

Hyperaspis ladybirds in Belgium, with the description of *H. magnopustulata* sp. nov. and faunistic notes (Coleoptera, Coccinellidae)

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Abstract

Hyperaspis magnopustulata species nova is described, and data on occurrences of Hyperaspidini in Belgium are reviewed. Literature data, field observation records and specimens in the collections of the Royal Belgian Institute of Natural Sciences (RBINS) are reviewed and discussed. This work confirms the presence of at least five species in Belgium, and possibly a sixth. *Hyperaspis campestris* (Herbst, 1783) and *H. concolor* Suffrian, 1843 were already known for Belgium and their presence is now confirmed based on revised museum material and recent field observations. *H. chevrolati* Canepari, 1985 and *H. pseudopustulata* Mulsant, 1853 constitute new additions to the Belgian microladybird fauna. The identification of one specimen labelled as *Hyperaspis inexpectata* Günther, 1959 in the collection of RBINS, could not be confirmed because the specimen is a female.

Keywords: new species, Belgium, faunistics, Hyperaspidini, Coccinellidae.

Introduction

Hyperaspidini are a tribe within the subfamily Scymninae. Although this subfamily mostly consists of small, hairy ladybirds, the appearance of the Hyperaspidini is different. European Hyperaspidini are glossy black with yellow, orange to red elytral markings and a smooth elytral surface lacking hairs. The ventral side of the body is predominantly black, but, depending on the species, legs and other parts may present the same yellow or orange to red coloration as the elytral markings. The differences between species are often small. Shape and size of the animal are diagnostic and the exact pattern, placement, size and shape of the elytral spots need to be studied in detail. Field determination is impossible as most species can only be identified by examining the genitalia structure using a dissecting microscope. All Belgian species of the tribe Hyperaspidini belong to the genus *Hyperaspis* Dejean 1833. This genus is distributed worldwide, the largest number of species occurring in the Neotropical Region (DE ALMEIDA & VITORINO, 1997). Early accounts of Scymnini and *Hyperaspis* spp. were given by

IABLOKOFF-KHNZORIAN (1971, 1977). CANEPARI *et al.* (1985) reviewed the systematics and distribution of European *Hyperaspis* spp., describing the males of the *Hyperaspis*-group and unravelling several new species. FÜRSCH (1992) also pointed out some of these findings. Since VAN GOETHEM (1975) new knowledge on systematics and identification of the genus became available. We therefore aimed at reviewing the genus for Belgium, based on available literature, museum material and field observation reports. The taxonomy proposed by CANEPARI *et al.* (1985) is followed here.

Materials and Methods

Literature data on Belgian Hyperaspidini

LOCK *et al.* (2007) presented an extensive literature overview of the Belgian ladybird species. We screened these published sources for occurrence data of Hyperaspidini in Belgium. Some of the specimens retrieved from literature were probably present in the collections but this was impossible to verify. Literature data were databased.

Review of collection material

Belgian *Hyperaspis* specimens present in the collections of RBINS were reviewed. Most of the material in the collection had been identified long before the more recent revision of the genus in Europe (CANEPARI *et al.*, 1985). To allow an accurate identification of the specimens, the genitalia were extracted. After soaking the specimen from the pin in water for one night, the abdomen was separated from the body by lifting it up between the two elytra. As the upper side of the abdomen is strongly stuck to the underside because of the drying, the abdomen was soaked in an oversaturated solution of KOH. In this solution, the upper side was gently removed from the underside with two needles, by tearing them apart at one side. The abdomen could then easily be laid open and the genitalia taken out. Everything was rinsed with water. Identifications were performed using available literature (CANEPARI *et al.*, 1985; FÜRSCH, 1992). Reviewed data were databased (see below) and additional identification labels were added where necessary. The abdomen was closed again and glued to the specimen after examination.

Field observations

Field records on *Hyperaspis* spp., to a large extent gathered by recorders of the Belgian ladybird working group (methods described in ADRIAENS *et al.* (2008)), were collected and databased.

