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A new species of *Drapetis* Meigen from calcareous grassland in southern Netherlands (Diptera, Hybotidae, Tachydromiinae)

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Front cover: *Drapetis monsmargila* sp. nov. Habitus male. © Camille Locatelli.

A new species of *Drapetis* Meigen from calcareous grassland in southern Netherlands (Diptera, Hybotidae, Tachydromiinae)

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Abstract

A survey of a limestone grassland with a Malaise trap in Maastricht at the extreme south of the Netherlands revealed the presence of a new species of *Drapetis* Meigen, 1822. It is described as *Drapetis monsmargila* sp. nov. and belongs to the *Drapetis exilis*-group in having the upper cross vein beyond the middle of the second basal cell (bm). The mid femur lacks transverse ribs or fine furrows anteriorly. The right epandrial lamella is remarkable in having a spherical dorsal extension bearing a comb of long setae. Both cerci are not fused and bear strong apical setae. The new species is compared with *Drapetis completa* Kovalev, 1972 and illustrations of the male terminalia and the tip of the mid tibia are given for both species. *Drapetis bruscensis* Grootaert, 2016 is recorded for the second time since its original description and for the first time in the Netherlands.

Keywords: calcareous grassland, *Drapetis*, new species, the Netherlands.

Introduction

A survey of the insect fauna was done in an ancient limestone quarry in Maastricht in the extreme south of the Netherlands. The survey was done with a Malaise trap that was operated for an entire season (April to October 2018). Among the empidoid flies some *Drapetis* Meigen, 1822 were found that to our knowledge appeared to belong to a hitherto undescribed species.

The genus *Drapetis* consists of small flies of 1.2 to 2 mm that are generally found on tree trunks (MICHELSEN & GROOTAERT, 2019) though we suspect that a number of species are active on soil as well. The taxonomy of the group remains quite obscure since no thorough revisions of the genus took place since COLLIN (1961), KOVALEV (1972) and CHVÁLA (1975). Thereafter, only some punctual papers on the western European fauna were published (STARK, 2003; GROOTAERT *et al.*, 2010; GROOTAERT, 2016). Recently MICHELSEN & GROOTAERT (2019) reviewed the *Drapetis* of Sweden and described *Drapetis abrollensis*. A key was provided for the males of the North-western European species excluding the Mediterranean species. In that paper special attention was given to modifications of the mid leg cuticle found exclusively in males of certain species within the *exilis* species group. The species diagnostic characters, in part ultra-structural modifications of the cuticle, are documented by SEM images. The find of brochosomes on the legs of three out of the six *Drapetis* species examined suggests that small leafhoppers are regularly used as prey.

Finally, GROOTAERT & HELLQVIST (2020) published two new *Drapetis* species from the Swedish Islands Gotland and Öland that appear to be associated with calcareous grasslands, the so-called alvars. The present findings here at Maastricht might suggest that there is a community of *Drapetis* species associated to calcareous grasslands.

With the present finding of a new species of *Drapetis*, we hope to demonstrate that the newly protected site at the quarry of Maastricht is really worth to be conserved.

Material & methods

Since April 2018 a Malaise trap is operated on a calcareous grassland at the ENCI-Quarry (GPS coordinates 50.8265 N-5.6844 E) located near Mount Saint Peter in Maastricht, the Netherlands. The ENCI (Eerste Nederlandse Cement Industrie) company has been quarrying limestone here since 1926. In 2009 a transformation plan for the entire ENCI area was developed and the quarry is now an official nature protected area and appointed as a Nature 2000 area. The area is of great importance for nature as the quarry and its environment provide specific habitat features for a specific and exceptional flora and fauna.

The samples are retrieved 3 times a month by volunteers of “Natuurmonumenten” and by the second author (P.B.). Details and images on the location of the trap can be found in BEUK (2019a; 2019b). The material is conserved in 70% ethanol in the collections of the Natural History Museum of Maastricht, the Netherlands. A male paratype of the new species is deposited in the collections of the Royal Belgian Institute of Natural Sciences in Brussels, Belgium (RBINS). In addition, the material deposited in the Zoological Institute of the Russian Academy of Sciences, St. Petersburg, Russia (ZIN) was examined.

Results

Two *Drapetis* species were found in the calcareous grassland of the ENCI quarry, Maastricht. On one hand *Drapetis bruscensis* Grootaert, 2016 recorded for the second time since its original description and for the first time in the Netherlands as well as a new species *Drapetis monsmargila*, described and figured below.

