

The taxonomy and life history of *Epimetasia monotona* (Amsel, 1953) comb. n. from Northwest Africa (Pyraloidea: Crambidae: Odontiinae: Odontiini)

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Abstract. The genus *Thyridopsis* Amsel, 1953 (originally established in Pyralidae: Schoenobiinae) is synonymised with *Epimetasia* Ragonot, 1894 (Crambidae: Odontiinae) and the type-species of *Thyridopsis*, *Thyridopsis monotona* Amsel, 1953, is transferred to *Epimetasia*. A description of larvae, pupae and adults of *Epimetasia monotona* (Amsel, 1953) **comb. n.** is given and information on the life history, including larval food plant and habitat is provided. A catalogue is given for the genus *Epimetasia*. *Pionea vestalis* Hampson, 1900 **syn. n.** is regarded as a junior subjective synonym of *Epimetasia vestalis* (Ragonot, 1894: 173) (*Metasiodes*) and therefore becomes a junior secondary homonym of the latter.

Resumé. Les auteurs synonymisent le genre *Thyridopsis* Amsel, 1953 (décrit dans les Pyralidae Schoenobiinae) avec *Epimetasia* Ragonot, 1894 (Crambidae: Odontiinae) et transfèrent l'espèce type de *Thyridopsis*, *T. monotona* Amsel, 1953 dans *Epimetasia*. En outre, ils décrivent la chenille, la chrysalide, ainsi que l'adulte d'*Epimetasia monotona* et ajoutent des informations concernant la plante-hôte et l'habitat. Ils fournissent aussi un catalogue du genre *Epimetasia*. *Pionea vestalis* Hampson, 1900 **syn. n.** est considéré comme un synonyme subjectif plus récent de *Epimetasia vestalis* (Ragonot, 1894: 173) (*Metasiodes*) et donc aussi comme un homonyme secondaire de ce nom.

Key words. Insecta, Lepidoptera, Morocco, Mauritania, larval host plant, *Trichodesma calcarata*, Boraginaceae.

This paper is dedicated to Mr. Abdelkader, forester in Telouet (High Atlas), for his untiring efforts for the reforestation of the region south of the Tizi-n-Tichka (a pass between Marrakech and Quarzazate).

Introduction

Our knowledge of the pyraloid fauna of Morocco is scattered in numerous taxonomic publications (e.g., Rebel 1896; Oberthür 1922; Rothschild 1925; Le Cerf 1933; Schmidt 1934; Lucas 1937; Amsel 1952, 1953, 1956, 1966; Asselbergs 1998). Though Charles Rungs (1979) wrote a synthesis on this knowledge (for all Lepidoptera), our understanding of the pyraloid fauna of Morocco is still limited due to the need of taxonomic revision of many pyraloid taxa which have representatives in Northwest Africa. These problems came into focus when Rolf Bläsius returned from Morocco with pyraloid specimens reared from a boraginaceous plant. Investigation of male genitalia structures undoubtedly refer this species to the Odontiinae, but for this taxon, the same situation holds true as mentioned for the pyraloid fauna of Morocco as a whole: there is no review available to enable ready identification. After searching the literature and museum collections, and discussions with colleagues, we find close

affinities of this species with the odontiine genus *Epimetasia* Ragonot, 1894. However, there was no species included in this genus which could be regarded as conspecific with “our” species from Morocco. Surprisingly, our investigations of further taxa described from north-western Africa showed conspecificity with a taxon described by Amsel (1953) in the Schoenobiinae, *Thyridopsis monotona*. This species is certainly a close relative of two species placed in the genus *Epimetasia*, *E. abbasalis* Amsel, 1974 and *E. rufoarenalis* (Rothschild, 1913). Because of this taxonomic situation, we herewith synonymise *Thyridopsis* Amsel, 1953 with *Epimetasia* Ragonot, 1894 and transfer *Thyridopsis monotona* Amsel, 1953 to the latter genus. However, a phylogenetic study remains necessary to test whether *Epimetasia* with its current constituent species is monophyletic. Here, we provide a re-description of the adults of *E. monotona* Amsel, 1953 comb. n. including a differential diagnosis and publish our observations on the life history and some morphological characters of the larvae and pupae of *E. monotona*.

Catalogue of *Epimetasia*

Epimetasia Ragonot, 1894: 226 (objective replacement name for *Metasiodes* Ragonot, 1894). Type species: *Metasiodes vestalis* Ragonot, 1894, by original designation (for *Metasiodes* Ragonot, 1894).

