

The discovery of a sibling species next to *Cyme reticulata* Felder, 1861 in New Guinea and a review of some allied taxa (Lepidoptera: Erebidae, Arctiinae, Lithosiini)

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Abstract: The species *Cyme reticulata* Felder, 1861 shows a great variability in New Guinea, and adjacent islands. One of these very common forms appeared to be a new sibling species which is described in this paper: *Cyme laeta* **spec. nov.** Four long forgotten allied taxa, described by the authors Rudolf van Eecke and Gustaaf Hulstaert, are compared and treated: *Asura roseifusa* Hulstaert, 1924a and *Asura flavagraphia* Van Eecke, 1926 are placed in *Cyme* (**comb.nov.**); *Asura punctilinea* Hulstaert, 1924a **syn.nov.** and *Asura punctilinea aquilonis* Hulstaert, 1924b **syn.nov.** are synonymized with *Cyme reticulata* Felder, 1861. Of all taxa concerned the adults and genitalia are depicted.

Rangkuman: Spesies *Cyme reticulata* Felder, 1861 menunjukkan variasi yang sangat besar di New Guinea dan kepulauannya. Salah satu bentuk umum spesies ini ternyata dibuktikan sebagai spesies tersendiri dan dideskripsi disini: *Cyme laeta* **spec. nov.** Empat taksa berkeluarga yang lama dilupakan dan yang dideskripsi oleh Rudolf van Eecke dan Gustaaf Hulstaert, dibandingkan dan dibahas: *Asura roseifusa* Hulstaert, 1924a dan *Asura flavagraphia* Van Eecke, 1926 ditempatkan di *Cyme* (**comb.nov.**); *Asura punctilinea* Hulstaert, 1924a **syn.nov.** dan *Asura punctilinea aquilonis* Hulstaert, 1924b **syn.nov.** disamakan dengan *Cyme reticulata* Felder, 1861. Dari semua taksa tersebut gambar-gambar bentuk dewasa dan genitalia disajikan.

Keywords: *aquilonis*, *flavagraphia*, *punctilinea*, *roseifusa*, Papua, Moluccas, new synonyms, new species.

Introduction

The genus *Cyme* Felder, 1861 is widely distributed with many species in the Indo-Australian region from Indochina and India through the Indonesian Archipelago and to as far as Australia and the Solomon Islands. Most species occur in New Guinea and the Australian region and are very colourful with a similar pattern of pale patches combined with bright red dots or lines on a brown or dull ground colour. Many species show a strong variability which makes it hard to determine species or varieties. It is to be expected that a lot of already described taxa will turn out to be synonyms of others and on the other hand new species will be found, so a thorough revision of the whole genus will be very necessary. This will be out of the scope of this paper in which the focus will be on the most common *Cyme* species

occurring mainly in the western part of New Guinea, *Cyme reticulata* Felder, 1861, the type species of the genus.

As many other species in the genus, *Cyme reticulata* shows some variation in the maculation on the wings. However, two of these variation types are so frequent and uniform that they could be separated into two groups. Genitalia study revealed that one of these appeared to be *Cyme reticulata* Felder, 1861 s.s. and the other a new species, *Cyme laeta* **spec. nov.**, which is considered to be the sibling species on New Guinea of *reticulata*.

During my research in the collection of Naturalis Biodiversity Center in Leiden, I came across the types of four allied taxa: six female syntypes of *Asura flavagraphia* Van Eecke, 1926, a female holotype of *Asura punctilinea* Hulstaert, 1924a, a female holotype of *Asura roseifusa* Hulstaert, 1924a and a female holotype of *Asura punctilinea aquilonis* Hulstaert, 1924b. It seems that these types and taxa have been overlooked by many authors since only the original descriptions mention these. These will therefore be included in my review too.

A still unresolved problem is the fact that the genitalia of the types of the generally accepted synonyms of other taxa resembling *reticulata* have not been examined yet, which is an absolute necessity to have a firm conclusion. It is not at all sure if these indeed concern synonyms or, again, separate species. These types concern *Barsine placens* Walker, [1865] from Timor (type in NHMUK), *Calligenia cyclota* Meyrick, 1886 from Queensland, Australia (type probably in QMBA), and *Barsine intrita* Swinhoe, 1892 from Ceram (type in OUMNH). In this paper a start will be made with unravelling the puzzle which this species complex forms.

Abbreviations

BMNH - acronym formerly used for specimens and genitalia slides in NHMUK

KSP - Koleksi Serangga Papua, Waena, Papua, Indonesia

NHMUK – Collection of Natural History Museum, London, United Kingdom

OUMNH - Hope Entomological Collections, University Museum, Oxford, United Kingdom

QMBA – Queensland Museum, Brisbane, Australia

RMNH – Collection of Naturalis Biodiversity Center, Leiden, The Netherlands (former Rijksmuseum voor Natuurlijke Historie)

RMNH.INS. – Acronym for unique collection numbers of specimens and slides in RMNH

The genus *Cyme* Felder, 1861

Type species: *Cyme reticulata* Felder, 1861

The genus *Cyme* comprises as far as yet known 42 recognized species (listed by [lepindex](#), [funet](#) and [papua-insects](#)), some with subspecies and synonym names. When a thorough revision of the genus is completed this number may well be increased. The species are widely distributed in the Indo-Australian region with most species occurring in New Guinea and adjacent islands. The species are often characterized by bright coloured wing pattern, similar as in *Lyclene* Moore, [1860], *Asura* Walker, 1854, *Miltochrista* Hübner, 1819 and *Barsine* Walker, 1854, with which it was historically often mixed and confused. The species are only slightly sexual dimorph, females are often larger and have thinner filiform antennae and the forewing termen may be slightly more arched.

The genitalia of *Cyme* species in males have symmetrical valvae of the typical lithosiine form. Uncus long and slender, in some species with a knot or bend in the middle, vinculum with a saccus, which may be well developed or just indicated by a small keel. Juxta upside down

“V”-shaped. Cucullus of valve with a strong clasper which is diagnostic, apical part less sclerotized, rounded without a process. Sacculus strong and extended with a long sharp process, usually curved inwards. Aedeagus narrow and straight or bend, vesica with some scobinated fields with small cornutal spines of different (diagnostic) size, basally one large and long cornutus which is diagnostic.

Females with a long and distinct strongly sclerotized antrum, ostium with a strong antevaginal “V”-shaped rim. Cervix well developed on top of the bursa copulatrix at the left side with the shape of a pointed cap, the shape and direction of the pointed apex is diagnostic. Bursa copulatrix oval or globular shaped, with chitinous ribs running from the cervix, one obscure longitudinal signum in a fold dorsally in the center of the bursa skin which is of different intensity and shape in different species.