Results

Only two *Hyperaspis* species could be retrieved from published sources for Belgium: *H. campestris* and *H. reppensis* (BOVIE, 1897; ADRIAENS & MAES, 2004; LOCK *et al.*, 2007). Note that Fauna Europaea (last update 22 December 2009, version 2.1) only lists *H. campestris* for Belgium (FAUNA EUROPAEA WEB SERVICE 2010). Belgian *Hyperaspis* specimens retrieved in RBINS were collected by Constant in 2005, De Ruelle in 1935, Derenne in 1922, 1936 and 1950, Bovie (no date, possibly around 1830) and by Muller in 1912. Male specimens labelled as *H. reppensis* were not correctly identified and belong either to *H. concolor*, *H. chevrolati* or *H. pseudopustulata*. One male specimen formerly labelled *H. reppensis* is assigned to a new taxon *H. magnopustulata* sp. nov. based on the male genitalia. Two *H. concolor* males recently found by J. Constant



Fig. 1: Picture of the *Hyperaspis* species (© J. Bogaert) discovered in a heathland nature reserve in the north of Flanders.

(labelled 11.V.2005, Houyet, Namur, Belgium) were confirmed and added to the collection. One female labelled *H. inexpectata* (Derenne, 19.IV.1936, Schoten, Antwerp, Belgium) could not be reliably identified by examination of the genitalia. Therefore, the occurrence of that species in Belgium is possible but remains unverified until confirmed by the finding of a male specimen. Five *Hyperaspis* species are thus recorded in Belgium (and possibly a sixth), three of which constitute new additions to the Belgian fauna.

The number of field observations of *Hyperaspis* spp. remains very low because of the rarity of the species in general, and the lack of accessible identification keys. Nevertheless, *H. campestris*, which has specific habitat demands, was successfully recorded due to increased sampling effort. Furthermore, two field observations of *H. concolor* males were made. The identification was verified by checking genitalia structure and the specimens were added to the RBINS collections. Furthermore, three specimens of *Hyperaspis* sp. (all females) were discovered in a heathland nature reserve in the north of Flanders (Kalmthout, UTM 31UMGR ES998943, 4.V.2006, K. Jonckheere; Kalmthout, UTM 31UMGR FS0093, 15.IV.2007, J. Bogaert) (Fig. 1).

We present distribution maps of the species mentioned here in figure 2. All the studied material is presented in Table 1. Distribution patterns are described based on the Belgian ecoregions (Fig. 3) (SEVENANT *et al.*, 2002).

Table 1: Literature data (data type L), collection records (C) and field observations (F) of *Hyperaspis* spp. in Belgium. In case of collection material or literature the name of the collector/author is mentioned respectively, if known.

Species	Number	Sex	Date (D/M/Y)	Municipality	Data type
<i>Hyperaspis campestris</i>	1	?	Around 1830?	La Hulpe	L (Bovie 1897)
	1	?	16/06/1935	Eupen	C (De Ruelle)
	1	m	26/06/1935	Goé	C (De Ruelle)
	1	f	30/06/1935	Eupen	C (De Ruelle)
	1	f	5/07/1935	Goé	C
	1	f	20/06/1949	Seilles	C (Derenne)
	1	m	9/06/1975	Bihain	C (Derenne)
	1	?	15/06/1994	Meeuwen	F
	5	?	6/08/1998	Hachy	F
	1	f	27/08/2000	Koersel-Beringen	F
	1	f	3/05/2004	Westmalle	F
	29	?	2/09/2004	Arlon	F
	1	f	22/06/2005	Houyet	F
	1	f	10/07/2005	Louvain-La-Neuve	F
	1	m	2/09/2005	Scherpenheuvél-Zichem	F
	6	?	5/04/2007	Herselt	F
	7	?	8/04/2007	Herselt	F
	1	f	11/04/2007	Herselt	F
	3	?	11/08/2007	Tessengerlo	F
	2	f/m	1/06/2008	Aarschot	F
	1	?	2/05/2009	Herselt	F
	1	?	15/06/2009	Meeuwen	F
	1	m	15/08/2009	Gerhagen	F
	2	?	?	Dourbes	C
	1	?	25/03 - 08/04/2007	Peer	F
<i>Hyperaspis chevrolati</i>	1	m	Around 1830?	La Hulpe	C (Bovie 1897)
<i>Hyperaspis concolor</i>	1	m	4-5/06/1922	Houyet	C (Derenne)
	1	m	12/05/1950	Rosières	C (Derenne)
	1	?	22/12/2005	Olloy-sur-Viroin	F
	2	m	11/05/2006	Houyet	F, C
<i>Hyperaspis magnopustulata</i>	1	m	Around 1830?	La Hulpe	C (Bovie)
<i>Hyperaspis pseudopustulata</i>	1	m	24/04/1912	Bonnelles	C (Muller)
<i>Hyperaspis</i> sp.	1	f	19/04/1936	Schoten	C (Derenne)
	1	f	04/05/2006	Kalmthout	F, C (J. Bogaert)
	2	f	15/04/2007	Kalmthout	F, C (J. Bogaert)

