

CHANGES IN THE FRONTAL SINUSES
OF THE WEASEL (*MUSTELA NIVALIS*) IN POLAND
POSSIBLY CAUSED BY NEMATODES OR TREMATODES

KRZYSZTOF SCHMIDT

Mammal Research Institute, Polish Academy of Sciences
17-230 Białowieża

ZMIANY W ZATOKACH CZOŁOWYCH
U ŁASICY ŁASKI (*MUSTELA NIVALIS*) Z POLSKI
SPOWODOWANE PRAWDOPODOBNIE PRZEZ NICIENIE LUB PRZYWRY

Abstract. The presence of parasitic Nematodes was determined by visual assessment of damage to the 271 weasel skulls (154 males and 117 females). The damages were attributed to *Skrjabingylus nasicola* (LEUCKART, 1842) or *Troglootrema acutum* (LEUCKART, 1842) (on the basis of it's appearance and relevant papers). The frequency of infestation by both parasites was 38%. It was higher in females and also increased along with age. A significant dependence between skull length of adult specimens and infestation rate was found.

INTRODUCTION

According to present knowledge, 6 species of the genus *Skrjabingylus* and one of the class Trematoda — *Troglootrema acutum* parasitize mustelids in the frontal sinus region (LEWIS 1967, HANSSON 1968, VAN SOEST et al. 1972, DEBROT and MERMOD 1981). *S. nasicola* is the least specialized and the most common species from among of them (DEBROT and MERMOD 1981). This species was frequently found in *Mustela nivalis* (e.g. KING 1977) and in Poland was recorded in *Mustela putorius* (MALCZEWSKI 1964). From the others species, *S. magnus* and *S. chitwoodorum* were determined as specific for the North-American skunk (*Mephitis mephitis*) (LEWIS 1967, VAN SOEST et al. 1972), whereas *S. petrovi* and *S. ryjkovi* were found in the genus *Martes* only in the USSR (KONTRIMAVITSCHUS 1969). *S. lutrae* is specific to otter (*Lutra lutra*) (LANKESTER and CRICHTON 1972). There are different opinions about the occurrence of *Troglootrema acutum*. It can be said that this species parasitizes principally on larger mustelids (*M. putorius*, *M. vison*) (HANSSON 1968) and has never been found in *Mustela nivalis* (VAN SOEST et al. 1972). It is considered that the range of *T. acutum* is limited only to Central Europe (VAN SOEST et al. 1972).

All the parasites mentioned cause similar deformities of the frontal bones in the supra-orbital region. From the museum material of cleaned skulls, it is

impossible to recognize the actual species of parasite causing pathological changes (VAN SOEST et al. 1972). This especially concerns those areas where the fauna of parasites in Mustelidae is not known. In such cases, characteristic cranial damage can only be attributed to a group of species that may potentially occur in a given area.

The aim of the present paper is to outline information about the infestation rate of the weasels obtained during studies on the morphometric variation of *Mustela nivalis* skulls from Poland (SCHMIDT 1992).