Checklist of the genus *Cyme* Felder, 1861

A checklist of the genus *Cyme* as far as yet known is certainly not complete and may at some points even be incorrect. As stated before the genus needs a thorough revision, which will be a tremendous task. The list presented here is a base to start with, compiled from the websites of Funet (www.funet.fi) and the Papua Insects Foundation (www.papua-insects.nl).

- anaemica* (Hampson, 1911) [New Guinea]
- analogus* (Rothschild, 1913) [Solomon Islands]
- aroa* (Bethune-Baker, 1904) [New Guinea]
 - fasciolata* (Rothschild, 1913)
- asuroides* (Rothschild, 1913) [New Guinea]
- avernalis* (Butler, 1887) [Solomon Islands]
 - bougainvillei* Rothschild, 1913
 - isabellina* Rothschild, 1913
 - floridensis* Rothschild, 1913
- basitesselata* (Rothschild, 1913) [New Guinea]
- biagi* (Bethune-Baker, 1908) [New Guinea]
 - coccineoflammeus* Rothschild, 1913
- celebensis* (Roepke, 1946) [Sulawesi]
- citrinopuncta* (Rothschild, 1913) [New Guinea]
- coccineotermen* (Rothschild, 1913) [New Guinea]
- crocota* (Hampson, 1900) [Louisiade Archipelago]
- effasciata* Felder, 1861 [Ambon]
 - cinnabarina* (Pagenstecher, 1884)
- euprepioides* (Walker, 1862) [India to Borneo and The Philippines]
 - inclusa* (Snellen, 1877)
 - samboanganus* (Strand, 1922)
 - ssp. interserta* (Moore, 1878)
- feminina* (Rothschild, 1913) [Solomon Islands]
- flavagraphia* (Van Eecke, 1926) **comb. nov.** [Buru]
- haemachroa* (Hampson, 1905) [Solomon Islands]
- insularis* (Rothschild, 1913) [Louisiade Archipelago]
- laeta* **spec. nov.** [New Guinea]

manusi (Rothschild, 1916) [Admiralty Islands]
metascota (Hampson, 1905) [Solomon Islands]
 suffusa (Draudt, 1914)
 bougainvillicola (Strand, 1922)
miltochristaemorpha (Rothschild, 1913) [New Guinea]
 aureorosea (Rothschild, 1913)
miltochristina (Rothschild, 1913) [New Guinea]
multidentata (Hampson, 1900) [Buru]
phryctopa (Meyrick, 1889) [New Guinea]
pyraula (Meyrick, 1886) [New Guinea, Queensland]
pyrostrota (Hampson, 1914) [Solomon Islands]
pyrrhauloides (Rothschild, 1913) [New Guinea]
quadrilineata (Pagenstecher, 1886) [Moluccas, New Guinea, Queensland]
 melitaula (Meyrick, 1886)
 simulans (Butler, 1886)
 moluccensis (Van Eecke, 1929)
quadrifasciata (Rothschild, 1913) [Sulawesi]
reticulata Felder, 1861 [Moluccas eastwards to Bismarck Archipelago]
 placens (Walker, [1865]) **status incerta**
 cyclota (Meyrick, 1886) **status incerta**
 intrita (Swinhoe, 1892) **status incerta**
 punctilinea (Hulstaert, 1924a) **syn. nov.**
 aquilonis (Hulstaert, 1924b) **syn. nov.**
reversa (Rothschild, 1916) [Admiralty Islands]
 dampierensis (Rothschild, 1916)
roseifusa (Hulstaert, 1924a) **comb. nov.** [Kai Islands]
septemmaculata (Heylaerts, 1891) [Java]
 agraphia (Hampson, 1900)
serratilinea (Turner, 1940) [Australia]
sexualis Felder, 1861 [Moluccas eastwards to Bismarck Archipelago]
 cancellata (Pagenstecher, 1900)
 effulgens (Pagenstecher, 1900)
 quadrifasciata (Rothschild, 1913)
 mylea (Rothschild, 1916)
 terminodenta (Hulstaert, 1924)
structa (Walker, 1854) [New South Wales, Australia]
 pyrrhopsamma (Hampson, 1903)
suavis (Pagenstecher, 1886) [New Guinea]
triangularis (Rothschild, 1936) [New Guinea]
vepallida (Holland, 1900) [Buru]
vivida (Walker, [1865]) [Sulawesi, Bacan]
wandammenensae (Joicey & Talbot, 1916) [New Guinea]
xantherythra (Hampson, 1900) [New Guinea]

Systematic part

***Cyme reticulata* Felder, 1861** (figs 3-5, 9-10, 13, 15, 17-18)

Barsine placens Walker (1865: 251) **status incerta**

Calligenia cyclota Meyrick (1886: 705) **status incerta**

Barsine intrita Swinhoe (1892: 108) **status incerta**

Asura punctilinea Hulstaert (1924a: 129) **syn. nov.**

Asura punctilinea aquilonis Hulstaert (1924b: 88) **syn. nov.**

Holotype *reticulata*: ♂ BMNH-1689158, [Buru], “*Cyme reticulata*, Feld., FELDER COLLn., *reticulata* n., Rothschild Bequest, B.M. 1939-I., Arctiidae, genitalia slide, No. 4653”.

Holotype *placens*: ♀ NHMUK, “Timor, 62-62, *Barsine placens*”.

Syntypes *cyclota*: 2 ♀♀ QMBA[?], Cairns, Queensland, coll. Lucas & Macleay.

Holotype *intrita*: ♀ OUMNH, Ceram, Wallace.

Holotype *punctilinea* (fig. 9, 17): ♀ RMNH.INS.1148745, Olilit, Tenimber, D. van Roessel.

Holotype *aquilonis* (fig. 10, 18): ♀ RMNH.INS.1148744, Har, Gr. Kei, 1923, [R.P.J.] Yernaux.

Diagnose: Forewings with pale brown background colour. Colourful spots on forewings with a rim darker than background, and generally smaller than those in the new species. Spot SM1 small and not reaching above spot SB (fig. 1). Apex of hindwings with brown fringes. Tube of male aedeagus simple, without groove. Female antrum longer than in the next species, reaching the bursa copulatrix, and without a solid sclerotized flap at the ventral side of the cervix bursae (see next species).

Description: Fwl: ♂ 11.0-12.0 mm, ♀ 12.5-15.0 mm. Frons and vertex orange, vertex with a dark brown cross-shaped mark. Collar and thorax of the same colour as frons and vertex, patagia with a dark brown rim. Thorax with some dark brown markings. Abdomen yellow with an orange taint.

