REDESCRIPTION AND BIOLOGY OF THE MITE *ACANTHOPHTHIRIUS POLONICUS* HAITLINGER 1978, PARASITIC ON THE POND BAT, *MYOTIS DASYCNEME* (BOIE, 1825) (PROSTIGMATA: MYOBIIDAE)

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----- ABSTRACT—*Acanthophthirius polonicus* is redescribed in all stages. This mite appears to be very common in the fur of the pond bat, without causing any visible injury to the skin of the host. The whole lifecycle of the mite is completed on the bat. -----

INTRODUCTION

At least four more or less separated populations of the pond bat (*Myotis dasycneme*) exist in Europe (Sluiter et al. 1971). This bat has an unusual biology. The Benelux-Germany population can be found in winter in natural and artificial caves in Belgium, the Dutch province of Limburg and in Germany. In summer the whole population is concentrated in the Dutch province of Friesland, where the females live in a few breeding colonies, while the males live a solo existence (Sluiter et al. 1971, Voûte 1972).

Parasites of the pond bat have not previously been studied on a large scale. During an investigation in summer and winter resting habitats of the pond bat in The Netherlands, a high number of specimens of the family Myobiidae were collected. About 300 of the myobiids collected, appear to belong to the species *Acanthophthirius polonicus* Haitlinger 1978, from which, until now, only one female specimen was known from a pond bat in Lower Silesia (Poland). The authors also collected two specimens of *Pteracarus minutus daubentoni* Dusbábek, which were probably accidental parasites aquired from *Myotis daubentoni* using the same cave as a winter habitat. Earlier 6 specimens of *A. emarginatus* (Dusbábek) were reported from a pond bat of the Benelux-Germany population (Fain 1976). No other myobiids were reported from pond bats (Anciaux de Faveaux 1971, 1976).

REDESCRIPTION OF *ACANTHOPHTHIRIUS POLONICUS* HAITLINGER FEMALE—Body elongated; in 5 specimens length of idiosoma 544-572μ, width 264-293 μ; integument transversely striated but areas between d4 and d5, around the ventral sclerites, near ic2, ic3, ic4, behind cxI 1 and 2, and l5 smooth, while a very finely striated area exists posterior of cxI 1 and 2; vi, ve, sci, sce, d1, d2, d3, l1, l2 expanded and striated; d4, d5, l4, l5, g1-5, ic2-4 normal; vulvar lobes large and curved (Fig. 1A); two pairs of normal anal setae present; on the ventral side ic2 and ic3 long, (in 5 specimens 92-120 μ and 91-105μ respectively), other ventral setae much shorter, never reaching half the length of ic2 or ic3; two more or less bilobate sclerites present (Fig. 1B) between ic4 and g2; chaetotaxy of the legs (I-IV): coxa 2-3-0-1, trochanter 3-3-3-3, femur 5-5-3-3, genu 8-6-6-6, tibia 5-6-6-6, tarsus 5-7-6-6; tarsal claws (I-IV) 1-2-2-2. For more outside measurements see table 1.

MALE (Fig. 2)—Body elongated; in 5 specimens length of idiosoma 432-515μ, width 217-255μ; integument transversely striated, areas between ic4, ic1, and cxI, anterior of ic2 and l5 smooth, the area posterior of cxI 1 and 2 is finely striated; ve, sci, sce, d1, d2, l1 expanded and striated, other body setae normal; genital plate very asymmetrical, only the left posterior lobe developed; genital plate situated slightly in front of d1; d1 not on one line; penis in one specimen 183μ long; on the ventral side ic 2 92-120μ long (in 5 specimens), other ventral setae much shorter, never reaching 1/3 of the length of ic 2;

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TABLE 1.—Means and ranges of some outside measurements of *Acanthophthirius polonicus* (5 specimens were measured unless indicated otherwise), and comparison with the measurements given by Haitlinger (1978) for one female mite.

