

## NOTES AND DESCRIPTIONS OF AFROTROPICAL *APPAS* BUTTERFLIES (LEPIDOPTERA: PIERIDAE)

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**Abstract:** Samples of butterflies of the genus *Appias* are studied upon material obtained in the Guinea-Bissau, São Tomé e Príncipe, and Angola. Five new subspecies are described: three of *A. epaphia*, from Angola, São Tomé island and Príncipe island; one of *A. sylvia*, from Angola; and one of *A. phaola* from Angola. Notes are presented on the remaining species/subspecies known to occur in the ancient Portuguese colonies.

**Key words:** Lepidoptera, Pieridae, *Appias*, faunistics, new subspecies, Africa.

### Notas y descripciones de mariposas afrotropicales del género *Appias* (Lepidoptera: Pieridae)

**Resumen:** Se presentan los resultados de diversos muestreos de mariposas del género *Appias* provenientes de Guinea-Bissau, de São Tomé y Príncipe y de Angola. Se describen cinco nuevas subspecies: tres son de *A. epaphia*, de Angola, de la isla de São Tomé y de la del Príncipe; una es de *A. sylvia*, de Angola; y una más de *A. phaola*, también de Angola. Se presentan notas sobre las restantes especies y subspecies conocidas de los países africanos de habla oficial portuguesa.

**Palabras clave:** Lepidoptera, Pieridae, *Appias*, faunística, subspecies nuevas, África.

#### Taxonomy / Taxonomía:

*Appias epaphia piresi* ssp.n.

*Appias epaphia aequatorialis* ssp.n.

*Appias epaphia angolensis* ssp. n.

*Appias phaola uigensis* ssp. n.

*Appias sylvia ribeiroi* ssp. n.

Genus *Appias* Hübner, 1819, the Albatrosses, is known from the Afrotropical Region and from Madagascar by 6 species and 18 subspecies (Ackery *et al.*, 1995; D'Abrera, 1997) of mainly sylvicolous butterflies, which caterpillars feed especially on Capparaceae and on Euphorbiaceae. Larsen (2005) assigns that the genus is also well represented in the Oriental Region and occurs in the Neotropics.

In the present contribution five new subspecies are described – three of *A. epaphia*, one of *A. phaola* and one of *A. sylvia* – and compared with the known ones; furthermore, some notes and new data will be added to the knowledge of most of the remaining Afrotropical species of the genus, namely in what the African Portuguese Speaking Countries (PLP's) are concerned.

The studied material belongs to the entomological collections of the Instituto de Investigação Científica Tropical / IICT (abbreviated as CZ), of the Museu Nacional de História Natural / Museu Bocage (MB), of the junior co-author (BS: definitive registration number, bs: provisional registration number – partially deposited in the CZ); samples in the Lieutenant Colonel António Figueira (AF) and Mr. João Pedro Cardoso (JPC, collected by L. Miguel Cardoso) private collections are also studied. A few samples lack registration number (sn).

Some specimens were obtained in the São Tomé island during the zoological mission held by the MB and the Faculty of Sciences of the Lisbon University in 1984 (MZFCUL); among the material stored in the CZ, two specimens from the Príncipe were collected by the former researcher of the IICT Eng. J. Rosário Nunes (RN, now retired) and one by Mr. Décio de Passos (DP, then the Príncipe airport meteorologist); other samples were collected in

the Príncipe island by Dr. Carlos Pires (CP) and by Prof. Artur Serrano (AS). Remaining studied material was obtained during the fieldwork coordinated by Prof. F. Frade (main collector, Mr. L. Paulos) during the activity of the Projects Estudos Apícolas do Ultramar (EAU) in Angola, and Missão Científica de São Tomé (MCST) in the São Tomé e Príncipe. Guinea-Bissau samples were collected during the fieldwork supported by the Project “Estudo do Parque Natural das Lagoas de Cufada (Guiné-Bissau)” (PNLC). The Golungo Alto specimens in the MB were part of the Colonel Mário Macedo (MM) private collection, offered to that institution by his widow, Miss Cândida Macedo.

Afterwards (Table I), we present a list of the administrative Province as well as of the coordinates (latitude, longitude, altitude) for each one of the localities from where *Appias* samples are known in the ancient Portuguese colonies.

#### Taxonomic study

*Appias epaphia epaphia* (Cramer, 1779)

Fig. 1-4, 37.

MATERIAL EXAMINED: GUINEA-BISSAU: QUINARA: Buba, gardens and fallows around the town, XI/1997, PNLC, 1 ♂ (CZ-4905); Id., 1 ♂ (CZ-4906); Id., 1 ♂ 1 ♀ (CZ-4915); Id., XI/2002, 1 ♀ (CZ-5169). Between Cantanha and the Cufada Lake, path in dry forest, II/2001, PNLC, 1 ♂ (CZ-5062). Incassol, dry heavy forest close to the village, II/2001, PNLC, 1 ♂ (CZ-5081)

PREVIOUS REFERENCES to the Guinea-Bissau: The 1997 re-examined samples were reported by Sousa & Mendes (1999) as a faunistic novelty to the country and concern

Table I.