Forewings pale brown. Spots SB, SM1 and M2 pale yellow with a rim of dark orange to red, all other spots pale red. Spot SM1 small, not overlapping with spot SB (fig. 1). Fringes of forewings chocolate brown. Hindwings creamy yellow, darker at the apex and dorsum, with hairs at dorsum. Fringes on hindwings of the same colour as the hindwing, the apex brown.

Variation: Spots in *reticulata* variable in size. Some specimens miss one or multiple spots, an extreme form is shown in fig. 5. Colour of spots not diagnostic except for the ones mentioned in the description. Background colour of wings varies from light to very dark brown.

Male genitalia: Uncus is long and slender with a knot near the end and a hook at the apex. Tegumen wide, with a blunt top. Vinculum half circular, without distinct saccus but with a little protrusion. The valvae are rather narrow with a straight sacculus. Clasper almost in the middle and crescent-shaped, with a sharp point. Cucullus without apical process, apical part rounded and less sclerotized, distally covered with long setae. Sacculus with a long and slender extended process, slightly curved inwards and with a sharp apex.

Aedeagus short, with a round coecum. Vesica with two scobinated fields, the dorsal one having larger and longer cornuti than the distal one. One large and straight bar-shaped basal cornutus.

Female genitalia: Antrum long, strongly sclerotized with a rectangular shape and flat, almost touching the bursa and at connection slightly constricted. Cervix bursae strongly sclerotized with dense chitinous drops, folded as a pointed hat positioned on top of the bursa at the left side. Ductus seminalis is connected with the cervix at the left side. Bursa copulatrix quite large, globular, with many folds in which one indistinct signum dorsally in the center of the bursa.

Distribution: The complete distribution of this widely distributed species is not sufficiently known and has to be investigated by more research of genitalia of “look alike” from other areas. With certainty the species has been recorded from West New Guinea, the Schouten Islands, the Raja Ampat Islands and Southern Moluccas. Specimens have been found in lowland rainforests as well as at moderate altitudes up to about 900 meters, with some exceptions to 1500 meters (Mokwam, Arfak Mountains). It seems less common than the new species described below.

Cyme laeta spec. nov. (Figs 6-8, 14, 16)

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Holotype: ♂ RMNH.INS.1282893, Indonesia, Papua, Supiori Island, Kab. Supiori Utara, Nansfori, 0°41'S - 135°40'E, 16-19.x.2008, leg. R. de Vos & P.J. Zumkehr.

Paratypes (12 ♂♂, 21 ♀♀): 2 ♀♀, RMNH.INS.1282894-95, as holotype; 1 ♂, 1 ♀, RMNH.INS.1282896-97, Indonesia, Papua, Kab. Yahukimo, Lelambo (distr. Kangguruk), 4°01'S - 139°47'E, 900 m, at light, 24-26.x.2008, leg. P.J. Zumkehr; 1 ♂, RMNH.INS.1282898, Indonesia, Papua Barat, Birdshead Peninsula, Tamrau Plateau, Senopi, 476 m, 0°50'S - 132°55'E, 21-23.xi.2011, at light, Papua Insects Foundation; 1 ♀, RMNH.INS.1282899, Indonesia, Papua Barat, Birdshead Peninsula, Neney Valley, Arfak, Benyas, 722 m, 1°27'S - 134°01'E, 17.xi.2011, at light, Papua Insects Foundation; 1 ♀, RMNH.INS.1282900, Indonesia, Papua Barat, Birdshead Peninsula, Arfak Mountains, Maripi, 112 m, 0°55'S - 133°58'E, 19.xi.2011, at light, Papua Insects Foundation; 1 ♂, RMNH.INS.1298134, Indonesia, Papua, Star Mountains, Abmisibil, 4°40'S - 140°34'E, 1970 m, 29.xi-3.xii.2001, leg. H.J.M. van Mastrigt; 1 ♂, 1 ♀, RMNH.INS.1298135-36, Indonesia, Irian Jaya, Batanta Island, south coast, primary forest, 0°54' S - 130°40' E, 8.ii.1996, ZMA-expedition 1996; 1 ♂, RMNH.INS.1298137, Indonesia, Irian Jaya, Birdshead Peninsula, Gn. Bembab, 15 km N Ransiki, 350 m, 2.iii.1996, ZMA-expedition 1996; 1 ♂, RMNH.INS.1298138, Indonesia, Besum, Papua, Jayapura District (nr Genyem), 2°46'S - 140°12'E, sec. Lowland forest, abandoned cocoa plantation, 5-7.ii.2009, leg. A.J. de Boer, M. Schouten & R. Mambrasar; 1 ♀, RMNH.INS.1298140, Indonesia, Irian Jaya, Cyclops Mts, Depapre, 500 m, 21.i.1996, at light, ZMA-expedition 1996; 1 ♀, RMNH.INS.1298141, Indonesia, Irian Jaya, Wandammen Peninsula, Dotir, river Mawoy, primary forest, 6 km inland, 2°37' S - 134°33' E, 300 m, 18.ii.1996, at light, ZMA-expedition 1996; 1 ♀, RMNH.INS.1298142, Indonesia, Irian Jaya, Biak Island, Korem, 21.xi.1993, at light, leg. A.J. de Boer, A.L.M. Rutten & R. de Vos; 1 ♂, 1 ♀, RMNH.INS.1298143-44, Indonesia, Irian Jaya, Keb. Merauke, Kouh, 17.vi.1993, leg. P.J.A. de Vries; 1 ♂, RMNH.INS.1298145, Indonesia, Papua, Kab. Sarmi, Kwerba, 2°38' S - 138°24' E, 70 m, 29-30.vii.2005, leg. H.J.M. van Mastrigt, CI-RAP Mamberamo-Foya Exp.; 1 ♀, RMNH.INS.1298146, Indonesia, Papua, Kec. Abenaho, Landikma, 3°49' S - 139°14' E, 914 m, 18-22.ii.2009, leg. A.J. de Boer, M. Schouten & R. Mambrasar; 1 ♀, RMNH.INS.1298162, Indonesia, Papua, Star Mountains, Kecamatan Oksibil, Mabilabol, 4°54' S - 140°37' E, 1340 m, 27-29.xi.2001, leg. H.J.M. van

