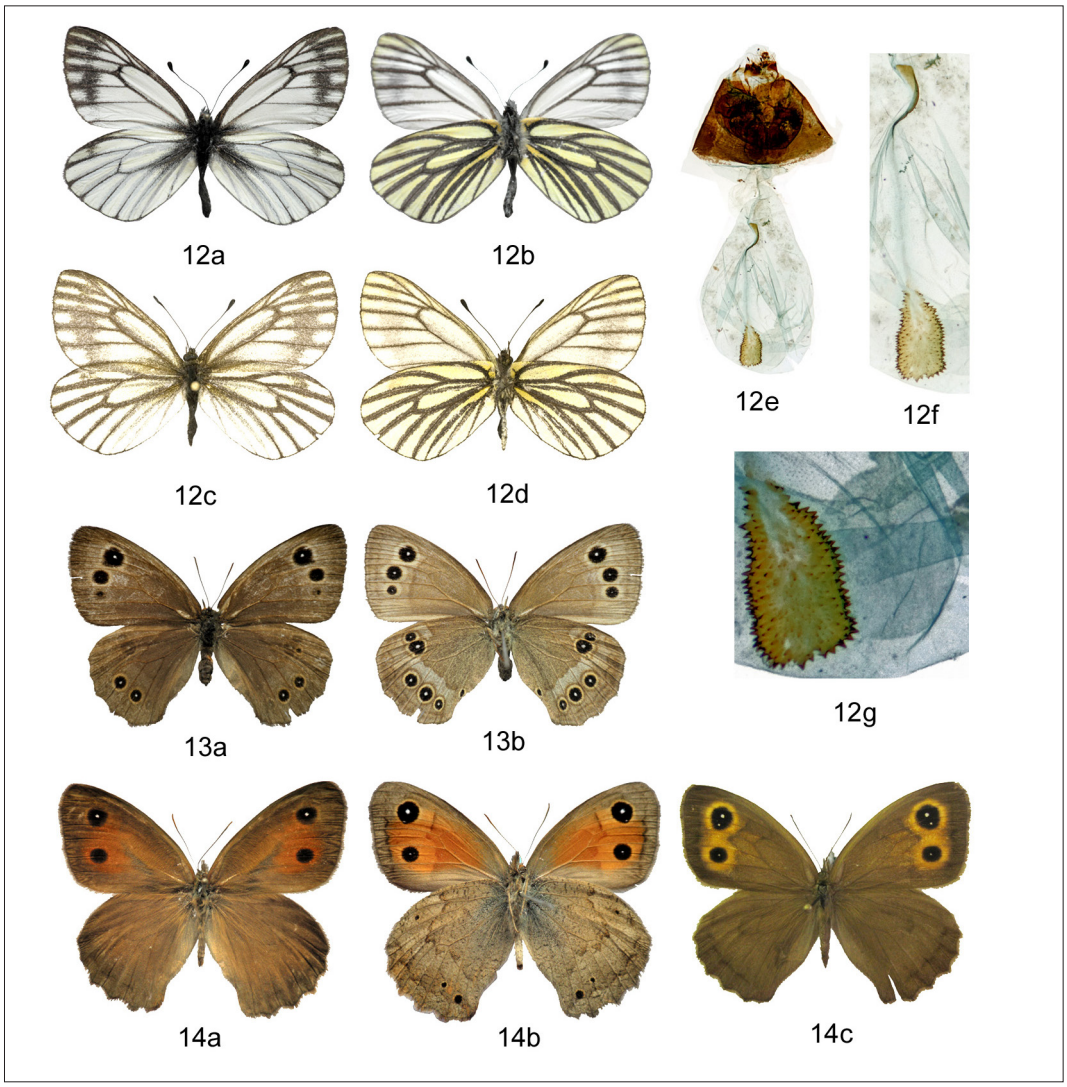
Distribution: China (including Tibet).

Variation: According to Ziegler (website) the following other subspecies are known from China:

ssp. *thibetana* (VERITY, 1907); distribution Tibet, China.

ssp. *diluta* (VERITY, 1911); distribution: Shaanxi, China.

In Sichuan we found the nominotypical species, males and females, near lake Mugecuo and we also observed specimens on a meadow (2050 m) near Jiuzhaigou. *S. davidis* is an altitude species. The ground colour on the underside of the hind wings of *S. davidis* is less canary yellow and the venation is not so heavily as in *S. venata*.



Figures 12a-14c Pieridae, Satyrinae of Sichuan: **12a**, **12b**. *Sinopieris venata* (LEECH, 1891), recto and verso, ♂, Sichuan, 20 km W of Litang (4000-4300 m). 12-07-2007, leg. M. Kopp. **12c**, **12d**. Idem, recto and verso ♀, same locality. **12e**, **12f**, **12g**. Idem, ♀, genitalia complete, genitalia detail with signum and genitalia detail with bag. **13a**, **13b**. *Aphantopus arvensis* OBERTHÜR, 1876, recto and verso, ♀, Jiuzhaigou, 2050 m, 08-07-2010. **14a**, 14b. *Hyponephele sifanica* GRUM GRSHIMAILO, 1891, recto and verso, ♂, Jiuzhaigou, 2050 m, 07-07-2010. **14c**. Idem, recto, ♀, Gansu, Road Lanzhou-Linxia, 2400 m, 30-07-1993, leg. J. Verhulst. Specimens shown at 90% of natural size. [Frans Slieker]