variable	measurements in μ						
	female of Haitlinger	females	males	tritonymphs	deutonymphs	protonymphs	larvae
idiosomal length	550	550 (544-572)	483 (432-515)	419 (407-439)	269 (260-354)	277 (237-293)	235 (227-237)
idiosomal width	344	274 (264-293)	236 (217-255)	203 (192-217)	158 (133-185)	132 (121-136)[a]	106 (102-108)
length ve	115	136 (120-152)	132 (120-145)[a]	-	-	-	-
length vi	66	66 (64-69)	6 (5-8)[a]	50 (43-57)	39 (33-49)	21 (19-28)	8 (6-10)
length sce	180	192 (182-207)	187 (138-225)	76 (55-96)	41 (36-51)	22 (17-26)	8 (7-10)
length sci	93	106 (99-109)	45 (41-50)	106 (99-115)	89 (83-101)	70 (63-85)	39 (33-51)
length d1	72	82 (73-89)	58 (51-66)	53 (39-67)	25 (18-39)	13 (9-20)	13 (13-13)
length d2	66	80 (78-83)	86 (75-91)	31 (25-36)	20 (13-26)	11 (9-14)	13 (12-13)
length d3	79	85 (80-94)	?	25 (20-29)[a]	16 (13-20)	12 (11-12)	-
length d4	36	37 (31-43)	?	15 (13-23)	10 (6-11)	9 (7-10)	12 (11-13)
length d5	*	20 (18-22)	?	10 (10-11)	-	-	-
length l1	230	220 (201-243)	213 (182-228)	105 (98-114)	51 (49-53)[a]	19 (14-26)	14 (13-14)
length l2	70	86 (80-93)	?	26 (20-34)[a]	16 (12-26)	11 (10-13)	13 (12-13)[a]
length l3	36	37 (28-41)[a]	?	22 (19-29)	12 (11-16)	-	12 (11-12)
length l4	36	43 (38-51)	35 (26-44)	14 (12-16)	10 (8-11)	12 (11-12)	-
length l5	*	444 (413-469)	469 (399-517)	240 (218-253)[b]	198 (184-217)[a]	145 (131-161)[a]	127 (120-131)[a]
length ic1	26	11 (9-12)	10 (9-11)	9 (8-10)	7 (6-9)	6 (6-7)	-
length ic 2	88	105 (92-120)	112 (91-131)	43 (34-58)	-	-	-
length ic 3	82	97 (91-105)	13 (13-14)	-	-	-	-
length ic 4	26	27 (25-33)	25 (19-35)	-	-	-	-

* measurement not given by Haitlinger.
? these five setae could not be identified among the 2 pairs present.
a only four measurements could be taken due to missing setae.
b only three measurements could be taken due to missing setae.
\- character not present in this stage.

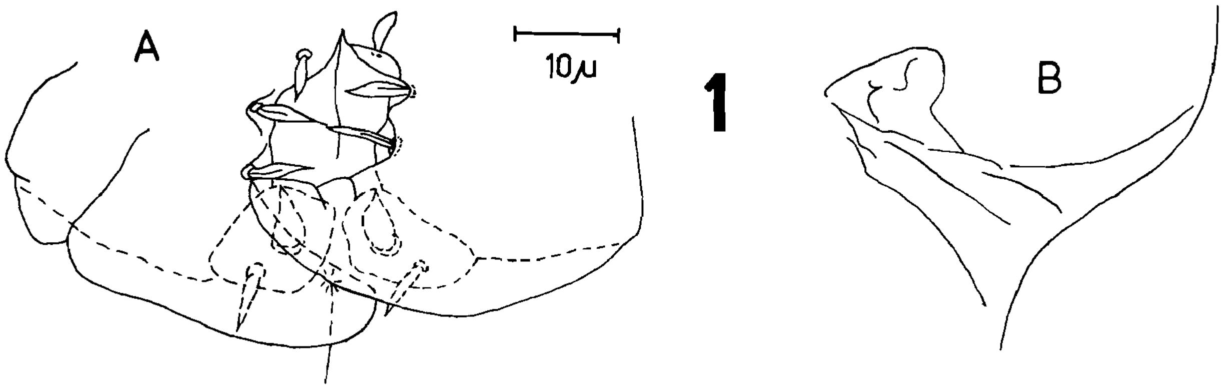

Fig. 1: Some details of the female of *A. polonicus* – A, Vulvar lobes; B, the left sclerite.

chaetotaxy of the legs (I-IV): coxa 2-3-0-1, trochanter 3-3-3-3, femur 5-5-3-3, genu 6-5-6-6, tibia 5-6-6-6, tarsus 5-5-6-6; tarsal claws (I-IV) 1-2-2-1. For more outside measurements see table 1.

TRITONYMPH—Body elongated; in 5 specimens length of idiosoma 407-439μ, width 192-217μ; integument transversely striated but ventrally a small longitudinally striated area exists on the anterior half of the body; vi, sci, sce, l 1 and d 1 expanded and striated, other body setae (d 2-5, l2-5, ic l-2) normal; cxI 1 and 2 expanded; chaetotaxy of the legs (I-IV): coxa 2-0-0-1, trochanter 0-1-1-1, femur-genu (4 + 4)-5-2-2, tibia 5-6-5-5, tarsus ?-6-6-6; tarsal claws (I-IV) 1-1-1-1. For more outside measurements see table 1.

