

***Sinapex*, a new genus with two new species (Erebidae, Arctiinae, Lithosiini) from Papua, Indonesia**

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Abstract: Two new species from Papua, Indonesia, are described, which belong to a new genus. *Sinapex* **gen. nov.**, *S. nigrilineata* **spec. nov.** and *S. nigriperifera* **spec. nov.** are described, the adult and genitalia are depicted.

Rangkuman: Dua spesies baru dari Papua, Indonesia, anggota dari genus yang baru, dideskripsi di sini. *Sinapex* **gen. nov.**, *S. nigrilineata* **spec. nov.** dan *S. nigriperifera* **spec. nov.** dideskripsi dan gambar bentuk dewasa dan genitalia disajikan.

Keywords: Lepidoptera, Arfak Mts, Jayawijaya Mts, New Guinea.

Introduction

During some recent visits to the northern Arfak Mountains (Papua Barat) in Indonesian New Guinea a fairly common and rather conspicuous lithosiine species was collected at light (fig. 1) which was not yet known to science. They all were females, had a pale yellow to bone-white appearance with a thin longitudinal line on the forewings and black hindwings. Much later the males were discovered in the collection of Naturalis Biodiversity Center (Leiden), matching by the similar black line running over the forewing, although the hindwings were very different, being very peculiar, almost round and with a conspicuous black surrounding line along the wing margin. This feature was also found in other male specimens collected near the village Walmak in the Jayawijaya Mountains, more than 800 km further to the East in the Central Mountain Range. Study of the genitalia revealed that they indeed belong to the same genus but concern two different species. But which genus? The construction of the genitalia combined with the peculiar hindwings of the male do not match with any other known genus. New Guinea is, however, known for its many endemics and monotypical genera and species groups, so it is quite reasonable to conclude that we are dealing with a yet unknown genus with two new species.

In this paper the new genus is described including its two recently discovered species.

Abbreviations

Fwl - Forewing length (measured from base to apex)

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

RMNH.INS - Prefix for the unique registration number of slides and specimens in the insect collection of RMNH

Material and methods

The specimens (holotypes and paratypes) were photographed with a Nikon D600 with AF Micro-Nikkor 60mm f/2.8D lens, mounted on a Kaiser RSX Copy Stand with RTX camera arm and using a 32 watt circular lamp mounted on a light box (Fritz Weber). The genitalia of two males (holotypes) and two females (paratypes) were dissected, mounted and depicted. Dissected genitalia were put in cold KOH 10% for one night. After washing and cleaning with 30% alcohol to remove fat, scales and dirt, the genitalia were stained in a solution of chlorazol black in 30% alcohol and fixed in 95% alcohol. The genitalia were prepared for preservation in Euparal Essence (to prevent air bubbles) and after a few minutes mounted on a glass slide in a few drops of Euparal medium following the standard used in the Natural History Museum in London (Robinson, 1976): abdomen on the left side and genital on the right side (in the case of males with genital armature top right and aedeagus bottom right). To prevent the smaller parts, like the aedeagus, from floating, the Euparal drops were left to dry at least 24 hours without glass cover in a closed Petri dish (to protect against dust). The next day a proper size glass cover was put on the parts in the sticky Euparal, adding a few fresh drops of Euparal. The complete slide was left to dry for weeks in the Petri dish. Labels were only added after drying completely, so therefore it was necessary to write a slide number on the glass slide to avoid mixing up with other drying slides. The preparation slide was made by the first author and was numbered with a unique standard number of labels provided by the museum, with the prefix RMNH.INS.

Digital photographs were made with a motorized Zeiss V20 binocular microscope and a digital Axio MRc5 camera controlled by Axiomanager M2 software.

Forewing lengths (Fwl) were measured with a digital calliper from forewing base to apex. Morphological terminology of the external structures (excluding the genitalia) mainly follows Scoble (1992) and Holloway et al. (2001).

The terminology of the genitalia mainly follows Tuxen (1970) and Kôda (1987).

Systematic part

Sinapex gen. nov.

urn:lsid:zoobank.org:act: 94482BAC-D848-49C9-813A-E1F65165E656

Type species: *Sinapex nigrilineata* spec. nov.

Diagnosis: Abdomen in male distally broad with lateral scale tufts. Forewing costa in male strongly arched, apex of forewing in both not sharp. Male hindwings oval without a noticeable apex, in male at upperside with a distinct black marginal rim, ventrally with veins M2 and CuA1 accentuated black. Species with a strongly arched costa are known in *Macaduma* Walker, 1866 and *Lambula* Walker, 1866, but the combination with the oval hindwings is unique and the genitalia have a different structure.

