

## Notes on the genus *Psychonotis* (Lepidoptera: Lycaenidae) from Western New Guinea (Papua and Papua Barat), with description of a new subspecies of *P. melane* (Joicey & Talbot, 1916)

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**Abstract:** An overview of the genus *Psychonotis* Toxopeus, 1930 in Western New Guinea is given and a new subspecies, *P. melane astra* **subsp. nov.** is described from the Star Mountains in Eastern Papua. *Thysonotis plotinus* Grose-Smith & Kirby, 1896 is synonymized with *T. caelius plateni* Grose-Smith & Kirby, 1896. *Thysonotis dissimilis* (Joicey & Talbot, 1916) is considered to be a subspecies of *Psychonotis caelius* (C. & R. Felder, 1860).

**Rangkuman:** Diberikan suatu ikhtisar dari genus *Psychonotis* Toxopeus, 1930 yang ditemukan di New Guinea bagian barat dan deskripsi subspecies baru, *P. melane astra* **subsp. nov.** dari Pegunungan Bintang sebelah timur Papua. *Thysonotis plotinus* Grose-Smith & Kirby, 1896 adalah sinonim dari *T. caelius plateni* Grose-Smith & Kirby, 1896. *Thysonotis dissimilis* (Joicey & Talbot, 1916) dianggap sebagai subspecies *Psychonotis caelius* (C. & R. Felder, 1860).

**Keywords:** Polyommataini, Papua New Guinea, Star Mountains, *caelius* species group.

### Introduction

The genus *Psychonotis* Toxopeus, 1930 contains small polyommataine lycaenids, closely resembling species of *Danis* Fabricius, 1807, which are, however, much larger and have a very different male genitalia structure. But due to their general phenotypic similarities, in the past, both genera were together placed in *Thysonotis* Hübner, 1819, which is now regarded as a synonym of *Danis*.

The three genera *Danis*, *Perperes* Hirowatari, 1992 and *Psychonotis* were known to form the “*Danis* section” sensu Eliot (1973). Based on molecular data, Stradomsky (2016) has removed *Psychonotis* from this section, placing it within the tribe Castaliina, being closely related to *Callictita* Bethune-Baker, 1908 and *Upolampes* Bethune-Baker, 1908. Hirowatari (1992) discussed the morphological characters of *Psychonotis* and Parsons (1998: 98, 432) has given a detailed overview, referring in particular to the “*Danis/Psychonotis* mimicry complex” in Papua New Guinea.

*Psychonotis* is widely distributed from Sulawesi to Australia and Oceania (New Caledonia) and shows a maximum species diversity in the eastern part of its occurrence (Bismarck and Solomon Archipelago). Currently sixteen different species are known and those occurring in Papua New Guinea and the Solomon Islands were subject of two papers by Tennent (1999) and Müller (2003). Not much is known about the species diversity of *Psychonotis* in Western New Guinea and, aside of the relatively common and widely distributed type species *P.*

*caelius*, *P. melane* is the only further species so far recorded from this area, with *melane* being regarded as a Wandammen Mountains endemic (at the west side of the Cenderawasih Bay).

Müller (2003) has divided the species from New Guinea and Australia into four different species groups, of which only the „*caelius* species group“ occurs in Western New Guinea. *Psychonotis melane*, as the only known species with completely brown wing uppersides, was not discussed by Müller, but possibly this taxon has to be placed in its own “*melane* species group.”

#### Abbreviations used

KSP – Koleksi Serangga Papua (former private collection of Henk van Mastrigt), Universitas Cenderawasih, Waena, Papua, Indonesia.

CSSK – Collection Stefan Schröder, Köln, Germany

### Checklist of *Psychonotis* taxa from Papua and Papua Barat

*Psychonotis caelius plateni* (Grose-Smith & Kirby, 1896) [TL: Waigeo]

*plotinus* Grose-Smith & Kirby, 1896 **syn. nov.** [TL: Stephansort]

*ekeikei* Bethune-Baker, 1908 [TL: Ekeikei], synonymized by D`Abrera, 1977

*aetius* Fruhstorfer, 1915 [TL: Friedrich Wilhelmshafen], synonymized by D`Abrera, 1977

*coelinus* Grose-Smith, 1898 [TL: Fergusson Island], synonymized by Parsons 1998

*Psychonotis caelius dissimilis* (Joicey & Talbot, 1916) **stat. nov.** [TL: Schouten Islands]

*Psychonotis melane melane* (Joicey & Talbot, 1916) [TL: Wandammen Mountains]

*Psychonotis melane astra* **subsp. nov.**

### *Psychonotis caelius* (C. & R. Felder, 1860)

*Psychonotis caelius* is the most common and widely distributed type species of the genus. It displays some regional variability and currently eleven subspecies are known, covering almost the complete geographical range of the genus (Tennent, 1999: 115).