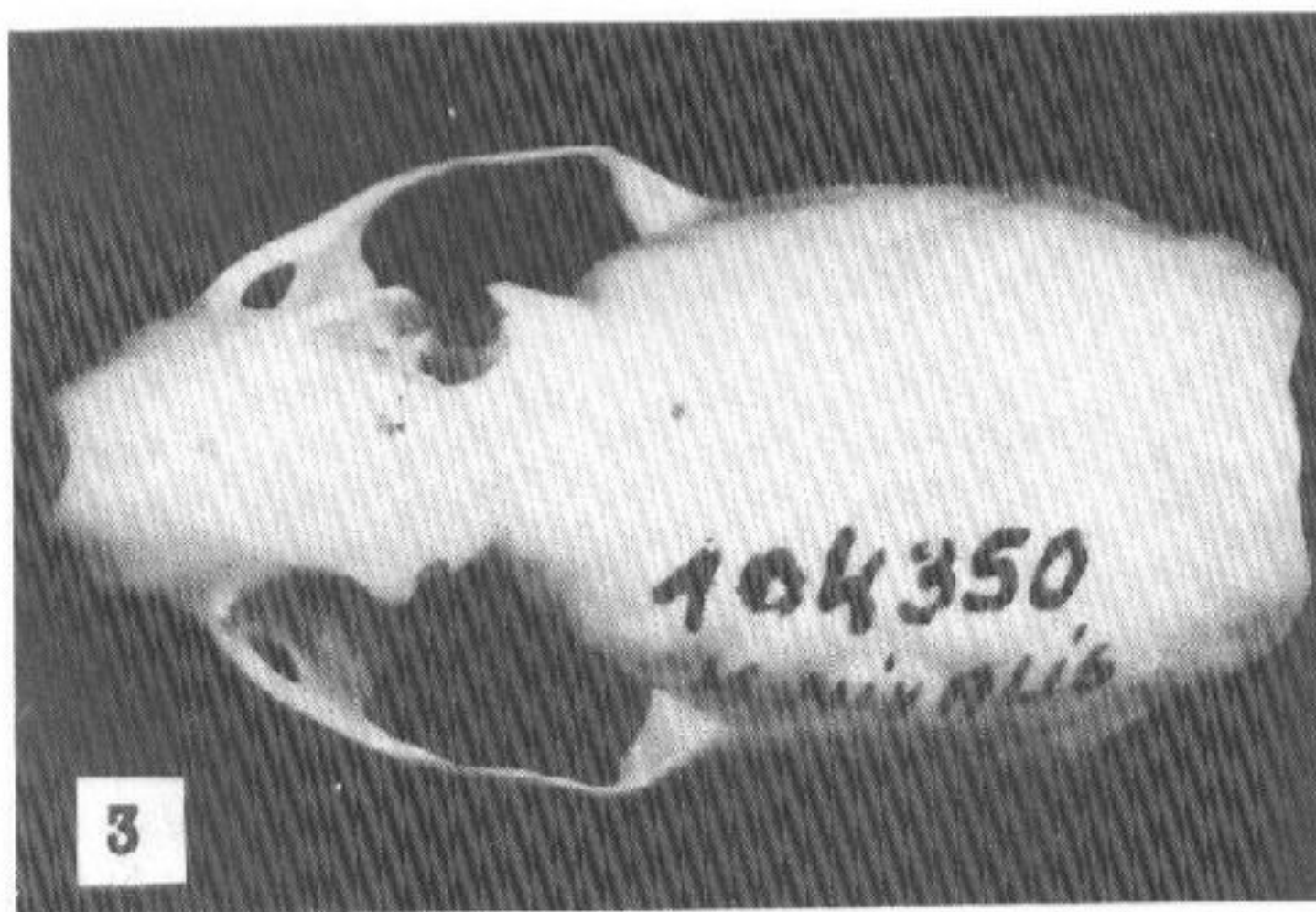
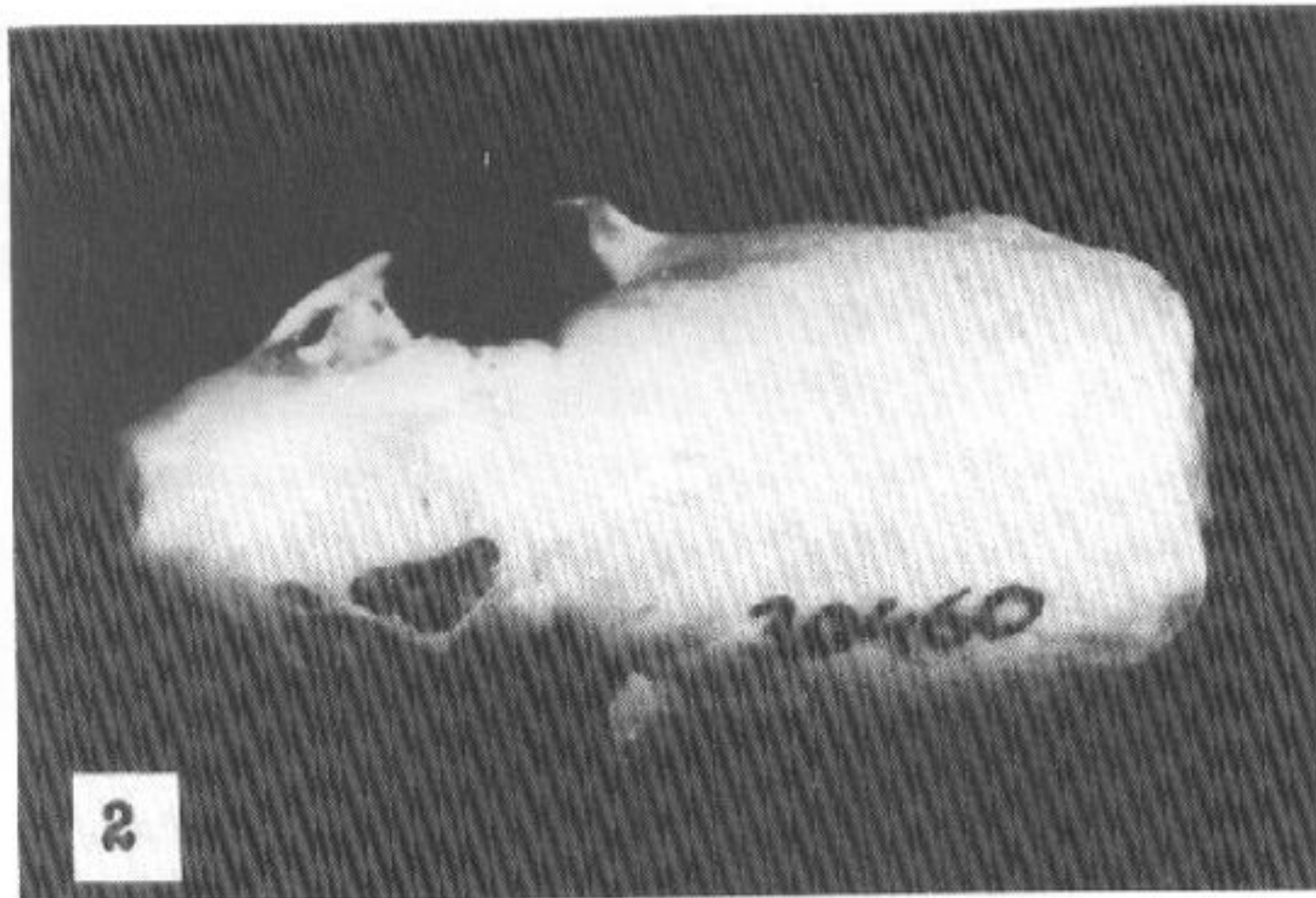