***Sinopieris stoetzneri* (Draeseke, 1924)** (Figs. 11a, 11b, 11c, 11d, 11e, 11f)

Type locality: Kangding (Tatsienlu), Sichuan, China

Distribution: Sichuan, NW Yunnan, China

Note: Röber in Seitz (1909) figured the species as *S. davidis*. However this label is not correct: the figure shows a female specimen of *S. stoetzneri*! Just like *Aporia delavayi* the cell of the underside hind wing in *S. stoetzneri* is crossed by a forked stripe. Draeseke (1924) describes - without figures - *Aporia martineti stoetzneri* as ab. nov. and this form is figured by Della Bruna *et al.* (2004). In order to avoid further misidentifications we figure both male and female of *S. stoetzneri* here. *S. stoetzneri* seems to prefer only high altitude biotopes. We found males and females near lake Mugecuo in a very restricted area at 3700 m in open spots of a pine forest, just beneath the tree line. The species was observed in low numbers, together with *S. davidis*. *S. stoetzneri* shows a remarkable behaviour when the sun disappears. In a short time all individuals left the biotope, moving to nearby high pine forest trees and set down on these conifers. They stayed there in immobility and were difficult to observe. When sunshine returned they immediately descended to the lower vegetation.

***Sinopieris venata* (Leech, 1891)** (Figs. 12a, 12b, 12c, 12d, 12e, 12f)

Type locality: Kangding (Tatsienlu), Sichuan, China

Distribution: Sichuan, China

This species is more abundant than the previous ones and we found many specimens in June 2009 at altitudes between 1500-2600 m near Jiuzhaigou. Females were scarce. Near Lake Mugecuo only one specimen was seen in 2010 at 3800 m.

Note: *Venata* was originally described by Leech (1891) as var. nov. of *Pieris davidis*. In the same year Oberthür (1891) described *Pieris davidina*. About *venata* Leech points out: 'on the underside of both sexes the secondary's and tips of primaries are rich lemon-yellow, and the veins are broadly bordered with black'. This description agrees very well with the distinctive characteristics, given by Oberthür. Huang (2003) does not know typical *davidina* specimens.

Our opinion is, that *davidina* is a synonym of *venata*. Wu (2010) does not include *davidina* in his treatment of the genus *Sinopieris*. The papers from Leech & Oberthür were both published in June 1891. So there is a

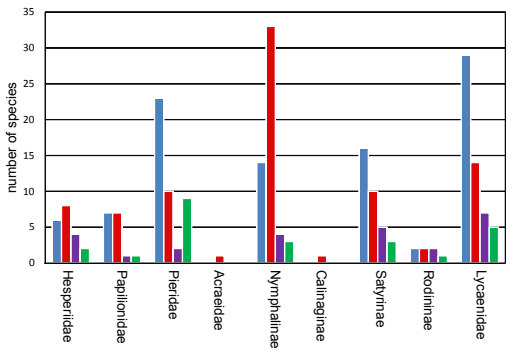


Figure 15 Number of species by family-group taxon per locality; blue = Jiuzhaigou, red = Qingcheng, purple = Luding, green = Kangding

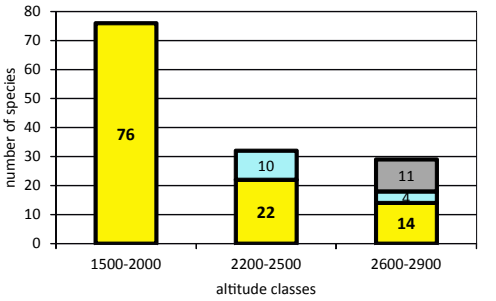


Figure 16 Distribution of species in relation to altitude classes, in Jiuzhaigou (new species in next altitude).

Table 1 Total number of species by family-group class per locality. Overlap indicates the number of species observed in more than one locality.

Localities	Jiuzhaigou	Qingcheng	Luding	Kangding	Total	Total spp	in overlap	% of species
Hesperiidae	6	8	4	2	20	15	5	33,33
Papilionidae	7	7	1	1	16	14	2	14,29
Pieridae	23	10	2	9	44	35	10	28,57
Acraeidae	0	1	0	0	1	1	0	0
Nymphalinae	14	33	4	3	54	44	10	22,73
Calinaginae	0	1	0	0	1	1	0	0
Satyrinae	16	10	5	3	34	29	5	17,24
Rodininae	2	2	2	1	7	4	3	75
Lycaenidae	29	14	7	5	55	46	9	19,57
Total	97	86	25	24	232	189	44	23,3

question about the priority of the names. But we also refer to Röber in Seitz (1909), where *venata* Leech (= *davidina* OBERTHÜR) was discussed and mislabelled as *venosa*.

Lycaenidae

Lycaena sichuanica BOZANO & WEIDENHOFFER, 2001

Type locality: near Barkam, Sichuan, China.

Distribution: Sichuan (Barkam and Jiuzhaigou), China.

When this species was described, only the holotype, a male, was known. Some years later two more male specimens were found from the same locality in the collection of Chambost, the collector of the holotype (Bozano 2004). On June 16 and 17, 2009 we visited Jiuzhaigou Nature Reserve. On a meadow at 2600 m we found five males and three females of *L. sichuanica*. The female was unknown and we described the diagnostic characters and the genitalia (Vis & Coene 2010). On 8 July 2010 we returned to this location to do some research of the habitat and to collect some females for egg deposition. We succeeded in some breeding experiments and three imago's hatched, two males and one female (Coene & Vis 2011). Taking in mind the altitude of the habitat on 2600 m and the rather moderate climatological conditions of the Jiuzhaigou region more broods of *L. sichuanica* can be possible, supposing the first generation is on the wings in May.

