Acutitornus persectus spec. nov., a new species of gall-forming moth from the Northern Cape province of South Africa (Lepidoptera: Gelechiidae: Apatetrinae, Apatetrini)

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A new apatetrine gelechiid, *Acutitornus persectus* spec. nov., is described from the Northern Cape province of South Africa. The larvae of this species develop in stem galls in *Stipagrostis namaquensis* (Nees) (Poaceae), a grass species with the unusual defense mechanism of abscising leaves in response to insect or fungal attack.

Keywords: Lepidoptera, Gelechiidae, New Species, *Stipagrostis* Galls, Afrotropical Region.

INTRODUCTION

The micromoth family Gelechiidae is among the most species-rich with an estimated 4700 described species placed in some 500 genera (Nieukerken *et al*., 2011), with perhaps as many awaiting description (Karsholt *et al*., 2013). Outside Europe and North America the life histories of the majority of species remain undocumented.

Of the seven gelechiid subfamilies currently recognized (Karsholt *et al*., 2013), Apatetrinae predominantly occur in arid to semiarid habitats in various parts of the Old World including the Palaearctic (e.g., *Apatetris* Staudinger, 1879; *Coloptilia* Fletcher, 1940; *Epidola* Staudinger, 1859; *Oecocecis* Guenée, 1870; *Proactica* Walsingham, 1904), Australasian (*Epiphthora* Meyrick, 1888) and Afrotropical Regions, attaining their greatest diversity at generic level in the southwestern part of southern Africa, with a total of 13 genera comprising only 19 described species currently recorded (*Acutitornus* Janse, 1951; *Anapatetris* Janse, 1951; *Autodectis* Meyrick, 1937; *Cerofrontia* Janse, 1951; *Curvisignella* Janse, 1951; *Filisignella* Janse, 1951; *Grandipalpa* Janse, 1951; *Ischnophylla* Janse, 1963; *Lanceoptera* Janse, 1960; *Macrocalcara* Janse, 1951; *Namatetris* Bidzilya & Mey, 2011; *Neopatetris* Janse, 1960; *Radionerva* Janse, 1951, and *Rotundivalva* Janse, 1951). Eleven of these genera are monotypic, the remainder comprise two and five described species, respectively. It is at present uncertain whether another monotypic genus, *Autodectis* Meyrick, 1937, is also referable to this group.

As this contribution is not of a systematic nature we prefer to uphold the systematic status quo by placing *Acutitornus* in Apatetrinae, although it has been suggested that the genus might be better placed in Anomologinae based on certain characters of the male genitalia; however, the type genus *Anomologa* Meyrick, 1926 is in turn related to the *Apatetris* group (O. Bidzilya, pers. comm.). Ponomarenko (2009) placed *Acutitornus* in Aristoteliinae, but Karsholt *et al*. (2013) consider Aristoteliinae as a junior synonym of Anomologinae.

At the time of description *Acutitornus* was monotypic; presently the genus contains five species, the remainder having been described by A.J.T. Janse over the following 12 years (Janse, 1958, 1963). The genus is endemic to the semiarid parts of southern Africa, its distribution being centered on the Kalahari, with two species recorded from the Nama Karoo biome in the Northern Cape. However, it has also been recorded from the Succulent Karoo, and the range of *A. munda* Janse, 1951 extends to the Kaokoveld along the Namibian Escarpment (W. Mey, pers. comm.).

Two members of this genus have been reared, both from galls on *Stipagrostis* Nees (Poaceae). *Acutitornus liebenbergi* Janse, 1963 was bred from galls on *Stipagrostis obtusa* (Del.) Nees (as *Aristida obtusa*) by Janse, whereas the type series of the present species was obtained from stem galls on *S. namaquensis* (Nees) De Winter by C.H.S. The larva of the related apatetrine *Grandipalpa robusta* Janse, 1951 develops in galls on *Stipagrostis* *sabulicola* (Pilg.) De Winter (unpublished record in TMSA collection).