DEUTONYMPH—Body elongated; in 5 specimens length of idiosoma 260-354μ, width 133-185μ; integument as in tritonymph; following body setae are present, vi, sci, sce, d1-4, l 1-5, ic l; cxI expanded; chaetotaxy of the legs (I-IV): coxa 1-2-0-1, trochanter 0-1-1-0, femur-genu (4 + 4)-4-2-1, tibia 4?-6-5-4, tarsus ?-6-6-6; tarsal claws (I-IV) 1-2-1-1. For more outside measurements see table 1.

PROTONYMPH—Body elongated; length of idiosoma 237-293μ (in 5 specimens), width 121-136μ (in 4 specimens); integument as in tritonymph; following body setae are present, vi, sci, sce, d1-4, l1, l2, l4, ic l; cxI expanded; chaetotaxy of the legs (I-IV): coxa 1-1-1-0, trochanter 0-0-0-0, femur-genu (3 + 4)-3-1-0, tibia 4?-5-4-4, tarsus ?-6-6-6; tarsal claws (I-IV) 1-2-1-1. For more outside measurements see table 1.

LARVA (Fig. 3)—Body elongated; in 5 specimens length of idiosoma 227-237μ, width 102-108μ; integument as in tritonymph; body setation strongly reduced, all hairs normal, on the ventral side 15 present, on the dorsal side vi, sci, sce, d 1, d2, d4, l1, l2, l3, ai and ae present; chaetotaxy of the legs (I-III): coxa 1-0-0, trochanter 0-0-0, femur-genu (2 + 5)-2-0, tibia 4?-5-4, tarsus ?-6-6; tarsal claws (I-III): 1-1-1. Fore more outside measurements see Table 1.

EGG AND PRELARVA (Fig. 4)—Elongated; eggs fastened to the hairs of the host by means of a capsule, not by fine threads as in *Cheyletiella*; chorion smooth, not striated or sculptured; length of egg (range of 4 measurements) 262-287μ, width (range of 4 measurements) 93-103μ; prelarva striated transversely, with rudimentary gnathosoma; length of prelarva (range of 4 measurements) 226-231μ, width (range of 4 measurements) 79-101μ.

Locality of material used in this redescription: 65 females, 9 males, 31 tritonymphs, 28 deutonymphs, 25 protonymphs, 35 larvae, were collected from 1 male *Myotis dasycneme*,

