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Unexpected Finding of Brachyopa panzeri Goffe, 1945 (Diptera, Syrphidae) within the Urban Environment of Geneva

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Abstract This study reports the unexpected discovery of Brachyopa panzeri [1] (Diptera, Syrphidae) in Geneva's urban landscape. In a significant finding, Brachyopa panzeri Goffe was observed on a recently cut trunk of Acer campestris, oozing sap, located within a central park in Geneva, notably adjacent to the main entrance of the Natural History Museum Geneva. This observation constitutes the first recorded instance of this seldom encountered species in the canton of Geneva. The paper provides an in-depth analysis of various behavioral characteristics of Brachyopa panzeri Goffe, contributing to the broader understanding of its ecological interactions and habitat preferences. This discovery not only enriches our knowledge of urban biodiversity but also highlights the significance of urban green spaces in conserving insect diversity.

Index Terms Keywords: Brachyopa panzeri Goffe, Syrphidae, Geneva, faunistics, behavior.

I. Introduction

Diptera, commonly known as flies, often carry a negative stigma in the public eye. Deemed unsanitary due to their association with unappealing locations such as cow dung, dog droppings, carrion, and waste bins, these insects evoke a sense of disgust. Their hairy bodies, often black, and their reputation as vectors for severe diseases like yellow fever, malaria, chikungunya, and sleeping sickness, further contribute to the inclination to dispose of them swiftly. Consequently, only a limited number of individuals, including scientists, show interest in these insects, resulting in a rudimentary understanding of their taxonomy, faunistics, and biology. In Switzerland, for instance, almost 7000 Diptera species are documented [2], but estimates suggest that over 9000 species could potentially inhabit the region, making it the zoological order with the highest species diversity.

However, the hoverfly family (Syrphidae) stands out as an exception to this generalization. These flies, often adorned with vibrant colors, can mimic bees, bumblebees, and wasps. Moreover, they are valued for their larvae, which feed on aphids. Despite some negative perceptions associated with species developing in onion bulbs and other Liliaceae, hoverflies have garnered attention from scientists and are considered one of the most well-known insect families in Europe. Switzerland alone hosts 475 known species ([3] [4]), and recent discoveries, including at least three new species [5], indicate that the family still holds undiscovered secrets.

Among the myriad of Syrphidae species in Switzerland, some are exceptionally rare, including Brachyopa panzeri [1] (Figure 1, 2, 3). In an unexpected turn of events on May 11, 2009, Bernard Landry, a scientific collaborator at the Natural History Museum, observed a significant number of dipterans near the museum's main entrance on a maple stump oozing sap. This led to the observation and capture of dipterans, among which a sizable Brachyopa species caught attention. The identification revealed it to be a rarely observed species absent from most entomological collections. This noteworthy and unforeseen discovery marks the first documented occurrence of B. panzeri in the canton of Geneva. Given its significance, we deemed it essential to share details of this unexpected finding.

II. Summary of the History of Brachyopa panzeri Goffee

The history of Brachyopa panzeri [1], traces back to its initial description by Panzer in 1798 under the name Musca conica Panzer. However, due to its atypical appearance for a Syrphidae, the species remained enigmatic for an extended period. It often became entangled with species from diverse families, including Heleomyzidae (Suillia spp.), Sciomyzidae (Tetanocera spp.), Scathophagidae (Micropselapha sp., Scathophaga spp.), and even Muscidae (Phaonia spp., Thricops spp.). Compounding the challenge, the original description was quite brief, hindering clear differentiation from other Brachyopa species. Furthermore, the loss of Panzer's types added to the confusion in the literature.

Distinguishing species within the genus Brachyopa poses a considerable challenge due to their morphological resemblance. Early records [6], [7] in various locations mentioned

Figure 1: Brachyopa panzeri Goffe. Male, lateral view (GE: Geneva, Natural History Museum, 11.V.2009). (Photo: C. Reuteler, Natural History Museum Geneva).