Below we describe a new species of *Acutitornus* Janse and provide details on its life history. The type material is preserved in the collection of the Ditsong National Museum of Natural History (formerly Transvaal Museum), Pretoria, South Africa (TMSA).

Acutitornus persectus Krüger **spec. nov.**, Figs 1–4

TYPE MATERIAL. Holotype ♂, **SOUTH AFRICA, *Northern Cape***: Kelkiewyn Farm, Calvinia District, 681 m, 31°12′01″S 19°41′33″E, emerged 19.iii.2013 (C. H. Scholtz); reared ex stem galls on *Stipagrostis namaquensis*; TM Lep. Heter. Genitalia slide No. 16783. – (TMSA).

Paratypes (3♀). **SOUTH AFRICA**, ***Northern Cape*:** 1♀, *ibidem*, emerged 23.iii.2013; TM Lep. Heter. Genitalia slide No. 16784; 2♀, *ibidem,* emerged 7.iii.2013 (all C. H. Scholtz). – (TMSA).

ADULT (Figs 1, 2). Large (forewing length 12 (♂) to 13–14 mm (♀)) and robust, strikingly marked moths; female slightly larger than male, sexes otherwise similar. Antennae filiform with distinct scape, more robust in male. Labial palpi very prominent, recurved, clad in white scales dorsally and brown (male) or ochreous (female) scales ventrally. Legs long and slender, hind tibiae of both sexes bearing well-developed hair pencils. Forewings lanceolate, shiny silvery white with a striking double blackish-and-pale gold transverse fascia; hind wings cream, also noticeably glossy. Cilia pure white on both pairs of wings and not glossy in contrast with remainder of wings. Underside of both pairs of wings similar to upper side in female; male displaying brownish grey suffusion over distal part of forewings. Vestiture of body predominantly pale gold with some parts, notably crown of head and scutellum, pure white; female with well-developed corethrogyne.

Male genitalia (Fig. 3). Uncus scooped, broadly rounded; gnathos prominent, more strongly sclerotized than remainder of genitalia, acutely angled and with tapering and pointed medial element. Tegumen well developed, displaying prominently excised margins; vinculum somewhat shorter, terminating in a distinct saccus. Valvae stout and subtriangular, showing fairly distinct division into sacculus and dorsal part. Aedeagus subcylindrical with blunt and rounded, moderately well sclerotized apical part, distinctly more heavily sclerotized medium part and thinly membranous anterior section.

Female genitalia (Fig. 4). Ovipositor lobes narrow and pointed, densely and finely setose. Both pairs of apophyses short and stout, a. posteriores with round tips, a. anteriores somewhat shorter and more pointed. Segment A8 comparatively well sclerotized and only approximately one-third as wide as A7, its posterior opening so narrow as not to allow for ovipositor lobes to be fully extended. Sterigma not discernibly modified. Bursa copulatrix delicate and tubular. The very delicate bursa was lost during dissection and had to be reconstructed in the figure.

Fig. 1

Acutitornus persectus Krüger spec. nov., holotype male. Scale bar in mm.

Fig. 2
Acutitornus persectus Krüger spec. nov., paratype female. Scale bar in mm.

DIAGNOSIS. Adult facies is diagnostic, both within the genus and in southern African gelechiids as a whole, although some Xyloryctidae (Gelechioidea) such as *Eupetochira xystopala* (Meyrick, 1908) are superficially similar. This is by far the largest *Acutitornus* species known so far, approaching *Grandipalpa robusta* Janse in size; several other members of the genus also display a transverse forewing streak which, however, is not as well developed and/or differently coloured (compare Figs 1, 2 herein with Pl. 113, Fig. 3 in Janse (1951) and Pl. 112, Fig. h, Pl. 113, Fig. a, and Pl. 134, Fig. b in Janse (1963)).

