Bull. Soc. Nat. luxemb. 101 (2001) p. 111-116

First Record of *Keroplatus tipuloides* (Bosc, 1792) in Luxembourg (Diptera, Nematocera, Keroplatidae)

by

Melanie Cardew [1]) & Evelyne Carrières [2])

Abstract: In 1999 the species *Keroplatus tipuloides* Bosc, 1792 (Diptera, Nematocera, Keroplatidae) was found in the forest Schnellert near Berdorf. This is the first record of this species in Luxembourg.

Résumé: En 1999 l'espèce *Keroplatus tipuloides* Bosc, 1792 (Diptera, Nematocera, Keroplatidae) a été trouvée dans le massif forestier Schnellert près de Berdorf. C'est la première mention de cette espèce au Luxembourg.

Keywords: Keroplatidae, *Keroplatus tipuloides*, Luxembourg.

1. Introduction

1.1. Rationale of the Study

Whilst visiting Luxembourg in 1998, M. Speight told us that the Diptera species *Keroplatus tipuloides* (Bosc, 1792) could be found in the Schnellert forest near Berdorf (Gauss-Luxembourg 91/96). According to M. Speight (pers. comm.) the preferred habitat of *K. tipuloides* are dead wood forests containing a large number of the carpophore species *Fomes fomentarius*. In fact, the Schnellert, as opposed to many remaining forests in Luxembourg, is designated as a "dead wood" forest.

Due to the economic pressure on forests over at least the last century, it is one of the few remaining dead wood forests in Luxembourg. The fallen trees, left to decompose in situ after the heavy storms in 1989 and 1994, have created clearings interesting to entomologists and an increased growth of carpophores of *F. fomentarius*. The predominant tree species infested by *F. fomentarius* in the Schnellert is *Fagus sylvatica*.

In the late spring of 1999 and, within the context of the Schnellert project carried out by the Musée national d'histoire naturelle of Luxembourg, we established the first findings of this species of Diptera.

According to Santini (1982), Matile (1986), Krivosheina & Mamaev (1988) and Ståhls & Kaila (1990), *K. tipuloides* has a Palearctic distribution as it is known in Austria, the Balkan peninsula, Estonia, Fennoscandia, France, Germany, Hungary, Italy, Iran and Latvia.

[1]) 12 Cité Kremerich, L-6133 Junglinster, Luxembourg (cardew@ltnb.lu).

[2]) Musée national d'histoire naturelle, 25 rue Munster, L-2160 Luxembourg, Luxembourg (carrieres_kam@hotmail.com).

1.2. Taxonomy

The European species of the genus *Keroplatus* are divided into two species groups (*K. tipuloides* gr. and *K. testaceus* gr.). *K. tipuloides* (Fig. 1) is the only European member of its group. Whereas the adults of the *K. tipuloides* group have strongly coloured wings and palpi, which are short and globulous, adults of the *K. testaceus* group have diffusely spotted wings and long palpi. *K. tipuloides* was previously known as *Keroplatus sesioides* Wahlberg (Hackman 1980, Väisänen 1982, Anonymous 1986), but Matile (1986) established their synonymy (Ståhls & Kaila 1990).