Metasiodes Ragonot, 1894 (July 30): 172–173. Type species: *Metasiodes vestalis* Ragonot, 1894, by original designation. *Metasiodes* Ragonot, 1894 (July 30) is a junior homonym of *Metasiodes* Meyrick, 1894 (May 11): 8 (Pyraloidea).

Thyridopsis Amsel, 1953: 1441 **syn. n.** Type species: *Thyridopsis monotona* Amsel, 1953, by original designation.

Epimetasia abbasalis Amsel, 1974: 197–198, fig. 1a, Abb. 2 fig. 4. Type locality: South Iran, Issin, 240 m.

Epimetasia albalis Amsel, 1959: 54. Type locality: Iraq, Shaqlawa.

Epimetasia eoa (Meyrick, 1936: 28) (*Neoschoenobia*). Type locality: Iraq, Rayat. Amsel 1959: 54 (*Epimetasia*).

Epimetasia gregori Amsel, 1970: 56–58, text-fig. 20, pl. 3 figs. 41, 42. Type locality: Afghanistan, Band-i-Amir, 2900 m.

Epimetasia gregori gulbaharalis Amsel, 1970: 58, pl. 3 fig. 46. Type locality: Afghanistan, Straße Gulbahar-Sarobi, 1600 m.

Epimetasia gregori panjaoalis Amsel, 1970: 58, pl. 3 fig. 45. Type locality: Afghanistan, Mullah-Jacub-Paß, Oberlauf des Helmand, 3000 m.

Epimetasia monotona (Amsel, 1953: 1442, figs. 1, 1a). **comb. n.** Type-locality: Mauritania, Oum el Ahmar.

Epimetasia rhodobaphialis (Ragonot, 1894: 173–174) (*Metasiodes*). Type locality: [Uzbekistan] Samarkand.

Epimetasia rufoarenalis (Rothschild, 1913: 140–141) (*Calamochrous*). Type locality: [Algeria] central western Sahara, north of Aïn Guettara. Speidel & Hassler 1989: 33, pl. 5 fig. 7 (*Epimetasia*).

Pionea simplicialis Rothschild, 1915: 401–402. Type locality: [Algeria] Hoggar mountains, Oued Ag’elil. Speidel & Hassler 1989: 33, pl. 5 fig. 7 (syn.?).

Epimetasia vestalis (Ragonot, 1894: 173) (*Metasiodes*). Type locality: [Turkey] Mardin.

Pionea vestalis Hampson, 1900: 395, **syn. n.** Type locality: [Turkey] ‘Armenia, Mardin’. *Pionea vestalis* Hampson, 1900 is regarded here as a junior subjective synonym of *Metasiodes vestalis* Ragonot, 1894 and therefore a secondary junior homonym of *Epimetasia vestalis* (Ragonot, 1894). It is evident from Hampson’s (1900) description that he described a new species, which is originally indicated by “n. sp. (Stgr. MS)”.

Epimetasia vestalis rubrilinealis Zerny, 1939: 173, pl. 11 fig. 9. Type locality: Iran, Elburs-Gebirge, Tarsee Gebiet, 2100–2200 m.



Figs. 1–4. Adult specimens of *Epimetasia*. 1. *E. monotona* comb. n., dorsal view. from Morocco, 15 km northeast Agadir, Asif Tamrhakht river, 300–600 m, Bläsius leg., coll. MTD. 2. *E. monotona* comb. n., ventral view (same specimen as in Fig. 1). 3. *E. abbasalis* Amsel, 1974, holotype ♀, with labels: “Holotypus ♀ | *Epimetasia* | *abbasalis* Amsel”, “S-Iran, Issin 240 m | 5.4.1973, Periploca- | aphylla-Steppe | leg. H. G. Amsel”, SMNK. 4. *E. rufoarenalis* (Rothschild, 1913), syntype ♀, with labels: “Type”, “N. of Ain Guettara | Centr. W. Sahara | 8.–11.iv.1912 | Hartert & Hilg.”, „Calamachrous | rufoarenalis | Type Rotsch.“, BMNH. 1♂ India, BMNH.