Locality	Province	Latitude	Longitude	Alt. (m)
<b>ANGOLA</b>				
Bom Jesus	Bengo	09° 10' S	13° 34' E	85
Buco Zau	Cabinda	04° 46' S	12° 34' E	350
Cacuaco	Bengo	08° 47' S	13° 21' E	< 50
Calandula	Malanje	09° 06' S	15° 57' E	1110
Calulo	Kuanza Sul	09° 59' S	14° 54' E	990
Cassoalala	Kuanza Norte	09° 29' S	14° 22' E	< 50
Catete	Bengo	08° 35' S	13° 42' E	< 50
Caxito	Bengo	08° 35' S	13° 40' E	< 50
Dalatando	Kuanza Norte	09° 18' S	14° 55' E	780
Duque de Bragança	See: Calandula	---	---	---
Estrada de Catete	See: Luanda	---	---	---
Ibid., Km. 19	See: Luanda	---	---	---
Estrada de Grafanil	See: Luanda	---	---	---
Estrada da Muxima	See: Luanda	---	---	---
Golungo Alto	Kuanza Norte	09° 08' S	14° 46' E	630
Grafanil	Luanda	08° 53' S	13° 18' E	90
Inga	Uige	07° 27' S	14° 27' E	600
Luanda	Luanda	08° 50' S	13° 15' E	50-70
Luanda/Aeroporto	See: Luanda	---	---	---
Lucala	Malanje	09° 24' S	15° 02' E	400
N'Dalla Tando	See: Dalatando	---	---	---
Novo Redondo	See: Sumbe	---	---	---
Quiçama	Bengo	09° 11' S	13° 23' E	130
Quicolo	Luanda	08° 48' S	13° 20' E	60
Quiminha	Bengo	08° 58' S	13° 47' E	120
Roça Rio Bimbe	Kuanza Sul	11° 05' S	14° 13' E	ca. 450
Salazar	See: Dalatando	---	---	---
Sumbe	Kuanza Sul	11° 12' S	13° 51' E	50
Tentativa	Bengo	08° 36' S	13° 36' E	< 50
Viana	Luanda	08° 54' S	13° 23' E	110
Zenza do Itombe	Kuanza Norte	09° 17' S	14° 13' E	95
<b>GUINEA-BISSAU *</b>				
Buba	Quinara	12° 24' N	14° 59' W	< 50
Cantanha to Cufada Lake	Quinara	12° 17' N	15° 04' W	< 50
Incassol	Quinara	12° 15' N	14° 55' W	< 50
* - All the localities in the Parque Natural das Lagoas de Cufada (PNLC)				
<b>MOZAMBIQUE *</b>				
Espungabera	Manica	20° 28' S	32° 45' E	820
"Gazaland"	Gaza-Undeterminable	?	?	?
Sipungabera	See: Espungabera	---	---	---
* - All the data obtained from the literature				
<b>SAO TOMÉ E PRÍNCIPE</b>				
<b>Príncipe Island *</b>				
Aeroporto (Airport)	---	01° 40' N	07° 25' E	90
Maria Correia	---	01° 36' N	07° 20' E	50
Roça Esperança	---	01° 38' N	07° 25' E	130
Roça Sundy	---	01° 40' N	07° 23' E	160
St.º António (town)	---	01° 39' N	07° 25' E	< 50
Terreiro Velho	---	01° 37' N	07° 26' E	220
* - The Príncipe Island is not divided in administrative provinces				
<b>São Tomé Island</b>				
Água Izé	Cantagalo	00° 13' N	06° 44' E	< 50
Ilhéu das Cabras	Água Grande	00° 25' N	06° 43' E	< 50
Lagoa Azul	Lobata	00° 25' N	06° 37' E	< 50
Morro Peixe	Lobata	00° 24' N	06° 39' E	60
St.ª Catarina	Lembá	00° 16' N	06° 29' E	< 50
Porto Alegre	Caué	00° 02' N	06° 32' E	< 50

material obtained by the 1st zoological PNLC mission; 2001 samples were obtained by the 3rd and 2002 material by the 4th zoological missions supported by the same Project.

GEOGRAPHIC DISTRIBUTION: After Ackery *et al.* (1995) and D'Abreu (1997) *A. epaphia epaphia* flies from Senegal to Zaire and western Uganda. Larsen (2005) registers that it occurs from West Africa to Kenya, western to the Rift Valley.

BIOTOPE: Degraded forest, riverine forest and heavy wood. Buba specimens were obtained in degraded semi-arid biotopes around the town, including gardens with exotic flowers; this means that in Guinea-Bissau also it is well adapted to dry and disturbed areas as Larsen (2005) registers to other West African towns.

NOTES: Kielland (1990), Ackery *et al.* (1995) and Larsen (1996, 2005) assign the caterpillars to feed on Capparaceae (species of *Boscia*, *Capparis*, *Maerua*, *Niebuhria* and *Ritchiea*) and on Cleomeaceae (species of *Cleome*). In the PNLC Catarino (2002) reports *Capparis erythrocarpus* and *Cleome viscosa* only, which represent the potential food-plants inside this protected area.

#### *Appias epaphia contracta* (Butler, 1888)

MATERIAL EXAMINED: None

PREVIOUS REFERENCES to Mozambique: *A. epaphia contracta* was reported to Mozambique by van Son (1949, as the morph *albida* ♀ of *A. e. orbona*) upon material collected in "Gazaland" (Gaza district, Southern Mozambique) in June. Later (Dickson & Kroon, 1978) it was assigned to Rhodesia, Eastern Transvaal and Mozambique (precise location in this last country, never registered).

GEOGRAPHICAL DISTRIBUTION: After Ackery *et al.* (1995) and D'Abreu (1997) the subspecies lives in the southern and eastern Africa and in the Comoro Islands.

BIOTOPE: Probably the same as for the nominal subspecies. NOTES: In South Africa, the caterpillars are known to occur (van Son, 1949) on *Capparis* sp. (Capparaceae). In Mozambique, several species of this genus were assigned to the Gaza area (Wild, 1960), namely *Capparis tomentosa*, *C. sepiaria*, *C. lilacina* and *C. rosea*, and shall represent the local host-plants.

#### *Appias epaphia piresi* ssp.n.

Fig. 5-8, 38

MATERIAL EXAMINED: SÃO TOMÉ E PRÍNCIPE: *Príncipe Island*: Roça Sundy, AS, 1 ♂ holotype 1 ♀ allotype 1 ♂ paratype (CZ-5262); Id., XI/1954, MCST, 1 ♂ paratype (CZ-2299); Id., VIII/1955, MCST, 2 ♂♂ 1 ♀ paratypes (CZ-2514). Airport, XI/1955, DP, 1 ♀ paratype (CZ-2409). Maria Correia, V/1986, CP, 2 ♂♂ 2 ♀♀ paratypes (BS-18939-18942). Roça Esperança, XI/1954, MCST, 2 ♀♀ paratypes (CZ-2328). Locality ?, ?/1969, RN, 1 ♂ 1 ♀ paratypes (CZ-4918)

DIAGNOSIS: Length of antenna: 11.8-12.0 mm (♂) always damaged in the ♀; length of forewing: 24.0-26.9 mm (♂) 24.0-27.2 mm (♀); wingspan: 52.4-56.8 mm (♂) 50.2-57.0 mm (♀). Scale pattern of the wings (retro and verso) as in Figs. 5-8, valva of ♂ as in Fig. 38.