Hybotidae Meigen, 1820
Tachydromiinae Meigen, 1822
***Drapetis* Meigen, 1822**

***Drapetis monsmargila* sp. nov.**

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(Figs 1–4)

TYPE MATERIAL: Holotype ♂: **the Netherlands**, Maastricht (Limburg) ENCI-groeve Nat. Mon. Nieuw kalkgrasland GPS 50.8265N 5.6844E, 21–30 VI.2018, leg. NHM Maastricht MT. In the collection of the Natural History Museum in Maastricht.

Paratypes: 6♂♂, same provenance as holotype (5♂♂ in the collections of the Natural History Museum in Maastricht, 1♂, inventory number IG34187, RBINS).

DERIVATIO NOMINIS. The name *monsmargila* refers to the former hill (Lat. *mons*) at Maastricht composed of limestone or *margila* (Lat. for mergel in Dutch, a kind of limestone).

DIAGNOSIS. MALE. A small species (1.2–1.5 mm) of the *exilis*-group with upper cross-vein (r-m) distinctly beyond middle of second basal cell (bm). Inner vertical bristles 2× as long as the short anterior and posterior ocellar bristles. Antenna entirely brownish black; postpedicel nearly quadrangular, about as long as wide; pedicel with ventral setulae shorter than pedicel is long. Legs with a variable yellowish to black colour pattern. Mid femur lacking a pattern of transverse fine furrows or ribs anteriorly. Hind femur not thickened nor bent. Male mid tibia with a tiny apical tooth-like projection that is in fact composed of 3 spinules (Fig. 2B, C). Right epandrial

lamella with a dorsal apical spherical extension (Fig. 3A, de) bearing a comb-like set of long setae. Right and left cercus not fused.

DESCRIPTION. MALE. Body length: 1.2–1.5 mm; wing length: 1–1.3 mm.



Fig. 1. *Drapetis monsmargila* sp. nov. Habitus male. © Camille Locatelli.

Head. Black in ground-colour, shining through thin grey pruinosity. Frons narrowing downwards; face linear, narrower than frons, widening immediately above clypeus. All setulae and setae on head and antennae dark, except lower postoculars, on palpus and labella pale yellowish. Anterior ocellars short, crossing; posterior ocellars half as long as anterior ocellars, 3 long vertical bristles; inner vertical bristles 2× as long as anterior ocellars; following shorter. Lower postoculars whitish. Antenna brownish black, but scape and pedicel darker than postpedicel. Pedicel with ventral setulae shorter than pedicel is long; postpedicel nearly quadrangular, about as long as wide. Scape, pedicel, postpedicel, postpedicel width and stylus in mm: 0.03:0.04:0.08:0.08:0.42. Stylus nearly 3× (2.8×) as long as the 3 antennal segments together.

Thorax. Shiny black. Long setae black, setulae yellowish brown. A pale seta above fore coxa. Mesonotum entirely covered with fine setulae. Anteriorly with a single pair of erect acrostichals; a pair of long prescutellar dorsocentrals; 3 short notopleurals; a pair of long crossing scutellars with a tiny seta at each side. Mesopleura (anepisterna) with sparse short setulae.

Wing. Tinged brownish, veins pale brownish. Both vein R_{4+5} and M slightly undulating. Anal vein not present (a faint brownish wrinkle might indicate its position). Squama black with black setae. Haltere with knob and stem brown.

Legs. With a variable yellowish to black colour pattern (Fig. 4). Fore coxa generally black on base, paler on apical half. Fore femur black, but knee yellowish brown. Fore tibia and all tarsomeres yellowish brown. Mid and hind coxae, femora, tibiae and tarsi dark brown, though the colour of especially femora is variable from yellowish to black. Fore leg: femur with 2 anterior preapicals nearly as long as femur is wide; ventral setae lacking, except a thin short seta at base (shorter than half width of femur). Mid leg (Fig. 2): femur lacking an anterior pattern of transverse fine furrows or ribs (Fig. 2A); near base with some longer setulae and a short row of anteroventral setae in apical third; tibia with a tiny black apical tooth that is in fact composed of 3 short spinules (Fig. 2B, C). Hind leg: femur not thickened nor bent; tibia a little curved dorsoventrally; femur, tibia and tarsomeres in mm: 0.6:0.56:0.3:0.14:0.12:0.07:0.08.

