FIRST REPORT OF SIPHONAPTERA INFESTING *MICROTUS (MICROTUS) CABRERAE* (RODENTIA-MURIDAE-ARVICOLINAE) IN CUENCA, SPAIN

AND NOTES ABOUT THE MORPHOLOGIC VARIABILITY OF *CTENOPHTHALMUS (CTENOPHTHALMUS) APERTUS PERSONATUS* (INSECTA-SIPHONAPTERA-CTENOPHTHALMIDAE)

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Summary:

The fleas infesting *Microtus (Microtus) cabrerai* from three different areas of Cuenca province (Spain) have been studied. It is the first time that an ectoparasitological study of this badly known rodent has been done. Four Siphonaptera species have been detected: *Rhadinopsylla (Actenophthalmus) pentacantha*, *Peromyscopsylla spectabilis spectabilis*, *Nosopsyllus fasciatus* and *Ctenophthalmus (Ctenophthalmus) apertus personatus*, which was the most abundant species (26 males and 31 females of a total of 28 males and 35 females). Considering the great morphologic variability within the male processus basimerus ventralis (p.b.v.) of segment IX of *C. personatus* subspecies, three morphotypes have been recognised. The male polymorphism detected, would be the result of both host confinement and genetic selection acting on the parasite. It should be pointed out that *C. (C.) apertus personatus* is not narrowly host-specific, therefore further studies are required to clarify this taxonomic situation.

KEY WORDS : Siphonaptera, *Microtus (M.) cabrerai*, *Ctenophthalmus (C.) apertus personatus*, morphologic variability, Cuenca, Spain.

Résumé : PREMIÈRE OBSERVATION DE SIPHONAPTERA CHEZ *MICROTUS (MICROTUS) CABRERAE* (RODENTIA-MURIDAE-ARVICOLINAE) EN ESPAGNE ET NOTE SUR LA VARIABILITÉ MORPHOLOGIQUE DE *CTENOPHTHALMUS (CTENOPHTHALMUS) APERTUS PERSONATUS* (INSECTA-SIPHONAPTERA-CTENOPHTHALMIDAE)

Les puces des *Microtus (Microtus) cabrerai* capturés en trois stations différentes de la Province de Cuenca (Espagne) ont été récoltées. Il s'agit de la première étude sur les ectoparasites mal connus de ce rongeur. Quatre espèces de Siphonaptères ont été identifiées : *Rhadinopsylla (Actenophthalmus) pentacantha*, *Peromyscopsylla spectabilis spectabilis*, *Nosopsyllus fasciatus* et *Ctenophthalmus (Ctenophthalmus) apertus personatus* (26 mâles et 31 femelles de cette puce sur un total de 28 mâles et 35 femelles). En considérant la grande variabilité morphologique du processus basimeris ventralis (p.b.v.) du segment IX mâle de la sous-espèce *personatus*, trois morphotypes ont été reconnus. Le polymorphisme trouvé chez les mâles pourrait être le résultat conjoint du confinement de l'Hôte et de la sélection génétique agissant sur le parasite. Il faut, toutefois, relever que *C. (C.) apertus personatus* ne semble pas avoir une spécificité aussi étroite. Pour éclaircir ce problème taxonomique, des études complémentaires sont à faire.

MOTS CLÉS : Siphonaptera, *Microtus (M.) cabrerai*, *Ctenophthalmus (C.) apertus personatus*, variabilité morphologique, Cuenca, Espagne.

INTRODUCTION

The vole *Microtus (Microtus) cabrerai* (Thomas, 1901) (Muridae: Arvicolinae) is an Iberian endemic mammal which lives in isolated colonies and peculiar biotopes. This behaviour joint with its sparsely distribution in the Iberian peninsula makes difficult to locate and to study it.

Microtus (M.) cabrerai parasites, as a result of its hosts ecology, are subjected to the same confinement and are consequently not very well known. Therefore, studying this rodent's parasitofauna becomes very interesting since it allows observations on how both endemicity and isolation of this host acts over its qualitative and quantitative richness.

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As with other parasites, the difficulty in capturing and studying this host has been a disadvantage in knowing which species are parasitizing it. In this context, the Siphonaptera obtained from *Microtus (M.) cabrerai* coming from a colony living in Cuenca (Spain) represents the first study carried out in the Iberian Peninsula.