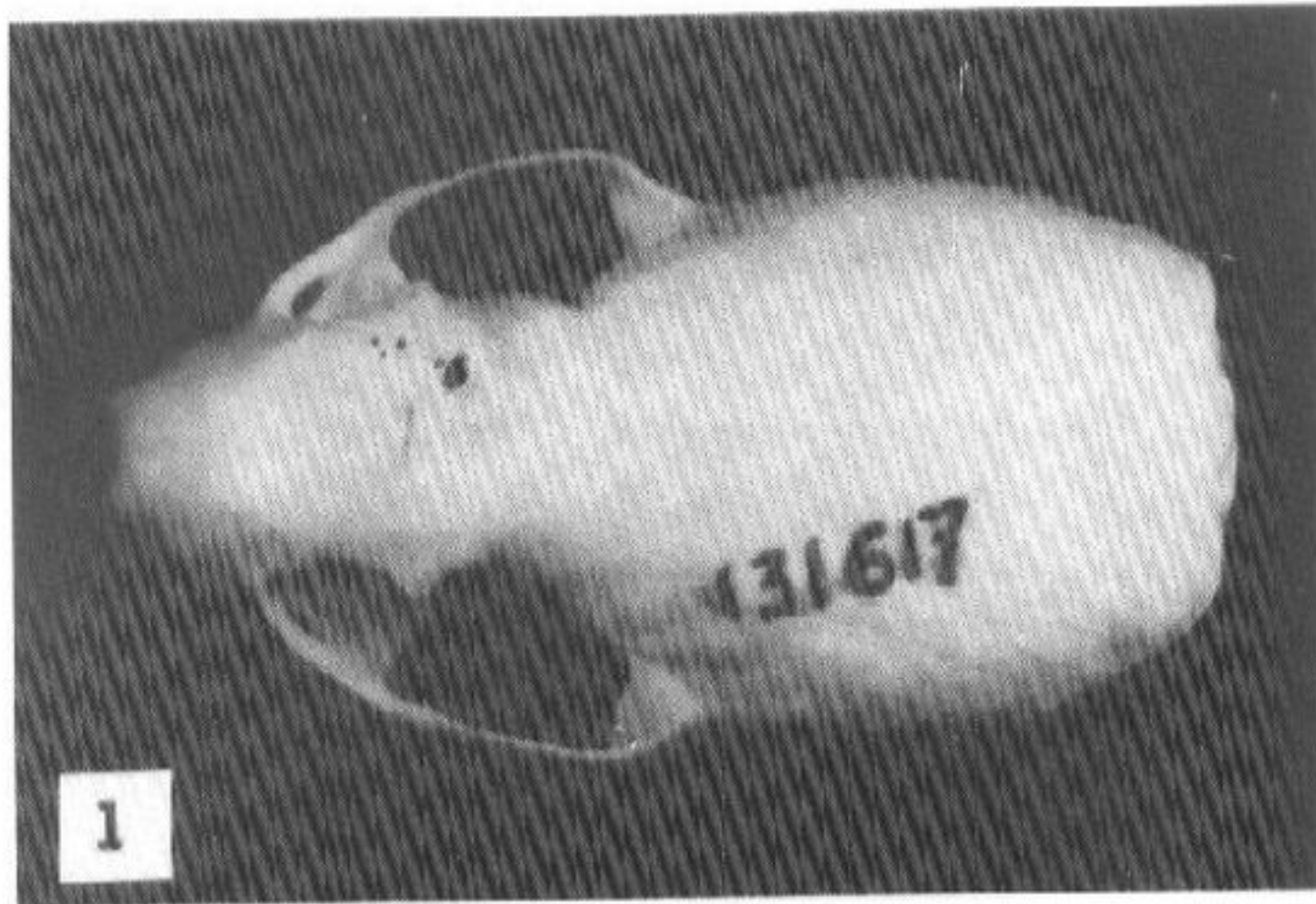
Material and methods