Occurrence of nominate *P. caelius* is restricted to the Aru Islands and this taxon is characterized by its strongly reduced hindwing marginal lunules. Basal metallic on the hindwing is only weakly developed and costal metallic scaling on the forewing is reduced but the original illustration in Felder, Felder & Rogenhofer (1864: pl. 33, fig. 11-12) shows the typical green costal markings quite well.

Characters of the type species were used to define the *caelius* species group of Müller (2003: 164) and members belonging to this group are characterized by the presence of green scales on the forewing underside costa and base. Hindwing marginal lunules are complete and metallic blue-green. However, these characters stand only in the areas discussed by Müller.

Concerning Western New Guinea populations of *caelius*, the two names *plotinus* (Grose-Smith & Kirby, 1896) and, much less frequently, *plateni* (Grose-Smith & Kirby, 1896) were used in the past.

***Psychonotis caelius plateni* (Grose-Smith & Kirby, 1896)** (Figs 1-16)*Thysonotis plateni* Grose-Smith & Kirby, 1896: 40, pl. 3 fig. 5-6.*Thysonotis plotinus* Grose-Smith & Kirby, 1896: 44, pl. 4 fig. 5-7. **syn. nov.**

Grose-Smith & Kirby described *plateni* from material collected by Platen on his expeditions to Waigeo during the 1880s. *Psychonotis caelius plateni* closely resembles ssp. *plotinus*, which was described a few pages later in the same publication and the given illustrations of both species serve very well to understand their proposed separation.

*Psychonotis caelius plateni* and *plotinus* are of about the same size and have a similar underside wing pattern. The main differences, as seen from the original drawings, are the narrower band of marginal ocelli and the white marginal striae in *plateni*. Accordingly, the white hindwing band is slightly broader in *plateni* than in *plotinus*.

Longer series of *plateni* from Western New Guinea, including some offshore islands, show that there is a wide range of variation in both males and females. In the males, the width of the discal bands on both fore- and hindwing varies; they may be reduced in width towards the inner margin of the hindwing or end as a broad band. Accordingly, the width of the dark median band also varies. The marginal lunules are also variable. Usually they are well developed but in some populations like in specimens occurring in the Arfak Mountains (*P. caelius* cf. *plateni*, Fig. 17-18) they are reduced in width. Females are also very variable. The white discal bands vary in width but are generally much narrower than in the males and usually there is some metallic blue basal scaling on the upperside (Fig. 7-12).

The white marginal streaks on the hindwing are present in almost all males and females, even though they may be only faintly developed. In some localities, like Timika (Fig. 10), rare specimens with greatly reduced streaks occur (Fig. 10a), which otherwise do not differ from phenotypes of other populations.

Two males from the Dau River determined as *P. caelius* cf. *plateni* (Peg. Bintang Batimban, KSP 12090; 12091, Fig. 21-22) have the dark hindwing margin broadened and the green metallic marginal lunules strongly reduced, but in all other characters they do not differ from *plateni*, and especially females show no difference at all. Marginal white streaks are faintly developed. Most likely they belong to montane population, as broadened hindwing margins are also, but to a lesser extent, present in specimens from the Arfak Mountains. However, there appears to be no general trend that may be useful to separate different geographical races.

As the characters of the underside pattern vary, the main difference between both subspecies appears to be the “row of narrow white streaks” (Grose-Smith & Kirby, 1896: 40) at the hindwing margin in *plateni*. Grünberg in Seitz (1928: 829) refers to these marginal hindwing markings as an “unterbrochene weiße Saumlinie” and D’Abrera (1977: 328), described it as “a small row of white marginal spots” on the hindwing, which are lacking in *plotinus*. In their original diagnosis of *T. plotinus*, Grose-Smith & Kirby (1896: 44) are describing a “submarginal row of oval black spots, separated from the rest of the black border by the metallic blue surrounding them” and there is no indication of a white marginal line in the figures given on their plate (Grose-Smith & Kirby, 1896: pl. 4, fig. 6). However, marginal white streaks are very obvious in their figure given for *plateni* (Grose-Smith & Kirby, 1896: pl. 3 fig. 6).

