

DET KONGELIGE DEPARTEMENT  
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NORGES SVALBARD- OG ISHAVS-UNDERSØKELSER  
LEDER: ADOLF HOEL

MEDDELELSE Nr. 28

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## ARCTIC NERVOUS DISEASES

Reprinted from  
Skandinavisk Veterinär-Tidskrift  
No. 6, 1935

OSLO  
I KOMMISJON HOS JACOB DYBWAD  
1935



# Arctic nervous diseases.

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**Preface.** In leisure hours the author has been making extracts from the literature on nervous diseases, especially in the Arctic, first and foremost from the accounts of Polar expeditions, next from works on veterinary and human medicine, physiology and zoology, about 400 works in all. The object aimed at was to throw some light on the problems connected with arctic hysteria, the term 'arctic' being adopted solely for the reason that the ailments dealt with are of especially common occurrence in hyperborean regions. But the identical ailments, no doubt, appear blunted or occur latent in districts a long way south of the Polar regions. On the whole, the polar tracts again and again have proved to be a fortunate hunting ground because the scientific problems there are forthcoming in clearer detail than in the fog-gier atmosphere of the civilized continents where the threads of life are too closely entangled and complicated. Therefore, the solution of special tasks in these tracts often has led to elucidation of pure facts of general application.

Although not in the position to present original studies of his own from the polar tracts, the author thinks that a thorough compilation and systematization of the facts hitherto known will prove to be of great value to those engaged in future field work and laboratory researches. Also the authors comments may, perhaps, be of interest.

Mrs. M. A. CZAPLICKA in her book *Aboriginal Siberia* (1914) has given a detailed compilation and discussion of the facts of the nervous ailments pertaining to mankind. The present author has in a general way proceeded along the same line, but he has also included animals and furthermore extended the references to investigations made in Greenland, Arctic America and on nearly

all arctic and antarctic expeditions. And in his comments he discusses the facts from a veterinarian's point of view. W. L. LINDSAY, an English alienist, in his dealing with nervousity in Arctic districts, gives his opinion as follows: »The etiology of insanity in arctic or extreme northern countries is in various respects peculiar and exceptional. In countries such as Greenland, Iceland, and Lapland, there are certain causes directly productive of, or indirectly conducive to, mental diseases that either do not exist in more southern latitudes, or, if they are operative at all, operate on a much smaller scale or under very different circumstances of detail. The great peculiarity of the etiology of insanity in high northern latitudes is the dominance of natural or external — in other words, non-preventible circumstances or conditions, necessarily or essentially connected with or depending on latitude and climate. These natural influences are productive of a mental habitude that belongs not only to individuals, but whole peoples; a constitution variously characterized by travellers as melancholy, apathy, indifference, and one that is in itself a predisposition or stage in its production.» Contrary to LINDSAY I venture the opinion that the factors are not so much darkness, superstition etc., as especially malnutrition and loss of body heat first and foremost. Among the different causes enumerated by LINDSAY are hunger and thirst, too much of putrid, sour and improper food, especially including salt and fat ones. As to fat food, however, experience from man and animals points in the direction that LINDSAY's view is an erroneous one, see the following articles.

It is the intention to have the whole compilation of extracts from the above mentioned 400 works printed later. But in order to give the readers some idea of the usefulness of the compilation, the author gives below a short outline of 6 articles, which he has recently published in Norwegian, and in the preparation of which the above-mentioned compilation was first employed.

Besides these 6 articles, there will in conclusion be presented a chapter (7) containing comments not hitherto published, mainly on the differential diagnosis and treatment of the Eskimo dog disease. Letters in brackets refer to this chapter. Full literature references are presented in the 6 Norwegian articles.

1. *Wild animals under culture.* From the Norwegian newspaper »Aftenposten» for January 31st 1931.

In order to obtain the best hygienic conditions, and to influence favourably the fertility in mink and marten for fur-

farm purposes, I have recommended feeding at intervals with living mice, see page 340.

2. *Is the mute type of rabies and the Arctic disease »piblokto» deficiency diseases of a nature related to scurvy? Whale-meat and deadliness among silver foxes.* »Aftenposten», March 27th 1931.

When, in 1915/16, the Norwegian State District Veterinarian B. HJELDE had published his renowned article on the connection between scarcity in sunlight and occurrence of rickets in swine, I began to inquire into the Polar explorers' accounts on sanitary conditions among their dogs and horses.<sup>1</sup> On a later occasion I will account more fully for my findings, and discuss the problems more in detail from the material concerned, which has not in this respect, as far as I know, been systematically treated. It may well be possible that other writers have previously been touching several of the facts which I am calling attention to in the present article, and that all of my statements cannot be presented as original findings, but it seems, on the other hand, as if they have not received due attention. On account of the many mystical deaths lately occurring among silver foxes after preceding paralysis and convulsions, I now have thought it advisable to publish the present short preliminary communication.

From many of the Polar accounts it is evident that a disease much resembling rabies often occurs among the Eskimo dogs. In the limited space of a newspaper I find it unnecessary to give a full account of the symptoms and course of the disease, of which E. ASTRUP, I. I. HAYES,

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<sup>1</sup> About this time, Professor SIMON PAULLI, Copenhagen, at my request, informed me that, the skeletons of dogs killed under an alleged outbreak of rabies in Greenland, see HJORTLUND later, did not show any traces of rickets. It was, however, the Norwegian physician BENDIX EBBEL, who in a Norwegian publication (1908) first called attention to the interrelation between light and rickets. *Author's note* (1935).

E. KANE and G. S. NARES have given good descriptions.<sup>1</sup> This disease deviates distinctly from dog distemper which, being of infectious nature, has at times badly devastated the western Greenland colonies. About 1906 the Danish veterinarian S. R. HJORTLUND was sent over there and he arrived at the conclusion that in the cases examined by him the diagnosis rabies was evident. I never have been convinced, however, of the correctness of his conclusions based as they are upon a few inoculations on rabbits. His article *De smitsomme hundesygdomme i Grønland*<sup>2</sup> was published in the Danish Monthly Magazine for Veterinarians in 1908.<sup>3</sup> In my opinion, the general tendency during the 'great Arctic Night' towards nervous excitement, and a not satisfiable perverted and depraved appetite, in man as well as in beast, indicates symptoms of a deficiency disease rather than signs of an infectious disease, as the true rabies is. Further, I have arrived at the conclusion that several nervous symptoms are a mild form or prodromic symptoms of a disease resembling rabies, or, a tendency to tetanic cramps, as E. KANE with great truth characterizes the phenomenon commonly occurring in Polar tracts.

Highly interesting is the absence of desire to take care of the new-born offspring so often observed among sluts on Polar expeditions, or, the more frequent cases of a directly hostile attitude, namely the so-called »cannibalism». OTTO SVERDRUP mentions a slut »Silla», which in July 1900 evidently thought the rearing of her own puppies did not keep her busy enough, as she stole and nursed puppies of another bitch. The same »Silla» later accompanied ROALD AMUND-

<sup>1</sup> The clinical symptoms of »mad» dogs have been described so often that I do not consider it necessary to do so again. It is to be hoped that the symptoms of the disease of mad dogs and of the human disease »piblokto» both can be synchronized for educational purposes either by the Canadian Royal Mounted Police or by Polar travellers in North Greenland. Slow motion pictures will, no doubt, prove to be of much use and highly interesting.