Males of the *Hyperaspis* spp. in Belgium can be recognised using the following table:

Identification key for the male Hyperaspidini by the median lobe (tegmen - male genitals) (Fig. 4)

1. Median lobe less than twice as long as broad in ventral view (Fig. 5) 2
 - Median lobe clearly more than twice as long as broad 5
2. Side where the flag is fitted to the median lobe, straight.
 - Hyperaspis concolor* Suffrian 1843
 - Side where the flag is fitted to the median lobe, curved 3

3. Broad flag 4
 - Small flag and a sharp point at top and knee.
 - Hyperaspis chevrolati* Canepari 1985
4. Median lobe with knee pronounced but not sharp.
 - Hyperaspis campestris* (Herbst 1783)
 - Median lobe without knee and very rounded top.
 - Hyperaspis inexpectata* Gunther 1959
5. Median lobe with clear flag.
 - Hyperaspis pseudopustulata* Mulsant 1853
 - Median lobe without flag. Both sides have thickened edges. Highest point is on the left.
 - Hyperaspis magnopustulata* sp. nov.

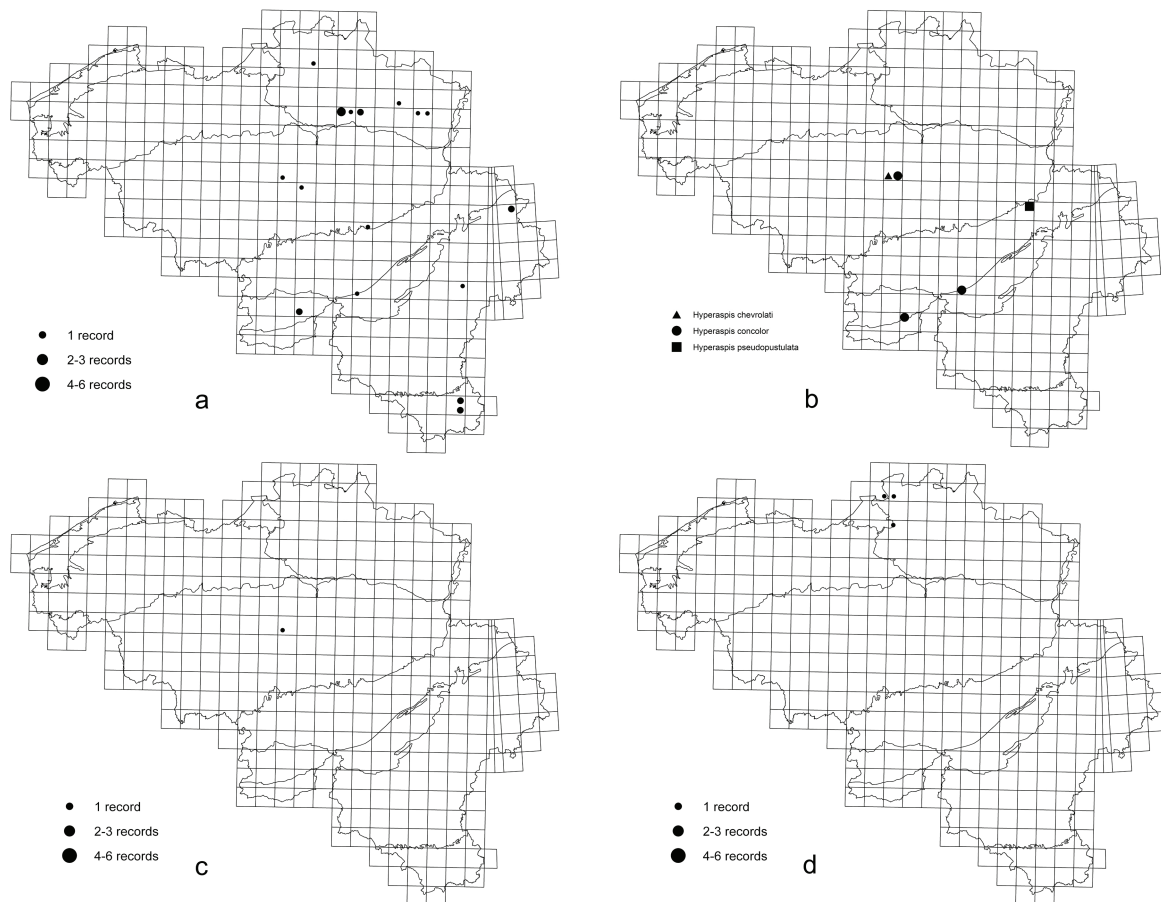


Fig. 2: Species distribution maps of *Hyperaspis* spp. in Belgium on a 25 km² UTM grid cell scale (background 100 km² UTM grid), with indication of the different ecoregions in Belgium. (a) *H. campestris*, the size of the dots is proportional to the number of records in the grid cell (b) *H. chevrolati* (●), *H. concolor* (▲) and *H. pseudopustulata* (■) are shown on the same map (c) *H. magnopustulata* sp. nov. (d) *Hyperaspis* sp.

