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First records of *Loborhynchapion amethystinum* (Miller, 1857) from Switzerland, new biological insights and remarks on *Loborhynchapion obtusum* (Desbrochers des Loges, 1866) (Coleoptera, Apionidae)

Carlo Giusto[1] & Christoph Germann[2,3]

[1] Via Milite Ignoto 46/9, I-16036 Recco (Genova), Italy; carlo.giusto.apion@gmail.com
[2] Naturmuseum Solothurn, Klosterplatz 2, CH-4500 Solothurn, Switzerland.
[3] Naturhistorisches Museum der Burgergemeinde Bern, Bernastrasse 15, CH-3005 Bern, Switzerland; germann.christoph@gmail.com

The first records of *L. amethystinum* from the Cantons of Valais and Grisons in Switzerland are reported. However, the record of *L. obtusum* from Switzerland remains doubtful. Both species are illustrated and their morphology, ecology and ethology are compared. *Astragalus monspessulanus* is quoted for the first time as host plant of *L. amethystinum* and new data on the larval and pupal microhabitat are provided.

Keywords: Curculionoidea, distribution, ecology, ethology, adventive species.

INTRODUCTION

In his «Nachträge zur Fauna coleopterorum Helvetiae besonders aus dem Gebiete des berner Seelandes, des Jura und der Walliseralpen», published in 1888, Rätzer quoted *Apion obtusum* Desbrochers des Loges, 1866 from the Val d'Entremont (Swiss Valais) among 14 listed apionid species. Later, the same record, also reported by Favre (1890) and Stierlin (1898), has been generically quoted from Switzerland by Alonso-Zarazaga (2011) and Pelletier (2014) who cited the same species as *Loborhynchapion obtusum*.

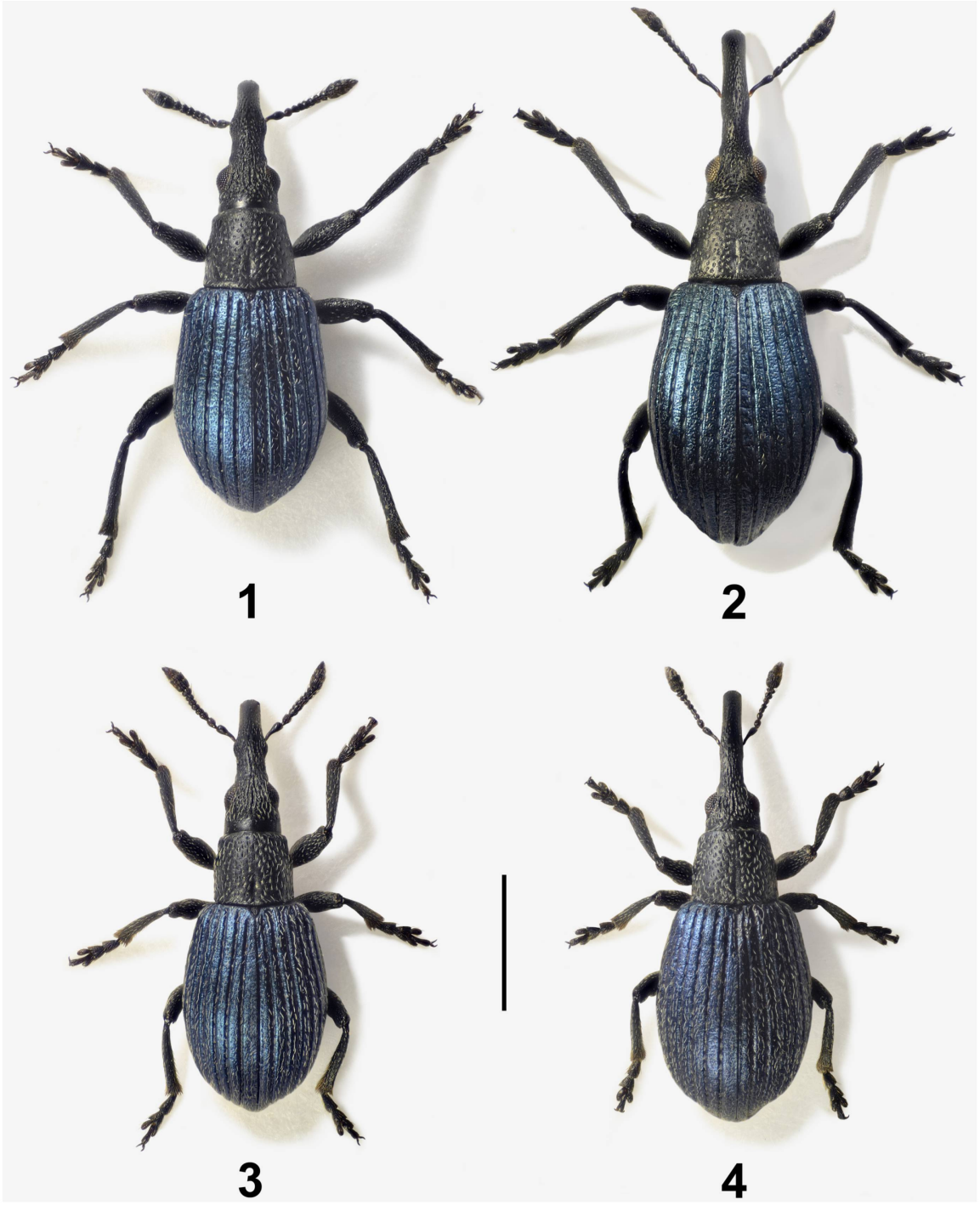
Because the examination of most collections from Switzerland, including those of August Rätzer (1845–1907) stored in the Naturhistorisches Museum der Burgergemeinde Bern, did not reveal any specimens of *L. obtusum*, Germann (2010) correctly included the species as doubtful in his checklist of the Swiss weevils.