<sup>2</sup> »The contagious dog diseases in Greenland.»

<sup>3</sup> »Maanedskrift for Dyr læger.»

SEN on his expedition through the North-West Passage. During the bad nutritional conditions of autumn 1903, to which I refer later, she not alone permitted other dogs to eat her new-born puppies, but indeed herself devoured the last of them. This is apparently Mother Nature's own form for insurance during miserable nutritional conditions. Next autumn when according to ROALD AMUNDSEN the reindeer were as fat as pigs, she again gave birth to a litter of pups and kept them. AMUNDSEN says that she would have gone through fire in order reach her puppies after weaning . . . After receiving food rich in fat the voracity of the dogs and their tendency to gnaw on everything diminishes.

When, next, I became aware of the fact that a nervous excitement and a strange tendency to gnaw were found also among the Manchurian ponies<sup>1</sup> SHACKLETON made use of during his South-Polar expedition, and of the further fact that the symptoms of scurvy among Polar travellers, and the arctic disease »piblokto» among Eskimos, had strikingly many points in common with the disease which S. R. HJORTLUND alleged to be the mute form of rabies (A), I came to the conclusion that the latter disease — at any rate in the Polar tracts — merely is a deficiency disease. In the main, the symptoms in both cases are identical. When I say 'in the main' it is because the syndromes for the latter diseases have a greater range of variation than the symptoms in infectious diseases. S. R. HJORTLUND expressively calls attention to the fact that the sketch of the symptoms in the dogs attacked by the Greenland »rabies» varies exceedingly much, so that under such circumstances casus descriptions cannot be quite like one another. The notions osteomalacia and rachitis are indeed widely different. A little child cannot have osteomalacia, since its skeleton consists of cartilage, and a grown-up person cannot display rickets owing to the fact that the skeleton has become ossified. The said pathological conceptions are with regard to causality none the less identical, both often being accompanied by various nervous

<sup>1</sup> According to my view these obtained too much maize in their food.

symptoms, cramps inter alia. This variation in symptoms of the deficiency diseases and the avitaminosis is, no doubt, due to varying circumstances, such as whether pregnant or not, differences of sex and age, different feeding etc.

The correctness of the conception, that it is not true rabies which occurs among the Greenland dogs, is indicated by the following. The disease is not incurable, see further, chapter 7. After having been known for more than 50 years among Polar explorers and in Greenland, the disease has not, according to R. E. PEARY, as late as 1910, been transmitted by bite to man or beasts. The believers in the rabies theory have maintained that the cause of this non-transmission is to be sought in the fact that the Eskimos are clad in hide or fur which cleanses the teeth of the dog from virus before penetrating the skin. They further claim that the tendency to profuse bleedings, so common among the Greenlanders, causes the virus to be washed out from the bitten wound. It appears to me that both assertions are not well founded because in sledging it frequently occurs that the dog harnesses and traces become so entangled that according to all Polar travellers they can only be unravelled by the dog-driver after he has taken his mittens off. The chance of being bitten is then close at hand. R. E. PEARY and E. ASTRUP were repeatedly bitten without impunity by dogs of two teams in which the alleged rabies had broken out upon a severe snow-storm during a sledge journey in 1892. Noteworthy is, further, that the worst combatants among the dogs often seem not to contract the disease, the cause for this hardly being, as S. R. HJORTLUND states, that »mad» dogs in their fits still retain their respect for the former but rather, that the »boss» dog of the team manages to get the lion's share of the food supply whereby the stronger dog obtains more food and, consequently, more resisting power against this deficiency disease.<sup>1</sup> In Greenland

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<sup>1</sup> In cases of general hunger only, this assumption holds good. Many weaker dogs are then bereft of their food on occasions at which scarcity of animal food is prevalent. When devitalized products are fed to dogs, also the boss may contract the disease. *Author's note* (1935).



the disease occurs most commonly during the worst of the dark period or closely afterwards, and at times of especially severe cold, in February especially (B).

ROALD AMUNDSEN's dogs first sickened from the disease in the Atlantic upon unbalanced feeding with dog-biscuits and stock-fish, i. e. dried, lean cod.<sup>1</sup> Of his dogs, these came from Norway direct where no case of rabies during that year (1903), nor before and afterwards is known to have occurred. On receiving a further supply of dogs from Godhavn in Greenland, his stock, however, was again attacked when somewhere north of America. It is well worth noticing that ROALD AMUNDSEN had to throw overboard more than 3 tons of dog-pemmican at the time his vessel »Gjøa» grounded on a reef, and that the dogs, prior to the second outbreak for a long time had been fed on especially lean reindeer-meat. Dr. I. I. HAYES' dogs also contracted the sickness upon feeding with lean reindeer-meat. He was not, however, aware of the cause, but in any event he kept aloof from believing rabies to be the true cause. M'CLINTOCH's dogs sickened from feeding on tainted stock-fish. The latter and L. MYLIUS ERICHSEN & HARALD MOLTKE observed symptoms resembling those in the alleged rabid dogs upon feeding with fresh shark meat, which is known to be especially »lean» in the ordinary meaning of this word. In November 1908 ROBERT E. PEARY had lost 53 dogs out of 246. He states that the whale-meat on which they had been fed was seemingly lacking in nourishment.<sup>2</sup> On the

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<sup>1</sup> Stock-fish contain a surplus of phosphorus in relation to the calcium content, and, further, is practically devoid of fat. *Author's note* (1935).

<sup>2</sup> According to feeding trials conducted by R. O. ROCHMANN in 1931/32 with whale-meat exclusively in order to determine whether such a feeding would produce convulsions in foxes, it was proved with positive results to be so in the case of young foxes only, and that addition of ground fresh bones, containing some fat, counteracted the occurrence of cramps. I should think that old foxes likewise would have sickened if the said experiments had been conducted with frozen, decayed whale meat and if simultaneously a severe cold had set in. PEARY's experience

whole, it seems as if formerly the epidemic type of the disease was more pronounced, and that the disease was more common in the southern parts, Upernivik, Tassiusak and Umanak, where the dogs are fed more on fish, than in the northern district, Cape York, where more blubber usually is given.

Among the foxes in Greenland the identical disease is well known, and has been described by ASTRUP, HJORTLUND and PEARY. Trapping of live white and blue foxes which are, in Greenland, often living in the same district, is a matter of daily routine in winter-time, but even so, no instance of transmission from bites has been reported. This in spite of the fact that the Greenland blue-fox, according to Army-Veterinary-Captain A. MOHOLDT's paper, read before the Norwegian Veterinary Association's course on fur-farming in January 1931, particularly bites at the face and hands.

Dogs and foxes leading, even during the cold Arctic Winter, an out-door life day and night, require, of course, comparatively more fat than man who lives, partly at least, in heated rooms either in a vessel or in a snow or stone hut. Another circumstance to be taken into consideration is that the dogs, when living in company with man, during periods of scarcity affecting both, will easily come into second rank as regards division of the food which, as far as the blubber is concerned, must also serve as fuel.