Detailed species accounts

Hyperaspis campestris (Herbst, 1783)

H. campestris is without doubt the most frequently found species of *Hyperaspis* in Belgium. However, although it can be locally abundant, the species is very rare, with field records in only 13 grid cells (1x1 km UTM). This seems to be consistent with data from surrounding countries (GEISER, 1992; COUTANCEAU, 1993). The species seems to have highly specialised habitat requirements. It is most commonly found in open woodland areas on acidic, fairly dry and sandy soil, almost exclusively in the presence of bilberry *Vaccinium myrtillus* L. and often also heather *Calluna vulgaris* (L.) Hull. BOVIE (1897) mentions *H. campestris* for La Hulpe, which

constitutes the only available literature record. The discovery of a specimen in Averbodebos (25.IX.2005, Scherpenheuvel-Zichem, UTM mgr 31U FS3755, Lambert x=191929 y=191603) during the ladybird working group survey was described by BOGAERT (2006) and BOGAERT & BAUGNÉE (2005). The species was found on *V. myrtillus* in an open stand of *Pinus sylvestris* L. (BOGAERT 2006). The recent field observation data were summarised by BOGAERT & BAUGNÉE (2005). At present, *H. campestris* has been recorded from 18 Belgian localities scattered in six natural districts, mostly in open woodland (pine, oak, birch) with dwarf shrub vegetation (bilberry, heather). In The Netherlands, the species was found to

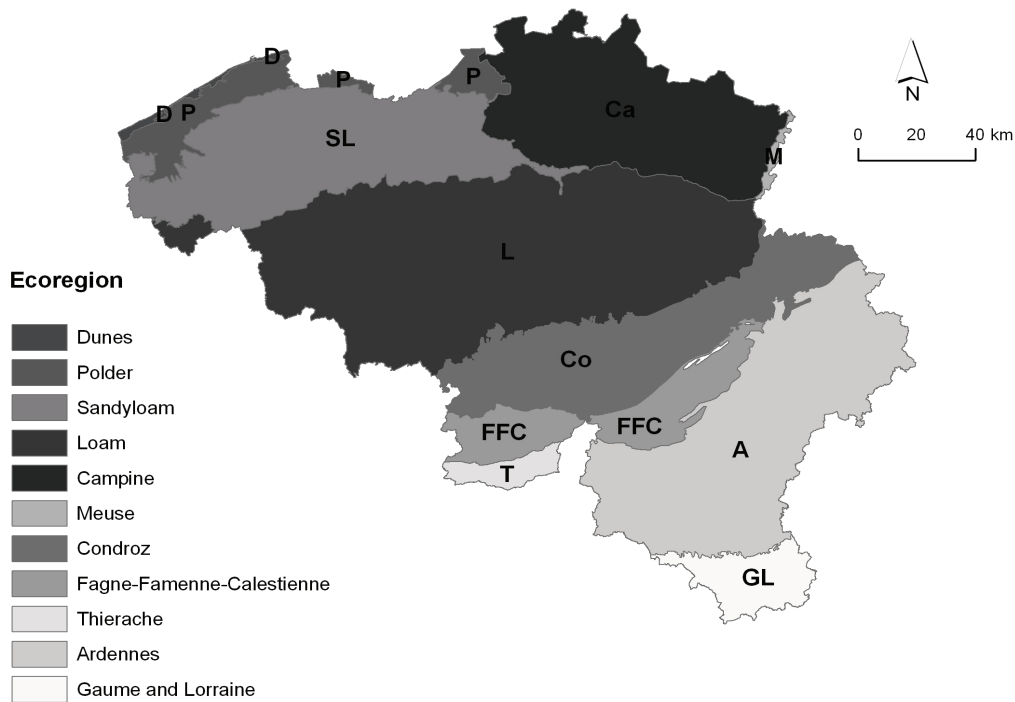


Fig. 3: Location of the Belgian ecoregions.