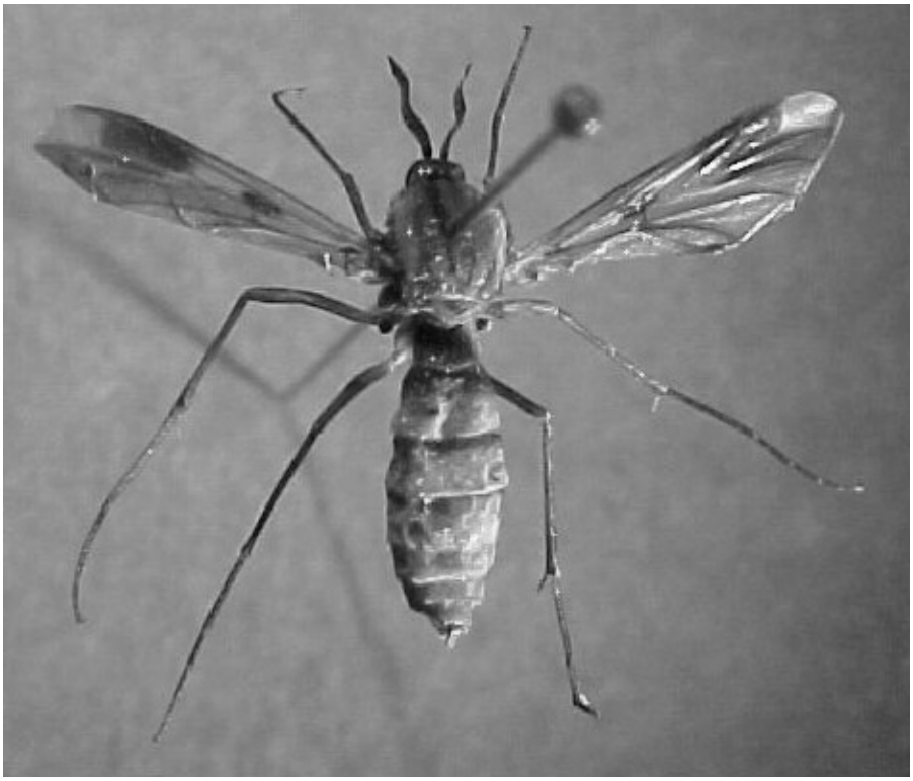

Fig. 1. ♀ *Keroplatus tipuloides* (Bosc, 1792), wing span 16 mm.

1.3. Biology

As this species is rare, there only exist very sparse data on their ecology (Santini 1982). *K. tipuloides* inhabits forests as well as humid and dark places such as caves, ravines and banks of streams. It is a species associated with the bracket fungus *F. fomentarius*, which grows on senescent or dead *F. sylvatica* (Matile 1990).

The larvae, living under these carpophores, use their salivary glands to produce an irregular mucilaginous net, which traps spores. As fungus-spore feeders, these larvae ingest both the mucus and the fallen spores. Both larvae and adults are nocturnal. The larvae are reported to be luminous (Santini 1982, Ståhls & Kaila 1990).

2. Methodology

2.1. Choice of the Trapping Method

Kaila (1993), in order to trap insects associated with decaying wood or wood fungi, proposed a window flight trap based on the trap used by Biström & Väisänen (1988). The principle use of this window flight trap was to collect saproxylic and mycophagous insects, especially Coleoptera, in flight. A total of 93 traps were placed in 5 forests over a trapping period of 12276 days "yielding a large number of Diptera, especially Mycetophilidae and Keroplatidae" (Kaila 1993).

Considering that Kaila (1993) captured a large range of insects of different orders with a trap not easily workable, we decided to use a reactive eclector trap as opposed to a proactive window trap. As such, our first aim was to locate the presumed larvae of this species before constructing the trap over the infested carpophore.

2.2. Design of the Trunk Eclector

In order to collect samples of the family Keroplatidae, we developed an eclector trap, which consisted of two metallic clothes hangers, a cylindrical plastic container, a transparent lid, white opaque nylon cloth, a funnel and a ring clamp.

One clothes hanger was fixed horizontally to the tree above the carpophore and the second was suspended vertically by the hook of the first hanger and, deformed such that it could be attached to the tree below the infested carpophore. The plastic funnel was fixed vertically within the hook of the hanger situated above the carpophore (Fig. 2). The white opaque nylon cloth was attached below the carpophore - clothes hanger structure to the tree and pulled around this structure. The bottom of the trap was covered with soil and litter to provide the larvae with a puparial habitat. To close the structure, the cloth is fixed in-between the hook and the funnel with the ring clamp. The plastic container, filled with an 8 % aqueous solution of formaldehyde, was slipped over the funnel which links it to the inside of the carpophore - clothes hanger structure. In order to convey a greater stability to this structure, wire was wound round the eclector container and the trunk of the tree (Fig. 3).