According to my view, it is evident that these cases of paralysis, convulsions and other nervous disturbances as abnormal, piercing, howling, tendency to biting, wheeling or circling around, and other abnormal and peculiar movements, and, probably, hallucinations both in man and beasts, are due to deficiency of fat. As far as I can judge from existing literature, ROALD AMUNDSEN among the Polar explorers is the first one to mention the said deficiency as the cause of the disease. In particular, I believe that, when all fat dispensable has been combustioned, a drain of the above-mentioned was gained under such circumstances, a fact corroborated by HARRY WHITNEY. *Author's note* (1935).

glycerine-phosphoric acid in the lecithine combinations of the central nerve system takes place with ensuing nervous disorders, but it is also possible that the loss of fat involves disturbances in the calcium metabolism. On those foxes autopsied by the State Veterinary Institute, no pathological changes in the central nerve system were ascertained. HAYES, mentioned above, who was a physician, came to the following conclusion: »Dissection revealed nothing. There was no apparent inflammation either of the brain, the nerve centres, the spinal cord, or the nerves themselves and I was wholly at a loss to understand the strange phenomenon.»

Hardly all sorts of fat are alike as curative or preventive remedies. Thus, PEARY had bad results from feeding his dogs on pork, whereas he attained good results from feeding on walrus meat. In Greenland, the latter is given the dogs in slices, with hide, blubber and meat in one piece. Possibly the pork PEARY used contained too much salt, which acts as a poison on Eskimo dogs. As curative remedies, I should suppose that the application of calcium compounds combined with sedatives ought to be tried, and prophylactically, or, when the foxes are again able to ingest food, cod-liver-oil with or without phosphorus added, and fresh lard.

According to my notion the Cape York disease »piblokto» (an Eskimo term, also »pøblakto» or »pivdliuvok», that is to say furious, mad or running amuck) holds out a rich field for the study of comparative pathology, and it is possible that such researches may lead to important conclusions furthering the understanding of a series of nervous ailments in man. For the raising of dogs and also for fur-farming a continued research of this disease is of the greatest importance. According to my view there are several indications that the disease is identical with the mystic ailment which in English veterinary magazines is termed »canine hysteria» or fright disease.

March 4th 1931 at a meeting of the Geographical Society, I heard H. INGSTAD reading a paper on his stay among the Canadian Indians north-west of the Hudson Bay. From this account

it was quite obvious that these Indians as a rule starved, and on the whole, neglected their sledge-dogs. In Constantinople and in Canada, inter alia, the so-called mute type of rabies occurs, and it seems to me there are many indications that this disease as well as »piblokto» and canine hysteria is one and the same disease, all of them caused by fat and vitamin hunger. It is a question whether everything that goes under the designation rabies in reality is this disease. — — —

As is well known, whale, walrus and seal have an enormous layer of blubber beneath the epidermis, while on the other hand, accumulations of fat in the musculature and abdomen as those known in land animals are practically non-existent. According to MYLIUS-ERICHSEN and MOLTKE and other Polar travellers, the hide of the narwhale together with the underlying layer of blubber is, no doubt, one of the best antiscorbutica known in Greenland. There are no two opinions about the fact that as a vitamin reserve the fat from subcutis is a factor of great importance, though Eskimo dogs like carnivorous animals in general, when able to chose from an animal killed, seem to value most the vitaminous parts viz., the blood and the entrails. Whale-meat given as food for farm-foxes is, of course, not poisonous in itself, but during a typical, long and severe cold period, such as we just have had this year (1931), it is highly probable that feeding foxes on it can prove to be a malnutrition since the fat reservoir of the whale, occurring in the blubber layer, has been removed to serve other purposes.

On the above-mentioned expedition OTTO SVERDRUP always gave his dogs extra rations of blubber during the coldest season. From his book »New Land» it would appear that he was in possession of an uncommonly practical insight into, and understanding of, the feeding and methods of taking care of sledge-dogs. This opinion is well substantiated by the fact that his dogs were quite free from the »inevitable» Arctic dog disease (syn. Eskimo dog disease) during his whole expedition in the vessel »Fram» (1898—1902) while

practically all other Polar expeditions with a large number of dogs have had their population of dogs seriously decimated.<sup>1</sup>

3. *Raw Animal nutrition. Scurvy and vitamin-C. Tuberculosis and cancer.* From The Norwegian Veterinary Magazine, October 1932.

The Danish clergyman C. BASTHOLM in 1803 with great truth stated: »In the cultivated countries we learn only what man can be, in the uncultivated countries what man is.» Through the literature mentioned in my preface, see page 310, I have also come in close contact with the literature on scurvy. In this article several of OTTAR RYGH's statements on scurvy, especially the vegetable line of research versus the raw animal nutrition line, are discussed and contested. The latter line, tried by the pioneer Polar explorers, mostly with the very best results, has been totally over-looked by RYGH in his account (1931) of the alleged discovery of the chemical composition of the synthetic C vitamin. Scurvy, no doubt, is not conditioned by absence of a single factor, vitamin C, but by several collateral causes, first and foremost of which is loss of body heat, either as a consequence of lack in sunshine and fat, or, as a consequence of living in damp and cold rooms, cp. further page 337. This must be emphasised. The said causes combined in a high degree also promote the development of another deficiency disease — rickets. Heating of the floor by means of electricity, as adopted experimentally of late, has kept the stock of swine-houses free from rickets, which was formerly badly ravaging the occupants.

The correctness of the assertion that scurvy in man and in guinea-pigs are identical ailments is, in my opinion, open to doubt. The pathologic-anatomic symptoms of the »experimental» scurvy in guinea pigs may just as well be the result of some other deficiency disease as of manifest scurvy.

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<sup>1</sup> A translation of this article is to be found in Münchener Tierärztliche Wochenschrift, 1933, No. 36, page 425.

The experimental scurvy may very well be a mixed symptom complex in which also rickets and osteomalacia are represented. Various types of nervous symptoms often accompanying scurvy in Polar travellers, are not mentioned at all in HOLST & FRÖLICH's classical investigations, nor by O. RYGH. Microscopic and dissection material from the former cases are not at all mentioned. A series of Polar travellers has shown that meat from animals laid down in the Polar regions acts as curative antiscorbuticum. During periods of severe cold about one third of the food may consist of fat. Several Eskimo races either do not eat products from the vegetable kingdom, or have consumed their supply of these products when the severe winter time in earnest sets in. The hyperborean races use practically everything on an animal as food, except bone-tissue, sinews and horny substances. Most noteworthy is the rapid change for the better in scurvy after ingestion of fresh blood, even in cases of deranged mentality.

Among Greenlanders, tuberculosis seems to gain hold at a pace approximately proportional to the abolition of their old sources of animal food, especially seal-meat. Danish physicians have pointed out how rare on the whole cancer *was* at the beginning of this century in the Danish colonies.

In the fight against tuberculosis »certified milk» is nowadays supplied to town children. I should think that in high mountain sanatoriums this disease will, in future, be combated by administering blood from reindeer and other animals leading an open air life and therefore being in a thorough mineral and vitamin balance. Also, against several other ailments such blood will, no doubt, be resorted to as a tonic.

As to the »latent» types, mentioned in my preface, see page 310, pathological phenomenons as apoplexia, certain types of arthritis, rheumatism and asthma, and in horses, crib-biting and the tendency to »run-away», ought to be looked upon as results of deficiency diseases.

