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A new species of *Thestor* Hübner, [1819] (Lepidoptera: Lycaenidae: Miletinae) from the Clanwilliam region of the Western Cape, South Africa.

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Abstract: A new species from the western mountains of the Western Cape is described, and the evolutionary origins, as well as the taxonomic history, of the species and its genus are briefly discussed.

Key words: Miletinae, Thestor, variation, genitalia, melanism, evolutionary science.

Citation: Pringle, E.L. & Heath, A. 2019. A new species of *Thestor* Hübner, [1819] (Lepidoptera: Lycaenidae: Miletinae) from the Clanwilliam region of the Western Cape, South Africa. *Metamorphosis* **30**: 51–54.

INTRODUCTION

This fascinating new species was discovered by André Coetzer at a relatively high altitude in the mountains overlooking Clanwilliam. It is compared with its closest ally *Thestor protumnus protumnus* (Linnaeus), which was one of the oldest described species of butterfly in South Africa. (by the great Swedish naturalist Carolus Linneaus, as *Papilio protumnus* in 1764). In 1819, Hübner placed two species into the genus *Thestor*, and subsequently in 1875 Scudder selected *protumnus* as the type for this genus. This was later disregarded by Tutt, who wrongly used the European species *ballus* as the type, causing Wallengren to create the genus *Arrugia* for *protumnus* in 1872. This sequence of taxonomic events – long thought to be of no real significance – was later to return to haunt South African taxonomists, when the nomenclature of *Thestor obscurus* Van Son became a matter of some sharp debate.

MATERIALS AND METHODS

All material examined was collected by Andre Coetzer from the type locality. Dissections were made of the male genitalia, as well as those of related species, by removing the posterior half of the abdomen, and soaking these in 10% KOH overnight; they were then cleaned of soft tissue and transferred to 100% glycerine for storage. The aedeagi were subsequently removed from the diaphragm and photographed under a SOX dissecting microscope; their outlines were subsequently done by using Microsoft Powerpoint.

Wing venation and markings have been analysed through the numerical system widely used by taxonomists, and neatly summarised by Ford (1945) and Larsen (2005). Terminology for the male genitalia follows Van Son (1941) and Heath & Pringle (2004).

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Abbreviations

DNMNH = Ditsong National Museum of Natural History, Pretoria, South Africa.
CC = Coetzer Collection, Johannesburg.

DESCRIPTION OF NEW SPECIES

Genus *Thestor* Hübner, [1819]

Type species and designation: *Papilio petalus* Cramer, by subsequent designation (Scudder, 1875). = *Arrugia* Wallengren, 1872. Type species: *Papilio protumnus* Linnaeus, by subsequent designation (Scudder, 1875).

***Thestor coetzeri* sp. nov.** (Figs 1 & 2)
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Type material:

Holotype ♂: Middlebergpas, Citrusdal, Western Cape, South Africa. 32°37′32.18″S, 19°08′06.07″E, c. 900 m. 17.xii.2017, A. Coetzer leg., DNMNH.
Allotype ♀: same data.
Paratypes: 6 ♂, 3 ♀, same data as holotype except held in CC; 14 ♂, 4 ♀ ibidem, but 23.xi.2017; 1 ♂ ibidem, but 16.xii.2016.

Description of facies:

Male (Fig. 1): Forewing length: 16–18 mm. Antenna-wing ratio: mean 0.34 (n = 22).
Body: Antenna short, gradually thickening towards the rounded apex, with no pronounced club. Eyes naked, and labial palpi long. Legs covered with whitish hairs, with the tarsus of the proleg terminating in a double claw in both sexes.
Wings: Upper side ground colour of both wings dark brown, almost black. Forewing: Black discocellular spot as wide as it is long. Black discal band of spots fused from the costa to area 4, with additional spot positioned basad of this in areas 3 and 2. A paler greyish area, normally in the discocellular area adjacent to discocellular spot. Visible sex brand at juncture between veins 2, 3 and 4.