BIOLOGY (Figs 5, 6). Larvae develop in stem galls on *Stipagrostis namaquensis* (Nees) De Winter

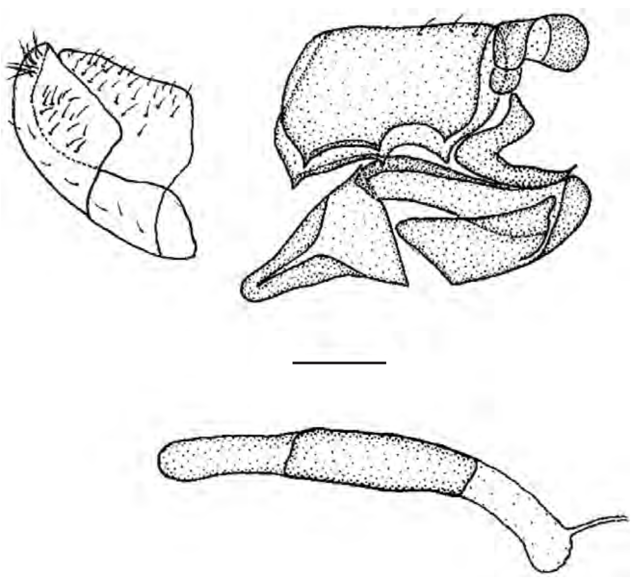

Fig. 3
Acutitornus persectus Krüger spec. nov., male genitalia, left valve detached. Scale bar = 0.3 mm.

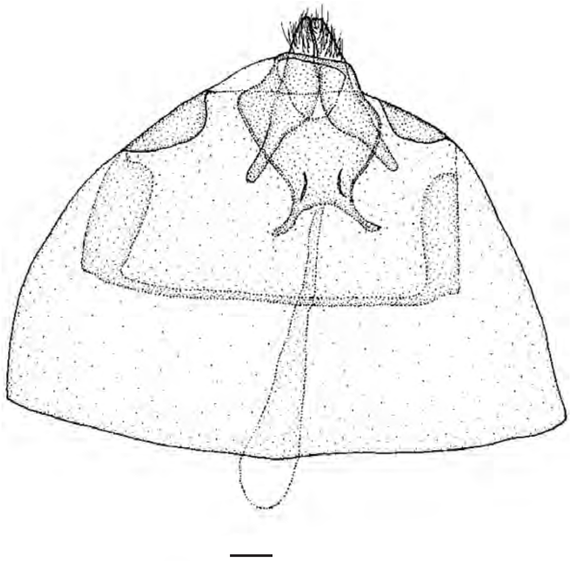

Fig. 4
Acutitornus persectus Krüger spec. nov., female genitalia. Scale bar = 0.3 mm.

(Poaceae). The galls formed by this moth species are rather unusual in several respects; firstly they are formed on a grass species with the special adaptation of abscising leaves, possibly in response to insect or fungal attack and, secondly, the resulting gall is unlike most other Lepidoptera galls.

Stipagrostis namaquensis, the 'river bushman grass', is a perennial, up to about 1 m-tall and very

Fig. 5
Typical *Acutitornus persectus* fungus galls on *Stipagrostis namaquensis*. Diameter of gall 2–3 cm.

Fig. 6

Typical (?) fungus galls on *Stipagrostis namaquensis.* Diameter of gall 2–3 cm.

spiky grass. Clumps may be as large as 2 m in diameter. Leaf blades are 6–10 cm long and 1–2 mm wide, pointed at the tip. The species is widespread, although sparsely distributed across the western half of South Africa and most of Namibia where it grows in seasonally dry sandy water courses and adjoining washes. Across much of its distribution the species often has what appear to be fungus or mite galls of the ligules. These develop at the nodes and are typically about 2 to 3 cm in diameter, composed of various flat, plate-like layers (Fig. 5). However, a population of the grass in the Calvinia region of the Northern Cape lacks the fungal nodal galls but has superficially remarkably similar, fluffy white galls in their place. Closer examination shows these to be composed of a solid core of about 1 cm in diameter, surrounded by a dense covering of fine cottony filaments (Fig. 6).