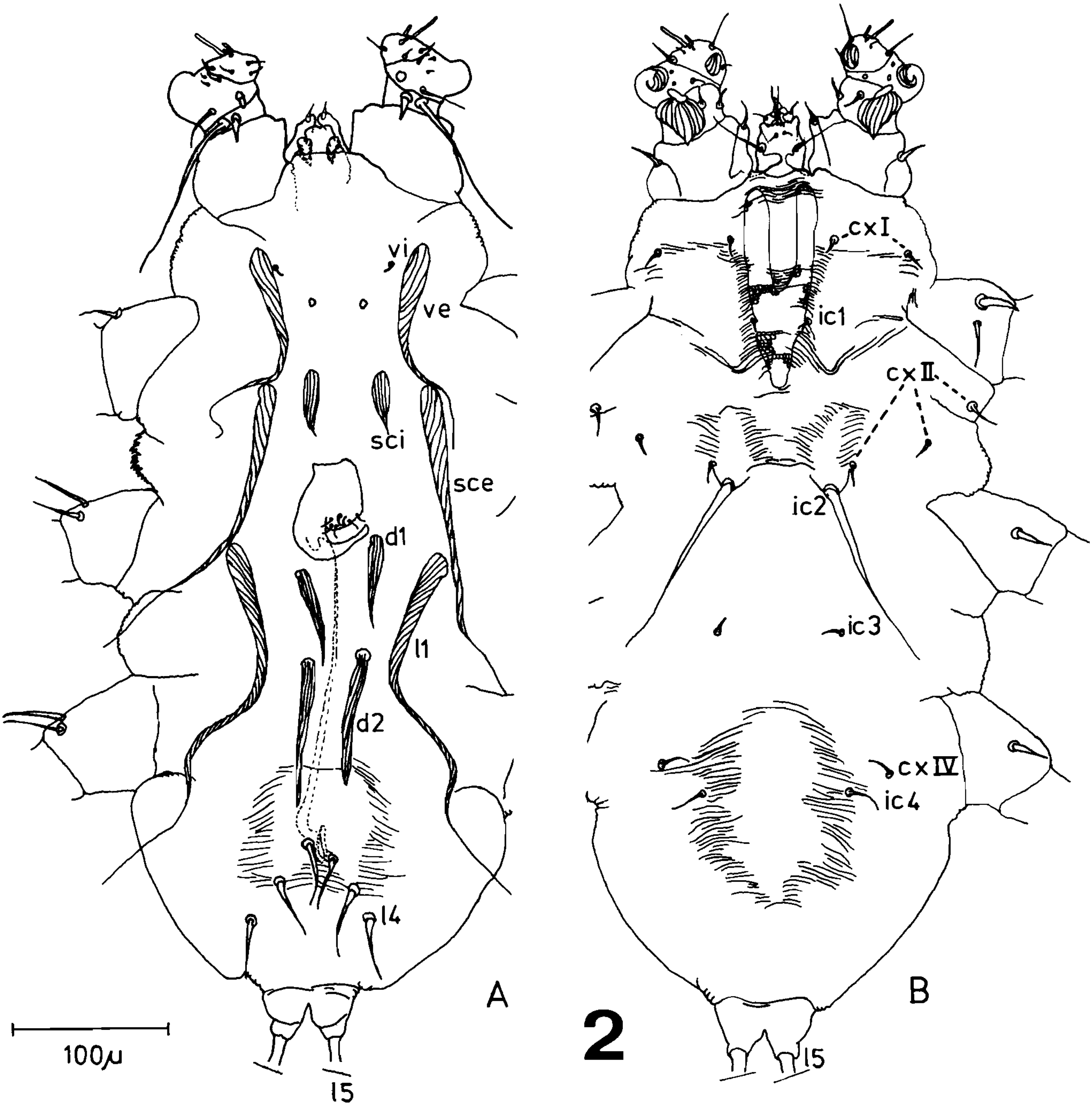

Fig. 2: The male of *A.polonicus* –A, dorsal view; B, ventral view.

preserved in alcohol under registration number 12295 in the Rijksmuseum voor Natuurlijke Historie in Leiden (The Netherlands). This bat had been collected on December 11, 1952 in the "leraarsgrot" in Houthem, Southern-Limburg, The Netherlands.

TAXONOMICAL DISCUSSION

Although *A.polonicus* has been described only last year, the existence of a specific myobiid mite species on the pond bat was to be expected even earlier after the evolutionary studies of Fain (1977).

