STRUCTURE OF THE OCCIPITAL REGION IN PIERIDAE (LEPIDOPTERA) FROM JAPAN

Nagao Koyama* and Takashi Tsubuki**

Synopsis: The structure of the occipital region in the Pierid butterflies mainly from Japan was observed. As the result, Leptidea was separable from the other species by the form of occipital prominence. The others were divided into 2 groups and 4 subgroups. Catopsilia resembled very closely Pierinae while Aporia and Anthocharis are very similar to Coliadinae in the occipital structure.

INTRODUCTION

Previously the authors reported the structure of the occipital region in some families of Rhopalocera, such as Nymphalidae, Libytheidae and Papilionidae (Tsubuki & Koyama, 1978, 1979).

Though a few papers were related briefly to the occipital structure of Pieridae (Eassa, 1963; Tsubuki et al., 1975), detailed descriptions on it have not been performed up to the present.

Then the authors studied the occipital form of 26 species in 12 genera belonging to Pieridae occurring mainly from Japan.

Before going further the authors wish to express their gratitude to Messers N. Koda, K. Akita and Y. Imagawa, who gave valuable materials for this study.

MATERIALS

The materials used are shown in the following.

Leptidea amurensis amurensis Ménétries
Eurema hecabe mandarina de l' Orza
E. laeta bethesba Janson
* E. brigitta droma Horsfield
E. blanda arsakia Fruhstorfer
Colias erate poliographus Motshulsky

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GENERAL STRUCTURE OF OCCIPITAL REGION (Fig. 1)

The occipital region of Pieridae is composed of 2 main parts, viz. dorsal part of occiput, postocular plate with occipital foramen. A ratio of the width (W) to the height (H) of the occiput (W/H ratio) ranges 1.8-2.3 (Table 2). The coloration of the occiput generally takes black or dark brown.

1. Dorsal part of occiput (Fig. 1, Dpo.)

The dorsal part of occiput consists of 2 parts, such as big occipital prominence and small intermediate plate. The former occupies the central part, and the latter the dorsal sides. Both of them are covered with scales. The dorsal part of occiput develops to some extent laterally. The occipital prominence protrudes to the dorsal and posterior directions strongly in several genera (ex. Eurema: Photo 2, Anthocharis: Photo 6), and weakly in some others (ex. Pieris: Photo 7, Hebomoia: Photo 11). Such genera as Pieris (ex. Photo 39) and Appias (ex. Photo 47) have the sharply projected intermediate plate, but the others (ex. Gonepteryx: Photo 27, Catopsilia: Photo 59) not. The intermediate plate is
generally shaped like a triangle.

A ratio of the width (w) to the marginal height (h) (w/h ratio) ranges 2.0–3.5 and that of the width (w) to the width of occiput (W) varies 0.39–0.60. (Table 2).

2. Postocular plate (Fig. 1, Pop.)

The postocular plate is divided into 5 parts; e.g. peripheral part of compound eye, marginal furrow, scaled region, basal part and side part of occipital foramen. This plate swells largely.

a) Peripheral part of compound eye

It is generally too narrow to be recognized.

b) Marginal furrow

No scales are grown. In many species boundary region along the peripheral part of compound eye is furnished with densely fine wrinkles, but not in the other part. Small tubercles are scattered in a few species (ex. Appias nero: Photo 85). The sensory organ is found in most species.

A ratio of the width(F) to the facetal diameter(d) is 1.8–4.5 (Table 2).

c) Scaled region (Fig. 1, Sr.)

Scales are distributed densely. Besides proximally running fine wrinkles are observed in many species. No small tubercles are grown with exception of some

d) Basal part and side part of occipital foramen (Fig. 1, Bp., Spo.)

No scales are found. The basal part is smooth and distinguished by the transoccipital band from the scaled region. The side part of occipital foramen is covered with small tubercles and small setae.

3. Occipital foramen (Fig. 1, Of.)

It is separated into the dorsal and ventral parts by the tentorial bridge. The former is wider than the latter. The dorsal margin of the former curves to the dorsal direction. The postocciput develops and its dorsal part protrudes strongly to the posterior direction. The postoccipital ridge develops well except in *Eurema* (Photo 15) and *Leptosia* (Photo 55). The proboscidial fossa is deep.

