

The moose nose bot fly *Cephenemyia ulrichii* Brauer (Diptera: Oestridae) reported in Norway for the first time

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Introduction

Nose or pharyngeal bot flies in the genus *Cephenemyia* (Diptera: Oestridae) are obligate parasites with larvae inhabiting the nasal cavity, pharynx and throat of cervids (Zumpt, 1965). Four species are present in Europe: *C. trompe* (Modeer) in reindeer *Rangifer tarandus*; *C. stimulator* (Clark) in roe deer. *Capreolus capreolus*; *C. auribarbis* (Meigen) in red deer *Cervus elaphus* and fallow deer *Dama dama*; and *C. ulrichii* Brauer in moose *Alces alces* (Zumpt, 1965; Grunin, 1966; Nilssen & Haugerud, 1990).

Moose are distributed in northern and eastern Europe (Niethammer & Krapp, 1986). Their highly host specific nose bot fly, *C. ulrichii*, only partially accompanies its host (Zumpt, 1965). When present, moose are often very heavily infected. Young calves, in particular, are said to show high mortality when they harbour large numbers of larvae (Zumpt, 1965; Grunin, 1966). In Fennoscandia, *C. ulrichii* was previously only known from Finland (Frey, 1914; Brander, 1963; Valtonen, 1972; Mikkola *et al.*, 1982; Andersson, 1988) but has been reported from a large area in northern

Sweden during 1979-86 (Stéen *et al.*, 1988). This may indicate that this parasite is expanding its distribution. *C. ulrichii* has never been reported from Norway despite the fact that a large population of moose exists there. The purpose of this investigation was to determine whether *C. ulrichii* has reached Norway.

Material and methods

A survey of the occurrence of *C. ulrichii* in Norwegian moose was performed on heads of 23 moose calves (6-7 months of age) from 6 separate areas (Table 1 and Fig. 1). The moose were shot by hunters in September - October 1987 at a time when *C. ulrichii* is in its first instar and only 1-3 mm long. The special rinsing and sieving technique described for sampling first instar larvae of *C. trompe* in reindeer (Nilssen & Haugerud, submitted) was used. In short, heads were split, and the turbinates, ethmoid labyrinths and the nasal septum were carefully loosened and the sinuses opened. The loosened material, as well as the «emptied» cavity of the nasal channel, the sinuses, and the throat/pharynx complex were rinsed with tap water through a funnel. The rinsed material

Table 1. Results of sampling of L₁-larvae of *C. ulrichii* in Norwegian moose. All animals sampled were calves (6-7 months of age) shot in September - October 1987.

Location (see Fig. 1)	Number of moose investigated	Area sampled	Geographic position	Number of L ₁ -larvae detected
1	2	Ringsaker	60°50'N, 10°45'E	0
2	5	Ytre Rendalen	61°45'N, 11°15'E	0
3	8	Bardu	68°45'N, 18°30'E	0
4	4	Senja	69°15'N, 17°30'E	0
5	1	Kvænangen	69°30'N, 22°E	0
6	3	Pasvik	69°30'N, 30°E	6 (n=1)