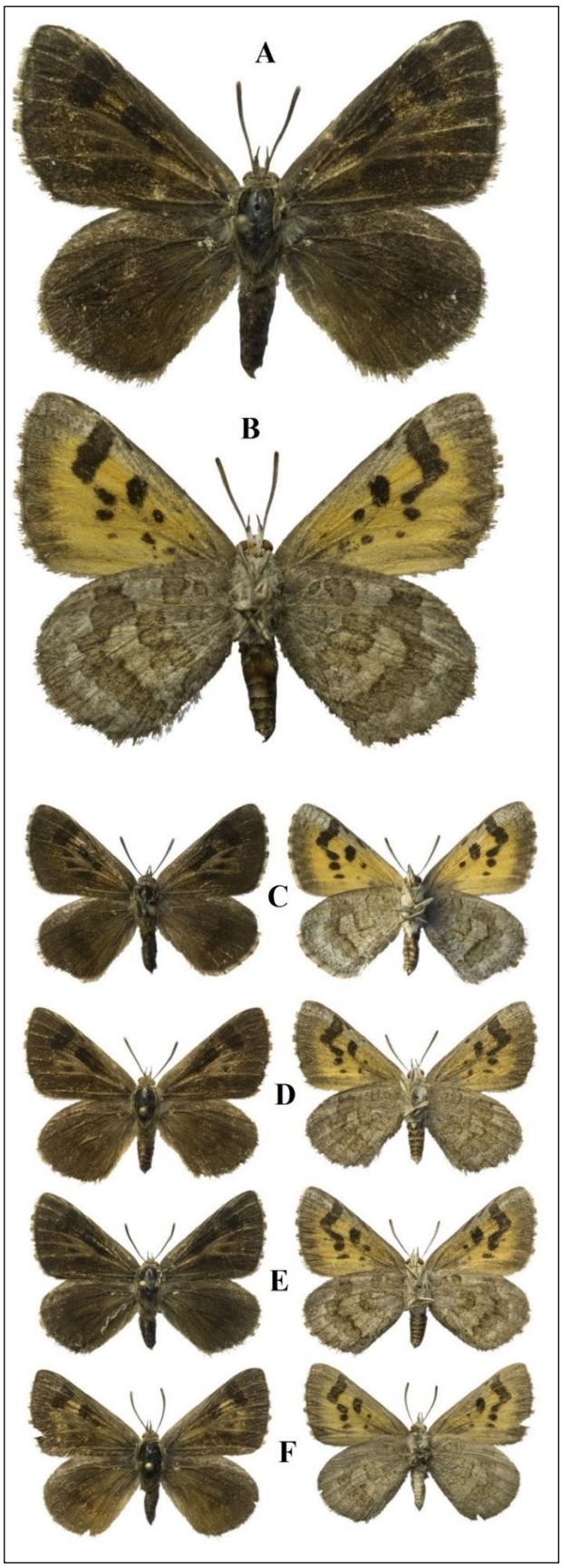

Figure 1 – *Thestor coetzeri* **sp. nov.** Middelbergpas leg. A. Coetzer. A – holotype ♂ recto 17.xii.2017; B – idem verso; C – paratype ♂ recto & verso 23.xi.2017; D – paratype ♂ recto & verso 17.xii.2017; E – paratype ♂ recto & verso 17.xii.2017; F – paratype ♂ recto & verso 17.xii.2017.