Mastrigt; 1 ♂, 1 ♀, RMNH.INS.1298147-48, Indonesia, Irian Jaya, Marauw, Biak Beach Hotel, 22 km E Biak, 6-11.i.1997, leg. A.J. de Boer; 1 ♂, 1 ♀, RMNH.INS.1298149-50, Indonesia, Irian Jaya, Birdshead Peninsula, Gn. Meja Reserve, nr Manokwari, 0°52'S 134°06'E, 28.i.1996, at light, leg. ZMA-expedition 1996; 1 ♀, RMNH.INS.1298139, Indonesia, Papua, Central Highlands, Kecamatan Abenaho, Pass Valley, 3°51' S - 139°05' E, 1950 m, 11-17.ii.2005, at light, leg. UNCEN-ZMA Expedition 2005; 1 ♂, 1 ♀, RMNH.INS.1298151-52, Indonesia, Irian Jaya, Birdshead Peninsula, Prafi, 15 km West of Andai, secondary forest, 200 m, 0°52' S - 133°53' E, 29.i.1996, at light, leg. ZMA-expedition 1996; 1 ♂, RMNH.INS.1298153, Indonesia, Irian Jaya, Birdshead Peninsula, Ransiki, 1°31' S - 134°10' E, 1.iii.1996, leg. ZMA-expedition 1996; 1 ♀, RMNH.INS.1298154, Indonesia, Irian Jaya, Birdshead Peninsula, 10 km S Andai, 0°58'S 133°59'E, 1.ii.1996, leg. ZMA-expedition 1996; 1 ♀, RMNH.INS.1298155, Indonesia, Irian Jaya, Wandammen Peninsula, Tandia, cultivated area, 2°52' S - 134°32' E, 21.ii.1996, at light, ZMA-Expedition 1996; 1 ♀, RMNH.INS.1298161, Indonesia, Irian Jaya, Birdshead Peninsula, Tuan Wowi, 240 m, 2.xi.1993, leg. A.J. de Boer, A.L.M. Rutten & R. de Vos; 1 ♀, RMNH.INS.1298156, Indonesia, Papua, Walmak, Kab. Yahukimo, Nipsan District, 4°07' S - 139°38' E, 1710 m, 31.i-16.ii.2005, at light, leg. UNCEN-ZMAN-expeditie 2005; 1 ♀, RMNH.INS.1298157, Indonesia, Irian Jaya, Birdshead Peninsula, Arfak mountains, Warkapi (nr Breie), primary lowland forest, 500 m, 12.xi.1993, at light, leg. A.J. de Boer, A.L.M. Rutten & R. de Vos.

Additional material: More specimens, which are not included in the type series, are known from the localities mentioned above and other localities present in the collections of RMNH, NHMUK and KSP. One specimen in RMNH is worth to mention, a female from Lae, Papua New Guinea, 28.vi.1968 (with "Coode 210/3"), which is the only specimen of this species so far known from the eastern side of New Guinea.

Diagnose: Generally larger than *reticulata*. Forewings dark chocolate brown, with distinctly more contrast than in *reticulata*. Spots SB, SM1 and M2 always larger than those in *reticulata* and with a less noticeable rim. Spot SM1 on forewing partly above spot SB (fig. 1) (in *reticulata* these spots do not overlap). Apex of hindwing without distinct suffusion (as seen in *reticulata*). Male genitalia larger and uncus slightly thicker than those of *reticulata*. Tegumen not as wide as in *reticulata*. Juxta larger and wider than that of *reticulata*. Valvae triangular shaped (in *reticulata* narrow) with a more robust and curved clasper. Apical part of cucullus much narrower than in *reticulata*, distally covered with longer and more setae. Sacculus with a longer and more slender extended process than in *reticulata*. Aedeagus shorter than in *reticulata*. Tube of aedeagus with a deep longitudinal groove (absent in *reticulata*). Setae of vesica notably shaped with the dorsal ones larger and distal shorter and more pointy than those in *reticulata*. Female antrum shorter and broader than in *reticulata*, not reaching the bursa copulatrix. Antrum does not reach the bursa and leaves a part of the ductus bursae just above the bursa copulatrix unsclerotized (in *reticulata* this part is almost completely sclerotized by the longer antrum). Cervix with a solid sclerotized flap at the ventral side (absent in *reticulata*).

Description: Fwl. ♂ 13.3-14.3 mm, ♀ 13.3-15.8 mm. Frons and vertex dark orange, vertex with a dark brown cross-shaped mark. Collar darker than frons and vertex, patagia with a dark brown rim. Thorax same colour as frons and vertex and with some dark brown markings. Abdomen orange with yellow taint.

Forewings dark brown. Spots SB, SM1 and M2 (fig. 1) pale yellow and rather large, all other spots pale red. Spot SM1 large and reaching to partly above SB. Fringes on forewings dark brown. Hindwings pale yellow, darker yellow at the apex and dorsum, with hairs at dorsum. Fringes on hindwings of the same colour as hindwings.

Variation: Spots in *laeta* are always rather large, but can be variable in size between specimens. Colouring on wings variable, sometimes with more or less contrast. Specimens from higher altitudes (i.e. from Pass Valley, fig. 6) are often darker by the reduction of some smaller spots.

Male genitalia: Genital rather large. Uncus long and slightly thick, with a knot near the end and a hook at the apex. Tegumen not as wide, gradually narrowing, with a blunt top. Juxta relatively large and wide. Vinculum horse shoe-shaped without distinct saccus but with a small protrusion. The valvae are triangular shaped with a straight sacculus. Clasper robust and curved, crescent-shaped and with a sharp apex. Cucullus without apical process, apical part rather narrow, distally covered with long setae. Sacculus relatively long with a slender extended process, having a sharp apex, slightly curved inwards.

Aedeagus short with a bulbous coecum. Vesica with two scobinated fields, both the dorsal and distal ones having rather large and long cornuti. The distal ones being shorter and more pointy than the dorsal ones. One large, straight and slightly folded bar-shaped basal cornutus. On the tube of the aedeagus a longitudinal deep groove.

Female genitalia: Antrum is strongly sclerotized with a rectangular shape, being rather flat, broad and short, not reaching the bursa and leaving a part of the ductus bursae just above the bursa copulatrix unsclerotized. Cervix bursae strongly sclerotized with chitinous drops, folded as a pointed hat with a pointy apex, positioned on top of the bursa at the left side and ventrally with a solid sclerotized flap. Ductus seminalis is connected with the cervix at this apex at the left side. Bursa copulatrix large, more or less shoe-shaped. A signum present in one of the many folds dorsally in the lower part of the bursa copulatrix.