Description: Labial palpi short and porrect with the last segment projecting beyond the head. Antennae filiform, in male scarcely with short ciliation. Abdomen usually dark brown, in male distally broad with lateral scale tufts. Forewing costa in male strongly arched, in female moderately arched, apex of forewing in both not sharp. Forewings of male usually pale coloured.

Male hindwings oval without a noticeable apex, in male at upperside with a distinct black marginal rim, ventrally with veins M2 and CuA1 accentuated black, probably with a scent

function. Hindwings of female of normal lithosiine shape, usually dark coloured and without the black scent scaling on the veins.

Male genitalia: Male genitalia with uncus short finger-shaped and with a broad triangular-shaped base, with two short peniculi. Tegumen wide and well developed, vinculum with shallow saccus. Valvae symmetrical, more or less stretched rectangular and equally broad, apically with two short processes, at cucullus and sacculus. Sacculus rim in the middle strongly concave. Cucullus with costa arched and with a weakly developed ampulla. Clasper may be present or absent.

Aedeagus with a dense bunch of needle-shaped thorns on the carinal plate, vesica wide, scobinated and with or without cornuti.

Abdomen at 1st segment laterally with a long brush of scent hairs, segment 4 and 5 laterally with a rather small corematis lobe.

Female genitalia: Cervix bursae large, weakly or strongly sclerotized. Ductus seminalis connected at a conical-shaped lobe. Bursa copulatrix broadly connected with cervix, globular, and with one star-shaped signum.

Distribution: Both species known to belong to this genus are found in New Guinea at high altitudes, in the Arfak Mountains (Papua Barat) and the Jayawijaya Mountains (Papua) respectively.

Etymology: The name *Sinapex* is a combination of the Latin words *Sine Apex* (= without top), indicating the oval shaped hindwings of the male which show no clearly defined apical corner.

***Sinapex nigrilineata* spec. nov.** (figs 1, 4-7, 12-13, 16, 18, 20, 22)

urn:lsid:zoobank.org:act: 8170D563-1898-4A95-95C7-BEBC7EDABEEB

Holotype: ♂, RMNH.INS.1282873, Indonesia, Papua Barat, Arfak Mts, Mokwam, 1469 m, 1°06'S - 133°54'E, 21-23.x.2014, at light, Leg. P.J. Zumkehr & F. Groenen.

Paratypes: 1 ♂, 5 ♀♀, RMNH.INS.1283312, 1283319-23, as holotype; 3 ♂♂, 3 ♀♀, RMNH.INS.1282876, 1283313-14, 1282875, 1282877, 1295681, Indonesia, Papua Barat, Arfak Mountains, Mokwam, 1510 m, 1°06'S - 133°54'E, 6-1.xi.2011, at light, Papua Insects Foundation; 1 ♂, 3 ♀♀, RMNH.INS.1283315, 1282874, 1283317-18, Indonesia, Papua Barat, Birdshhead Peninsula, Arfak Mountains, Demaisi, 1637 m, 1°10'S - 133°53'E, 14.xi.2011, at light, Papua Insects Foundation; 1 ♂, RMNH.INS.1283316, Indonesia, Papua Barat, Birdshhead Peninsula, Arfak Mountains, Demaisi, 1645 m, 1°10'S - 133°53'E, 24.x.2014, at light, S. & J. Sinnema, F. Groenen & P.J. Zumkehr.

Furthermore 25 additional females from Mokwam and Demaisi from the same collection events as above mentioned.

Diagnosis: Forewing of male chalk white (in *nigriperifera* white and sprinkled with brown scales). A black line is running from base towards apex (not reaching it) on the radial vein in both, male and female (in *nigriperifera* there is no such line). Female with forewings pale

yellow to off-white (in *nigriperifera* it is grey-white) and forewings longer than in *nigriperifera*.

Male genitalia with uncus gradually narrowed towards the tip (more sharply in *nigriperifera*) and its base bell-shaped as opposed to triangular. Rim of sacculus more steeply concave when compared to *nigriperifera*, but unlike the latter bearing a clasper. Presence of a shallow subapical pustule (a clear lobe in *nigriperifera*) and an ampulla, both covered with short setae (in *nigriperifera* the ampulla has longer hairs than the subapical lobe). Aedeagus cylindrical (bottle-shaped due to broader coecum in *nigriperifera*). Tube ventrally open for two thirds of its length (only half open in *nigriperifera*). Thorns on the carinal plate have an anterior-posterior orientation whereas in *nigriperifera* these are transversely orientated. Vesica showing cornuti and sclerotized plates, in marked contrast with *nigriperifera* which lacks both.

