

PERSISTENT PRURITIC PAPULES FROM DEER KED BITES

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Abstract. Deer ked (*Lipoptena cervi* L.), a haematophagous louse fly of deer, also attacks man and can cause persistent pruritic papules. Nineteen patients with this condition were examined. They suffered attacks while carrying out their work, or merely walking, in forested areas. The bite papules appeared mostly on the head and back. They were very itchy and resistant to treatment and persisted from 2 weeks up to 12 months. Histologically, a typical insect bite reaction was found without any signs of retained deer ked mouth parts. Direct immunofluorescence showed deposits of C₃ in dermal vessel walls in 7 of the 11 papules examined. Skin tests with a deer ked whole body extract were positive in all patients tested, showing both immediate and delayed reactions. Moreover, 57% of the patients tested had elevated serum IgE levels. All these findings suggest that IgE, complement and cell-mediated immune mechanisms are involved in the pathogenesis of deer ked bite reactions.

Key words: Deer ked; Insect allergy; Persistent papules

Deer ked (*Lipoptena cervi* L., Fig. 1) is a louse fly (Hippoboscidae, Diptera) occurring in nearly all parts of Europe, in Siberia and in North America (14). In the Scandinavian countries this ectoparasite of deer has been known since Linnaeus but in Finland the first observations were made in 1960 on the southeastern frontier. Since then it has spread westwards into the southern and central parts of the country. In Finland the main host of the deer ked is the moose (*Alces alces*), but it attacks man too. Appearing in great numbers, especially in late summer and autumn, the insect has become a real nuisance to people living, working or simply walking in the forests. It is very flat and easily finds its way under the clothes and into the hair.

From 1978 we have seen patients with pruritic papules from deer ked bites. Because these papules were very resistant to any treatment and often persisted for many weeks or months, we examined all such patients admitted to our clinic during 1979-80 more thoroughly.

LIFE CYCLE OF THE DEER KED

The haematophagous deer keds live unwinged in the fur of their hosts, breeding one living larva at a time. This soon becomes a pupa which falls to the ground. In the following August or September new winged imagines hatch. Usually they do not fly far away, and instead of actively seeking, they prefer to wait on trees and plants for a suitable host. After finding a host they lose their wings and remain on the same deer for the rest of their lives (6).

PATIENTS AND METHODS

Nineteen patients, 7 men and 12 women, were examined. A complete medical history was taken, with special reference to atopy and previous reactions to arthropod bites and stings. A skin biopsy was taken from 11 patients and the specimens were divided for routine histopathology (haematoxylin and eosin) and immunofluorescence (IF). Deep-frozen sections were stained with commercial FITC-conjugated antisera for IgG, IgM, IgA, C3 and C1q as described earlier (11). Routine laboratory tests included erythrocyte sedimentation rate, complete blood cell count, liver enzymes, serum total IgE and urinalysis.

Deer keds were collected in the forest and stored at -20°C until used. The insects were ground with a pestle and suspended in phosphate-buffered saline. The extract was centrifuged at 2500 rpm for 30 min and the supernatant was passed through a 0.45 µm Millipore filter. The protein concentration of the stock solution was 0.3 mg/ml. This whole-body extract, diluted 1:10, 1:100 and 1:1000 in physiological saline with 0.4% phenol, was used in skin tests in the form of a 0.1 ml intradermal injection using 0.1 mg/ml histamine hydrochloride as positive and diluent as negative control. Six healthy persons with no previous contact with deer keds served as controls in the skin tests.

RESULTS

Clinical features

The patients were attacked by the deer keds between the end of July and early October, when they were timber-cutting, picking berries or mushrooms, hunting, etc. in wooded areas. Eight patients developed papular reactions during the first year of contact, whereas 11 patients started to react later