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**Fig. 1-4.** *Appias e. epaphia* (Cramer, 1779): 1. ♂ dorsal. 2. ♂ ventral. 3. ♀ dorsal. 4. ♀ ventral. **Fig. 5-8.** *Appias epaphia piresi* ssp.n.: 5. ♂ dorsal. 6. ♂ ventral. 7. ♀ dorsal. 8. ♀ ventral. **Fig. 9-12.** *Appias epaphia aequatorialis* ssp. n.: 9. ♂ dorsal. 10. ♂ ventral. 11. ♀ dorsal. 12. ♀ ventral. **Fig. 13-18.** *Appias epaphia angolensis* ssp.n.: 13. ♂ dorsal. 14. ♂ ventral. 15. "white" ♀ dorsal. 16. "white" ♀ ventral. 17. "light yellow" ♀ dorsal. 18. "light yellow" ♀ ventral.





**ETYMOLOGY:** The new subspecies is dedicated to our colleague and friend Dr. Carlos Pires, specialist on sand-flies (Diptera: Psychodidae: Phlebotominae) at the Instituto de Higiene e Medicina Tropical, in Lisbon, who collected part of the type material.

**DISCUSSION:** Relatively to the nominal subspecies and in the male, *A. e. piresi* ssp.n. shows more acute forewing, clearly less extended and more yellowish area in the basal verso forewing and reduced blackish apical area in this same wing surface; in the female, there is a conspicuous reduction of the orange-golden scales of the verso forewing and a reduction of the white areas of the forewing retro.

**BIOTOPE:** The specimens come from mixed zones, where more or less degraded areas exist close to the border of forest remains and to cocoa plantations.

**NOTES:** None host-plant is known in the Príncipe; indeed, after Exell (1973) none plant of genera *Boscia*, *Capparis*, *Maerua*, *Ritchiea* and *Nebuhria* (Capparaceae assigned as potential food-plants to the species) is known to occur in the island. The *A. epaphia* samples assigned by Pyrcz (1992) to St.º António and to the Terreiro Velho certainly belong to this new subspecies.

***Appias epaphia aequatorialis* ssp.n.**

Fig. 9-12, 39.

**MATERIAL EXAMINED: SÃO TOMÉ E PRÍNCIPE: São Tomé Island:** LOBATA: Morro Peixe, VI/1984, AS, 1 ♂ holotype, 2 ♂♂ paratypes (BS-18816, 19041-19042); Id., MZFCUL, 1 ♂ paratype (MB-sn). AGUA GRANDE: Ilhéu das Cabras, 13/XI/1993, JPC, 1 ♂ paratype (JPC-72). CAUÉ: Porto Alegre, X/1954, MCST, 1 ♀ allotype 1 ♀ paratype (CZ-2370). LEMBÁ: St.ª Catarina, VI/1984, AS, 1 ♀ paratype (BS-18817).

**DIAGNOSIS:** Length of antenna: 11.0-11.5 mm (♂) 11.7-12.2mm (♀); length of forewing: 25.5-26.9 mm (♂) 26.6-27.8 mm (♀); wingspan: 53.5-56.8 mm (♂) 55.2-56.4 mm (♀). Scale pattern of wing (retro and verso) as in Figs. 9-12, the valva of ♂ as in Fig. 39.

**ETYMOLOGY:** The new subspecies is named according to the geographical position of the São Tomé Island; as a matter of fact, the Equator crosses the Ilheu das Rolas (Rolas' Islet), in the extreme South of the São Tomé main island, off the village of Porto Alegre.

**DISCUSSION:** *A. e. aequatorialis* ssp.n. approaches the just described *A. e. piresi* ssp.n., from which it can be distinguished in the male sex by the even more reduced area (as well as number of vein's apical dots) with black scales. The female is the darkest of all the described subspecies even when compared with *A. e. piresi* ssp.n., from which it is well individualized, furthermore, on account of the quite visible verso golden-orange scales of the basal forewing.

**BIOTOPE:** The specimens were collected more or less close to forest (Porto Alegre and St.ª Catarina areas), where some reduced forest patches remain (Morro Peixe) or on the savannah area of Ilhéu das Cabras (Cabra's Islet), a small islet north of the São Tomé town, lacking trees.

**NOTES:** One only species of Capparaceae is known (Exell, 1973) to occur in the São Tomé Island, *Capparis tomentosa* and shall correspond to the subspecies host-plant.

Pyrcz (1992) assigns *A. epaphia* to Água Izé and to the Lagoa Azul (as Laguna Azul) based on specimens that, with no doubts, belong to the new subspecies.

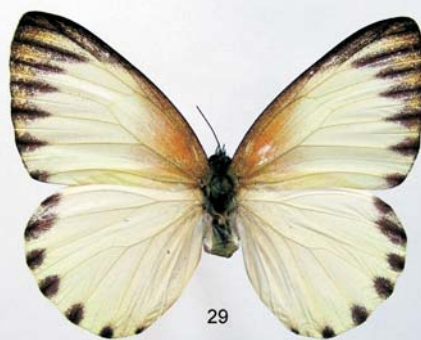
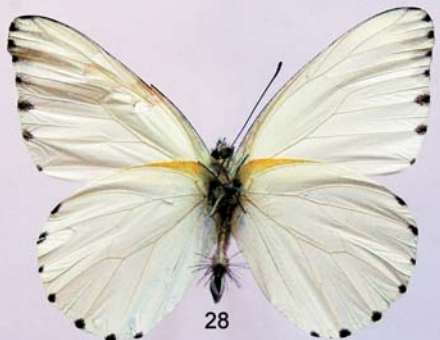
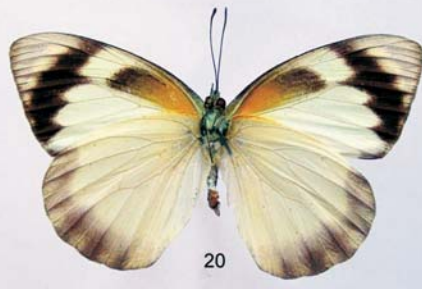
***Appias epaphia angolensis* ssp. n.**

Figs. 13-20, 40.