Female genitalia with partly sclerotized cervix bursae (in *nigriperifera* it is unsclerotized). Star-shaped signum round and small (whereas in *nigriperifera* it is oval, larger and with longer spines).

Description: Fwl: ♂ 7.7-8.9 mm; ♀ 7.4-8.6 mm. Male: Head white. Labial palpi short and porrect with the last segment projecting beyond the head. Antennae filiform with scarce and short ciliation. Thorax white with two black dots on meso- and metathorax. Abdomen dark brown, distally broad with tufts of larger scales. Legs ivory. Forewing costa strongly arched, apex with an angle of 110°. Forewings dorsally chalk white to silver and with a distinct black line along the radial vein, running from base to apex but not reaching it. Apical third of costa with brown fringes, dorsum with a brown rim.

Male hindwings oval without a noticeable apex. Dorsally pale grey-brown, at wingbase gradually diffusing, a black marginal line around the entire hindwing and long white fringes. Forewings ventrally grey-brown, at the costal half dark brown to black. Hindwings ventrally with veins M2 and CuA1 accentuated black, probably with a scent function.

Female: Head, thorax and forewings pale buff-yellow. Antennae filiform without ciliation. Thorax with two black dots on meso- and metathorax. Abdomen dark brown, distally with a short yellow anal tuft. Legs pale buff. Forewing costa moderately arched, apex slightly rounded. Forewings like in male with a distinct black line along the radial vein, running from base to apex but not reaching it. Fringes of forewing of the same colour as wing, dorsum with a black rim.

Female hindwings of normal lithosine shape, more or less triangular. Dorsally dark grey to black, fringes basally black, distally white. Forewings ventrally dark grey-brown, at forewing base yellow. Hindwings entirely dark grey-brown.

Male genitalia: Apical part of uncus short finger-shaped with a broad base, a tuft of long hairs arising radially from its median region and extending beyond its tip. Basal part of uncus broad and bell-shaped, with two short peniculi at the base. Tegumen wide and well developed, vinculum with shallow saccus. Valvae symmetrical, more or less stretched rectangular and equally broad, apically with two short processes, one at cucullus and one at sacculus. Sacculus rim in the middle strongly concave and sclerotized. Cucullus with a shallow subapical pustule and a weakly developed ampulla, both covered with short setae. Clasper clearly present, gutter-shaped, and partially projecting beyond the rim of sacculus. Tube of aedeagus cylindrical, slightly curved and ventrally for two-thirds open. Carinal plate with a dense bunch of needle-shaped thorns with an anterior-posterior orientation. Vesica

wide, with some scobinated fields and with a dense bunch of needle-shaped cornuti at the 4th distal diverticle. 1st basal diverticle with two slightly sclerotized plates.

Abdomen at 1st segment laterally with a long brush of scent hairs and a rather small coremata lobe on each side of segment 4 and 5, the lobes at the 4th segment seemingly larger than the ones at the 5th segment.

Female genitalia: Papillae analis relatively large. Antrum hardly sclerotized, obscure. Cervix bursae large, partly strongly sclerotized. Ductus seminalis connected to a conical lobe at the lower middle of the cervix. Bursa copulatrix broadly connected to cervix, globular, and with one small spherical signum presenting radially disposed short conical projections giving it a star-like appearance.

Distribution: The species has been found in the northeastern part of the Arfak Mountains, Papua Barat, Indonesia in foggy moss rich forests (fig. 2).

Etymology: The name *nigrilineata* refers to the longitudinal black line on the forewing running at the radial vein in front of the cell.

***Sinapex nigriperifera* spec. nov.** (figs 8-11, 14-15, 17, 19, 21, 23)

urn:lsid:zoobank.org:act: 01FAA038-C95D-4DB5-907D-86F480E914E2

Holotype: ♂, RMNH.INS.1282868, Indonesia, Papua, Kecamatan Nipsan, Walmak, 1710 m, 4°07'S - 139°38'E, 10-18.ii.2005, at light, cultivated area, UNCEN-ZMA Expedition, Papua Indonesia 2005.

Paratypes: 1 ♀, RMNH.INS.1282869, Indonesia, Papua, Kecamatan Nipsan, Walmak, 1710 m, 4°07'S - 139°38'E, 31.i-16.ii.2005, at light, cultivated area/disturbed mountain forest, UNCEN-ZMA Expedition, Papua Indonesia 2005; 1 ♀, RMNH.INS.1282870, Indonesia, Papua, Kab. Yahukimo, Walmak (distr. Nipsan), 1710 m, at light, 4°07'S - 138°36'E, 20-25.ix.2011, leg. F. Groenen.