Methods

In the field, the larvae were found in the roots of the food plant. The infested roots were cut off and transported in plastic bags to preserve a certain amount of humidity. At home, the roots containing larvae were planted in plastic pots with a mixture of sand and soil. This was regularly sprinkled with water to prevent total dehydration of the roots. The larvae collected in late April presumably were fully grown and did not feed much more, whereas the larvae collected on 27.ii.2004 presumably starved in the dying roots.

The larval morphology is described on the base of one exuvia of the last larval stage. Description of colours is based on the dry specimen. For further investigations, the exuvia was macerated in 10% KOH, subsequently neutralised in water, stained with Chlorazol Black and finally investigated in 70% Ethanol. After investigation, the larval exuvia was mounted on a slide in Euparal. The chaetotaxy is described using the nomenclature of Hasenfuss (1960) and Hasenfuss & Kristensen (2003).



Fig. 5. The habitat of *E. monotona* on the road from Tamrhakht to Imouzzet-des-Ida-Ouatanane in the Asif Tamrhakht river valley, 15 km northeast of Agadir at 300–600 m. **Fig. 6.** The flower of *Trichodesma calcarata*, the host plant of the larvae of *E. monotona*.

The description of pupal morphology is based on two pupal exuviae which were investigated dry. After investigation, both specimens were mounted on two separate slides in Euparal. The description of pupal morphology follows the nomenclature of Patocka (1999, 2001). Most parts of the pupal head are not described because they were lost during ecdysis.

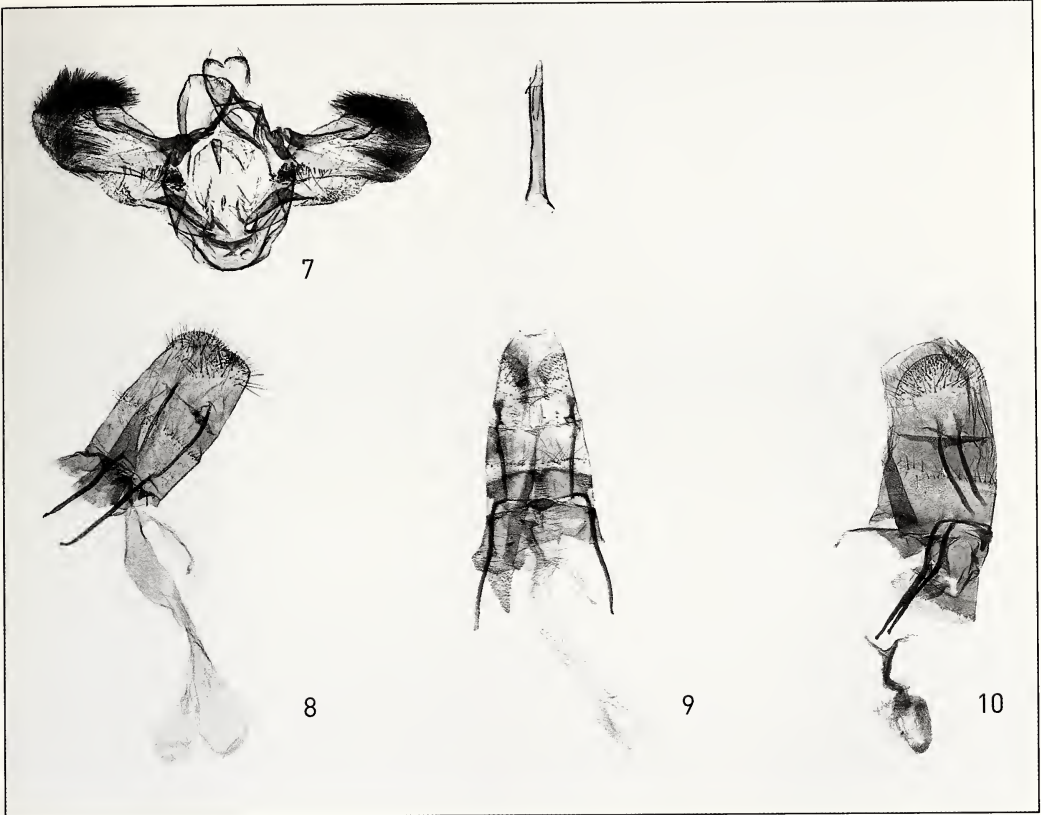
Few data are available on preimaginal stages of Odontiinae. For comparison, we investigated larvae of *Cynaeda dentalis* ([Denis & Schiffermüller], 1775) (6 larvae (L3–L5?), Germany, Brandenburg, Jänschwalde/Ost, 24.iv.2000, leg. Stübner), which, however, might not be a close relative of *Epimetasia*.