MATERIAL AND METHODS

The voles studied were taken from Valldemosillo, Pajarón and Grande, three different areas of Cuenca (Spain).

All Siphonaptera collected in this survey (28 males and 35 females) were kept in 70 % alcohol. Before being mounted in Canada balsam, specimens underwent both a clearing treatment with 20 % potassium hydroxide and a dehydrating process through a series of ethanol rinses of ascending concentration to 100 %.

The specific and subspecific determination of flea specimens was based on morphological characteristics of

Morphotype I. *Ctenophthalmus* (C.)
apertus personatus. Segment IX
of male

Morphotype I. *Ctenophthalmus* (C.)
apertus personatus. Phallosome
of male

Ctenophthalmus (C.) *apertus personatus*.
Segment IX of male. Teruel.
From Beaucournu & Launay, 1978

Ctenophthalmus (C.) *apertus personatus*.
Phallosome of male. Teruel.
From Beaucournu & Launay, 1990

Ctenophthalmus (C.) *apertus* spp. from Teruel:
A: *apertus apertus*; B-D: *apertus personatus*.
Variation of segment IX of male in type series.
From Beaucournu & Launay, 1978

Fig. 1. – *Ctenophthalmus* (C.) *apertus personatus*, segment IX and phallosome of male, from Cuenca and Teruel.

both segment IX and the phallosome for males and sternite VII for females (Beaucournu & Launay, 1990).

RESULTS AND DISCUSSION

Four flea species were collected: *Rhadinopsylla (Actenophthalmus) pentacantha* (Rothschild, 1897) (one female), *Ctenophthalmus (Ctenophthalmus) apertus personatus* (Beaucournu & Launay, 1978) (26 males and 31 females), *Peromyscopsylla spectabilis spectabilis* (Rothschild, 1898) (two females) and *Nosopsyllus fasciatus* (Bosc, 1800) (two males and one female). All four fleas species had been previously reported parasitizing other voles than *Microtus (M.) cabrerai* (*Microtus*, *Pitymys*, *Arvicola* and *Clethrionomys*), since they are not host specific parasites finding them on *Microtus (M.) cabrerai* was not unusual. Most of flea specimens were collected on *Microtus (M.) cabrerai* from Valldemosillo area (26 males and 35 females). Only two males of *C. (C.) apertus personatus* were

detected on two *Microtus (M.) cabrerai*, one of them in the Pajarón, the other in Grande.

The specific and subspecific determinations for females of both *Rhadinopsylla (A.) pentacantha* and *Peromyscopsylla spectabilis spectabilis* were based on the morphologic characteristics proposed by Beaucournu & Launay (1990). Thus, by sternum VII, spermatheca and its duct for the first species and by bristles on the anal stylet (only one ventro-lateral setae) for the second. Likewise, determination of the two males and one female of *Nosopsyllus fasciatus* was based on morphological characters; segment IX for males and both sternum VII and the number of lateral plantar bristles of the metatarsus of the female.

The most abundant flea on *Microtus (M.) cabrerai* was *C. (C.) apertus personatus* (26 males and 31 females), hitherto known from the specimens studied by Beaucournu & Launay (1978), collected on *Microtus (Pitymys) duodecimcostatus*, *Microtus arvalis*, *Arvicola sapidus*, *Apodemus sylvaticus* and *Crocidura russula* coming from Teruel (Spain). Consequently, finding this taxon in three

Morphotype II

Morphotype III

Fig. 2 – *Ctenophthalmus (C.) apertus*. Morphologic variability within the male processus basimerus ventralis (p. b. v.).

Ctenophthalmus (C.) apertus gilcolladoi.
Segment IX of male. Madrid.
From Hopkins & Rothschild, 1966

Ctenophthalmus (C.) apertus meylani.
Segment IX of male. Ronda, Málaga.
From Beaucournu & Launay, 1990

Fig. 3 – Sternite VII of female. A: morphotype I; B: morphotype II; C: morphotype III. A': *C. (C.) apertus personatus* from Albarracín, Teruel Spain (Beaucournu & Launay, 1990). B': *C. (C.) apertus gilcolladoi* from Segovia Spain (Beaucournu & Launay, 1990). C': *C. (C.) apertus meylani* from Sierra Nevada, Granada Spain (Beaucournu & Launay, 1990).

different areas of Cuenca represents an important faunistic contribution since it is the third time that it has been reported in the Iberian Peninsula, distant geographically from where it was detected, and on a new host. The large number of specimens obtained during this study allowed us to carry out a study on their intraspecific morphologic variability and to compare them with those from Teruel. Considering the polymorphism within the male processus basimerus ventralis (p. b. v.) of segment IX from Cuenca, there should be recognised the existence of three different morphotypes.