Diagnosis: See for comparison with *nigrilineata* spec. nov. its diagnosis.

Forewing in *nigriperifera* white and sprinkled with brown scales, without black line in the forewing. Female with forewings grey-white.

Male genitalia cucullus without a clasper. A clear lobe and ampulla, the latter having longer hairs than the subapical lobe. Aedeagus bottle-shaped due to broader coecum. Tube half open. Thorns on the carinal plate transversely orientated. Vesica without any sclerotization. Female genitalia hardly sclerotized. Star-shaped signum oval, large and with long spines.

Description: FwL: ♂: 8.5 mm; ♀: 7.9-8.2 mm. Male: Head white. Labial palpi short and porrect with the last segment projecting beyond the head. Antennae filiform with scarce and short ciliation. Thorax white with two black dots on meso- and metathorax. Abdomen dark brown, distally broad with tufts of larger scales. Legs white. Forewing costa strongly arched, apex rounded. Forewings dorsally white, scarcely sprinkled with dark brown scales. Fringes all around forewing dark brown.

Male hindwings oval without a noticeable apex. Dorsally at base dark grey-brown, distally fading to grey-white, on the veins darker. A black marginal line around the entire hindwing and long white fringes.

Forewings ventrally grey-brown, at the costal two-third dark brown. Hindwings ventrally pale grey, at base darker grey-brown, with veins M2 and CuA1 accentuated black, probably with a scent function.

Female: Head and thorax white. Antennae filiform without ciliation, brown. Thorax with two black dots on meso- and metathorax. Abdomen dark brown. Legs grey. Forewing costa arched, apex slightly rounded. Forewings white, more heavily sprinkled with dark brown scales, giving it a marbled appearance. Apical fringes pale brown.

Female hindwings of normal lithosine shape, more or less triangular. Dorsally dark brown. Forewings and hindwings ventrally unicolorous dark grey-brown.

Male genitalia: Uncus short finger-shaped abruptly narrowed apically, bearing a tuft of long hairs arising radially from its median region and extending beyond its extremity. Base of uncus broad and triangular-shaped, with two short peniculi at the base. Tegumen wide and well developed, vinculum with shallow saccus. Valvae symmetrical, more or less stretched rectangular and equally broad, apically with two short processes; at cucullus and sacculus. Rim of sacculus in the middle widely concave and sclerotized. Clasper absent. Cucullus with a subapical lobe and a weakly developed ampulla, the first covered with short setae, ampulla bearing longer hairs. Aedeagus broad at coecum, bottle-shaped. Tube of aedeagus short and ventrally half open, carrying a dense bunch of transversely orientated needle-shaped thorns on the carinal plate. Vesica wide, scobinated but lacking further sclerotization in the form of either cornuti or plates.

Abdomen at 1st segment laterally with a long brush of scent hairs, and with a rather small corematic lobe on each side of segment 4 and 5.

Female genitalia: Papillae analis of moderate size. Antrum well developed and sclerotized, almost square, followed by a short and broad ductus bursae running into the cervix bursae which is weakly sclerotized and very large, running down to near the bottom of the bursa copulatrix. Ductus seminalis connected to a conical lobe at the lower right side of the cervix. Bursa copulatrix broadly connected with cervix, globular but hard to define from cervix, and with one large elliptical signum bearing radially disposed long spines.

Distribution: The species is found at about 1700 meter in mountain forests of the Jayawijaya Mountains, Papua, Indonesia (fig. 3).

Etymology: The name *nigriperifera* refers to the black line at the rim of the hindwings.

