On two African polytypic species of Leptopsylla (Siphonaptera)

FRANS G. A. M. SMIT

The known forms of Leptopsylla Roths. 1911 can be divided into 3 groups :

a) with 3 spines in the genal ctenidium,

b) with 4 spines in the genal ctenidium,

c) with 6 spines in the genal ctenidium.

Until recently non-Nearctic species with 2 genal spines were also included in this genus, but now these are all incorporated in the genus *Peromyscopsylla* Fox 1939, the main difference from *Leptopsylla* not being the number of genal spines, but the point of insertion of the fore coxa on the prosternum : in *Leptopsylla* the fore coxa is inserted *below* the apex of the prosternum (Fig. 1), in *Peromyscopsylla* at the apex of the prosternum (Fig. 2).



Fig. 1. Attachement of fore coxa to prosternum in Leptopsylla segnis Schönherr, φ . Fig. 2. The same in *Peromyscopsylla silvatica silvatica* Meinert, φ .

The present paper deals only with species of Leptopsylla which have 3 spines in the genal ctenidium. This group consists of 3 polytypic species, namely: L. Taschenbergi, L. Algira and L. Aethiopicus^{*}). Of these 3 species, only L. Algira and L. Aethiopicus are dealt with in this paper. These two species can be distinguished from L. Taschenbergi as follows:

^{*)} In order to avoid confusion between monotypic species (*L. taschenbergi* and *L. aethiopicus* were considered such until now) and polytypic species I write the above trivial names with a capital, to indicate the species as a whole, or polytypic species or Rassenkreis; for shortness sake I call it a species here.



Fig. 3. Leptopsylla taschenbergi taschenbergi Wagner, & (from N. Caucasus): paramere.



Fig. 4. Leptopsylla taschenbergi taschenbergi W., 9 (from Korab Mts., Jugoslavya): antepygidial setae.

 \diamond Paramere strongly bent, boomerang-shaped (Fig. 3). \heartsuit Without a broad interspace between the two groups of antepygidial setae on each side (Fig. 4) L. Taschenbergi \diamond Paramere more or less straight (Figs. 10, 11, 21, 22, 23). \heartsuit With a broad interspace between the two groups of antepygidial setae on each side (Figs. 31, 33) L. Algira and A. Aethiopicus

Including the two new subspecies, described below, both L. Algira and L. Aethiopicus consist of 3 subspecies, of which one, L. algira popovi Wagner & Argyropulo 1934, does not occur in Africa, but in Azerbaijan^{*}). Here follow the description of two new subspecies of Leptopsylla, each of which is represented by a series in the N. C. Rothschild Collection of Siphonaptera.

^{*)} L. Taschenbergi, a European species which extends into North Africa, also consists to our present knowledge of 3 subspecies: L. t. taschenbergi Wagner 1898, L. t. amitina J. & R. 1914 and an undescribed one, found in Eastern Algeria, a description of which by Dr K. JORDAN is in the press.

Leptopsylla algira tuggurtensis new subspecies

Diagnosis: Separable from both the other subspecies (L. a. algira J. & R. 1912 and L. a. popovi W. & A. 1934) in the male by the relatively very short and broad processes of the clasper and in the female by the shape of the posterior margin of the 7th sternum.

Description : 3 The fixed and movable processes of the clasper are both relatively short and broad (Figs. 5, 6 and 7). The movable process is at most $2\frac{1}{2}$ times as long as broad at its widest point and is much more evenly crescentic than is the case in either of the other two subspecies (cf. Figs. 8 and 9). The seta on the posterior margin of the fixed process of the clasper is inserted on the lower half of this process, as in L. a. popovi, while this seta is placed much more apically in L. a. algira (Figs. 6, 7 and 8, 9). Ventral margin of the clasper almost flush with that of the manubrium (Fig. 5), while this margin is more or less rounded in L. a. algira, and strongly rounded in L. a. popovi. The ninth sternum (Fig. 10) is very like that of the other two subspecies; I can only compare it with that of L. a. algira (Fig. 11), as L. a. popovi is not represented in our collection and WAGNER's drawing of it is not very detailed. The forked setiferous lobe of the ninth sternum (Fig. 10) agrees with that of L. a. algira (Fig. 11), it also has a bifurcate or (more usually) trifurcate seta at the apex of its dorsal process. The so-called



Fig. 5. Leptopsylla algira tuggurtensis n. ssp. & (from Touggourt): genitalia and 8th sternum.





paramere, which is intimately connected with the apical lobe of the ninth sternum, differs in the two subspecies, although in both subspecies a certain degree of individual variation can be observed. The ventral arm of the paramere in the present form is narrowed in its middle part and spatulate at the apex, while in *L. a. algira* this arm is more of an even width. For differences in the two lobes of each paramere of the two subspecies see Figs. 10 and 11.

