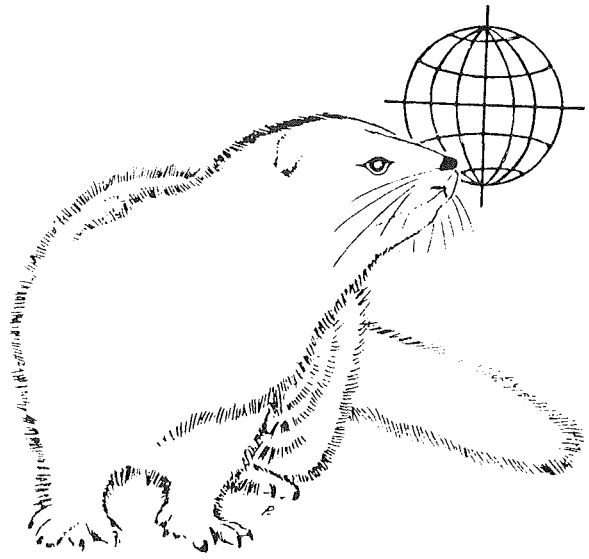

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8. COMMUNICATION

NOTES.

SCIENTIFUR, VOL. 10, No. 3, 1986.

The present issue of SCIENTIFUR - and the following one - will be the last issues of the first 10 volumes. The 'child' is now going to be almost grown up.

At the beginning in this Notes we take the opportunity to congratulate our colleague and friend Bruce Smith with his 30 years anniversary in editing and distributing the famous "Fur Rancher".

It is our intention to start printing of SCIENTIFUR in a professional way from the start of Volume 11. Of course, we know it will be more expensive, but we do hope that the number of subscribers will continue to increase and that serious supplying companies with international relations will support SCIENTIFUR and by this the international information and communication in fur animal production by advertising. This will be more attractive in a professional printed journal with possibilities of colour print.

We agree that the paper quality have to be fine, but we discuss very much the size of the journal. Ought it be size A4 - 29.6 x 21.0 cm, A5 - 14.8 x 21.0 cm, or the - for your editor very attractive - 'oversize' A5, namely 17 x 24 cm? We know that the standard sizes is the cheapest, but we want to do it so attractive as possible for both the readers and the advertisers. We should like to hear your opinion. - Please, write us!

One thing we have experienced by letters to the editor is the fact that many places of the world require more information of directly applicable form. Perhaps, SCIENTIFUR, e.g. through combination of the scientific information with more practical information, could be attractive for common farmers, who really need the applicable information regarding fur animal production.

The costs of such a service will mainly depend on the number of new subscribers. In the light of our intentions with SCIENTIFUR as the international center for information regarding fur animal production, we should like to hear, how far some farmers organizations have ideas about the need for better information to the members.

During the years you have been able to read in the Notes of this journal that there are many possibilites for increasing information and communication activities on internationally level. We will try to raise money from some Scandinavian funds for a 5 years project in this area - but,perhaps it will be difficult!

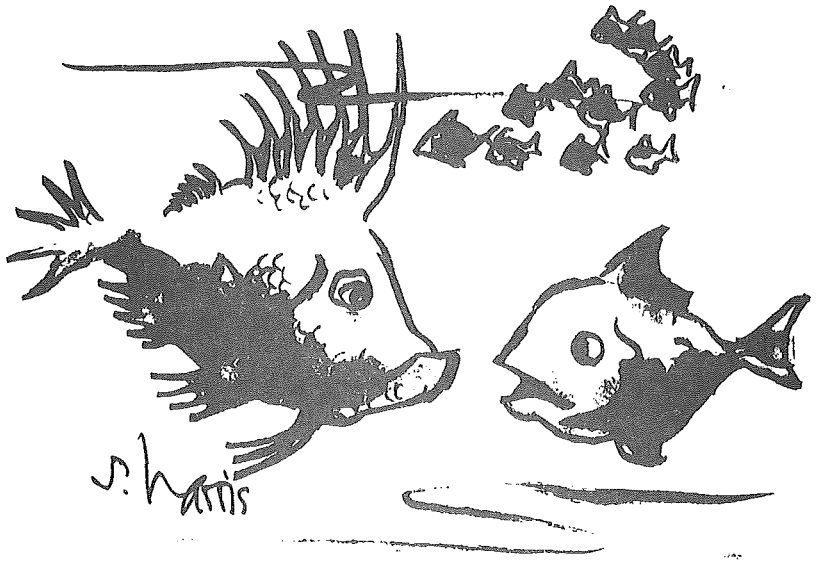
If we have no success in getting money this way, it is our intention to ask for help at the fur farmers organizations. The fact is that the total cost of the project will be approximately 1 mill Dkr. per year, equal to 125.000 US$, or in relation to the skin produced approximately 3.3 Danish coins (Dkr. 0.033) per skin, equal to 1/2 cent per skin produced. It should be resonable for ensuring the future of the international information and communication in the area of fur animal production.

Hopefully, we will hear from some of you regarding our questions and suggestions, and hopefully all of you will be successful in your profession.

Kind regards

Your Editor

Gunnar Jørgensen



Don't kid yourself. If you're too ugly to be cooked, they'll grind you up into one of those fish protein concentrates.

Original Report

Preliminary experiments to improve the cage- and nest systems of farm foxes (short communication)

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There is in Scandinavia an increased interest in giving farm foxes better conditions. They should e.g. have nests and resting places, where they are protected against cold and draught, and against stressing stimuli from the farm environment.

The nest boxes should also have qualities that minimize the occurrence of defecations in the nests. Finally, they must be constructed to fit the standards of 2-row mink and fox houses, which are the most commonly used in Scandinavia.

During autumn 1985 and winter 1985-86, some preliminary tests were made concerning the reactions of Blue and Silver foxes to 1) wooden shelves (Fig. 2), and 2) a new type of nest box mounted on top of the cage (Fig. 3 and 4). Unfortunately, only a small number of foxes were available; they were borrowed from some other experiments.

In the first two experiments non-breeding animals (males and females) were tested; in the third experiment only breeding females.

1. Shelves (Fig. 2)

Almost all the foxes used the shelves; but the Blue foxes started more quickly than the Silver foxes. The Blue foxes defecated more on the shelves (Table 1). The reason why Blue foxes show a greater tendency to use the shelves may be that they belong to a group, Alopex, which is more adapted to mountainous habitats than foxes of the Vulpes group, such as the Silver fox.

Table 1. Reactions of non-breeding farm foxes to winter nest boxes (Bb1) and shelves (sh). Results are based on weekly observations in January-March 1986.

	% foxes regularly using		% foxes defecating on	
	Bb1	sh	Bb1	sh
Blue foxes (N = 18)	22	94	83	78
Silver foxes (N = 6)	0	83	50	17

2. Top nest box (winter) (Fig. 3)

In preference tests with the traditional nest boxes (Fig 1) as alternative, most of the foxes preferred the new top nest box, with entrance tunnel, a netting insert

Table 2. Choices of non-breeding farm foxes between four types of nest boxes: Two placed on the bottom of the cage (Bb1 and Bb2), one placed on the top (T1) and one hanging on the wall at floor level (LJ); the foxes were allowed free choice between the different types of nest boxes in standard 2-room fox cages, from which the partition had been removed. Bb2 was placed beneath the entrance holes of T.
Observations were made during the foxes' normal periods of rest, once daily, during 10 consecutive days.
The figures indicate the percent of observations, where the fox was found resting in the respective nest boxes.
x indicates the conclusion as to preference.

Blue fox No.	Bb1	Bb2	T1	LJ
1 male	0 -	0 -	90 x	0 -
2 female	0 -	10 -	90 x	0 -
3 male	0 -	10 -	90 x	0 -
4 female	0 -	30 -	70 x	0 -
5 male	0 -	20 -	80 x	0 -
6 female	0 -	10 -	80 x	0 -
7 male	0 -	0 -	100 x	0 -
8 female	0 -	0 -	60(x)	40 -
9 male	0 -	10 -	0 -	10 -
10 female	0	0	10	50 x
11 male	0 -	30 -	70 x	0 -
12 female	0 -	0 -	80 x	0 -
13 male	0 -	70 x	20 -	0 -
14 female	0 -	0 -	0 -	0 -
15 male	0 -	0 -	20 -	50 x
16 female	0 -	0 -	80 x	0 -
17 male	0 -	0 -	90 x	0 -
18 female	0 -	0 -	90 x	0 -

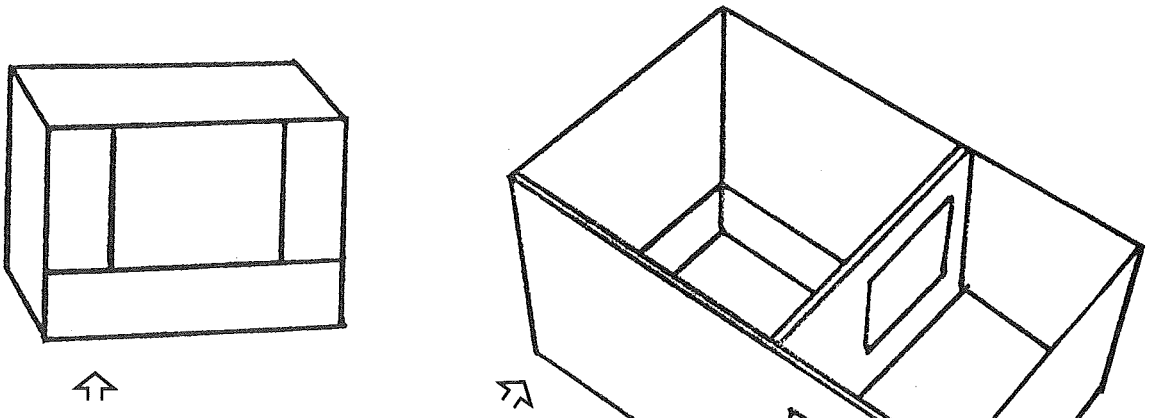

Fig. 1. Traditional types of nest boxes standing on the bottom of the fox cage. 1) winter shelter (Bb1), 2) breeding nest box (Bb2).

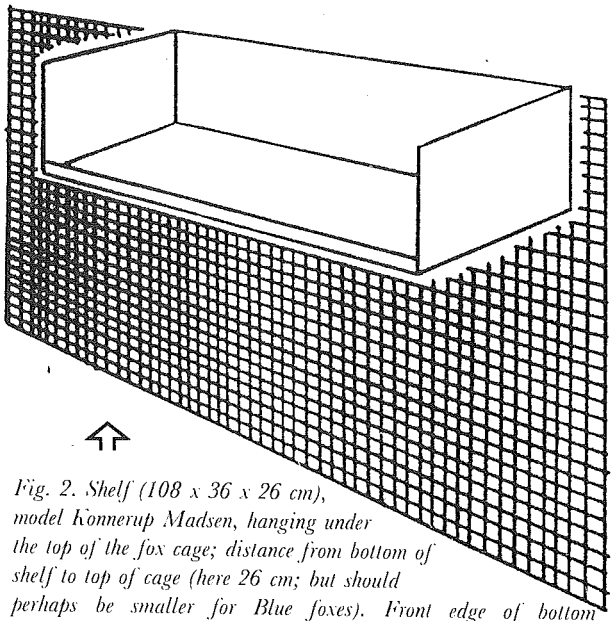

Fig. 2. Shelf (108 x 36 x 26 cm), model Konnerup Madsen, hanging under the top of the fox cage; distance from bottom of shelf to top of cage (here 26 cm; but should perhaps be smaller for Blue foxes). Front edge of bottom sloping inwards.

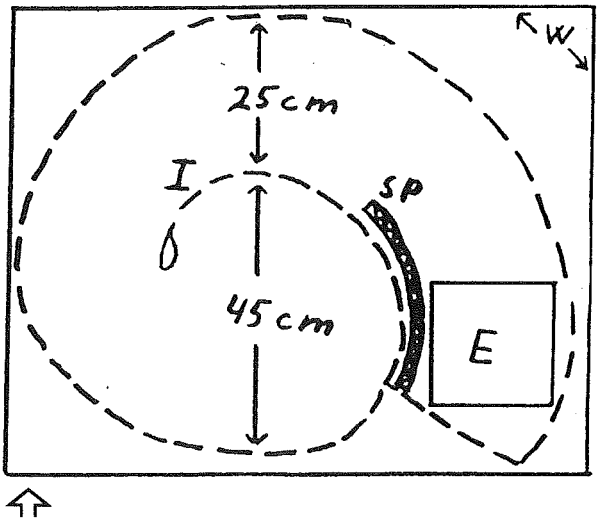

Fig. 3. Outline of new winter nest box.
T1 = Top nest box, model 1. Placed on the top of the fox cage.
W = Wooden box (92 x 76 x 40 cm); top and front can be opened, the front downwards.
I = Removable insert of plast-coated wirenet (mesh width = 1 x ½ inch; total length = 325 cm, width = 20-25 cm, corresponding to the height of the insert; top and bottom of insert in wirenet too). Tunnel 20-25 cm wide; central room ∅ = 45 cm; shutters at E, and over central room.
E = Entrance hole i W and I (23 x 20 cm).
SP = Solid partition part.

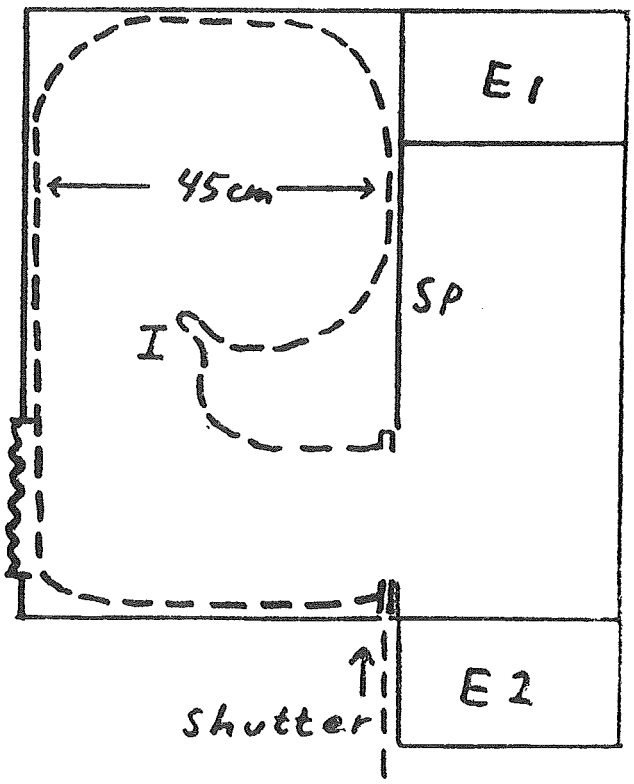

Fig. 4. Outline of new breeding nest box.
T2 = top nest box, model 2. Placed on the top of the fox cage.
W = Wooden box (80 x 80 x 40 cm); top and front can be opened, the front downwards.
I = Removable insert, made as in T1, but with a different shape. Tunnel (abt. 80 cm); central room ∅ abt. 45 cm; shutters at E and over central room.
E = Entrance hole in W and I (23 x 20 cm).
SP = Solid partition (removable).

Table 3. Use of different nest boxes during the first time of a choice test. Based on video recordings of a young Blue Fox female. For further information see the text of Table 2.

1 = during the first 24 hours.
2 = after 3 days.
Bb1 = Bottom nest box 1; (Fig. 1).
Bb2 = Bottom nest box 2; (Fig. 2).
T1 = new type of nest box placed on the top of the cage; (Fig. 3).

	Bb1		Bb2		T1	
	1	2	1	2	1	2
Frequency of visits	51	9	37	7	13	12
Average duration pr. visit (min.)	1.3	3.2	1.3	1.3	7.0	6.4
Total time in nest box (min./hrs. obs.)	66	29	50	9	93	77

and combined with a shelf (Tables 2 and 3). This was found through both scanning observations and video-recordings. The foxes did not, at this time, defecate inside the top nest boxes, neither in the tunnels nor in the inner room of the nest box.

3. **Top nest box** (breeding) (Fig. 4)

In the third experiment, concerning breeding nest boxes, 5 Silver fox females and 5 Blue fox females were tested. They were about 10 days pregnant at the start of the experiment. The two types were separated from each other both in time and in space: The Silver foxes arrived 1 month before the Blue foxes, and the two types were placed at separate ends of the fox house.

Behavioural observations were made as indicated in the table texts.

The breeding results are shown in Table 4, which includes data on choices for birth and later in the period of lactation. As can be seen 4 of the 5 Silver foxes, gave birth in the top nest box, whereas only 2 of the 5 Blue fox females did so. Of the two Blue fox females which gave birth in the traditional bottom

Table 4. Choices made by breeding farm fox females between two types of breeding nest boxes: One traditional on the bottom of the cage (Bb2) and one new model on the top of the cage (T2).*

	Date of birth	Place of birth	Number of pups	†	Choice of nest box in week no. after birth				
Silver Foxes (n = 5)					1	2	3	4	5
1	4/5	T	5	0	T	T	T	B	B
2	27/4	T	4	0	T	B	T	B	B
3	30/4	T	4	0	T	T	T	B	B
4	1/5	B	4	0	B	T	B	B	B
5	11/5	T	5	0	T	T	T	B	B
Blue Foxes (n = 5)									
1	11/6	T	8	0	T	T	T	B**	B
2	6/6	T	6	0	T	T	T	B**	B
3	11/6	B	10	0	B	B	B	T	B
4	6/6	B	6	6	B	B	B	B	B
5	27/6	T	5	0	T	T	T	T	B

*) Fox started to defecate in nest box
**) The foxes were tested individually and were given free choice between the two types of nest boxes in standard 2-room fox cages.
T was placed on the roof of one of the cage sections, with a shelf (Fig. 2) low. B was placed in the other cage section.
T = T2, Fig. 4). (B = Bb2, Fig. 1).

nest box, one killed all of its pups shortly after.

The only Silver fox, which chose the traditional bottom nest box, transferred its pups to the top nest box 3-4 days after birth.

The one blue fox, which had surviving young in the bottom nest box, transferred them to the top nest box on day 4 after birth.

In general, the females transferred their pups to the bottom nest box around 3-4 weeks after birth, i.e. at the time when the young had started to move towards the nest opening and sometimes fell down on the shelf below, (Table 4).

None of the Silver foxes defecated inside the top nest box nor on the shelf. This was the case, both with the breeding females throughout the breeding period and also after they had transferred their young to the other cage. It was also after they had transferred their young to the breeding period and also after they had transferred their young to the other cage. It was also the case with the young Silver foxes after weaning. Two of the Blue foxes, on the other hand, started to defecate in the nest box entrance tunnel and on the shelf below at about 30 days after birth, and after they had transferred their young to the other nest box.

The reason, why the top nest boxes were preferred may be: 1) their placement, and 2) their shape, including inner dimensions and the presence of a tunnel.

Even if the placement may seem contrary to that of foxes' natural dens, it contributes to reduce the fear of the animals: In general, small mammals react strongly to disturbances from above. This is an adaptation to the fact that most of their enemies attack from this angle. Also, in agonistic interactions, the dominant individual always tends to make itself taller, i.e. to be seen from above its opponent.

Through an elevation of the site of the nest box, the animal is elevated with respect to the human observer, and thus it may be less subject to stress due to fear. Also, the presence of a narrow entrance tunnel undoubtedly reduces stress due to fear; because under natural conditions the foxes generally make such narrow entrances to their dens to be protected against larger enemies as e. g. wolves.

The reason why, as opposed to the Silver foxes, two of the Blue foxes suddenly started to defecate inside the nest box, is unclear. It could be due to a sudden disturbance: At about the time they started, we had just opened their nest box because of a period of warm weather. It could also be a case similar to the often reported observation that foxes defecate e.g. on their hoarding sites at the time they have emptied and abandoned them: In the present experiment, the two only foxes that did defecate in the top nest box, started to do so, when their pups were about 4 weeks old and had just been transferred to the bottom nest box.

Original Report

Effects of social stress on circulating eosinophil leukocytes and sexual behaviour in ranch mink

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Summary

From 2 to 10 months of age, male and female ranch mink were housed either singly or in different social groups. Group housed animals showed elevations in circulating eosinophil leukocytes, indicating increased stress levels. At the age of 6 months, stress levels decreased for all group housed animals, and at that time individual stress levels reflected dominance relationships in the groups, so that high ranking animals were less stressed than low ranking animals. Despite the observed stress effects of group housing, group housed females revealed higher levels of sexual performance than singly housed females. It is suggested that familiarity with conspecifics is important for females' optimal breeding.

Introduction

When housed together in captivity on limited space, many mammalian species develop stress as a result of the continuous presence of conspecifics. The crucial factor appears to be an increased risk of being attached by conspecifics, and when group members show different levels of aggressive behaviour, low-aggressive members in general show more stress than high-aggressive conspecifics (Christian, 1963). This so-called social stress is primarily characterized by increases in pituitary-adrenocortical secretion activity, so that low-aggressive or subordinate animals show higher hormone secretion activity than high-aggressive or dominant group members (Nock and Leshner, 1976). Social stress has been extensively studied in laboratory rodents, and many details of the relationships between aggressive behaviour and hormonal responses of rodents have now been clarified (Heller, 1985). In modern mink production, it is a common practice to house two or more individuals together in the same cage. Thus, it could be expected that social stress might be developed, and that perhaps dominance relationships would be reflected in individual differences in physiological stress levels. Mink are solitary animals in nature, and social stress may, therefore, be of particular relevance in captivity for this species when compared with other farm animals of more social nature.