Figure 2: Brachyopa panzeri Goffee. Male, dorsal view (GE: Geneva, Natural History Museum, 11.V.2009). (Photo: C. Reuteler, Natural History Museum Geneva.

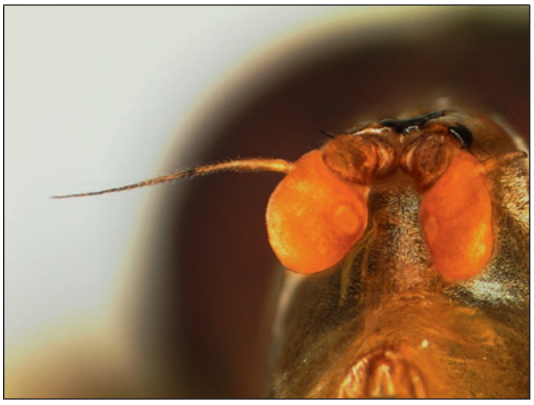

Figure 3: Brachyopa panzeri Goffee. Male, antennae (GE: Geneva, Natural History Museum, 11.V.2009). (Photo: C. Reuteler, Natural History Museum Geneva).

B. conica in Switzerland, but these identifications are viewed with caution, possibly referring to other species. The first reliable citation was by [8], designating it as a rare species in the Jura and Plateau regions (5-9 localities in Switzerland). Subsequently, [9] included it in the list of Syrphidae in Zurich.

Species within the genus are morphologically similar, often requiring microscopic examination, especially of the male genital tract, for accurate identification. [10] provided the first reliable key covering the nine Swiss species, though four species described later from Central Europe were missing, necessitating integration based on their original descriptions.

[11] clarified the taxonomy, revealing that some species had been misidentified in the past. It emphasized the unreliability of older publications and established a more accurate framework for identification. B. panzeri is now documented in several European countries, including Germany, Austria, Belgium, Denmark, France, Hungary, Luxembourg, Netherlands, Poland, Czech Republic, Romania, Russia, Slovakia, Sweden, and Switzerland.

B. panzeri shares specific characteristics with B. dorsata Zetterstedt, notably the presence of more or less bare antennal chaeta (arista) and a mesonotum that is brown or slightly blackened. Differentiation relies on the structure of the male genital tract. Additionally, B. panzeri's wings often exhibit diffuse browning at the edge and on the "vena spuria" (a rib in the middle of the wing fading in the middle of cell R5), distinguishing it from B. dorsata, which has entirely transparent wings. Despite recent descriptions lacking this detail, historical drawings accompanying Panzer's description in 1798 clearly depict the partially dark wings of B. panzeri.

In a crucial revision, Goffe (1945) recognized that the name Musca conica was a homonym of Musca conica Gmelin, 1790, rendering it invalid. To resolve this, he proposed the valid name Brachyopa panzeri [1]. Approximately 30 years later, [11] spearheaded the first comprehensive revision of the Brachyopa genus, listing 12 species in the Palearctic region. This publication catalyzed a significant advancement in our understanding, leading to the description of eight new species, primarily from the Mediterranean region but also from central Europe. Currently, Europe boasts 15 recognized species, with nine documented in Switzerland ([6]).

III. Materials and Methods

Observations were conducted on seven specimens collected using a 40 cm diameter entomological net, and specific details are outlined in the "Results and Discussion" section. These specimens are meticulously pinned on minutiae and incorporated into the Museum collection at the Natural History Museum Geneva (MHNG). Fly images were captured using the AutoMontage® system and a LEICA MZ APO binocular.