Two hundred seventy one weasel skulls (154 males and 117 females) from museum collection gathered between 1907–1988 were examined. The material was originated from the following regions of Poland: Baltic Coast, Pomerania Lake Region, Masurian Lake Region, Białowieża Primeval Forest, Podlasie, Lublin Upland, Sandomierz Lowland, Świętokrzyskie Mountains, Bieszczady Mountains, Tatra Mountains, Lower Silesia. The skulls were completely cleaned, thus it was impossible to find the parasite specimens. Only pathological changes in the frontal bones were registered. The skulls of weasels which showed deformities in the supra-orbital region of the frontal bones was determined as infested. The damage consisted of swelling of the outer table of the frontal bone often with erosion. Sometimes the frontal sinuses were completely open (Figs 1-3). The signs of infestation occurred on both left and right sinuses, as well as on both simultaneously. On the basis of papers mentioned one can suppose that the most probable cause of these changes was *S. nasicola* or *T. acutum*. The term „infestation” was used in relation to specimens with visible distortions caused by both possible parasites.

Results and discussion

The frequency of infestation regardless of the sex, was 38%. This value is relatively low when compared with *M. nivalis* populations in Great Britain (69-100%: KING 1977), in Holland (56.1%: VAN SOEST et al. 1972) and in Sweden (53%: HANSSON 1968). However, one can expect that this number is underestimated considering it was not possible to detect more recent infestation in the cleaned skulls (LEWIS 1967, HANSSON 1968).