Lycaena svenhedini (NORDSTRÖM, 1935)

Type locality: S. Kansu (S. Gansu, China).

Distribution: S. Gansu, Shaanxi, N. Sichuan, China.

There are very few reports about the species at all. Bozano (1991) observed some specimens near Shi-Fe-Ngou near Lanzhou (Gansu) in a narrow valley with steep and woody slopes and small cultivated fields. In the same year a Czechoslovakian entomologist seemed to have taken only three specimens at Hua Shan, East Shaanxi. We could collect and observe both sexes at two localities near the road Jiuzhaigou to Baihe. In June the species was rather rare but in fresh condition. Its favourite habitats were meadows (1500-1600 m) with orchard trees and scattered bushes and broad leaved trees. The undergrowth exists mainly of high grasses. In July the species was more abundant, but a lot of them were damaged or worn. The males took their positions on the grasses and on low shrubs with the wings half open.

Table 2 Total number of species by family-group class observed in only one altitude class in Jiuzhaigou.

altitude in m	1500-2000	2200-2500	2600-2900	spec. in 1 altitude	spec. in 1 group	% of species
Hesperiidae	3	0	1	4	6	66,67
Papilionidae	2	4	1	7	7	100
Pieridae	10	0	1	11	23	47,83
Acraeidae	0	0	0	0	0	0
Nymphalinae	10	0	1	11	14	78,57
Calinaginae	0	0	0	0	0	0
Satyrinae	8	1	3	12	16	75,00
Rodininae	2	0	0	2	2	100
Lycaenidae	16	1	3	20	29	68,97
Total	51	6	10	67	97	69,07
% of spec in 1 altitude/ species in group	52,58	6,19	10,31	69,07		

Satyrinae

***Aphantopus arvensis* Oberthür, 1876** (Figs. 13a, 13b)

Type locality: ?

Distribution: China.

This species is found in meadows in near broad-leaved bushes (2000 m) in Jiuzhaigou, where it prefers full sunshine. Its flight remembers to the European *A. hyperantus* Linnaeus 1758. In mid-June males were in fresh condition but females failed. In the beginning of July females appeared, while most males were in bad condition.

***Aphantopus hyperantus* Linnaeus, 1758**

Type locality: Europe (Sweden).

Distribution: Europe, Russia, Siberia, N. Kazachstan, Mongolia, N.E.China, Korea.

This species is common in many parts of the Palaearctic region. In Sichuan it was observed near a road 40 km west of Jiuzhaigou at 2600-2900 m. Only in this area it was found in limited numbers and localized at moisty places near bushes. In July both males and females were in fresh condition. Our specimens belong to ssp. abaensis Yoshino, 2003.

***Araschnia prorsoides* (Blanchard, 1871)**

Type locality: ?

Distribution: N. India, Himalayas, N. Burma, W. China.

This localized species was observed mainly near subtropical forests in Qingcheng Shan. They flew in open spots and along roads en paths. In June males and females belong to the summer generation andthey were in fresh condition. They shared their habitat with *Neptis* species, *Heliophorus* species and *Araragi sygiyamai* Matsui, 1989.

***Coenonympha amaryllis* (Stoll, 1782)**

Type locality: Siberia.

Distribution: from S. Urals to N. and E. Kazakhstan, Siberia, Mongolia, Amur, Ussuri, C.N. and W. China, S. C. and E. Tibet, Korea, Nepal.

According to Bozano (2002) the following subspecies are known in China:

Table 3 Relative similarity of altitude classes with regard to the number of species in Jiuzhaigou. Bold: number of species in altitude class, Normal: Taxa in common by altitude class, Italic: similarity coefficient between two altitude classes.

altitude	1500-2000	2200-2500	2600-2900
1500-2000	**76**	22	14
2200-2500	*0,26*	**32**	15
2600-2900	*0,15*	*0,33*	**29**

ssp. *amaryllis* (STOLL, 1782)

ssp. *pavonina* ALPHÉRAKY, 1888

ssp. *tydeus* LEECH, 1892

In June we found some *pavonina* between 1490-1635 m along the road Jiuzhaigou-Baihe. The upperside of this ssp. is ochreous-yellow with pronounced submarginal ocelli and on the underside the ocelli on both wings are striking large with elongated white pupils. In July, about 40 kilometres W of Jiuzhaigou, a few specimens were collected of ssp. *tydeus* between 2677-2933 m. They are quite different from *C. pavonina*, both on the under- and upperside. The upperside is darkbrown without ocelli; on the underside the ocelli are small or nearly obsolete.

***Coenonympha semenovi* ALPHÉRAKY, 1887**

Type locality: de la chaine Bourkhane-Bouddha (Tsaidame) [Burhan Budai Shan, Qinghai, China].

Distribution: Qinghai, W. Sichuan, N. Xinjiang, China.

According to Bozano (2002) the following subspecies are known in China:

ssp. *semenovi* ALPHÉRAKY, 1887

ssp. *leanotchka* HEMMING, 1933

ssp. *jiadengyuica* HUANG & MURAYAMA, 1992

ssp. *sala* KOCMAN, 1995

In July some males and females of ssp. *leanotchka* were observed only in the lower situated area of the alpine meadows near Lake Mugecuo. They preferred the most moist spots of their habitat. When the sun disappeared they hided immediately in high grasses. This poorly known species seems to be restricted to higher altitudes.