IV. Results and Discussion

Specimens Studied: In the city of Geneva, Canton of Geneva, Switzerland, the observations were centered in front of the main entrance of the Natural History Museum (Route de Malagnou 1), at coordinates 501128/117210

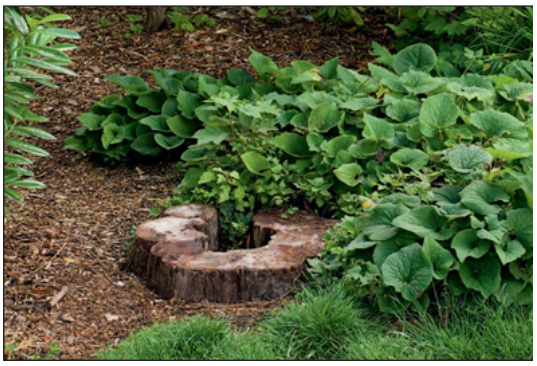

Figure 4: Habitat ofBrachyopa panzeri GOffe. Tree stump in front of the Natural History Museum. (Photo: Ph. Wagner, Natural History Museum Geneva).

Date	Hour	D.total	B.p. m	B.p.. f
11.V.2009	5:00 p.m. -5:15 p.m.	59	4	1
13.V.2009	10:00 a.m. - 10:15 a.m.	28	0	0
13.V.2009	11:10 a.m. - 11:20 a.m.	19	0	0
13.V.2009	3:10 p.m. -3:20 p.m.	41	1	1
28.V.2009	10:20 a.m. - 10:30 a.m.	35	0	0
28.V.2009	3:20 p.m. -3:30 p.m.	30	0	0
Total		212	5	2

Figure 5: Capture of dipterans on the stump. Abbreviations: D. total = Diptera total;B.p.=Brachyopa panzeri; m = males; f = females.

(46º11'57"N/06º09'28"), with an approximate altitude of 400 m. The specimens were found on a stump of a field maple (Acer campestris) exuding sap (Figure 4). The dates, times of searches, and the count of males and females are detailed in Figure 5. Across six field collections, a total of 212 Diptera specimens were captured, with Brachyopa panzeri represented by seven individuals (5 males, 2 females). The species was observed only twice (on May 11 and 13, 2009) in the afternoon after 3:00 p.m., and the identification was validated through the examination of the genital tract.

Behavior

The observed flies were located around a stump of a field maple that had been recently felled due to its compromised health condition. The central portion of the trunk was hollow, jeopardizing the stability of the tree (Figure 5). The tree, situated in a heavily frequented area by Museum visitors, posed a threat to people and property, necessitating its removal to prevent potential accidents. The felling took place during a growth period, resulting in the stump being saturated with sap from the roots. Sap, rich in microorganisms like bacteria and yeast, serves as an attraction for various insects. The alcohol produced during the fermentation of these microorganisms becomes a valuable food source for the larvae of several species and is preyed upon by numerous predators [2]. Contrary to typical observations of Brachyopa species being attracted to sap in deciduous tree habitats within forests, B. panzeri was collected and observed on a stump situated far from a forest, specifically in a park with widely spaced trees of diverse species. This suggests a robust population of this species, drawn more to fermentation fumes than to a densely wooded micro habitat.

V. Observations of Brachyopa panzeri Behavior

Flies were frequently observed in the vicinity of the stump, and even more commonly in the central hole where sap was more abundant. Some specimens alighted on the damp wood, while others circled closely around the stump. At times, they hovered without forward movement, a characteristic behavior of this family, suggesting a survey of the area, potentially to assess suitability for egg-laying (for females) or to locate females (for males). The higher number of captured males might indicate increased activity rather than a gender-specific prevalence. Females were seen either walking on the stump or within bark crevices, making them less visible and more challenging to capture compared to males.

Contrary to assumptions by [4], it was not possible to substantiate the hypothesis that adults predominantly inhabit tree canopies. Existing literature frequently mentions adult observations around reproduction sites, notably near sap-exuding stumps. However, their atypical appearance within the family, relatively dark coloration, difficulty in finding suitable micro habitats for development, subtle behavior, and limited activity period in the year could contribute to their rarity in collections.

