

FIRST REPORT OF *ACASIS APPENSATA* (EVERSMANN, 1842) IN SERBIA WITH AN EXAMINATION OF THE GENUS *ACASIS* DUPONCHEL, 1845 (LEPIDOPTERA: GEOMETRIDAE) ON THE BALKAN PENINSULA

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Abstract

Acasis appensata (Eversmann, 1842) (Lepidoptera, Geometridae) is reported in Serbia for the first time. The status on the Balkan Peninsula of the two Western Palaearctic species of *Acasis* Duponchel, 1845 is discussed. The localized distribution pattern of both *A. appensata* and *A. viretata* (Hübner, 1799) is probably genuine, though both species may be significantly under-recorded for want of adequate field workers in the region.

KEY WORDS: Balkans, Lepidoptera, Geometridae, faunistics

Introduction and Methodology

A field survey of Lepidoptera in selected parts of the Balkans was undertaken by all five authors during the summer of 2019 as a part of the ongoing "Balkans Moths Project". On the night of 03.07.2019, several light traps were operated by CWP, PD & AK from dusk to first light near the "wildlife feeding area" at Kašanjan on Mt. Jadovnik in the Prijepolje region of Serbia, at an altitude of 1268 m (43°19'34" N, 19°46'51" E; UTM square

DN09). The trapped area focused on an open limestone and dolomite bedrock, herb-rich grassland, bordered on all sides by mixed forest (Fig. 1). A white sheet, held vertically on the side of a Land Rover was inspected casually throughout the night; four small traps, fitted with 8-watt (368 nm) actinic “blacklight” tubes and containing chloroform were left to operate until daybreak. After bulk-sorting of target species of Noctuoidea and Pyraloidea, the remaining material collected from the 8-watt actinic traps was tipped into a plastic container, charged with a few crystals of 1-4-para dichlorobenzene, to prevent mould growth, and returned to England with the first author for eventual examination.

Further survey work was undertaken in Serbia during 2020 by SB and AN-B including, in particular, the night of 28.06.2020, when they operated light traps all night on the Stara Planina Mts. above Ravno Bučje village 43°26'55" N, 22°34'30" E, on the road to the Sveti Nikola Pass. Here the collecting methodology involved 3 portable light traps, each with an 8-watt actinic (368 nm) light powered by 12-volt batteries, as well as a Finnish “tent trap” with a 160-watt MV bulb at the top of the pole and a 20-watt (368 nm) black light over the catching pot below. An additional 20-watt (368 nm) lamp was also positioned about 70 m from the tent trap. The distance between the Finnish tent trap and the light traps, as well as between the light traps themselves, was about 1 km. All traps were in similar habitats along the course of a stream, although we cannot be certain which trap caught the *Acasis* material discussed below.

The genitalia of the male and female from Kašanj (Fig. 3A and 3B) were cleared and then placed on a glass slide in clove oil, with a cover slip on top, without staining. They were photographed with a Nikon Eclipse 55i compound microscope using LED lighting with a Nikon D90 DSLR camera body attached. A total of 147 high resolution images was taken of 6 parts of each structure, then focus-stacked using Helicon Focus, to produce 6 focused images for each specimen. These images were then patched together into a single image with the background cleaned and adjusted using Photoshop Elements. Genitalia of the other specimens, depicted in Fig. 3C, 3D and 3E, were fixed to glass slides in Euparal mountant after staining with a 2% merbromin solution and photographed with a Zeiss stereo microscope Stemi 2000-C with an AxioCam ERc 5S digital camera with self-modified transmitted light.



Figure 1. General view of the habitat at Kašanj (Photograph taken July 2013). The main sheet was positioned just to the right and rear of the photographer. Photo by Predrag Jakšić.

Results

Examination of the 2019 material from Kašanj was performed in January 2021. Two very worn samples of an *Acasis* species were recovered from amongst approximately 300 other small Geometridae specimens. The genus is easily recognized and can be confirmed by the presence of long thin "hair pencils" (Fig. 3F) on the hind legs of males; this feature affects selected genera within the Trichopterygini tribe, separating this tribe from all other members of the subfamily Larentiinae.