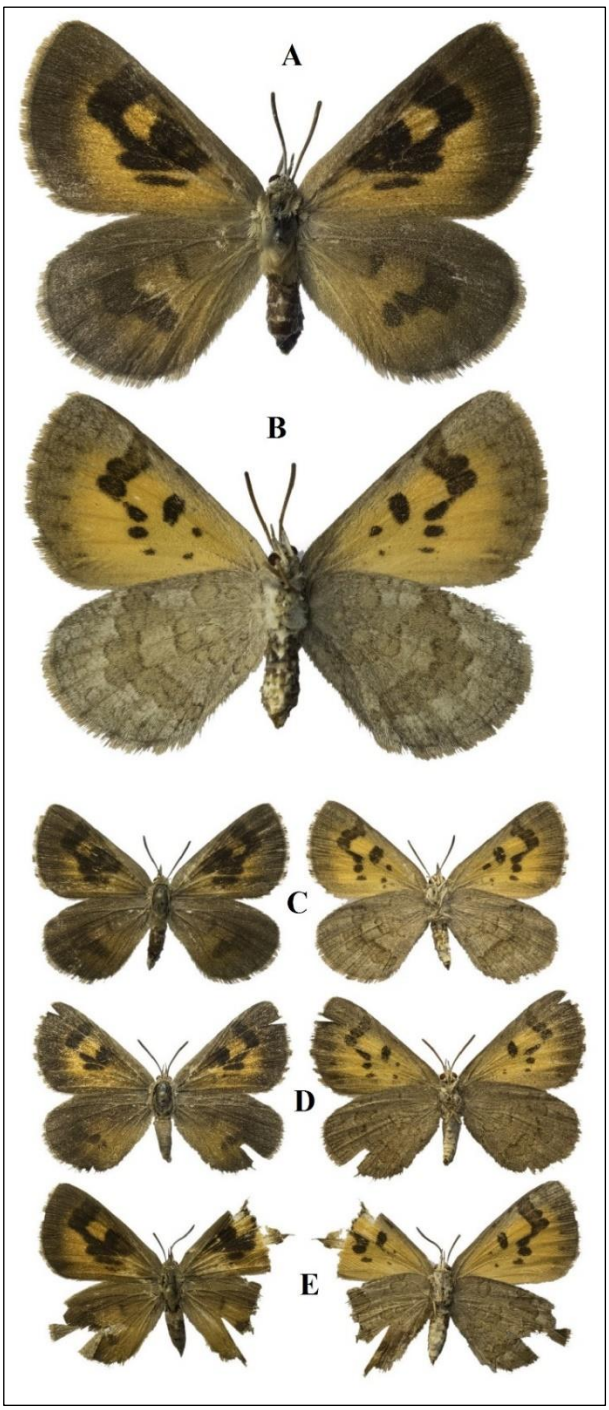

Figure 2 – *Thestor coetzeri* **sp. nov.** Middelbergpas leg. A. Coetzer. A – allotype ♀ recto 17.xii.2017; B – idem verso; C – paratype ♀ recto & verso 23.xi.2017; D – paratype ♀ recto & verso 23.xi.2017; E – paratype ♀ recto & verso 23.xi.2017.

Cilia white, very lightly chequered at end of veins. Hindwing: Colouration very uniform, with hint of darker markings in postdiscal area. Cilia white, lightly chequered at end of veins. Underside forewing: Ground-colour ochreous yellow in discal area, but dark grey in submarginal, apical and, in some instances, basal areas. Prominent black discocellular spot, with sub-basal spot in the disc, and in most specimens, an additional spot below this in area 1b. Continuous black discal band runs from costa to area 4, then angles sharply towards base in areas 3 and 2. Usually – but not always – an additional spot

below this, in area 1b. Hindwing: Ground colour light grey, slightly darker in submarginal area, with darker series of brown postdiscal rings running from costa to tornus, and another series in sub basal area. These rings vary from being prominent and very visible in some specimens, to being rather inconspicuous in others.

Variation in the males: Most males are as in the holotype uniformly dark, almost black on the upper side, with an inconspicuous light area adjacent to the forewing cell. However, four of the 26 ♂s examined have faint ochreous markings in the discal and basal areas of the forewing, as well in areas 1 to 3 and the cell of the hindwing. These are similar in appearance to extreme melanistic examples of nominate *protumnus*, such as in just two of the thirty specimens of nominate *protumnus* examined. There are, however, no specimens of nominate *protumnus* as dark as the normal form of this species.

Female: (Fig. 2) Forewing length: 18–20 mm. Antenna-wing ratio: mean 0.34. Larger than the males, with outer margins of the wings more rounded in shape.