***Hyponephele sifanica* GROUM GRSHIMAILO**, 1891 (Figs. 14a, 14b, 14c)

Type locality: 'Amdo, in montibus ad flumen Chuan-Che', Huang He (Yellow River), Guide, Qinghai, China.

Distribution: China.

It took more than a century after the description (in 1891) before data on this species was published (Eckweiler & Bozano 2011). It seems the distribution is restricted to China. In 2010 we found this species in very low numbers in a dry meadow near Jiuzhaigou at an altitude of 2000 m. Ssp. *sifanica* is distributed in Qinghai, N Gansu, Shanxi to Beijing and S Heilongjiang, while ssp. *deiphobe* Leech, 1894 is known from N Sichuan, S Gansu, Fujiang? Our specimens belong to ssp. *deiphobe*. According to the fresh condition of the imagines, emergence just started in the beginning of July. Females were not seen. Males were flying together with other Satyrids as *Melanargia asiatica*, *Aphantopus arvensis*, *Minois dryas* and *Ypthima* species. In the habitat no other *Hyponephele* species were observed. The butterflies are active in sunny and warm weather, they did not hide in shade of shrubbery or trees. Their flight is a combination of gliding and wing flapping about one meter above vegetation in sunny and warm weather.

***Lethe yunnana* D'ABRERA, 1990**

Type locality: Yunnan.

Distribution: Yunnan, S. Gansu, W. Sichuan (?), China.

This species seems to be local and is very close to *L. argentata* (Leech, 1891). Its occurrence in N. Sichuan was not yet confirmed, but we found the species in 2009 and 2010 in Jiuzhaigou Nature Reserve in wetlands. In June we observed at least fifteen specimens in fresh condition. In July of 2010 only some worn specimens were present. This butterfly occurs preferably in shaded areas, like many species of the genus *Lethe*.

Altitudinal observations

During our expeditions in 2009 and 2010 we found 189 species of butterflies. The number of species separated into family-group taxa in relation to the localities is demonstrated in Figure 15. In subtropical Qingcheng (700-1200 m) we see an obvious peak of the Nymphalinae. In the Jiuzhaigou area (1500-2900 m) the peaks are occupied by the Pieridae, Satyrinae and the Lycaenidae. In Table 1 the total number of species per locality is presented, together with the number of species, observed in more than one locality (overlap). The Satyrinae and Lycaenidae show fewer tendencies to leave their habitat, while the Riodininae seem to be less fussy. On the other hand many species were only seen in one particular altitude class. For the Jiuzhaigou area these species (67) in each family-group taxon in relation to altitude is demonstrated in Table 2. In altitude class 1500-2000 m most taxa (52,6%) were restricted to that class. The distribution of the species from the lower to the higher altitudes in Jiuzhaigou is demonstrated in Figure 16. Only 11 taxa (11,3%) of the 97 recorded taxa in the region are restricted in the altitude class 2600-2900 m.

Similarity

Due to the great differences of the localities, we only did a similarity check of the butterfly fauna in Jiuzhaigou (Table 3). The resemblance between the altitude class 2200-2500 m and 2600-2900 m is noticeably greater than between 2200-2500 m and 1500-2000 m. However, the provisional conclusion is, that more data are needed to prove a more convincing similarity.

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REFERENCES

Bozano, G.C., 1991 - Note on a little known Chinese lycaenid: *Lycaena svenhedini* (Nordström) - Nachrichten des Entomologischen Vereins Apollo 12(3): 211-213

Bozano, G.C., 1999 - Satyridae part I. In: G.C. Bozano (ed.) Guide to the butterflies of the palearctic region - Omnes Artes, Milano, 58 pp

Bozano, G.C., 2002 - Satyridae part III. In: G.C. Bozano (ed.) Guide to the butterflies of the palearctic region - Omnes Artes, Milano, 71 pp

Bozano, G.C., 2004 - New records for recently described Butterflies: (Lepidoptera: Lycaenidae, Nymphalidae, Satyrinae) - Nachrichten des Entomologischen Vereins Apollo N.F. 25 (1/2): 25-26

Coene, Hans A. & Vis, Ruud, 2008 - Contribution on the butterfly fauna of Yunnan, China (Hesperioidea, Papilionoidea) - Nota Lepidopterologica 31(2): 231-262

Coene, Hans A. & Vis, Ruud, 2011 - First report of early stages and ecological data of *Lycaena sichuanica* in Sichuan, China (Lepidoptera: Lycaenidae) - Entomologische Berichten 71 (3) 77-80

De Jong, R., 1976 - Affinities between the West Palearctic and Ethiopian butterfly faunas - Tijdschrift voor Entomologie 119: 165-215

Della Bruna, C. Gallo, E. Lucarelli, M. Sbordoni, V., 2002 - Satyrinae part II. *In*: G.C. Bozano (ed.) Guide to the butterflies of the palearctic region - Omnes Artes, Milano, 59 pp.

Della Bruna, C. V. Gallo, Sbordoni., 2004 - Pieridae part I. *In*: G.C. Bozano (ed.) Guide to the butterflies of the palearctic region - Omnes Artes, Milano, 86 pp

Draeseke, J., 1924 - Die Schmetterlinge der Stötznerschen Ausbeute II, Pieridae - Deutsche Entomologische Zeitschrift Iris 38: 1-8

Eckweiler, W. Bozano, G.C., 2011 - Satyrinae, part IV.- *In*: G. C. Bozano (ed.), Guide to the butterflies of the palearctic region - Omnes Artes, Milano. 102 pp.