Preliminar comparisons of stress levels in group housed and singly housed juvenile mink suggest that higher stress levels are in fact induced in group housed animals (Jeppesen and Heller, 1985). This study, however, was carried out using animals of different farm origin, and dominance relationships were not determined.

The purpose of the present study was to investigate individual stress levels in juvenile mink under different social housing conditions, and to relate individual stress levels to determined dominance relationships. Moreover, we wished to evaluate effects on subsequent reproductive success. Social stress was assessed by measuring numbers of circulating eosinophil leukocytes; a measure which has previously been proven reliable for assessing experimental stress in mink (Heller and Jeppesen, 1985).

Materials and methods

The animals of this study were 50 male and 50 female pastel mink born in May 1985.

At the age of eight weeks, the animals were weaned and transferred to five different social housing conditions:

1) 20 males housed singly
2) 10 females housed singly
3) 10 males and 10 females housed in mixed-sex pairs
4) 20 males housed in pairs
5) 30 females housed in triplets.

All animals were held under conventional farm conditions in standard wire cages (30 x 45 x 90 cm) at National Institute of Animal Science, Dept. of Fur bearing Animals, 3400 Hillerød, Denmark.

Fifty mm^3 blood samples were collected approximately four weeks (21/8), seven weeks (12/9), eleven weeks (10/10), and fifteen weeks (7/11) after transfer to the different social housing conditions. Individual eosinophil leukocyte levels were determined according to the method described by Zarrow et al. (1964). During the experimental period, dominance relationships were repeatedly determined

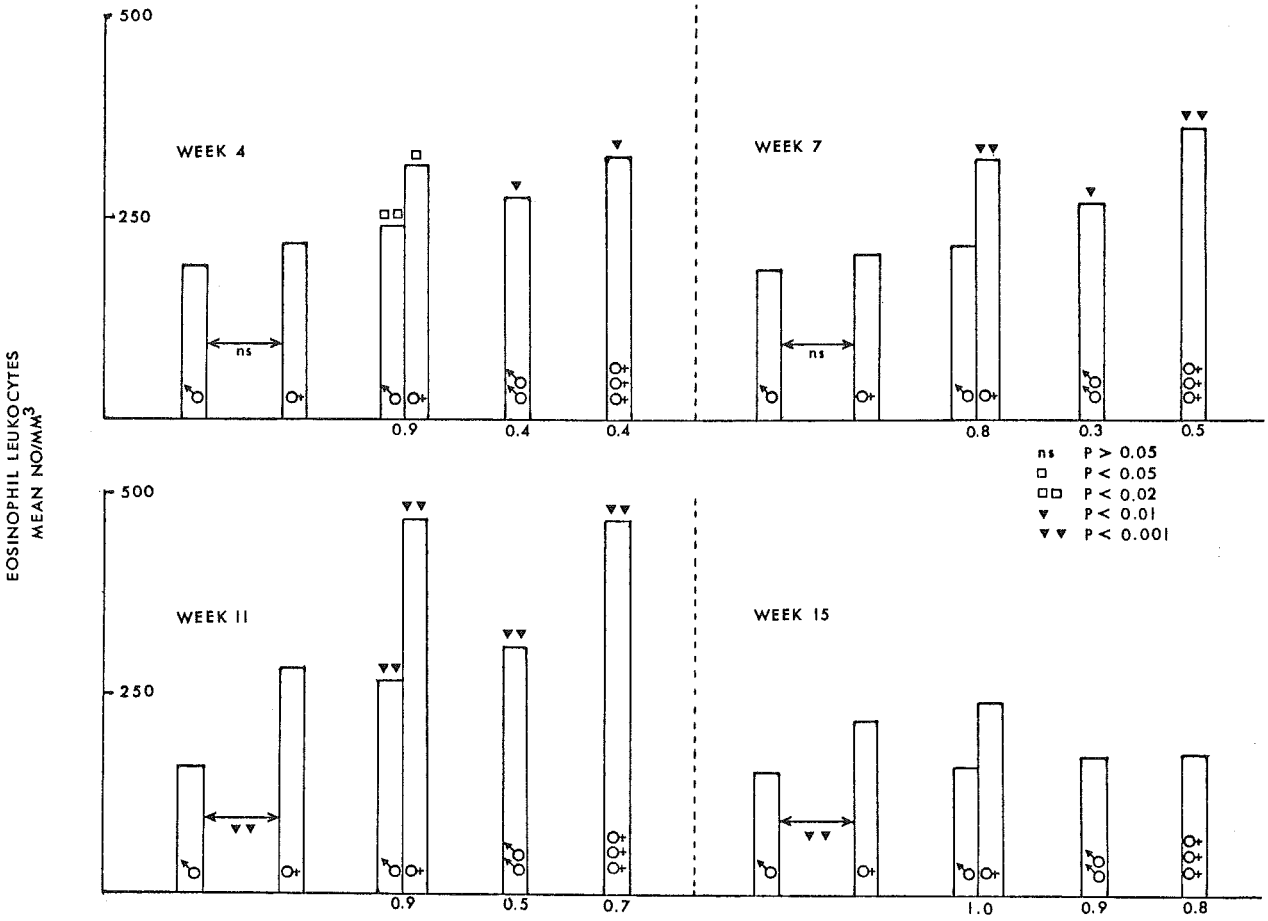

Fig. 1. Effects of different social housing conditions on mean circulating eosinophil leukocyte levels. See text for further details.

by behavioural observations. Feeding orders, spontaneous aggression, and behavioural responsiveness to a novel stimulus were recorded for cohabiting individuals. Social stress effects on reproduction were evaluated by measuring selected elements of the sexual behaviour during three successive male-female confrontations in March 1986, and by recording the number of pups delivered and surviving the fifth week of life in May 1986.

Results

Effects of the different social housing conditions on mean circulating eosinophil leukocyte levels are shown in Fig. 1. Significant differences between singly housed animals and animals in the other housing conditions are indicated separately for each sex on the figure. Arrows indicate comparisons between singly housed males and females.

Except for the 15-week bloodsampling, group housed animals of both sexes showed higher levels of circulating eosinophils than their singly housed counterparts. Singly housed females reached higher eosinophil levels than singly housed males during the two last periods of observation, and females cohabiting with males showed higher cell counts than their cagemates.

Kruskal-Wallis one-way analysis of variance (Siegel, 1956) revealed temporal variations in eosinophil levels during the observation period. Except for singly housed males, which showed almost constant levels throughout the experiment, the cellcounts declined significantly in the last 15-weeks bloodsampling ($P<0.001$ for other groups).

Records of feeding orders, spontaneous aggression, and behavioural responsiveness to a novel stimulus in the socially housed groups revealed individual differences which could only be explained by establishment of dominance relationships among the cohabiting animals. The dominance relationships, however, were only stable during the whole observation period in mixed-sex pairs, in which males dominated females throughout. Among the other cohabiting animals, dominance relationships shifted during the period.

Dominant social status correlated with low eosinophil levels for mixed-sex pairs during all observation period. The proportion of groups in which dominant individuals showed lowest eosinophil levels, as compared to their cagemates, is indicated below the abscissa i Fig. 1.

Table 1. Sexual performance of group housed (G) and singly housed (I) female mink during three successive male-female confrontations with 1-week intervals.

	1. confrontation		2. confrontation		3. confrontation		All confrontations	
	G	I	G	I	G	I	G	I
Number of females observed	22	9	22	9	22	9	22	9
Number of females copulating	15	3	15	2^{+}	19	$4^{\S}$	21	$4^{\S}$
Mean latency to intromission (min)	39.4	25.6	17.3	22.5	29.7	39.0	28.8	36.4
Mean duration of intromission (min)	36.9	39.0	36.9	48.5	61.3	48.5	37.6	45.3

$^{+}P = 0.06$
$^{\S}P < 0.01$

The sexual performance of group housed and singly housed females during three successive male-female confrontations is shown in Table 1. Due to deaths among subordinate females in the high-density female groups, all triplets of females were reduced to pairs prior to the confrontations. X^2-tests revealed that a significant higher proportion of group housed females showed copulation, although there were no significant differences between group housed and singly housed females with respect to specific behaviorual elements once copulation was initiated.

The homogeneity of copulating females' behavioural performance was reflected in the ultimate reproductive success of those females. Average litter sizes reached 5.3, 5.0, and 4.7 for singly housed females, females housed in mixed-sex pairs, and females in triplets, respectively. The corresponding numbers of pups surviving their fifth week of life were 5.0, 4.7, and 4.1.

Discussion

Rearing juvenile mink in groups leads to marked elevations in circulating eosinophil leukocyte levels.. The levels of eosinophils obtained in group housed animals in the present study resemble the levels induced in isolated juvenile mink by prolonged and severe immobility stress (Heller and Jeppesen, 1985). It may therefore be suggested that the socially reared animals investigated here experience stress to an extent comparable with the stress induced experimentally in the above cited study. Provided this assumption is valid, several more detailed points could be made regarding the experienced social stress of the different experimental groups in the present study.

When males and females are housed together in pairs, females experience more stress than males. Individual stress levels reflect dominance relationships in the groups, at least to some extent, so that high ranking or dominant animals are less stressed than low ranking or subordinate animals. These interpretations of the eosinophil data agree with the existing knowledge of interactions between social stress, group size, and dominance relationships in laboratory rodents (Christian, 1963; Nock and Leshner, 1976; Heller, 1985), and the present study, therefore, seems to extend this knowledge to include juvenile mink. Examining the temporal variations in eosinophil levels more carefully, it appears that the experienced stress in all groups diminishes between 11 and 15 weeks of social rearing. Such a decrement in the social stress response with prolonged exposure to conspecifics, however, is not in concert with the results obtained in rodent studies. A simple explanation to this apparent discrepancy may be that the eosinophil data do not reflect actual levels of experienced stress after prolonged periods of stress, or in other words that the eosinophil response exhausts after long-term stress. The observed eosinophil levels at the 15-week bloodsampling in the present study and in previous studies using prolonged experimental stress, there were no signs of eosinophil exhaustion (Jeppesen and Heller, 1986). It seems more likely, therefore, that the experienced stress levels were in fact reduced between 11 and 15 weeks of social housing in the present study. The behavioural observations performed here support such an interpretation in that the most stable dominance relatiosnhips in the groups and the highest correlation between dominance and eosinophil levels were recorded in the 15-week period. Other studies on the ontogeny of aggressive behaviour in socially reared mink (Dodd, 1985) have found a marked reduction in intraspecific aggression at the same time of year as we here notice a reduction in circulating eosinophil levels. According the general view on the causes of social stress, namely increased risk of being attacked, a fall in aggression, of course, would lead to reduced social stress as the eosinophil data indicate in the present study. If this interpretation holds true, the existence of interspecific differences in the prolonged

social stress response between mink and laboratory rodents will have to be accepted.

The most pronounced experimental effects on subsequent reproduction observed here concerned females' sexual receptivity. Group housed females initiated copulation far more willingly than singly housed females. This implies that the social stress experienced earlier in life by the group housed females improved sexual performance or at least did not impair other facilitatory effects associated with social rearing. Among such facilitatory effects, familiarity with conspecifics could be accentuated. Gilbert and Bailey (1969) previously stressed the importance of a socialization period for optimal breeding within 5 to 8 weeks after birth, and in another study (1967), the same authors found inhibiting effects of visual isolation on the reproductive success of female mink when isolated during 8 to 10 months of age. In the present study, differential housing was initiated at 2 months of age and continued during breeding until 10 months of age. The observed low levels of sexual performance among singly housed females, therefore, cannot be due to disturbed socialization within 5 to 8 weeks after birth, but has to be explained by the long period of physical isolation prior to breeding. In our own investigation (Jeppesen and Heller, 1986), the sexual performance of experimentally stressed females did not differ from non-stressed controls. Thus it can be stated that neither experimental nor social stress reduces sexual behaviour of ranch mink.

The experimental effects on copulation were directly reflected in the number of pups delivered and in the number of pups surviving the fifth week of life.

Acknowledgement

Thanks to the National Institute of Animal Science, Dept. of Fur bearing Animals, 3400 Hillerød, Denmark, for the opportunity to do experiments with mink at Trollesminde research farm.

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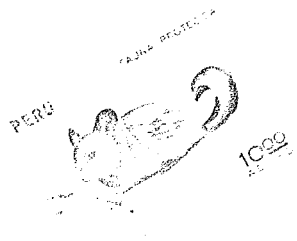


CHINCHILLA, STUDY OF LITERATURE.

(Litteratur vedrørende chinchilla).

Gurbakhsh Singh Sanotra.

Chinchilla has been used by the inhabitants of south America for centuries; this small animal was not merely used as a pet, but its skin and hairs was used for clothes and weaving of carpets.

Since the discovery of the continent in question by the Spaniards, chinchilla became well known to the rest of the world owing to its excellent quality of fur.

The idea of chinchilla-farming was originally put forward by Juan I. Molina in 1782, but the real, practical implementation of this idea was carried out in the early twenties by a mine engineer named M.F. Chapman, who at that time was working in Chile. On a global scale, chinchilla fur production does not rank at a tremendous level, on the contrary furs softness, tenderness makes it most demanded in spite of its high price.

Regarding nutrition of the animals, pellets containing moderat quantities of proteins and fats have proved to be the best suited feed under farm-conditions. Along with pellets an everyday supply of good quality hay and green grass is recommended. Another factor which plays an important part in nutritional respect is coprophagy. Current experiments carried out by Björnhag and Sjöblom (1977), have shown that chinchilla is capable of reingesting as much af 54% of its fecal nitrogen content.

To produce fur of good quality, it is necessay to have a good farm management to take care of the animals. This factor is important, it is appropriate to point out that chinchilla in comparison to many other animals closely related to it, has a low reproductive rate. Under farm conditions a female chinchilla normally give birth to about 4 kits a year.

Chinchilla as other animals, becomes victim of a number of diseases. Diseases of the digestive system, fur-chewing and ring-worm are among the common ones. The last two diseases are of economic importance.

Natl. Inst. of Animal Science, Copenhagen, Denmark. 1985.
83 pp, 24 tables, 10 figs. Author's summary.
In DANH. Summary in ENGL.

A METHOD FOR ESTIMATION OF THE DEGREE OF HAIR COVER DEVELOPMENT IN MAMMALS BY MEASUREMENTS OF THE INFRARED IRRADIATION WEAKENING.

A.T. Kliukina.

It is proposed to use the weakening of skin infrared irradiation to study the degree of hair cover development in mammals. Under constant irradiation, the less hair cover density, the greater registered flow. In measurements on a live animal, an infrared flow irradiated by the animal itself is registered but, in case of studying the skins, the infrared flow is made by a heater to which the skin closely adheres. Theoretical analysis and experiments have shown that the woolfat, the angle of hair inclination and the scrapings' thickness do not influence practically the results of measurements. The influence of hair contortion and en-

vironmental temperature are considered by the coefficients established experimentally. The maximum error of the method amounts to 5%, the number of gradiations obtained on the same skin attaining 26. The results of studying the hair cover topography of the standard dark-brown mink by a new method are provided.

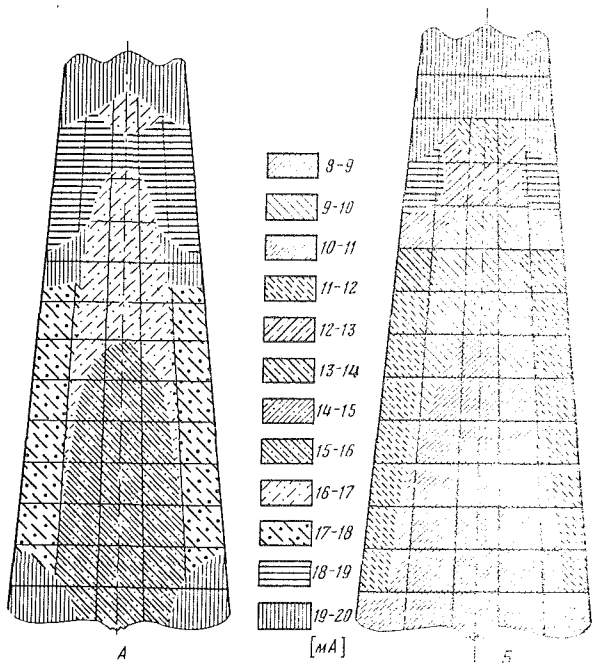


Рис. 4. Топография массы волосяного покрова стандартной шкурки темно-коричневого типа: *А* — самки, *Б* — самца (меньшему значению тока соответствует бо́льшая масса волос)

Zoologicheskii zhurnal, Moskva "Nauka", 63, 8, 1242-1249, 1984.
4 figs., 3 tables, 3 references. Author's abstract.
In RUSS. Summary in ENGL.

IDENTIFICATION OF HAIRS OF SWISS MAMMALS. V. CARNIVORA. VI. ARTIODACTYLA.

(Détermination des mammifères de la Suisse par leur pelage: V. Carnivora. VI. Artiodactyla.

Albert Keller.

The last part of the study of hair structure of swiss mammals is consecrated to the families of Canidae, Mustelidae, Felidae, Suidae, Cervidae and Bovidae. Keys are proposed for the identification to family and species level using the different cuticular and medullar structures, as well as the shape of the cross-sections.

Rev. suisse Zool., 88, 3, 803-820, 1981.
11 figs., 16 references. Author's abstract.
In FREN. Summary in ENGL.

FIG. 2.
Vulpes vulpes: a morphologie de la cuticule; b structure médullaire; c coupes transversales.

FUNCTIONAL STATUS OF THYROID IN MINK REARED UNDER HOT CLIMATE CONDITIONS.

I.Z. Akhmetov, Kh. Sh. Khairutdinov, R. Absamatov.

The functional thyroid activity was examined using ^{131}I in three animal genotypes under acclimatization. The adaptation is shown to be accompanied with alterations in thyroid status. It is noted thyroid function changes depending on daily time and season. The thyroid functions are repressed in summer and under insolation especially. The individual and genotypical differences are revealed in animal tolerance to high temperature and intensive insolation.

Sel'skokhozyaistvennaya Biologiya, 8, 87-90, 1985.
3 tables, 10 references. Authors' summary.
In RUSS. Summary in ENGL.

CHEMICAL COMPOSITION AND NUTRITIVE VALUE OF THE SKELETAL MUSKULATURE OF NUTRIAS.

(Chemicke zlozenie a nutritivna hodnota kostroveho svalstva nutrii).

Olga Palanska, Milan Barta, Stefan Palenik.

The basic chemical composition, content of amino acids, content of "freely" bound water, stiffness, myoglobin and hydroxyproline contents were examined in the femural musculature of standard nutrias at the age of 3 years and 8 months of male and female sexes. Nutrias at the age of three years show a higher fat content irrespective of sex. A higher content of ash matter and higher values of stiffness were found in the musculature of females at the age of 3 years. The musculature of males at the age of 3 years had a higher content of myoglobin and a lower retention of water. Higher contents of lysine, threonine, valine, isoleucine, phenylalanine, arginine, proline and thyrosine were recorded in the structure of amino acids in the musculature of nutria males at the age of 3 years. Females at the age of three years had higher contents of threonine, valine, isoleucine, histidine, aspartic acid, xerine, glutamic acid, thyrozine and hydroxyproline. The musculature of females has generally a higher fat content from the aspect of sexual appurtenance. Also differences in the content of aspartic acid, glutamic acid and hydroxyproline were found.

Pol'nohospordarstvo = Agriculture, Bratislava, Szechoslovakia Slovenskej akademia vied 31, 2, 145-155, 1985.
6 figs., 11 references. Authors' abstract.
In SLOE. Summary in ENGL and RUSS.

AMMONIA LEVELS IN THE WHELPING NESTS OF FARMED RACCOON DOGS AND POLECATS.

Hannu Korhonen, Mikko Harri.

1. Ammonia concentrations were measured in the nests of farmed raccoon dogs (Nyctereutes procyonoides Gray, 1834) and polecats (Mustela putorius) at weaning time.

2. Ammonia levels in the nests of raccoon dogs and polecats varied

from 1 to 43 ppm and from 0 to 5 ppm, respectively.

3. In the raccoon dog, with increasing litter size, the ammonia concentrations tended to increase exponentially.

4. In the polecat, no marked relationship between litter size and ammonia levels were found.

5. The results show that no special adaptations are required in farm life because even the highest ammonia concentrations measured were below the harmful level.

Comp. Biochem. Physiol., 84A, 1, 97-99, 1986.
2 tables, 1 fig., 13 references. Authors' abstract.

HEAT LOSS OF FARMED RACCOON DOGS AND BLUE FOXES AS EVALUATED BY INFRARED THERMOGRAPHY AND BODY COOLING.