Considering the very slight differences between *plateni* and *plotinus* both are here considered synonyms, with *plateni* having page priority over *plotinus*.

**Distribution:** Fruhstorfer (1915: 42) had already recognized that: “Eine ähnliche Form kommt in Sorong, Holl. Nord-west-Neu-Guinea vor. Nach Druce finden sich benachbarte Stücke auch auf Mysole und Dorey” [A similar form occurs at Sorong, Holl. Nord-west-Neu-Guinea. According to Druce, related specimens can also be found on Mysole and Dorey]. Fruhstorfer’s observation can be confirmed and apparently, *plateni* is distributed throughout Western New Guinea (Kaimana, Sorong, Japen, FakFak, Avona, Timika, Arfak, Nabire). Specimens occurring at Bulolo (PNG) do not differ much and it appears that the range of *plateni* includes much of mainland New Guinea.

Remarks concerning the taxon *plotinus* Grose-Smith & Kirby, 1896:

*Thysonotis plotinus* was originally described from “Stephansort” (now Bogadjim) at the northern coast in the Madang Province of Papua New Guinea and Parsons (1998) has included all PNG mainland populations in ssp. *plotinus*, while D`Abrera (1977: 328) imprecisely restricted the distribution of *plotinus* to Eastern New Guinea and questionably New Britain.

Parsons (1998: pl. 68, figs. 1913, 1915) illustrates a male and a female as ssp. *plotinus* from PNG, both with well developed white marginal streaks, which are not characteristic for this subspecies but for *plateni*. Müller (2003: fig. 10) also figured a similar male specimen from the Central Highlands of PNG with well developed marginal streaks. Specimens from the Madang Province (Tokan) and Morobe Province (Bulolo), which is situated about 400 km south of Stephansort, also possess the white marginal line and do not differ significantly from specimens from West Papua (Fig. 16a).

The variation observed in *P. caelius plateni* is very wide and it appears that this also includes phenotypes previously known as “*plotinus*”. A separation of both forms, based on the width of the white discal bands or the metallic submarginal lunules is impossible. As already discussed above, *plotinus* is considered to be a synonym of *plateni* and can therefore only be regarded as a variation of *plateni*.

### ***Psychonotis caelius dissimilis* (Joicey & Talbot, 1916) stat. nov. (Figs 23-24)**

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*Thysonotis dissimilis* Joicey & Talbot, 1916b: 76, pl. 3 figs 7-8.

The Schouten Islands (Numfor, Biak, Supiori) race of *Psychonotis caelius* was described as *Thysonotis dissimilis* (Joicey & Talbot, 1916), but this taxon was generally overlooked and questionably included in *Danis* Fabricius, 1807.

*P. caelius dissimilis* is a small subspecies, with a wing length of 16-18mm, indicating at first sight that it rather belongs to *Psychonotis* than to *Danis*, because species of the latter genus are much larger than *Psychonotis*. In the original description, *dissimilis* was compared with *hebes* Druce, 1904 and *eudocia* Druce & Bethune-Baker, 1893, both assigned to *Psychonotis*. The short yellow streak along the forewing costa at the wing base (present in *P. eudocia*, Figs 25-26) is missing. *Psychonotis caelius dissimilis* is an island race, differing from mainland *caelius* in having the white band on the hindwing much broader and more curved, following the wing shape. The blue costal streak on the forewing is reduced and the greenish-blue lunules on the hindwing are narrowed. Males from Biak and Supiori show the hindwing underside white bands clearly broader than in nominate *caelius*, but male genitalia do not significantly differ from those of *caelius* and therefore *dissimilis* is regarded here as a subspecies.

**Distribution:** Confined to the islands Biak and Supiori, Papua, Indonesia.

***Psychonotis melane melane* (Joicey & Talbot, 1916)** (Figs 27-28, 33)

*Thysonotis melane* Joicey & Talbot, 1916a: 82, pl. 7 fig. 7.

*Psychonotis melane*: D'Abbrera, 1977: 329 fig. of *Psychonotis melanae* [sic!] sensu Parsons, 1998: 674.