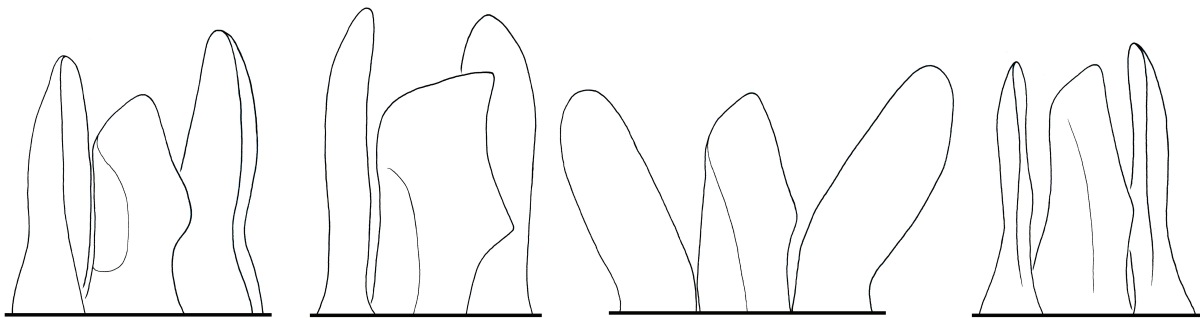


Fig. 4: figures of the male genitals of the different species (not to scale). (a) *Hyperaspis campestris* (b) *H. chevrolati* (c) *H. concolor* (d) *H. Pseudopustulata*.

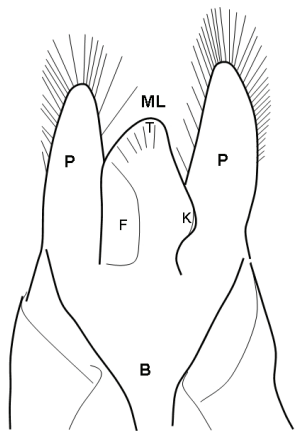


Fig. 5: part of male genitalia (schematic) - B, basal piece; P, paramere; ML, median lobe with F, flag; K, knee and T, top.

be locally abundant in similar habitats in the national park Hoge Veluwe (pers. obs.). The finding in Su Bannet (22.VI.2005, Houyet, Namur) seems atypical for the species as it was found on the lower branches of *Tilia platyphyllos* Scop. along a forest road on slate, without bilberry in the neighbourhood (BRANQUART *et al.*, 1999; BRANQUART & MAES, 2003). Examined specimens were 3 – 3.3 mm long and 2 – 2.2 mm wide. Rather round appearance in dorsal view and convex in lateral view. In literature, the length of the body varies from 2 to 4.5 mm (VAN GOETHEM, 1975; DE GUNST, 1978). Head is yellow with black on upper side hidden by pronotum. Pronotum with

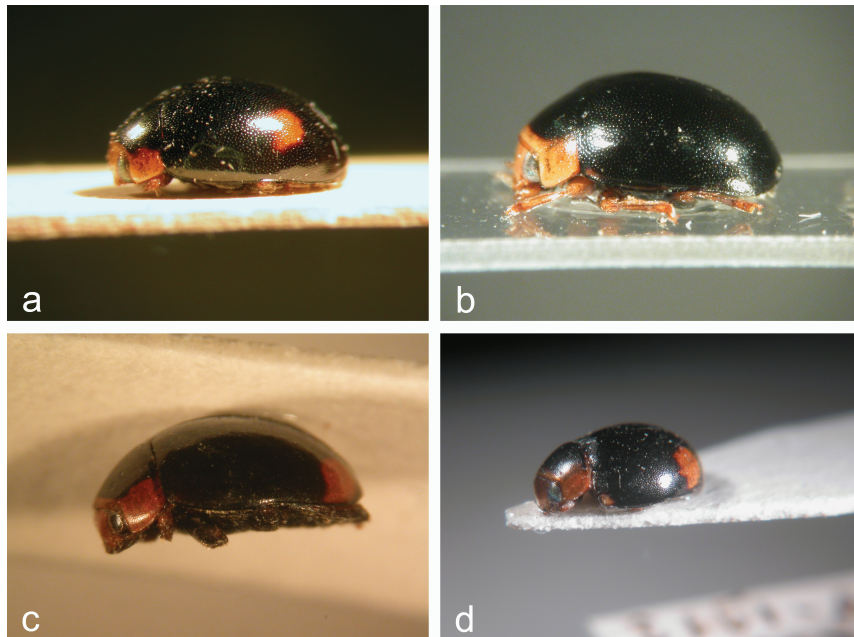


Fig. 6: Pictures of the different *Hyperaspis* species (© J. Bogaert). a: *H. campestris*; b: *H. concolor*; c: *H. chevrolati*; d: *H. pseudopustulata*.