Distribution: *Cyme laeta spec. nov.* is a common species which has almost exclusively been found in the western part of New Guinea and some adjacent islands (Batanta, Biak, Supiori, Wakde Island). Specimens have been found in almost every forested biotope, from sea level up to high mountains at an altitude of 2000 meters. Until now only one specimen is known from Papua New Guinea: Lae, Morobe Province, which indicates that the species is much wider distributed than at this moment recorded.

Etymology: The name of this species, *laeta* (Latin, meaning: joyfull, happy, cheerful), refers to my feeling when discovering the new species, but can also refer to the bright and cheerful colours of the species, even more so in comparison with the, in relation to *laeta*, more dull coloured *reticulata*.

***Cyme roseifusa* (Hulstaert, 1924) comb. nov.** (figs 11, 19)

Asura roseifusa Hulstaert (1924a: 129)

Holotype: ♀ RMNH.INS.1148746, Langgoer, Kl. Kei, A. Peeters.

Diagnose: Medium sized with a slightly darker background colour on forewings. Spots on forewings large. Apex of hindwings with dark fringes. Genitalia different than in *Laeta* with the cervix bursae folded as a pointed hat with a stub apex (in *reticulata* sharp). Cervix ventrally without a solid sclerotized flap (as seen in *laeta*)

Description: ♀ 13.7 mm. Frons, vertex and collar orange with few markings on vertex. Patagia with narrow brown rim. Thorax same colour as frons, vertex and collar, with only few markings. Abdomen pale yellow to pale orange.

Forewings dark brown with cream-yellow spots. Spots in row MA (fig. 1) orange to pinkish. all spots large but not fused. Forewings with brown fringes. Apex of forewings with dark brown fringes. Hindwings cream-yellow, darker at edges. Fringes on hindwings light brown, dark brown on apex. The females cervix bursae folded as a pointed hat with a stub apex. Cervix ventrally without a solid sclerotized flap.

Male unknown.

Female genitalia: Antrum strongly sclerotized, slightly trumpet shaped, tapering near the bursae. Ductus bursae partially unsclerotized. Cervix bursae strongly sclerotized with chitinous drops, folded as a pointed hat with a stub apex, positioned on top of the bursa at the left side. Cervix ventrally without a solid sclerotized flap. Ductus seminalis connected with apex of cervix on the left side. Bursa copulatrix large and globular. One signum in one of the many folds dorsally in the lower part of the bursa copulatrix.

Distribution: The only known specimen is the female holotype which is collected on Little Kai Island ("Klein Kei"), Moluccas, Indonesia.

***Cyme flavagraphia* (Van Eecke, 1926) comb. nov.** (figs 12, 20)

Asura flavagraphia Van Eecke (1926: 343)

Lectotype *flavagraphia* (herewith designated from syntype series): ♀, RMNH.INS.1282885, Boeroe, 1921, L.J. Toxopeus; Cat.no. 4, Museum Leiden, *A. flavagraphia*, Det. v. E.

Paralectotypes *flavagraphia*: 3 ♀♀, same as lectotype; Cat.no. 3 (RMNH.INS.1282884); Cat.no. 5 (RMNH.INS.1282886); Cat.no. 6 (RMNH.INS.1282887); 2 ♀♀, Cat.no. 1 (RMNH.INS.1298215), Cat.no. 2 (RMNH.INS.1148669), Buru, 1921, Station 7, leg. L.J. Toxopeus, TYPE, Museum Leiden, *Asura flavagraphia*, Det. v. E. ♀, [blue strip].

Note: Two of the syntypes were not spread and have little damage, but are the only two specimens with a label indication "TYPE". However, in the original description Van Eecke (1926) did not designate a certain type, so all six are syntypes. Therefore it has been chosen to designate a lectotype of the most neat and spread female (Cat.no. 4) to show all wing characters.

Diagnose: Distinctly larger than the previous species. Thorax and forewings very dark. Forewings with reduced spots, row of SMA2 (fig. 1) absent. Spots SB and SM1 as in *reticulata*, M1 bigger than in *reticulata*. Hindwings pale yellow, without suffusion at apex. Female genitalia with shorter antrum and smaller cervix compared to the other mentioned species. Cervix not shaped as a pointed hat (as seen in *reticulata*), but more like a shark's fin

Description: ♀ 15.3-16.8 mm. Frons, vertex and collar dark orange. Patagia with very wide and very dark brown rim. Thorax very dark brown with dark orange markings. Abdomen pinkish orange.

Forewings with dark brown background colour. Spots creamy yellow with an orange rim. SMA1 and spots on dorsum dark orange. Row of SMA2 spots absent. MA spots fused to three spots. Forewings with black fringes. Hindwings pale yellow with greyish yellow fringes. Male unknown.

Female genitalia: Antrum strongly sclerotized and rather short. Caudal part of ductus bursae unsclerotized. Cervix strongly sclerotized with chitinous drops, small and with stub apex. Cervix shaped like a shark's fin. Ductus seminalis connected with apex of cervix on left side. Bursa copulatrix large and oval shaped with a signum in one of the many folds dorsally in the lower part of the bursa copulatrix.

Distribution: The original syntype series was collected on Buru Island, Moluccas, Indonesia.

Conclusions

Cyme reticulata Felder, 1861 s.l. is widely distributed from the Moluccas to New Guinea and further eastwards. But in West New Guinea two phenotypes seem rather dominant and I wondered if these would indeed concern two forms of *reticulata* or are in fact two different species. A few allied species were included in the research to compare the possible rate of differences between the genitalia of separate species. Looking at the external characters of the specimens of *Cyme reticulata* s.l. from West New Guinea, it became very clear to which phenotype the females and males belong. The *Cyme reticulata* male holotype, of which the genitalia were depicted by Volynkin et al. (2019), was used to identify the true *reticulata* specimens from New Guinea. The genitalia of the male specimens from West New Guinea are exactly matching those of the holotype from Buru. These male specimens are therefore considered to belong to the true *Cyme reticulata*. The female genitalia depicted by Volynkin et al. (2019) is not a type specimen, but is externally very similar in appearance to the male, and its genitalia do indeed match with those of the true *reticulata* phenotype from New Guinea. Therefore it can be concluded that, at least in West New Guinea, specimens with the smaller spots on the forewings concern true *reticulata*, in which spot SM1 (fig. 1) is small and not reaching to above spot SB. Male and female specimens from West New Guinea which are generally larger in size and have larger spots, and with spot SM1 large and more or less partly above spot SB, appear to have different genitalia in both, male and female, and can therefore be considered to be a new species, which is described as *Cyme laeta* **spec. nov.**

However, generally accepted synonym taxa of *Cyme reticulata*, such as *Barsine placens* Walker, 1865, *Calligenia cyclota* Meyrick, 1886 and *Barsine intrita* Swinhoe, 1892, have not been checked on genitalia yet, so it is very important that this will be done in the future. Since these taxa do not originate from New Guinea it is not expected that these taxa will turn out to be *laeta* **spec. nov.** after all, but it isn't sure that they are synonym with *reticulata* either. I therefore call upon researchers from the deposit institutes of these types to examine the genitalia to clarify this taxonomic uncertainty.