 \circ Sinus of the posterior margin of the 7th sternum (Fig. 12) rather shallow, the lobe above the sinus well-marked in all the specimens examined, but very much smaller than that of *L. a. algira* (Fig. 13); the lobe is not longer than basally broad and usually has a rather sharp-pointed apex.

Material examined :

Touggourt (Algeria), from Mus musculus algirus, III-1920. Coll. K. Jordan and N. Ch. Rothschild. Male holotype and 7379 paratypes, plus many 33 and 99 in alcohol.



Fig. 10. Leptopsylla algira tuggurtensis & (from Touggourt): setiferous apical lobe of 9th sternum and paramere.



Fig. 11. Leptopsylla algira algira J. & R. & (from Alger): setiferous apical lobe of 9th sternum and paramere.



Fig. 12. Leptosylla algira tuggurtensis Q (1-6 from Touggourt, 7 and 8 from Djama, 9 from Biskra): spermatheca, sternum VII and variation in posterior margin of sternum VII.



Fig. 13. Leptopsylla algira algira J. & R. ♀ (1 and 2 from Hammam-Rirha, 3-5 from Alger): spermatheca, sternum VII and variation in posterior margin of sternum VII.

Biskra (Algeria), from Mus musculus deserti^{*}), 31-III-1914. Coll. L. W. Rothschild and E. Hartert. 1 Q. Djama^{**}) (Algeria), from Dipodillus campestris^{***}), II-1920.

Coll. K. Jordan and N. Ch. Rothschild. 2 99.

The known distribution is within the low lying Tuggurt (also

**) This particular Djama is between Biskra and Touggourt, and is not to be confused with a place of the same name in Tunisia.

***) Dipodillus campestris = Gerbillus campestris.

^{*)} Mr. G. H. E. HOPKINS kindly pointed out to me that this host-name is presumably a lapsus calami or a mistranscription, Mus deserti being a separate species found in South Africa. Was the host Jaculus jaculus deserti (formerly known as Dipus deserti)?



•= LEPTOPSYLLA ALGIRA ALGIRA J.+ R.

X=LEPTOPSYLLA A. TUGGURTENSIS N.SSP.

Fig. 14. Map of part of Algeria, showing the distribution of two subspecies of *Leptopsylla Algira*.

spelled Touggourt) district of Algeria, separated from the known range of L. a. algira by the Atlas Mountains (Fig. 14).

Leptopsylla aethiopicus nakuruensis new subspecies

Diagnosis: Separable from the other two subspecies (L. a. aethiopicus Rothsch. 1908 and L. a. thalia De Meillon 1949) by the movable process of the clasper being straighter. The female is separable from that of L. a. thalia by the shape of the posterior margin of the 7th sternum, but is inseparable from that of L. a. aethiopicus.

Description : δ The setae at the posterior margin of the movable process of the clasper (Figs. 15, 16 and 17), which is straighter than in the other two subspecies, form one continuous row, whereas they are separated into two groups by a wide gap in *L. a. aethiopicus* (Figs. 18 and 19). The seta on the posterior margin of the fixed process of the clasper (Figs. 15, 16 and 17) is placed somewhat more towards the apex than is the case in the other two subspecies (Figs. 18, 19 and 20). The setiferous lobe of the ninth sternum (Fig. 21) is much narrower in its middle part and its dorsal process is relatively longer than it is in *L. a. aethiopicus* (Fig. 22) and *L. a. thalia* (Fig. 23). Paramere (Fig. 21) quite different from that of *L. a. aethiopicus* (Fig. 22) and more like that of *L. a. thalia* (Fig. 23). φ Posterior margin of the 7th sternum without any sinus (Fig. 24), resembling that of *L. a. aethiopicus* (Fig. 25), but somewhat more strongly bent in this new subspecies; otherwise the female is indistinguishable from that of *L. a. aethiopicus*.

Material examined :

All specimens are from Nakuru (Kenya) and were received from the Medical Research Laboratories at Nairobi.

From Rattus rattus, 19-IX-1927. Male holotype and 1 $\stackrel{\circ}{\circ}$ 2 $\stackrel{\circ}{\circ}$ paratypes.



Fig. 15. Leptopsylla aethiopicus nakuruensis n.ssp. 3 (from Nakuru): genitalia and 8th sternum.