For the investigation of all exuviae, a stereo-microscope with a maximum magnification of 56× was used and, as in Hasenfuss (1960), only the macrosetae were investigated. All specimens listed below were investigated by the authors with the exception of the holotype of *Thyridopsis monotona*, for which we have seen a digital colour image taken by Patrice Leraut (MNHN).

The catalogue of *Epimetasia* was compiled using the online database GlobIZ (www.pyraloidea.org).

Abbreviations

Cl	clypeal setae
Frl	frontolateral setae
GlobIZ	Global Information System on Pyraloidea
MNHN	Muséum national d'Histoire naturelle, Paris
MTD	Museum für Tierkunde, Dresden
SMNK	Staatliches Museum für Naturkunde, Karlsruhe



Figs. 7–10. Genitalia of *Epimetasia* specimens. **7.** *E. monotona*, ♂ (prep. Nuss 1065). **8.** *E. monotona*, ♀ (prep. Nuss 1049, same specimen as Fig. 1). **9.** *E. rufoarenalis* (prep. Nuss 1055, BMNH 22021). **10.** *E. abbasalis*, ♀ paratype from S-Iran, Bandar-Abbas, Kuhe-Genau, 550 m, 1. and 5.iii.1973, Ebert leg., SMNK (prep. Nuss 1066).

Epimetasia monotona (Amsel, 1953) comb. n.

Material. Holotype (by monotypy): ♀, 'Type', 'P. de Miré leg | 1.1.1949 | Oum el Ahmar | **Mauritanie**', 'Slide 15159-SB | ♂ | Bleszynski 1969', 'det. H. G. Amsel 1952 | Thyridopsis | monotona | Ams.', 'Thyridopsis | monotona', MNHN. – 1♀ **Morocco**, 15 km northeast Agadir, Asif Tamrhakht river, 300–600 m, 22.iv.2001 (larva), 12.vi.2001 (adult), Bläsius leg., coll. MTD. 4♂, 7♀, 1 larva, 1 pupa, same data, but 1.–15.v., 8., 10., 12., 13.vi.2001 (adults) (gen. prep. Nuss ♂ 1065, ♀ 1049), Bläsius leg., coll. Bläsius and coll. MTD. 1♂ Maroc Saharien, Maader Asfer, 10.v.1969, Rungs leg. (gen. prep. Leraut 6040), MNHN.

Adults (Fig. 1). **Head.** Head capsule globular; frons not protruded as typical for many odontiniens; compound eyes about 1 mm in diameter; maxillary palpi upright, about 400 µm long; labial palpi porrect, about 1 mm long; flagellum filiform, ventrally densely setose; flagellomeres of basal half of flagellum about as long as their diameter (10 µm). Head dorsally, maxillary and labial palpi light ochreous, with protruding scales at frons; ventrally contrasting, white.

Thorax. Forewing length ♂ 11–12 mm (N=2), ♀ 10 mm (N=1). Costa remarkably straight, sc, r1 and r2 distally approximate; r2 basally close to r3+r4; r5 free from