The first recordings of *Loborhynchapion amethystinum* (Miller, 1857) in the Swiss Cantons of Valais and Grisons give us the opportunity to compare the morphology of the two species and to analyze their distribution, ecology and ethology.

MATERIAL AND METHODS

Measurements and acronyms

Abbreviations of measurements (in alphabetical order) are as follows: Bl = body length measured in dorsal view, from the base of rostrum to the apex of elytra, in a position in which they are at the same level; Le = length of elytra from anterior margin to apex, in dorsal view; Lp = length of prothorax from front margin to base along



Figs 1–4: 1–2: habitus of *Loborhynchapion amethystinum* from Binntal: Giesse Camping. 1) male, 2) female.— 3–4: habitus of *Loborhynchapion obtusum* from Cima Ciantiplagna. 3) male, 4) female. Scale bar: 1 mm.

midline, in dorsal view; Lr = length of rostrum from apex (excluding mandibles) to fore margin of eye, in lateral view; We = width of elytra at their widest point, in dorsal view; Wmsr = width of mesorostrum at the widest point, in dorsal view; Wp = width of prothorax at the widest point, in dorsal view. Mean values are given in square brackets.

In the text the following acronyms have been used (in alphabetical order): CG = Carlo Giusto's collection, Recco, Italy; NMBE = Naturhistorisches Museum der Burgergemeinde Bern, Switzerland.

RESULTS

Loborhynchapion amethystinum (Miller, 1857)

(Figs 1, 2, 5–7)

Specimens examined: Switzerland: Canton of Valais – 1 ♂: 053_08.3, SCHWEIZ, VS, Binntal, Binn, Campingplatz, rechtes Ufer, (S-exp.), N 658.700-W 135.740, 1,500 m, 28.VI.2008, Ch. Germann leg., on *Astragalus monspessulanus* L., (NMBE); 6 ♂♂, 8 ♀♀, 1 larva, 1 ♀ pupa: Giesse (Camping) (VS) 46°22'15" N-08°12'09" E, 1,500–1,550 m, 4–5.VII.2015, Ch. Germann & C. Giusto leg., on *Astragalus monspessulanus* L. (CG); 2 ♂♂: 256_15.1 SCHWEIZ, VS, Binn, Giesse Camping, oberhalb, S-exp. Hang, [above, south exposed slope] 1,500 m, 4.7.2015, Ch. Germann leg. (NMBE); 1 ♀: 254_15.2 SCHWEIZ, VS, Binn, Giesse Camping, oberhalb, S-exp. Hang, 1,500 m, 9.6.2015, Ch. Germann leg. (NMBE); 2 ♂♂, 1 ♀: Binntal: env. of Binn (Gallery) (VS) 46°41'10" N-08°10'20" E, 1,360 m, 5.VII.2015, Ch. Germann & C. Giusto leg., on *Astragalus monspessulanus* L. (CG); 2 ♂♂, 3 ♀♀, 2 larvae, 2 ♀♀ pupae: 256_15.2 SCHWEIZ, VS, Binn, E Santigläis (bei Tunneleingang), 656.465 / 134.691, 1,350 m, 5.7.2015, Ch. Germann leg. (NMBE).