**MATERIAL EXAMINED: ANGOLA: LUANDA:** Luanda, town, VIII/1974, 1 ♂ holotype (BS-11614) 1 ♀ allotype BS-11571) 11 ♂♂ 25 ♀♀ paratypes (bs-11569-11570, 11575-11578, 11580-11585, 11587-11589, 11591, 11593, 11595, 11596, 11602-11608, 11610, 11613, 11622, 11626, 11627, 11637, 11638, 11641, 11813); Id., VII/1957, EAU, 1 ♀ paratype (CZ-2858); Id., VI/1971, 6 ♂♂ 2 ♀♀ paratypes (bs-437, 438, 444, 453, 455, 460, BS-11232, 11234); Id., VII/1971, 2 ♂♂ 5 ♀♀ paratypes (AF-PI102012-PI102018), 1 ♂ 4 ♀♀ paratypes (AF-sn), AF, 1 ♀ paratype (MB-8503); Id., VIII/1971, 1 ♂ paratype (BS-11231), 2 ♂♂ paratypes (AF-sn); Id., X/1971, 1 ♂ paratype (AF-sn); Id., VI/1972, 1 ♂ 1 ♀ paratypes (bs-575, 578), 1 ♂ paratype (AF-sn); Id., VII/1972, 4 ♂♂ 9 ♀♀ paratypes (AF-PI102032-PI102044), 7 ♂♂ 18 ♀♀ paratypes (AF-sn); Id., VII/1973, 1 ♀ paratype (AF-sn); Id., III/1974, 1 ♀ paratype (BS-11235); Id., VI/1974, 2 ♀♀ paratypes (bs-11636, 11659); Id., VII/1974, 18 ♂♂ 30 ♀♀ paratypes (bs-11568, 11572-11574, 11590, 11597, 11599-11601, 11611, 11612, 11615, 11617, 11618, 11620, 11621, 11623-11630, 11632, 11634, 11635, 11639-11642, 11644, 11645, 11647-11651, 11654-11658, 11660-11662, 11683). Aeroporto e estrada de Grafanil, VI/1971, 3 ♂♂ 1 ♀ paratypes (AF-PI102003-PI102006); Id., IX/1971, 1 ♂ paratype (AF-PI102026); Id., VI/1972, 1 ♂ 1 ♀ paratypes (AF-PI102027-PI102028); Id., XII/1972, 1 ♀ paratype (AF-PI102047). Estrada de Catete, VI/1971, 4 ♂♂ 1 ♀ paratypes (AF-sn), AF, 1 ♂ paratype (MB-8524); Id., VI/1972, 2 ♂♂ paratypes (AF-sn). Estrada de Catete, Km. 19, VII/1957, EAU, 1 ♀ paratype (CZ-2849). Caxito, VIII/1972, 2 ♂♂ 3 ♀♀ paratypes (AF-sn). Estrada da Muxima, Luanda, VII/1972, 1 ♂ paratype (AF-sn); Id., IX/1972, 1 ♂ paratype (AF-sn). Grafanil, VI/1971, 3 ♂♂ 1 ♀ paratypes (AF-sn); Id., VII/1971, 3 ♂♂ paratypes (AF-sn); Id., IX/1971, 1 ♂ 1 ♀ paratypes (AF-sn); Id., VI/1972, 2 ♂♂ paratypes (AF-sn). Quicolo, VI/1970, 1 ♀ paratype (AF-PI102001). Viana, VI/1971, 1 ♂ paratype (bs-454). MALANJE: Lucala, VI/1973, 1 ♂ 1 ♀ paratypes (AF-sn). BENGÓ: Bom Jesus, VI/1971, 1 ♂ paratype (bs-440), 2 ♀♀ paratypes (AF-sn). Cacuaco, VI/1970, 1 ♂ paratype (AF-PI102002); Id., VIII/1971, 1 ♂ 1 ♀ paratypes (AF-PI102022-PI102023), 1 ♂ 1 ♀ paratypes (AF-sn). Catete, VIII/1957, EAU, 1 ♂ paratype (CZ-2857); Id., VII/1971, 1 ♂ paratype (bs-445); Id., VI/1972, 1 ♂ 1 ♀ paratypes (BS-11233, 11237), 2 ♂♂ 1 ♀ paratypes (AF-PI102029-PI102031). Quiçama, VIII/1971, 1 ♂ paratype (AF-PI102021). Quiminha, VII/1971, 2 ♂♂ paratypes (AF-PI102019-PI102020), 2 ♂♂ paratypes (AF-sn); Id., IV/1973, 1 ♂ paratype (AF-sn); Id., XI/1973, 1 ♀ paratype (bs-2929). Tentativa, VIII/1971, 1 ♀ paratype (AF-PI102024), 2 ♂♂ paratypes (AF-sn); Id., IX/1971, 1 ♀ paratype (AF-PI102025), 1 ♂ paratype (AF-sn). KUANZA NORTE: Cassoalala, X/1971, 1 ♀ paratype (bs-461). Golungo Alto, ?/1962, MM, 2 ♂♂ 2 ♀♀ paratypes (MB-17165-17166, 17172-17173). Salazar, IX/1972, 2 ♂♂ paratypes (AF-PI102045-

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**Fig. 19-20.** *Appias epaphia angolensis* ssp.n.: 19. "dark yellow" ♀ dorsal. 20. "dark yellow" ♀ ventral. **Fig. 21-22.** *Appias perlucens* (Butler, 1898): 21. ♂ dorsal. 22. ♂ ventral. **Fig. 23-26.** *Appias phaola uigensis* ssp.n.: 23. ♂ dorsal. 24. ♂ ventral. 25. ♀ dorsal. 26. ♀ ventral. **Fig. 27-30.** *Appias s. sabina* Felder, 1865: 27. ♂ dorsal. 28. ♂ ventral. 29. ♀ dorsal. 30. ♀ ventral. **Fig. 31-32.** *Appias sylvia sylvia* (Fabricius, 1775): 31. ♀ dorsal. 32. ♀ ventral. **Fig. 33-36.** *Appias sylvia ribeiroi* ssp.n.: 33. ♂ dorsal. 34. ♂ ventral. 35. ♀ dorsal. 36. ♀ ventral.



PI102046), 1 ♂ paratype (AF-sn); Id., VII/1973, 1 ♀ paratype (AF-sn). Zenza do Itombe, VII/1971, 5 ♂♂ 1 ♀ paratypes (bs-436, 443, 447, 448, 457, 459), 4 ♂♂ 1 ♀ paratypes (AF-PI102007-PI102011) 3 ♂♂ paratypes (AF-sn); Id., VIII/1971, 1 ♂ paratype (AF-sn). KUANZA SUL: Novo Redondo, II/1963, 1 ♀ paratype (BS-11236). Roça Rio Bimbe, II/1963, 1 ♂ paratype (BS-11230); Id., V/1971, 1 ♀ paratype (bs-452).