4. *C and D vitamins*. From »The Norwegian Veterinary Magazine», December 1932.

The fact that seal meat, even if kept in a frozen state for a long time, retains antiscorbutic properties, is shown by Dr. FREDERIC A. COOK as a result of experience gained on the »Belgica» expedition. This is also corroborated by ROALD AMUNDSEN, another member of that expedition. This experience disproves the assertions of the chemical analysts that the C vitamin ceases to exist in the animal body after death. Noteworthy is that various salmonidae in a fat condition (not immediately previous to spawning), with their rich content of A and D, possess preventative antiscorbutic effect, although they are supposed to contain no vitamin C. To scurvy is further attributed an accompanying tendency to become liable to fractures, but in the extensive literature I have examined I found but a single case, where a fracture is mentioned in connection with the appearance of scurvy. As being far more commonly associated with scurvy, nervous derangements are mentioned. ROALD AMUNDSEN, who was not only well-practised, but also very well conversant with Polar literature, seems to indicate that scurvy and madness go together, the madness attained being either permanent or passing. I particularly remember a case when a member of a sledge party incurring a long period of famine, lost consciousness, but that a rapid and complete change for the better took place after dosings of blood from an ice-bear. General hunger and, as presumed with scurvy, vitamin deficiency, are often combined.

5. *Scurvy and rickets*. From »The Norwegian Veterinary Magazine», April 1933.

W. H. NEALE & LEIGH SMITH, later F. NANSEN & Hj. JOHANSEN wintered on Franz Josephs Land on ice-bear meat and blood as a staple diet. They had no lime-juice in their provisions. Some authors have ascertained that the liver is the source of the animal C vitamin. The fact that

a series of expeditions from the BARENTZ to the »Denmark» expedition in 1910 has proved bear's liver to be poisonous, must point in the direction that meat, blood and the other internal organs are also in possession of antiscorbutic properties. NANSEN & JOHANSEN highly appreciated toasted brain.

Apart from the nerve system, antiscorbutic properties as well as lecithine are to be found in tissues exhibiting, or being in a state just undergoing, an intensive cell division, viz., red marrow, red blood corpuscles, and the organ most of all rich in blood, i. e. the liver. To lecithine is attributed a driving and regenerative influence on the growth. Reserve-layers of this phosphoric combination are also to be found in the fat tissue on various places of the body. The hide of white-whale and nar-whale, which is known in Greenland under the designation »matak» as an excellent remedy against scurvy, is to be regarded as an enormous layer of *Rete malpighi*, its thickness indicating that an intense cell-division takes place.

Earlier writers have entertained the opinion that the phosphatides are antidotes of several deficiency diseases, but the »proof» is difficult to give, because the phosphatides are regarded as »contaminated» with vitamins.<sup>†</sup> In ascertaining

<sup>†</sup> According to a press report of April 29th 1935, two Danish scientists, HENRIK DAM and FRITZ SCHONHEYDER have discovered a new fat soluble vitamin K, necessary for poultry. Whether it is necessary for other animals or for man is not yet ascertained, but this is under investigation. Dr. DAM noticed some years ago, during an investigation on the cholesterine metabolism in chickens, that these animals, when living on an artificial food, containing an abundance of the known vitamins and other necessary constituents of food, were afflicted with a peculiar deficiency disease which, when cursorily regarded, had some resemblance to scurvy. It proved, however, that lime-juice, very rich in C, could not prevent the new disease. By replacing some of the constituents of the artificial food with other nutrients, it proved possible to prevent the disease, and a further investigation of the curative constituents gave as a result that the effect is attached to the extracted fat whereby the nutrient concerned is to be classified with the known vitamins A, D and E. Success was achieved in demonstrating that the active factor is not identical with the said vitamins. *Author's note* (1935).



whether scurvy in guinea-pigs is partly rachitic in origin, not only compounds of lecithine but also of calcium-natrium-lactate, phosphorus dissolved in cod-liver-oil and compounds of ergosterine, ought to be tried. In *Terap. Monatschr.* for 1913 VAN DER WELDEN has maintained that calcium therapeutics is effective against scurvy. J. QVIGSTAD states that the Laplanders of Northern Norway and Sweden since long have used not only blood of reindeer and seal against scurvy, but also fish-liver, which latter according to our present knowledge first and foremost should contain the anti-rachitic vitamin. According to another source, LINNÆUS has stated that he never heard of scurvy among Laplanders.

6. *On the importance of additional feeding with calcium and phosphorus compounds.* From »The Norwegian Veterinary Magazine», November 1934.

I recall the fact that experimental deficiency in minerals has been proved to lead to various nervous symptoms, especially hysteria, cramps and paralysis, and I further call attention to a possible connection between the occurrence of deficiency diseases of various types in swine and cattle on the one hand, and, on the other, to a hyper-nervous condition in man, accompanied by religious and erotic excesses combined with glossolalism, piercing cries and dæmoniacal possession, as is to be found nowadays in certain districts of south-west Norway, and, formerly, in Dalkarlia in Sweden. When appearance of nervousness and insanity occurs in connection with the flaring up of religious secterism in a district, we often will find a taboo against this or that form of food, particularly blood, fat and meat.

As to the arctic dog disease, I think that it is caused by mineral deficit and fat hunger with the latter as a contributory cause, see further page 338. According to »Our dogs» of November 11th 1932 Professor FREDERICK HOBDAY seems to have arrived at the conclusion that canine hysteria is caused by want of fresh animal matters in the food. The renowned Siberian investigator WM. BOGORAS maintains that he

has known many persons bitten by alleged rabid dogs but in no case did hydrophobia thereupon afterwards develop. According to other knowledge obtained, I know of no case of such a transmission neither in Alaska nor in Greenland.

I will further call attention to the statement by WM. BOGORAS that the most essential point in the perfection of so-called shamans is abstention from youth from all fat and rich food, and, in general, great moderation in eating. Shamanism, in variants extending over practically all the hyperborean regions, is a form of religion, the chief practitioners (shamans, in Greenland: *angekoks*) of which in their typical representatives are distinctly nervous, irritable, hysterical, half-crazy individuals, and, added hereto, strikingly often epileptics. Noteworthy also is that the modern medicamentation among woman often results in serious nervous derangements, further that the consumption of much fat in man often seems to soothe an irritable nerve system.

Also SAXL and DISQUÈ, quoted by OSCAR LOEW, have shown that scurvy can be cured by calcium lactate. In southern Norway the most efficient cure of an untypical osteomalacia in cattle is, according to L. SLAGSVOLD, ashes from foliiferous trees, in sour milk, all modern remedies, even phosphoric acid and compounds of vitamin D being taken into consideration. On the whole, a moderate admixture of fat to the food in our latitudes seems to promote the assimilation of lime and phosphoric minerals. During hunger an excretion of lime takes place and, according to OSCAR LOEW, a diet deficient in lime will result in a loss of body calcium greater than the assimilation of same. In arctic and subarctic regions the loss of calcium due to the said lack of fat, when occurring simultaneously with prevailing extremely cold weather, must, one should think, lead to a break-down of the nerve system.