Canton of Grisons – 1 ♂: 012_06_10. SCHWEIZ, GR, Ftan, Umgb., N813.774 /E186.189, 1,700 m, beating *Astragalus glycyphyllus,* 19.6.2006, Ch. Germann leg. (NMBE).

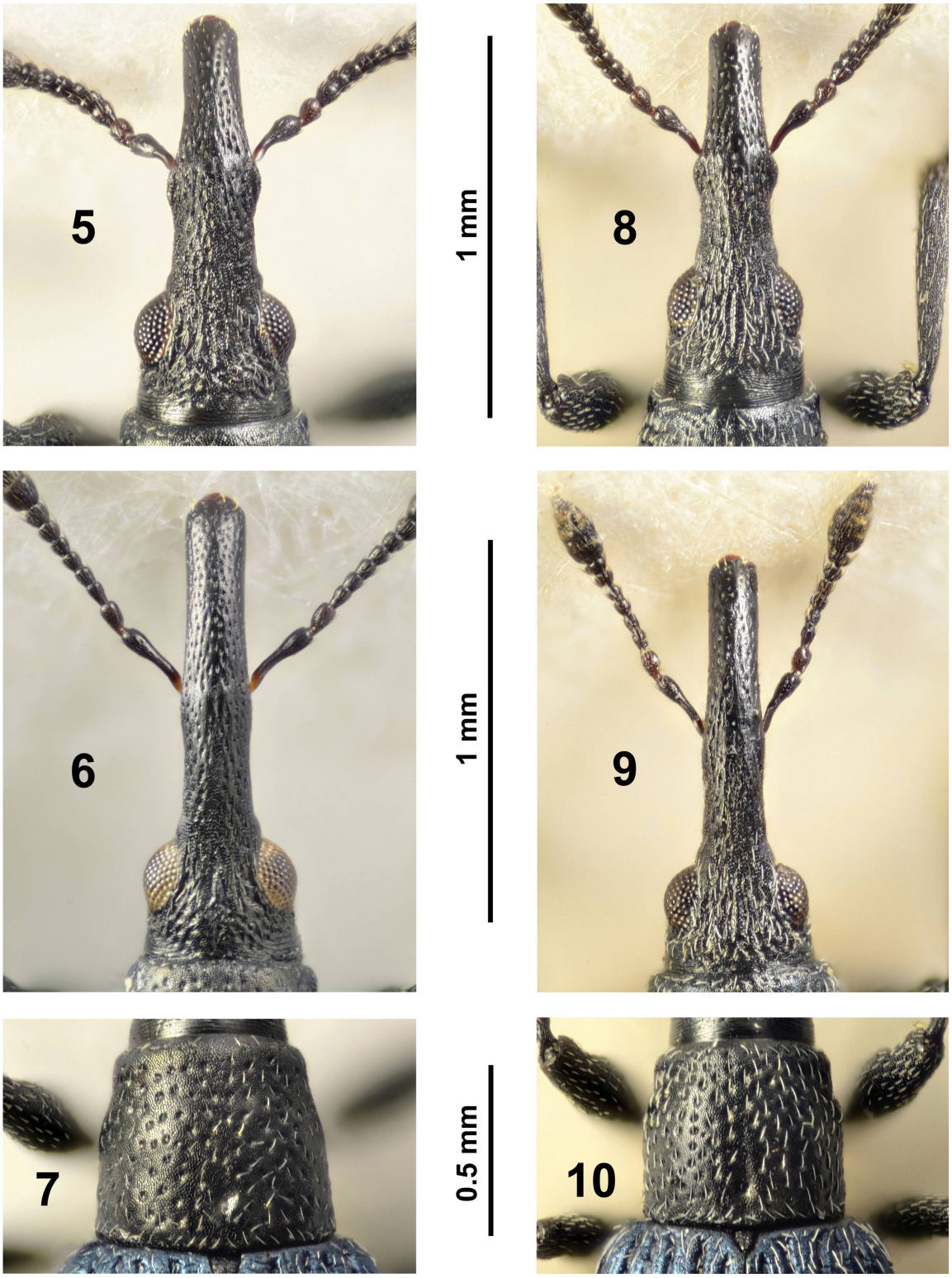
Distribution: Sibero-European species distributed from central Europe to Russian Far East.