Acasis viretata (Hübner, 1799) was immediately ruled out; this is a common species in Britain and one with which the first author is familiar. This left only *A. appensata* which, according to Hausmann & Viidalepp (2012) had not been recorded from Serbia. The species is also absent from Serbia in the map given in Fauna Europaea (<https://fauna-eu.org/>).

In order to confirm the identification, the genital apparatus was examined; this confirmed the identification of the specimens as *A. appensata*. The data are as follows:

Serbia: 1 ♂, 1 ♀, Prijepolje region, Kašanj, 43°19'35" N, 19°46'44" E, 1268 m a.s.l., 03.07.2019. (Fig. 2A and 2B) leg. Plant, Jakšić & King. In collection of C. W. Plant (England). Genitalia seen (Figs. 3A and 3B).

Both SB and A.N-B were working a different, but nearby site on the night; their traps did not produce *A. appensata*. However, on the night of 28.06.2020, they operated light traps for the entire night on the Stara Planina Mts. above Ravno Bučje village and attracted two further specimens of *A. appensata* as follows:

Serbia: 1 ♂, 1 ♀ (Fig. 2C), Stara Planina Mts. above Ravno Bučje village on the road to Sveti Nikola Pass, 43°26'55" N, 22°34'30" E, 1069 m a.s.l., 28.06.2020, river valley in *Fagus*, *Populus tremula* dark wet forest, leg. Beshkov & Nahirić-Beshkova, In collection of S. Beshkov (Bulgaria). Gen. prep. 01./19.01.2021, S. Beshkov (Fig. 3C).

Discussion

***Acasis appensata* (Eversmann, 1842)**

The most recent and authoritative publication on the Geometridae of Europe is the series *Geometrid Moths of Europe*; volume 3 (Hausmann & Viidalepp, 2012) contains the Larentiinae, including the genus *Acasis* Duponchel, 1845.

The distribution of *A. appensata* (Fig. 2) is showed in map form and suggests three separate populations: first a widespread, if widely-spaced, spread of reports from Scandinavia (especially Lappland) eastwards into Russia; second, an apparently isolated population in central Italy (endemic subspecies *callaina* sensu Hausmann & Huemer, 2011); and third in central and southern Europe. This latter range is centered on southern Germany and Austria, where the moth is evidently frequent, from there extending eastwards, though with far fewer reports, to Slovakia and the northern border area of Romania in Transylvania.

South-eastern Europe shows only three map dots in this work for *Acasis appensata* – two in Bulgaria and one in the southwest of Romania (Hausmann & Viidalepp, 2012). The species was reported as a new species for the Balkan Peninsula from Bulgaria, on the Rila Mts. above Kostenets Village, 03.05.1912, a single male, leg. I. Buresch in coll. NMNHS (Fig. 2D); genitalia prep. 01./21.01.2021, S. Beshkov (Fig. 3D) *vide* Buresch, 1914). Later, Slivov & Lukov (1976) recorded a single female from the slopes of Mt Vitosha near Boyana village on the outskirts of Sofia, at 800 m a.s.l., 10.08.1962. Both records are listed by Nestorova (1998), who makes no

further additions. It should be noted that we have not seen the specimens from Vitosha; whilst not doubting the data, it seems rather unlikely that the genitalia were checked, since Lukov (a Noctuidae specialist) did not undertake any genitalia work and only illustrated a handful of species. Accordingly, judgement is reserved.