In the examined material females were more frequently infested than males ($P < 0.05$). This especially concerned adult specimens (Tab. 1). Such a dependence was not found in *M. nivalis* in Great Britain (LEWIS 1967, KING 1977), in *M. erminea* in Switzerland (WEBER 1986) nor in *M. mephitis* in Mexico (KIRKLAND and MALDONADO 1988). It is difficult to find the cause of this phenomenon occurring only in Poland. The cause of the difference in the frequency of infestation between males and females can be attributed to the different food composition (ERLINGE 1975). As HANSSON (1967) suggested the most frequent carrier hosts of *Skrjabinogylus* might be shrews (*Sorex* spp.).



Figs 1-3. The examples of distortions in the frontal sinuses of the weasel skull caused by *Skrjabinogylus nasicola* or *Trogloctrema acutum*

TABLE 1
Frequency of infestation of *Mustela nivalis* from Poland by Nematodes
(*Skrjabinylus nasicola*) or Trematodes (*Trogloitrema acutum*)

Sex		Age classes			Total
		1	2	3	
Males	%	3.8	26.5	45.6	32.5
	n	26	49	79	154
Females	%	5.9	14.7	71.2	45.3
	n	17	34	66	117
	χ^2	0	1.29	10.57	4.32
	P	> 0.995	> 0.1	0.005	> 0.05
Total	%	4.6	21.7	57.2	38.0
	n	43	83	145	271

Males which are larger than females (see KING 1989 for review) are able to feed on larger prey than shrews, thus they are less susceptible to invasion. GAMBLE and RIEWE (1982) showed a similar argument for *Mustela frenata*. VAN SOEST et al. (1972) explained the difference in the frequency of infestation by *S. nasicola* between weasels and stoats on the same basis.

Frequency of infestation increased with age of weasels (Tab. 1). Such a tendency was also stated by HANSSON (1968, 1970) and KING (1977) in weasels and stoats, as well as by KIRKLAND and MALDONADO (1988) in skunks. Young weasels can be invaded even in the first months of their life (KING 1977), thus one can expect that an increase in the frequency of infestation is immediately related to an increasing probability of invasion with duration of life.

It was noticed that the skulls of infested adult males were smaller than those where no infestation had occurred at all ($P < 0.05$) (Tab. 2).

TABLE 2
Comparison of condylobasal length of infested and uninfested adult *M. nivalis* from Poland

Sex	Uninfested				Infested				t	P
	min	—	max	\bar{x}	n	min	—	max	\bar{x}	n
Males	34.6	—	42.5	39.2	44	33.6	—	42.8	38.2	35
Females	30.0	—	35.6	32.4	16	29.4	—	34.8	31.7	47

The skulls of invaded females were also smaller but the difference was not significant ($P > 0.05$). A similar dependence in stoats was stated by VAN SOEST et al. (1972). Correlation of the skull size and frequency of infestation with *Skrjabinylus* spp. in Mustelidae was also found by HANSSON (1968, 1970). She suggested that smaller skulls are more susceptible to damage considering their

thinner bones, and consequently pathological changes may become more evident. KING (1977) and GAMBLE and RIEWE (1982) did not state the connection between the size of the skull and infestation. Moreover, KING (1977) suggested there are various factors affecting the degree of infestation in relation to weasel size — e.g. the number of rainy days during the year — which may occasionally overlap with other factors affecting weasel size. Over half of the material from Poland ($n = 145$) comprised of weasels from Białowieża Primeval Forest, while the rest were collected from other regions of Poland. For this reason it is impossible that bioclimatological factors could have any influence upon the frequency of infestation. In relation to sexual differences one can suggest the possibility of a connection between the size of the weasel and its prey. However the differences between infested and uninfested specimens in relation to size are not as large as intersexual differences. Ideally one should not accept the reversal dependence, i.e. the effect of parasite presence on the size of skull. It seems that a minimal percent of infestation in young weasels does not confirm this possibility.

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