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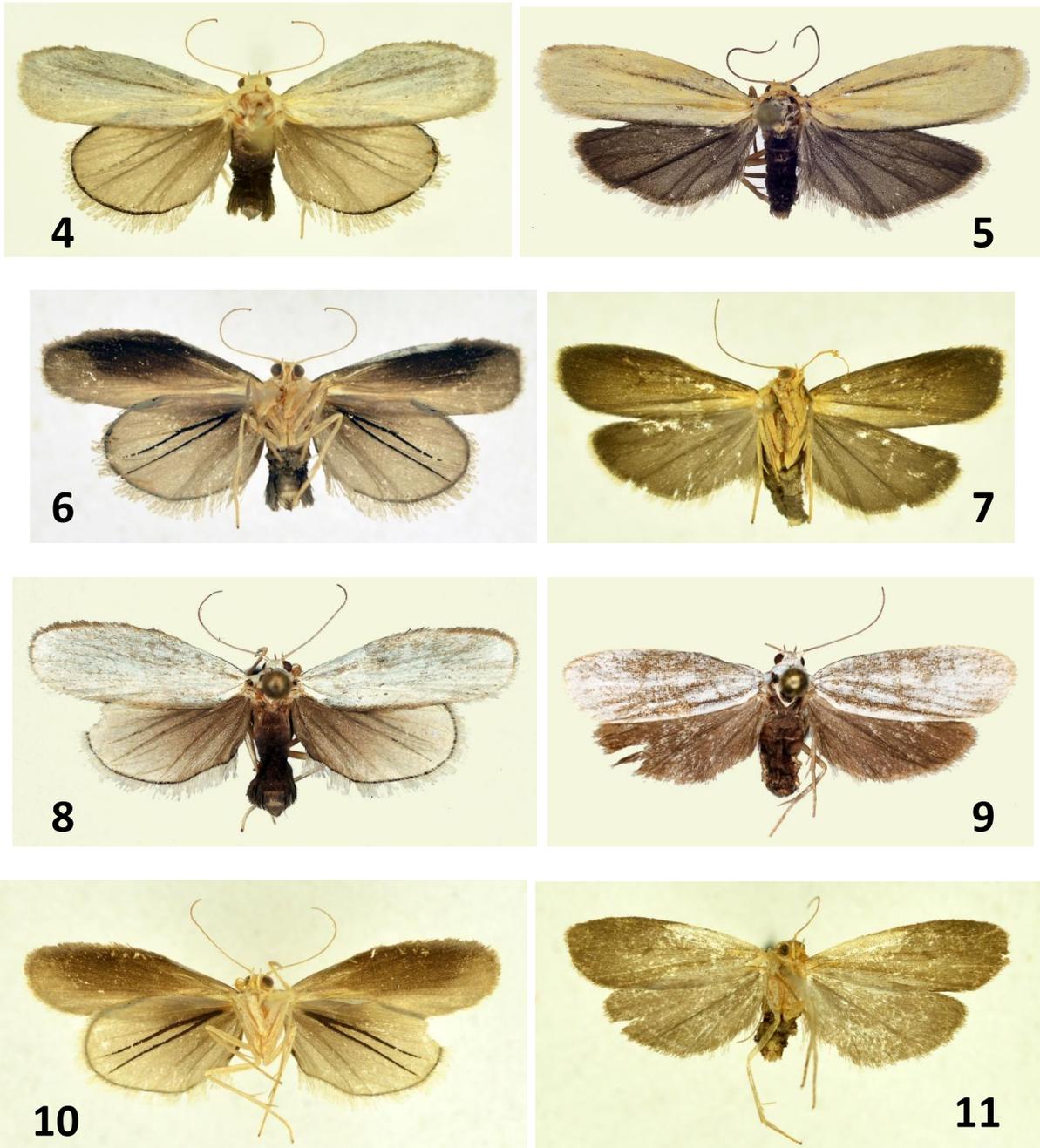
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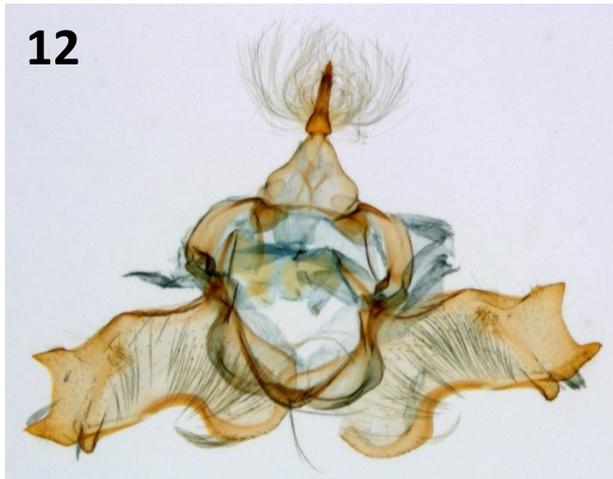
Fig. 1. *Sinapex nigrilineata* spec. nov., a female at light in Demaisi, Arfak Mts (photo: Sandra Lamberts); **fig. 2.** Biotope of *S. nigrilineata* spec. nov., Mokwam at 1500 meter, northern Arfak Mts, Papua Barat (photo: Piet Zumkehr).