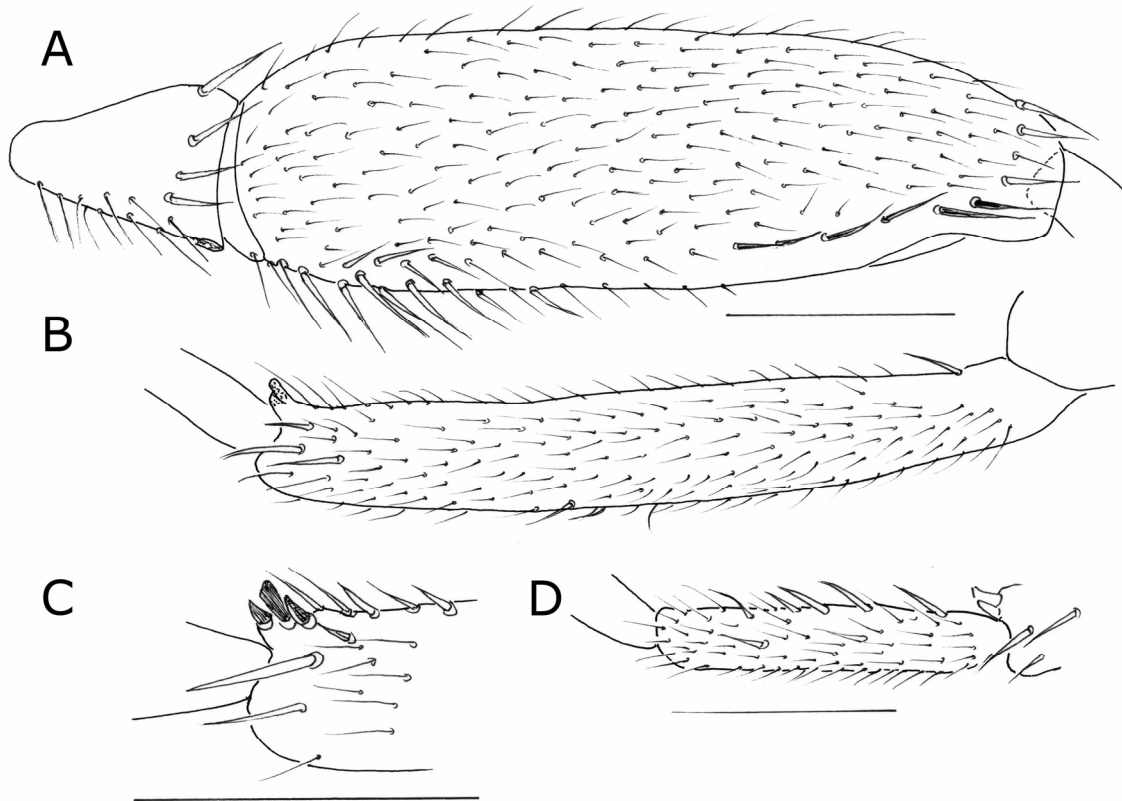


Fig. 2. *Drapetis monsmargila* sp. nov. Male mid leg. A, femur anteriorly. B, tibia anteriorly. C, detail of apical spinules on mid tibia posteriorly. D, tarsomere 1 anteriorly. Scale bars 0.1 mm. © P. Grootaert.

Abdomen. Tergite 1 not sclerotized, tergites 2–7 brownish. Tergites 4 and 5 lacking distinct squamiform setulae. Sternites 1 and 2 sclerotized. Sternite 3 only sclerotized anteriorly and at side (horseshoe shaped). Sternite 4 only sclerotized at sides while sternites 5 to 7 entirely sclerotized.

Male terminalia (Fig. 3). Cerci not fused. Left cercus a little longer than right cercus, club-shaped and densely set with fine setae; apical 3 setae stronger (Fig. 3B). Right cercus with apical third set with strong setae (Fig. 3A, B). Right and left epandrial lamella dorsally separated. Right epandrial lamella appears in dorsal view in low magnification as a black bar because dorsal border is yellowish transparent (Fig. 3A, t). Tip of ventral margin also transparent and appears as a yellowish rim (Fig. 3C, t). Right epandrial lamella with a dorsal apical spherical extension (Fig. 3A, de) bearing a comb-like set of long yellowish bristles. Right surstylus fused with right epandrial lamella. Left epandrial lamella fused with hypandrium,

bearing 5 setae on apical border (Fig. 3B). Dorsal left surstylus 1 (Fig. 3C, ls1) black, finger-like while left surstylus 2 is large and rounded, bearing long setae.