4. Occipital type (Table 2)

The marginal furrow and the scaled region bear generally no small tubercles. The main occipital type of Pieridae belongs to AA-AA.

**OCCIPITAL STRUCTURE IN EACH GENUS**

The size of the occipital part and the occipital type in each genus and species were shown in Table 1, 2.

1) *Leptidea* (Photo 1, 13, 14, 65)

The occipital prominence is characteristically divided laterally into 2 parts

<table>
<thead>
<tr>
<th>Genus</th>
<th>W/H</th>
<th>w/h</th>
<th>w/W</th>
<th>F/d</th>
<th>Occipital type</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Leptidea</em></td>
<td>2.2</td>
<td>2.6</td>
<td>0.56</td>
<td>1.8</td>
<td>AA-AA</td>
</tr>
<tr>
<td><em>Eurema</em></td>
<td>1.9</td>
<td>2.1</td>
<td>0.51</td>
<td>2.3</td>
<td>AA-AA</td>
</tr>
<tr>
<td><em>Colias</em></td>
<td>2.1</td>
<td>2.7</td>
<td>0.55</td>
<td>2.9</td>
<td>AA-AA</td>
</tr>
<tr>
<td><em>Gonepteryx</em></td>
<td>1.8</td>
<td>3.2</td>
<td>0.58</td>
<td>3.2</td>
<td>AA-AA</td>
</tr>
<tr>
<td><em>Aporia</em></td>
<td>1.9</td>
<td>2.8</td>
<td>0.48</td>
<td>4.1</td>
<td>AA-AA</td>
</tr>
<tr>
<td><em>Anthocharis</em></td>
<td>2.1</td>
<td>2.9</td>
<td>0.59</td>
<td>3.0</td>
<td>AA-AA</td>
</tr>
<tr>
<td><em>Pieris</em></td>
<td>2.1</td>
<td>2.3</td>
<td>0.44</td>
<td>2.8</td>
<td>AA-AA~AA-PP</td>
</tr>
<tr>
<td><em>Appias</em></td>
<td>2.2</td>
<td>2.1</td>
<td>0.39</td>
<td>2.6</td>
<td>AA-PP~PA-PP</td>
</tr>
<tr>
<td><em>Leptosia</em></td>
<td>2.3</td>
<td>2.0</td>
<td>0.44</td>
<td>2.1</td>
<td>AA-PP</td>
</tr>
<tr>
<td><em>Catopsilia</em></td>
<td>2.2</td>
<td>3.1</td>
<td>0.47</td>
<td>3.2</td>
<td>AA-AA</td>
</tr>
<tr>
<td><em>Hebomoia</em></td>
<td>2.1</td>
<td>2.8</td>
<td>0.47</td>
<td>4.0</td>
<td>AA-PP</td>
</tr>
<tr>
<td><em>Ixias</em></td>
<td>2.2</td>
<td>2.3</td>
<td>0.47</td>
<td>2.6</td>
<td>AA-AA</td>
</tr>
</tbody>
</table>
Occipital region in Pieridae (Lepidoptera)

Table 2. The characters of occipital structure in each species of Pieridae.