In »Magazine of the Norwegian Medical Association» for 1930 the County Physician N. CHRISTOFFERSEN states that true Laplanders are practically free from epilepsy. This observation in connection with the following one may be of

considerable interest: In »The Norwegian Magazine for Medical Science» of 1840 the District Physician WALTER states that he has never encountered scurvy among true sea or reindeer Laplanders, whereas Norwegians and Finlanders of the same regions were suffering from it, see also quotation from LINNÆUS in the preceding article, last sentence. WALTER attributes this to the use by the former of a herb *Rumex acetosa*, but I rather believe that their 'immunity' is due to rich animal food in the diet.

The fact, according to medical investigators, that blood from ordinary farm-stock animals does not contain vitamins, while on the other hand in Polar regions blood has a curative effect on scurvy, and seems to be regarded by natives and foreign trappers as a panacea to be consumed with greediness, also by beasts, indicates that good reasons exist for verifying closer the width of variation as to the content of the constituents of the blood with regard to vitamins and minerals.

Devitalized modern food, often second quality in every respect, in connection with the drinking of much coffee, seems to diminish the power of resistance against tuberculosis, and to further development of caries in the teeth, nervous disorders being often a concomitant. So far in the physicians opinion. The way out of this, in my opinion, lies in a diminishing of the carbohydrates and correspondingly an augmentation of fat and minerals in the food.

Since manifest scurvy is often accompanied by severe nervous derangements, I suppose that latent scurvy in sub-arctic regions may be held responsible for diverse nervous anomalies. The existence in certain parts of Norway of a generally prevailing geologic substratum deficient in lime, and a tendency towards nervous disorders in the same districts, especially during the season of obscuration, may indicate that a possible deficiency in fat, lime and phosphoric constituents exists. In the author's opinion, the typical »temper of a population» of such a district is chiefly due to the nourishment produced in those localities. In districts where deficiency diseases in animals are prevalent, special care

ought to be taken to achieve a correct balance by the introduction of products from the sea and through food produced elsewhere.

Malnutrition and its correlation with internal secretion probably constitute a wide field for research in the domain of mental hygiene.

### Comments.

Re: point »A», page 314. Differential diagnosis. In order to avoid misunderstanding, I beg to impress that, with our present knowledge there is, of course, in civilized countries, no reason for any altering of the forensic precautions concerning dogs suspected of being infected with rabies, just as wounds bitten by 'mad' dogs ought to be treated as rabid bites, although it may not be certain that they are rabid. It is not my aim, however, to try to disprove the existence of true rabies. On the other hand, I am convinced that many obscure points in the problem of rabies exist, which will in future undergo considerable alteration. The prohibition, now in force in several European countries, against importation, especially from Greenland, of dogs and foxes will, no doubt, from an administrative and scientific point of view, prove to have been a mistake.

Concerning the mute type of rabies, S. R. HJORTLUND in translation from Danish states as follows: »From times immemorial a distinction has been made between two clinically different forms of rabies: the furious and the mute, or dumb, type. Sticking to this classification, we find that in Greenland the cases almost exclusively fall within the latter type, for the irritative, furious or maniacal stage is short only, the disease therefore being of short duration, so that death occurs already 2—4 days after the outbreak of the sickness. In this respect the disease in Greenland differs from dog madness in the greater part of Europe (the Balkan peninsula excepted), where the furious type is the most common one; and this is very fortunate, since for this reason the disease is far less dangerous to man, such being the con-

ditions on the Balkan peninsula, where rabies occur very frequently among the numerous, partly wild-living dogs, while in rare instances only it happens that man is attacked by the disease.» It may be as HJORTLUND states, although I do not at present find it certain that it will be possible to uphold this classification in the future.

It is necessary to bear some points as to causality in mind when symptoms resembling rabies are discussed. Nowadays the various measures of eradicating true rabies in civilized countries, for instance, destruction of worthless, ownerless and vagrant dogs, and the high fees to be paid for keeping dogs, all act towards the object of reducing the number of dogs. This reduction, of course, first and foremost will be felt in respect of the class of dogs in which we may expect to find cases of false rabies caused by hunger. A contributory cause of paramount significance for an outbreak of the Arctic dog disease is overstocking of the population of dogs. The Danish veterinarian T. S. HAMANN, whom the Danish Government in 1865 sent to Greenland during the great 'epidemics' of the said disease then occurring in the western colonies, says that at most places far more dogs were to be found than the inhabitants were able to feed.

The great epidemics of former days in Greenland, as far as the above mentioned disease is concerned, have now come to an end. This fact is not only, as with distemper, due to the stamping out method, isolation of affected areas, and the eradication of virus, but also to the killing off of inferior dogs, just when a time of scarcity sets in. If, as a theoretical supposition, true rabies is to be found in Greenland and is there stamped out, then the false rabies also is stamped out, or at least checked, not owing to destruction of any virus, but because there will be more food available for the remaining dogs. Nowadays, the favourable innovations as regards fishing of the Greenland turbot (*Reinhardtius hippoglossoides*) and the larger halibut (*Hippoglossus vulgaris*), further, the revival of whaling, have led to better feeding of the dogs. According to ELSE WEGENER in *Alfred Wegeners letzte*

*Grønlandsfahrt* (p. 113) blubber from whales, stranded and found in a decayed state, was mixed with meat and used as dog's food in Umanak. As examples of the abovementioned stamping out process I need but mention a few. In her book *On Greenland's Closed Shore*, on page 255, ISOBEL W. HUTCHISON states concerning the dogs at Umanak in the autumn 1928: »To save them from starvation, over sixty of these poor brutes have been hanged already.» The place mentioned, in the history of the disease under discussion, was always one of its main centres. From his stay among the Arctic highlanders at Etah early in October 1908 HARRY WHITNEY says that the natives had a general clearing out of dogs not being able to pay for the food they ate.

As regards 'mad' dogs W. L. LINDSAY states: »Some of these instances of so-called madness may really be rabies, but in many other cases there is no evidence of the existence of that disease, and the furiosity is then probably attributable to suddenly developed and frequently ephemeral mania». . . . »there can be no doubt that if a dog is considered, rightly or wrongly, 'mad', and it is subjected to human pursuit and brutality that are so common when a wretched animal does become possessed of such a reputation, a dangerous degree of mental excitement is easily provoked, which may amount to, or pass into, mania.» According to my notion malnutrition as a fundamental cause of nervousness may be traced and reckoned with all the way from the desperate hunger wanderings of the lemmings up to and including insanity in man. Much points towards the possibility that 'wildness' and 'blood thirstiness' are nervous symptoms of malnutrition.