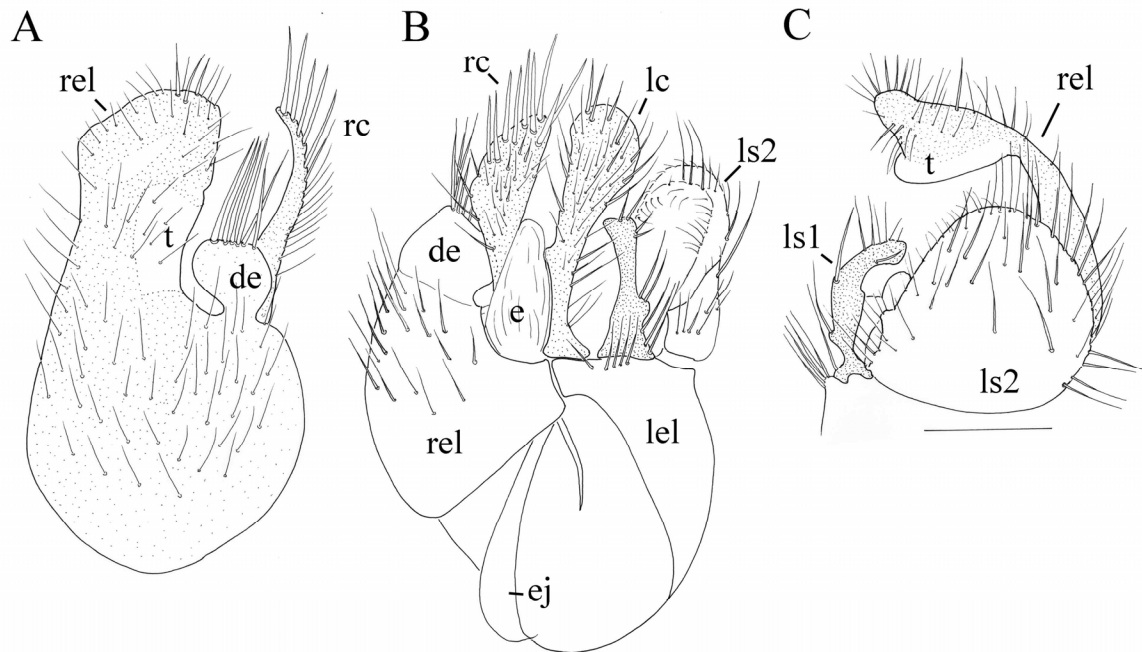


Fig. 3. *Drapetis monsmargila* sp. nov. Male terminalia. A, right epandrial lamella with dorsal extension (de) in dorsal view and right cercus (rc) in lateral view. B, epandrium dorsally. C, left surstyli and lateral side of right epandrial lamella. Abbreviations: de, dorsal extension of the right epandrial lamella; e, epiproct; ej: ejaculatory apodeme; lc, left cercus; lel, left epandrial lamella; ls1, left surstylus 1; ls2, left surstylus 2; rc, right cercus; rel, right epandrial lamella; t, transparent area. Scale bar 0.1 mm. © P. Grootaert.

FEMALE. Unknown.

Differential diagnosis and discussion

In the key to the male *Drapetis* species of Northwest Europe provided by MICHELSEN & GROOTAERT (2019), the new species will run to the *exilis* group as the upper cross vein ends beyond the middle of the basal medial cell (couplet 7). Since the mid tibia is simply tubular and not bearing a wide ventral crest bordered with numerous minute denticles as in *D. abrollensis*, the key will lead to couplet 8. In couplet 8 it is asked if the mid femur bears transverse cuticular ribs or fine furrows anteriorly or if the mid femur is practically smooth and covered by uniform setulae only. Care should be taken since the presence of fine furrows is often very difficult to see in ethanol conserved specimens. The mid femur in the new species is smooth (Fig. 2 A) leading to couplet 13. Vein R_{4+5} is not fading before reaching the wing margin like in *D. incompleta* Collin but reaches the wing margin in the new species. Then the new species should be compared with *D. stackelbergi* Kovalev and *D. completa* Kovalev.

Drapetis stackelbergi Kovalev, 1972 is peculiar in that the right and left surstylus bear strong black spines (KOVALEV, 1972, Fig. 15–16). No such spines are present in the new species. In addition, the cerci are thin in *D. stackelbergi* bearing only minute apical setae.