In particular, it is recorded from the following states: Switzerland (Canton of Valais, Canton of Grisons), Germany, Austria (Carinthia, Styria, Burgenland, Lower Austria, Vienna), Czech Republic (South Moravian Region), Slovakia (Bratislava Region, Trenčín Region, Košice Region), Hungary (Komárom-Esztergom, Pest, Budapest, Bács-Kiskur), Ukraine (Lviv Oblast, Chernivtsi Oblast, Vinnytsia Oblast), Romania (Sibiu), Bulgaria (Sofia City Province), Turkey (Central Anatolian Region), Syria, Iran, Azerbaijan (Nakhchivan Autonomous Republic), Uzbekistan (Bukhara), Kazakhstan, Russia (Southern Federal District, Volga Federal District, Urals Federal District, Siberian Federal District, Far Eastern Federal District), Mongolia, China (Xinjiang).

Remarks: In Europe—excluding the vague and unconfirmed indication of Hamburg for Germany (Seidlitz, 1891a, 1891b) that seems very unlikely—its presence is mostly localized, even if not common, in south-eastern Czech Republic, in western Slovakia and in eastern and south-eastern Austria. In view of this, the new records from Switzerland, especially those from the Canton of Valais, considerably extend the distribution area of this species westwards.

Host plants: Fabaceae: *Astragalus australis* (Linnaeus) Lamarck, *Astragalus austriacus* Jacquin, *Astragalus danicus* Retzius, *Astragalus glycyphyllos* Linnaeus, *Astragalus monspessulanus* Linnaeus, *Astragalus onobrychis* Linnaeus.

Remarks: Baudyš (1912), Lengerken (1941) and Scherf (1963, 1964) also cited *Trifolium pratense* Linnaeus as host plant of *L. amethystinum*, but, as already



Figs 5–10: 5–7: head and prothorax of *Loborhynchapion amethystinum* from Binntal: Giesse Camping. 5, 7) male, 6) female.— 8–10: head and prothorax of *Loborhynchapion obtusum* from Cima Ciantiplagna. 8, 10) male, 9) female.

pointed out by Wagner (1914), this record is wrong and must be attributed to *Ischnopterapion (Chlorapion) virens* (Herbst, 1797).

Astragalus monspessulanus is here quoted for the first time as host plant of *L. amethystinum*.

Ecology: All the specimens from Valais (Binntal: Giesse Camping) have been collected on a south facing slope in a montane *Pinus sylvestris* forest (Fig. 11) whereas the twelve specimens found at the entrance of the tunnel, just out of Binn, have been collected on a south-western facing rocky slope surrounded by a montane *Pinus sylvestris* forest (Fig. 12).

These observations agree well with bibliographical data indicating xerothermic grassy steppes, forest meadows and alpine heaths on sandy or gravelly soils as principal ecological niches inhabited by this species.

L. amethystinum mostly prefers hilly areas up to 1,000 meters a.s.l., but, as shown by the Swiss specimens, it can also reach 1,700 meters. The unusual finding of two specimens from Erciyes Mountain (Turkey) (Lodos *et al.* 2003), one of which found under stone at 2,700 m a.s.l., is extremely interesting and indicates the ability of this species to reach high altitudes, even if, at the same time, the eccentricity of the collecting locality in respect to the main distribution raises doubts about its correct identification.

Ethology: The limited bibliographical information about its ethology indicates that adults of *L. amethystinum* live on the exposed part of the host plant (Wagner 1906, 1914, 1916, Dieckmann 1977) and that, according to Stejskal (2004), in Ječmeniště (South Moravian Region, Czech Republic), they are common and active on the host plant, *A. austriacus*, especially during the night. Larvae develop inside the seeds of the pods (Wagner 1906, 1914, 1916, Urban 1923, Hoffmann 1958, Osella 1973, Köstlin 1973, Dieckmann 1977).

Our ethological observations agree with those of the adults that we found on the exposed parts of *A. monspessulanus* where traces of imago feedings were evident (Fig. 13), but totally contrast with those relative to larvae and pupae. Indeed we observed the pre-imaginal stages in the stems of the same plant inside of larval and pupal cells (Figs 14–17). Despite the observation in vitro of more than 60 pods for about two months, no specimen has been reared from the seeds of *A. monspessulanus*.