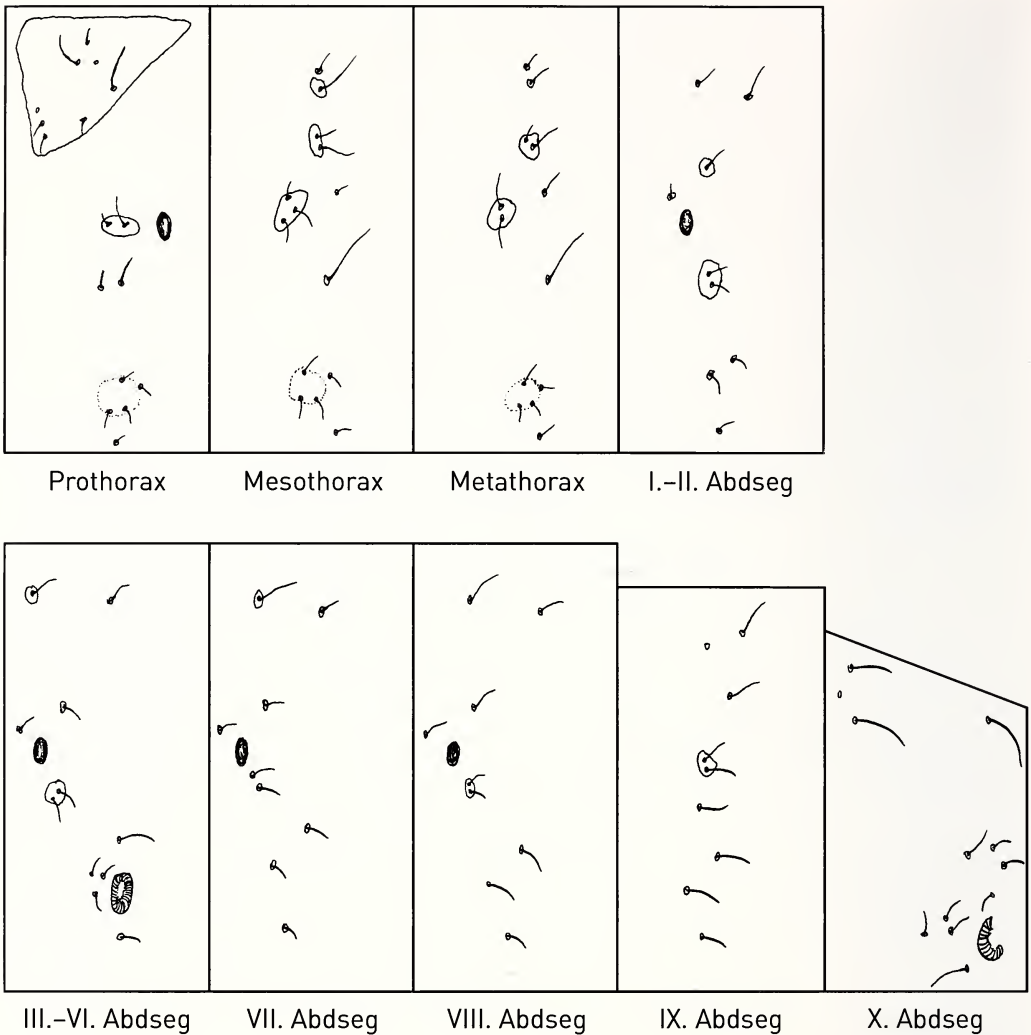
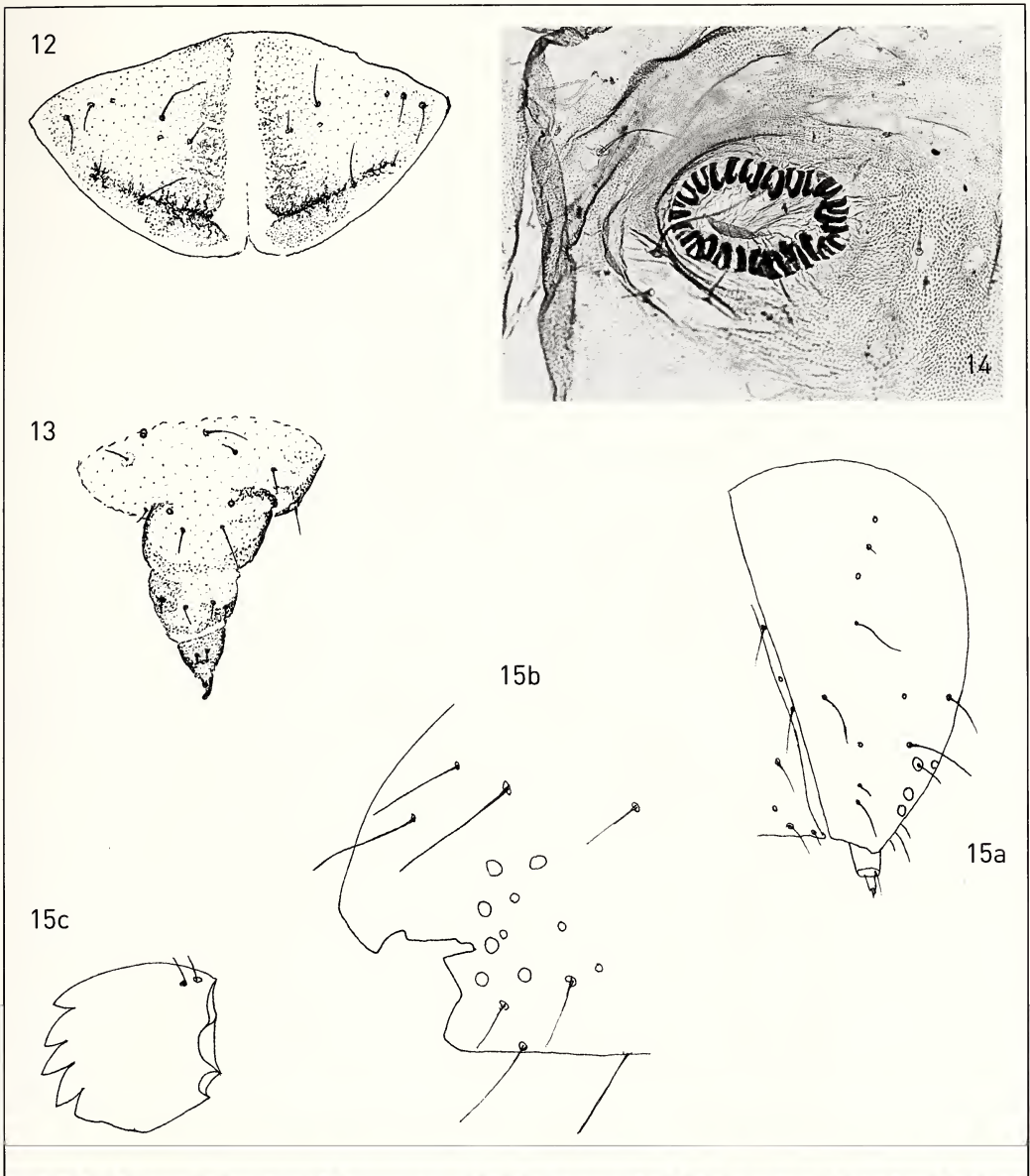