<table>
<thead>
<tr>
<th>Species</th>
<th>W/H</th>
<th>w/h</th>
<th>w/W</th>
<th>F/d</th>
<th>Occipital type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leptidea amurensis amurensis</td>
<td>2.2±0.1</td>
<td>2.6±0.1</td>
<td>0.56±0.07</td>
<td>1.8±0.2</td>
<td>AA-AA</td>
</tr>
<tr>
<td>Eurema hecabe mandarina</td>
<td>1.9±0.1</td>
<td>2.1±0.1</td>
<td>0.49±0.02</td>
<td>1.9±0.2</td>
<td>AA-AA</td>
</tr>
<tr>
<td>E. laeta bethesda</td>
<td>1.9</td>
<td>2.2</td>
<td>0.55</td>
<td>2.9</td>
<td>AA-AA</td>
</tr>
<tr>
<td>E. brigitta drona</td>
<td>2.0</td>
<td>2.0</td>
<td>0.51</td>
<td>2.3</td>
<td>AA-AA</td>
</tr>
<tr>
<td>E. bland aArsakia</td>
<td>1.9±0.1</td>
<td>2.0±0.1</td>
<td>0.50±0.02</td>
<td>2.3±0.7</td>
<td>AA-AA</td>
</tr>
<tr>
<td>Colias erate poliographus</td>
<td>2.2±0.04</td>
<td>2.5±0.1</td>
<td>0.55±0.02</td>
<td>2.7±0.1</td>
<td>AA-AA</td>
</tr>
<tr>
<td>C. palaeo aias</td>
<td>1.9±0.04</td>
<td>2.9±0.1</td>
<td>0.55±0.01</td>
<td>3.1±0.3</td>
<td>AA-AA</td>
</tr>
<tr>
<td>Gonepteryx rhamni maxima</td>
<td>1.8±0.1</td>
<td>3.5±0.2</td>
<td>0.60±0.023</td>
<td>0±0.8</td>
<td>AA-AA</td>
</tr>
<tr>
<td>G. aspasia niphonica</td>
<td>1.8±0.1</td>
<td>2.9±0.1</td>
<td>0.57±0.02</td>
<td>3.3±0.4</td>
<td>AA-AA</td>
</tr>
<tr>
<td>Aporia crataegi adherbal</td>
<td>1.9±0.1</td>
<td>2.7±0.2</td>
<td>0.49±0.03</td>
<td>4.5±0.6</td>
<td>AA-AA</td>
</tr>
<tr>
<td>A. hippa japonica</td>
<td>2.0±0.1</td>
<td>3.0±0.2</td>
<td>0.48±0.033</td>
<td>3.7±0.6</td>
<td>AA-AA</td>
</tr>
<tr>
<td>Anthocharis scolymus scolymus</td>
<td>2.2±0.1</td>
<td>3.1±0.2</td>
<td>0.59±0.01</td>
<td>2.7±0.5</td>
<td>AA-AA</td>
</tr>
<tr>
<td>A. cardamines issibii</td>
<td>2.1</td>
<td>2.7</td>
<td>0.58</td>
<td>3.3</td>
<td>AA-AA</td>
</tr>
<tr>
<td>Pieris rapae curcivora</td>
<td>2.2±0.1</td>
<td>2.4±0.1</td>
<td>0.46±0.01</td>
<td>2.7±0.3</td>
<td>AA-AP</td>
</tr>
<tr>
<td>P. melete melete</td>
<td>2.1±0.1</td>
<td>2.3±0.1</td>
<td>0.44±0.01</td>
<td>2.8±0.3</td>
<td>AA-AP</td>
</tr>
<tr>
<td>P. rapi japonica</td>
<td>2.1±0.1</td>
<td>2.6±0.2</td>
<td>0.45±0.05</td>
<td>2.6±0.4</td>
<td>AA-AP</td>
</tr>
<tr>
<td>P. canidia canidia</td>
<td>2.2±0.1</td>
<td>2.1±0.1</td>
<td>0.42±0.02</td>
<td>2.9±0.3</td>
<td>AA-AP</td>
</tr>
<tr>
<td>Appias paulina minato</td>
<td>2.2±0.1</td>
<td>2.2±0.1</td>
<td>0.40±0.01</td>
<td>2.2±0.2</td>
<td>PA-PA-P</td>
</tr>
<tr>
<td>A. albina semperi</td>
<td>2.2±0.04</td>
<td>2.1±0.2</td>
<td>0.38±0.01</td>
<td>2.6±0.3</td>
<td>AA-AP</td>
</tr>
<tr>
<td>A. lynica formosana</td>
<td>2.1±0.1</td>
<td>2.1±0.1</td>
<td>0.39±0.01</td>
<td>2.8±0.8</td>
<td>AA-AP</td>
</tr>
<tr>
<td>A. nero palawanica</td>
<td>2.2±0.1</td>
<td>2.0±0.1</td>
<td>0.39±0.01</td>
<td>2.9±0.1</td>
<td>PA-PA-P</td>
</tr>
<tr>
<td>Leptasia nina georgi</td>
<td>2.3±0.1</td>
<td>2.0±0.2</td>
<td>0.44±0.01</td>
<td>2.1±0.3</td>
<td>AA-AP</td>
</tr>
<tr>
<td>Catopsilia pomona pomona</td>
<td>2.2±0.04</td>
<td>3.0±0.3</td>
<td>0.45±0.02</td>
<td>3.2±0.3</td>
<td>AA-AP</td>
</tr>
<tr>
<td>C. pyranthe pyranthe</td>
<td>2.2±0.01</td>
<td>3.2±0.3</td>
<td>0.50±0.01</td>
<td>3.1±0.4</td>
<td>AA-AP</td>
</tr>
<tr>
<td>Hebowoia glaucippe formosana</td>
<td>2.1±0.04</td>
<td>2.8±0.2</td>
<td>0.47±0.02</td>
<td>4.0±0.4</td>
<td>AA-AP</td>
</tr>
<tr>
<td>Ixias pyrene insignis</td>
<td>2.2±0.2</td>
<td>2.3±0.3</td>
<td>0.47±0.03</td>
<td>2.6±0.4</td>
<td>AA-AP</td>
</tr>
</tbody>
</table>