Evans, W.H., 1949 - A catalogue of the Hesperiidae from Europe, Asia and Australia in the British Museum (N.H.) - British Museum, London, 502 pp

Gorbunov, P. & Kosterin, P., 2003 - The Butterflies of North Asia in Nature, Volume I - Cheliabinsk, 392 pp

Huang H., 1998 - Research on the butterflies of the Namjagbarwa Region, S. E. Tibet - Neue Entomologische Nachrichten 41: 207-264

Huang H., 2001 - Report of H. Huang's 2000 Expedition to SE. Tibet for Rhopalocera (Insecta, Lepidoptera) - Neue Entomologische Nachrichten 51: 65-151

Huang H., 2003 - A list of butterflies collected from Nujiang (Lou Tse Kiang) and Dulongjiang China with description of new species new subspecies and revisional notes (Lepidoptera, Rhopalocera) - Neue Entomologische Nachrichten 55: 3-114

Huang, H, & Wu, C-S., 2003 - New and little known Chinese butterflies in the collection of the Institute of Zoology, Academia Sinica, Beijing – 1 (Lepidoptera, Rhopalocera) - Neue Entomologische Nachrichten 55: 115-143

Huang, H. & Xue, Y-P., 2004 - Notes on some Chinese butterflies (Lepidoptera, Rhopalocera) - Neue Entomologische Nachrichten 57: 171-177

Koiwaya, S., 1993 - Studies in Chinese butterflies, vol II - Tokyo, 113 pp.

Leech, J.H., 1891 - New Species of Rhopalocera from Western China - Entomologist 24, suppl. 58: 57-58

Lorkovic, Z., 1950 - Neue ostasiatische Arten und Rassen der Gattung *Leptidia* nebst Nomenklaturberichtigungen - Periodicum Biologorum Zagreb, series II /B, 2/3 : 57-76

Oberthür, Ch., 1876 - Espèces nouvelles recuillis en Chine par M. l 'Abbé A. David - Etudes d' Entomologie 2 : XII: 13-34

Oberthür, Ch., 1891 - Nouveaux lépidoptères d'Asie - Etudes d' Entomologie 15: 7-25

Racheli, T. & Cotton, H.M., 2010 - (Bozano G.C. edit.) Guide to the butterflies of the palearctic region, Papilionidae, part II - Omnes Artes, Milano, 86 pp.

Seitz, A., 1909 - Die Gross schmetterlinge des Palaearctischen Faunengebietes, 1. Band: Die Palaearctischen Tagfalter - Stuttgart, 379 pp.

Tuzov, V.K. & Bozano G.C., 2006 - (Bozano G.C. edit.). Guide to the butterflies of the palearctic region, Nymphalidae part II, Argynnini - Omnes Artes, Milano, 72 pp.

Vis, Ruud & Coene, Hans A., 2010 - First records of the female of *Lycaena sichuanica* Bozano & Weidenhoffer 2001 in Sichuan, China (Lepidoptera: Lycaenidae) - Entomologische Berichten 70(4): 146-149

Wang, M. & Fan, X.L., 2002 - Butterflies Fauna Sinica: Lycaenidae - Henan Science & Technology Press, Zhengzhou, 440 pp.

Weidenhoffer, Z., Bozano, G.C., Churkin, S., 2004 - (Bozano G.C. edit.) Guide to the butterflies of the palearctic region, Lycaenidae part II - Omnes Artes, Milano,94 pp.

Wu Chunsheng, 2010 - Fauna sinica, Lepidoptera, Pieridae - Insecta vol. 52, Beijing, 397 pp.

Yoshino, K., 2001 - New butterflies from China 6 - Futao 38: 9-17

Yoshino, K., 2003 - New butterflies from China 8 - Futao 43 : 6-14

Ziegler, H., http://www.euroleps.ch [visited on January, 30, 2011]

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Appendix 1 Systematic list of butterfly species recorded in four regions of Sichuan, China in 2009 and 2010; A = Jiuzhaigou 1500-2000 m, B = Jiuzhaigou 2200-2500 m, C = Jiuzhaigou 2600-2900 m; D = Qingcheng 700-1200 m; E = Luding 1400 m; F = Kangding 2800 m, G = Kangding 3800 m. (0=present)

	Hesperiidae **location**	**A**	**B**	**C**	**D**	**E**	**F**	**G**
1	Aeromachus stigmata shanda Evans 1949					0		
2	Calaenorrhinus maculosus Felder, 1867				0			
3	Calaenorrhinus tibetana (Mabille, 1876)						0	
4	Carterocephalus dieckmanni Graeser, 1888	0						
5	Carterocephalus houangty jiuzaikouensis Yoshino, 2001			0				
6	Coladenia hoenei Evans, 1939	0						
7	Daimio thethys (Menetries, 1857)				0			
8	Erionota torus Evans, 1941				0			
9	Lobocla germana (Oberthur, 1886)					0		
10	Ochlodes ochracea (Bremer, 1886	0	0		0			
11	Ochlodes subhyalina (Bremer & Grey, 1853)	0			0		0	
12	Ochlodes venatus (Bremer & Gray, 1853)	0	0	0	0	0		
13	Taractrocera flavoides Leech, 1893					0		
14	Thoressa gupta leechii Evans,1932				0			
15	Thymelicus leonina (Butler, 1878)				0			
		5	2	2	8	4	2	0