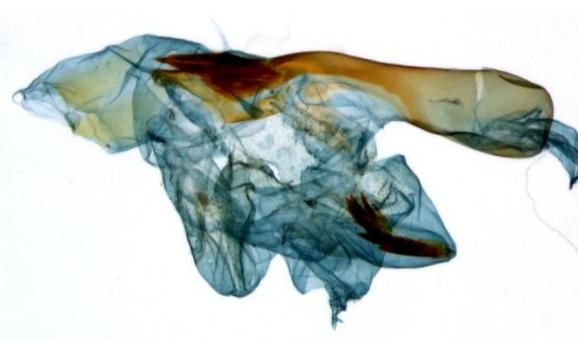
Fig. 3. Biotope of *S. nigriperifera* spec. nov., Walmak at 1700 meter, Jayawijaya Mts, Papua (photo: Joop Schaffers).



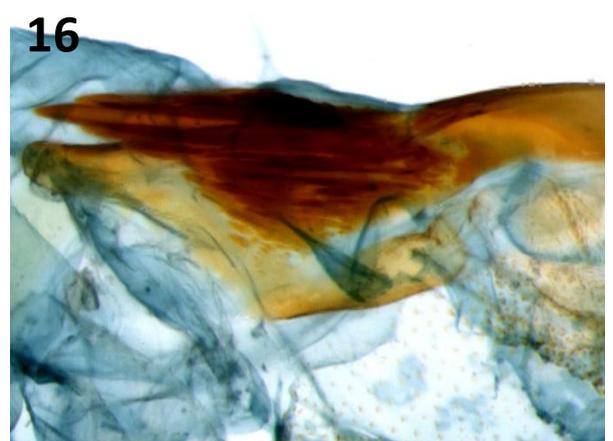
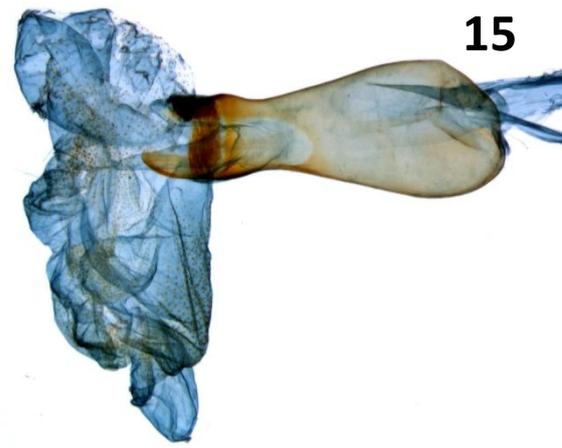
Figs 4-11. Adults of *Sinapex* species: **4.** *Sinapex nigrilineata* **spec. nov.**, holotype ♂, RMNH.INS.1282873; **5.** *S. nigrilineata* **spec. nov.**, paratype ♀, RMNH.INS.1282874; **6.** *S. nigrilineata* **spec. nov.**, holotype ♂ verso; **7.** *S. nigrilineata* **spec. nov.**, paratype ♀ verso, RMNH.INS.1295681; **8.** *S. nigriperifera* **spec. nov.**, holotype ♂, RMNH.INS.1282868; **9.** *S. nigriperifera* **spec. nov.**, paratype ♀, RMNH.INS.1282869; **10.** *S. nigriperifera* **spec. nov.**, holotype ♂ verso; **11.** *S. nigriperifera* **spec. nov.**, paratype ♀ verso, RMNH.INS.1282870.