As to differential diagnosis it is urgent to adopt LINDSAY's view. But there are other causes as well. Non-typical cases of distemper sometimes look no different from rabies. A simultaneous occurrence of the latter type in an outbreak of the former, also the catarrhal exudate often alluded to in polar accounts, will give valuable hints in forming a correct diagnosis. An isolated case of tæniasis with symptoms resembling rabies is mentioned by FREDERICK G. JACKSON. Dr. ATKINSON,

cited by A. CHERRY-GARRARD, demonstrated the existence of *Filaria immitis* combined with haematuria among dogs in SCOTT's last expedition. From Alaska SEYMOUR HADWEN has shown that there may be a connection between rabiform symptoms and the occurrence of *Dioctophyme renale* (syn. *Eustrongylus gigas*). In America, according to H. O. MÖNNIG, *Oncicola canis* is considered to be producing rabid symptoms. In »United States Department of Agriculture» — circular No. 338, revised June 1934, occurrence of tongue worm (*Linguatula serrata*) is mentioned as possible causes of the appearance of symptoms resembling rabies. It is, however, not probable that occurrence of worms should appear as cause of outbreaks of decidedly epidemic type of alleged rabies, possibly with one exception, namely when larvae of worms are transmitted by means of mosquitos. In foxes the occurrence of the encephalitis, described by R. G. GREEN, has to be included among causes producing symptoms somewhat like those of rabies. In the great majority of autopsies carried out by able men, physicians as a rule, no traces of worms have been found, and in most cases the dogs are emaciated beyond belief. In the literature I have found extremely few cases of fat carcasses of dogs autopsied after death ensuing from the Eskimo dog disease, and in such isolated cases one may suspect lack of minerals in the food, in dog pemmican especially, often inferior in quality, as being the cause. If the field is covered with snow and the dogs are kept chained, they will have no chance to correct any deficiency as regards this point.

For those particularly interested in the problems of differential diagnosis of this disease elsewhere than in the polar districts, I refer, for the sake of convenience and saving space, to A. AUJESZKY's article »Wut», page 778 in Vol. X in STANG und WIRTH's Tierheilkunde und Tierzucht.

**Re: point »B», page 316. Appearance of the Eskimo dog disease in summer time.** In many places dogs are subject to hunger or malnutrition in hot climates, particularly in summer time. In Egypt, for instance, a period of drought

and scarcity regularly sets in at the time of the »hot dog days». In more northern latitudes the 'dog days', no doubt, is merely a reminiscence from an ancient foreign civilization, handed down traditionally without connection at all with actual rabies. Such periods of famine for vagrant semi-wild or wild dogs, no doubt, are responsible for the occurrence of several 'mad' dogs in southern countries, but famines in summer in the Arctic are also often the proper cause for appearance of cases of false rabies. The fact that Alaskan dogs in summer time undergo much starvation and sufferings, we know from A. T. WALDEN, and MICHAEL MASON (*The Arctic Forests*, p. 60 and 61). From several other sources may be mentioned that famines constantly occur in many districts in Alaska, especially in spring and when something is wrong with the catch of fish. Some information from HUDSON STUCK's book *Voyages on the Yukon and its Tributaries* throws sufficient light on Alaskan dog-life. He says: »When the snow is gone and his winter labours are over, he might, one would think, look forward to a period of rest and comfort until the return of winter renders sled travel possible again. His summer should be a time of *sweet-doing-nothing* as the Italians say, that should repay him for the aching shoulders and sore feet and whip-lashed flanks of the winter trail. But, indeed, the ordinary Alaskan dog, had he the power of propection, would look forward to the winter during his summer purgatory. Chained to a stake, month after month, all through the summer heats with their venomous insect pests, the length of his chain the measure of his movements, his heavy coat a source of continual discomfort, the natural eager, active disposition of the animal is curbed and goaded into a sullen ferocity by his unmitigated restraint, this ceaseless irritation. — — — If the needle of the mosquito cannot penetrate the dense coat of the dog, it finds a vulnerable point around the eyes, and it is no uncommon thing to see a dog's eyes so swollen from their stings as to be almost closed, and raw and bleeding from constant rubbing with his paws. — — — The greater part of the dogs that



are *boarded* at fish camps in the summer are the mail dogs — — — They are probably the hardest worked and, on the whole, the hardest treated of all our dogs. — — — An ordinary sane travellerer will not venture out if the thermometer be below  $\div 50^{\circ}$  F.; but whatever the temperature, the mail must go and whatever the conditions, the full day's journey must be made. — — — In summer the contractor sends them off to a fish camp where they remain until he requires them again. — — — Moreover, dogs are a great expense, and the only cheap way of feeding them in summer is with the refuse of the fresh fish as they are caught for drying, and this can only be done at a fish camp.» — With regard to Indians and hygienic care of dogs, their reputation as a rule is none too good, cp. WALDEN, MASON and H. INGSTAD.

In general, however, there is no doubt that most cases of outbreaks in Alaska occur in winter. That winter time and the occurrence of false rabies are linked together in other regions of the high north, we can gather from CH. ELTON's material collected in Arctic Canada, and from BOGORAS and JOCHELSON's statements from Siberia. As to this point there can be no two opinions. JOHN J. UNDERWOOD's statement that in summer a few Alaska dogs become afflicted with rabies (not hydrophobia) therefore, no doubt, is somewhat misleading or inadequate. In Greenland, cases of false rabies often occur in connection with poor catches, especially in autumn and winter. If hunger, however, is not the cause of an outbreak, the latter may also be due to worms. The great kidney worm, according to SEYMOUR HAWDEN and H. O. MÖNNIG, is transmitted through the dogs' eating of raw fish, and communication of the heart worm by means of mosquitos is a possibility upon which attention ought to be focussed, see page 329.

Re: point »C», page 315. Treatment of the Eskimo Dog Disease. Since the interaction between causation and prevention of the Eskimo dog disease, in my opinion, is very complicated, dependent upon more colateral causes than the

foresaid two main factors, see page 311, I will for the sake of simplicity pass directly on to what is known facts as regards its treatment. On the complexity, just alluded to, I will return on another occasion.

Regarding curative treatment W. L. LINDSAY says that a shot is the usual treatment of mania and all kinds of mental affections in animals — a treatment which is based on utter ignorance of the natural history of animal insanity.

With regard to the Eskimo point of view of the disease very little is known. HARRY WHITNEY who wintered at Etah in 1908/09 was told by an Eskimo that the alleged rabies appearing that winter 'was the result of lack of food' that is to say proper animal food and not devitalized products.

To start with I will dwell upon S. R. HJORTLUND's comments on Fleet Surgeon BELGRAVE NINNIS' article *Eskimo Dog Disease: its Symptoms, Treatment, and Pathology*, published 1878 in Parliamentary Paper C. 2176. It is very unfortunate, I think, that this work was published in the inaccessible »Arctic Blue Books», issued by the British Admiralty, being thereby consigned to oblivion. HJORTLUND has quoted only the following passages taken from J. E. NOURSE's Narrative of the Second Arctic Expedition, made by CHARLES F. HALL: »Twenty-five apparently healthy dogs were embarked on board ship in the middle of July, 1875. The number subsequently increased to twenty-seven by the addition of two young ones. We were given to understand that feeding twice a week was amply sufficient; that the worst possible personal treatment was too good for them, and meat in any stage of decomposition a perfect luxury to their fastidious palates. — — — Seven and twenty animals, confined to a space which the utmost attention was scarcely sufficient to keep habitable, constantly quarrelling and fighting for dear life, exposed to sun, dew, snow, and wet generally, and without a chance of a run ashore — it was not to be wondered at that they began to show signs of disease. The first attacked was a young female 25 days on board, and she had a fit and died in 13 days. Others became

attacked. One was summarily shot, one ran away and was seen no more. Two were accidentally drowned; seven died from the disease; six recovered; one died mad. — — — Of the whole number, 12 only were under medical treatment; one had rabies and died; one so far recovered as to have two litters of pups, and then died ten months after her first fit, and two or three days after her last litter. Two fell into the water when in fits and were drowned. Two died notwithstanding everything that was done to cure them, and six recovered and were landed at Disco. — — — The treatment found most beneficial was calomel, followed in some cases by croton oil and solution of morphia, the best of water and good food. They were not kicked or cuffed, and they behaved as sociable and decorously as if brought up in a cottage.»