VI. Other Rarely Collected Species

During the fieldwork (Figure 5), a total of 212 dipterous specimens were captured, with Philosophizer (61 specimens) and Spheroidal (64 specimens) being the most prevalent families. Additionally, a few specimens from the families Sepsis, Euphoria, and Euphorically were observed and captured. Apart from B. pauperize, only one specimen of Sisyphus balusters (De Geer) was identified among the Spheroidal. Noteworthy, yet infrequently reported species, include:

Family Xylomyidae

This sizable species, often found in traps, is rarely observed in nature. It is known for its attraction to dead wood, where larvae reside under the bark. – New species for the canton of Geneva.

Family Stratiomyidae

Nemotelus nigrinus Fallen. 1 female, 28.V.2009. Typically caught on flowers or in marshes, the larvae's biology remains unknown. The observation on the stump suggests a potential development site, distinct from other Nemotelus species with larvae in aquatic environments, sometimes even in saltwater. – New species for the canton of Geneva.

Family Ulidiidae

Euxesta pechumani Curran. 2 females, 28.V.2009. Native to the New World, this species has been found in various coun-

tries, mainly in the South, since its first observation in Europe in 1921. Its biology is not well understood. – New species for the canton of Geneva.

Family Ulidiidae

Otites bacescui Gheorghiu. 1 male, 28.V.2009. Initially recorded in Switzerland with a few specimens captured using a beer trap in La Louvière (Geneva), it is known only in the canton of Geneva. These observations suggest an attraction to fermenting yeast odors, hinting at larval development in such an environment.

References

[1] GOFFEER.1945. Note on the type-species of some genera of Syrphidae (Diptera). Journal of the British Entomological Society, 2: 276-279.
[2] MERZB,BÄCHLIG,HAENNIJP.2007. Zweiter Nachtrag zur Checkliste der Diptera der Schweiz. Mitteilungen der Entomologischen Gesellschaft Basel, 56(4) (2006): 135-165.
[3] MAIBACHA,GOELDLIN DETIEFENAUP,DIRICKXH.G.1998. 51. Syrphidae (pp. 211-224). In: Merz B, Bächli G, Haenni JP, Gonseth Y (eds.),Diptera, Checklist. Fauna Helvetica, 1:1-369.
[4] MERZB,BÄCHLIG,HAENNIJP.2002. Erster Nachtrag zur Checkliste der Diptera der Schweiz. Mitteilungen der Entomologischen Gesellschaft Basel, 51(3-4) (2001): 110-140.
[5] SCHOCHG.1889. Miscellanea entomologica. II. Prolegomena zur Fauna Dipterorum Helvetiae. Wissenschaftliche Belage zum Programm der Kantonsschule in Zürich: 24-40.
[6] RINGDAHLO.1957. Fliegenfunde aus den Alpen. Entomologisk Tidskrift, 78: 115-134.
[7] GOELDLIN DETIEFENAUP.1974. Contribution to the systematic and ecological study of the Syrphidae (Dipt.) of the Western Palearctic region. Mitteilungen der Schweizerischen Entomologischen Gesellschaft, 47: 151-252.
[8] MERZb.2001. Die Schwebfliegen der Stadt Zürich (Diptera, Syrphidae). Mitteilungen der Entomologischen Gesellschaft Basel, 51(2): 42-92.
[9] THOMPSON FC.1980. The problem of old names as illustrated by Brachyopa “conica Panzer”, with a synopsis of Palaearctic Brachyopa.
[10] DOCZKALD, DZIOCKf.2004. Two new species of Brachyopa Meigen from Germany, with notes on B. grunewaldensis Kassebeer (Diptera, Syrphidae). Volucella, 7:35-59.
[11] MAIBACHA,GOELDLIN DETIEFENAUP,DIRICKXH.G.1992. Faunal List of Syrphidae of Switzerland (Diptera). Miscellanea FaunisticaHelvetiae, 1:1-51.