P<0.05 (T-test)
In case of under 4 specimens the standard error is omitted.

(Fig. 2). It protrudes rather strongly to the posterior direction, and also dorsally, though its central part is a little depressed. The dorsal projection of triangular intermediate plate is considerably high. The postocular plate is protruded weakly. Proximally running fine lines cover over the marginal furrow and the scaled region. The marginal furrow is narrowest (F/d=1.8). The occipital type belongs to AA-AA.

2) Eurema (Photo 2, 15–22, 66–69)

The occipital prominence is not divided. It protrudes largely to the posterior direction having a special prominence at its dorsal center. The prominence makes a reversed V-shaped line. The triangular intermediate plate also projects rather strongly. The postocular plate is convex very weakly. The postoccipital-
The occipital prominence of the posterior and dorsal directions. In the marginal furrow and scaled region structural characters are similar to that of *Leptidea*. The marginal furrow is widest (F/d = 4.1). The occipital type is AA-AA.

6) *Anthocharis* (Photo 6, 35-38, 76, 77)

The occipital prominence protrudes remarkably to the posterior direction provided with a slightly caved portion in the dorsal part as in Fig. 4. The intermediate plate is shaped like a slender triangle and hardly projecting dorsally. The postocular plate is protuberant rather hard. The structure of marginal furrow and scaled region resembles that of *Eurema* except that the inner part of scaled region has stout wrinkles running to all directions. W/W ratio (5.5) is very large. The occipital type belongs to AA-AA.
occipital region in Pieridae (Lepidoptera)

ception in inner part, the outer part of which is covered with big proximally running wrinkles. The sensory organ is absent. w/W ratio (0.59) is largest. The occipital type belongs to AA-AA.

7) Pieris (Photo 7, 39-46, 78-81)

The occipital prominence protrudes weakly to the posterior and dorsal directions. The intermediate plate, somewhat slender quadrangle shaped, projects markedly to the dorsal direction. In P. melete the plate seems longer than in P. nape. The postocular plate is weakly protruded. The structure of marginal furrow and scaled region is the same as that of Eurema, though in P. rapae small tubercles are scattered in the inner part of the latter. In P. canidia small tubercles are found in the scaled region and many fine wrinkles running to all directions in its inner part. The occipital type of P. napi and P. melete belong to AA-AA. Those of P. canidia and P. rapae are AA-PiP1 and AA-AP1, respectively.

8) Appias (Photo 8, 47-54, 82-85)

The structure of the occipital region is similar to that of Pieris except in the followings.

1. The occipital prominence and postocular plate protrude more weakly than those of Pieris.

2. The occipital type is PiA-PiP1 in A. paulina and A. nero, though AA-PiP1 in A. albina and A. lyncida.

3. W/W ratio (0.39) is smaller.

The scaled region has small tubercles. Only in A. paulina and A. nero the outer part of marginal furrow has also them. Moreover dorso-ventral wrinkles and fine wrinkles running to all directions are seen in A. albina and in the others, respectively in the inner part of scaled region.

9) Leptosia (Photo 9, 55, 56, 86)

The structure of occipital region resembles that of Pieris, but the followings are different.

1. The projection of intermediate plate is rather weaker.

2. The shape of intermediate plate makes a triangle.

3. The postocular plate is smaller.

4. The inner part of marginal furrow is covered with proximally running fine wrinkles.
5. W/H ratio (2.3) is larger while w/h one (2.0) is smaller.

The occipital type belongs to AA-PIp₁.