	Papilionidae **location**	**A**	**B**	**C**	**D**	**E**	**F**	**G**
1	Byasa confusus (Jordan, 1896)					0		
2	Graphium (Graphium) sarpedon (Linnaeus, 1758)				0			
3	Graphium (Pazala) tamerlanus (Oberthur, 1876)		0					
4	Pachliopta aristolochiae adaeus (Rothschild, 1908)		0					
5	Papilio arcturus Westwood, 1842				0			
6	Papilio bianor (Cramer 1777)	0			0			
7	Papilio dialis Leech, 1893				0			
8	Papilio macilentus Janson, 1877		0		0			
9	Papilio paris Linnaeus, 1758				0			
10	Papilio protenor (Cramer, 1775)		0					
11	Papilio xuthus Linnaeus, 1767	0						
12	Parnassius orleans (Oberthur, 1890)						0	
13	Parnassius stubbendorfi Menetries, 1849			0				
14	Troides aeacus (C & R Felder, 1860)				0			
		2	4	1	7	1	1	0

	Pieridae	location	A	B	C	D	E	F	G
1	Anthocaris bieti (Oberthur, 1884)				0				
2	Anthocaris thibetanus Oberthur, 1886			0	0				
3	Aporia acraea (Oberthur, 1885)							0	
4	Aporia bieti lihsieni Bang-Haas, 1933		0	0					
5	Aporia crataegi atomosa (Verity, 1911)		0						
6	Aporia delavayi minshani Banh-Haas, 1933		0	0	0				
7	Aporia gigantea Koiwaya, 1993					0			
8	Aporia goutellei (Oberthur, 1886)		0		0				
9	Aporia largeteaui (Oberthur, 1881)		0						
10	Aporia martineti (Oberthur, 1884)							0	0
11	Aporia potanini Alpheraky. 1892		0						
12	Aporia procris Leech, 1890							0	
13	Aporia signiana Sugiyama, 1994		0						
14	Aporia tsinglingica Verity, 1911		0						
15	Colias erate amdensis Verity, 1911		0	0	0	0			
16	Colias fieldi chinensis Verity, 1908		0	0	0	0		0	
17	Dercas enara Swinhoe, 1899					0			
18	Eurema hecabe (Linnaeus, 1758)					0			
19	Genepteryx acuminata Felder & Felder, 1862		0		0			0	
20	Gonepteryx amintha (Blanchard, 1871)					0			
21	Gonepteryx amintha murayamae Nekrutenko, 1973		0						
22	Leptidea morsei ommani Lorkovic, 1950		0						
23	Leptidea serrata Lee, 1955			0	0				
24	Leptidea amurensis (Menetries, 1859)		0						
25	Pieris napi (Linnaeus, 1758)			0	0				
26	Pieris brassicae (Linnaeus, 1758)							0	
27	Pieris canidia (Sparrman, 1767)		0			0	0		
28	Pieris erutae Poujade, 1888			0	0				
29	Pieris extensa Poujade, 1888					0			
30	Pieris melete (Menetries, 1857)					0			
31	Pieris rapae yunnana Mell, 1943		0	0	0	0	0		
32	Pontia edusa Fabricius, 1777		0						
33	Sinopieris davidis (Oberthur, 1876)								0
34	Sinopieris stoetzneri (Draeseke, 1924)								0
35	Sinopieris venata (Leech, 1891)		0		0				0
			18	9	12	10	2	6	4

	Acraeidae	location	A	B	C	D	E	F	G
1	Acraea issoria (Huebner, 1819)					0			
						1			

Nymphalidae

	Nymphalinae location	A	B	C	D	E	F	G
1	Apatura iris (Linnaeus, 1758)				0	0		
2	Apatura laverna Leech, 1893	0					0	
3	Araschnia davidis Poujade 1885	0					0	
4	Araschnia doris Leech, 1893				0			
5	Araschnia prorsoides Blanchard, 1871				0			
6	Argynnis childreni Gray, 1831				0			
7	Argynnis laodice (Pallas, 1771)	0						
8	Argynnis paphia paphioides Butrler, 1881				0			
9	Argynnis xipe niraea Oberthur, 1912	0	0	0				
10	Argynnis zenobia Leech, 1890	0						
11	Athyma opalina Kollar, 1844				0			
12	Athyma sulpitia (Cramer, 1779)				0			
13	Clossiana gong (Oberthur, 1884)							0
14	Damora sagana (Doubleday, 1847)				0			
15	Euthalia alpherakyi Oberthur, 1907				0			
16	Kaniska canace (Linnaeues, 1763)				0			
17	Limenitis amphyssa Menetries 1859	0						
18	Limenitis doerriesi Staudinger, 1892				0			
19	Limenitis helmanni Lederer, 1853	0						
20	Limenitis homeyeri venata Leech, 1893	0			0			
21	Limenitis sydyi Lederer, 1853	0						
22	Neptis alwina Bremer & Grey, 1852	0	0		0			
23	Neptis ananta Moore, 1858				0			
24	Neptis andetria oberthueri Eliot, 1969				0			
25	Neptis antilope Leech, 1892				0			
26	Neptis armandia Oberthuer, 1876				0			
27	Neptis clinia Moore, 1872				0			
28	Neptis namba leechi Eliot, 1969				0			
29	Neptis rivularis (Scopoli, 1763)	0	0	0				
30	Neptis sappho intermedia Pryer, 1877			0	0	0		
31	Neptis soma Moore, 1858				0			
32	Neptis yerburii Butler, 1886				0			
33	Panthema adelma Felder, 18..				0			
34	Pantoporia opalina Kollar, 1848				0			
35	Phaedima aspasia (Leech, 1890)				0			
36	Polygonia c-aureum (Linnaeus, 1758)	0			0			
37	Polyura eudamippus Doubleday, 1843				0			
38	Pseudergolis wedah Felder, 1867				0			
39	Sephisa princeps Fixsen, 1887					0		
40	Stibochiona nicea Gray, 1846				0			
41	Symbrenthia hypselis Godart, 1819-1824				0			
42	Timelaea maculata (Bremer & Grey, 1852)	0			0	0		
43	Vanessa cardui (Linnaeus, 1758)				0			
44	Vanessa indica (Herbst, 1794)				0			
		13	3	3	33	4	2	1