Morphotype I (Fig. 1) includes most of males obtained (17/26). All of them have a higher than wider p. b. v. bearing two quite acuminate lobes as in Beaucournu & Launay (1978, 1990) subspecies description, which makes the difference with nominal subspecies (Fig. 1A, B-D). However, in the Cuenca specimens the two lobes of p. b. v. are very variable in shape and differing morphologically from the type one.

Morphotype II (Fig. 2) includes five of the 26 males. Their p. b. v., quite similar in shape to those shown by *C. (C.) apertus gilcolladoi*, is digitate and narrower than in *C. (C.) apertus apertus*.

Morphotype III (Fig. 2) includes four of the 26 males. The shape of their p.b.v. tends to be similar to those of *C. (C.) apertus meylani*; that means conical.

Most of 31 females observed have their sternum VII similar in shape to those described by Beaucournu & Launay (1978) in type series (Fig. 3A, A'). However, polymorphism within the female sternum is notorious and, in some specimens, tends toward *C. (C.) apertus gilcolladoi* in shape (Fig. 3B, B') or *C. (C.) apertus meylani* (Fig. 3C, C').

Seven different subspecies of *Ctenophthalmus (C.) apertus* have been described in Spain: *C. (C.) apertus apertus*, *C. (C.) apertus allani*, *C. (C.) apertus azevedoi*, *C. (C.) apertus gilcolladoi*, *C. (C.) apertus gosálbezi*, *C. (C.) apertus meylani* and *C. (C.) apertus personatus*. Previous studies have demonstrated that all of them have a well defined morphology and their own geographic distribution. Thus, *apertus apertus* is present in Barcelona, Gerona, Huesca, Lérida, Tarragona and Teruel; *apertus allani* is present in León, Oviedo, Santander and Zamora; *apertus azevedoi* is present in Zamora; *apertus gilcolladoi* is present in Ávila, Badajoz, Madrid, Salamanca, Segovia, Valladolid and Zamora; *apertus gosálbezi* in Lugo and Orense; *apertus meylani* in Córdoba, Granada, Jaén and Málaga; and *apertus personatus* is found in Pamplona (one male) and Teruel (Fig. 4).

The morphological studies of several specimens of each “*apertus*” subspecies evidenced great variability in male modified abdominal segments as well as in

- C. (C.) apertus apertus* ●
C. (C.) apertus allani ■
C. (C.) apertus azevedoi ▲
C. (C.) apertus gilcolladoi ►
C. (C.) apertus gosálbezi ▼
C. (C.) apertus meylani ◄
C. (C.) apertus personatus ◆

Fig. 4. – Seven different subspecies of *Ctenophthalmus (C.) apertus* described in Spain.

female sternum VII (Hopkins & Rothschild 1966; Beauclournu & Launay 1978, 1990). Some of this morphological distinctness is possibly due to interbreeding of two subspecies which have sympatric distribution, but in most cases, they are just different morphotypes as a consequence of the wide morphologic intraspecific “*apertus*” variations.

In this study, the males and females from Cuenca displayed a wide polymorphism in the male modified abdominal segments and less variation in female sternum VII which are similar to any other male and female “*apertus*” subspecies from other Spanish areas. Despite p. b. v. differences within the Cuenca and Teruel specimens, in our opinion, neither interbreeding forms nor new subspecies are a good explanation. Host confinement is not a good argument for the existence of interbreeding forms between *C. (C.) apertus personatus* and other subspecies (*apertus gilcolladoi* or *apertus meylani*) parasitizing other voles than *Microtus (M.) cabrerai* in more or less contiguous areas. The three male morphotypes of *C. (C.) apertus personatus* from *Microtus (M.) cabrerai* in Cuenca would be, in our understanding, the result of both host confinement and genetic selection acting on the flea rather than any other explanation.

In order to clarify this taxonomic situation further studies on small mammals other than *Microtus (M.) cabrerai* as well as in other adjacent areas are required.

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