Fig. 11. Chaetotaxy of larva of *E. monotona* (prep. and drawing by Thomas Sobczyk).

cell; m2 and m3 close to each other; discoidal cells of fore- and hindwings distally open; hindwing sc+r1 fuse with rs for some distance along discoidal cell; m2 and m3 close to each other. Male and female frenulum with one bristle; male retinaculum with hamus. Forewings light ochreous, with inconspicuous antemedian and postmedian lines, approximated at dorsum; entire wing surface with scattered white, spatulate scales; underside uniform ochreous, but paler than dorsally and dorsum creamy white-scaled; hindwing brownish white, darker towards termen; fringe of fore- and hindwings brownish white, with a dark line.

Tympanal organ. Tympanum placed nearly vertically in body cavity; fornix conspicuously exceeding venula prima in lateral view; praecinctorium present; saccus



Figs. 12–15. Larval characters of *E. monotona*. **12.** Prothoracic shield. **13.** Foreleg. **14.** Proleg. **15.** Head: **a.** frontal view, **b.** lateral view, **c.** mandible (prep. and drawing by Thomas Sobczyk).

well developed; venulae secundae absent, but post-tympanal area with a pair of sclerotised lines medially.

Male genitalia (Fig. 7). In lateral view, uncus directed ventrally at an angle of about 45°, tegumen convex, conspicuously exceeding uncus. In caudal view, uncus distally conspicuously bilobed, each lobe rounded; gnathos arms basally fixed to tegumen, medio-distal extension short; vinculum semicircular, narrow; juxta rectan-

gular, lateral edges bent anteriorly; valvae medio-ventrally convex, caudally radially fluted and strongly setose (characteristic for Odontiinae); sacculus strongly sclerotised, with numerous stiff setae of different length. Phallus without cornuti; opening for ductus ejaculatorius at anterior tip; caudally with a one-sided elongation of phallic apodeme. Absent are the 'structurae squamiformes' and the riffled membrane, which assigns this species to the Odontiini (cf. Nuss & Kallies 2001).

Female genitalia (Fig. 8). Corpus bursae and ductus bursae membranous, very fragile, entire length 2300 μm ; corpus bursae ovoid, with appendix bursae inserted postero-laterally; ductus bursae straight, up to 200 μm in diameter, insertion of ductus seminalis close to ostium; segment VIII sclerotised with apophyses anteriores 860–940 μm long; papillae anales lobiform with apophyses posteriores 800 μm long.