10) *Catopsilia* (Photo 10, 57–60, 87, 88)

The occipital structure resembles that of *Appias*, but is distinguishable by the following points.
1. The intermediate plate projects very slightly to the dorsal direction.
2. The intermediate plate makes a triangle.
3. The inner part of scaled region is provided with dorso-ventral big wrinkles.
4. The occipital type belongs to AA-AA.

11) *Hebomoia* (Photo 11, 61, 62, 89)

The structure of occipital region is similar to that of the *Catopsilia* with the exception of the followings.
1. The intermediate plate is melanized more weakly, especially in the top.
2. The intermediate plate protrudes more sharply.
3. The occipital type is AA-PIp₁.

12) *Ixias* (Photo 12, 63, 64, 90)

The occipital prominence protrudes weakly to the posterior and dorsal directions. Besides the intermediate plate and the postocular plate are slightly protuberent. The outer part of marginal furrow and the central part of scaled region are provided with proximally running fine lines. Furthermore inner part of the latter bears big lines while the rest is smooth. The occipital type is AA-AA.

**GROUPING OF PIERIDAE BASED ON THE OCCIPITAL STRUCTURE**

In Pieridae the occipital structure varies according to genus or species as mentioned above. *Leptidea*, however, is independently different from the other genera in having divided occipital prominence. This must be a diagnostic indicator in the occipital structure (Group A).

The others, with the undivided occipital prominence (Group B), are separable into 2 main groups and 4 subgroups based on the grade of protruded occipital prominence and the height of intermediate plate.

**Group I.** The occipital prominence protrudes greatly to the posterior direction. *Eurema, Colias, Gonepteryx, Aporia* and *Anthocharis* belong to this group. The occipital type is uniformly AA-AA.

Subgroup 1. The intermediate plate projects highly to the dorsal direction. This subgroup contains *Eurema*.

Subgroup 2. The intermediate plate projects weakly to the dorsal directions. *Colias, Gonepteryx, Aporia* and *Anthocharis* belong to this subgroup. *Anthocharis*
is distinguished from the others in the slender intermediate plate and in the occipital prominence with depressed dorsal part. Then Aporia differs from the others in w/W and F/d ratios. Besides Colias is discriminated from Gonepteryx in w/W ratio (Col. 0.55, Gon. 0.58) and the grade of posterior protrusion in the occipital prominence.

**Group II.** The occipital prominence protrudes weakly to the posterior direction. This group includes Pieris, Appias, Catopsilia, Hebomoia, Leptosia and Ixias. The occipital type varies from AA-AA to PA-PP.

Subgroup 3. The intermediate plate projects sharply to the dorsal direction. This subgroup contains Pieris, Appias, and Leptosia. Leptosia is separated from the others by the slender shape of intermediate plate. Pieris and Appias are very similar to each other, though w/W ratio is different (Pie. 0.44, App. 0.39). The occipital type is not uniform though small tubercles are grown in many species.

Subgroup 4. The intermediate plate projects faintly to the dorsal direction. Catopsilia, Hebomoia and Ixias belong to this subgroup. Catopsilia and Hebomoia are separable from Ixias by the extremely poorly protruded occipital prominence. Moreover Catopsilia is distinguished from Hebomoia by F/d ratio (Cat. 3.2, Heb. 4.0) and dorsal coloration of intermediate plate. The occipital type varies from AA-AA to AA-PP.

The grouping of Pieridae based on the occipital structure is shown as in Fig. 5.

**COMPARISON OF PIERIDAE WITH NYMPHALIDAE, LIBYTHEIDAE AND PAPILIONIDAE IN THE OCCIPITAL STRUCTURE**

The occipital region of Pieridae comprises the dorsal part of occiput, the postocular plate and the occipital foramen as seen in Nymphalidae, Libytheidae and Papilionidae (Tsubuki and Koyama, 1978). The range of W/H ratio in Pieridae is the same as that in Papilionidae, which is shown in Table 3.

The dorsal part of occiput in Pieridae intrudes into the postocular plate, though not so strongly as that in Papilionidae. In the structure of the dorsal
Table 3. The characters of occipital structure in 4 families.