Hannu Korhonen, Mikko Harri.

1. Infrared thermographs showed that heat loss of the raccoon dog (Nyctereutes procyonoides Gray 1834) is greatest from the chest, the head, the abdomen and the feet. The blue fox (Alopex lagopus) seems to be somewhat better insulated.

2. Mass$^{-0.75}$ specific heat transfer coefficients (W/kg$^{0.75}$ per °C) in both species were similar. The wooden nest was able to decrease it significantly.

3. The results support the conclusion that heat loss, and thus the energy costs, of studied species could be reduced by providing them with either a winter nest or a rest-shelf in the cage.

WOODEN NEST (RACCOON DOG, BLUE FOX)

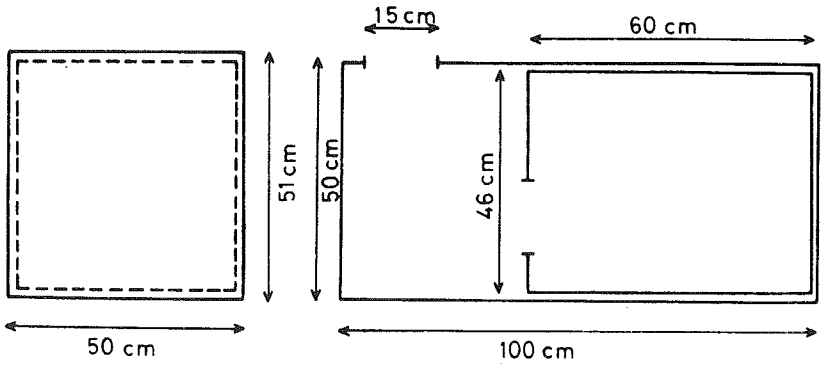


Fig. 1. Schematic picture of the experimental nest type.

Comp. Biochem. Physiol., 84A, 2, 361-364, 1986.
4 figs., 11 references. Authors' abstract.

RAISING RACCOONS FOR RELEASE. PART II. REHABILITATION AND DIET.

Adele T. Evans, Richard H. Evans.

The initial phases for rehalibitation of the raccoon raised for release are discussed. Topics include: digestive physiology; suckling and weaning period; artificial milk replacers; diet in the wild; dietary supplementation.

Veterinary Technician, 6, 6, 296-306, 1985.
6 figs., 4 tables, 19 references. CAB-abstract.

ANDROGEN AROMATIZATION AND 5α-REDUCTION IN FERRET BRAIN DURING PERINATAL DEVELOPMENT: EFFECTS OF SEX AND TESTOSTERONE MANIPULATION.

S.A. Tobet, J.H. Shim, S.T. Osiecki, M.J. Baum, J.A. Canick.

Ferrets of both sexes were killed 8 or 5 days before expected parturition as well as 7, 15, 30, or 51 days after birth, and the activities of aromatase (using 19-(^{3}H)hydroxyandrostenedione as substrate) and of 5α-reductase (using (^{3}H) testosterone as substrate) were assayed in whole homogenates of preoptic area plus anterior hypothalamus (POA), mediobasal hypothalamus (MBH), temporal lobe (TL), and cerebral cortex. Aromatase and testosterone 5α-reductase activities were also measured in these regions in adult gonadectomized male and female ferrets. Compared with adults of both sexes in which aromatase activity was low in all brain regions studied, fetal ferrets had high levels of aromatase activity in POA plus MBH and in TL. At these prenatal ages, aromatase activity in POA plus MBH was significantly higher in males than in females. Aromatase activity in POA, MBH, and TL remained high in both sexes on postnatal days 7, 15, and 30, before declining by postnatal day 51. Cortical aromatase activity was uniformly low across all perinatal ages. The existence of a sex difference in aromatase activity in fetal POA plus MBH cannot be explained by a concurrent sex difference in circulating testosterone. Administration of testosterone to pregnant female ferrets over days 30-41 of gestation caused 150- to 350-fold increases in maternal plasma concentrations of testosterone and 2- to 5-fold increases in fetal plasma testosterone. However, aromatase activity was not affected in the POA and MBH of fetuses or mothers, although activity was significantly increased in the TL of mothers given testosterone. Furthermore, castration of neonatal or adult breeding males decreased plasma androgen levels by factors of 8 and 480, respectively, but resulted in only modest reductions in POA, MBH, and TL aromatase activity (a significant reduction occurred only in the adult male TL). Relatively high levels of testosterone 5α-reductase activity were found in all brain regions across all perinatal ages, as well as in gonadectomized adult ferrets; there were no sex differences at any postnatal age studied. Prenatally, males had higher levels of 5α-reductase activity than females only on day -8 in the POA plus MBH. The results show that estrogen and 5α-reduced androgens can be synthesized in the brains of ferrets of both sexes during the perinatal period of sexual differentiation. A functional role for this neural metabolism of androgen remains to be demonstrated in this carnivorous species.

Endocrinology, 116, 5, 1869-1877, 1985.
4 tables, 3 figs., 40 references. Authors' summary.

A COMPARATIVE STUDY OF THE TAPETUM, RETINA AND SKULL OF THE FERRET, DOG AND CAT.

G.Y. Wen , J.A. Sturman, J.W. Shek.

Results of this investigation indicate that the ferret (Mustela putorius) closely resembles the dog (Canis familiaris) and should be a useful research animal alternative. The tapetum lucidum is a common structure present in the eyes of dogs, cats (Felis catus) and other nocturnal animals. Our study showed that this structure was present in ferret eyes. The color or reflection of the ferret and dog tapetum was remarkably reduced by the general fixation with glutaraldehyde. However, this color fading phenomenon was not observed in the cat tapetum. These observations led to this comparative study on several morphological, histochemical and biochemical parameters on mature ferrets, dogs and cats including: (1) the number of center tapetum cell layers, (2) thickness of center tapetum, (3) presence of a microtubule-like structure in each tapetal rod, (4) presence of electron-dense cores in tapetal rods after prolonged fixation in glutaraldehyde, (5) retention of reflection or color of tapetum after prolonged glutaraldehyde fixation, (6) zygomatic bones of eye orbits, (7) zinc content in tapetum, (8) cysteine in the tapetum, (9) cysteine sulfinic acid decarboxylase in liver, (10) thickness of retina from center tapetum, (11) anterior view of skull configuration, and (12) lateral view of skull configuration (jaw and teeth). Among these 12 parameters, ferret and dog were similar in the first nine points; ferret and cat were similar to each other only in the last two points. There was no difference in retinal thickness among these three animals.

Laboratory Animal Science, 35, 3, 200-210.
2 tables, 24 figs., 47 references. Authors' abstract.

USE OF FERRETS IN STUDIES OF THE VISUAL SYSTEM.

Cheryl A. Jackson, T.L. Hickey.

The ferret (Mustela putorius furo) is proving to be an excellent experimental animal for many anatomical and physiological studies of the adult and developing visual system. As a result, the amount of data available on the ferret's visual system is increasing at a rapid rate. The purposes of this paper are to briefly review some of those data and to present some of the reasons why the ferret is an appropriate choice as an experimental animal for visual system studies.

Laboratory Animal Science, 35, 3, 211-215, 1985.
3 figs., 34 references. Authors' abstract.

THE FOREBRAIN OF THE FERRET.

B. Isabel Lockard.

The basic neuroanatomy of the forebrain, mainly of the telencephalon, of the adult ferret (Mustela furo), is reviewed and illustrated with special references to the features that distinguish this animal from other carnivores. Reference to the pertinent literature describing similar regions of other carnivores are cited.

Laboratory Animal Science, 35, 3, 216-228, 1985.
12 figs., 42 references. Author's abstract.

BEHAVIOUR AND NEUROBEHAVIORAL TERATOLOGY USING THE FERRET.

Ausma Rabe, Raef Haddad, Ruth Dumas.

A behavioral profile of the ferret is presented for those who would like to use this animal in behavioural teratology and toxicology, or other disciplines involving behaviour. We have reviewed neurobehavioral teratoloty of lissencephalic ferrets and neuropsychology of ferrets sustaining frontal lesions, as well as most of the studies of "normal" ferret behaviour that have appeared in the research literature. Emphasis is placed on discussion of the tests used and how ferrets behaved on them. The behaviours discussed include spatial (maze) learning, delayed response, visual discrimination learning, discrimination learning sets, schedule maintained behavior, shock avoidance learning and spontaneously occurred behaviours, such as ambulation in open field, spontaneous alteration and species specific behaviours. Although the use of the ferret in behavioural experiments is not yet extensive and large gaps exist in our knowledge about the basic functional capacities of this animal, the ferret is unquestinably well suited for behavioral studies.

Laboratory Animal Science, 35, 3, 256-267, 1985.
1 fig., 1 table, 139 references. Authors' abstract.

THE ELECTROCARDIOGRAM OF NORMAL FERRETS AND FERRETS WITH RIGHT VENTRICULAR HYPERTROPHY.

Shirley H. Smith, Sanford P. Bishop.

Sixty-eight electrocardiograms were recorded on ferrets (Mustela putorius furo). These represent 29 normal weanling males, 19 normal adult males and 20 adult males with right ventricular hypertrophy (RVH). Analyses of rate, rhythm, axis and total voltage were used to define the normal electrocardiogram (ECG) and to identify changes seen in RVH. The normal ferret has a heart rate of about 300 beats per minute and a mean electrical axis of $+86° \pm 6.6$ (SD). A 56% increase in right ventricular weight to body weight ratio was not associated with right axis deviation. The overall voltage produced on the ECG was increased in the group with RVH as compared to the normal group ($p < 0.030$).

Laboratory Animal Science, 35, 3, 268-271, 1985.
1 fig., 1 table, 9 references. Authors' abstract.

LABORATORY MANAGEMENT OF THE FERRET FOR BIOMEDICAL RESEARCH.

Kathleen D. Moody, Teresa A. Bowman, C. Max Lang.

Ferrets have become an increasingly important animal in biological research. This paper discusses unique aspects of the ferret's anatomy, reproductive behavior, husbandry, and diseases as they relate to the research use of this animal.

Laboratory Animal Science, 35, 3, 272-279, 1985.
4 tables, 59 references. Authors' abstract.

EVALUATION OF KETAMINE, KETAMINE-XYLAZINE AND KETAMINE-DIAZEPAM ANESTHESIA IN THE FERRET.

A.F. Moreland, Carol Glaser.

Ketamine, ketamine-xylazine, and ketamine-diazepam were evaluated clinically in 15 ferrets, and safe dosage was determined for each. All of the three regimens provided excellent immobilization. However, muscle rigidity and incomplete analgesia were noted in ketamine alone and in ketamine-diazepam respectively. It was concluded that 25 mg/kg ketamine and 2 mg/kg xylazine intramuscularly provided acceptable analgesia, muscle relaxation, duration and smooth recovery, althouth cardiac arrhythmias were a concern and require careful observation.

Laboratory Animal Science, 35, 3, 287-290, 1985.
1 fig., 3 tables, 13 references. Authors' abstract.

ADRENALECTOMY IN THE FERRET.

Donna L. Filion, Richard M. Hoar.

A simple adrenalectomy technique is presented for the ferret (Mustela putorius furo). The adrenal glands were removed in two operations with an interim recovery period of approximately 1 week. The right adrenal should be removed first, as the surgery is complicated on that side by fascia which binds the adrenal to the inferior vena cava. Salt solution (1% NaCl) in place of water will maintain sodium balance.

Laboratory Animal Science, 35, 3, 294-295, 1985.
6 references. Authors' summary.

COMPENDIUM OF RECENT LITERATURE ON THE FERRET.

Kimberle A. Frederick, John G. Babish.

A survey of research publications since 1977 indicated that the ferret is a rather popular research animal. Using the BIOSIS and MEDLINE data bases, 569 citations of research involving the ferret were identified. Over 27% of these citations involved the use of ferrets in the field of physiology, and an additional 24% of the citations were in virology and immunology. The areas of pharmacology, toxicology and teratology accounted for 10.4, 8.4 and 4.0% of the citations, respectively.

Laboratory Animal Science, 35, 3, 298-318, 1985.
Authors' summary.

THE DECLINE OF THE RARER CARNIVORES IN GREAT BRITAIN DURING THE NINETEENTH CENTURY.

P.J.W. Langley, D.W. Yalden.

The literature documenting the decline in distribution of the polecat (Mustela putorius), Pine marten (Martes martes) and Wild cat (Felis silvestris) in Great Britain during the nineteenth century is surveyed, and a series of maps to illustrate the declines is presented. These highlight the different patterns of decline in the three species, and draw atten-

tion to the parallels in certain birds of prey. The declines do not match the decline in woodland, which was largely completed before they began. They do coincide with the development of the sporting estate, and moreover the differences between the species can partly be explained by differences in persecution.

Mammal Review, 7, 3 and 4, 1977.
1 table, 7 figs., 6 references. Authors' abstract.

CONTRIBUTION TO THE ECO-ETHIOLOGY OF THE STONE MARTEN (MARTES FOINA): HOME RANGE AND FOOD RESOURCES UTILIZATION STRATEGY. GENERAL INTRODUCTION AND DIET ANALYSIS (IN BELGIUM).

(Contribution á l'étude éco-éthologique de la Fouine (Martes foina): Strategies d'utilisation du domaine vital et des ressources alimentaires (1) Introduction Générale et analyse du régime alimentaire).

José Kalpers.

This first paper treats of the diet of the Stone marten, Martes foina, in some countries of Wallony. On the whole, 237 faeces and 5 stomachs from animals found dead were analysed. The prey diversity is very wide and undertakes mammals, birds, insects, molluscs and plants. Quantitatively, mammals fill the first place, with a total of 42%, followed by plants (21%), birds (20%), insects (12%) and eggs (4%). A comparison of the global diet between the three most important lots, i.e. Othée (Hesbaye), Cul-des-Sarts (Ardenne) and Plainevaux (Condroz) reveals significative differences ($p < 0.001$). We have also showed that the diet can vary from one year to the other in the same place. It appears that the Stone marten, on the alimentary level, is a generalist (eating a great diversity of food items) and opportunistic carnivore (feeding on the most abundant prey categories).

Cahiers d'Ethologie Appliquee (Belgium) 3, 2, 145-163, 1983.
4 tables, 4 figs., 23 references. Author's abstract.
In FREN. Summary in ENGL.

OBSERVATIONS OF PINE MARTENS II. TOLERANCE AND VOCALIZATIONS.

(Observasjoner av mår II: Toleranser og lydytringer).

Erling Kvalheim.

Four wild Pine martens, Martes martes, (so tame as to accept food offered from the hand) were under observation for 5 months (November-March) last winter (74/75). The observed martens were, a female, her two nearly two years old cubs (a male and a female) and an old male, assumed to be the father of the cubs. The previous winter these four animals were observed to be peacefully together up to February. And as late as the 30 May the same year there was recorded a certain companionship between mother and daughter. A sketch will show how physical contact was used as communication between the two of them.

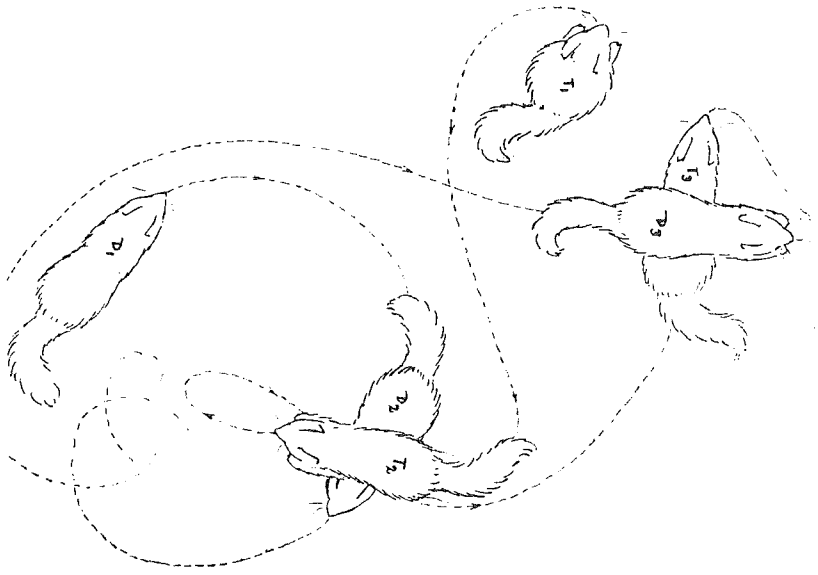


Fig. 5

Fysisk kontakt som kommunikasjon mellom to mår, Turid (T) og hennes 1-årige datter, Diana (D). Se for øvrig teksten.
Communication between martens, Turid (T) and her 1-year old daughter Diana (D), by physical contact. See text.

The observations made last winter showed the elderly female's increasing aggressivity towards her daughter (not directly observed, conclusion of other observations) and towards the old male animal. The reason is assumed to be that the old female was pregnant. The two male animals were more often seen together and always at peace.

A few sounds were registered such as a short of staccato "tock-tock"-sound (as Mr. Brink connects with males in mating-time). This certain sound was heard both from males and females and was not observed to have anything to do with courtship/mating.

Fauna, Oslo, 28, 3, 128-138, 1975.
2 tables, 4 figs., 4 references. Author's summary.
In NORG. Summary in ENGL.

COMMUNICATION AND TOLERATION BETWEEN PINE MARTENS (MARTES MARTES L.) LIVING IN THE WILD.

(Kommunikation und Toleranz unter in freier Wildbahn lebenden Edelmardern (Martes martes L.).

Erling Kvalheim.

Observations were made on freeliving, wild Pine Martens which were tamed and fed during the winter season. Some examples of the Martens reactions and behaviour are mentioned. A two year old female Marten showed fear of a squirrel. Three Martens learned to use a bell system to get food. The Martens were not able to smell out fresh eggs.

A synoptical table shows the number of meetings at the feedingplace between two Martens of varying age and sex.

An old male was able to get on with a two year old male. A sketch shows how physical contact was used as a means of communication between a female Marten and her two year old cub (female).

Next winter the same female Marten showed aggression towards the cub and an old male Marten. A few posible signs of false heat on the same female (in November and January) are described. A number of different sounds, heard under varying conditions are referred to.

Z. Jagdwiss. 28, 73-79, 1982.
2 figs., 2 tables, 5 references. Author's summary.
In GERM. Summary in ENGL, FREN.

COMPOSITION OF THE FOOD OF MARTENS.

Jacek Goszczynski.

The diet of martens (Martes sp.) was examined by means of analysis of 835 excrements. Fruits (42.7%), small rodents (32.4%), birds (15.7%), Lagomorpha (5.3%) and insects form the main components of food biomass. During the summer-autumn period the diet of martens consist chiefly of plant food, and in winter and spring animal food. The role of martens in reduction of voles, hares and game birds is discussed.

Acta Theriologica, 21, 36, 527-534, 1976.
1 fig., 4 tables, 12 references. Author's summary.
In ENGL. Summary in POLH.

EXPERIMENTS WITH BREEDING OF PINE MARTENS (MARTES MARTES L.) IN FARM CONDITIONS AT KUUSAMO.

(Försök att föda upp skogsmård (Martes martes L.) i farmförhållanden i Kuusamo).

Erik S. Nyholm.

Of 8 female pine martens captured in Finland in 1978-79, 5 survived and produced litters in captivity between 15. Apr. and 2 May. Two females killed their litters, but 13 young in the remaining 3 litters survived. Birth weight of young averaged 31.8 g (28-35). The main mating season is in July-Aug., and of females becoming pregnant at Kuusamo, the majority mated between 1 and 17. Aug. Details are given of feeding and management.

Finsk Pälstidskrift, 14, 4, 190-198, 1980.
10 figs., 1 table, 15 references. Animal Breeding Abstracts.
In SWED.

BIOLOGY OF REPRODUCTION AND DEVELOPMENT OF MUSTELA ERMINEA (CARNIVORA, MUSTELIDAE).

D.V. Ternovsky.

46 offsprings were obtained in the open-air cages from 40 stoat females out of which 29 were mated at the age of 17-75 days with the adult males.

In the females the normal maturation of reproductive system takes place at the early age in advance of the functioning of the organs of hearing and vision. A continous rut begins from the age of 20 days and lasts till autumn. The females give birth to the normal progenies. The duration of pregnancy is from 240 to 393 days (by 35 precise cases); it is connected with the labile delayed implantation and is, besides, determined by a great length of the rut (from March till September) as compared with a shorter, approximately thrice, period of procreation (April, May).

Zoologicheskii zhurnal, Moskva "Nauka", 62, 7, 1097-1105, 1983.
2 tables, 1 fig., 22 references. Author's summary.
In RUSS. Summary in ENGL.

CURRENT POSITION AND FUTURE OF THE PRODUCTION OF FUR BEARERS IN ARGENTINA.

(Estado actual y perspectivas de la produccion de peliferos en la Argentina).

Rafael Garcia-Mata.

At present, approx. 70,000 mink pelts are produced in Argentina each year. Possibilities of increasing production are discussed, and those of breeding other types of fur bearer are considered.

Rev. Arg. Prod. Anim., 4, 9, 985-992, 1984.
1 table. CAB-abstract.
In SPAN.