In my opinion HJORTLUND would have done well in studying NINNIS' original account more closely and not only in mentioning it in passing. Whether or not he has read NINNIS' article I am not quite sure. Anyhow, he seems to entertain preconceived opinions on NINNIS' report. In fact, NINNIS has described 12 cases, of which six (or seven, the aforesaid 'dam') were cured, whereas HJORTLUND's case list embraces only four cases, no treatment being tried. HJORTLUND's chief criticism of NINNIS' cases, viz., the variability of the symptom complexes, is not justified considering the fact that the same tendency to great variation also appears in the cases described by himself. In his aforesaid article, on p. 56, he states as follows (in translation): »There seems to be some variation in the appearance of the disease at the different outbreaks. One year, it is said, the disease has been accompanied by cramps and paralysis (particularly of the hind, quarters), another year the diseased animals have been snappish against other dogs, but not against man, a third year they have also set upon man, a fourth they have been fugitive, and a fifth particularly 'drop jaw' has been common etc., which condition is also known from many other diseases, and whose causes supposedly are peculiar changes

in virulence, action of various extraneous conditions, or the like, unless we have to be content with merely regarding it as an outcome of *leges coincidentia*.» — The great variability is also alluded to in eight other passages in HJORTLUND's article.

Apart from these considerations a closer examination clearly shows that within one and the same outbreak also a considerable degree of variation does occur among the various cases, cp. NINNIS' amongst others. The latter author regarded one of his cases, treated with negative result, to be true rabies but, owing to the great variability just alluded to, there is no reason for adopting his view as correct. Interesting it is to note that, according to several authors, the same tendency to great variability also appears in cases of scurvy. Much indicates that ROALD AMUNDSEN considered the madness in dogs as a sort of scurvy (cp. *The South Pole*, I. page 55). Several authors have expressed the same view in connection with other outbreaks of the Eskimo dog disease.

HJORTLUND further seems to think that the disease in the Cape York Eskimos dogs, alleged by other authors, amongst whom EYVIND ASTRUP, to be rabies, differs from the cases described by himself. I cannot, however, see there is any evidence, or probability, for such a distinction between these forms which, as I believe, must be one and the same disease.

NINNIS states: »The treatment found most beneficial and which I recommend is, on the first signs of pitchy stools, or tenesmus, give five grains of calomel, followed by croton oil, if necessary, and repeated at intervals, until the stools become natural. If there appears to be much uneasiness, or if the animal whines, I have given 40 minims of solution of morphia, and kept it under its influence, repeating the dose every four hours if necessary. — — — As the patient is generally hungry, I prefer to keep him from roaming, and give him the best of water and good food, in small quantities, and frequently. I think, if taken at this stage, very few would die. As the disease advances there is less time for

the action of medicine, therefore larger doses and more active remedies must be used.» On the above mentioned pitchy stools, also mentioned in cases of true rabies, I find it necessary to make a short comment. Dogs, when being famished, lick at and even devour mud, gnaw on pieces of wood and other indigestible things. That hungry Eskimo dogs are able to ingest practically everything, is a matter of common knowledge. From NINNIS' account it appears that the »good food» he refers to was walrus-meat, the most nutritive dog food known in Greenland, see page 318, in all probability containing adequate content of fat, further of calcium, phosphorus and iodine, since the food of this animal chiefly consists of shell fish (bivalves), clams, sea-urchins, starfishes etc.

Curious is the fact that the disease among ROALD AMUNDSEN's dogs, earlier referred to, abruptly was brought to an end, instead of becoming more widespread as it would have been if it were of infectious nature. AMUNDSEN says: »Too late, unhappily, I came to the conclusion that it was probably lack of fatty matter in their food that killed them.» Interesting to note is further that on his second voyage to the Antarctic his dogs after having for two months been fed on stockfish solely, and being on the brink of breaking down, soon changed for the better after having been given stockfish, maize-meal and ample of margarine, mixed and boiled together. It is an old experience that symptoms resembling those of rabies often occur in dogs on voyages of long duration. In his book *The Home of the Blizzard* DOUGLAS MAWSON gives a very illustrative example, from which the following is quoted: (MAWSON's ship left London July 27th, 1911, arrived at Cape Town September 24th, and at Hobart on the 88th day of the voyage) »Rough weather soon intervened — — — the wet conditions began to tell on their (the dogs') charges. — — — During the voyage they were fed on the finest dog-cakes, but they undoubtedly felt the need of fresh meat and fish to withstand the cold and wet. In the rough weather of the latter part of the voyage, water broke continually over the deck, so lowering their vitality

that a number died from seizures, not properly understood at the time. In each case death was sudden, and preceded by similar symptoms. An apparently healthy dog would drop down in a fit, dying in a few minutes, or during another fit within a few days. Epidemics, accompanied by similar symptoms are said to be common amongst these dogs in the Arctic regions, but no explanation as to the nature of the disease. During a later stage of the Expedition, when nearing Antarctica, several more of the dogs were similarly stricken. — — — The dog first affected caused some consternation amongst the crew, for after being prostrated on the deck by a fit, it rose and rushed about snapping to right and left. The cry of *mad dog* was raised. Not many seconds had elapsed before all the deck hands were safely in the rigging, displaying more than ordinary agility in the act.» — This dog was shot. It is, however, a curious fact that no mention of the disease is heard of after the dogs of this expedition came under the soothing influence of the »flesh-pots» of Antarctic. Not only malnutrition on long voyages is to be taken into account, but also the second main cause furthering an outbreak, viz. loss of heat from cold winds, rain, squalls and wet objects, cp. page 320.

R. E. BYRD tells from his first expedition that his dogs before arriving at New Zealand became ill after malnutrition (feeding on too much biscuits, according to L. GOULD, his next in command). Professor JOHN MALCOLM, Dunedin, fortunately advised BYRD to use a combination of beef tallow, meat meal, wheat germ, molasses and cod-liver oil during the further voyage to the Antarctic, where as is well known seal is abundant, whereby continued feeding with MALCOLM's 'meat-biscuits' becomes unnecessary. BYRD says: »Within a few days they began to pick up and by the time we started south most of them were beginning to get in good condition.»

Further information on the rôle of fat in this problem is given by CHARLES ELTON, stating as follows: »Winter 1928—29; an epidemic killed off most of the Eskimos' dogs, every team being reduced to one or two dogs. Broke out

in March and continued until June. Symptoms: first, the dogs became very weak and bad tempered. As the disease advanced some dogs lost power over their hind quarters, others of their fore legs. All foamed at the mouth and became very savage. The sickness was not incurable as a few of the Post dogs, which were very sick, recovered after administering sulphur and lard.» (From questionnaire answered summer, 1929, by ROBERT SKINNER, Leaf River Post.)