<table>
<thead>
<tr>
<th>Family</th>
<th>W/H</th>
<th>w/h</th>
<th>w/W</th>
<th>F/d</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pieridae</td>
<td>1.8~2.3</td>
<td>2.0~3.5</td>
<td>0.38~0.60</td>
<td>1.8~4.5</td>
</tr>
<tr>
<td>Papilionidae</td>
<td>1.8~2.3</td>
<td>1.7~2.9</td>
<td>0.43~0.85</td>
<td>1.4~3.4</td>
</tr>
<tr>
<td>Nymphalidae</td>
<td>1.7~2.6</td>
<td>1.5~3.3</td>
<td>0.29~0.53</td>
<td>2.0~6.3</td>
</tr>
<tr>
<td>Libytheidae</td>
<td>2.5</td>
<td>2.9</td>
<td>0.40</td>
<td>2.3</td>
</tr>
</tbody>
</table>

part of occiput, Pieridae is characterized by w/h ratio indicating the part is laterally long. It is much bigger than that in the other 3 families (Table 3). Besides the occipital prominence is very large and the intermediate plate very small situated laterally. w/W ratio is ordered Papilionidae > Pieridae > Nymphalidae and Libytheidae (Table 3). The connection part is absent as in Papilionidae.

In the postocular plate Pieridae is similarly composed of 5 parts as the other 3 families, and the peripheral part of compound eye develops very poorly. The occipital type is generally AA-AA as in Papilionidae.

In the occipital foramen, the ventral one is narrower and higher than that in the other families. The probosidial fossa is also deeper.

LITERATURE


———, 1981. Structure of the occipital region in Papilionidae (Lepidoptera) from Japan. (in press)

Photo 1–12. Lateral view of head (×17, except for 8, 10.)
1. *Leptidea amurensis*  
2. *Eurema hecabe*  
3. *Colias erate*  
4. *Gonepteryx rhamni*  
5. *Aporia crataegi*  
6. *Anthocharis scolympus*  
7. *Pieris rapae*  
8. *Appias paulina* (×14)
9. *Leptosia nina*  
10. *Catopsilia pomona* (×14)  
11. *Hebomoia glaucippe* (×11)  
12. *Ixias pyrene*  

Photo 13-64. Posterior view(left) and dorsal view(right) of head (×17) except for 47~54, 57~62)  
13, 14. *Leptidea amurensis*  
15, 16. *Eurema hecabe*
Occipital region in Pieridae (Lepidoptera)

17

18

19

20

21

22

23

24

III 17, 18. *Eurema laeta*  
21, 22. *E. blanda*  
19, 20. *E. brigitta*  
23, 24. *Colias erate*
25, 26. Colias palaeno
29, 30. G. aspasia
27, 28. Gonepteryx rhamni
31, 32. Aporia crataegi
Occipital region in Pieridae (Lepidoptera)

V 33, 34. *Aporia hippia*  
37, 38. *A. cardamines*  
35, 36. *Anthocharis scolymus*  
39, 40. *Pieris rapae*
VI 41, 42. *Pieris melete*
43, 44. *P. napi*
45, 46. *P. canidia*
47, 48. *Appias paulina* (×14)
Occipital region in Pieridae (Lepidoptera)

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VII 49, 50. *Appias albina* (×14)

51, 52, 53, 54, 55, 56. *A. lyncida* (×14)

56. *Leptosia nina*
57, 58. *Catopsilia pomona* (×14) 59, 60. *C. pyranthe* (×14)
61, 62. *Hebomoia glaucippe* (×11) 63, 64. *Ixias pyrene*
IX  Photo 65-90. Occipital structure (x 250)

65. Leptidea amurensis  66. Eurema hecabe
67. E. leeta  68. E. brigitta
69. E. blanda  70. Colias erate
71. C. palaeno  72. Gonepteryx rhamni
X 73. Gonepteryx aspasia 74. Aporia crataegi
75. A. hippia 76. Anthocharis scolytus
77. A. cardamines 78. Pieris rapae
79. P. melete 80. P. napi
Occipital region in Pieridae (Lepidoptera)

XI 81. *Pieris canidia*       82. *Appias paulina*
83. *A. albina*                84. *A. lyncida*
85. *A. nero*                  86. *Leptosia nina*
87. *Catopsilia pomona*        88. *C. pyranthe*
89. *Hebomoia glaucippe* 90. *Ixias pyrene*