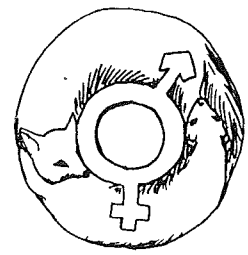
BIOLOGICAL INFORMATION ABOUT GAME ANIMALS FOR THE HUNTER.

(Wildbiologische information für den Jäger).

Franz Müller.

This book, the third in a series written for the hunter-conservationist, describes the identification characteristics, body measurements and weights, dentition, foot prints, age and sex determination, biology, behaviour, ecology, distribution, hunting terminology and legal status of the beech marten, pine marten, brown hare, capercaillie, black grouse, red fox, hazel hen, ptarmigan, grey partridge, mallard, mouflon, marmot, chamois, goshawk and jay. Outstandingly good are the numerous line drawings depicting the different species on play, flight, display, courtship, mating, and hunting and capture of prey. One small omission noted by the reviewer - the goshawk is now a breeding British bird.

Ferdinand Enke Verlag, D-7000 Stuttgart 1, G.F.R., 1980.
195 pp, rich illustrated. Index Vet.
In GERM.



GENETICS

STUDIES ON THE Lpm SYSTEM OF MINK ALLOTYPES IN THE CONTEXT OF THE ALEUTIAN DISEASE.

ИССЛЕДОВАНИЕ Lpm-СИСТЕМЫ АЛЛОТИПОВ НОРОК В СВЯЗИ С АЛЕУТСКОЙ БОЛЕЗНЬЮ

T.I. Kochlashvili, O.K. Baranov, V.I. Yermolaev.

Data on comparative study of the Lpm system of allotypes in minks of sovkhoz populations affected and nonaffected by Aleutian disease are presented. Significant interpopulational differences for frequencies of several Lpm genes of the second category (of corresponding haplo-, allo- and phenotypes) are revealed. This category includes genes species-specific for Mustela vison which make the main contribution to Lpm polymorphism. Seven minks with Lpm 3, 4, 6, 9, 10, 11 and Lpm 3, 4, 6 7, 9, 10, 11 phenotypes, unknown earlier, have been found in the stationary hotbeds of Aleutian disease. They are most probably caused by the appearance and spreading of the recombinant haplotype Lpm 3,4,6, 9,10, 11 in these populations. The data obtained are discussed from the point of view of their possible connection with epizootic of Aleutian disease.

Genetika, USSR, 21, 11, 1896-1903, 1985.
2 figs., 2 tables, 17 references. Authors summary.
In RUSS. Summary In ENGL.

DOMESTICATION IN THE SILVER FOX (VULPES FULVUS DESM): CHANGES IN PHYSIOLOGICAL BOUNDARIES OF THE SENSITIVE PERIOD OF PRIMARY SOCIALIZATION.

D.K. Belyaev, I.Z. Plyusnina, L.N. Trut.

The physiological boundaries of the sensitive period of primary socialization were studied in the silver fox (Vulpes fulvus Desm.). A total of 273 farm-bred foxes from 59 litters were observed from 1976 to 1978; pups were produced by vixens from two populations, one selected for domesticated behaviour and the other unselected. Results indicate that the age when the eyes are fully open, when the response to sound first appears and when exploratory behaviour is first shown in strange surroundings is 3 weeks, on average.

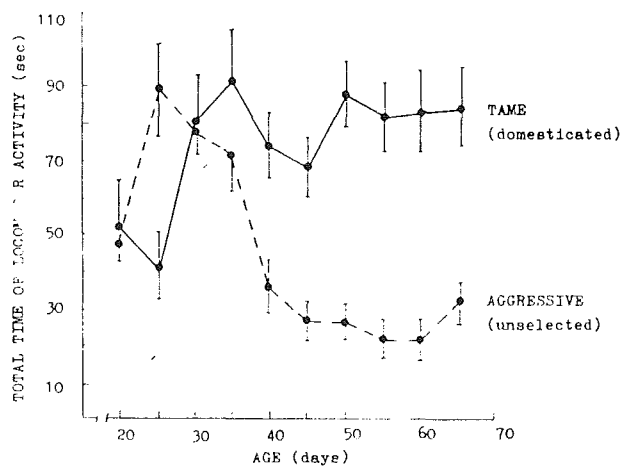


Fig. 1. Total time (s) of locomotor activity in tame and aggressive foxes according to age.

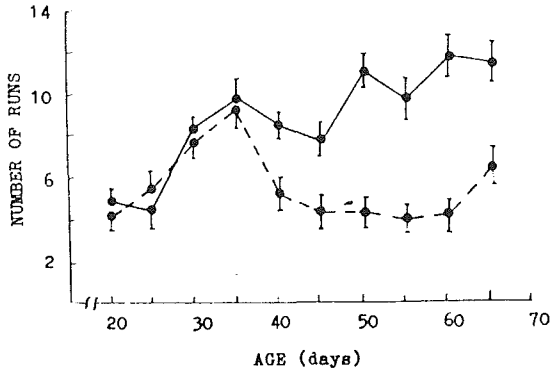


Fig. 2. Number of runs in tame (•——•) and aggressive (• — — •) foxes according to age.

The age when the socialization period starts appears to be 20-25 days old. The optimum period of the formation of primary social bonds appears to be 30-35 days, when maximum exploration in a novel situation is shown. The 40-45 days period appears to be the upper boundary of primary socialization in unselected foxes because pups show fear in response to novel stimuli, which prevents exploration. In pups from the population of domesticated foxes, the sensitive period of socialization is prolonged to over 60-65 days old.

Applied Animal Behaviour Science, 13, 4, 359-370, 1984/85.
6 tables, 3 figs., 20 references. Authors' abstract.

INHERITANCE OF COAT COLOUR IN CHINCHILLAS.

(Der Vererbung der Chinchillafarben).

Reinhard Scheelje.

An account is given of genotypes of 21 colour types of chinchilla.

Deutsche Pelztierzüchter, 59, 12, 199-201, 1985.
In GERM. CAB-abstract.

COLOUR TYPES IN FOXES.

(Fargetyper hos rev).

Einar J. Einarsson.

An illustrated description is given of the Blue Shadow, Sapphire, Blue Star, Lapponia, Tundra, Silver, Silver Shadow, Platinum and Arctic Pearl blue fox mutations, the Pastel, Platinum, Gold, Golden Cross, Silver Shadow, Silver Cross, Sun Glow and Arctic Marble silver fox mutations, and Golden Cross and Gold Platinum fox mutations in red X silver foxes, and the Platinum Blue, Golden Island and Northern Light mutations in arctic X silver foxes. Mating combinations used to breed these mutations are described.

Norsk Pelsdyrblad, 59, 1, 183-186, 1985.
4 figs. CAB-abstract.
In NORG.

ENDOCRINE FUNCTION OF THE GONADS IN MALES OF TWO GENOTYPES OF THE MINK, MUSTELA VISON.

R.G. Gulevich, L.V. Osadchuk, D.V. Klochkov.

The testosterone concentrations in the blood (from June to March) and the level of testosterone production by the gonads (in November) were measured by a ratio-immunological method in young male mink of the standard and sapphire genotypes. It was established that in November in standard males the testosterone concentration in the blood and the specific production of this hormone by the gonads are higher than in the sappire males ($p < 0.05$). In March a tendency for a higher testosterone level on the blood in standard mink in comparison with the sapphire mink was maintained. It is concluded that there are genotypic differences among male mink in the producing capacity of the testes and the level of testosterone in the blood during puberty.

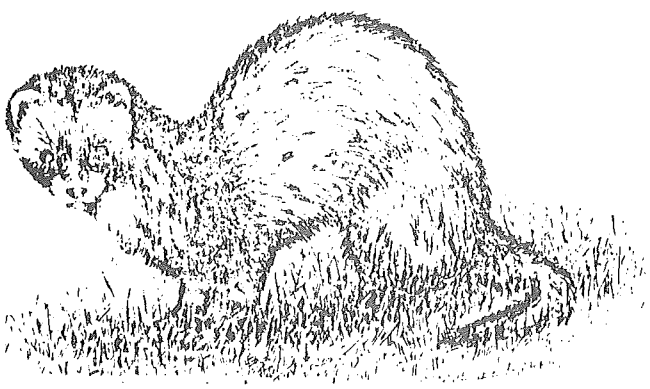
Journ. of Evolutionary Biochemistry and Physiology, 20,5, 316-319, 1985. (Translated from: Zhurnal evoliutsionnoi biokhimii i fiziologii, 20, 5, 1984).
1 fig., 8 references. Authors' summary.

EFFECTS OF NEONATAL CASTRATION AND TESTOSTERONE TREATMENT ON SEXUAL PARTNER PREFERENCE IN THE FERRET.

E.R. Stockman, R.S. Callaghan, M.J. Baum.

Groups of male and female ferrets were tested in a T maze to determine whether they preferred to approach and interact with a sexually active male or an estrous female. Control male and female ferrets gonadectomized (GX) on postnatal Day 35 and tested in adulthood while receiving no hormone or testosterone (T) displayed no significant preference. When given estradiol benzoate (EB), however, control males preferred stimulus females whereas control females preferred stimulus males. When tested in adulthood with EB treatment, males GX on postnatal Day 5 showed a significant reduction in their approach to stimulus females, although they did not switch their preference to stimulus males and thereby resemble control females. Female ferrets GX on postnatal Day 5 and given a high dosage of T over postnatal Days 5-20 showed a significant reduction in their approach to stimulus males, although they did not switch their preference to stimulus females, and thereby resemble control males. The results suggest that extended perinatal exposure of male ferrets to T is required for the development of a sociosexual preference for females.

Physiology & Behaviour, 34, 3, 409-414, 1985.
1 table, 3 figs., 23 references. Authors' abstract.



FACTORS THAT REGULATE THE DEVELOPMENT OF TESTICULAR AUTOIMMUNE DISEASES.

Kenneth S.K. Tung, Cory Teuscher, Suzanne Smith, Legrande Ellis, Maria L. Dufau.

A reproducible model of murine EAO is now available for study of testicular autoimmunity. A study, based on appropriate congenic mice and progeny of high and low responder parents, has revealed that the disease is uncer complex genetic controls. Genes linked to the major histocompatibility complex influence the susceptibility and severity of orchitis, while genes mapped outside H-2 have been shown, in the DBA/2 mice, to code for orchitis resistance. Moreover, preliminary data have indicated that orchitis and vasitis, pathologic processes affecting two separate locations in murine EAO, are under different genetic controls.

The genetic control of a disease, unlike that of immune response to a simple antigen, is likely to be complex. Since crude antigens have been used to induce murine EAO, and it is known that multiple antigens capable of EAO induction in the guinea pig are present in the guinea pig testis, the results obtained could represent the summation of genetic control to several antigens or antigenic determinants. In addition, the complexity may reflect the multiple factors that must influence the development and the nature of any disease process. In testicular autoimmunity, such factors might include the quantity and quality of the immune responses and difference in response to adjuvant. In addition, nonimmunologic factors that govern the susceptibility of the testis to autoimmune disease, including the blood-testis barrier, Sertoli cell function, and any local immunosuppressive environment, might also be important. As a corollary, we anticipate that understanding the mechanisms of genetic control of EAO should elucidate the relative physiologic significance of these parameters.

The fact that abnormal hypothalamic function and testicular autoimmunity are co-inherited in the dark mink must raise the question of whether the two disease processes are somehow related. However, until more is known about the endocrinologic and immunologic controls of the annual testicular development and regression in the seasonal breeder, the possible association between these disease processes remains speculative. As a testable hypothesis, we suggest that hypothalamic control of the testis, influenced by duration of the light cycle and regulated via gonadotropins, normally leads to unevenful regression and development of spermatogenesis. Changes in the testis, which might involve the orderly formation and breakdown of the blood-testis barrier, must also assure that the highly immunogenic germ cell autoantigens are not in a position to induce testicular autoimmunity. In the dark mink, then, the primary defect may be abnormal hypothalamic function. In severe cases, testicular development fails to occur at puberty, leading to primary infertility, while in less severe cases, hypothalamic dysfunction manifests late and exerts its effect mainly at the critical period of testicular regression. Autostimulation by germ cell antigens at this stage can lead to testicular autoimmune disease.

Ann. New York Academy of Sciences, 438, 171-188, 1984.
4 tables, 10 figs.

Authors' conclusions and speculations.

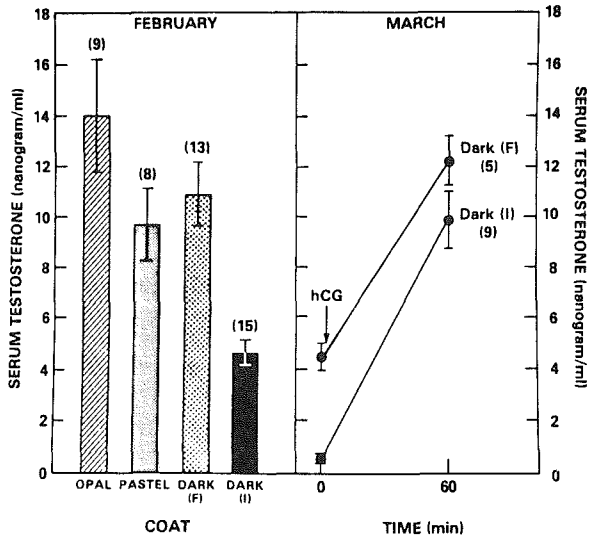


FIGURE 6. Serum testosterone levels in primary infertile mink and fertile mink of different fur colors (left panel). Testosterone response to hCG injection (100 μg) (*right panel*). Note that the testosterone levels of both fertile and infertile dark mink declined between February and March. (From Tung *et al.*[30] With permission from *Endocrinology*.)

GENETIC ANALYSIS OF BODY WEIGHT AND FUR QUALITY IN MINK. (Genetische Analyse der Lebendmasse und Fellqualität beim Nerz).

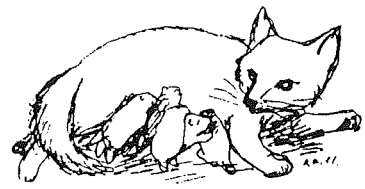
Heinz Pingel, Jörg Schumacher, Peter Zunft.

Animals from two mink populations (Standard and Jet) of the Dessau-Mosigkau cooperative farm were used to estimate h^2-values for body weight, fur colour and fur structure by means of half-sib analysis. The heritabilities obtained were as follows:

	Males		Females	
	Standard	Jet	Standard	Jet
Body weight as per November 1	0.36	0.22	0.72	0.78
Fur colour	0.63	0.67	0.47	0.74
Fur structure	0.86	0.77	0.53	0.67

A 100 g higher body weight was found to produce an increase in hair length by 1.1 and 1.6 cm for males and females, respect. As to improvement of pelts in colour and structure by means of selection, live appraisal by highly qualified selectors and by differentiation of structural characters must be brought in better agreement with the scores for markedable pelts. As the negative correlation between fur quality and body weight proves very small, simultaneous selection for body weight (= fur length), fur colour and fur structure is likely to bring about genetic gain in all the 3 traits, thus producing higher proceeds from mink production.

Arch. Tierz., Berlin, 29, 1, 13-20, 1986.
7 tables, 12 references. Authors' summary.
In GERM. Summary in RUSS and ENGL.



REPRODUCTION

MEMBRANE-BOUND ADENYLATE CYCLASE ACTIVITY IN THE TESTIS OF THE BLUE FOX.

A.J. Smith, T. Jahnsen, V. Hansson.

Membrane-bound adenylate cyclase (AC) activity was much higher in the presence of $Mn^{2}+$ than of $Mg^{2}+$. The $Mn^{2}+$-sensitive adenylate cyclase (MnAC) showed a linear rate of activity for at least 60 min. In contrast the $Mg^{2}+$-sensitive AC (MgAC) displayed a considerable burst in activity, to that after 90 min of activity it was approximately tenfold higher than at the start of incubation.

Guanine nucleotides enhanced MgAC activity; 10^{-6} to 10^{-5} M of 5'-guanylylimidodiphosphate caused a threefold stimulation. The MgAC could be stimulated by hormones (FSH, hCG, PGE, isoproterenol, glucagon), the highest activation being achieved with FSH. Increasing levels of ATP produced a concentration-dependent increase in MgAC activity. The apparent affinity of the AC for MgATP increased threefold (K_m 0.50-0.15 mM) by raising the free $Mg^{2}+$ concentration from 0.4 to 10.0 mM.

The membrane-bound AC of the blue fox testis is thus regulated by hormones, $Mg^{2}+$, and guanine nucleotides in a similar manner to ACs in other somatic cells and in testes from other species. The high MnAC activity in membrane particles from these testes probably represents membrane-bound AC activity in germ cells. The burst in MgAC activity during incubation may represent proteolytic activation of membrane-bound germ cell AC, with a gradual appearance of $Mg^{2}+$ sensitivity.

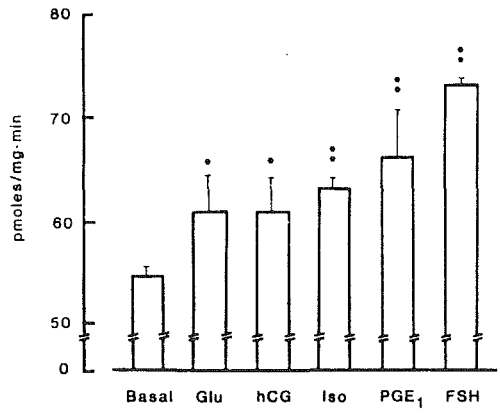


FIGURE 3. The effect of hormone stimulation on membrane-bound Mg^{2+}-sensitive testicular adenylate cyclase activity. Membrane particles (22 μg protein/tube) were incubated for 20 min at 35°C with either BSA (Basal; 0.02%), glucagon (Glu; 5 μg/ml), hCG (5 μg/ml), isoproterenol (Iso; 5 μg/ml), PGE_1 (10 μg/ml), or ovine FSH (10 μg/ml). In addition, the assay medium contained ATP (0.7 mM), EDTA (1.4 mM), Mg^{2+} (0.9 mM in excess of ATP and EDTA), and GTP (0.02 mM). Values are means ± SD of triplicates. Comparison with basal activity: $*p < 0.05$; $**p < 0.01$.

Archives of Andrology, 14, 1, 35-43, 1985.
8 figs., 10 references.

Authors' summary

REPRODUCTION OF FOXES.
V. OPTIMAL TIME FOR ARTIFICIAL INSEMINATION.

(Reproduktion hos Ræv. V. Det optimale tidspunkt for inseminering).

Ib J. Christiansen, Outi Lohi.

In an effort to find the optimal time for artificial insemination of foxes information about the electrical resistance in vaginal discharge, date of insemination and the breeding results of 331 silver foxes and 1321 blue foxes has been investigated.

Best results were obtained in reinseminated foxes, and in silver foxes the first insemination should be performed at the first day of decreasing electrical resistance and in blue foxes about 24 hours later.

The information on artificial inseminations in the breeding season 1985 will be examined in more details, since several factors i.e. breed, age, time in breeding season, fluctuations in the electrical resistance and interval between inseminations may be of importance for determining when artificial insemination should be recommended.

Årsberetning, Kgl. Vet.- og Landbohøjskole, Inst. for Sterilitetsforskning, no. 28, 73-77, 1985.
1 table, 5 references. Authors' summary.
In DANH. Summary in ENGL.

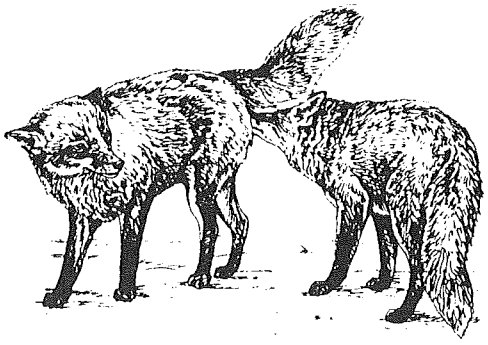
REPRODUCTION OF FOXES.
VI. CONTINUED INVESTIGATIONS OF DEEP-FREEZING OF SEMEN.

(Reproduktion hos ræv. VI. Fortsatte undersøgelser vedrørende dybfrysning af sæd).

Ib J. Christiansen, Mette Schmidt, Tove C. Mitchell.

The survival of the spermatozoa after deep-freezing and the dependence on the content of egg yolk, the time for adding egg yolk and the concentration of glycerol are investigated. It is essential that semen meant for deep-freezing is of the best quality, i.e. with a large number of spermatozoa of which at least 70% have a normal motility. The dilution should be performed in two steps. First the ejaculate is diluted with Tris extender without egg yolk to a concentration of 200 mill live spermatozoa pr. ml. After equilibration for 75-90 min at 5°C a final dilution (1:1) is made with Tris A II with 20% egg yolk and 12% glycerol resulting in a diluted ejaculate with 10% egg yolk, 6% glycerol and 100 mill live spermatozoa pr. ml. After further equilibration for 1-3 h at 5°C followed by a check of the viability and motility of the spermatozoa, the semen is ready for deep-freezing.