	Calinaginae **location**	**A**	**B**	**C**	**D**	**E**	**F**	**G**
1	Calinaga buddha Moore, 1858				0			
					1			

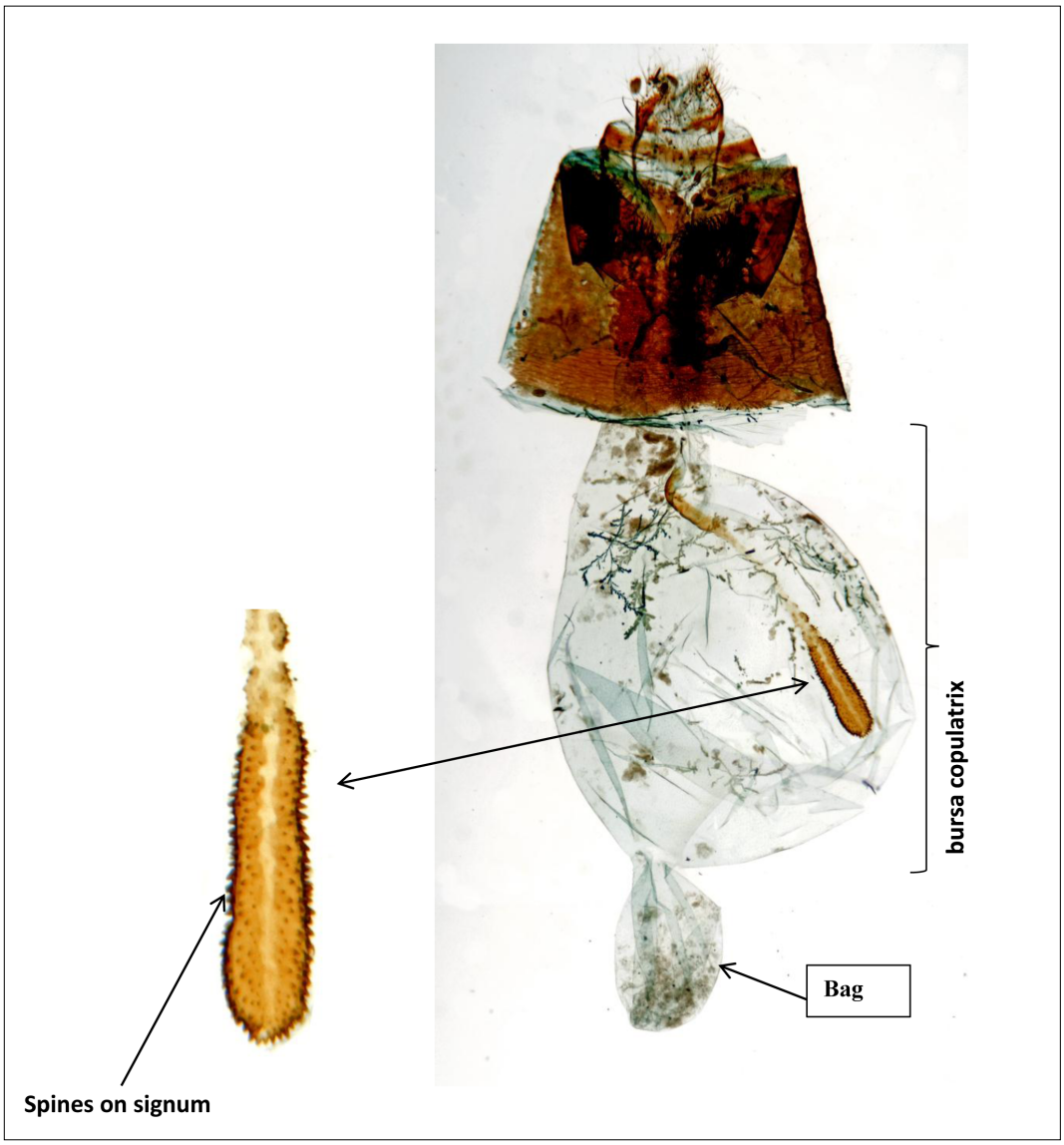
	Satyrinae **location**	**A**	**B**	**C**	**D**	**E**	**F**	**G**
1	Aphantopus arvensis Oberthuer, 1876	0	0					
2	Aphantopus hyperantus abaensis Yoshino, 2003			0				
3	Callarge sagitta (Leech, 1892)				0			
4	Callerebia polyphemus oberthuri Watkins, 1925					0		
5	Coenonympha amaryllis pavonina Alpheraky, 1888	0						
6	Coenonympha amaryllis tydeus Leech, 1892			0				
7	Coenonympha semenovi leanotchka Hemming, 1933							0
8	Hyponephele sifanica deiphobe Leech, 1894	0						
9	Kirinia epimenides (Ménétriés, 1859)	0						
10	Lethe marginalis Motschulsky, 1860	0						
11	Lethe syrcis (Hewitson, 1863)				0			
12	Lethe violacepictata (Poujade 1884)				0			
13	Lethe yunnana d'Abrera 1990			0				
14	Loxerebia sylvicola stotzneriana Draeseke, 1925		0					
15	Melenargia asiatica Oberthuer & Houlbert, 1922	0	0					
16	Minois dryas (Scopoli, 1763)	0						
17	Mycalesis francisca (Stoll, 1781)				0			
18	Mycalesis misenus sericus Leech, 1892				0			
19	Neope agrestis Oberthür 1876	0						
20	Neope christi Oberthur, 1886					0		
21	Tatinga thibetana (Oberthuer, 1876)	0					0	
22	Ypthima baldus Fabricius, 1775	0	0	0	0			
23	Ypthima ciris Leech, 1891					0		
24	Ypthima conjuncta Leech 1891				0			
25	Ypthima iris Leech, 1891	0						
26	Ypthima methorina Oberthur, 1891					0		
27	Ypthima motschulskyi Bremer & Grey 1855				0	0	0	
28	Ypthima sakra Moore, 1857				0			
29	Ypthima zodia Butler, 1871	0	0	0	0			
		12	5	5	10			