Larva (Figs. 11–15). Exuvia 17 mm long, whitish grey, head brown, prothoracic shield slightly paler brown than head, wrinkled, posterior area with two low crests, each forming acute angle with midline; stigmata black. Frons Frl 1 and Frl 2 close to each other, F_1 – F_1 closer to each other than the longer and thicker Cl_2 – Cl_2 . Mandibles with 4 (5) teeth. Prothorax with paired, strongly melanised thorns at anterior ventral edge; prestigmatal shield weakly sclerotised; prothoracic stigmata about twice as large as following stigmata; prestigmatal setae horizontally directed. Stigmata of abdominal segments II–VI larger than pinaculum III. Prolegs III–VI ovate, with hooks of crochets uniordinally arranged in full circle, each circle with 33–38 hooks. Abdominal segment VII in dorsal view with setae I–I and II–II equidistant; seta IV distant from stigma by about two times stigmal diameter. Pinacula of all segments weakly sclerotised. Anal prolegs with 15 hooks each.

Pupa (Fig. 16). Exuviae 15.0 mm long, diameter 4.0 mm. Integument pale brown, weakly sclerotised. Compound eyes large, round; proboscis short; forelegs reaching tips of antennae; midlegs reaching tips of forewings; hindlegs situated dorsally of median legs (only distal tips visible), only slightly exceeding tips of forewings. Wings terminating at anterior part of segment V; ventrally, only the forewings are visible. Abdominal segments V–VI with rudimentary proleg insertions. Segments V–IX with a pair of two tiny thorns. Segment X with two pairs of tiny thorns ventrally, and 6 thorns distally. Anal sulcus posteriorly bifurcated. Cremaster reduced to small protuberance. Abdominal segments VIII–IX with transverse rows of tiny thorns; segment X with two thorns only.

Differential diagnosis. *Epimetasia monotona* is similar to *E. rufoarenalis* (Fig. 4) and *E. abbasalis* (Fig. 3) in having ochreous forewings, with scattered white spatulate scales on the dorsal side. *E. monotona* differs by the uniform and darker ground colour and the inconspicuous pattern elements of the forewings. Contrastingly, *E. rufoarenalis* and *E. abbasalis* have paler forewings and more contrasting pattern elements. They differ from each other in the antemedian and postmedian lines, which meet at dorsum in *E. abbasalis*, but remain separate at dorsum in *E. rufoarenalis*. Also, the postmedian line meets the dorsum vertically in *E. rufoarenalis*, but in a pointed angle in *E. abbasalis*. Other species of *Epimetasia*, e.g. its type-species *E. vestalis* and *E. gregori* have a dominant pale yellow forewing colouration and lack the white spatulate scales on the dorsal forewing surface. Thus, a phylogenetic study remains necessary to test whether