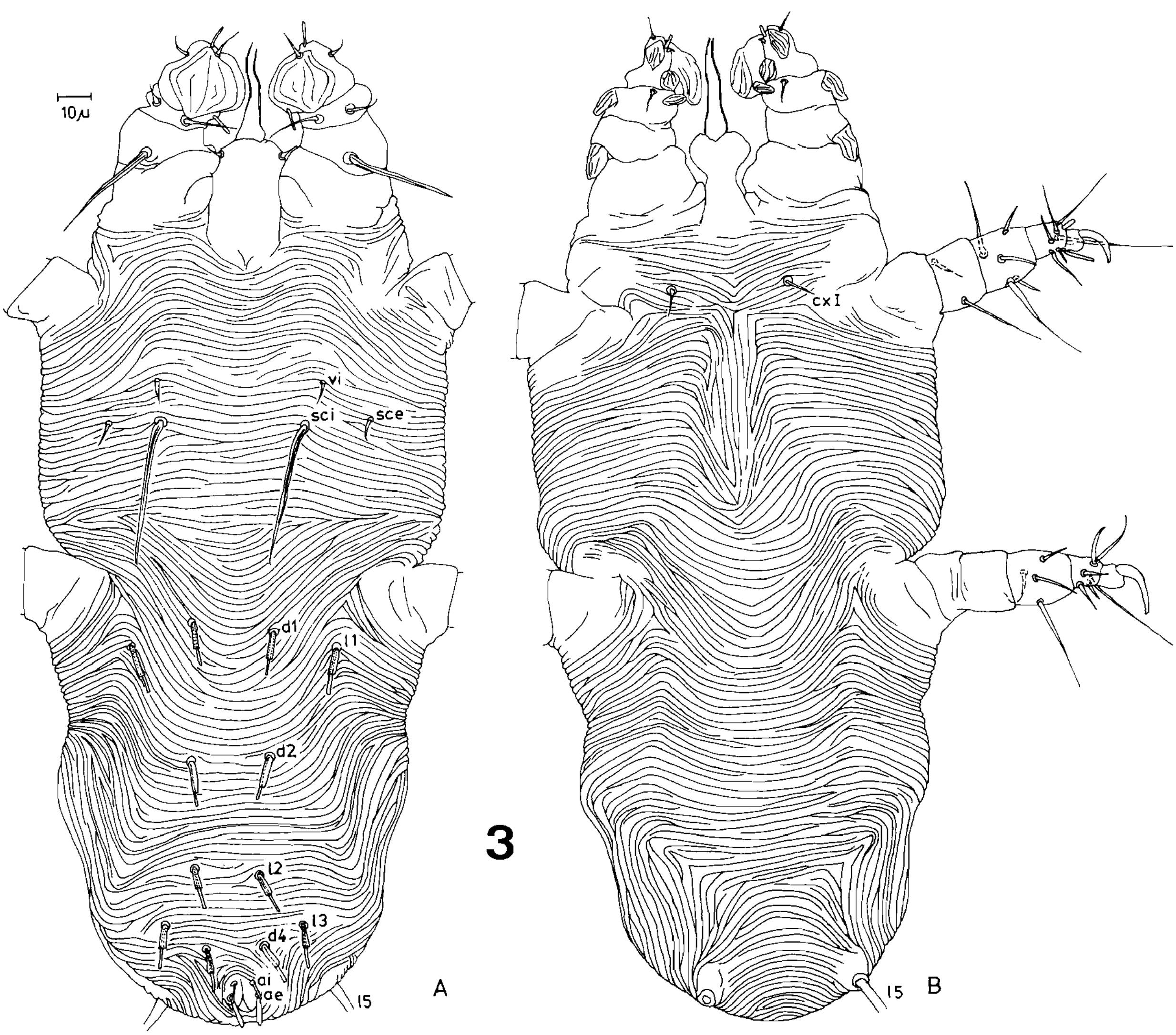

Fig. 3: The larva of *A. polonicus* –A, dorsal view; B, ventral view.

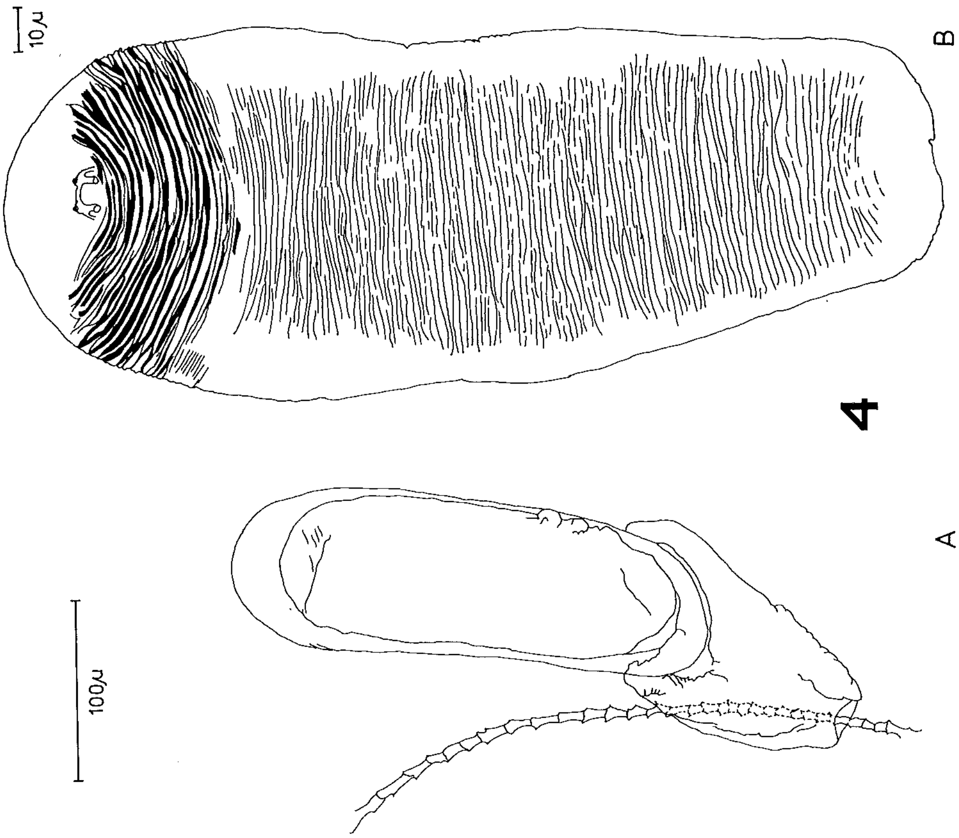

Fig. 4: Egg fastened to bat hair (A) and prelarva (B) of *A.polonicus*.