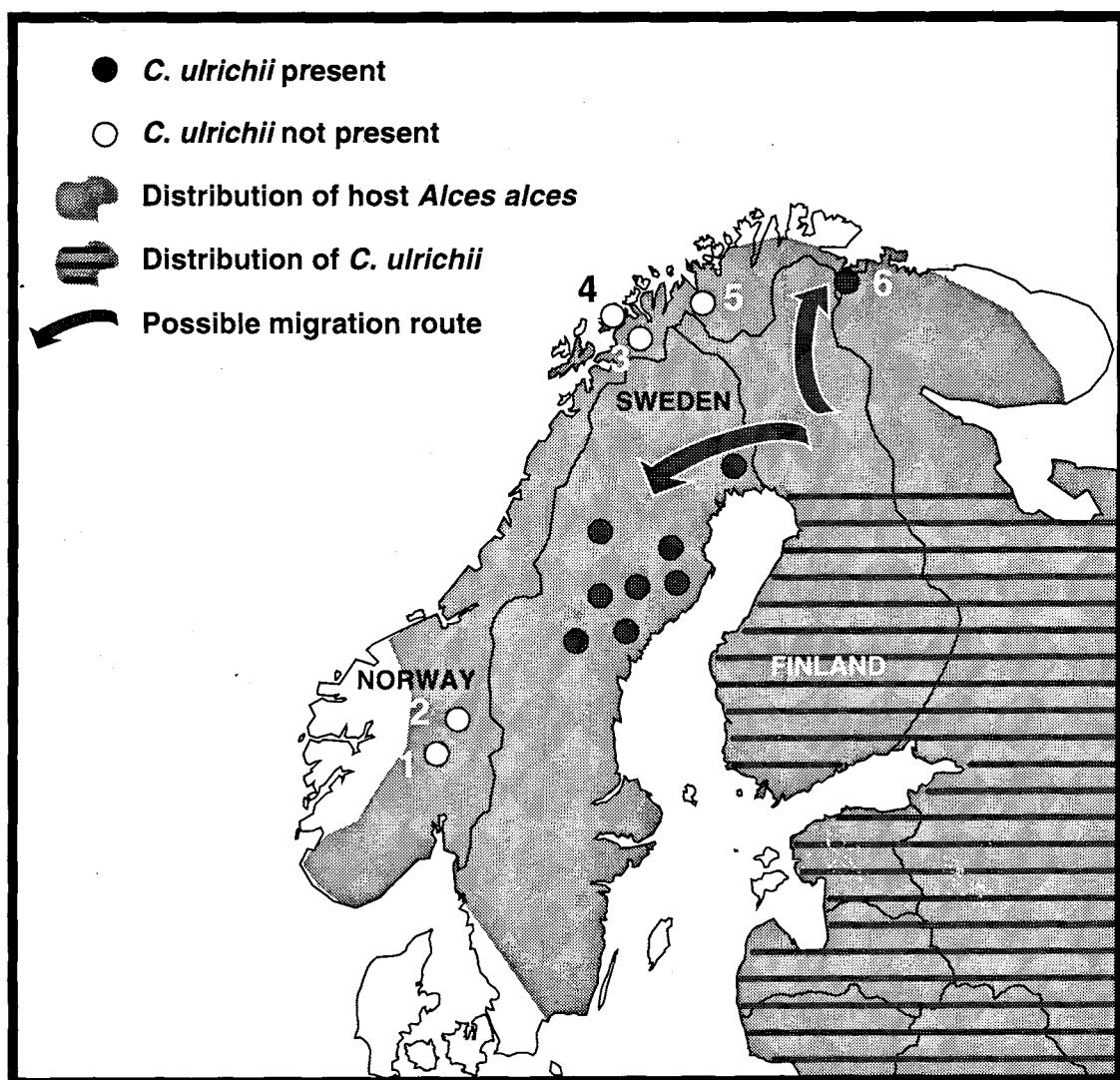


Fig. 1. Distribution of moose (*Alces alces*) (light gray) (modified after Niethammer & Krapp 1986) and the known distribution of moose nose bot fly (*Cephenemyia ulrichii*) (hatched areas) in northernmost Europe (Brander, 1963, Valtonen, 1972, Leena Oksanen, pers. comm.). The finds in Sweden are from 1979-86 as reported by Stéen *et al.* (1988). The arrows show the probable invasion routes of the parasite.

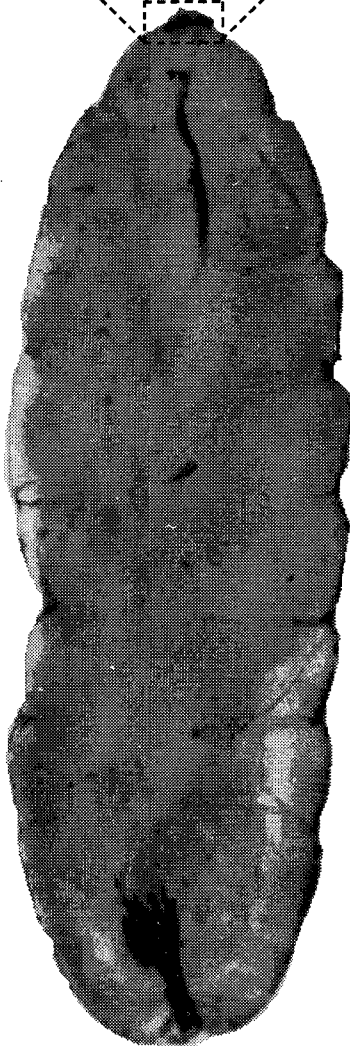


Fig. 2. *C. ulrichii* larvae (first instar) found in moose in Pasvik in northeastern Norway. There are 18 hooks on the anal pecten which distinguishes it from the reindeer nose bot fly *C. trompe*. Photo: Mike Kearney.

was sieved through a Nylon mesh, and the residue was examined and the larvae counted under a dissecting microscope.

Results

C. ulrichii (6 L₁ larvae) was only found in one head belonging to a moose calf from Pasvik in North-Eastern Norway (Table 1 and Fig. 1). The number of rows of denticles on the segments and the spines on the anal pecten were used as diagnostic characters. L₁ larvae of *C. ulrichii* have 15-22 (mostly 17) hook-like spines on the anal pecten, whereas *C. trompe*, which is common on reindeer in the area, has only 12-14 spines (Zumt, 1965). Our specimens had 18 spines on the anal pecten, and consequently can be identified with certainty as *C. ulrichii* (Fig. 2). An unpublished and un-checked find of third instar nose bot fly larvae from a moose from the same area in Norway in 1980 may also have been *C. ulrichii* (Steinar Wikan, pers. comm.).

Discussion

Fig. 1 gives the distribution of moose and its parasite *C. ulrichii* in northernmost Europe. *C. ulrichii* has long since been known from Finland (Frey, 1914; Brander, 1963; Valtonen, 1972; Mikkola *et al.*, 1982) and the recent finds from northern Sweden (Stéen *et al.*, 1988), together with the present find in northeastern Norway, may reflect that this bot fly is «invading» the rest of Scandinavia (see arrows in Fig. 1). Possibly, this is a result of the fact that the moose has increased in abundance and distribution in most of Scandinavia in this century.

The parasite, however, is not easily observed during the hunting season (September - November) owing to the small size of the larvae. All recordings from Sweden were of third instar larvae from moose killed accidentally during spring (Stéen *et al.*, 1988). The sampling technique used here, originally developed for *C. trompe* from reindeer (Nilssen & Hauge-rud, submitted), makes it possible to detect small first instar *Cephenemyia* larvae.

Conclusion

Our conclusion is that *C. ulrichii* has reached the northeastern part of Norway (Pasvik). A further expansion of this parasite may be expected in Norway as well as in southern Sweden. This study shows that moose can be sampled for *C. ulrichii* with the described technique in the hunting season when the larvae are in their first instar. The diagnostic charac-

ters shown in Fig. 2 can be used to distinguish *C. ulrichii* from congeneric species.

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