From Mastomys coucha^{*}), 23/24-VI-1927. 2 $\varphi \varphi$. From Aethomys chrysophilus^{**}). 1 φ . From Lophuromys aquilus. 1 φ .

Although this new subspecies is in several respects intermediate between L. a. aethiopicus and L. a. thalia, and is readily distinguishable from both in the male and from the latter in the female, it is apparently closer related to L. a. thalia than to L. a. aethiopicus.

Recapitulating, the two polytypic species of *Leptopsylla* dealt with in this paper, are known to comprise :

L.	algira	algira J. & R. 1912	L.	aethiopicus	aethio	picus	5 R.	1908
L.	algira	tuggurtensis m.	L.	aethiopicus	nakuri	uens	is m	
L.	algira	popovi W. & A. 1934	L.	aethiopicus	thalia	De	M.	1949

L. a. aethiopicus Roths. 1908 was formerly known as a full species, so was L. a. thalia De Meillon 1949, but it is now clear that they both are subspecies of L. Aethiopicus. This can be seen from the comparison of differences between both species, as given below.

^{*)} Mastomys coucha = Rattus coucha.

^{**)} Almost certainly a misdetermination of Aethomys kaiseri. (Information kindly supplied by Mr. G. H. E. HOPKINS, who made the original determination).

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Figs. 16 and 17. Leptopsylla aethiopicus nakuruensis & (from Nakuru): clasper.
Figs. 18 and 19. Leptopsylla aethiopicus aethiopicus R. & (fig. 18 from Kilimanjaro, fig. 19 from Bufundi, Kigezi, Uganda): clasper.



Fig. 20. Leptopsylla aethiopicus thalia De M. & (paratype, from Matopos, S. Rhodesia): clasper.



Fig. 21. Leptopsylla aethiopicus nakuruensis & (from Nakuru): setiferous apical lobe of 9th sternum and paramere



Fig. 22. Leptopsylla aethiopicus aethiopicus R. 3 (from Lubero, Kivu, Belgian Congo): setiferous apical lobe of 9th sternum and paramere.



Fig. 23. Leptopsylla aethiopicus thalia De M. & (paratype, from Matopos, S. Rhodesia)): setiferous apical lobe of 9th sternum and paramere.



Fig. 24. Leptopsylla aethiopicus nakuruensis Q (from Nakuru): spermatheca, sternum VII and variation in posterior margin of sternum VII.



Fig. 25. Leptopsylla aethiopicus aethiopicus R. φ (1-3 from Kibonoto, Kilimanjaro, 4-6 from Blukwa, Belgian Congo): spermatheca, sternum VII and variation in posterior margin of sternum VII.





Differences between the polytypic species Leptopsylla Algira and Leptopsylla Aethiopicus.

Geographic distribution : L. Algira: North of the Sahara.

L. Aethiopicus : South of the Sahara.

In respect of the first spiniform seta above the two frontal spiniforms, there is no marked difference between the two species, but this seta seems to shorten proceeding southwards. (Fig. 27 A—E).

The internal infratubercular incrassations of the head obviously become broader southwards (Fig. 27 A-E).

Though there is some variation, the width of the genal process above the first genal spine is in :

L. Algira : very small (Fig. 28), at the base near the eye practically nil. L. Aethiopicus: broader (Fig. 29), the base near the eye does not touch the dorsal margin of the upper spine.

Differences in antepygidial setae are striking in the females, not so in the males, which however also show a very distinct contrast :

L. Algira ϑ : without a dorsal process of any significance between the groups of antepygidial setae on the left and right sides (Fig. 30).

L. Algira φ : the upper seta of the lower pair of antepygidial setae on each side about half as long as the lower seta (Fig. 31).

The 7th sternum of φ : *L.* Algira: with additional hairs before the row of setae; posterior margin with a well-developed sharp-pointed dorsal lobe (Figs. 12 and 13).

The 8th sternum of δ : L. Algira : blunt, dorsal margin convex (Fig. 5).

Clasper and manubrium of δ : L. Algira: fixed process of claspar digitoid (Figs. 5, 6, 7, 8 and 9); manubrium at most as long as body of clasper plus fixed process (Fig. 5). (For method L. Aethiopicus δ : with a conspicuous dorsal process between the groups of antepygidial setae on the left and right sides (Fig. 32).

L. Aethiopicus φ : the upper seta of the lower pair of antepygidial setae on each side about as long as the lower seta (Fig. 33).

L. Aethiopicus: with a single row of setae; posterior margin without a well-developed dorsal lobe. (Figs. 24, 25 and 26).