A very distinctive species for the genus. As its name suggests, males are dark brown or black on the upperside and compared with other species of this genus, the white underside bands are reduced in width. Joicey & Talbot (1916a: 82) also mentioned in their description that the “basal two thirds of costa [are] blue” and that the hindwing white discal band is narrowing sharply to the inner margin. The metallic lunules on the hindwing margin are comparably large, and approaching in size the lunules of *caelius*, but may be outlined rather faintly in most cases and are sometimes reduced to a thin line of blue scales along the outer wing margin. There is a faint streak of metallic blue scales along the costa of the forewing and some basal scaling on the hindwings. Underside markings are generally much stronger in *caelius*. Female specimens are apparently still unknown.

**Distribution:** Regarded as a local subspecies of the Wandammen Mountains (located on the west side of the Cenderawasih Bay) in West Papua, and the Wissel Lakes, Papua (Paniai District: Waghete, Modio, K. Enaro, Tuguwai, a small series of four males in KSP [KSP 11923-11926]).

***Psychonotis melane astra* subsp. nov.** (Figs 29-32, 34)

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**Holotype:** ♂ KSP 22930, Papua, Star Mountains, Pegunungan Bintang, Mabilabol, ii.2005, leg. Daawiah & Hanna.

**Paratypes:** (2 ♂♂, 1 ♀) 1 ♂ KSP 11928 [dissected], Pegunungan Bintang, Mabilabol, ii. 2005, leg. Daawiah & Hanna; 1 ♀ KSP 11929, Pegunungan Bintang, Mabilabol, ii. 2005, leg. Daawiah & Hanna; 1 ♂ KSP 11927, Pegunungan Bintang, Mabilabol, iii.1982.

**Description:** Forewing length 11-12mm. Upperside uniformly dark blackish brown, with the underside white bands faintly shining through. Fringes dark black brown. Underside blackish with broad white median bands on both wings. Some isolated metallic green scales along the costa of forewing and at the hindwing margin. One specimen shows a single line of green scales faintly following the shape of marginal lunules. Externally females do not differ from the males.

Male genitalia: As in the nominate subspecies. Valvae slightly more rectangular in outline and more coarsely serrated (Fig. 34).

Notes: Specimens of ssp. *astra* differ significantly from the nominate subspecies. The metallic underside markings are strongly reduced and the blue green scaling is almost completely missing. The white hindwing median band is not triangular in shape, but follows more or less the wing shape, so that it appears much broader than in nominate *melane*. It is not as strongly narrowing towards the inner margin and remains much broader immediately at the margin.

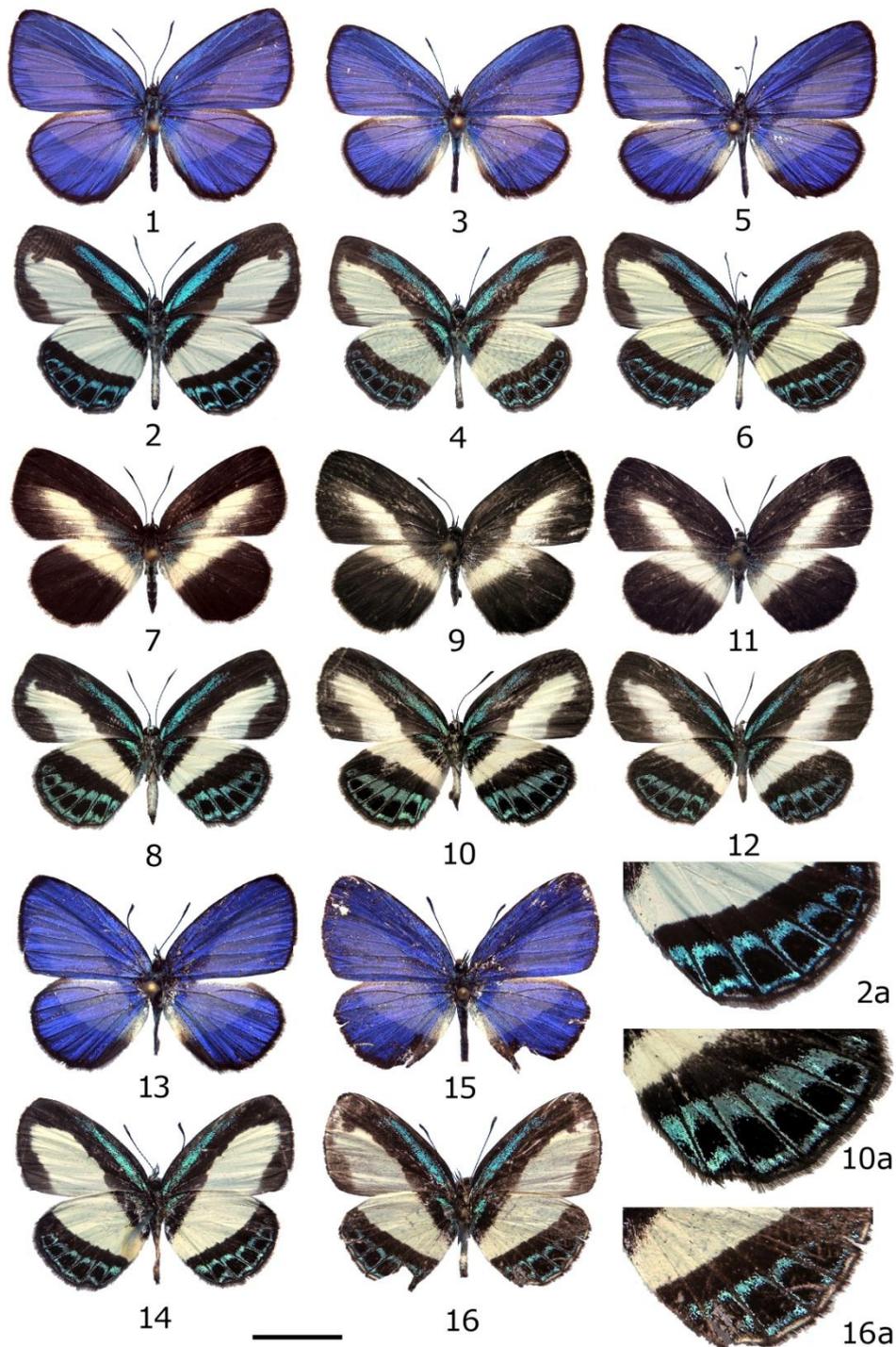
**Distribution:** Only known from the type locality in the Star Mountains.