Årsberetning, Kgl. Vet.- og Landbohøjskole, Inst. for Sterilitetsforskning, Denmark, 28, 78-83, 1985.
1 table, 3 references. Authors' summary.
In DANH. Summary in ENGL.



REPRODUCTION IN FOXES. VII. EFFECT OF TEMPERATURE ON SEMEN DILUTED WITH TRIS EXTENDER.

(Reproduction hos ræv. VII. Opbevaringstemperaturens betydning for sæd fortyndet med Tris).

Tove Cleeman Mitchell, Ib J. Christiansen.

The vitality and motility of sperm cells in fox semen diluted with Tris extender were examined. The parameters were estimated after 1-2 h, respectively 3-4 h incubation at 25°C. A change in one or both parameters was seen after 1-2 h incubation and a definite deterioration after 3-4 h incubation. It can be concluded that fox semen diluted with Tris extender can not be recommendedfor use at temperatures above 20°C.

Årsberegning, Kgl. Vet.- og Landbohøjskole, Inst. for Sterilitetsforskning, Denmark, 28, 84-85, 1985.
In DANH. Summary in ENGL. Authors' summary.

REPRODUCTION IN FOXES. VIII. EXTENDERS FOR FRESH FOX SEMEN.

(Reproduktion hos ræv. VIII. Sædfortyndingsvæsker til opbevaring af frisk rævesæd).

Mette Schmidt, Tove C. Mitchell, Ib J. Christiansen.

Four extenders (Tris, EDTA, CUE with and CUE without egg yolk) were investigated for their ability to preserve the motility of the spermatozoa, when diluted fox semen is stored at a temperature of 20°C for up to 24 h.

It was found that the motility after 4 h was reduced to 2/3 of the initial motility, and after 12 h the motility was so low that only the best of the ejaculates had a sufficient fertility.

It is concluded that fox semen should be diluted with EDTA or CUE, and that CUE was a little better than EDTA. Furthermore it was observed that spermatozoa from some foxes had a higher rate of survival when the semen was diluted with EDTA, whereas semen from other foxes showed a better survival of the spermatozoa when diluted with CUE.

Årsberetning, Kgl. Vet.- og Landbohøjskole, Inst. for Sterilitetsforskning, Denmark, 28, 86-90, 1985.
2 figs. Authors' summary.
In DANH. Summary in ENGL.

FEMALE PSYCHOLOGY AS AN IMPROVER OF THE ARTIFICIAL INSEMINATION OF THE FOX.

Seppo Pasanen, Jouko Meriläinen.

This experiment was designed in an attempt to increase the success of AI in the fox by imitating natural mating and simultaneously stimulating the clitoris and papilla area of the female. 39 red fox and 279 arctic fox females were inseminated with red fox semen, containing 90 x 106 to 700 x 106 spermatozoa which had been diluted with IVT diluent and

stored at 20 deg.C for 0-10 h. The insemination device comprised a catheter surrounded by an inflatable rubber phallus. For red fox and arctic fox females resp., pregnancy rate was 62-68 and 35-40%, and litter size 3.2-4.4 and 5.0-6.3. The low CR in arctic fox females was due to a large number of abortions.

10th Internat. Congress on Animal Reproc. and Artificial Insemination, June 10-14, 1984.
Univ. of Illinois at Urbane-Champaign, Illinois, USA, Vol. III. Paper No. 378, 3, 1984.
4 references. CAB-abstract.

SERUM TESTOSTERONE LEVELS IN MALE MINK PRIOR TO THE BREEDING SEASON AND THE RESULTING FERTILITY.

(Testosteronindhold i serum hos hanmink før avlssæsonen og deres fertilitet i denne).

Ib J. Chistiansen, Tove C. Mitchell, H.H. Koefoed-Johnsen, Mogens Hansen, Per Henriksen.

Serum from 114 mink housed at 3 farms has been analyzed for testosterone content prior to the breeding season 1984 to investigate whether there is a connection between the testosterone level before the breeding season and the fertility. The serum levels of testosterone are shown in Tables 2, 3 and 4 and in Fig. 1 A, B and C. The breeding results are tabulated in Tables 5, 6 and 7. No relation was found between the breeding results from mink housed at farm A and the testosterone levels. Opposite to other reports there was found no relation between high testosterone levels in February and lack of fertility. The investigations is continued in the breeding season 1985.

Årsberetning, Kgl. Vet.- og Landbohøjskole, Inst. for Sterilitetsforskning, Denmark. 28, 61-72, 1985.
3 figs., 10 tables, 5 references. Authors' summary.
In DANH. Summary in ENGL.

PINAL DENERVATION BY CERVICAL SYMPATHETIC GANGLIONECTOMY SUPPRESSES THE ROLE OF PHOTOPERIOD ON PREGNANCY OR PSEUDO-PREGNANCY, BODY WEIGHT AND MOULTING PERIODS IN THE MINK (MUSTELA VISON).

Lise Martinet, Daniel Allain, Y. Chabi.

In mink, termination of the delayed implantation period, following reactivation of the corpora lutea, and onset of the spring moult are associated with a rise in prolactin secretion triggered by increasing daylength, while decreasing daylength induces the autumn moult. To establish whether suppression of the function of the pineal rendered the mink unresponsive to daylength changes, the superior cervical ganglion was removed bilaterally 2-4 weeks before mating. Intact and operated females were then left outdoors or were put under at lighting regime of either 15 h light: 9 h darkness (15L:9D) or 8L:16D. In July, at the end of the spring moult, the 15L:9D lighting regime was changed to one of 8L:16D. Under artificial photoperiods ganglionectomy suppressed the stimulatory

Birth weight affects mortality and is dependent on litter size. Also the number of teats is of great importance. A relationship between a low number of milkproducing teats and a high early kit mortality has been found.

Feeding related factors such as poor hygienic quality and lack of specific nutrients can influence the kit mortality.

Inst. för Husdjursförädling och Sjukdomsgenetik, Sveriges Lantbruksuniv. Uppsala, Sweden.
Seminarieuppsats No. 154, 1985.
2 tables, 26 references, 18 pp. Author's summary.
In SWED. Summary in ENGL.

A RISE IN TONIC LUTEINIZING HORMONE SECRETION OCCURS DURING PHOTOPERIOD-STIMULATED SEXUAL MATURATION OF THE FEMALE FERRET.

Kathleen D. Ryan, Susan L. Robinson.

This study determined whether a rise in tonic secretion of LH occurred before long day-induced precocious puberty of the female ferret. Twenty immature females were assigned to 1 of 2 photoperiods at 15 weeks of age. Ten ferrets were placed in a long day, stimulatory photoperiod (16 h of light, 8 h of darkness) to induce sexual maturation, and 10 remained in the nonstimulatory photoperiod (8 h og light, 16 h of darkness) for the duration of the study. Intensive blood sampling regimens (every 10 min for 8 h) were conducted at selected times after the onset of long days to permit definition of detailed secretory patterns of plasma LH. Females in each photoperiod were sampled from chronic jugular venous catheters approximately twice weekly until puberty was evident in females housed in long days. The end point for determination of the pubertal onset of adult ovarian function was the appearance of estrogen-sensitive vulvar edema.

Results show a marked increase in frequency of episodes of LH secretion per 8-h interval in females undergoing sexual maturation. No such change in frequency occurred in unstimulated females housed continously in short days, nor did the short day females exhibit vulvar edema. Further, the increment in LH secretion occurred before either vulvar edema or a significant incrase in plasma estradiol levels was observed. Therefore, the rise in LH secretion that occurs after several weeks of exposure to a long day photoperiod may well be an important drive to maturational changes in ovarian function.

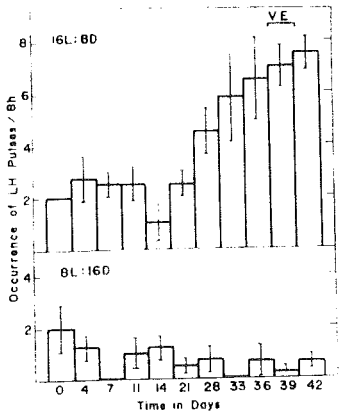


FIG. 1. Effect of long days (*upper panel*) and short days (*lower panel*) on frequency of episodic LH secretion in intact female ferrets (mean ± SEM). The onset of vulvar edema (V.E.) in 10 females in long days is shown with a *horizontal bar* (mean ± SEM for all 10 females). In each panel, n = 4 females on each day of the study.

Endocrinology, 116, 5, 2013-2018, 1985.
2 tables, 4 figs., 26 references. Authors' abstract.

BONE MARROW HYPOPLASIA ASSOCIATED WITH ESTRUS IN FERRETS.

Ann Sherrill, John Gorham.

Bone marrow hypoplasia was characterized in a group of female ferrets during prolonged estrus. All ferrets exhibited hematological changes characteristic of various degrees of bone marrow hypoplasia. Hematological findings included initial thrombocytosis and leukocytosis followed by thrombocytopenia, leukopenia and anemia. Platelet counts below 50,000/µl were observed in 55% of the ferrets. Hemorrhagic anemia due to thrombocytopenia was the most common cause of death and the mortality rate was 40%. Histopathological findings included bone marrow hypoplasia affecting all cell lines and decreased splenic extramedullary nematopoiesis.

Bone Marrow Hypoplasia in ferrets

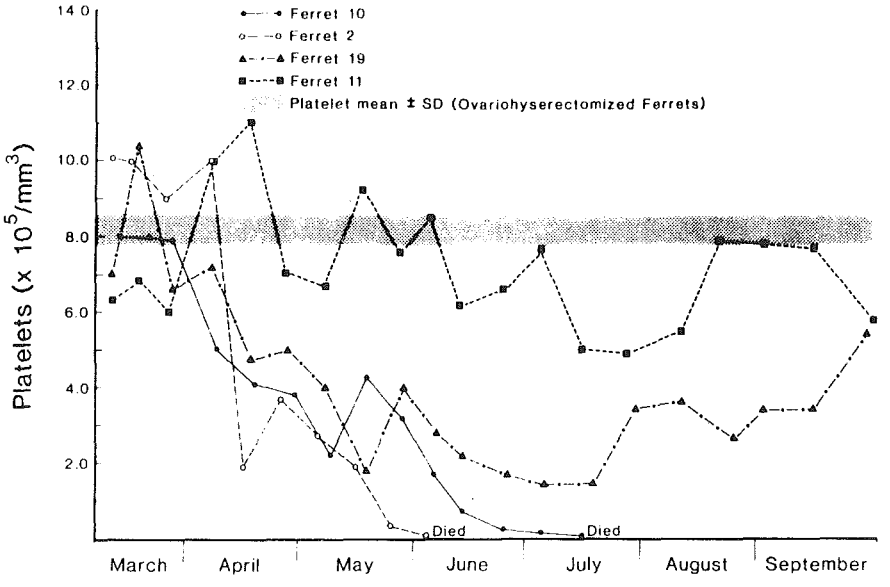


Figure 1 Change in platelet count of four ferrets during estrus

Laboratory Animal Science, 35, 3, 280-286, 1985.
2 tables, 4 figs., 23 references. Authors' abstract.

CONGENITAL MALFORMATIONS AND VARIATIONS IN REPRODUCTIVE PERFORMANCE IN THE FERRET: EFFECTS OF MATERNAL AGE, COLOR AND PARITY.

Daniel E. McLain, Susan M. Harper, Daphne A. Roe, John G. Babish, Christopher F. Wilkinson.

Demographic data of ferrets from a commercial breeding colony were analyzed for the effects of maternal age, parity and strain on reproductive performance and the frequency of gross congenital abnormalities observed at parturition. Litter size (mean $\pm$ SEM) was found to be greatest for young, primiparous females (10.3 $\pm$ 0.2) and decreased with advancing maternal age and parity to a cohort mean of 8.1 $\pm$ 0.1 for third parity females 16 months of age. Age, parity or strain had no effect on 24-

hour neonatal mortality (7%) or mortality from birth to weaning (20%) and an examination of the causes for death suggested that these rates can be reduced. The malformation rate from two cohorts of females whelping at different times of the year was low (< 1.0%) and not significantly different. A higher frequency of malformed offspring was detected in females of low previous parity (0-2) than those with three of more. Based on data obtained in this survey, the ferret would seem a valuable alternative, nonrodent species for teratologic investigations using currently recommended protocols.

Laboratory Animal Science, 35, 3, 251-255, 1985.
5 tables, 27 references. Authors' abstract.

SEASONAL SEX CYCLE OF MALE EUROPEAN MUSTELIDS.

(Le Cycle Sexuel Saisonnier du Mâle des Mustélidés Europeens).

M.C. Audy.

Sexual cycles of males of the following European Mustelids have been studied: the badger (Meles meles L.), the marten (Martes martes L.), the stone-marten (Martes foina Erx.) and the polecat (Mustela putorius L.). The variables investigated have been: histological and histometric changes in the genital system and changes in plasma testosterone levels as measured by radioimmunoassay. It has been found that marten, stone-marten and polecat, like most wild mammals, show a single period of activity while the badger shows active, spermatogenesis throughout the year, thought it is sexually active only in January-February. Testosterone levels vary throughout the sexual cycle being elevated during the mating season and often showing another peak during the sexually quiescent period.

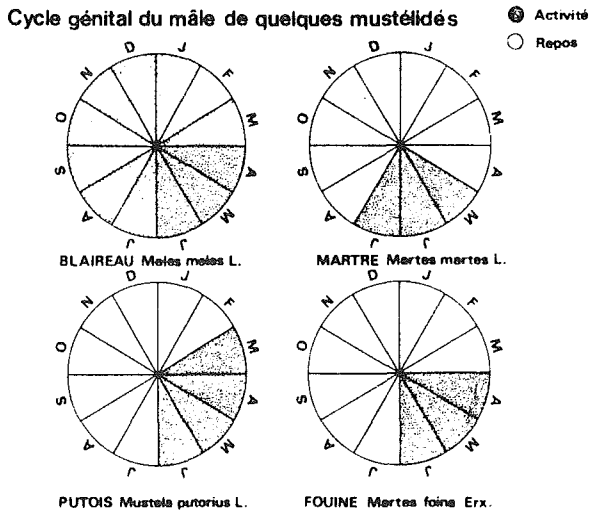


FIG. 6. Représentation schématique du cycle sexuel du mâle des Mustélidés européens. La durée de l'activité testiculaire est plus ou moins longue, son démarrage au cours de l'année à des périodes différentes.

General and Comp. Endocrinology, 30, 1, 117-127, 1976.
6 figs., 2 tables, 23 references. Author's summary.
In FREN. Summary in ENGL.

THE REPRODUCTION OF THE PINE MARTEN (MARTES MARTES) IN THE WILD.

(Die Fortpflanzung des Edelmarders (Martes martes L.) in freier Wildbahn).

P. Krott.

The reproduction of the pine marten in the wild was studied. Both male and female were sexually mature at the age of about 14 months, and reproduced thereafter successfully. Mating periods could be recorded only in June and July, lasting for about 10 days in the case of the female. The female, once gravid, did not participate further in mating activity. Gestation lasts 264-274 days. The animals live i pairs from the beginning of winter until late summer (the end of the mating season), and then alone until winter begins again. The young remain with the female until fall. The male probably takes an equal part in the raising of the brood. The young are hidden not only in trees, but also in rocky crevasses, caves and the like, always in a safe out of the way place that the male selects.

Z. Jagdwiss. 19, 3,113-117, 1973.
1 figs. Author's summary.
In GERM. Summary in ENGL and FREN.

BASAL ENERGY METABOLISM OF MUSTELIDS.

J.A. Iversen.

Oxygen consumption was measured during sleep in seven species of mustelids. Their body weight ranged from 50 g to 15 kg. When basal metabolic rate (BMR) was plotted against weight on logarithmic coordinates (Fig. 1), a break in the linearity appeared at a weight level of about one kg. In species with a body weight below one kg, the regression line of BMR against weight is best represented by the equation $M=95.8\ W^{0.55}$ (± 0.03; standard error of estimate) when M is basal metabolic rate in kcal/day and W is body weight in kg. The equation $M = 84.6\ W^{0.78}$ (± 0.15) describes the relationship of animals weighing one kg or more, indicating that the BMR is proportional to almost the same fractional power of body weight, 0.75, as that of other mammals. The high BMR observed in weasels and stoats, suggests that of metabolic adjustment has occurred in the smaller species of the mustelid family.

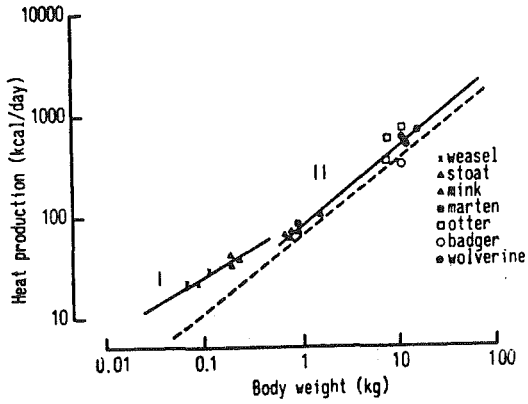


Fig. 1. Log/log plot showing the relationship between heat production and body weight in mustelids. Dotted line represents the mammalian standard curve and is drawn from the data of Kleiber (1961)

J. comp. Physiol., 81, 4, 341-344, 1972.
1 fig., 10 references. Author's summary.

ENZYMATICALLY PREHYDROLYZED SOYBEAN MEAL FOR MINK (MUSTELA VISON) I. NUTRITIVE VALUE FOR GROWTH AND FURRING.

R.J. Belzile, F. Dauphin, A.G. Roberge.

Experiments were conducted to measure the nutritive value of dehulled soybean meal (SBM) prehydrolyzed for 5 h with pancreatin, pepsin or papain. In these studies, a conventional meat-based diet and an unhydrolyzed SBM diet were used as control diets. For the pancreatin experiment, the levels of SBM used in the wet diet (35% DM) were 5, 10 and 15%, whereas, for the pepsin and papain experiment, only a 10% SBM level was used. Results indicate that the introduction of SBM in a growing-furring mink diet for partially replacing animal proteins led to a reduction in body weight gain and to some reduction in pelt size, but the quality of the fur remained essentially the same. There was some

improvement of body weight gain from feeding hydrolyzed SBM, especially at the 10 and 15% levels, but pelt length and fur quality were unaffected.

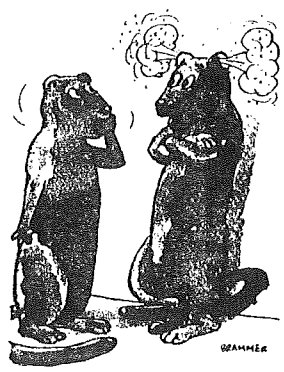
Can. J. Anim. Sci. 66, 505-513, 1986.
5 tables, 19 references. Authors' summary.
In ENGL. Summary in FREN.

ENZYMATICALLY PREHYDROLYZED SOYBEAN MEAL FOR MINK (MUSTELA VISON). II. EFFECTS ON BLOOD AMINO ACIDS AND ON BRAIN NEUROTRANSMITTERS).

A.G. Roberge, R.J. Belzile.

During postweaning growth and furring, 42 male Pastel kits were distributed into four groups. One group received a conventional diet made up of raw meat and commercial cereal mix; the other groups were fed diets containing, on a wet-matter basis, 10% soybean meal, 10% soybean meal prehydrolyzed with pepsin or 10% soybean meal prehydrolyzed with papain. Dry matter, protein and energy contents were approximately the same in all diets. Weight gain over 20 wk was significantly lower in soybean meal-fed groups compared with one fed the conventional diet. Serum amino acids and brain biogenic amines were measured. When mink were fed pepsin-treated soybean meal, there was a significant increase in serum methionine, taurine, glycine and arginine contents compared with the groups fed the conventional or soybean diets. In the pepsin-treated group, the serum urea level was significantly lower than in the groups fed untreated or papain-treated soybean meal, suggesting that pepsin treatment decreases protein catabolism. In the papain treated group, there was more tryptophan in the serum, suggesting a greater availability for the brain and for serotonin synthesis. In this respect, comparing papain and pepsin treatments, the serotonin content was significantly higher ($P < 0.01$) for the papain than for the pepsin group but in the same order of magnitude as the conventional or soybean-meal groups. A greater utilization of serotonin in the pepsin group and a greater mobilization of serotonin in the papain groups seemed to dissociate these two treatments on the basis of neurotransmitter synthesis as well as of the availability of amino acids. On the other hand, whole-brain noradrenaline content was significantly decreased ($P < 0.01$) with both pepsin and papain treatments compared with the conventional and untreated soybean-meal groups, suggesting greater noradrenaline utilization.

Can. J. Anim. Sci., 66, 515-521, 1986.
4 tables, 14 references. Authors' summary.
In ENGL. Summary in FREN.



Do you think that the serotonin is moving in that direction instead of stimulating the melanin-synthesis??

UTILIZATION OF POTATO PROTEIN IN GROWING MINK DIETS.

(Utilisation d'un isolat de protéines de pomme de terre chez le vison en croissance).

Geneviéve Charlet-Lery, Marie-Thérèse Morel, Daniel Allain.