2.3. Study Sites

A total of three traps were installed throughout the Schnellert and checked at two weeks intervals. The trapping period started on 25.5.1999 and ended on 13.8.1999.

Eclector trap E1 was situated at the bottom of a slope on a fallen dead tree. This *F. fomentarius* covered by a trap (Fig. 3) was the only carpophore visibly infested by *K. tipuloides* in this area. The carpophore was situated at approximately 85 cm from the ground. The fallen dead tree was close to a small wet area and a vertical stump on which there were 11 *F. fomentarius* not containing any visible traces of the mucilaginous net, larvae or cocoons. The area surrounding the fallen tree was open to light (clearing > 100 m^2) and the ground cover was dense (> 30%) with tall grass growth.

The eclector traps E2 and E3 were situated on a dead standing tree trunk on which were growing 13 *F. fomentarius* carpophores visibly infested with cocoons. The infested carpophores of all sizes were growing all around the trunk at different heights from the ground, from 1.8 m up to 5 m. At a greater height we are not able to acertain whether the carpophores were infested. This trunk was standing close to sandstone cliffs in a dry area of the forest. Here, light only reached an area of less than 50 m^2. The ground cover did not exceed 30%.

3. Results

Seven specimens of *K. tipuloides* emerged during the two trapping periods 18.6.1999 to 2.7.1999 and 2.7.1999 to 16.7.1999. No other specimens were found in our traps after July 1999. The Diptera collection of the Musée national d'histoire naturelle of Luxembourg currently contains three males and four females of this species.

Site E1: 21.5.1999: 6 larvae observed. 18.6.1999 - 2.7.1999: 2 males and 1 female.

Site E2: 25.5.1999: cocoons observed. 2.7.1999 - 16.7.1999: 1 female.

Site E3: 25.5.1999: cocoons observed. 18.6.1999 - 2.7.1999: 1 female. 2.7.1999 - 16.7.1999: 1 male and 1 female.

L. Matile (France) and P. Chandler (Royaume Uni) confirmed our identification of the specimens captured as *K. tipuloides*.

4. Discussion

According to L. Matile (pers. comm.) and Santini (1982), the mature larvae are known to leave the carpophore and build their cocoon in or on the tree trunk or in the litter, within a radius of up to 5 m from the carpophore. However, when removing the traps, we observed that the larvae had made their cocoons within the mucilagenous net and not in the soil or in the litter placed inside the trunk eclector. In addition, observations on other infested *F. fomentarius*, not covered by a trap, revealed what was thought to be empty *K. tipuloides* cocoons within the net. Within our study area, *K. tipuloides* has only been found in approximately three different regions.

In general, the trunks containing the infested *F. fomentarius* were dead and exposed in all directions. We have not been able to establish the link between the presence

Fig. 2. Clothes hangers attached to tree and *Fomes fomentarius* (standing trunk).

of *K. tipuloides*, the position of the dead trees, the number, orientation, size and age of infested *F. fomentarius* and, the brightness and humidity of the different infested locations. Additionally, the areas in which *K. tipuloides* was found were far apart, sometimes up to 1 km. This may be due to a particular colonising technique employed by *K. tipuloides* whereby this species establishes a main population in one given area (here locations E2 and E3) and then it establishes expanding satellite populations (here location E1).

Further hypotheses explaining the rarity of this species may be the limited number of larvae that emerged (see Results, site E1). However, the accuracy of this hypothesis is doubtful, as the trap was not installed the day the larvae were observed (see site E1). Some mature larvae may have left the carpophore prior to constructing a cocoon and pupated further away (Santini 1982).

Other hypotheses include the patchy distribution of *K. tipuloides*, the absence of decaying wood around the infested *F. fomentarius* and the general climatic conditions of Luxembourg. In the Tuscan coastal woodlands of San Rossore, Migliarino Pisano and Macchia Luchese (Italy), where the climate is mediterranean, is known to complete four generations per year (Santini 1982). The first generation emerges at the end of April and the second generation at the end of June. Generations three and four emerge respectively at the beginning of September and at the end of October. On the other hand, in Finland, where only three specimens of *K. tipuloides* have been trapped (one male and one female on 19.7.1960, and one male on 14.7.1989), more than one generation per year is unlikely (Kaila & Ståhls 1990). The life span of *K. tipuloides* in Luxembourg is not known and further studies need to be carried out to establish whether this species could have more than one generation.