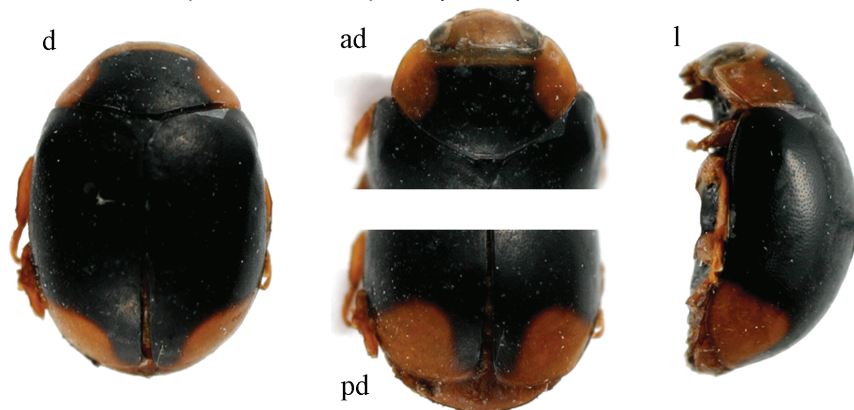


Fig. 7: Dorsal (d), antero-dorsal (ad), postero-dorsal (pd) and lateral view (l) of *Hyperaspis magnopustulata* sp. nov.

narrow yellow anterior border. Sides of pronotum partially yellow. Red spot typically placed at 3/4 of elytron (Fig. 6a). No other European *Hyperaspis* species has a spot so much anteriorly placed. Humeral spots absent.

***Hyperaspis concolor* Suffrian, 1843**

In the Derenne collection (RBINS), two ladybirds (Derenne, 12.V.1950, Rosières, Brabant-Wallon; Derenne, 5.VI.1922, Houyet, Namur), formerly identified as *H. reppensis* males, were found lacking spots near the middle or rear end of the elytra, but with a small humeral spot present in the anterior corner. These specimens were revised as *H. concolor* and identification was verified by checking genitalia structure. Moreover, two males were captured in the vicinity of Houyet (11.V.2005),

remarkably close to the place where a specimen was found almost 100 years ago. Examined specimens are 2.8 – 2.9 mm long and 1.9 – 2.2 mm wide. Relatively slightly convex and very rounded. Head yellow with black upper side hidden partially under pronotum. Pronotum with broad, yellow anterior border. Sides of pronotum broadly yellow (Fig. 6b). Thus, it appears that *H. concolor* has been present in Belgium for over 90 years and its presence could be confirmed by recent field observations.

***Hyperaspis chevrolati* Canepari 1985**

Belg. sp. n.

The examined specimen is 3.6 mm long and 2.8 mm wide. CANEPARI *et al.* (1985) gave the length of this species as 3.3 mm – 4.1 mm. In dorsal view, clearly oval shaped and slightly