A.polonicus belongs to the subgenus *Myotimyobia* as defined by Fain (1976), because in the male no cuticular expansions are seen on the body, and because legs II-IV are normal. Haitlinger (1978) did not place this species in any subgenus, probably because he had not seen the male mite.

A.polonicus differs from all other species in the subgenus by the extremely strong asymmetrical genital plate in the male, with a strongly developed left lobe and a complete reduction of the right lobe (Fig. 2). Asymmetry is seen in other species of the subgenus but it is than of a different nature. The asymmetry does not usually involve the complete reduction of the right posterior lobe. Examples are *A. emarginatus*, *A. gracilis*, *A. hanensis*, *A. lucifugus*, *A. mystacinalis*, *A. natalensis* (Dusbábek 1963, Fain & Whitaker 1976, Fain 1978). When a complete reduction of the right lobe is seen, as is the case in *A.bechsteinialis* , the left lobe is not so strongly developed (Fain 1978).

The paired sclerites on the ventral body side of the female were not mentioned or depicted by Haitlinger (1976), but they seem to be a good descriminating character. In other species where they were reported (*A. bechsteinialis*, *A. caudatus eptesicus*, *A. gracilis*, *A. myoti*, *A. mystacinalis*, *A. namurensis*, *A. natalensis*, *A. pantopus*, *A. serotinus*) the sclerites are of a different shape than in *A.polonicus* (Fain 1976, Fain & Whitaker 1976, Fain 1978).

BIOLOGY

To study the incidence of *A.polonicus* the following bat specimens were available: 26 male bats and 23 female bats collected in autumn and winter of 1907, 1926, 1949, 1951, 1952, and 1953. These bats were fixed in alcohol immediately after death. They were obtained by courtesy of the Rijksmuseum voor Natuurlijke Historie, Leiden (The Netherlands). The bats originated from artificial caves in the south of the Dutch province Limburg and adjacent regions of Belgium.

A number of live pond bats were examined in the summer and winter of 1975 and 1976. Only a few specimens of *Acanthophthirius* could be obtained since it proved impossible to study the fur of the bats systematically. From September to December 1976 three bats (all males) were kept in the laboratory. These bats adapted to the investigator and could be inspected for *Acanthophthirius* with relative ease.

The alcohol material from the winter habitat revealed all stages of *Acanthophthirius* in fair numbers. The sex ratio strongly favoured the female mites. This could be due to a shorter life span of the male mites. Only one bat (2% of the number investigated) was found to be without *Acanthophthirius* in its fur. The highest number of parasites on one host was 194, but presumably even in this case some specimens were overlooked or lost in the fixation and preparation procedures. The bats studied alive in winter did reveal myobiids, but due to the wet fur of the bats it was impossible to collect these mites. Also in summer, myobiid mites were seen on the bats. The fur was dry now, but due to the activity of the bats only one male of *A. polonicus* could be collected. The bats caught in September and kept in the laboratory possessed all stages of the mite in appreciable numbers during the whole 4 months of their stay. On one occasion one male of *A. polonicus* was found on the breeding cage of the bats. Other dust samples from the breeding cage (taken at least at weekly intervals) were negative for myobiids. And so, where guano samples taken from a summer habitat from a female colony of the bat at monthly intervals during one season.

These results indicate that *A. polonicus* completes its life cycle in the fur of the host. The mite can be expected on all or almost all pond bats of the Benelux-Germany population.

Many mites were found attached to the skin, presumably feeding. It is hardly conceivable that this had no ill effects on the skin of the host. But we did not observe any injury.

In addition to the Benelux-Germany population of the pond bat studied by us, at least three other populations exist in Europe (Sluiter et al. 1971). An investigation of bat parasites in the Armenian SSR did not reveal any myobiid mite from the pond bat (Dusbábek & Arutnian 1976). In Poland *A. polonicus* was not found to be abundant (Haitlinger 1978). The population in Denmark does not seem to have been investigated for any mite parasite (Anciaux de Faveaux 1971, 1976). It would be interesting to study the four populations carefully (including the examination of a few freshly killed or freshly fixed bats) to discover if the incidence of parasitism is indeed different.

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