Moreover, it is striking that no material of true *reticulata* and only one specimen of *laeta* is known from the eastern part of New Guinea (Papua New Guinea). It is at least expected that *laeta* occurs commonly in the western part of Papua New Guinea too, near the Star

Mountain Range of Papua, but no records are available at this moment. Further eastwards, two other somewhat resembling, but externally distinctly different species are apparently replacing *reticulata* and *laeta*: *Cyme manusi* (Rothschild, 1916) and *C. reversa* (Rothschild, 1916), found on the Admiralty Islands, Bismarck Archipelago and easternmost mainland of New Guinea. Study of the genitalia of both taxa have to confirm if these two are not conspecific and in what relation it stands with *reticulata* and *laeta*.

Another interesting found was the discovery in the collection of Naturalis Biodiversity Center of the types of four other allied taxa of *Cyme reticulata* which apparently have been forgotten by successive authors: *Asura punctilinea* Hulstaert, 1924a, *Asura roseifusa* Hulstaert, 1924a, *Asura punctilinea aquilonis* Hulstaert, 1924b and *Asura flavagraphia* Van Eecke, 1926. Being allied taxa of *reticulata*, these types were revised and included in this research. *Asura flavagraphia* Van Eecke, 1926 and *Asura roseifusa* Hulstaert, 1924a turned out to be good species and are transferred to *Cyme* **comb. nov.** The female genitalia of *Asura punctilinea* Hulstaert, 1924a **syn. nov.** and *Asura punctilinea aquilonis* Hulstaert, 1924b **syn. nov.** appeared to be identical with those of *reticulata* and these taxa are therefore considered to be junior synonyms of *Cyme reticulata* Felder, 1861.

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Literature

- Hulstaert, G., 1924a. New moths from New Guinea, Kei, and Tenimber. *Annals and Magazine of Natural History* (9)13: 127-139.
- Hulstaert, G., 1924b. Heteroceres indoaustraliens nouveaux. *Annales de la Société Entomologique de Belgique* 64: 85-101.
- Meyrick, E., 1886. Revision of Australian Lepidoptera. *Proceedings of the Linnean Society of New South Wales* (2)1: 687-802.
- Meyrick, E., 1889. On some Lepidoptera from New Guinea. *The Transactions of the Entomological Society of London* 1889: 455-522.
- Pagenstecher, A., 1886. Beiträge zur Lepidopteren-Fauna des malayischen Archipels (III.). Heteroceren der Aru-Inseln, Kei-Inseln und von Südwest-Neu-Guinea. *Jahrbücher des Nassauischen Vereins für Naturkunde* 39: 104-194.
- Roepke, W., 1946. The Lithosiids collected by Dr. L.J. Toxopeus in Central Celebes, with remarks on some allied species. *Tijdschrift voor Entomologie* 87: 77-91.
- Rothschild, W., 1916. On the Lepidoptera in the Tring Museum sent by Mr. A.S. Meek from

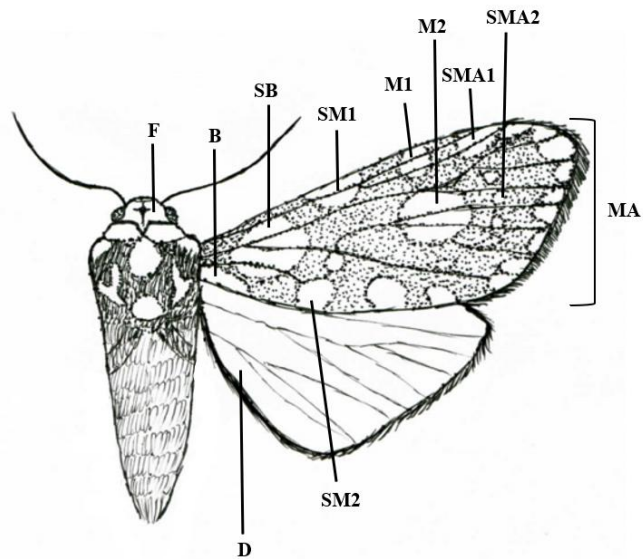
- the Admiralty Islands, Dampier and Vulcan Islands. *Novitates Zoologicae* 23: 319-334.
- Swinhoe, C., 1892. *Catalogue of Eastern and Australian Lepidoptera Heterocera in the collection of The Oxford Museum, part I, Sphinges and Bombyces*: 324 pp. At The Clarendon Press, Oxford.
- Van Eecke, R., 1926. Fauna Buruana. Lepidoptera Heterocera, Fam. Zygaenidae, Syntomidae and Arctiidae. *Treubia* 7(4): 341-350.
- Volynkin, A.V., S-Y. Huang & M.S. Ivanova, 2019. An overview of genera and subgenera of the Asura / Miltochrista generic complex (Lepidoptera, Erebidae, Arctiinae). Part 1. Barsine Walker, 1854 sensu lato, Asura Walker, 1854 and related genera, with descriptions of twenty new genera, ten new subgenera and a check list of taxa of the Asura / Miltochrista generic complex. *Ecologica Montenegrina* 26: 14-92.
- Walker, F., [1865]. *List of the Specimens of Lepidopterous Insects in the Collection of the British Museum, XXXI*. Supplement: 321 pp., Trustees British Museum, London.