L. Aethiopicus : pointed, dorsal margin concave (Fig. 15).

L. Aethiopicus: fixed process of clasper more triangular, blunt Figs. 15, 16, 17, 18, 19 and 20); manubrium about twice as long as body of clasper plus

of measurement see	Fig. 34):
the ratio is in :	
L. a. algira	0.8 : 1
L. a. tuggurtensis	— 1:1
L. a. popovi	- 0.9 : 1

Setiferous apical lobe of 9th sternum δ : L. Algira (Figs. 10 and 11): L. Algira apical seta of dorsal process is and 22 bi- or trifurcate. Dorsal margin dorsal dorsal dorsal rather straight with two angles, curved therefore partly vertical; dorsal cess process almost thrice as long as ventral one; few hairs on the especial lobe; dorsal and ventral arms whole much stronger marked than in L. Alg. L. Aethiopicus.

fixed process (Fig. 15): the ratio is in : L. a. aethiopicus -2 : 1 L. a. nakuruensis -1.7 : 1 L. a. thalia -2 : 1

L. Aethiopicus (Figs. 21, 22 and 23): a normal apical seta on dorsal process. Dorsal margin curved irregularly, dorsal process about twice as long as ventral one; more hairs on lobe, especially dorsally. On the whole less specialized than in L. Algira.

Apex of ventral arm of paramere : L. Algira : rather blunt.

L. Aethiopicus : more pointed.

Key to the known African subspecies of Leptopsylla Algira and Leptopsylla Aethiopicus.

1.	ð ð
	φ φ
2.	Without a conspicuous process dorsally between the two groups
	of antepygidial setae on the two sides (Fig. 30): L. Algira 3
-	With this conspicuous process (Fig. 32): L. Aethiopicus 4
3.	Movable process at most $2\frac{1}{2}$ times as long as broad at widest
	point; seta on posterior margin of fixed process of clasper at-
	tached in lower half of process (Figs. 6 and 7). Eastern Algeria
	algira tuggurtensis
	Movable process at least thrice as long as broad at widest
	point; seta on posterior margin of fixed process of clasper at-
	tached in upper half of process (Figs. 8 and 9). Western Algeria
	algira algira
4.	A wide interspace between the 3rd and 4th posterior setae of
	the movable process (Figs. 18 and 19). Central and East Africa
	This interprete about the same as these between the athen athen
	the set of forming a continuous new (Figs 16, 17 and 20)
5	Moushla process rather straight (Figs. 16 and 17) East Africa
5.	iviovable process father straight (Figs. 10 and 17). East Africa
	Movable process strongly bent in lower half (Fig 20) South
	Africa aethionicus thalia
6.	Upper antepygidial seta of lower group about half as long as
	lower one (Fig. 31): L. Algira
	Upper antepygidial seta of lower group almost as long as lower
	one (Fig. 33): L. Aethiopicus 8
7.	Posterior margin of 7th sternum with a very deep sinus and the

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Fig. 27. Part of frons of: A. L. a. algira & (from Alger); B: L. a. tuggurtensis & (from Touggourt); C: L. a. aethiopicus & (from Lubero, Kivu, Belgian Congo); D: L. a. nakuruensis & (from Nakuru); E: L. a. thalia & (from Matopos, S. Rhodesia).



Fig. 28. Anterior part of head of Leptopsylla algira algira J. & R. A (from Alger). Fig. 29. The same of Leptopsylla aethiopicus aethiopicus R. A (from Kibonoto, Kilimanjaro).



Fig. 30. Antepygidial setae of Leptopsylla algira algira J. & R. ♂ (from Alger).
Fig. 31. Antepygidial setae of Leptopsylla algira algira J. & R. ♀ (from Hammam-Rirha). Fig. 32. Antepygidal setae af Leptopsylla aethiopicus aethiopicus R. ♂ (from Kibonoto, Kilimanjaro). Fig. 33. Antepygidial setae of Leptopsylla aethiopicus aethiopicus R. ♀ (from Bufundi, Kigezi, Uganda).



Fig. 34. Outline of manubrium and clasper of Leptopsylla aethiopicus aethiopicus R., showing method of measurement of both. A = length of manubrium. B =length of clasper. In this subspecies A:B = 2:1.

British Museum (Natural History), The Zoological Museum, Tring (Herts.) July 1950.



Smit, F. G. A. M. 1951. "On two African polytypic species of Leptopsylla (Siphonaptera)." *Tijdschrift voor entomologie* 93, 25–40.

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