**PREVIOUS REFERENCES** to Angola: Bacelar (1958) registers *A. e. epaphia* to the Golungo Alto (Kuanza Norte – included in a paper mostly on the Cabinda lepidoptero fauna) upon material disappeared in the 1978 MB's fire (or even before that), impossible to re-examine; almost certainly it belongs to this new subspecies.

**DIAGNOSIS:** Length of antenna: 10.0-11.7 mm (♂) 10.0-11.6 mm (♀); length of forewing: 22.4-25.7 mm (♂) 23.0-28.4 mm (♀); wingspan: 47.2-55.8 mm (♂) 49.2-59.6 mm (♀). Wings pattern (verso and retro) as in Figs. 13-20, valva of ♂ as in Fig. 40.

**ETYMOLOGY:** The new subspecies is named after the geographical origin of the known samples, Angola.

**DISCUSSION:** The males of *A. e. angolensis* ssp.n. show along the year (from May to October, also once in February) a complete lack of black marginal dots on the hindwing (retro and verso) like the dry-season morph males of *A. e. contracta* in "Rhodesia" (Dickson & Kroon, 1978, as *A. e. orbona*), though the black apical dots of the nerves do exist in this last one in the wet-season males; besides, the verso basal orange area of the forewing in the new subspecies, is more contrasting and much more extended than in *A. e. contracta*, attaining at least half the cell's length, and the forewing distal area is clearly rounder.

The valva shape, more or less angled in the new subspecies, is also distinct from what was represented to *A. e. orbona* in South Africa (van Son, 1949, as *A. e. f. orbona*), as well as for the remaining described subspecies. In what the females are concerned, new subspecies is polymorphic and the main three observed types, independent from the season (most of them from July and August), match the morphs known in the South African *A. e. orbona* (Dickson & Kroon, 1978), considered typical to the wet and to the dry-season.

**BIOTOPE:** Part of the samples was obtained in dry or in humid forest areas; material from Luanda was collected in arboreal savannah mixed with dry forest patches.

**NOTES:** In the littoral and sub-littoral areas of the north-western Angola (Bengo to Kuanza Sul) Grandvaux-Barbosa (1970) assigns the occurrence of several potential host-plants as *Capparis erythrocarpus*, *C. subglabra*, *Maerua angolensis*, as well as *Boscia urens* and *B. welwitschii* (Capparaceae).

*Appias lasti lasti* Grose-Smith, 1889

MATERIAL EXAMINED: None.

PREVIOUS REFERENCES to Mozambique: Not traced.

GEOGRAPHICAL DISTRIBUTION: After Ackery *et al.* (1995) and D'Abrera (1997) the subspecies flies from Kenya to Tanzania and Mozambique.

BIOTOPE: Coastal forests

NOTES: The caterpillars of *A. lasti* are known (Kielland, 1990, Larsen, 1996) to feed in East Africa on species of *Drypetes* and *Phyllanthus* (Euphorbiaceae) as well as of *Capparis*, *Maerua*, *Ritchiea* and other Capparaceae.

*Appias lasti natalensis* Neustetter, 1927

MATERIAL EXAMINED: None.

PREVIOUS REFERENCES to Mozambique: Not traced (?).

GEOGRAPHICAL DISTRIBUTION: The subspecies is reported (Ackery *et al.*, 1995, D'Abrera, 1997) from the Natal and, presumably, from Zululand and Southern Mozambique, though both agree in that the material origin is dubious.

BIOTOPE: Forest.

NOTES: To the potential host-plants, see note on the previous subspecies.

*Appias perlucens* (Butler, 1898)

Fig. 21-22, 41.

MATERIAL EXAMINED: ANGOLA: CABINDA: Bucu Zau, V/1952, dia, 1 ♂ (CZ-sn); Id., VII/1952, 1 ♂ (CZ-sn).

PREVIOUS REFERENCES to Angola: The species was described (sub *Pieris*) from "Angola". Aurivillius (in Seitz, 1928) assigns *A. perlucens* from Sierra Leone to Angola (again, none precise Angolan locality reported). *A. s. sylvia* f. *auriflua* and *A. s. sylvia* f. *ochraciens* (Talbot, 1943), considered (Ackery *et al.*, 1995) in the *A. perlucens* synonymy, were described both from N'Dalla Tando, 2700 feet (Kuanza Norte). The re-examined (Cabindan) males were misidentified (Bacelar, 1956) as *Appias rhodope*.

GEOGRAPHICAL DISTRIBUTION: After Ackery *et al.* (1995) from Senegal to Angola and Zaire, but Larsen (2005) reports that the species definitely do not flies in West Africa and that the cotype-female from the Gold Coast (Ghana) is a light specimen of *A. sylvia*.

BIOTOPE: Ackery *et al.* (1995) and D'Abrera (1997) note that it is restricted to forests and localised.

NOTES: The host-plants of the species remain unknown.

Hulstaert (1924, as *A. canisia*) points this species to Kabinda, Dunga-Njangara-Doruna and Malela, considered by Ackery *et al.* (1995) to be in Angola; as a matter of fact, they all concern former Zaire.

*Appias phaola phaola* (Doubleday, 1847)