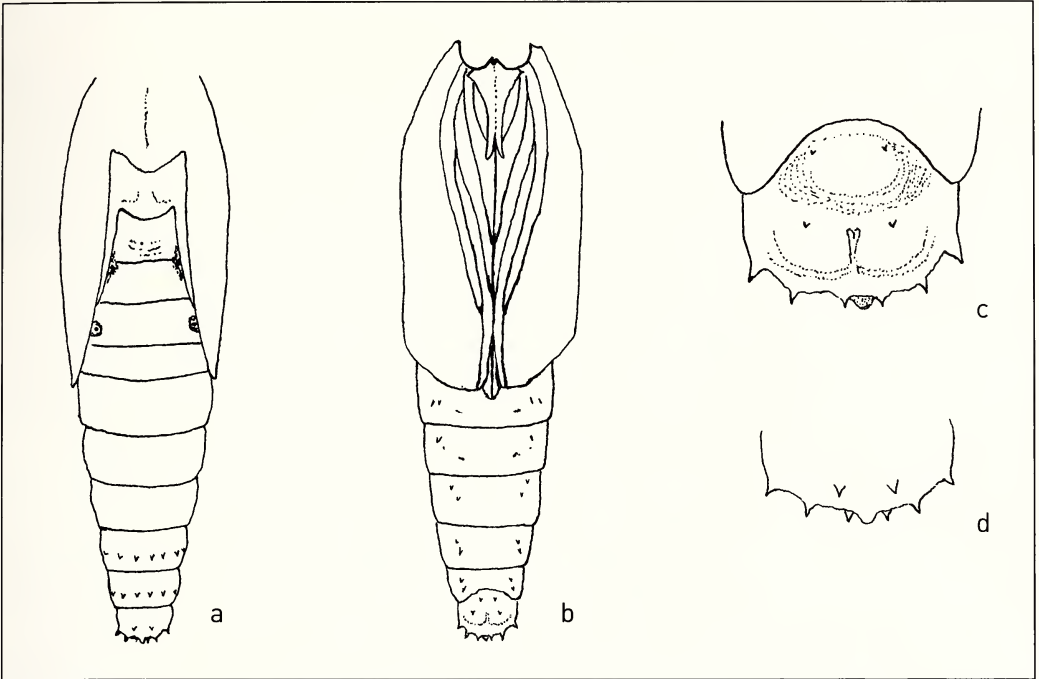


Fig. 16. Pupa of *E. monotona*: **a.** dorsal view, **b.** ventral view, **c.** cremaster, ventral view, **d.** cremaster, dorsal view. (prep. and drawing by Thomas Sobczyk)

Epimetasia with its current constituent species is monophyletic. In the female genitalia, the corpus bursae is not divided in *E. rufoarenalis* and *E. abbasalis*, but it is divided into one larger and one smaller corpus in *E. monotona*. In contrast with *Epimetasia monotona*, the larvae of *Cynaeda dentalis* have the head and pinacula black (brown in *E. monotona*); the pinacula are conspicuously sclerotised and elevated; the head is prognathous (orthognathous in *E. monotona*); the prolegs are round (each circle with 35 hooks). According to Patocka (2001), the pupae of *C. dentalis* bear a conspicuous cremaster with two pairs of hooks.

Distribution. Known from Oum el Ahmar in Mauritania and from lower montane western Morocco near Agadir and Maader Asfer.

Life history. The larvae feed in the stout (thumb-thickness) roots of *Trichodesma calcarata* Batt. (Boraginaceae). Infested plants are characterised by a reduced growth and parts of the plant becoming dead. Knee high plants along the road were rarely infested. During April and May, only full grown larvae have been found. It might be interesting to mention that the ground colour of the moths camouflages them well on the brown calcareous soil surface.

Boraginaceae are used as larval host plants by other odontiine species also. For example, larvae of *Epascestria pustulalis* (Hübner, 1823) are leaf miners in *Anchusa officinalis* and larvae of *Cynaeda dentalis* are miners in *Echium vulgare* (Hasenfuss 1960).

Habitat. The locality at 15 km northeast Agadir in the Asif Tamrhakht river valley is situated on the road from Tamrhakht to Imouzzet-des-Ida-Ouatane and belongs to the

westernmost foothills of the High Atlas. The annual precipitation in this area is about 200 mm. The habitat is within the *Argania spinosa* (L.) Skeels forest, which is endemic to southwestern Morocco. This forest is associated with succulent spurge, such as *Euphorbia officinarum beaumierana* (Coss. & Hook.f.) J.Vindt and *E. regisjubae* Webb & Berthel. The foodplant of the larvae of *E. monotona*, *T. calcarata*, grows on an embankment that has been repeatedly disturbed by construction work on the road during recent years. It is not known yet to what extent these disturbances may favour or damage this plant population.

Remarks. In the original description of *Epimetasia abbasalis*, Amsel (1974: 197, fig. 4) describes and figures the female genitalia with the corpus bursae horseshoe-shaped and at both tips with a small, streak-like appendage. This structure is probably a gland, which is larger in size than the corpus bursae of *E. abbasalis*, which is figured here and is a simple, globular sac (Fig. 10).

Acknowledgements

We very much acknowledge the advice given by Wolfgang Speidel, which taxa within the Odontiinae might be checked first to identify the specimens reared on *Trichodesma calcarata*. Without his help it would probably have taken much more time to solve this taxonomic problem. Our thanks also go to the curators Robert Trusch (SMNK) and Kevin Tuck (BMNH) of the museum collections we have visited for this study. We are delighted to thank Michael Shaffer and Klaus Sattler (BMNH) for interesting and helpful discussions. After reading the description of *Thyridopsis monotona*, we were especially happy that Patrice Leraut (MNHN) provided a digital image of the holotype of this species and thus supported a fast completion of the manuscript. Last but not least, we thank Camille Peyre (Bram, France) for the determination of the host plant *Trichodesma calcarata* and Andreas Stübner (Jänschwalde-Ost, Germany) for providing immature specimens of *Cynaeda dentalis*. Francesca Vegliante (Dresden), Bernard Landry (Genève) and Martin Corley (Faringdon) provided useful comments on the manuscript.

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