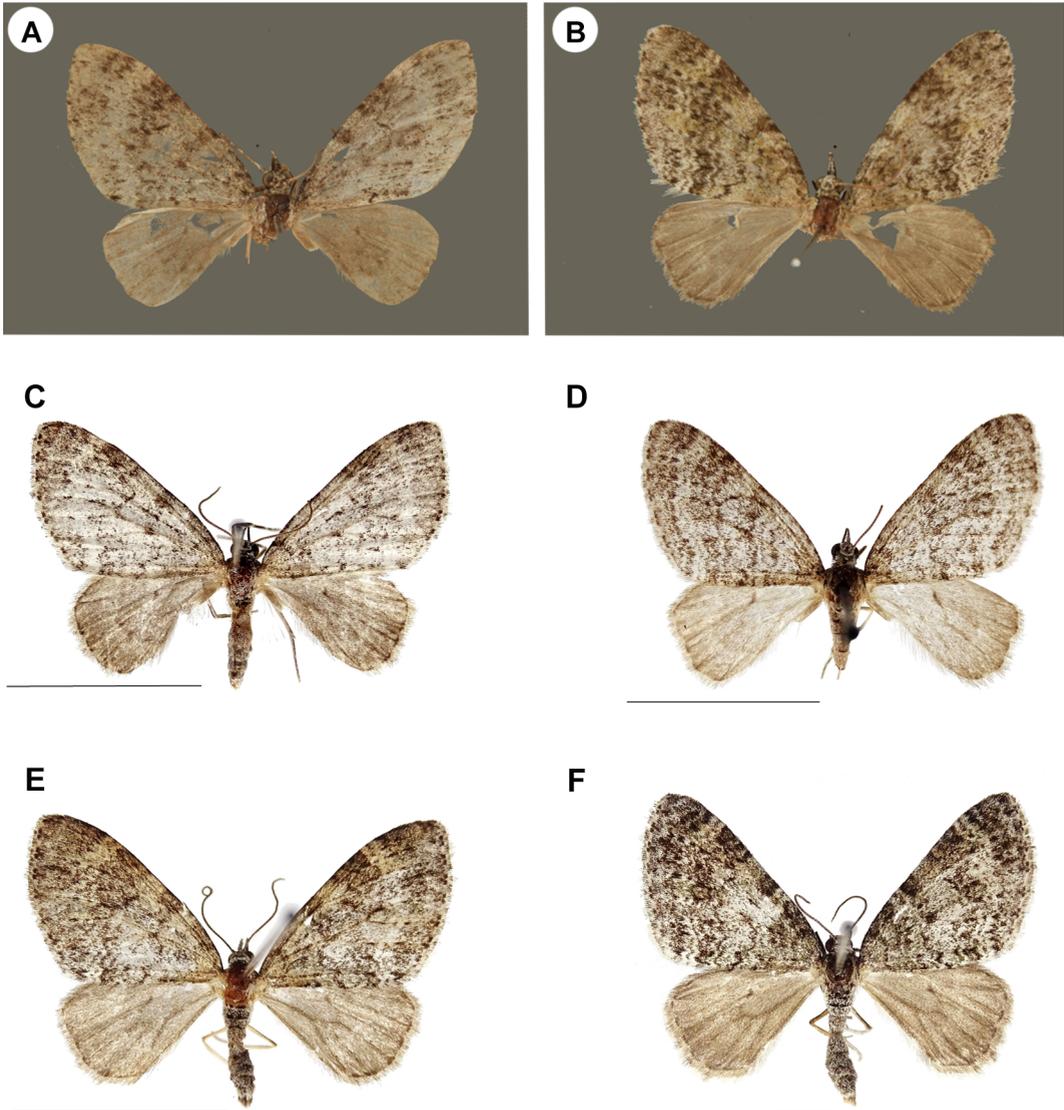


Figure 2. Adults of *Acasis appensata* (Eversmann). A – ♂, Kašanj, Prijepolje region, Mt. Jadovnik, Serbia, 03.07.2019. Photographer Graeme Smith; B – ♀, Kašanj, Prijepolje region, Mt. Jadovnik, Serbia, 03.07.2019. Photographer Graeme Smith; C – ♂, Stara Planina Mts. above Ravno Bučje Village, Serbia, 28.06.2020; D – ♂, above Kostenets Village, Rila Mts., Bulgaria, 03.05.1912, leg. I. Buresch in coll. NMNHS; E – ♂, above Petrich, between Gorski Kat and Vodohvashtaneto, Bulgaria, 29.05.2010, leg. S. Beshkov; F – ♀, above Petrich, between Gorski Kat and Vodohvashtaneto, Bulgaria, 29.05.2010, leg. S. Beshkov.