MATERIAL EXAMINED: None

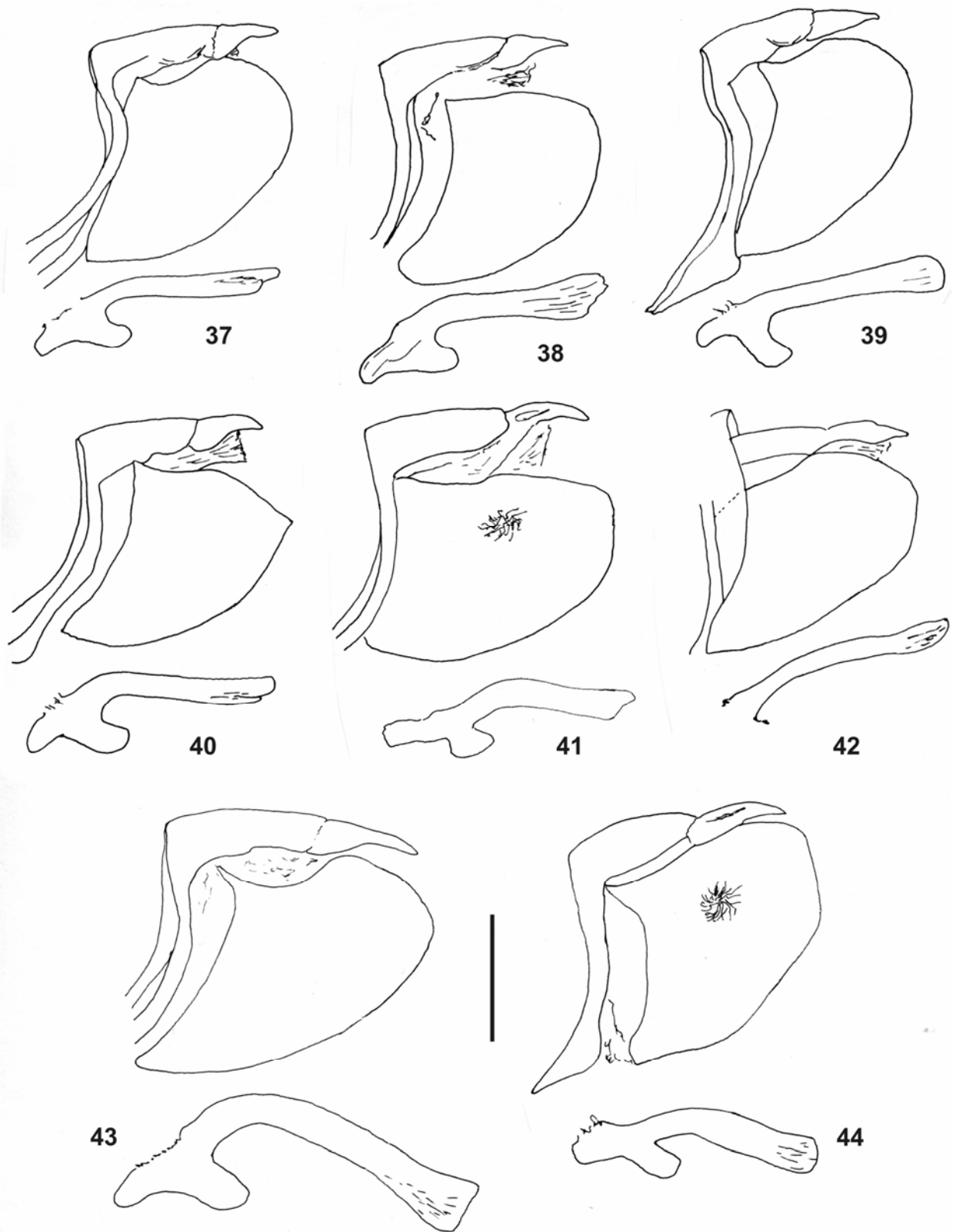
PREVIOUS REFERENCES to São Tomé: The (?) same (?) species was registered in the São Tomé island only once, by Bacelar (1948), upon 3 ♂♂ 1 ♀ collected by Newton (precise localities and dates unknown) and stored in the MB, at least partially determined by E. Sharpe; they all disappeared in the 1978 fire – or even before – and so, the correction of their determination is impossible to rectify.

GEOGRAPHICAL DISTRIBUTION: *A. phaola phaola* flies after Ackery *et al.* (1995) and D'Abrera (1997) from Liberia to the Congo; Larsen (2005) adds Sierra Leone

BIOTOPE: Forest.

NOTES: Viejo (1984) and Pyrcz (1992) report Bacelar (1948) reference without comments. Larsen (2005) notes that the subspecies was described from the Bioko Island (Equatorial Guinea), presents its known geographical distribution but do not consider its presence in the São Tomé Island.





**Fig. 37-44.** ♂ genitalia – valva: **37.** *Appias epaphia epaphia* (Cramer, 1779). **38.** *Appias epaphia piresi* ssp.n. **39.** *Appias epaphia aequatorialis* ssp.n. **40.** *Appias epaphia angolensis* ssp.n. **41.** *Appias perlucens* (Butler, 1898) **42.** *Appias phaola uigensis* ssp.n. **43.** *Appias s. sabina* Felder, 1865 **44.** *Appias sylvia ribeiroi* ssp.n. (scale: 1 mm)

***Appias phaola uigensis* ssp. n.**

Fig. 23-26, 42.

**MATERIAL EXAMINED:** ANGOLA: UIGE: Inga, X/1964, 1 ♂ holotype 1 ♀ allotype (BS-11242, 11253); Id., IX/1964, 2 ♂♂ paratypes (BS-11255, 11256); Id., XI/1964, 2 ♂♂ paratypes (BS-11254, 11257)

**PREVIOUS REFERENCES** to Angola: The species is new to Angola.

**GEOGRAPHICAL DISTRIBUTION:** *Appias phaola* was known (Ackery *et al.*, 1995, D'Abrera, 1997) by 3 subspecies: nominal one, from Liberia to the Congo, *A. p. intermedia*, from Zaire to western Tanzania; and *A. p. isokani* from the north-eastern Tanzania to the coastal Kenya.

**DIAGNOSIS:** Length of antenna: 11.6-12.0 mm (♂) 10.8 mm (♀); length of forewing: 24.6-26.7 mm (♂) 24.8 mm (♀); wingspan: 51.6-57.2 mm (♂) 51.6 mm (♀). Verso and retro surface of the wings as in Figs. 23-26, the valva of ♂ as in Fig. 42.

**ETYMOLOGY:** The new subspecies is named according to its known geographical distribution, the Uige province in the north-western Angola.

**DISCUSSION:** The new subspecies agrees in the male sex to what is known to the nominal subspecies (D'Abrera, 1997), though the apical black area of the forewing is more developed, wider along the costa; the female is, however, completely different, not only in the ground colour of the four wings, but also due to the absence of light maculation on the black forewing distal areas. *A. p. intermedia* male is similar to that of the new subspecies though with better developed apical black dots on the hind-wing veins, but, again, the female sex is quite distinct (Kielland, 1990): indeed, the yellowish tint of (mainly) the forewing lacks or is quite indistinct in *A. p. intermedia*, the black markings are better developed in the new Angolan subspecies, and the black apical area of the forewing is wider in *A. e. uigensis* ssp. n.

**BIOTOPE:** The studied samples were obtained in the coffee-forest of the forest-savannah mosaic reported as typical to the Uige and Kuanza areas by Grandvaux-Barbosa (1970).