One of the characteristics of the grass is that leaf blades are deciduous at the ligule, a possible adaptation to abscise leaves in response to attack by leaf-feeders. A consequence of this strategy is that most of the galls that develop at nodes above roughly the middle of the stem are abscised in early summer and in years of high population growth of the moth; these abscised galls form several layers thick on the ground beneath the grass clumps. Only the basal ones survive.

The area where the galls have been recorded is near the edge of the winter rainfall region and predominantly receives winter rain although summer thunderstorms occur as well, particularly during late summer. In this region, *Stipagrostis namaquensis* is a ‘summer’ grass, flushing in spring and then growing throughout much of the summer. *Acutitornis persectus* appears also to have a similar summer phenology – adults emerge in about March and lay eggs on young nodes. Larval development and gall growth proceed throughout winter, with galls reaching maximum size in spring. Larval development continues inside the gall until late summer when pupation takes place, and shortly thereafter the adults emerge. Most other univoltine insect species in the region have spring-to-spring generations.

The moth larvae are pale and legless without a distinct head capsule, the mandibles being the only sclerotized part of the body. The absence of legs and a distinct head capsule creates the impression that the larva is likely to be that of a beetle or wasp and it was only after rearing the species through that the surprising result was a moth. The legless condition is atypical for Lepidoptera, although it is known from a wide variety of species that feed inside plant tissue such as leaf-miners, seed-borers and, as in this case, gall-formers. The mature larva chews an emergence hole in the woody core gall tissue and clears a tunnel through the filaments to enable the adult moth to emerge and expand its wings.

Grass is an unlikely host for an insect species with long development because many South African grass species grow in regions where natural fires are a regular occurrence, hence any insects living on or developing in grass tissue run the risk of repeated bouts of population annihilation. *Stipagrostis namaquensis*, however, grows in regions of low fire frequency and mostly in sandy areas where insufficient plant biomass accumulates to sustain regular fires.

Consequently, it would seem as if the development of the mechanism of leaf-abscission at the ligule in the grass is aimed at protecting it from fungal and insect attack. The ligule evolved in grasses at the junction of the blade and leaf sheath to act as a gasket to protect the axillary bud from rainwater draining down the midrib of the leaf where it would otherwise accumulate and collect debris that may facilitate attack by pathogens. In the case of *Stipagrostis namaquensis*, both a fungus and a highly specialized insect species attack the leaves at the ligule, and the plant has responded by abscising affected leaves.

DISTRIBUTION. Northern Cape province of South Africa, presently known only from the type locality.

ETYMOLOGY. From Latin *per*, intensive prefix, and *secuo* (past participle *sectus*), to cut: with reference to the diagnostic prominent double black-and-gold transverse line across the forewings.

DISCUSSION

All southern African Apatetrinae are, as far as is known, associated with grasses on which the larvae feed or in which they form galls, and all species occur in the drier western parts of the subcontinent. *Grandipalpa robusta*, as the name suggests, is a large species which has been reared from terminal leaf axil galls on the large and robust dune grass, *Stipagrostis sabulicola* on the edge of the Namib Desert. Similarly, *Acutitornus liebenbergi* is known from terminal leaf axil galls on *Stipagrostis obtusa* (initially recorded as *Aristida obtusa*) in the area classified as ‘Orange River Nama Karoo’.

The association between grasses and aridity may be more than coincidental since grasses growing in moist areas develop large biomass which is then vulnerable to periodic fires from lightning. In arid areas, however, growth is limited and grass clumps are more dispersed than in more moderate regions. Consequently, fires are less likely to occur, and fires, once started, would be restricted to smaller areas.

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