Cited websites (May 2021)

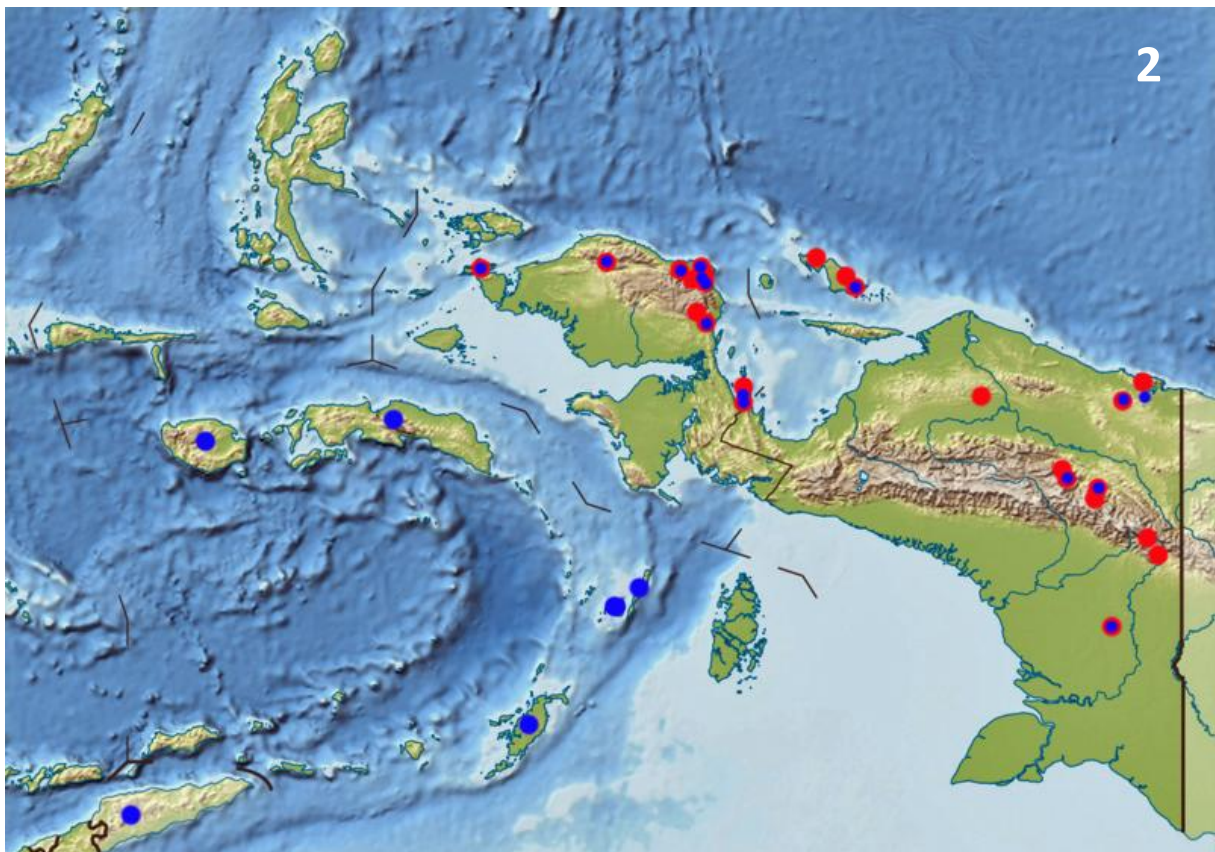
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lepindex - <https://www.nhm.ac.uk/our-science/data/lepindex/advanced>

papua-insects - <http://www.papua-insects.nl/index.htm>



1



2

Fig. 1. Scheme of maculation pattern as mentioned in the descriptions. F = frons patch; B = basal patch; SB = subbasal patch; SM = submedian spot; M = median spot; SMA = submarginal spot; MA = marginal spot; D = dorsal hairs

Fig. 2. Distribution of *Cyme reticulata* (blue dots) and *C. laeta* (red dots). Position of the blue dots on the Moluccan islands are fictive and generally meant.