Wings: Upper side ground colour varies from dark orange to yellowish orange, and in most cases extends over most of the forewing, as well as the lower portion of the hindwing. Forewing: Prominent dark submarginal and apical border; in some specimens, this also covers most of areas 1a and 1b, to the virtual exclusion of the ground colour. Very large black discocellular spot covers most of cell. Discal band of black spots very wide and prominent from costa to area 4 then angles sharply inwards in area 3, with elongated spot below this in area 2, and in some instances another elongated spot below in area 1b. In most examples, the discal spots in areas 2 and 3 are fused with discocellular spot. Hindwing: Costal, submarginal and basal areas covered by dark suffusion, leaving a very restricted area of ground colour in areas 1 and 2. There is a postdiscal row of black spots from areas 2 to 5. Cilia of both wings broader than in the male; in most cases they are lightly chequered at the end of the veins, though this is more pronounced in some instances. Underside similar to male, but with orange-yellow area more extensive, and black submarginal spots of the forewing more prominent. Black discal row of spots in forewing also noticeably larger and more prominent from costa to area 4, in comparison to the spots in areas 3, 2 and 1b.

Genitalia ♂ (Figs 3 & 4) Valves, labides, juxta and saccus are the same as in *protumnus* and its subspecies *aridus* and *terblanchei*. The male genitalia of *dryburghi* differ markedly in the shape of the labides, saccus and aedeagus, so cannot be confused with *protumnus* and its races. The aedeagus of this species also shares the same general features as those of *protumnus* and its races, with a bifid apex when viewed from above. Van Son (1941) could find no obvious or consistent differences between the genitalia of *protumnus* and *aridus*, and this was echoed by Pringle and Heath (2004) in their assessment of all three of the races of *protumnus*. A closer examination of the aedeagus, however, revealed some small but significant differences between this species and those races of *protumnus*. These differences proved to be consistent in all four of the extractions done, when compared to four each of *protumnus* and *aridus*, and two of *terblanchei*.

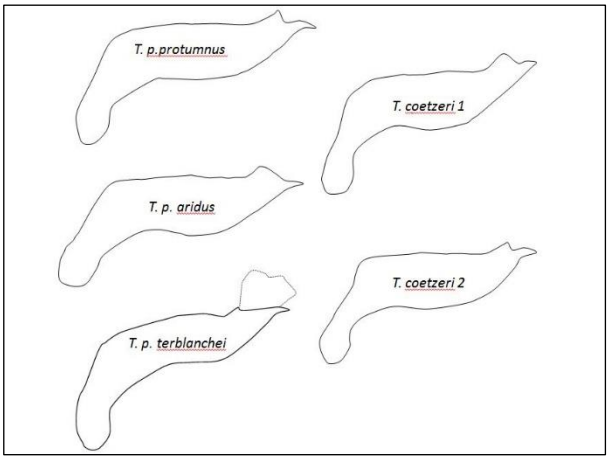

Figure 3 – Outlines of the male aedeagi of *Thestor* species (lateral view).

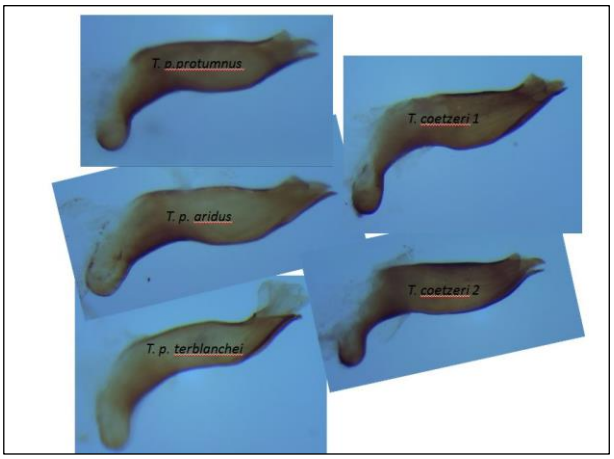

Figure 4 – Photographs of the male aedeagi of *Thestor* species (lateral view).