	Riodininae **location**	**A**	**B**	**C**	**D**	**E**	**F**	**G**
1	Abisara fylla ((Doubleday & Hewitson, 1851)	0			0			
2	Dodona durga (Kollar, 1844)					0		
3	Dodona eugenes hoenei Forster, 1951	0			0	0		
4	Polycaena lama Leech, 1893							0
		2			2	2		1

	Lycaenidae location	A	B	C	D	E	F	G
1	Albulina orbitulus pheretimus (Staudinger, 1892)							0
2	Araragi sugiyamai Matsui, 1989				0			
3	Aricia eumedon (Esper, [1780])			0				
4	Celastrina albocaerulea Moore, 1879				0			
5	Celastrina argiolus (Linnaeus, 1758)	0			0		0	
6	Celastrina dilecta Moore, 1879				0			
7	Celastrina oreas (Leech, 1893)	0			0			
8	Celastrina perplexa Eliot & Kawazoe, 1983	0	0					
9	Everes argiades hellotia (Menetries, 1857)	0			0			
10	Glaucopsyche lycormas (Butler, 1866)	0	0	0				
11	Heliophorus brahma Moore, 1853				0			
12	Heliophorus saphir (Blanchard, 1871)				0	0		
13	Japonica adusta (Riley, 1930)				0			
14	Japonica lutea (Hewitson, 1865)	0						
15	Laeosopis praetextatus Fujioka, 1992	0	0					
16	Lampides boeticus (Linnaeus, 1767)					0		
17	Lycaena li (Oberthur, 1886)					0		
18	Lycaena pang (Oberthur, 1886)							0
19	Lycaena sichuanica Weidenhoffer & Bozano, 2001			0				
20	Lycaena svenhedini Nordstroem, 1935	0						
21	Niphanda fusca (Bremer & Grey, 1853)	0				0		
22	Phengaris atroguttata Oberthür 1886						0	
23	Phengaris teleius sinalcon Murayama, 1992			0				
24	Plebejus pseudaegon sinicus (Forster, 1936)	0						
25	Polyommatus amanda (Schneider, 1792)			0				
26	Polyommatus amorata Alpheraky, 1897	0	0	0				
27	Pseudozizeeria maha (Kollar, 1844)				0	0		
28	Rapala caerulea Bremer & Grey, 1853	0						
29	Rapala nissa (Kollar, 1848)				0			
30	Rapala selira Moore, 1874	0						
31	Rapala subpurpurea Leech, 1890	0			0			
32	Satyrium eximia fixseni Leech, 1893	0						
33	Satyrium iyonis Ota & Kusunoki, 1957	0						
34	Satyrium ornata (Leech, 1890)	0						
35	Satyrium percomis Leech, 1893	0	0					
36	Satyrium pruni pseudopruni Murayama, 1992	0	0					
37	Satyrium prunoides rubicundula Leech, 1890	0	0					
38	Satyrium thalia chan Yoshino, 2002	0	0					
39	Satyrium v-album Oberthuer, 1886	0					0	
40	Scolitantides orion (Pallas, 1771)		0					
41	Sinthusa chandrana Moore, 1883				0			
42	Spindasis leechi (Swinhoe, 1912)	0						
43	Taraka hamada (Druce, 1875)				0			
44	Tongeia potanini (Alphėraky, 1889)					0		
45	Tongeia zuthus (Leech, 1893)					0		
46	Wagimo sulgeri (Oberthur, 1908)	0						
		24	9	6	14	7	3	2

	Summary	location	A	B	C	D	E	F	G
15	Hesperiidae		5	2	2	8	4	2	
14	Papilionidae		2	4	1	7	1	1	
35	Pieridae		18	9	12	10	2	6	4
1	Acraeidae					1			
44	Nymphalinae		13	3	3	33	4	2	1
1	Calinaginae					1			
29	Satyrinae		12	5	5	10	5	2	1
4	Riodininae		2			2	2		1
46	Lycaenidae		24	9	6	14	7	3	2
189	Totals		76	32	29	86	25	16	9

APPENDIX 2 Anatomical terms of genital parts used in this study.



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