Drapetis completa has a thin right cercus lacking strong setae on the tip and the right margin and the left cercus is thin as well (Fig 5 B; KOVALEV, 1972: fig. 17). Both cerci are wide with a club-shaped apex in the new species (Fig. 3B). The dorsal margin of the right epandrial lamella bears no spherical extension bearing long setae in *D. completa*. Right and left cercus are narrowly connected at their tips in *D. completa*. The cerci are not connected at their apices

in the new species. CHVÁLA (1975) mentions that both *D. completa* and *D. stackelbergi* have extensively yellow legs, but in view of the variation in colour that occurs in *D. monsmargila* sp. nov. as in several other *Drapetis* species, this character is not reliable.



Fig. 4. *Drapetis monsmargila* sp. nov. Variation in colour of legs in males. © P. Beuk.

Extended diagnosis of *Drapetis completa* Kovalev, 1972

Since it was necessary to clarify a number of characters in *Drapetis completa* Kovalev, 1972 a short re-description of the species is given below as well as new illustrations of the male terminalia and the tip of the mid tibia.

***Drapetis completa* Kovalev, 1972**

(Figs 5–6)

KOVALEV, 1972: 186 (description male and female); figs 10–11 (tergites 4 and 5); fig. 17 (cerci and left surstylus 1); fig. 18 (left surstylus 1); fig. 19 (left surstylus 2); fig. 20 (sternites 1–4); fig. 22 (hind femur and tibia); fig. 23 (right epandrial lamella lateral).

TYPE LOCALITY: Yaschera, Luzhsk, Russia.

ADDITIONAL REFERENCES: MICHELSEN & GROOTAERT, 2019: fig. 5A: mid femur anteriorly.

TYPE MATERIAL EXAMINED. Holotype, male (Fig. 5), labelled (Fig. 5): “[printed in Cyrillic, Russia] Yaschera, Luzhsk. [= Luzhskiy District]/ Leningr. [= Leningradskaya] o. [= oblast, province]/ Stackelberg, 9.viii.[1]958”; “Holotypus/ *Drapetis completa*/ V. Kovalev” (INS_DIP_0000543, ZIN).

ADDITIONAL MATERIAL EXAMINED: 1 male, SWEDEN, Åbrolla, Osby (56°26'N 14°08'E), alt. 142 m, 14–21 July 2018, leg. V. Michelsen (in coll. RBINS).



Fig. 5. *Drapetis completa* Kovalev, 1972. Male habitus, holotype, lateral view. Holotype labels. © I. Shamshev.

REDESCRIPTION. A small species (1–1.2 mm, n=3; holotype 1 mm) of the *exilis*-group with upper cross-vein (r-m) distinctly beyond middle of second basal cell (bm). Inner vertical bristles 2 x as long as the short anterior and posterior ocellar bristles. Antenna entirely blackish; postpedicel short, triangular, 1.3 x as long as wide; pedicel with ventral setulae half as long as pedicel is long. Legs usually yellowish brown, but hind femur and tibia dark brown, except for tip (colour very variable!). Mid femur lacking a pattern of transverse fine furrows or ribs anteriorly (MICHELSEN & GROOTAERT, 2019, fig. 5A). Fore femur thickened, mid femur more slender than fore femur while hind femur is thickened, dorsoventrally bent and as wide as fore femur (KOVALEV, 1972, fig. 22). Male mid tibia lacking an apical tooth, but tip anteroventrally set with a dense patch of minute spinules with a rounded tip. Hind tibia narrowed on about apical half (KOVALEV notes this character in his key). Tergite 3 with some squamiform setulae, tergites 4 and 5 with numerous squamiform setulae. Right epandrial lamella with a dorsal apical triangular extension that is digitiform and bearing strong setae (Fig. 5A, de) and a large bifid ventral apical extension homologous to the right surstylus (Fig. 5A, ve). Right and left cercus connected over a very short distance, the free apices of the right and left cercus very short, bearing short setulae (Fig. 5B). Left epandrial lamella fused with hypandrium, bearing 5 setae on apical border. Haltere with brown knob (somewhat variable according to KOVALEV, 1972).