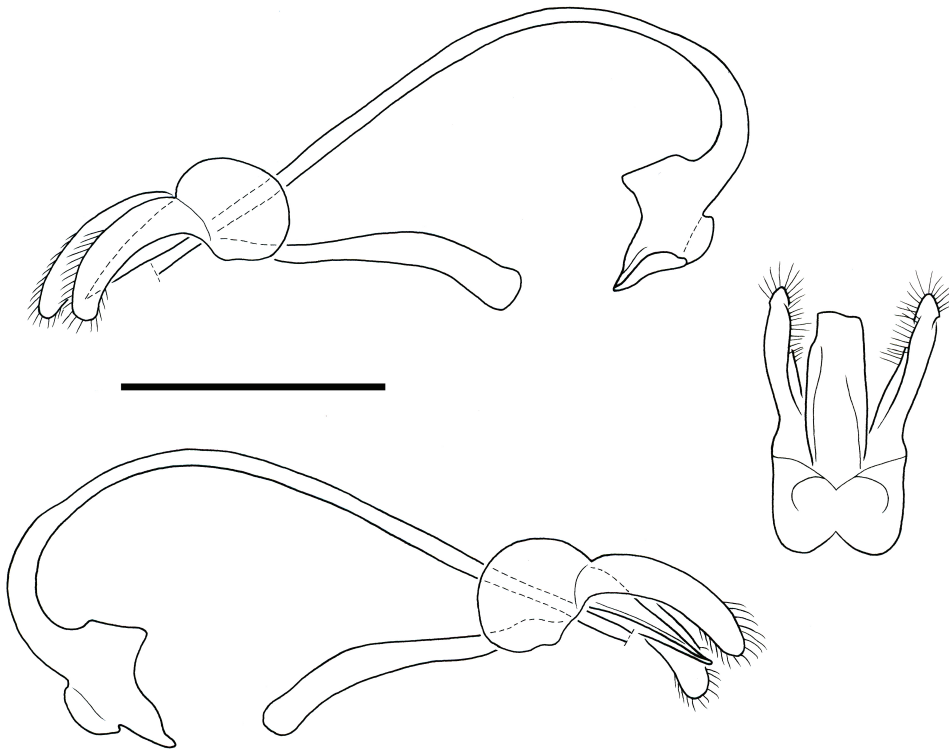


Fig. 8: Male genitalia structure *H. magnopustulata* sp. nov.

convex in lateral view. Head orange to red. Pronotum with rather broad anterior, orange to red border. Sides of pronotum broadly yellow. Apex of elytra with rather large spot, comma-shaped with a short tail. Reddish comma not touching margin of elytra (Fig. 6c). Very light humeral spot. *Hyperaspis chevrolati* Canepari 1985 constitutes a new addition to the Belgian fauna.

***Hyperaspis pseudopustulata* Mulsant 1853**

Belg. sp. n.

The examined specimen is 3 mm long and 2.5 mm wide. Very round ladybird, moderately convex. Head orange with black upper side hidden by pronotum (like all of the Hyperaspidini described before). Pronotum with broad anterior orange border and very broad lateral spot. Black from pronotum reaching end of pronotum, with fine line continuing to about half of pronotal side spot. Humeral spot and large, round, posterior spot on the elytra somewhat irregular at anterior side. In the RBINS collections, this ladybird was identified as *H. inexpectata* Gunther 1959. However, the genitalia structure clearly revealed this as *H. pseudopustulata*. With only a single specimen in the collection (Muller, 24. .1912, Boncelles) (Fig. 6d) the status of this species in Belgium remains largely unknown. Surprisingly, MAJERUS & KEARNS (1989) report it to be

widely distributed and often common in Britain, where deciduous woodland and orchards are its preferred habitat. As it is often found in mosses on or below trees, this habitat might have been overlooked in Belgium.

***Hyperaspis magnopustulata* sp. nov.**

Material examined: Holotype male, date unknown, A. Bovie, La Hulpe, Belgium (RBINS) (Fig. 7).

Derivatio nominis: the name comes from the Latin words *magnus* (= big), and *pustula* (= spot), literally “with a big spot”. The name refers to the size of the elytral spot in this species.

H. magnopustulata sp. nov. is 3.8 mm long and 2.5 mm wide. Body with slightly parallel sides and very convex in side view. Head orange with barely black upper side completely hidden by pronotum. Pronotum with narrow orange anterior border. Pronotal side spots very broad, from lower side border, up to behind eyes, and rounded at dorsal side. Spots touching anterior and posterior border with a sharp angle. Pronotal parts hidden between prothorax and pterothorax orange. Very small humeral spot. At apex of elytra, big spot closely adjoining elytral border; black areas form shape of a normal distribution curve slightly bowed at apex. Tarsi, tibiae, and femora of front and middle legs, bright orange. Hind legs, with small basal part of femur dark orange. Hind legs slightly darker than other legs.

All trochanters and coxae dark orange. Carina on prosternum parallel and slightly approaching each other. Elytral epipleuron black, dark orange in middle. Prothoracic hypomeron orange. Mesepimeron silver orange. Abdomen bicoloured with outer part dark orange and inner part black. Abdominal postcoxal lines very deep, slightly extending over anterior border of second abdominal ventrite. Male genitalia (Fig. 8) differ from the genitalia of all other Belgian *Hyperaspis* species in the structure of the side edges of the median lobe. Both sides reinforced nearly equally. No flag or knee is present. In side view, it consists of a plate that is slightly conical at the top. In ventral view, top is stepped in two parts with the left step the highest. In side view, the paramere gradually curves to 45° and is four times as long as broad. Hairs on the parameres densely (>30/paramere) placed from slightly more than a half paramere on the dorsal side to a quarter paramere at the ventral side. Hairs longer than the paramere is broad.