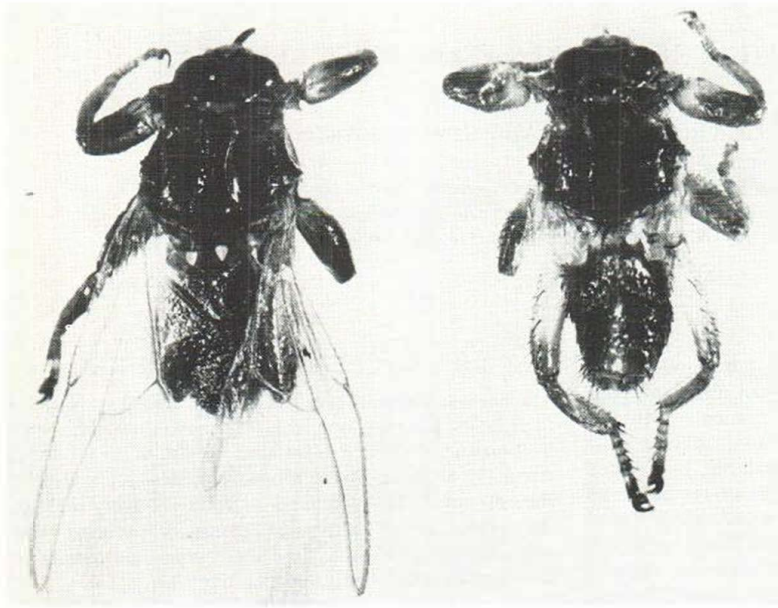


Fig. 1. Winged and unwinged deer ked imago. Natural length 4 mm.

on (Table I). Thereafter every subsequent contact with deer keds caused a new eruption.

The papules were situated most commonly on the scalp, neck and upper back. Their number varied from 1 to 20. Most of the patients had not perceived the actual bite, but some of them noticed an immediate wheal and flare reaction. Usually, reddish pruritic papules (Fig. 2) appeared from 1 to 24 h after deer ked contact. The pruritus was in many

cases intense, leading to scratching, erosions and sometimes to a secondary infection. Later the papules became firm and brownish (Fig. 3), persisting for several weeks or months (Table I). Some patients experienced flare-ups of old quiescent papules after new bites.

Trials with all available insect repellents proved unsuccessful. Treatment with a betamethasone valerate cream brought some relief on the itch. It

Table I. Data of 19 patients with persistent papules from deer ked bites

Patient no.	Age/sex	First year of deer ked contact	Deer ked papules			S-IgE	Personal history of atopy
			Since	Max. duration (mos.)	Direct IF		
1	33/F	1960	1964	2	C ₃	400	-
2	60/F	1972	1972	1	-	26	-
3	48/M	1972	1972	6	C ₃	500	-
4	35/F	1973	1977	0.5	C ₃	84	-
5	24/M	1974	1976	6	C ₃	1 000	-
6	53/M	1075	1975	2	C ₃	150	-
7	34/M	1975	1979	3	C _x	400	-
8	32/F	1978	1978	6	-	120	-
9	13/M	1978	1980	1	-	50	-
10	35/M	1978	1980	5	C ₃ , IgM	nd	-
11	52/F	1979	1979	4	-	nd	+
12	35/M	1969	1969	9	nd	nd	+
13	27/F	1971	1971	0.5	nd	6 200	-
14	62/F	1973	1973	1	nd	33	-
15	45/F	1973	1980	2	nd	70	-
16	64/F	1974	1980	2	nd	280	+
17	38/F	1976	1976	1	nd	nd	+
18	28/F	1976	1977	6	nd	nd	-
19	54/F	1977	1979	12	nd	320	-

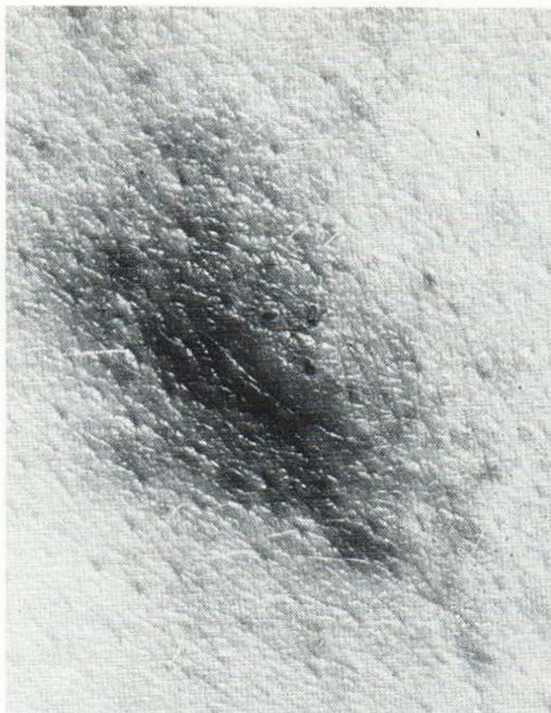


Fig. 2. A 5-day-old deer ked bite reaction.