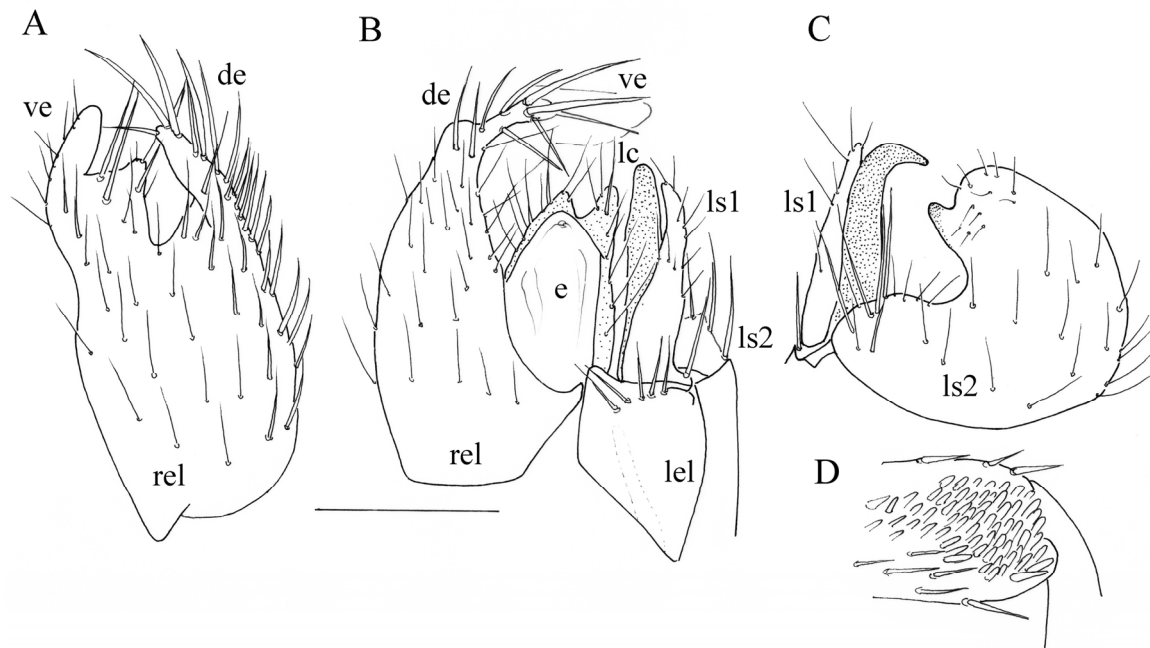


Fig. 6. *Drapetis completa* Kovalev, 1972. Male (Sweden). A, right epandrial lamella. B, hypandrium dorsal view. C, left surstylus ls1 and ls2. D, denticles on tip of mid tibia. Abbreviations: de, dorsal extension of the right epandrial lamella; e, epiproct; lc, left cercus; lel, left epandrial lamella; ls1, left surstylus 1; ls2, left surstylus 2; rel, right epandrial lamella; t, transparent area; ve, bifid ventral extension of right epandrial lamella. Scale bar 0.1 mm. © P. Grootaert.

Comments

KOVALEV (1972) described *D. completa* from north-western part of Russia, but later this species was found to occur in central and southern regions of the European part of Russia, Czech Republic, Germany, Norway, Sweden, Switzerland and Ukraine (SHAMSHEV, 2016). CHVÁLA (1975) did not include this species in his monograph.

Drapetis completa differs in many characters from *D. monsmargila* sp. nov. especially in the morphology of the cerci. In *D. monsmargila* sp. nov. the cerci are large, with the right cercus bearing strong setae and right and left cercus are entirely separated. In *D. completa*, the cerci

are small, with fine apical setulae and the cerci are connected near their apices over a short distance (Fig. 5B). Obvious is also the spherical dorsal extension bearing a comb of setae in *D. monsmargila* sp. nov. while there is digitiform protuberance in *D. completa* (Fig. 5A, B). Remarkable are the rather strong squamiform setae on tergite 4 and 5 while there are some flattened setae on tergite 3 as well that give an impression of squamiform setae.

General conclusion

It might be too preliminary but the present findings here at Maastricht might suggest that there is community of *Drapetis* species such as *D. hirsuticercis*, *D. terjei*, *D. undulata*, and now *D. monsmargila* sp. nov. that are associated with calcareous grasslands. As members of the *exilis*-group they seem to be related in having more or less undulating veins R₄₊₅ and M and rather distinct developed cerci densely set with setae of which some are thickened. Unfortunately, all these species are very rare and no focused research on their ecology was done on them yet.

This is the third paper in a series of papers on the remarkable fauna of the newly established calcareous grassland at the ENCI quarry in Maastricht (BEUK, 2019a; 2019b). In view of its specific and exceptional fauna, it is obvious that the protection of the area is entirely justified as well as the restoration of quarries for biodiversity, people and economy.

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