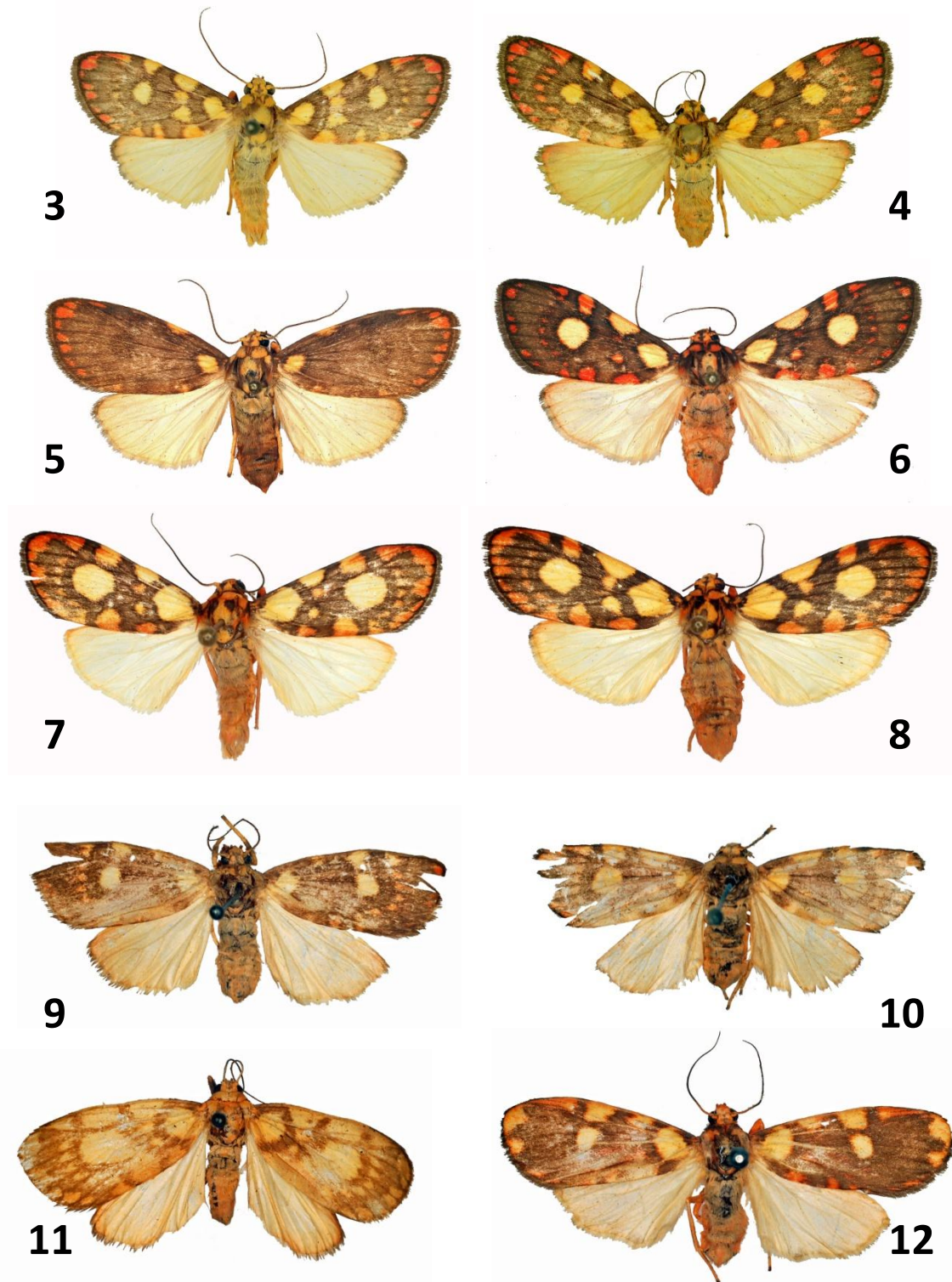


Fig. 3-12. *Cyme* species. **3.** *Cyme reticulata* Felder, 1861, ♂, Gn. Meja Reserve, Papua Barat, RMNH.INS.1298065; **4.** *C. reticulata* Felder, 1861, ♀, Batanta Island, Papua Barat, RMNH.INS.1298066; **5.** *C. reticulata* Felder, 1861, dark form, ♀, Gn. Meja Reserve, Papua Barat, RMNH; **6.** *C. laeta spec. nov.*, paratype ♀, dark form, Pass Valley, Papua, RMNH.INS.1298139; **7.** *C. laeta spec. nov.*, holotype ♂, Nansfori, Supiori Island, Papua, RMNH.INS.1282893; **8.** *C. laeta spec. nov.*, paratype ♀, Nansfori, Supiori Island, Papua, RMNH.INS.1282894; **9.** *C. reticulata* (holotype *Asura punctilinea* Hulstaert, 1924a) ♀, Olilit, Tanimber, RMNH.INS.1148745; **10.** *C. reticulata* (holotype *Asura aquilonis* Hulstaert, 1924b) ♀, Kai Besar (Great Kai), RMNH.INS.1148744; **11.** *Cyme roseifusa* (Hulstaert, 1924a), holotype ♀, Kai Kecil (Little Kai), RMNH.INS.1148746; **12.** *Cyme flavagraphia* (Van Eecke, 1926), lectotype ♀, Buru, RMNH.INS.1282885.



Fig. 13-14. Male genitalia of *Cyme* species, **a.** genital armature, **b.** aedeagus. **13.** *Cyme reticulata* gen.slide RMNH.INS.1298063; **14.** *C. laeta* gen.slide RMNH.INS.1282893.

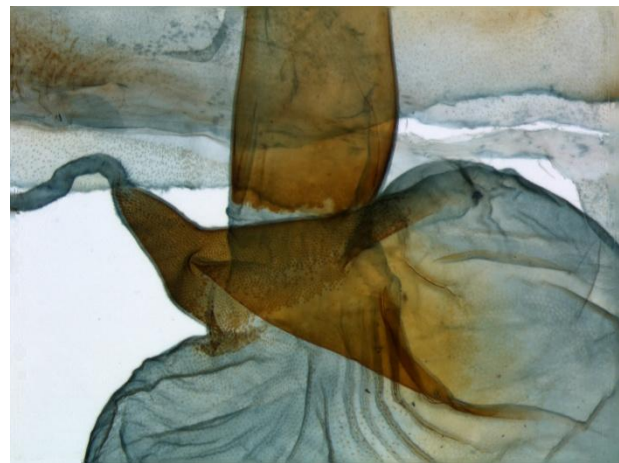
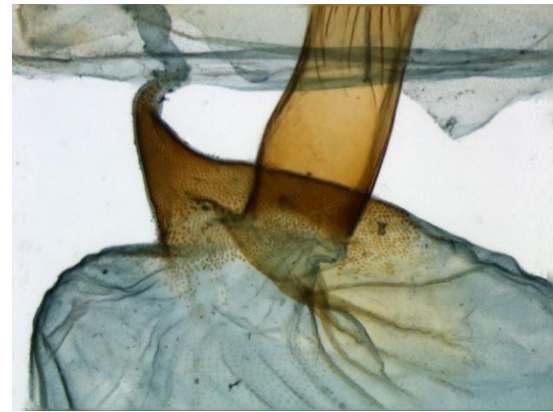
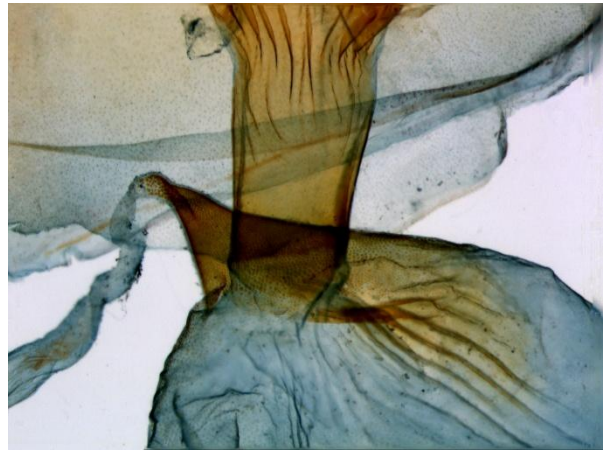
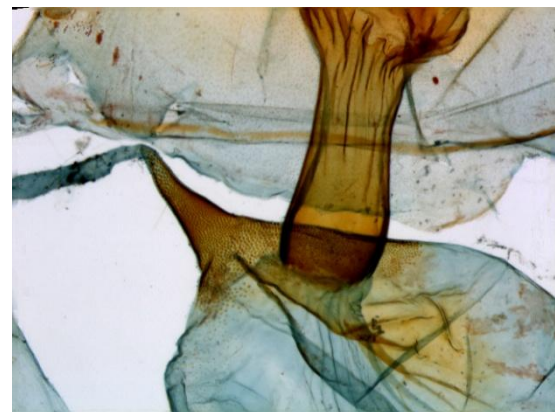


Fig. 15-16. Female genitalia of *Cyme* species, a. genital, b. cervix bursae. **15.** *Cyme reticulata* gen.slide RMNH.INS.1282892; **16.** *C. laeta* gen.slide RMNH.INS.1282894.



17b



18b

Fig. 17-18. Female genitalia of *Cyme* species, **a.** genital, **b.** cervix bursae. **17.** *C. reticulata* (holotype *Asura punctilinea* Hulstaert, 1924a) gen.slide RMNH.INS.1148745; **18.** *C. reticulata* (holotype *Asura aquilonis* Hulstaert, 1924b) gen.slide RMNH.INS.1148744.



Fig. 19-20. Female genitalia of *Cyme* species, **a.** genital, **b.** cervix bursae. **19.** *Cyme roseifusa* (Hulstaert, 1924a), holotype ♀, gen.slide RMNH.INS.1148746; **20.** *C. flavagraphia* (Van Eecke, 1926), lectotype ♀, gen.slide RMNH.INS.1148744.