The species *K. tipuloides* is of particular interest to the faunistic inventory of the Schnellert as it is a bio-indicator of forests known to be “dead wood” forests (Speight

Fig. 3. *Fomes fomentarius* eclector trap (lying trunk).

1989). This saproxylic insect species can be used to "identify European forests of international importance with regards to nature conservation" (Speight 1989). Due to its rarity *K. tipuloides* can be found on the Finnish list of endangered species ("Red Data Book") (Anonymous 1986).

With regard to the rarity of *K. tipuloides* and according to many dipterologists (L. Matile pers. comm., Kaila & Ståhls 1990) interested in the family Keroplatidae, a forest inhabited by the species should be strictly protected.

Acknowledgements

We wish to thank M. Meyer (Musée national d'histoire naturelle Luxembourg) and M. Speight for inspiring us to look for *Keroplatus tipuloides*, P. Chandler for the identification of our specimens, L. Matile and L. Kaila for their help with regard to the ecology of *Keroplatus tipuloides* and the means with which this species could be trapped, P. Carlisle and M. Cardew for English spelling and grammar corrections, and E. Cardew for the photos taken with the digital camera.

References

Anonymous, 1986. - Uhanalaisten eläinten ja kasvien suojelutoimikunnan mietintö. II Suomen uhanalaiset eläimet. - Komiteamietinö 1985: 43, 466 pp. Helsinki. [Cited in: Ståhls, G. & L. Kaila, 1990. - *Keroplatus tipuloides* Bosc rediscovered in Finland (Diptera: Nematocera: Keroplatidae). - Notulae Entomologicae 69: 203-206.]

Biström, O. & R. Väisänen, 1988. - Ancient-forest invertebrates of the Pyhän-Häkki national park in Central Finland. - Acta Zool. Fennica 185: 1-69.

Hackman, W., 1980. - A check list of the Finnish Diptera. I. Nematocera and Brachycera (s.str.). - Notulae Entomologicae 60: 17-48.

Kaila, L., 1993. - A new method for collecting quantitative samples of insects associated with decaying wood or wood fungi. - Entomologica Fennica 4: 21-23.

Krivosheina, N. P. & B. M. Mamaev, 1988. - Family Keroplatidae. - In: *Catalogue of Palaearctic Diptera* (ed. A. Soós & L. Papp) 3: 199-210.

Matile, L., 1986. - L'Identité du "Ver de la Tipule de l'Agaric" de Reaumur, et notes taxonomiques sur les Keroplatus Palearctiques (Diptera, Mycetophiloidea, Keroplatidae). - Annls. Soc. Ent. Fr. (N.S.) 22 (3): 353-367.

Matile, L., 1990. - Recherches sur la systématique et l'évolution des Keroplatidae (Diptera, Mycetophiloidea). - Mémoires du Museum National D'Histoire Naturelle Zoologie 148: 1-672.

Santini, L., 1982. - Contributions to the knowledge of Italien fungus-gnats. II. Observations made in Tuscany on ethology of *Keroplatus tipuloides* Bosc. (Diptera, Mycetophilidae, Keroplatinae). - Frustula Entomol., N.S. 2 (15): 151-174. [in Italian with English summary]

Speight, M. C. D., 1989. - Les invertébrés saproxyliques et leur protection. - Sauvegarde de la nature, vol. 42, 77 p. Council of Europe Publishing, Strasbourg.

Ståhls, G. & L. Kaila, 1990. - *Keroplatus tipuloides* Bosc rediscovered in Finland (Diptera: Nematocera: Keroplatidae). - Notulae Entomologicae 69: 203-206.

Väisänen, R., 1982. - Vanishing and vulnerable Diptera of Finland. - Notulae Entomologicae 62: 111-121.