In this species, the aedeagus is shorter, measured along the dorsum from the apical tip to the base of the coecum, and has a more sinuous, narrower coecum. It is also narrower across the excised distal portion, with a shorter ventral tip. It should be noted that the outlines of the distal excised portions of the aedeagi illustrated here are mere outlines, and include both sclerotized and non-sclerotized features. These outlines will therefore vary depending on the extent to which the vesica is everted, so their shapes have no diagnostic significance. They are nevertheless useful for illustrating the comparative breadth of this distal excised portion in the various taxa.

Small but consistent differences in the genitalia have proved to be a useful means of separating closely-related species within this genus; in many cases the differences are not very substantial, and the development and use of other taxonomic tools may still be required to get conclusive results. In this case, since the aedeagus is a real contact point between the sexes, it is felt that the small differences between the male aedeagi are extremely significant. A good example of where a difference in the aedeagus has proved to be conclusive can be seen in *dryburghi*, where the main distinguishing feature in comparison with the rest of the *protumnus* group is the

consistent fusion of the notch between the ventral tips of the aedeagus.

Diagnosis

The extent of the dark markings in both sexes on all wings is a remarkable feature of this insect. As mentioned previously only a very small proportion of the males are similar to the darkest males of the nominate race. Species within all *Thestor* groups except for the *braunsi* and *compassbergae* groups have dark and light forms, and the present species is no exception. However, no males or females of nominate *protumnus* have produced forms which are comparable to the normal form of this species. There are in addition other consistent differences between this species and the nominate race: in the male, the faint submarginal dots visible on the forewing underside of the nominate race are absent; in the female, the dark spots on both wing surfaces are consistently larger than in the nominate race, and the spots of the discal band of the forewing are angled much more sharply towards the base in area 3.

Habitat and behavior

Specimens were found on Cedarberg Sandstone Fynbos FFs4 (Mucina & Rutherford, 2006), on the lower slopes of the Cedarberg mountains, at an altitude of 880–930 m. This habitat type contains an unusually high number of endemic insect and plant species relative to its size (see Mucina & Rutherford 2006, p. 103); it should therefore come as no real surprise that a butterfly species should mirror this trend.

According to Mr Andre Coetzer, the males preferred open sandy patches, where they settled frequently on the rocks, sand or on surrounding vegetation. They flew rapidly, but often returned to the same perch from which they took off. The females were much scarcer and were found lower down, in taller fynbos. To date, it has been recorded only during November and December.

Distribution

So far, this species is known only from its type locality.

Etymology

This species is named after Messrs. Bennie and André Coetzer, in recognition of their substantial contribution to the study of Lepidoptera in South Africa.

DISCUSSION

The existence of this unusual *Thestor* colony only c. 40 km north of the nearest colonies of *protumnus protumnus*, and c. 70 km south of the nearest colonies of *aridus* (see Pringle *et al.*, 1994) poses several challenges to taxonomists, as well as to evolutionary scientists. What has caused the marked increase in melanism in only one population, surrounded in relatively close proximity by colonies of "normal" *protumnus* and *aridus*? This cannot simply be attributed to differences in altitude between their respective habitats, because *protumnus* occurs at roughly the same altitude on Piketberg mountain, while *aridus* also occurs at similar altitudes on the Gifberg and Kobee mountains. All these populations occur in areas of similar rainfall, so this does not appear to be an important factor either. Heath and Pringle (2004) hypothesised that *protumnus* and *basutus* are probable root species of this genus, with the *brachycerus* group the most recently evolved. This conclusion was based on morphology, as well as on as yet unpublished molecular work. The upper side of most males of the present species cannot easily be distinguished from the upper sides of the darker members of the *brachycerus* complex. This would seem to indicate that the entire *brachycerus* complex could have evolved relatively quickly from similar abnormal populations of *protumnus.* The structural differences in the genitalia, and the markings on the undersides, would have taken longer to evolve. While there is no doubt that a species such as *murrayi* provides a good possible intermediate form between the "yellow" and "black" *Thestor* species, there is an equally good argument to suggest that the evolution of colouration, as shown by this fascinating species, could have been a first step in this process. Evolutionary science is still in its infancy, and leaves plenty of room for conjecture; nevertheless this species provides very good potential material for research concerning the evolution of some butterfly species.

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