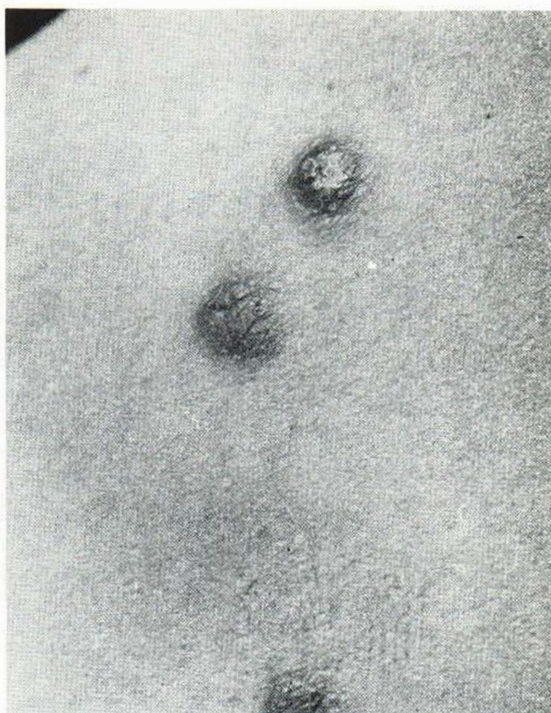


Fig. 3. Persistent deer ked bite papules of 3 months' duration.

seemed to shorten the duration of the papule if used immediately after a bite.

Laboratory and skin biopsy findings

Three patients had blood eosinophilia ($>0.400 \times 10^9/l$). Elevated total IgE levels (>150 U/ml) were found in 8 of the 14 sera examined (Table I). Other routine blood tests were normal.

The papules biopsied were from one day up to 4½ months old. In all 11 specimens the histology showed an insect bite reaction; a marked dermal mononuclear infiltrate with varying admixtures of eosinophils (Fig. 4), sometimes reaching the subcutis. Plasma cells and macrophages were frequent, especially in old papules. In one specimen, clear vasculitic changes with endothelial swelling, fibrinoid deposits and some leucocytoclasia were found.

Direct IF showed deposits of C3 in dermal vessel walls in 7 of the 11 specimens examined (Table I). In one specimen IgM occurred at the same site as C3 but no IgG, IgA or C1q was found.

Skin tests with deer ked extract

All 5 patients tested showed a positive delayed reaction and 3 of them also an immediate reaction

(Table II). All 6 controls were negative up to the 1:10 dilution. A biopsied 24-h-old skin test reaction showed the same histology and IF finding with C3 as the natural lesions.

Associated conditions

Four patients had a personal history of atopy. Two of them had had atopic dermatitis in childhood, one had had bronchial asthma and one still had bronchial asthma with allergic rhinitis.

Ten patients reported previous exceptionally strong immediate, or long-lasting delayed reactions to bites or stings of other insects. Most of them concerned mosquitoes, but some also black fly and wasps.

DISCUSSION

In spite of the long history and wide prevalence of the deer ked in most parts of Europe and elsewhere, we found only one earlier report, from Russia, concerning skin eruptions from this louse fly (7). In Finland this newcomer has been very numerous and the mass occurrences can be at least partly explained by the great increase in the moose popu-