Using the AVEBE process, potato proteins were extracted by thermocoagulation of waste water from potato starch manufactures and included into a pelleted food mixture for growing minks. Eight percent of the product "Protein PF" supplied 17 p. 100 of the total dietary proteins.

Two groups of 24 growing male minks were used in the experiment and 4 animals of each group were used in 2 digestibility trials.

"Protein PF" significantly reduced ($p < 0.01$) digestibility coefficients of energy (82 to 78 p. 100) and protein (79 to 73 p. 100), but as the level of feed intake was higher in the "Protein PF" diet (+ 6 p. 100) the growth of the animals was the same in both groups from mid July till slaughter. Fur quality was not altered in either group.

This protein rich plant diet (85 p 100 DM) with an amino acid pattern comparable to that of fish meal, poor in minerals (3.5 p. 100 DM) and supplying few carbohydrates (8-12 p. 100 DM) is suitable for growing mink feeding at least at the level tested in this experiment.

Ann. Zootech, 34, 2, 149-158, 1985.
5 tables, 14 references. Authors' summary.
In FREN. Summary in ENGL.

EXAMINATION OF MINK (MUSTELA VISON) FED A SULPHURIC ACID PRESERVED FISH SILAGE DURING LACTATION AND GROWTH PERIOD. I. CLINICAL-CHEMICAL EXAMINATION.

J.S.D. Poulsen, G. Jørgensen.

When applying large quantities of sulphuric acid ensiled fish feed to mink, a change of the acid-base balance and the electrolyte balance is to be expected (Poulsen & Jørgensen, 1977).

The aim of the present examination has been to evaluate the clinical and clinical-chemical changes in mink by long term feeding with a sulphuric acid preserved fish feed and a neutralized sulphuric acid preserved fish feed.

The experimental material consisted of 8 groups of minks, fed and treated as indicated in the Tables I and II. The acid-base balance was examined at 10 weeks of age and once more before pelting together with some clinical-chemical parameters.

In a short time, group 7 (40% silage) had to be excluded of the experiment due to indigestion.

The application of increasing quantities of silage has had a significant influence on the acid-base balance of the animals. The influence is stronger in the acute stage of the 10 weeks old animals while the older animals may reduce the reaction of the influence of the acid feed on the homeostasis of the animals.

The application of the acid feed has a tendency to reduce the hemoglobin and the erythrocyte concentration (PCV) of the animals, probably resulting from changed organ functions, causing an increase of the number of cases with macroscopical organ degenerations (Poulsen & Jørgensen, 1986).

The albumin/globulin ratio was changed when applying increasing quantities of silage. Total protein in serum shows relatively high values in the group, which got a feed, neutralized with sodium hydroxide. At the neutralization, a laxative salt has been generated, provoking a subclinical dehydration. The calcium concentration in serum is reduced in the groups 2-5. The magnesium concentration in serum shows the same tendency as for calcium.

The enzyme activity of ASAT, ALAT and CK is increased in all the experimental animals compared to the values of other animals.

Nord. Vet. Med., 38, 90-105, 1986.
4 tables, 7 figs., 19 references. Authors' summary.
In ENGL. Summary in DANH.

EXAMINATION OF MINK (MUSTELA VISON) FED A SULPHURIC ACID PRESERVED FISH SILAGE DURING LACTATION AND GROWTH PERIOD. II. PRODUCTION AND PATHOLOGIC STUDIES CORRELATED TO RESULTS OF CLINICAL-CHEMICAL STUDIES.

J.S.D. Poulsen, G. Jørgensen.

When feeding an increasing quantity of sulphuric acid ensiled feed to mink is was seen that the percentage of the barren females increased.

The mortality changed, too, and was relatively high in some groups. Thus the groups 3 and 8 had a remarkably high mortality rate after weaning of the kits.

The females, which got the most sulphuric acid ensiled feed were losing most weight during the lactation period. However, the growth of the kits till 4 weeks of age, showed a normal development except the kits of group 4, 7 and 8. When the kits were taking up the feed themselves, their growth reduced proportionally with the silage quantity added. The percentage difference in the kit weight at 8 weeks of age remained stable till pelting time.

At statistical- and correlation calculation some relationship has been established between the values of some clinical-chemical parameters and production data of the experimental animals. It is observed that the values of hemoglobin, calcium concentration in serum, ALAT and CK increases proportionately with the body weight and the ALAT values increases with the liver weight. Other relationships between the heart and kidney weight with clinical-chemical data were found. Furthermore, a correlation was found between base excess values and the pH of feed, magnesium and inorganic phosphate concentrations in serum, ASAT and BASP. ASAT activity was found to be negatively correlated with organ and body weight, but positively correlated with base excess.

When separating animals with and without macroscopically pathological organ changes it was found that animals without pathological changes had a higher body and liver, and heart weight, but less weight of the

kidneys. The hemoglobin concentration, calcium, and magnesium, and zinc concentration in serum and activity of CK were also increased whereas in cases with macroscopically found organ changes in inorganic phosphate, and copper concentration, and activity of ALAT and BASP were increased.

Nord. Vet.-Med., 38, 106-118, 1986.
5 tables, 7 figs., 6 references.
In ENGL. Summary in DANH.

Authors' summary

FLUID BALANCE OF MINK GIVEN MOIST OR DRY FEEDS.

(Minkens vätskebalans vid utfodring med vår- resp. torrfoder).

Maria Neil.

During 5 days feed and water intakes were monitored and urine and faeces were collected daily from 12 healthy male standard mink 1 year old, given moist or commercial dry diet. Total intake and total output of fluid, and thus fluid balance, were not affected by diet, but with moist diet 80% of fluid output was excreted as urine, compared with 52% for dry diet. Special attention to supply and accessibility of drinking water and to possible upsets in fluid balance and to relevant diseases and conditions was recommended for mink given dry feed.

Våra Pälsdjur, 54, 10, 286-287, 1983.
2 figs.

CAB-abstract.

ENERGY REQUIREMENTS OF THE FOX.

(Rævens energiforsyning).

Hans Henrik Møller.

By studying literature the requirements for the maintenance, reproduction, lactation, furring and growth are decided. The energy requirement for the different manifestations of life are determined from the deposit amount of energy. These requirements are thereafter compared with feeding trials and norms mentioned in the literature. From these comparisons the energy norms of maintenance, growth of pups, gestation and lactation are determined.

Metabolizable energy (ME) is the most common measure of energy value in the feeding of fur animals. It has been necessary to put in an estimate for the utilization of ME which is the connection between net energy (NE) and ME.

The energy requirements for maintenance are found to be 130 kcal ME/ $kg^{0.75}$/day for foxes with normal (low) muscle activity. With the environmental temperatures found in Denmark there will seldom be a need for extra energy because of low temperatures. Especially if you ensure that there are good shelter conditions for the foxes.

Due to the different growth curves for blue and silver foxes different energy norms are found for growth of the two species. The energy norms of a two month old silver fox are found to be 4.6 kcal ME/g weight increase, increasing to 9.7 kcal ME/g at the end of the growth period. The pups of a blue fox have an energy norm from the age two months equivalent to a one month older silver fox.

The energy requirements for pregnancy are determined from the deposit amount of energy in the foetus. For a blue fox with 10 pups the total amount of energy is found to be 1735 kcal ME and 1239 kcal ME for a silver fox with 5 pups.

In the first three weeks all the energy supply for the pups comes from the milk. Growth of the pups in this period gives an indirect estimate for the milk yield and the energy requirement for lactation. When the pups are 3-4 weeks old they start to eat making it impossible to separate food eaten by the pups and by their mother. The norms are therefore a total norm for the pups and the mother. Following energy norms are set up for lactation in addition to the maintenance of the mother fox.

10-day periods of lactation	additional energy per pup daily (kcal ME) blue fox	silver fox
1st period	50	70
2nd "	100	125
3rd "	150	180
4th "	250	280
5th "	350	300-350
6th "	410	

It's difficult to set a norm for changes in the weight of grown up animals during the year because of their different mating seasons. The energy value of increasing/decreasing weight are found to be 8.2 kcal ME/gram except in the furring period where it's found to be 6.0 kcal/gram.

Hovedopgave i Pelsdyrproduktion, K.V.L., Denmark, 1986.
22 tables, 5 figs., 77 references, 62 pp. Author's summary.
In DANH.

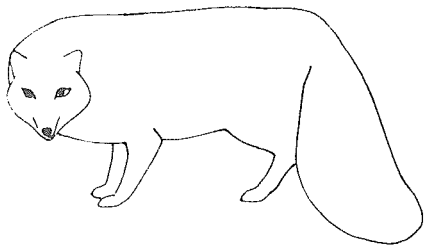
LIVER FUNCTION AND SOME HAEMATOLOGICAL INDICES IN POLAR FOXES FED WITH PRESERVED FODDER.

(Czynność watroby i wybrane wskaźniki hematologiczne u lisów polarnych zywionych karma konserwowana).

Henryk Bieguszewski, Grazyna Jaworska, Roman Szymeczko.

The purpose of the work was to determine the influence of fresh blood substitution (15 per cent of fodder) for blood preserved with sodium benzoate and sulphuric acid, and half of fresh slaughtering garbages (30 per cent of feed dose) for garbages preserved with formaldehyde, on liver function, time of blood coagulation and some haematological indices. The studies were carried out altogether on 42 foxes. There was not found any influence of preserved fodder on liver function in reference to sucrose metabolism and the content of properdin and methaemoglobin in the blood of foxes. It was noted an increase (statistically not significant) of sulphobromphtaleine compared with the group of control foxes. The applied conservatives did not influence the time of blood coagulation.

Medycyna Weterynaryjna, Poland, 40, 9, 552-554, 1984.
3 tables, 16 references. Authors' abstract.
In POLH. Summary in RUSS and ENGL.



FEEDING YOUNG FOXES WITH DIETS SUPPLEMENTED WITH SYNTHETIC AMINO ACIDS.

(Zywienie mlodych lisów polarnych z zastosowaniem aminokwasów syntetycznych).

Irena Narucka, Andrzej Potkanski, Alzbieta Potkanska.

The preliminary investigations on supplementing the diet of polar fox with lysine and methionine were carried out on 120 foxes divided into 6 groups (20 animals in each group). There were two levels of synthetic amino acids. In the groups 2 and 5 the diet was supplemented with 0.06% methionine (58.49 g per 100 kg feed) and 0.20% of lysine (204.00 g per 100 kg feed). The groups 3 and 6 were given 0.12% methionine (116.80 g per 100 kg feed) and 0.40% of lysine (408.00 g per 100 kg feed). The groups 1 and 4 were control groups. The animals were given feed ad libitum.

In the period of experiment 3.3% of the experimental animals died, while in this age group 16% of the animals died in the farm. This fact would indicate that the experimental diet had no negative influence on health of the foxes.

The results obtained did not permit any reliable conclusion concerning the effect of the amino acids supplement on weight gain and coat value, because the experimental foxes were the youngest in the farm and their coat was not properly mature when all animals were evaluated.

The investigation described was only a part of a large experimental design planned for 5 years, which unfortunately could be continued.

Roxzniki Akademii Rolniczej w Poznaniu, Zootechnika, Poland, 148/31, 131-136, 1984.
4 tables, 3 references. Authors' summary.
In POLH. Summary in ENGL and RUSS.

ARGININE DEFICIENCY, HYPERAMMONEMIA AND REYE'S SYNDROME IN FERRETS.

Devendra R. Deshmukh, Peedikayil E. Thomas.

Young male ferrets developed hyperammonemia and encephalopathy shortly after eating a diet lacking in arginine. The dietary supplementation of arginine or intraperitoneal injection of ornithine prevented hyperammonemia and shortened the duration of encephalopathy. Therefore, young ferrets were assumed to be unable to meet their ornithine needs from sources other than arginine. Adult ferrets did not develop hyperammonemia and encephalopathy after eating arginine-free diet. Because young ferrets are also susceptible to human influenza infections, they were further tested as animal model of Reye's syndrome. Reye's syndrome is a serious childhood disorder that develops following influenza infections and is characterized in part by an encephalopathy, hyperammonemia and elevated serum transaminases. In young ferrets, concurrent administration of aspirin with human influenza inoculation and an arginine-free diet produced symptoms similar to those seen in humans with Reye's syndrome. The ferret model appears to be useful for studying the roles of various etiologic agents and their interactions in producing

Reye's syndrome-like disorders. The ammonia metabolism in ferrets is reviewed and the ferret model for Reye's syndrome and its applications for the better understanding of this disorder in humans are discussed.

Laboratory Animal Science, 35, 3, 1985.
28 references. Authors' abstract.

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Original Report

Distribution of Pseudomonas Aeruginosa Serotypes from Mink and Fox in Finland. A Vaccination Trial in Mice

Matti Piiroinen, College of Veterinary Medicine and *Eeva-Liisa Hintikka,* National Veterinary Institute

Summary

Thirtyeight isolates of *Pseudomonas aeruginosa* originating from cases of haemorrhagic pneumonia in mink and 37 isolates originating from cases of metritis in farm raised fox were serotyped by antisera (Difco) for 0-antigens. Serotype 0:6 was the most common isolated from mink and serotype 0:9 the most common from fox. In addition, strains of serotype 0:7 were found in mink and of types 0:3, 0:4, 0:5 and 0:6 in fox.

The method of serotyping in which live bacteria were used typed more effectively than the method with autoclaved bacteria.

The bacterin type vaccine by serotype 0:6 and 0:7 immunized effectively against the challenge by the homologous strains but gave no cross protection against each other in vaccination trials carried out in mice.

The current classification of *Pseudomonas aeruginosa* strains into 17 serotypes according to so-called continuous numbering system is based on differences in O-antigen.

Pseudomonas aeruginosa infections are causing important economical problems on fur animals in Finland. Haemorrhagic pneumonia specificially produced by strains of this commonly opportunistic *Pseudomonas* appears in form of yearly epidemics on Finnish mink farms. *Pseudomonas aeruginosa* is often isolated also from cases pyometra of farm raised foxes in Finland.

The serotyping of Finnish *Pseudominas aeruginosa* isolates from fur animals has earlier been done only occasionally. For a succesful vaccination, one is obligated to know the serotypes appearing as pathogens on the farm or in the area because the available evidence strongly suggests that the protection by aquired immunity principally applies only for homologous strains. Prevention of *Pseudomonas* infections through vaccination has gained an important role because of the well known ability of this bacterium to live and multiply outside the animal host and its very high resistence against desinfectanta and antibiotics.

The aim of this study was to determine the common serotypes of *Pseudomonas aeruginosa* causing infectious deseases in farm mink and fox in Finland and also to test the suitability of Difco antisera set for serotyping the *Pseudomonas aeruginosa* isolates from these fur animals. Immunity caused by bacterin type vaccines prepared from strains of two different serotypes isolated from mink was also studied by a vaccination trial in mice.

Materials and methods

Isolates: The material comprised 75 *P. aeruginosa* isolates, 38 from cases of mink pneumonia and 37 from cases of fox metritis. Part of the fox isolates originated from artificially inseminated vixens.

All the isolates were from material sent to the National Veterinary Institute for diagnosis from fur farms in different parts of Finland. The majority of isolates from mink were from the years 1979-84. The oldest isolate originated from 1970. The isolates from fox were from the years 1981-84. *P. aeruginosa* isolates had been maintained on broth agar in a temperature of 4° C, and subcultured every 3-4 months. For the typing the strains were cultivated on blood agar before transferring to bromthymol-blue lactose agar.

Serological typing: The typing of the isolates was carried out with slide agglutination technique by using Difco antisera (Bacto-Psedomonas aeruginosa antisera set 3081-32-8, Bacto-*Pseudomonas aeruginosa* antigen set 3082-32-7). For the typing both viable and autoclaved bacteria cells were used.

Vaccination trial: Two bacterin-type vaccines consisting of the serotypes 0:6 and 0:7 respectively were prepared at the National Veterinary Institute. The vaccine strain was grown in Roux bottles on meat agar for one day, at 37° C.

Bacterial growth was harvested with carbol (0.5 %) inactivated in a water bath at 65° C, and with 0.05 %

formalin. For production of vaccine three *P. aeruginosa* strains all of the serotype 0:6 originating from mink were used. Similarly for production of vaccine B also three strains from mink were used, two of them of the serotype 0:6 were the same as for vaccine A, and the third was of the serotype 0:7.

Mice of NMRI-strain were vaccinated s.c. with 0.2 ml of undiluted vaccine and 1:2, 1:4 and 1:8 dilutions. For the experiment with vaccine A two groups of ten mice were inoculated by each vaccine concentration besides which there were left two unvaccinated control groups of 10 mice, comprising 100 mice altogether. For the trial with vaccine B three groups of 10 mice were vaccinated with each vaccine dilution, besides which there were three unvaccinated control groups, 150 mice altogether.

At the time of vaccination the mice weighed 16 ± 1 gr. The mice were kept in separate cages for each test group of 10.

Challenge: For the challenge, LD-50 doses for the suspension of those strains, of serotypes 0:6 and 0:7, to be used were determined. The selected seven *P. aeruginosa* strains were cultivated in broth, at a temperature of 37° C for 24 hours. The bacteria counts were calculated from dilutions 10^{-1} through 10^{-5} by the plate count method immediately before the inoculation. For each challenge strain, five groups of 10 mice were infected with five serial dilutions, respectively. The inoculate was 0.5 ml of suspension and given i.p. The mice were observed daily for one week. LD-50 values were calculated by Reed-Muench method. The values varied between $10^{4.2}$-$10^{6.2}$ CFU/mouse between the seven strains examined.

The vaccinated animals were challenged 2 weeks after the vaccination. The inoculated dose was about 50 × LD-50, which was expected to kill 80-100 % of the unvaccinated animals. The method for inoculation was the same as for the LD-50 determination.

Results

Method for serotyping: The serotyping results were exactly the same wether living or autoclaved bacteria were used when isolates originating from mink were tested. About half, 18/37, of the isolates originating from foxes gave identical serotypes in tests with living and autoclaved bacteria. For the remaining 19 isolates results were different, in that the isolate could be typed only by one of the methods and the other gave no specific results. Among these 19 isolates 15 were groupable only by using with viable bacteria but they gave polyagglutination when autoclaved bacteria were used (Table 1).

Table 1. P. aeruginosa serotypes of mink and fox. The arrow points in the direction of the possible differences when typed with viable or autoclaved cells.

	Mink		Fox	
Serotype	live culture	autocl. culture	live culture	autocl. culture
1				
2				
3			3 →	3
4			1 →	1
5			1 →	1
6	35 →	35	2 →	1
7	3 →	3		
8				
9			21 →	7
10				
11				
12				
13				
14				
15				
16				
17				
NG			4	15
PA			5 →	9
Total No of strains	38	38	37	37

NG = non-groupable.
PA = polyagglutinable.

Serotypes: Table 1 gives the results for O-serotypes. Serotype 0:6 was the most common among the isolates from mink. The only other serotype found from mink was 0:7. The three isolates which were serotyped as 0:7 gave weak agglutination also with antiserum 0:8.

The serotype 0:9 was the most common among isolates from fox when testing was carried out with living cells. Four other serotypes were found. In tests with living cells five out of 37 isolates gave polyagglutination and four were non-groupable. When autoclaved bacteria were used only 40 % of the isolates from fox could be divided into a specific type.

Vaccination results: Tables 2 and 3 give the results from the vaccination trials. Vaccine A which contained only serotype 0:6 gave 90-100 % protection against challenge by serotype 0:6 strains, but no protection against serotype 0:7 strain.

Vaccine B containing strains of serotypes 0:6 and 0:7 gave 90-100 % protection against challenge by both serotypes, when applied singly or jointly.

Table 2. Protective effect in mice vaccinated with Pseudomonas aeruginosa serotype 6 vaccine and challenged with P. aeruginosa serotypes 6 or 7.

Vaccine serotype	Vaccine dilution	Challenge serotype	Survivals/ total	Protection %
0:6	1:1	6	10/10	100
»	1:2	6	9/10	90
»	1:4	6	10/10	100
»	1:8	6	10/10	100
	Control (unvaccinated)	6	1/10	
0:6	1:1	7	0/10	0
»	1:2	7	2/10	20
»	1:4	7	0/10	0
»	1:8	7	2/10	20
-	Control (unvaccinated)	7	1/10	

Table 3. Protective effect in mice vaccinated with Pseudomonas aeruginosa vaccine serotype 0:6 and 0:7, against challenge with serotype 0:6 or 0:7 or both.

Vaccine serotype	Vaccine dilution	Challenge serotype	Survivals/ total	Protection %
0:6 and 0:7	1:1	6	10/10	100
»	1:2	6	10/10	100
»	1:4	6	10/10	100
»	1:8	6	10/10	100
-	Control (unvaccinated)	6	0/10	0
0:6 and 0:7	1:1	7	10/10	100
»	1:2	7	10/10	100
»	1:4	7	10/10	100
»	1:8	7	10/10	100
-	Control (unvaccinated)	7	1/10	10
0:6 and 0:7	1:1	6 and 7	10/10	100
»	1:2	6 and 7	9/10	90
»	1:4	6 and 7	9/10	90
»	1:8	6 and 7	10/10	100
-	Control (unvaccinated)	6 and 7	0/10	0

Discussion

Method: The serotyping with viable bacteria is simple and less time-consuming than the method with autoclaved bacteria. In the present study, additionally more isolates were serotyped with viable cells than with autoclaved cells. In cases in which both methods were succesfully applied the results were identical. The method with living bacteria thus was both easier to use and more effective than the other method in conditions of this study. In addition, *Pseudomonas* isolates which are nongroupable or polyagglutinable for viable bacteria might be typeable with autoclaved cells.