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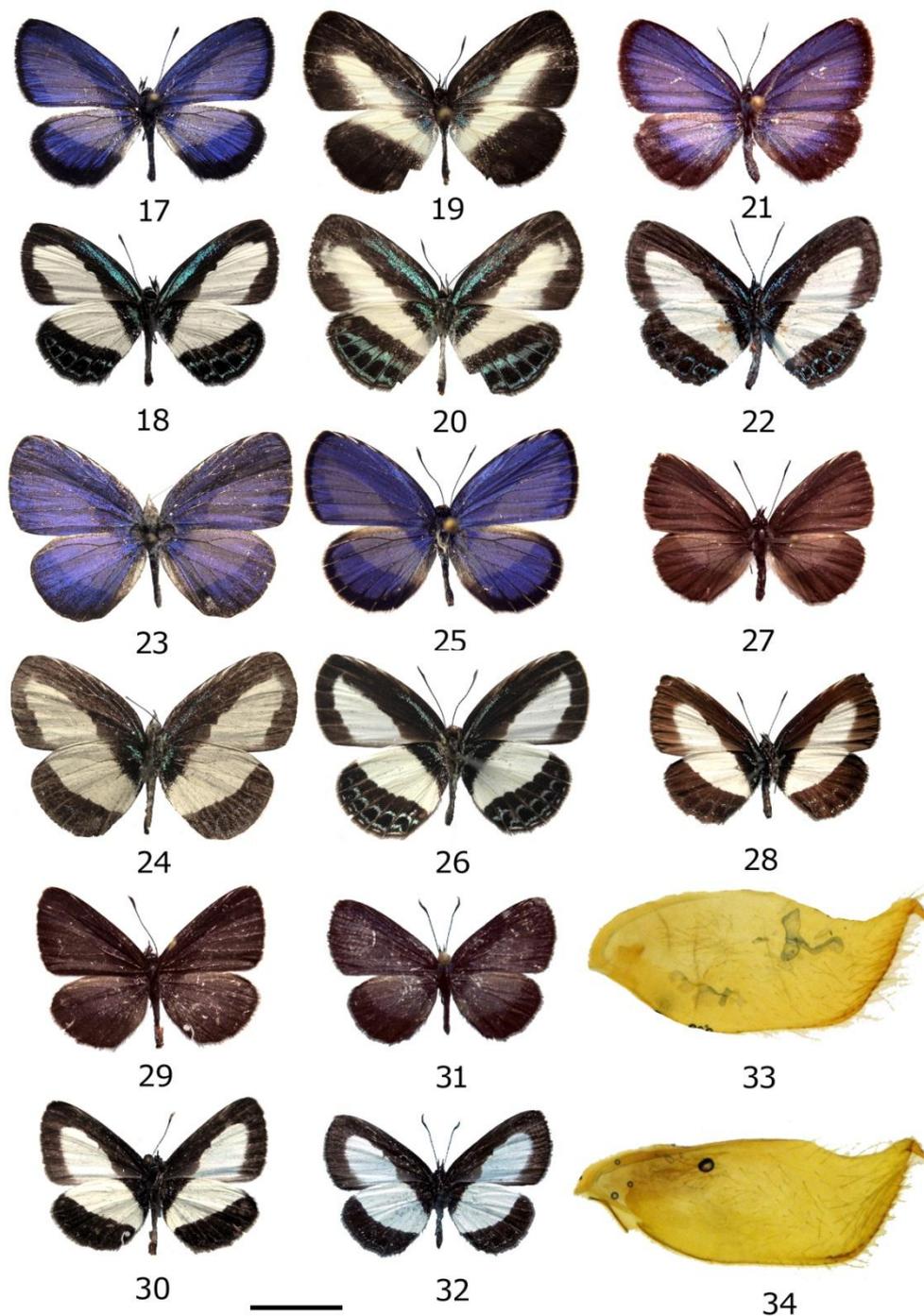
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**Figs 1-16.** *Psychonotis caelius plateni* (Grose-Smith & Kirby, 1896) [all in CSSK].