A third report for Bulgaria is that of Beshkov (2011), who lists the species from two close, but separate, localities above Petrich town in *Platanus/Castanea/Corylus* forest on the Belasitsa Mts. as follows:

2 ♂♂, Above Petrich, on the Louda Mara River between Gorski Kat and Vodohvashtaneto, 41°22'03" N, 23°12'30" E, 174 m a.s.l., 29.05.2010, leg. S. Beshkov, in coll. S. Beshkov and,

1 ♂, Above Petrich on the Louda Mara River, 41°22'21" N, 23°12'24" E, 470 m a.s.l., 29.05.2010, leg. S. Beshkov, in coll. S. Beshkov.

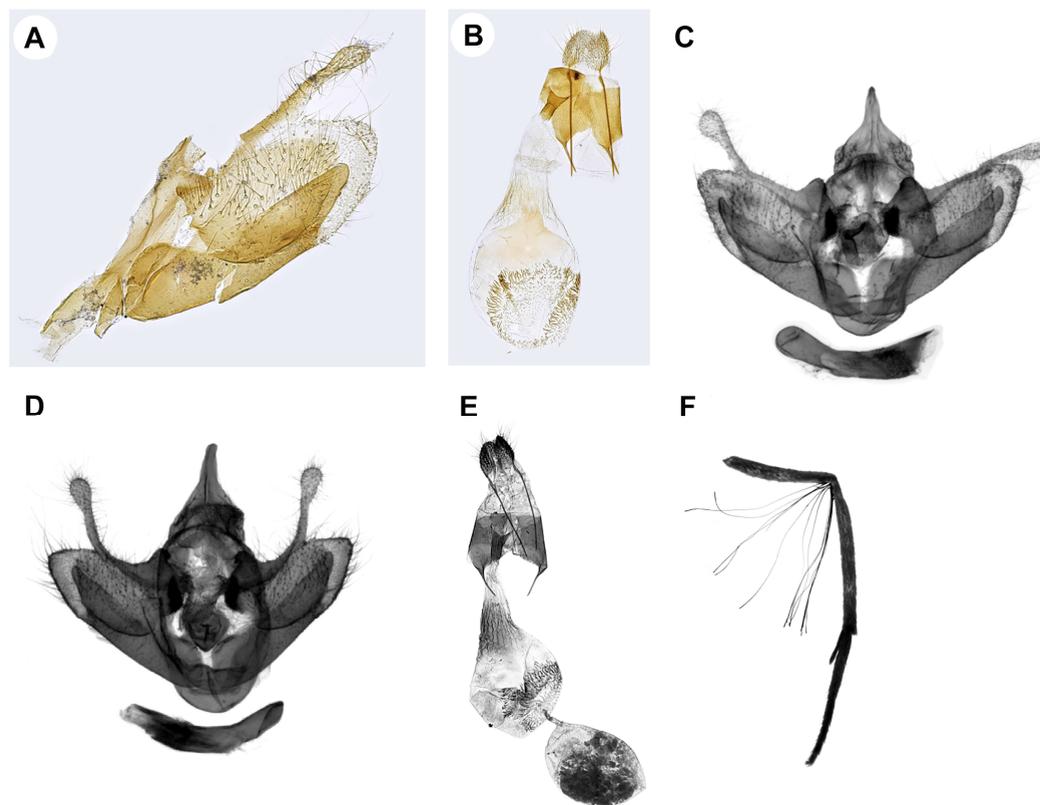


Figure 3. Genitalia of the recorded *Acasis* spp. A – *Acasis appensata* (Eversmann), partial genitalia (right valva) of male in Fig. 2A; Kašanj, Prijepolje region, Serbia, 03.07.2019, photograph by Peter Hall; B – *Acasis appensata* (Eversmann), partial genitalia of female in Fig. 2B; Kašanj, Prijepolje region, Mt. Jadovnik, Serbia, 03.07.2019, photograph by Peter Hall; C – *Acasis appensata* (Eversmann), genitalia of male in Fig. 2C; D – *Acasis appensata* (Eversmann), Bulgaria, 03.05.1912, leg. I. Buresch, genitalia of male shown in Fig. 2D; E – *Acasis appensata* (Eversmann), Bulgaria, above Petrich, between Gorski Kat and Vodohvashtaneto, 29.05.2010, leg. S. Beshkov, genitalia of female moth shown in Fig. 2F; F – “hair pencils” on the hind leg of male *Acasis* spp.