This typing method of *P. aeruginosa* is based on heat stable 0-antigens. It is possible that the surface structure of the cell wall and capsular substances could prevent 0-agglutination with living cells. Long incubation times allow the formation of the named substances.

Therefore the incubation time should not exceed 24 hours. The same phenomen is noticed in so-called mucoid strains, which commonly occur in chronic infections (Homma 1979, Bergan and Høiby 1975). In this material mucoid strains were not noticed, maybe because of relatively long laboratory histories of the strains and of in vitro excisting pressure to nonmucoid variants (Bergan and Høiby 1975). Usually this inhibiting effect will disappear after cells are autoclaved or washed. It remains unclear why a great number of isolates originating from fox could be typed with living cells but not with autoclaved cells. We have not found observations on such a phenomen on reported in the literature.

Serotypes: According to other studies serotype 0:6 is the most common on mink all over the world. Long and Gorham (1981) found in their material that 75 % out of 47 isolates from mink i USA and Canada in the years 1975-78 belonged to serotype 0:6. In that material they found also serotypes 0:2, 0:5, 0:5, 0:8, 0:9 and 0:16. In corresponding material from Japan also, serotype 0:6 has been the dominating one.

The prevailing serotype in Norway and Sweden has been 0:6 and in addition to that also serotypes 0:7 and 0:8 have been found.

In this Finnish collection of *P. aeruginosa* isolates from mink covering a period of many years only two serotypes 0:6 and 0:7 were presented. It is known that types 0:7 and 0:8 give cross agglutination (Berche et al 1979). The three isolates from mink in this study which were serotyped as 0:7 gave weak agglutination also with antiserum 0:8. This is noted also by the manufacturer of the antisera.

In the literature concerning the typing of *P. aeruginosa* isolates of fox, only one Danish study was found, but the typing is based on pyocyanins (Gierløff 1980) not on 0-antigens.

The frequency of serotype 0:9 is surprisingly high, ca. 57 %, among the isolates from foxes. Among the human *P. aeruginosa* isolates the frequence of serotype 0:9 is 1 to 10 % and in material isolated from a collection of different animals, other than fox, the portion of serotype 0:9 is only about 3 % (Lányi and Bergan 1978).

One explanation for the high frequence of serotype 0:9 in this particular material is that 19 out of 21 of this serotype originated from the same fox farm. From this particular farm came 59 % of all isolates from foxes referred to in this study. This farm provided 22 isolates; out of them 19 were serotype 0:9, two were polyagglutive and one non groupable.

When more than one *P. aeruginosa* isolate was serotyped from the same mink or fox farm it was found that they were usually of the same serotype. The only exception was the big fox farm where serotype 0:9 predominated and where polyagglutinable and non-groupable serotypes were also found. It is possible that the polyagglutinable isolates during subculturing have changed in vitro from 0:9 to polyagglutinable. Such serotype changes have been noted in vitro and even in vivo (Bergan and Høiby 1975, Lányi and Bergan 1978). Based on this study it seems that *P. aeruginosa* outbreaks on mink and fox farms are caused by one serotype on a particular farm during an epidemic.

In the cultures studied the numbers of non-groupable and polyagglutinable isolates correspond with those from other studies where the numbers of polyagglutive isolates have been 0 to 13 % and the numbers of non-typeable 0 to 38 % (Lányi and Bergan 1978). With our Finnish isolates typed as viable cells, polyagglutination was 13 % and non-groupable isolations 11 %, and they were found only among isolates from foxes.

Serotypes 0:6 and 0:7 gave no cross protection reactions in this study done with mice. Berche with coworkers (1979) found the same result in their study even when they used purified lipopolysaccarid vaccine.

According to Fisher (1974) the efficacy of polyvalent vaccine was weaker against each serotype than that of monovalent vaccines. The results from this study do not give support to that opinion as regards bivalence but the checking of this detail would require a more exact measuring of immunity in vaccinated animals.

The factors connected with epidemics of haemorrhagic pneumonia in mink are not all clarified. In Finland the epidemics are usually seen during autumn and cold weather. Feeds and faeces have also been pointed out as possible vehicles and sources of infection for mink epidemics (E. Smeds personal communication).

In Finland 300.000-600.000 minks are vaccinated yearly against *P. aeruginosa* infection. The correlation between the mouse potency test and *Pseudomonas* vaccine for mink remains open. According to the

experience gained in Finland and opinion formed by the authors during production and evaluation of *Pseudomonas* vaccines, mice may quite reliably be used for efficacy testing of *Pseudomonas* vaccine.

The practical conclusion from the present study is that Finnish *P. aeruginosa* vaccine for mink should contain at least serotypes 0:6 and 0:7.

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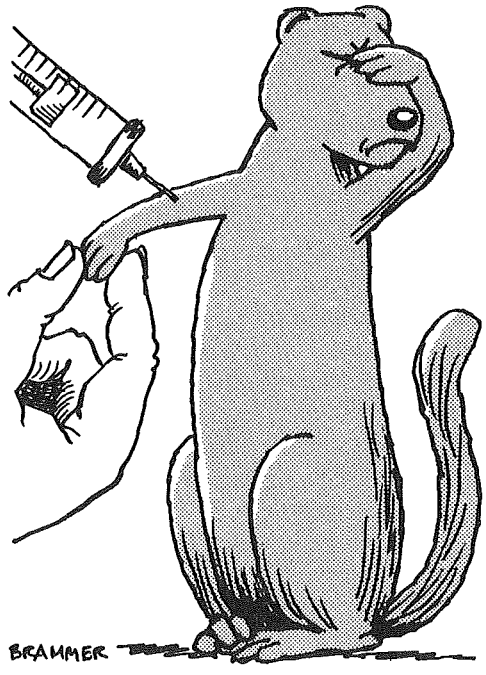
SCIENTIFUR, VOL. 10, NO. 3 1986.



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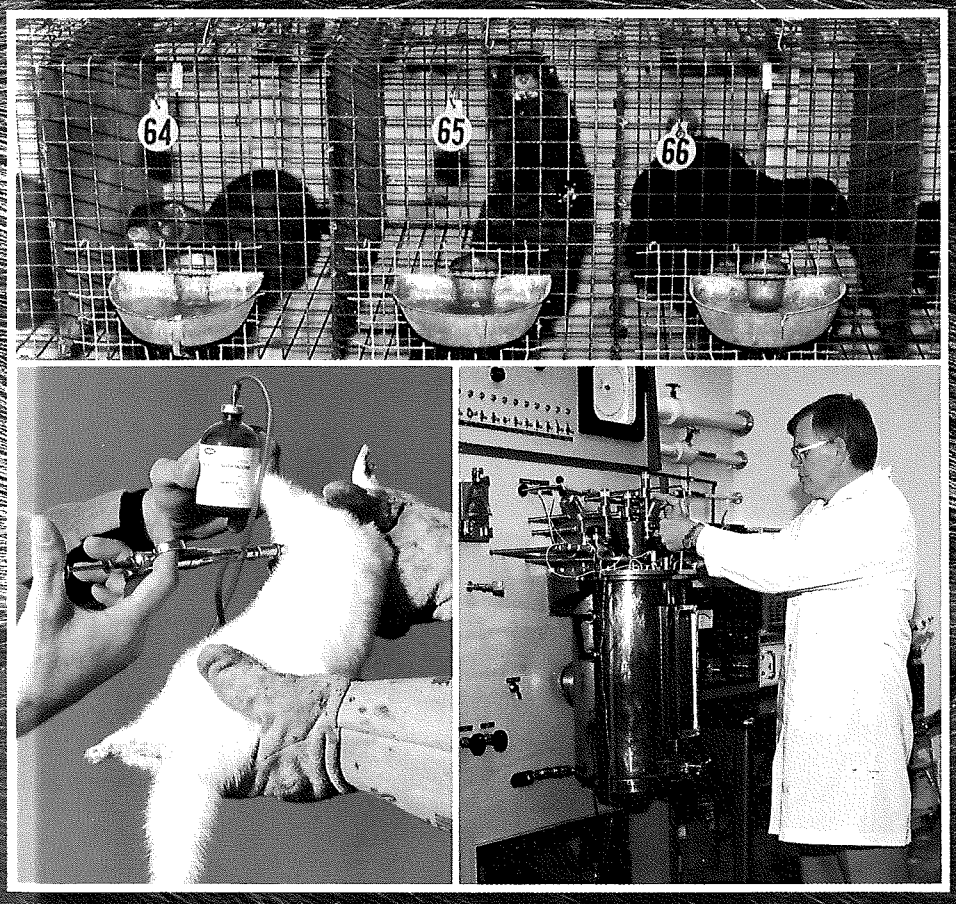

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MUCH OF THE INCREASED IgG IN ALEUTIAN DISEASE OF MINK IS VIRAL ANTIBODY.

David D. Porter, Helen G. Porter, Austin E. Larsen

Aleutian disease (AD) is caused by a persistent infection of mink with an autonomous parvovirus. Chronically infected mink develop widespread plasmacyctosis, a marked elevation of their serum IgG, and immune complex disease. A substantial fraction of the IgG in the serum of mink with Aleutian disease may be specifically absorbed by monolayer cell curltures infected with Aleutian disease virus. The maximum percentage of absorption of IgG found was 81% in a mink with 5.4 g/dl of IgG. Mink with the monoclonal gammopathy of Aleutian disease had a particularly large percentage of the IgG absorbed. The percentage of IgG absorbed from serums of mink with aleutian disease is directly proportional to the serum IgG level and to the Aleutian disease viral antibody titer. The amount of IgG which can be absorbed by infected cell monolayers increases during the course of experimental infection, and the absorption is immunologically specific. Thus, it appears that much of the hypergammaglobulinemia in mink with Aleutian disease represents virus-specific antibody.

J. of Expt. Pathology, 1, 2, 79-88, 1984.
3 figs., 3 tables, 30 references. Authors' abstract.

ANALYSIS OF ALEUTIAN DISEASE VIRUS INFECTION IN VITRO AND IN VIVO: DEMONSTRATION OF ALEUTIAN DISEASE VIRUS DNA IN TISSUES OF INFECTED MINK.

Marshall E. Bloom, Richard E. Race, Bent Aasted, James B. Wolfinbarger.

Aleutian disease virus (ADV) infection was analyzed in vivo and in vitro to compare virus replication in cell culture and in mink. Initial experiments compared cultures of Crandell feline kidney (CRFK) cells infected with the avirulent ADV-G strain or the highly virulent Utah I ADV. The number of ADV-infected cells was estimated by calculating the percentage of cells displaying ADV antigen by immunofluorescence (IFA), and several parameters of infection were determined. Infected cells contained large quantities of viral DNA (more than 10^5 genomes per infected cell) as estimated by dot-blot DNA-DNA hybridization, and much of the viral DNA, when analyzed by Southern blot hybridization, was found to be of a 4.8-kilobase-pair duplex monomeric replicative form (DM DNA). Furthermore, the cultures contained 7 to 67 fluorescence-forming units (FFU) per infected cell, and the ADV genome per FFU ratio ranged between 2 x 10^3. Finally, the pattern of viral antigen detected by IFA was characteristically nuclear, although cytoplasmic fluorescence was often found in the same cells. Because no difference was noted between the two virus strains when cultures containing similar numbers of infected cells were compared, it seemed that both viruses behaved similarly in infected cell culture. These data were used as a basis for the analysis of infection of mink by virulent Utah I ADV. Ten days after infection, the highest levels of viral DNA were detected in spleen (373 genomes per cell), mesenteric lymph node (MLN; 750 genomes per cell), and liver (373 genomes per cell). In marked contrast to infected CRFK cells, the predominant species of ADV DNA in all tissues was single-stranded virion DNA; however, 4.8-kilobase-pair DM DNA was found in

MLN and spleen. This observation suggested that MLN and spleen were sites of virus replication, but that the DNA found in liver reflected sequestration of virus produced elsewhere. A final set of experiments examined MLN taken from nine mink 10 days after Utah I ADV infection. All of the nodes contained ADV DNA (46 to 750 genomes per cell), and although single-stranded virion DNA was always the most abundant species, DM DNA was observed. All of the lymph nodes contained virus infectious for CRFK cells, but when the genome per FFU ratio was calculated, virus from the lymph nodes required almost 1,000 times more genomes to produce and FFU than did virus prepared from infected cell cultures. Furthermore, although the presence of DM DNA indicated that virus replication was occurring in these MLNs, no cells exhibiting characteristic nuclear ADV antigen could be identified by IFA performed on frozen sections. Taken together, these experiments suggests that mesenteric lymph node was a target organ for ADV replication, but that the number of cells actually replicating virus was probably small.

Journ. of Virology, 55, 3, 696-703, 1985.
3 tables, 4 figs., 38 references. Authors' abstract.

SAFETY AND IMMUNOGENIC VALUE OF THE VACCINES AGAINST BOTULISM AND DISTEMPER SIMULTANEOUSLY ADMINISTERED TO THE MINK.

Jerzy Gorski, Jerzy Motz.

The safety and effectiveness of vaccines used against botulism (Norvac C) and distemper (Canivac F) produced by Biowet Biological Laboratories, Pulawy have been evaluated. These vaccines were used in minks and polecats either simultaneously or over the time interval of 2-3 weeks. The simultaneous vaccination proved to be the safe operation that guaranteed at least the same high degree of immunity as that done in a traditional way i.e. first by vaccination against botulism and then against distemper.

Bull. vet. Inst. Pulawy, 27, 1-4, 16-22, 1984.
2 tables, 19 references. Authors' summary.

MORPHO-PATOGENESIS OF ENCEPHALOMALACIA IN FOXES.

Junko Araki.

There was an outbreak of the neurological disease, by which about 260 silver foxes died, at a fox farm stocking about 900 silver foxes in central Hokkaido in spring 1983, 7 affected silver foxes (less than 1 week old-3 years old) were examined histopathologically.

Findings revealed scattered or disseminated ischemic nerve cell necrobioses and bilateral-symmetrical ischemic focal necroses or malacias (bilateral-symmetrical polioencephalomalacia) in the prosencephalic cortices, mesencephalic nuclei, nuclei of the posterior brain stem and cerebellar cortices.

The small and minute arterioles in the meninges overlying the necrotic of malacic foci frequently showed edematous swelling and loosening (microvascular alterations). The nerve bundles, including the vascular nerves, in the meninges of the cerebral basis and gyri only sometimes showed degeneration of axons.

Mesothelial proliferation was observed frequently in the cerebral meninges and optic nerve sheaths, and less frequently in the spinal dural sheaths, occasional multinuclear giant cell formation of mesothelial cells was also found.

Generally, the specimens revealed slight leukomyelodegeneration, white matter degeneration in the posterior brain stem and optic nerve degeneration.

Feebly eosinophilic inclusion bodies were seen in the nerve cells of the posterior brain stem from one fox of less than one week old. Electron microscopic examination revealed the inclusions to be "fine-particle aggregating structures" (including particles of 13-14 nm in diameter).

Morpho-pathogenesis: The ischemic changes in the brain were conjectured to be due to neurogenic local functional disturbances in the blood curculation.

Causal pathogenesis: Giant cell formation of the meningeal mesothelium, neuronal cytoplasmic inclusions ("fine-particle aggregating structures") in the posterior brain stem and basophilic intranuclear and cytoplasmic inclusions in the hair matrices should not be ignored in investigating the causal genesis of the disease.

Jpn. J. Vet. Res., 33, 1/2, 1985.
Abstract of thesis. Author's abstract.
Only abstract received.

MALIGNANT FIBROUS HISTIOCYTOMA IN A FOX.

Yukio Fujimaki, Masahiro Sugiyama, Masae Isoda.

A malignant fibrous histocytoma (MFH) appearing in the foreleg of a fox was shown to be composed mainly of storiform, pleomorphic and fascicular areas. Electron microscopy demonstrated fibroblastic and histiocytic cells as well as giant cells, xanthoma cells and undifferentiated mesenchymal cells. The existence of undifferentiated mesencymal cells suggested that MFH is of undifferentiated mesencymal cell origin with a broad fibroblastic and histiocytic spectrum.

Jpn. J. Vet. Sci., 47, 1, 147-150, 1985.
6 figs., 16 references. Author's abstract.

TREATMENT OF BRONCHIAL CAPILLARIASIS IN ARCTIC FOXES WITH FENBENDAZOLE.

R.E. Brannian.

At Kansas City Zoo, Missouri, USA, in July 1980, 1 male and 2 female Alopex lagopus infected with Capillaria aerophila were unsuccessfully treated with oral levamisole 13 mg/kg for 7 days. One week follwoding cessation of levamisole treatment, the foxes were treated orally with fenbendalzole at 30 mg/kg for 2 days. This treatment was repeated at 2-week intervals for a total of 4 treatments. During the course of this treatment, the foxes improved markedly with the eventual remission of all respiratory signs and a return to normal activity and appearance. The foxes remained asymptomatic until April 1982 when coughing episodes recurred. Faecal and sputum examination revealed C. aerophila. Fenbendazole was again used successfully to treat the foxes.

J. Zoo An. Med., 16, 66-68, 1985.
1 table, 8 references. CAB-abstract.

ECHINOCOCCUS GRANULOSUS IN A FOX.

R.C.A. Thompson, W.L. Nicholas, M.J. Howell, L.M. Kumaratilake.

The finding of adult E. granulosus in a Vulpes vulpes from New South Wales, Australia, is discussed in relation to the role of foxes as definitive hosts.

Australian Vet. Journal, 62, 6, 200-201, 1985.
16 references. CAB-abstract.

TRICHOPHYTON INFECTION IN NUTRIA.

A. Kh. Sarkisov, L.I. Nikiforov, A.M. Litvinov.

When 522 Myocastor coypus, aged 3-6 months and affected by ringworm of varying degrees of severity, were inoculated with "Mentavak" Trichophyton mentagrophytes vaccine, the duration of the disease was shortened considerably in comparison with untreated animals. Prophylactic vaccination at 45 days of age, repeated 7-10 days later, protected coypu from natural and experimental infection for at least 2 years. A vaccination programme on some fur farms reduced the incidence of ringworm from 20-40% to 0.17%.

Veterinariya, Moscow, USSR, 5, 48-49, 1985.
In RUSS. CAB-abstract.

CARRIER-STATE OF SALMONELLA SP. IN THE INTERNAL ORGANS AND MEDULLA OBLONGATA IN BLUE FOXES.

(Nosicielstwo paleczek Salmonella w narzadach wewnetrznych i rdzeniu przedlyzonym u piesaków).

Wieslawa Szpakiewicz.

The carcasse of blue foxes were examined for the carrier-state of Salmonella sp. in years 1978-1982. One hundred and fifty two foxes of a large scale farm and 121 from individual farms, and besides 90 dead foxes were tested. The samples of internal organs and medulla oblongata were plated on nutrient media and also on Osborne's broth medium with mannitol and blood. In foxes from the large scale farm bacteria of Salmonella sp. were found in 36 cases (23.6) including 8 cases (5.2%) from medulla oblongata. Most often S. isangi (17 cases) was isolated. In foxes from individual farms S. dublin was noted in two cases only (1.65%). The strains of Salmonella were isolated from the medulla oblongata after prior cultivation in broth medium with mannitol and blood, and later on BG medium.

Medyzyna Weterynaryjna, 41, 4, 205-206, 1985.
1 table, 15 references. Author's abstract.
In POLH. Summary in ENGL and RUSS.

MEASLES VIRUS ENCEPHALITIS IN FERRETS AS A MODEL FOR SUBACUTE SCLEROSING PANENCEPHALITIS.

Halldor Thormar, Pankaj D. Mehta, Marc R. Barshatzky, Hannah R. Brown.

Young adult ferrets were used as experimental animals to study subacute sclerosing panencephalitis (SSPE). When cells infected with cell-associated measles virus strains isolated from SSPE patients were inoculated intercerebrally (i.c.) into ferrets, they developed an acute encephalitis and died within 1 to 3 weeks without detectable antibody formation. Immunization with live measles vaccine 5 weeks before i.c. inoculation changed the course of the infection in about 50% of the ferrets. These animals developed a subacute encephalitis within weeks or months after inoculation. Cell-associated measles virus was isolated from their brains and high measles antibody titers were found in their sera, comparable to those in sera of SSPE patients. Measles virus specific immunoglobulins (IgG) were present in their brains and determination of IgG/albumin ratios indicated that antibodies were synthesized in the brain in response to the persistent measles virus infection. Measles specific oligoclonal IgG bands were found in the sera and spinal fluids of these animals. Therefore, subacute ferret encephalitis has virological and immunological characteristics in common with SSPE, indicating that it may serve as a model for the human disease. Other animal models of SSPE are described briefly.