**Fig. 1.** ♂, upperside, Waigeo, no date; **Fig. 2.** underside; **Fig. 2a.** Hindwing showing the green metallic lunules and white marginal streaks; **Fig. 3.** ♂, upperside, Waigeo, x.2009; **Fig. 4.** underside; **Fig. 5.** ♂, upperside, Nabire, Kaladiri vill., xii.2013; **Fig. 6.** underside; **Fig. 7.** ♀, upperside, Sorong, i.2012; **Fig. 8.** underside; **Fig. 9.** ♀, upperside, Timika, vi.2001; **Fig. 10.** underside; **Fig. 10a.** Hindwing with reduced marginal streaks; **Fig. 11.** ♀, upperside, Yapen, Ambaidiru, iii.2006; **Fig. 12.** underside; **Fig. 13.** ♂, upperside, Bulolo, vi.2001; **Fig. 14.** underside; **Fig. 15.** ♂, upperside, Madang, Tokan vill., vi.2001; **Fig. 16a.** Hindwing with well developed marginal streaks. [scale for set specimens = 1cm]



**Figs 17-22.** *Psychonotis caelius* cf. *plateni* (Grose-Smith & Kirby, 1896). **Fig. 17.** ♂, upperside, Arfak Mountains., ix.2013, CSSK; **Fig. 18.** underside; **Fig. 19.** ♀, upperside, Arfak Mountains., Duebei, 1200m, i.2011, CSSK; **Fig. 20.** underside; **Fig. 21.** ♂, upperside, Peg. Bintang, Batimban, Dau River, vii.2003, KSP12091; **Fig. 22.** Underside; **Fig. 23.** *Psychonotis caelius dissimilis* (Joicey & Talbot, 1916), ♂ upperside, Supiori Isl., viii.-ix.2006, CSSK; **Fig. 24.** underside; **Fig. 25.** *Psychonotis eudocia* Druce & Bethune-Baker, 1893, ♂, upperside, Bacan, Labuha, ix.2015, CSSK; **Fig. 26.** Underside (note the short yellowish streak at the forewing base); **Fig. 27.** *Psychonotis melane melane* (Joicey & Talbot, 1916), ♂, upperside, Wissel Lake, Tuguwai, xii.1980, KSP11926; **Fig. 28.** underside; **Fig. 29.** *Psychonotis melane astra* subsp. nov., ♂, paratype, upperside, Star Mountains, Peg. Bintang, Mabilabol, ii.2005, KSP 11928; **Fig. 30.** underside; **Fig. 31.** *Psychonotis melane astra* subsp. nov., ♂, holotype, upperside, Star Mountains, Peg. Bintang, Mabilabol, ii.2005, KSP11930; **Fig. 32.** underside; **Fig. 33.** *Psychonotis melane melane* (Joicey & Talbot, 1916), ♂, left valva, KSP11924. **Fig. 34.** *Psychonotis melane astra* subsp. nov., ♂, left valva (note the more rectangular outline and the slightly stronger teeth), KSP11928. [scale for set specimens = 1cm]