Phenology: Adults stay on host plants from May to October.

Loborhynchapion obtusum (Desbrochers des Loges, 1866)

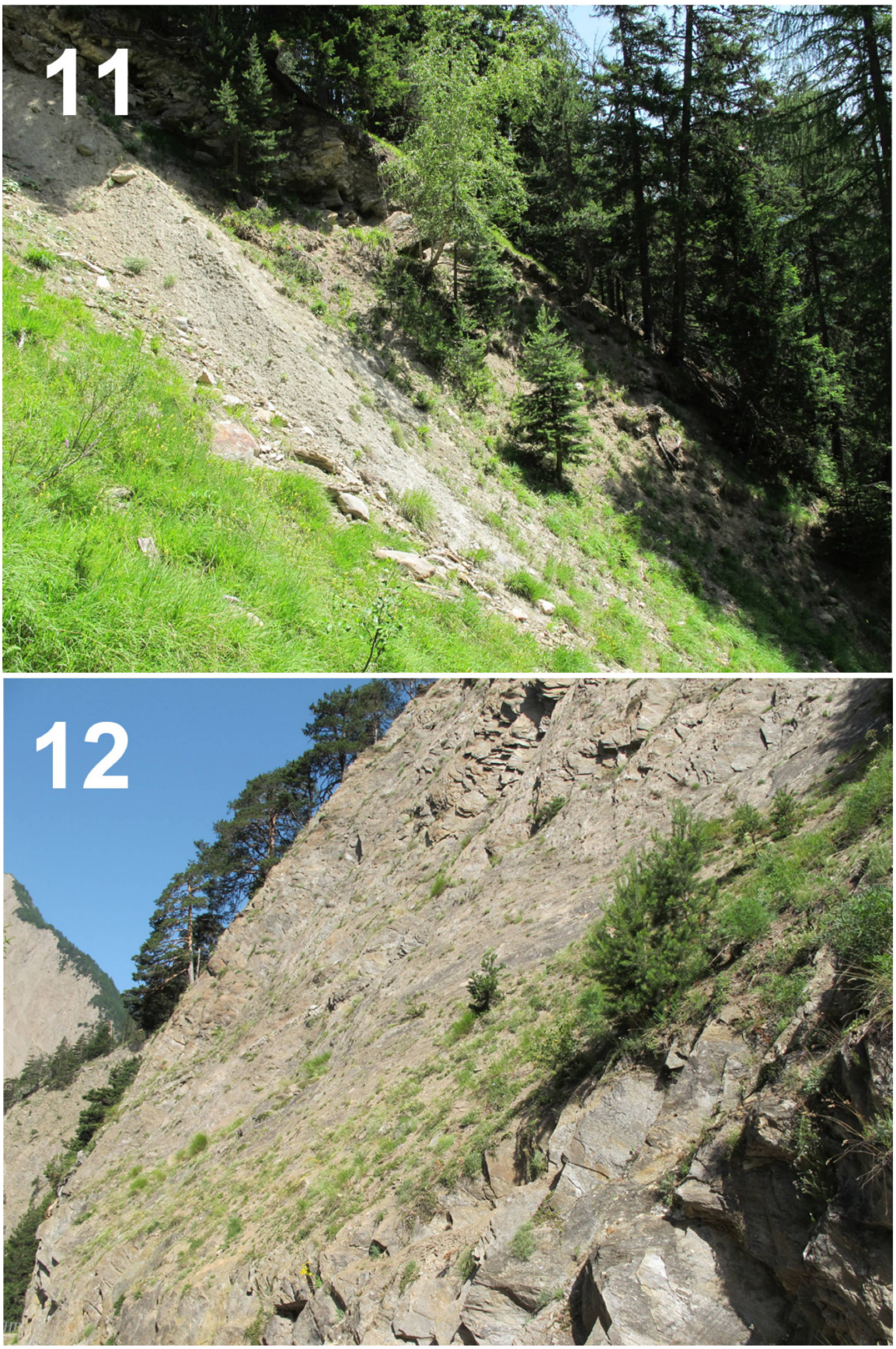
(Figs 3, 4, 8–10)

Specimens examined: Italy: Piedmont – 1 ♂, 1 ♀: Cima Ciantiplagna (Torino), 2,750 m, 30.IX.1989, C. Giusto leg., sub *Oxytropis helvetica* Scheele (CG); 1 ♀: I–Piemonte: Valle di Susa: Cima Ciantiplagna, 2,600 m, 3.X.1982, M. Meregalli leg. (CG).