The remaining southeastern Europe map dot, in the southwest of Romania, cannot be resolved in terms of the country of origin without further investigation since it is placed on the boundary between Romania, Bulgaria and Serbia. Investigation proves that this record is also mapped by Székely (2010); it relates to the report from the Retezat Mts. (1000-1300 m a.s.l.) in southwest Romania of six specimens in the Diószeghy

collection: 17.05.1922, 26.05.1922, 27.05.1922 (2) and 04.06.1923 (2), published in the Diószeghy collection catalogue (Căpușe & Kovács, 1987). Other records for *A. appensata* in Romania are all from the north (e.g., Bicz Gorges (eastern Carpathians) and the Noroieni Forest (northwestern Romania) and are omitted from this present analysis of the Balkan Peninsula.

Acasis appensata is known also from Croatia, but only in the northwest Illyria/Adriatic area (Stauder, 1929) and it may not have been seen in that country since then (Toni Koren, personal communication). Dr Koren also advises that his database indicates a complete absence of reports of *A. appensata* from Bosnia and Herzegovina. We are unaware of any reports of *A. appensata* from North Macedonia or Albania, or from European Turkey, although there is a single report from Asiatic Turkey, some distance east of the Bosphorus – a surprising locality. Given that Mt. Belasitsa, a known locality for the moth in Bulgaria, lies on the border of Bulgaria, North Macedonia and Greece, the presence of *A. appensata* in the latter two countries seems highly likely.

Tomić *et al.* (2002) do not include *A. appensata* as a Serbian species. Consequently, as far as we can ascertain, the discoveries presented in this paper represent the first reports of the species in Serbia.

Hausmann & Viidalepp (2012) consider the species to be silvicolous, suggesting that in southern Europe it is also a montane species. The larvae feed from a weakly spun silk web on the flowers and fruits of species of *Actaea* (Ranunculaceae), including *A. spicata* L. (European Baneberry). In Finland, Mutanen *et al.* (2003) recorded *Actaea erythrocarpa* (Fisch. & C. A. Mey.) Freyn and *Valeriana officinalis* (L.). According to Sarić (1992), *A. spicata* is widespread in the hilly and mountainous regions of Serbia.

***Acasis viretata* (Hübner, 1799)**

Hausmann & Viidalepp (*op. cit.*) show *A. viretata* as widespread and common across northern and central Europe, from Iberia in the west to the Urals in the east, and from Britain and southern Scandinavia in the north to northern Italy, Slovenia and the northern mountains of Hungary and Romania (Transylvania only) in the south. There are only four localities indicated within the southern part of the Balkans region, affecting Bulgaria, Croatia and Serbia.

Ganev (1983a) reported *Acasis viretata* as a new species for the Balkan Peninsula from Bunkera, near Sofia, at 600 m a.s.l., 01.08.1978, 1 ♀. This is repeated in Nestorova (1988) without any further information. Later on, Ganev (1983b) included *A. viretata* in his inventory of Bulgaria's Geometridae (on page 34) without comment; his introductory words to the list mention only three taxa as being new to the country, none of which was *A. viretata*; logically, therefore, the source is his previous report from Bunkera. As with *A. appensata*, we have not seen the specimens from Vitosha and whilst not doubting the data, it seems rather unlikely that the genitalia were checked and so judgement is reserved.

Acasis viretata is evidently common in northern Croatia, from where it has been collected many times in recent years (Toni Koren, personal communication). There are also literature references, including Abafy-Aigner (1896), Kranjčev (1985), Mann (1857) and Stauder (1929). All of these reports reflect a presence in the northern area of the country within, even if only at the periphery of, the main European population that reaches south to Austria and Slovenia.

For Serbia, the map dot in Hausmann & Viidalepp (2012) corresponds physically with the data in Dodok (2006) and relates to the region of Užice in western Serbia, from where it was reported as a new species for the country and illustrated in colour. The moth has also been collected in the Ovčar-Kablar Gorge in southern central Serbia (Đurić & Hric, 2015) and further north in the Vorovo Forest, Mt. Fruška Gora [numbers, collecting date and important information not specified] (Stojanović *et al.*, 2010). This latter work illustrates the male genitalia as well as the adult moth and also mentions the larval pabulum as *Aruncus sylvester*

(Rosaceae). As no mention is made by Stojanović of finding larvae, presumably the source for this is either Osthelder (1929) or Bergmann (1955)?