Lab. Animal Science, 35, 3, 229-232, 1985.
1 table, 20 references. Authors' abstract.

LOCALIZATION OF MEASLES VIRUS ANTIGENS IN SUBACUTE SCLEROSING PANENCEPHALITIS IN FERRETS.

Hannah R. Brown, Halldor Thormar, Marc Barshatzky,
Henryk M. Wisniewski.

Young adult male ferrets were inoculated intracerebrally (i.c.) with a cell-associated encephalitogenic subacute sclerosing panencephalitis (SSPE) virus strain to study the pathogenesis of the disease at the ultrastructural level. Most became acutely ill in 8-13 days. Areas of the brain were examined with indirect immunoperoxidase labeling techniques to detect measles antigen. None of these animals showed the characteristic viral nucleocapsids or marked inflammatory response associated with SSPE. However, all had positive immunolabeling of unstructured virus antigen, especially in post-synaptic regions in all areas of the brain that were examined. One ferret, immunized with measles vaccine 40 days prior to challenge with SSPE, became ill 18 days post inoculation (p.i.). Perivascular cuffins of inflammatory cells and large cytoplasmic inclusions of fuzzy nucleocapsids were found in the brain and spinal cord. The study indicates that ferrets which become acutely ill after inoculation with cell-associated SSPE virus do so before there is a marked cellular immune response or formation of virus nucleocapsids.

Lab. Animal Science, 35, 3, 233-241, 1985.
6 figs., 14 references. Authors' abstract.

Worldwide Furbearer Conference

August 3-11, 1980
Frostburg, Maryland USA

Worldwide Furbearer Conference Proceedings

August 3-11, 1980
Frostburg, Maryland USA

VOLUME I

Edited by

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Duane Pursley, M.S.
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Worldwide Furbearer Conference Proceedings

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VOLUME II

VOLUME III

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Not knowing the difference between a Worldwide Conference and an International Congress we want to pay your attention to the fact that in 1980 two important international events regarding fur bearing animals were arranged.

The topics discussed was not the same so in a good way they are completing each other. Some of the reports have been abstracted in SCIENTIFUR.

We are sorry that SCIENTIFUR not until six years after the conference is able to tell about the Worldwide Furbearer Conference. We hope in the future also to be able to advertise such important events in due time before they are going on, so that everybody can have possibilities to participate.

Your editor.

EDITORS' PREFACE

The following proceedings resulted from a conference held on the Frostburg State College Campus, Frostburg, Maryland, August 3 to 11, 1980.

The Editors and the individual Session Chairmen served as the editorial board for deciding which papers would be included in this Proceedings. The format with some modifications is based on that of the Journal of Wildlife Management and the Council of Biology Editors' Style Manual. The arrangement of the sessions within the proceeding was determined by the session chairmen. Papers within each session are arranged taxonomically, with those papers covering several taxa at the end of the session. Taxonomic arrangement and scientific names generally follow Hall (1981, The Mammals of North America, 2nd Edition, John Wiley and Sons, New York) and Walker (1975, Mammals of the World, 3rd Edition, The Johns Hopkins University Press, Baltimore). Where substantial disagreement existed or where interpretation was required, the author's preference was generally used.

We relied heavily on the input of the session chairmen and the many others who helped make this Proceedings a reality. However, as the editors of this publication, we fully accept the responsibility for its quality.

Joseph A. Chapman
Duane Pursley
Appalachian Environmental Laboratory
Frostburg, Maryland 21532

June 15, 1981

THE WORLDWIDE FURBEARER CONFERENCE, INC.

The Worldwide Furbearer Conference, Inc. is incorporated in the State of Maryland and registered with the Internal Revenue Service as a non-profit corporation for educational purposes.

FOREWORD

The University of Maryland was privileged to act as co-host for the 1st Worldwide Furbearer Conference. More than 300 conferees from 6 continents and 30 countries attended. The delegates were professionals involved in the study, collection, marketing, and conservation of furbearing animals.

The Conference was conceived and planned by the faculty of the University's Appalachian Environmental Laboratory in conjunction with officials of the Maryland Wildlife Administration and the International Association of Fish and Wildlife Agencies. The 9-day event, held on the campus of Frostburg State College, was sponsored by more than 20 public commissions and private organizations. During 14 sessions, more than 100 papers were delivered.

Such conferences demonstrate the international desire - and need - to meet together, to discuss problems of common concern, and to discover solutions. This exchange of ideas, achievement of accord, and development of cooperative programs will redound to the advantage of all.

In our increasingly interconnected world, the activities of any country are meshed with the activities of other countries. Scientists lead other citizens in taking a universal view. It is essential that scientists with the same interests, wherever they dwell, join together for the common good to share information and to assist one another in solving mutual problems. Our scientific partnerships serve as models for human cooperation in other fields.

Benefits result from the various backgrounds and diverse, yet complementary, interests of the participants. These participants included both U.S. and foreign researchers involved in the study of the physical characteristics and behavior of furbearers and the effects of man and other factors on these species.

Other participants were from the game management profession. These people oversee the harvest of the furbearers within their respective states and countries. They formulate the regulations that control hunting and trapping. They have an important responsibility; they must administer wisely and equitably and be guided by the best information available. Thus, this Conference served as a forum through which new and better management practices and policies may be expected to emerge.

In addition, the Conference was attended by delegates from the commercial furbearer industry. These individuals directly serve the consumer. They obtain the raw materials from the collectors, process them, seek out buyers, and distribute the hides and pelts to retail markets.

Also represented - and acting as one of the sponsors of the Conference - were the trappers and hunters themselves, the very foundation of the furbearer industry. These men are the harvesters of the pelts and hides that have been prized for comfort, warmth, and general utility since time immemorial.

Lastly, there were delegates who attended to petition that the humanitarian and philosophical aspects of hunting and trapping not be disregarded. The humane treatment of animals and the threat of extinction of species are ethical considerations of genuine concern to a large segment of the public. The sponsors of the Conference assure those delegates that their attitudes are respected, that the propriety of their views is unquestioned, and that their feelings were ever on the minds of other delegates.

The Worldwide Furbearer Conference was an important occasion - important because it was the 1st such Conference, important because the delegates to the Conference came from many lands, important because of the pervading economic and social impact that furbearing animals have on the human race, and important because of the great interest in furbearers by the general public.

A university occupies a unique position in our society. It stands in the neutral middleground, halfway between the realms of governmental authorities and commercial and private interests. It involves itself in the accumulation and dissemination of knowledge along a broad spectrum of natural and social issues. Contributing to the understanding of these issues is a major focus of the University of Maryland, and is a normal outgrowth of our role as the State's principal research university and land-grant institution.

We believe that the Conference will be a powerful stimulus to our work. We hope it will be similarly helpful to each of the delegates and that it will inaugurate a running series of international conferences dealing with furbearing animals.

The diversity and high quality of the papers presented were notable. Each of the papers made a worthy contribution to the body of knowledge about furbearing animals and the associated industry. The Conference brought forth an extraordinary quantity of seminal information that the delegates can actually apply in their careers. It is to the good fortune of all that the Proceedings of the 1st Worldwide Furbearer Conference have been preserved in this publication. Available for consultation and reference, this 3-volume text will serve to stimulate future work directed toward improved use and conservation of fur resources.

John S. Toll
President
University of Maryland

VOLUME I

SESSION 1 - Jean Dorst, Chairman

SESSION 2 - Hendrik N. Hoeck, Chairman

SESSION 3 - William E. Poole, Chairman

SESSION 4 - Joseph A. Chapman and Ken Myers, Chairmen

SESSION 5 - Clyde Jones, Chairman

VOLUME II

SESSION 6 - William M. Samuel and Jon D. Dunsmore, Chairmen

SESSION 7 - John D. Skinner, Chairman

SESSION 8 - William Lopez-Forment, Chairman

SESSION 9 - Kenneth R. Dixon, Chairman

SESSION 10 - Duane Pursley and Greg Linscombe, Chairmen

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VOLUME III

SESSION 11 - Neal R. Jotham, Chairman

SESSION 12 - Charles J. Henny, Chairman

SESSION 13 - Harry V. Thompson, Chairman

SESSION 14 - Kent B. Fuller and Arthur J. Lalonde, Chairmen

Letters to the Editor.

THE BRITISH COLUMBIA
FOX BREEDERS ASSOCIATION
BOX 339, HUDSON HOPE, B.C. V0C 1V0

Dear Sir or Madam:

This letter is written to serve as an introduction to the British Columbia Fox Breeders Association. We were incorporated in March 1986 at our headquarters in Hudson's Hope, British Columbia to improve, advance and protect the ranched fox industry in British Columbia.

Our plans this year include publishing a quarterly newsletter for our members with helpful information on raising fox and any current news items. We also will provide an information list with addresses and phone numbers of persons involved in the fox industry including organizations and supply companies.

We are planning to hold a Live Fox Show on the weekend of November 15-16th, 1986 in Hudson's Hope, with one day being devoted to education and information. We are also in the process of establishing a co-operative Fox Food Plant to provide those involved in the fur farming industry in the Peace River area with an inexpensive and stable feed supply.

We would like to be put on your mailing list and appreciate any information or help that you might send our way to aid in our association being a success. If we can be of any help to your organization or company in any way please feel free to contact us and we would be happy to oblidge.

We look forward to hearing from you and will keep you posted as to our activities in the coming years.

Sincerely yours,

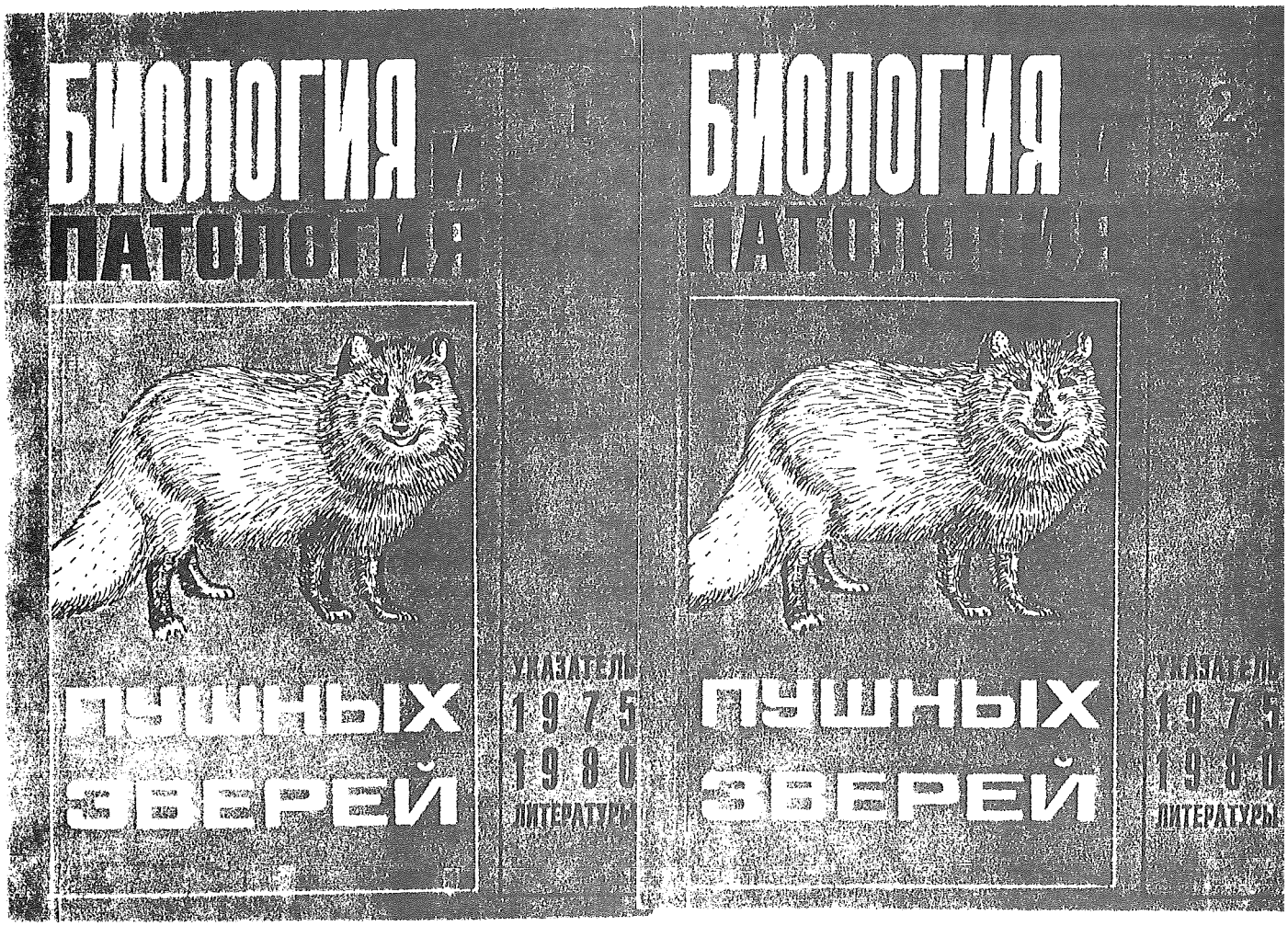
R E Bach

Robert E. Bach, President
The British Columbia Fox Breeders Association
P.O. Box 339
Hudson's Hope, British Columbia
Canada V0C 1V0

NEW BOOKS.

BIBLIOGRAPHY OF BIOLOGY AND PATHOLOGY OF FUR-BEARING ANIMALS FOR THE PERIOD OF 1975-1980.

CEdited by: PROF: V.A. BERESTOV



In two volumen of totally 441 pages, 2698 titles of scientific reports and other information regarding fur animal production is given.

The material is arranged in subject chapters, and 57 pages represents a list of authors in alphabetical order with marking of the title number(s) for which he is responsible.

All of the reports are given by the title in original language and in Russian, e.g. Russian titles are only given in Russia.

Karelian Branch of the USSR
Academy of Science,Petrozavodsk,
185610 Pushkinskaja 11, USSR.

Price: 40 Kop. Order No. 583.

Abstract: G. Jørgensen.

Detection of Aleutian disease virus in the bone marrow of naturally infected, farmed mink. (De) (SUM: en)

Nachweis des Aleutian Disease-Virus im Knochenmark natürlich infizierter Farmnerze

Vorgelegt von

Stefan Fritz Gabriel

aus Bielefeld

Inaugural-Dissertation, Tierarztliche Hochschule, Hannover :81pp.,1984
NOTES : 13pp. of ref.

Hannover 1984

SUMMARY

In the presented study the Aleutian disease-Virus (ADV) was demonstrated in bone marrow cells of naturally infected farm mink. An average of 4,4 ± 2,4 percent of nucleated bone marrow cells showed ADV-specific immunofluorescence in their cytoplasm. From nine out of ten seropositive mink infectious ADV could be isolated.

Suspensions of mink bone marrow cells were fractionated by means of adherence to plastic surfaces and by countercurrent elutriation in order to characterize the ADV-containing cells.
Adherent monocytes/macrophages were identified by esterase staining and were shown to be negative for ADV and specific antigens.

By elutriation antigen-containing cells could be enriched 7.3 times in the mean. They were shown to be small mononuclear cells. A significant correlation between numbers of antigen-containing cells and pyronino-philic lymphocytes in fractionated bone marrow cells was demonstrated by a statistic analysis.

As no intranuclear fluorescence could be detected in any sample there is no evidence that bone marrow supports active replication of ADV in persistent infected mink.

The results of this study give further indication for a lymphotropism of ADV. The possible consequences of such a lymphotropism on pathogenesis of Aleutian disease as well as on persistence of the virus are discussed.

Aus dem Institut für Virologie
der Tierärztlichen Hochschule Hannover

EVALUATION OF THE ROLE OF PSEUDOMONAS AERUGINOSA ELASTASE IN THE PATHOGENESIS OF PSEUDOMONAS HEMORRHAGIC PNEUMONIA

By

Laila Elsadig Elsheikh

Uppsala 1985

Swedish University of Agricultural Sciences,
College of Veterinary Medicine,
Department of Veterinary Microbiology, Uppsala Sweden

National Veterinary Institute, Uppsala Sweden

Sveriges Lantbruksuniv. Uppsala (Sweden). 1985. 44 p
Bibliography p. 34-44. Summary (En). A dissertation
bound with a collection of 4 reprints.

PREFACE

This thesis is based on the data presented here and in the following papers, which will be referred to in the text by their Roman numerals.

I. Elsheikh, E.L., Bergman, R., Cryz, Jr., S. and Wretlind, B.(1985). A comparison of different methods for determining elastase activity of Pseudomonas aeruginosa strains from mink. Submitted to Acta Path. Microbiol.Scand. Section B.

II. Elsheikh, E.L., Abaas, S. and Wretlind, B. (1985). Adherence of Pseudomonas aeruginosa to tracheal epithelial cells of mink; Studies on bacterial hydrophobicity and elastase production. Accepted for publication in Acta Path.Microbiol.Scand. Section B.

III. Elsheikh, E.L., Kronevi, T., Wretlind, B., Abaas, S. and Iglewski, B.H. (1985). Assessment of elastase as a Pseudomonas aeruginosa virulence factor in experimental lung infection in mink. Submitted to Veterinary Microbiology.

IV. Elsheikh, E.L., Bergman, R. and Wretlind, B. (1985). Protective activity of passive immunization against Pseudomonas aeruginosa elastase and lipopolysaccharide in experimental Pseudomonas pneumonia in mink. In manuscript.

ISBN 91-576-2522-0
Tryck: Sveriges lantbruksuniversitet, Uppsala 1985

EVALUATION OF THE ROLE OF PSEUDOMONAS AERUGINOSA ELASTASE ON THE PATHOGENESIS OF PSEUDOMONAS HEMORRHAGIC PNEUMONIA

Av Laila Elsadig Elsheikh

Veterinär

AKADEMISK AVHANDLING som för avläggande av veterinärmedicine doktorsexamen offentligen försvaras i "Ettans" föreläsningssal, Klinikcentrum, Ultuna, måndagen den 16 december 1985, kl. 13.15.

ABSTRACT

Pseudomonas aeruginosa strains isolated from mink ranches were characterized regarding elastase production in relation to O-serological types. A parent laboratory strain (PA01), its elastase temperature-sensitive mutant (PA01-E64) and elastase-deficient mutant (las 16) acted as controls in the study. Four enzymatic and immunological methods for measuring elastase production were evaluated. All P.aeruginosa strains isolated from mink were found to produce elastase activity as measured by the ^{14}C-elastin microtitre plate assay. There was a good correlation between levels of elastase activity as measured by the ^{14}C-elastin assay and levels of elastase antigen, as quantified by the Enzyme Linked Immunosorbent Assay (ELISA), r=0.97. No association was found between the amount of elastase produced and the O-serological type of the strains. As shown by ELISA, all strains produced antigenically similar elastase, although the amounts produced varied considerably. Total proteolytic activity on skim milk agar plates, also correlated well with elastase activity produced on elastin agar plates, although 34% of the strains were classified as non-elastase producing by the latter method. Thus the ^{14}C-elastin and ELISA methods were judged to be sensitive, practical methods for determining levels of elastase production by P.aeruginosa strains.

The ability of six P.aeruginosa strains (with different elastase activity) to adhere to mink tracheal epithelial cells (MTEC) were examined in relation to the cell surface hydrophobic properties. Hydrophobicity and elastase production were measured during growth for up to 48 h. Bacterial hydrophobicity was quantitatively measured as the affinity of Palmitic acid (hydrophobic probe) to the cell surface. A highly elastolytic strain (B1) adhered significantly better than the lower elastase-producing strains, regardless of their surface hydrophobic properties. According to PQ 10 values, the bacterial surface became less hydrophobic during the exponential growth phase (up to 6 h) and then continued to increase slowly for the duration of the experiment (48 h). Based on ELISA values, elastase production started after 2-4 h, reaching a plateau after 24 h of growth. No association between elastase production and the observed change in hydrophobicity was found. Thus elastase activity and not surface hydrophobicity seemed to play a role in promoting the adherence ability of P.aeruginosa strains.

To study the role of elastase in the pathogenesis of Pseudomonas hemorrhagic pneumonia, differences in virulence among the strains were studied. Intratracheal inoculation of the clinical strains B1 and B9, which showed high and medium elastase activity, caused high mortality, severe tissue damage and shortened survival time. In contrast, the low elastase producer B10, was less virulent. Similar findings were observed when the parent strain (PA01) was compared to its elastase-deficient mutants. Elastase was found to be a virulence-enhancing factor in mink Pseudomonas hemorrhagic pneumonia.

Mink were passively immunized with anti-elastase and anti-lipopolysaccharide serum. After challenge with P.aeruginosa organisms, significant increases in survival time and survival rate were found in immunized animals compared with control groups. The protective effect provided by each antiserum was similar; moreover, elastase provided protection regardless of the O-serotype of the challenge strain. The result of this study indicates the potential for using elastase as a vaccine and further suggests a role for elastase as a P.aeruginosa virulence factor in Pseudomonas pneumonia.

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