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References

- ADRIAENS T. & MAES D., 2004. - Voorlopige verspreidingsatlas van lieveheersbeestjes in Vlaanderen, resultaten van het lieveheersbeestjesproject van de jeugdbonden. *Bertram* 2: 1-69.
- ADRIAENS T., SAN MARTIN G., GOMEZ G. & MAES D., 2008. - Invasion history, habitat preferences and phenology of the invasive ladybird *Harmonia axyridis* in Belgium. *BioControl* 53(1): 69-88.
- BOGAERT J., 2006. - Bosbesglanskapoentje *Hyperaspis campestris* in de bossen van Averbode. *Natuur.Focus*, 5: 103-104.
- BOGAERT J. & BAUGNÉE J.-Y., 2005. - Het bosbesglanskapoentje *Hyperaspis campestris* in het Averbodebos met een overzicht van haar verspreiding en ecologie in België. *Coccinula Newsletter of the Belgian Ladybird Working Group*, 13: 14-19.
- BOVIE A., 1897. - Les coccinelles de Belgique. *Annales de la Société Entomologique de Belgique*, 41: 133-162.
- BRANQUART E. & MAES D., 2003. - Le point sur la distribution des coccinelles en Belgique. *Coccinula Newsletter of the Belgian Ladybird Working Group*, 7: 5-23.
- BRANQUART E., BAUGNÉE J.-Y., MAIRESSE J.L. & GASPARD C., 1999. - Inventaire de la faune des coccinelles de Wallonie (Chilocorinae, Coccinellinae et Epilachninae). Rapport final, Gembloux.
- CANEPARI C., FÜRSCHE H. & KREISSL E., 1985. - Die *Hyperaspis*-Arten von Mittel-, West- und Südeuropa. Systematik und Verbreitung. *Giornale Italiano di Entomologia*, 2: 223-252.
- COUTANCEAU J.-P., 1993. - Faune des Coccinellides du Nord de la France (Coleoptera). *Entomologia Galliae*, 4: 229-233.
- DE ALMEIDA L.M. & VITORINO M.D., 1997. - A New Species of *Hyperaspis* Redtenbacher (Coleoptera: Coccinellidae) and notes about the Life Habits. *The Coleopterists Bulletin*, 51: 213-216.
- DE GUNST J.H., 1978. - De Nederlandse Lieveheersbeestjes (Coleoptera Coccinellidae). *Wetenschappelijke Mededelingen Koninklijke Nederlandse Natuurhistorische Vereniging*, 125: 1-96.
- FAUNA EUROPAEA WEB SERVICE (2010). Fauna Europaea version 1.1. (Internet address <http://www.faunaeur.org>).
- FÜRSCHE H., 1992. - Familie Coccinellidae (Marienkäfer). In: LOHSE, G.A. & LUCHT, W.H. (Eds.), Die Käfer Mitteleuropas. 2. Supplement-band mit katalogteil, Goecke & Evers, Krefeld: 164-171.
- GEISER R., 1992. - Rote Liste gefährdeter Marienkäfer (Coccinellidae) Bayerns. *Schriftenreihe Bayerisches Landesamt für Umweltschutz*, 111: 132-133.
- IABLOKOFF-KHNZORIAN S.M., 1971. - Synopsis des *Hyperaspis* Paléartiques (Coleoptera Coccinellidae). *Annales de la Société entomologique de France*, 7: 163-200.
- IABLOKOFF-KHNZORIAN S.M., 1977. - Les représentants français des Scymnini (Coléoptères, Coccinellidae). *Nouvelle Revue d'Entomologie*, 7: 183-194.
- LOCK K., ADRIAENS T., BOGAERT J., SAN MARTIN G. & GODEAU J.-F., 2007. - Literatuurgegevens over lieveheersbeestjes in België. *Coccinula Newsletter of the Belgian Ladybird Working Group*, 14: 23-35.
- MAJERUS M.E.N. & KEARNS P., 1989. - Ladybirds. Naturalist's Handbook 10. Richmond Publishing, Slough.
- SEVENANT M., MENSCHAERT J., COUVREUR M., RONSE A., HEYN M., JANSSEN J., ANTROP M., GEYSENS M., HERMY M. & DE BLUST G., 2002. - Ecodistricten: Ruimtelijke eenheden voor gebiedsgericht milieubeleid in Vlaanderen. Ministerie van de Vlaamse Gemeenschap, Administratie Milieu, Natuur, Land- en Waterbeheer. Studieopdracht in het kader van actie 134 van het Vlaams Milieubeleidsplan 1997-2001.
- VAN GOETHEM J.L., 1975. - Coccinellidae van België, Lieveheersbeestjestabel. BJN, CJN, KJN, NJN, Zeist.