**NOTES:** The host-plants for the species' caterpillars remain unknown, though as Kielland (1990) and Larsen (1996) suggest they shall belong to the Capparaceae.

***Appias sabina sabina* Felder, 1865**

Fig. 27-30, 43.

**MATERIAL EXAMINED:** ANGOLA: BONGO: Tentativa, II/1972, 1 ♀ (AF-PI401001). CABINDA: Buco Zau, VI/1952, dia, 1 ♀ (CZ-sn). KUANZA NORTE: Salazar, IV/1972, 1 ♂ (AF-PI401002); Id., VI/1972, 1 ♂ (AF-PI401014), AF, 1 ♂ (MB-8560). LUANDA: Luanda, V/1972, 1 ♂ 1 ♀ (BS-11238, 11239), 4 ♂♂ 6 ♀♀ (AF-PI4001003-PI401013). MALANJE: Quedas do Duque de Bragança, V/1971, 1 ♀ (BS-11240). UIGE: Inga, X/1964, 1 ♀ (BS-11241)

**PREVIOUS REFERENCES** to Angola: Druce (1875, sub *Beleinois*) and Aurivillius (1928 in Seitz) reported *A. sabina* (at species level) from Angola without details – precise localities never registered. The re-examined Cabinda ♀ was misidentified by Bacelar (1956) as a *Mylothris poppea* ♂.

**GEOGRAPHICAL DISTRIBUTION:** Aurivillius (op. cit.) points *A. sabina* Felder, 1865 from Sierra Leone to Angola; after

Ackery *et al.* (1995) and D'Abrera (1997) the nominal subspecies flies from southern Sudan, Ethiopia and western Uganda to Equatorial Guinea, Zaire, Nigeria and Sierra Leone – previous citations from Angola not considered; Larsen (2005) adds western Kenya to the nominal subspecies range. Three other subspecies are known, from the Comoro (*A. s. comorana*), from East Africa: Kenya east of the Rift Valley, Malawi, Zimbabwe and Mozambique to South Africa (north-eastern Transvaal) (*A. s. phoebe*), and from Madagascar (*A. s. confusa*).

**BIOTOPE:** After Dickson & Kroon (1978), the South African subspecies flies in woods and forests and Larsen (op. cit.) reports also forest. Angolan material was obtained (after Grandvaux-Barbosa, 1970) from primary evergreen forest (in Cabinda) to dry, more or less thick forest (remaining sites), but in Luanda it was collected in open biotopes (migrating ?).

**NOTES:** *A. sabina* caterpillars are known to live (Kielland, 1990, Larsen, 1996, 2005) on species of *Boscia* and *Ritchia* (Capparaceae), and of *Drypetes* and *Phyllanthus* (Euphorbiaceae). In the littoral and sub-littoral areas of the north-western Angola from the Bengo to the Kuanza Sul, Grandvaux-Barbosa (1970) assigns the occurrence of *Boscia urens*, *B. welwitschii* and *Phyllanthus guineensis*, while he reports *Phyllanthus capillaries* (today in the *P. nummularifolius* synonymy after Radcliffe-Smith, 1996) and *P. guineensis* to the Uige area. *Drypetes gossweileri*, *Ritchia fragariodora* and *R. mayumbensis* are registered by Gossweiler & Mendonça (1939) to the Cabindan Maiombe and may also represent caterpillars potential host-plants, as it may happen in the inner highlands (Malanje, Kuanzas) with several *Phyllanthus* (*P. capillaries* – see note behind, *P. glaucophyllus*, *P. microphyllinus*, *P. prostrates* and *P. welwitschii*).

*A. sabina* morph (♂) *divisapex* Hulstaert (Hulstaert, 1924) was described from Kabinda (Zaire: western Katinga) though it was reported by Ackery *et al.* (1995) as being in Angola.

***Appias sabina phoebe* (Butler, 1900)**

**MATERIAL EXAMINED:** None

**PREVIOUS REFERENCES** to Mozambique: van Son (1949) considers that it is quite probable that the subspecies will occur in the western Mozambique, as samples were already known from the "Eastern Rhodesia", close to the countries border. Later, Dickson & Kroon (1978, as *A. sabina udei*) point the subspecies to the Manica' Xiluvo Hills and confirm van Son's statement.

**GEOGRAPHICAL DISTRIBUTION:** The species flies (Ackery *et al.*, 1995, D'Abrera, 1997) along eastern Africa, from Kenya to Malawi, Zimbabwe, Mozambique and South Africa (north-eastern Transvaal).

**BIOTOPE:** Forest.

**NOTES:** In Mozambique a number of species that may be understood as potential host-plants to the caterpillars was assigned to the Manica area (Wild, 1960, Radcliffe-Smith, 1996), namely: *Drypetes arguta*, *D. gerrardi*, *D. mossambicensis* and *D. natalensis*; *Phyllanthus beillei*, *P. bernierianus*, *P. delagoensis*, *P. engleri*, *P. fraternus*, *P. gramini-cola*, *P. hutchinsonianus*, *P. inflatus*, *P. macranthus*, *P. maderaspatensis*, *P. manicaensis*, *P. mendoncae*, *P. myrta-ceus*, *P. nummularifolius*, *P. ovalifolius*, *P. pentandrus*, *P.*



*pinnatus*, *P. reticulatus* and *P. tsetsenae*; and *Maerua angolensis*, *M. brunnescens*, *M. juncea*, *M. kirkii* and *M. parvifolia*.

***Appias sylvia sylvia*** (Fabricius, 1775) (Figs. 31-32)

**MATERIAL EXAMINED:** GUINEA-BISSAU: QUINARA: Between Cantanha and the Cufada Lake, path in dry heavy forest, in the damper zone, close to the lake, XI/2002, PNLC, 1 ♀ holotype (CZ-5172).

**PREVIOUS REFERENCES** to the Guinea-Bissau: The species is new to the country.

**GEOGRAPHICAL DISTRIBUTION:** The species is known by six subspecies (Ackery *et al.*, 1995, D'Abrera, 1997, Larsen, 2005): nominal one from Gambia, Senegal and Guinea to Cameroon, Nigeria and former Zaire; *A. s. nyasana* from along most of Central Africa – see ahead; *A. s. zairensis* along Zaire, the Shaba area excluded; remaining ones (*A. s. abyssinica*, *A. s. sudanensis* and *A. s. ugandensis*) are restricted to East Africa.