Distribution: W-Alpine species.

Known only from France (Savoie, Hautes-Alpes) and Italy (Piedmont).

Host plants: Fabaceae: *Oxytropis helvetica* Scheele (synonym of *Oxytropis gaudinii* Bunge).



Figs 11–12: habitats of *Loborhynchapion amethystinum*: 11) surroundings Giesse Camping, — 12) surroundings Binn: entrance of the tunnel.

Ecology: A species apparently restricted to cacuminal areas in western Alps from 2,000 m up to 2,750 m a.s.l. The pair of photographed specimens were collected on the south facing slope near the summit.

Ethology: The specimens from Cima Ciantiplagna were found under little stones partially covering the procumbent stems of *O. helvetica*. Until now, larva and pupa remain unknown.

Phenology: The few known specimens have been collected from August to October.

CONCLUSIONS

It is absolutely evident that our knowledge about the two aforementioned species is very unbalanced in favour of *L. amethystinum*. This is apparently due to the presence of *L. obtusum* in a restricted areal, to its monophagy and to the fact that this species seems confined to the cacuminal zone in the western Alps. *L. amethystinum*, on the contrary, is oligophagous and more euryoecious, and has been able to colonise an extended area in the Palaearctic Region. Apart from the ecological and the biological differences listed above, it is possible to recognize the two species as follows:

— Species, on average, larger (Bl ♂: 2.41–2.65 [2.55] mm, ♀: 2.66–2.93 [2.80] mm); body surface shiny; dorsal piliform scales thin and inconspicuous; male rostrum stout with mesorostral dilatation obtusely rounded, female prorostrum cylindric (Lr ♂: 0.72–0.84 [0.79] mm, ♀: 0.90–1.03 [0.97] mm; Wmsr ♂: 0.24–0.27 [0.26] mm, ♀: 0.18–0.21 [0.20] mm; Lr/Wmsr ♂: 2.74–3.32 [3.08], ♀: 4.56–5.26 [4.88]; Bl/Lr ♂: 3.11–3.46 [3.24], ♀: 2.70–3.05 [2.86]); prothorax bell-shaped with superficial, thin and sparse punctation (Lp ♂: 0.55–0.63 [0.59] mm, ♀: 0.53–0.66 [0.62] mm; Wp ♂: 0.59–0.67 [0.63] mm, ♀: 0.57–0.71 [0.60] mm; Lp/Wp ♂: 0.90–0.98 [0.93], ♀: 0.91–0.99 [0.93]); elytra (Le ♂: 1.63–1.81 [1.74] mm, ♀: 1.81–2.03 [1.95] mm; We ♂: 1.01–1.14 [1.10] mm, ♀: 1.12–1.30 [1.24] mm; Le/We ♂: 1.44–1.68 [1.58], ♀: 1.52–1.67 [1.58]) ..... ***Loborhynchapion amethystinum*** (Miller, 1857)

— Species, on average, smaller (Bl ♂: 2.36 mm, ♀: 2.48–2.53 mm); body surface moderately shiny, almost opaque; dorsal piliform scales clearly visible; male rostrum stout with mesorostrum obtusely dilatated, female prorostrum feebly tapering to apex (Lr ♂: 0.69 mm, ♀: 0.82–0.84 mm; Wmsr ♂: 0.24 mm, ♀: 0.18 mm; Lr/Wmsr ♂: 2.88, ♀: 4.56–4.67; Bl/Lr ♂: 3.42, ♀: 3.01–3.03); prothorax trapezoidal or feebly bell-shaped with superficial rather dense punctation (Lp ♂: 0.52 mm, ♀: 0.58–0.60 mm; Wp ♂: 0.55 mm, ♀: 0.60–0.65 mm; Lp/Wp ♂: 0.95, ♀: 0.92–0.97); elytra (Le ♂: 1.64 mm, ♀: 1.80 mm; We ♂: 1,02 mm, ♀: 1.16–1.18 mm; Le/We ♂: 1.61, ♀: 1.53–1.55).... ***Loborhynchapion obtusum*** (Desbrochers des Loges, 1866)

Considering that *O. helvetica* is recorded for the southern Swiss Valais, as shown in Info Flora (2015), the presence of *L. obtusum* in this area must be considered possible and probable. Therefore, in light of this, it is desirable that further field researches be carried out at high altitudes to verify this hypothesis and so, finally, confirm or refute Rätzer's quotation.