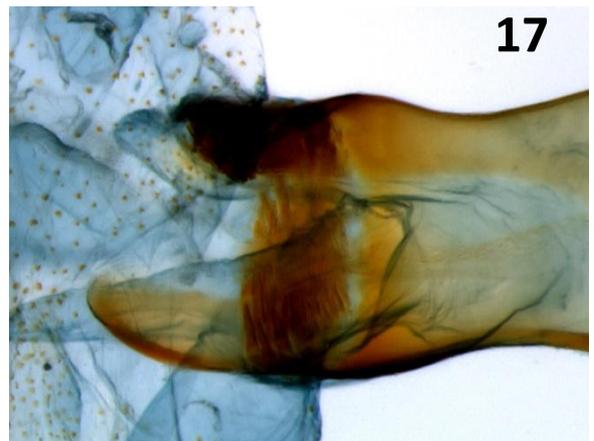
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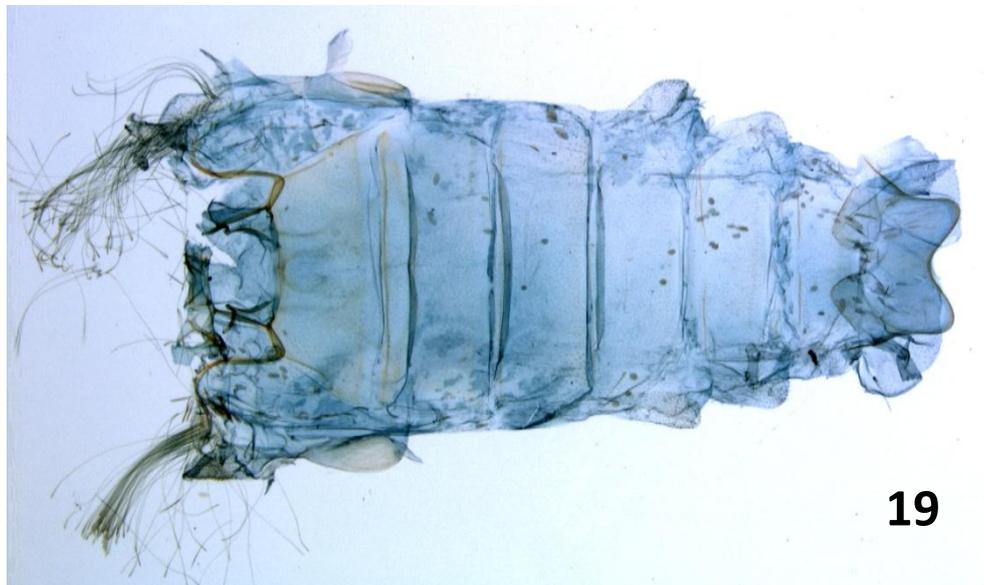
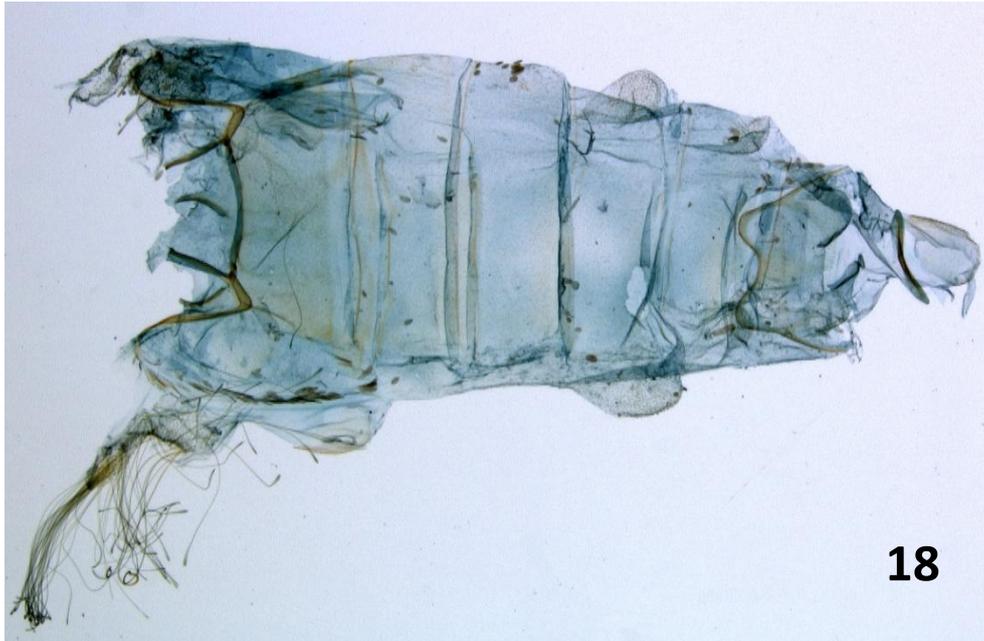
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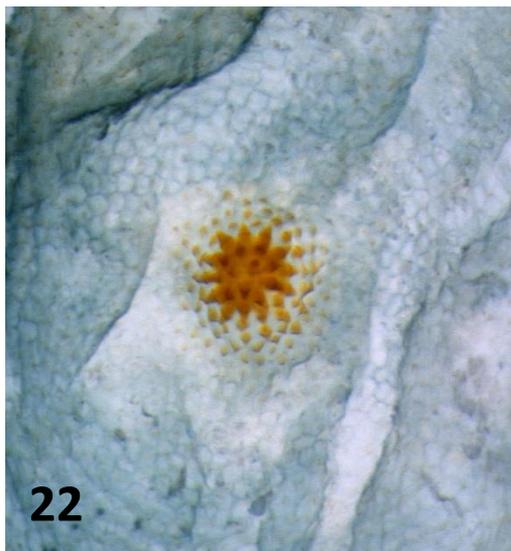
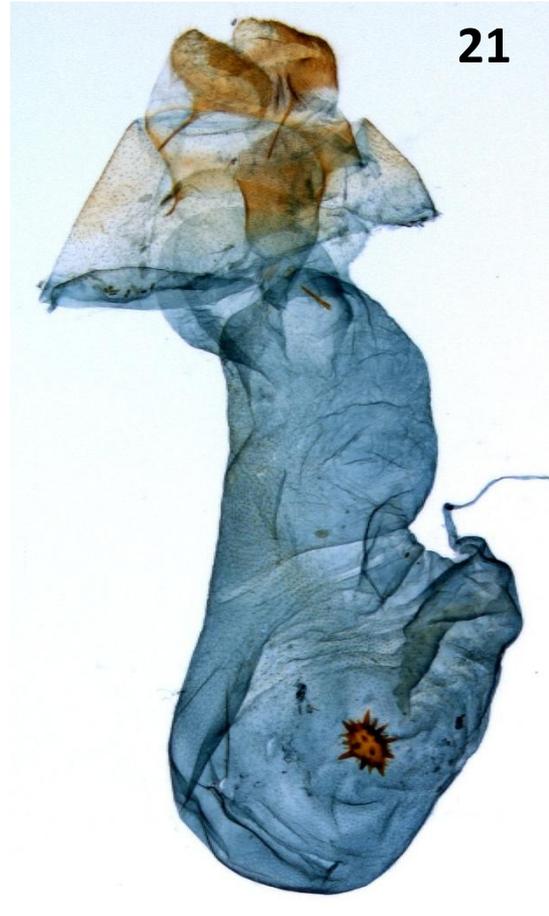
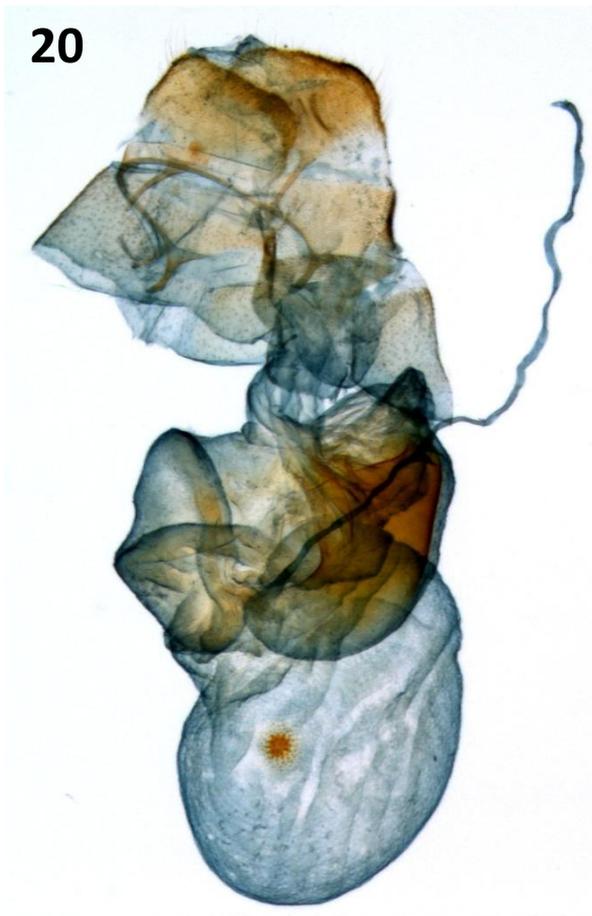
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Figs 12-17. Male genitalia of *Sinapex*: **12.** *S. nigrilineata*, genital armature RMNH.INS.1282876; **13.** *S. nigrilineata*, aedeagus RMNH.INS.1282876; **14.** *S. nigriperifera*, genital armature RMNH.INS.1282868; **15.** *S. nigriperifera*, aedeagus RMNH.INS.1282868; **16.** *S. nigrilineata*, carinal plate RMNH.INS.1282876; **17.** *S. nigriperifera*, carinal plate RMNH.INS.1282868.



Figs 18-19. Abdomen of *Sinapex* males: **18.** *S. nigriperifera*, RMNH.INS.1282876; **19.** *S. nigriperifera*, RMNH.INS.1282868.



Figs 20-23. Female genitalia of *Sinapex*: **20.** *S. nigriperifera*, genitalia RMNH.INS.1282877; **21.** *S. nigriperifera*, genitalia RMNH.INS.1282869; **22.** *S. nigriperifera*, signum RMNH.INS.1282877; **23.** *S. nigriperifera*, signum RMNH.INS.1282869.