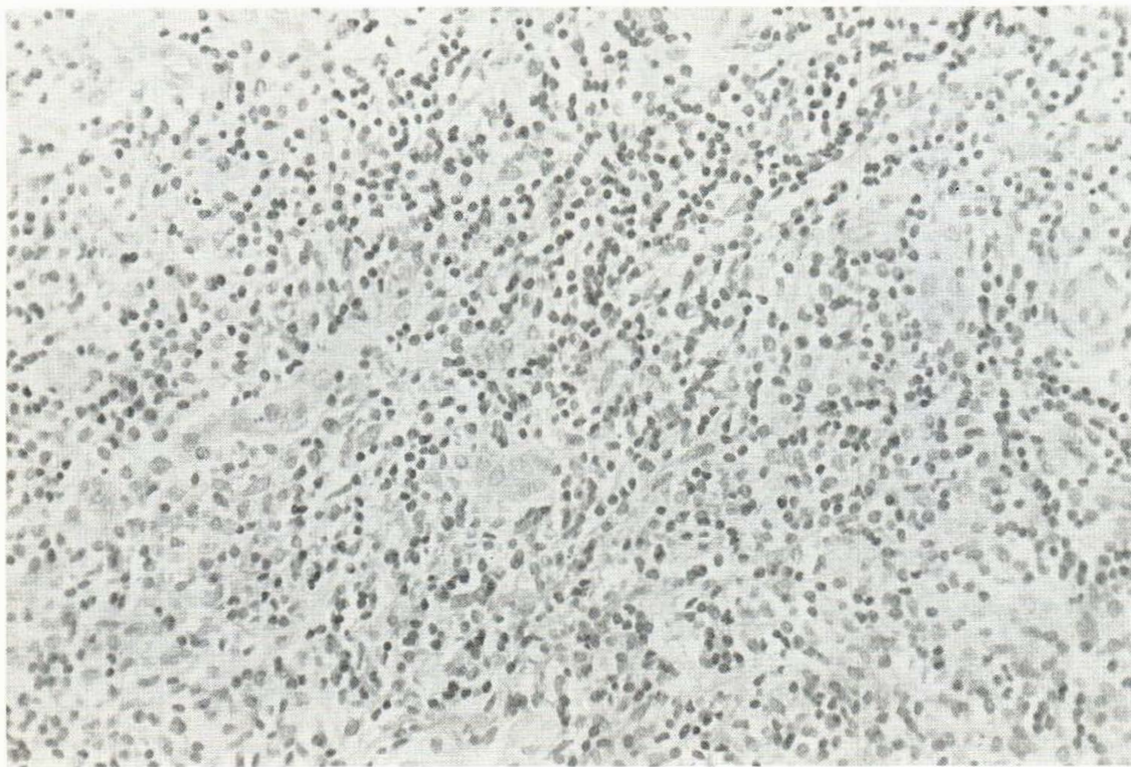


Fig. 4. Histology of a 2-month-old deer ked papule. A dense dermal round cell infiltrate with some eosinophils.

lation during the last two decades. Our patients, for example, were attacked by 10 to 200 deer keds during just one visit to a forest. Because all insect repellents tried were ineffective, the only way our patients could avoid a new eruption was not to venture into forested areas when deer keds were present.

During the first few days the deer ked papules did not differ from other insect bites, but later on they became firm and their overall duration was exceptionally long. Such persistence has earlier been reported after bites by ticks, mosquitoes, sandflies and chiggers (1, 3, 15) and in scabies (8). The recurrence after every new contact as well as the fact that others attacked are asymptomatic points to an immunologic origin of the papules. This view was substantiated by the skin tests with deer ked extract. These were positive in all patients tested, showing both immediate and delayed reactions. The C3 deposits in dermal vessel walls of the papules and of a biopsied skin test reaction suggest that complement activating factors are important in

the pathogenesis. The absence of C1q points to activation via an alternative pathway. In scabietic papules and nodules, similar C3 deposits are frequently found (12) suggesting that related mechanisms are operating in these two ectoparasitic conditions.

The elevated serum IgE levels in our patients have several possible explanations. Atopy does not seem to be important, since only 4 patients were

Table II. Intradermal skin tests with deer ked whole-body extract

Patient no.	Immediate (20 min)		Delayed (24 h)	
	1:100	1:1000	1:100	1:1000
4	+	neg	+	neg
6	+	neg	+ ^a	neg
7	neg	neg	+	neg
8	nd	neg	nd	+
17	+	neg	+	neg

^a On biopsy, dense perivascular round cell infiltrate and C3 deposits in dermal vessel walls.

atopics, a finding that is concordant with a study on Hymenoptera allergy (13). Besides atopy, elevated serum IgE levels are encountered in several helminthic endoparasitoses (5) and in scabies, where specific IgE antibodies to the scabies mite can be found (4, 10). Because no retained deer ked mouth parts were found in the skin sections, the high IgE levels and the persistence of the papules need some other explanation. The sensitizing antigen(s) are probably derived from the salivary secretion, as shown for many other haematophagous insects (2). Binding of a hapten of salivary origin to dermal collagen seems to be important in the induction of experimental flea bite hypersensitivity in guinea pigs (9). Such a binding could also occur in deer ked bites and perhaps some defect in the managing of the antigen could lead to its continuous presence in the dermis, and consequently to the persistence of the papules and to high IgE production.

It is of interest that many of our patients reported exceptional reactions to other insects. This could imply some defect in handling insect antigens or could also be due to some kind of cross-sensitivity between deer ked and other not very closely related insects. Nevertheless, in our patients, the acquisition of the deer ked sensitivity did not alter the intensity of their skin reactions to other insects.

In conclusion, this study has shown that deer keds can in some people cause very persistent and therapy-resistant papules. Whatever the exact pathogenesis of these papules is, it seems clear that immunologic mechanisms are involved.

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