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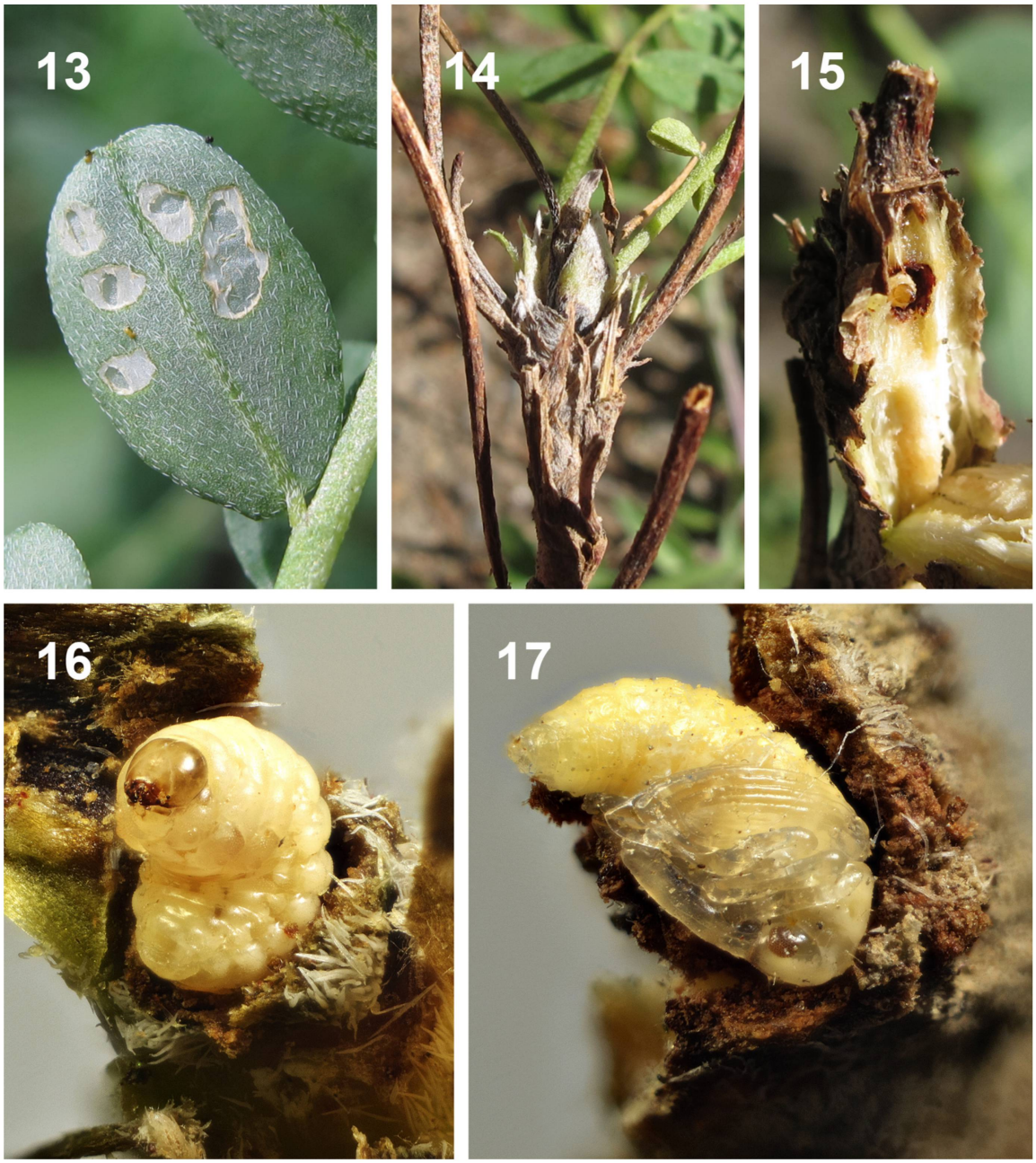

Figs 13–17: 13–14: *Astragalus monspessulanus* from Binntal: Giesse Camping: 13) leaf with traces of imago feedings of *Loborhynchapion amethystinum*, 14): infested stem. — 15–16: larva of *Loborhynchapion amethystinum* in its cell. — 17: pupa of *Loborhynchapion amethystinum* in its cell.

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