For Montenegro, *Acasis viretata* is noted on Mt. Durmitor in the Tara River Canyon (Tomić *et al.*, 1990). The same record is repeated by Dodok (2006); we are unaware of any other reports.

The single report from Greece has yet to be traced. Such an isolated population seems surprising, though perhaps no more so than the Serbian data. The map dot is positioned at the location of Mt. Timfristos or its surroundings, one of the comparatively well-visited Greek localities (Peder Skou, personal communication).

The larvae of *A. viretata* are known to feed on the leaves of a variety of deciduous tree species throughout the European range of the moth.

Conclusions

Unless there has been a significant input of recording effort over the entire geographical area under study, dot distribution maps rarely convey much more than a general pattern of the distribution of any given species. The most recent maps of the two species of *Acasis* under discussion indicate that both species are widespread and not uncommon across the northern parts of Europe, but in the southern part of the Balkans (Croatia, Bosnia, Herzegovina, Serbia, Albania, Montenegro, North Macedonia, Greece, European Turkey and Bulgaria), locations are counted in single figures.

According to Sarić (1992), *Actaea spicata*, the larval food plant of *A. appensata*, is widespread in the hilly and mountainous regions of Serbia. Consequently, the lack of foodplant cannot be regarded as a limiting factor in the geographical range of this moth in Serbia. Similar comments apply to *A. viretata* – there are no reasons as regards habitat or larval foodplant that would limit the distribution of the moth.

Climate may be a consideration. Southern Europe has a climate that differs from that further north and so there is a possibility that Serbia lies below the dividing line of these two zones. We have not specifically investigated this factor here, but note that if the evident warming of the global climate continues in the long term, then it is most likely that the distributional range of some species of moths will either expand or contract within the southern Balkan region.

It is possible, therefore, that the overall pattern in the distribution maps of two very localized moth species may be correct. However, isolated reports are widespread across the entire region and this, together with the evident foodplant availability and suitable habitat, is strongly indicative of under-recording. There are certainly active and highly competent lepidopterologists in Serbia, Croatia and Bulgaria, but their number is small. The low number of literature contributions suggests that this is particularly so regarding all-night nocturnal sessions. In other areas, notably Albania and North Macedonia, we are unaware of any active field workers at the present time (2021). This is a most disappointing situation in these times of raised awareness about the high value of biodiversity studies. In particular, as the global climate warms it is judged likely that some Asiatic Lepidoptera species might colonize Europe via the Balkans; in this regard it is scientifically worrying that we currently have no significant data baseline – not even for Serbia. Professional and amateur lepidopterologists should be encouraged to undertake Lepidoptera inventory surveys across the southern Balkans. This encouragement could come from academic institutions, but at the same time, some level of funding for other parties is considered desirable.

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ПРВИ НАЛАЗ *ACASIS APPENSATA* (EVERSMANN, 1842) У СРБИЈИ СА
ПРЕГЛЕДОМ РОДА *ACASIS DUPONCHEL*, 1845 (LEPIDOPTERA:
GEOMETRIDAE) НА БАЛКАНСКОМ ПОЛУОСТРВУ

КОЛИН В. ПЛАНТ, СТОЈАН БЕШКОВ, ПРЕДРАГ ЈАКШИЋ, ЕНДРЈУ КИНГ И АНА НАХИРНИЋ-БЕШКОВА

Извод

Acasis appensata (Eversmann, 1842) (Lepidoptera, Geometridae) је по први пут саопштена за Србију. Статус две западно-палеарктичке врсте *Acasis Duponchel*, 1845 на Балканском полуострву је дискутован. Екстремно локализован тип дистрибуције *A. appensata* и *A. viretata* (Hübner, 1799) вероватно је исправан, мада обе врсте могу бити знатно мање евидентирани због недостатка одговарајућих теренских истраживача у региону.

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