**BIOTOPE:** The species is typical from forest and moist wood, though after Larsen (2005) it can also appear in more disturbed areas, since some forest nucleus remain in good condition.

**NOTES:** The caterpillars of *A. sylvia* (other subspecies) are known to feed on species of *Drypetes* and of *Phyllanthus* (Euphorbiaceae) (Kielland, 1990, Larsen, 1996). In the PNLC, Catarino (2002) assigns the presence of *Drypetes floribunda*.

The only female from the PNLC agrees well with the white morph reported by Larsen (2005) and assigned as the most common form in the neighbouring Guinea.

***Appias sylvia nyasana*** (Butler, 1897)

**MATERIAL EXAMINED:** None

**PREVIOUS REFERENCES** to Angola: Druce (1875, sub *Beleinois*, at species level), reports *A. sylvia* to Angola (localities not registered) in what may concern this subspecies or the following one.

Previous references to Mozambique: After van Son (1949), the subspecies shall occur in the western Mozambique, as it has been collected in the eastern “Rhodesia” (Zimbabwe) close to the shared countries border. Dickson & Kroon (1978) register material from the Sipungabera (= Espungabera, Manica Province) area, close to eastern “Rhodesia” (Zimbabwe), though they comment that Pinhey has not accepted this information.

**GEOGRAPHICAL DISTRIBUTION:** After D'Abrera (1997) the subspecies flies in south-western Zaire, north-eastern Angola, Namibia, Zambia, Tanzania and Malawi – Mozambique citation not considered – and the species (with 4 considered subspecies), from Sierra Leone to Nigeria, Equatorial Guinea, Cameroon, Ethiopia, Sudan, Uganda, Kenya and Zaire (except for the Shaba).

**BIOTOPE:** Forest ?

**NOTES:** To the host-plants, see note on the previous subspecies.

***Appias sylvia ribeiroi* ssp. n.**

Fig. 33-36, 44.

**MATERIAL EXAMINED:** ANGOLA: KUANZA SUL: Calulo, III/1972, 1 ♂ holotype 1 ♀ allotype 1 ♀ paratype (BS-11250-11252). KUANZA NORTE: Cassoalala, II/1972, AF, 1 ♂

paratype (MB-8495). Dalatando, VI/1972, 1 ♂ paratype (BS-11246); Id., XI/1972, 1 ♂ paratype (BS-11247); Id., XII/1973, 2 ♂♂ paratypes (BS-11245, 11248); Id., IV/1974, 1 ♂ paratype (BS-11244). Salazar, III/1972, 1 ♂ paratype (AF-PI103001); Id., IV/1972, 2 ♂♂ paratypes (AF-PI100001-PI100002); Id., VI/1972, 1 ♂ paratype (AF-PI100003), AF, 1 ♂ paratype (MB-8557); Id., VII/1972, 1 ♂ paratype (AF-PI103002); Id., VIII/1972, 1 ♂ paratype (AF-PI103002). UIGE: Inga, X/1964, 1 ♂ paratype (BS-11249)

**DIAGNOSIS:** Length of antenna: 11.6-12.9 mm (♂) 13.1 mm (♀); length of forewing: 25.8-29.0 mm (♂) 27.9-28.3 mm (♀); wingspan: 53.8-61.8 mm (♂) 59.6-60.8 mm (♀). Wings verso and retro as in Figs. 33-36; valva of ♂ as in Fig. 44.

**ETYMOLOGY:** The new subspecies is named after the memory of Prof. Dr. Henrique Ribeiro, specialist in fleas (Siphonaptera) and in mosquitoes (Diptera: Culicidae), Professor at the Instituto de Higiene e Medicina Tropical, in Lisbon, a colleague and a friend so suddenly disappeared (Porto: 3/11/1930, Oeiras: 25/5/2005), who spent part of his life in Angola.

**DISCUSSION:** The new subspecies is the second one in the species reported to Angola; it is distinguishable from *A. s. nyasana* (as registered flying in the north-eastern country) in the male sex, mainly by the clearly less extended orange colour on the forewing base, by the more pointed forewing, and by the lack of the black dot on the apex of the hindwing vein 1b; the female seems more similar (to the Tanzanian material represented by Kielland, 1990) though the wings ground colour is more pinkish and devoid of yellow tint.

**BIOTOPE:** Forest in a forest-savannah mosaic (see Grandvaux-Barbosa, 1970).

**NOTES:** Grandvaux-Barbosa (1970) assigns *Phyllanthus capillaris* (today in the *P. nummulariifolius* synonymy, as previously reported) and *P. guineensis* to the north-western country what corresponds to potential food-plants to the new subspecies' caterpillars.

As just referred Druce (1875, sub *Beleinois*, at species level – unknown details) reports the species to the country upon material that will correspond either to this new subspecies or to the previously reported *A. s. nyasana*.

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We are deeply obliged to Dr.<sup>a</sup> Graça Ramalhinho, Director of the MB by her permission to study the samples of *Appias* from São Tomé e Príncipe and Angola deposited in this institution's entomological collection; to Prof. Artur Serrano and to Dr. Carlos Pires, by the offered material obtained in São Tomé e Príncipe; and to Lieutenant Colonel António Figueira and Mr. João Pedro Cardoso by their private collection loaned samples (material from São Tomé and Angola). We want to thank also our colleagues of the ICT, the botanists Drs. Estrela Figueiredo, Eurico Martins and Luis Catarino by their help on the bibliography concerning the caterpillars' potential host-plants, mainly in the islands of São Tomé and Príncipe, in Mozambique and in the Guinea-Bissau.

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# MONOGRAFÍAS S.E.A.

Sociedad Entomológica Aragonesa

## Catálogo de los Carabidae (Coleoptera) de la Península Ibérica / Catalogue of the Carabidae (Coleoptera) of the Iberian Peninsula

José Serrano

*Monografías SEA*, vol. 9, Septiembre, 2003, 130 pp.

La obra consta del **catálogo** propiamente dicho, la **bibliografía**, una propuesta formal de **cambio nomenclatural**, el **índice taxonómico**, la relación de **novedades** para la fauna ibérica con respecto al catálogo de Zaballos & Jeanne (1994), la **relación sintética de la Sistemática** empleada junto con las **estadísticas** del catálogo y dos **mapas** de la Península Ibérica.

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