Whether the Eskimo dog disease and allied diseases are caused either by lack of fat and minerals or by a deficiency of fat, minerals and vitamins, no one with our present knowledge is able to tell. The favourable influence of fat upon the disease may be manifold as to causes. How much the effect is to be ascribed to its well known chemical constitution and caloric value, and how much is to be attributed to an influence of vitamin A, D and E, is an open question as far as I can gather from the literature available. It seems as if margarine, simply, has played an important role for ROALD AMUNDSEN's dogs, see page 336, as well as in H. G. WATKIN's last expedition, see his comments on page 297 in MARTIN LINDSAY's book *Those Greenland Days* (1932). Excessive ingestion of fat, e. g. train oil and melted blubber, involves a purgative effect. The high caloric value, as well as the aforesaid effect on the metabolism of calcium and phosphorus constituents, no doubt, are of the greatest significance. Worthy of note is also the blunting influence already mentioned on page 325. As to this point VILHJÁLMUR STEFÁNSON in his book *My Life with the Eskimo*, on page 133, says: »I have noticed — and Dr. ANDERSON's experience has been the same as mine — that on a diet of fats alone one gradually loses strength, but that this symptom of malnutrition is not so conspicuous as sleepiness and mental inability to call quickly into action such strength as one has.» — In this connection recent knowledge points in the direction that lard as to fertility counteracts the effect of vitamin E. From all this, it thus becomes apparent that fat acts as a »calmer» on the central nerve system. Whether

the effect of vitamin D comes in, or fat in itself alone possesses the above mentioned curative effect, is open to question. Probably there exist, in the various types of fat, constituents not yet ascertained by science. Thus the auxine as such a constituent is of comparatively recent date, cp. further footnote on page 323. According to the Danish surgeon CHR. N. RUDOLPH, Upernivik, train-oil is said to be possessed of the curative effect in cases of the Eskimo dog disease, but he himself never succeeded in corroborating this allegation. As regards need of sulphur, a few remarks may be of interest. Through eating hair and feathers the Eskimo dog practically always has a chance of being satisfied concerning this point. F. L. M'CLINTOCK was told — very probably by his interpreter in the Greenland Language CARL PETERSEN, a well-practised dog driver, or by some native member of the same expedition — that feather was good for the dogs. ACTON FRIIS observed on the »Denmark» expedition that Eskimo dogs gorged upon meat of musk-ox, but still continued to nip off a little bit of tallow here and a tuft of hair there. In this connection it is of interest to note a fact often observed among foxes in western Greenland, namely hairless spots in the pelt, no doubt, caused by hair-eating, analogous to the eating of wool in sheep, and feather-eating in poultry, both symptoms indicating deficiency disease. Worthy of note in this connection is HARALD A. SALVESEN's observations that several of his parathyroidectomized dogs lost their fur.

Most cases of loss of fugitive dogs, so often related on from polar expeditions, first and foremost are due, no doubt, to a need of bettering their conditions. The phenomenon is not a pathologic sign in itself, cp. poriomania (fugues) in man. Eskimo dogs, marauding on everything, even kill, when in number, ice-bear and seal. Mice and lemmings furnish dogs and foxes food of superior quality. I often have seen farm watch-dogs kill lemmings and mice as a sport only, and not eat them. ALEXANDER G. SCHRENK relates on Samoyade dogs behaving in a similar manner.



But when famished, both lemmings and mice are devoured by dogs with relish, cp. for instance LOCKWOOD, cited by A. W. GREELY (p. 443), as regards lemmings. From observations in the Norwegian high mountain plateau »Hardangervidda» in 1934 PER HØST relates on the dogs used for tending tame-reindeer, that they at times gorged upon a sort of vole (*Microtus ratticeps*).

In connection with CHARLES ELTON's statement: »It is believed by a good many men living in the North that the disease attacks white foxes at the time when lemmings have disappeared, food is short, and the fox unable to resist disease.» — I am able to quote some highly interesting facts from which the favourable influence of lemmings as food and 'cure' of the disease is apparent. ALBERT H. MARKHAM, a member of NARES expedition, in which the Eskimo dog disease broke out, see NINNIS above, relates on a bitch »Sallie», attacked when on a sledge journey by the characteristic fits of that disease, that she had to be cast off from the team. He says: »First in December more than two months later she came on board in emaciated condition, but being well cared for and attended to, she rapidly picked up, and was eventually the strongest and best dog in our team. The only probable conclusion that we could arrive at was that she had supported life by hunting and feasting on lemmings, for the traces of these little animals were the only indications that we had of the existence, outside our own circle, of animal life.» EJNAR MIKKELSEN on his expedition also had cases of the alleged rabies among his dogs. Probably too much decayed whalemeat was the cause. MIKKELSEN states on a dog »Journiska», which had run away from him, as follows: »He had come running into the camp one night and was apparently very glad to see his old friends again. He had lived about three weeks in the country on mice and lemming which he had caught and killed, and was fat and healthy when he returned. His roaming in the wilds had apparently cured him of his fits.»

En passant may be mentioned that formerly several remedies have been tried, seemingly with no results, viz., ammonia injection (DE LONG), bleeding mentioned by several authors, and painting of pharynx with nitras argenticus as carried out by CHR. N. RUDOLPH.

Of modern inventions, attention must be called first and foremost to intravenous injections of calcium chloride dissolved in water and to intramuscular injections of calcium gluconate, and calcium lactate dissolved in water and administered per os. Experiments ought to be carried out also with luminal and with the German remedy »Antitetanisches Präparat No. 10» consisting of irradiated ergosterine from »Merck und Farbenindustrie». Owing to the great success the said calcium remedies have had in veterinary medicine in the treatment of various deficiency diseases accompanied by convulsions and paralyzes, one should think that said remedies would be worth trying against the Eskimo dog disease. According to information received from the Norwegian veterinarian, H. F. WIRSTAD, who with good results has used calcium chloride against nervous attacks ensuing from distemper in dogs. To speculate whether the Eskimo dog disease is due partly to deficiency of vitamin B, C or D, separately or in summation, is at the present stage of little use. Since LESLIE J. HARRIS (»The Lancet», No. 5672) warns against use of parathyroidal hormone in cases of tetanic convulsions, this hint ought to be taken into consideration.

Dogs attacked by the alleged rabies may be handled between the flurries if »a man is very slow in his motions», says A. T. WALDEN, renowned from the Alaskan dog races and as a member of BYRD's expeditions, and, further, he says that »— — — a quick movement of any kind seems to throw him into paroxysms of attack». — WALDEN says that he »succeeded to water an afflicted dog out of a bottle, by sitting astride him, holding his head, and letting the water run down his throat. — — — further got the same dog's harness off and chained him — — — All this had to be done with great care.» — In this connection I would recall

the fact that there exists evidence from several sources that afflicted dogs were used before the sledge until death relieved them from their pains. A most interesting analogy between this disease and the 'piblokto' among the hyperboreans nearest to the North Pole, especially well known among the Eskimos in the Cape York district early in winter, is the immense augmentation in muscular force during the attacks, but to this point I hope to be able to return on another occasion. The reason why WALDEN did not at once kill the dog just alluded to was that, if he had done so, his team would be bereft of power to a considerable degree.

Finally, I would bring into recollection the opinion of the English alienist W. L. LINDSAY on the problems discussed in the present article: »I therefore venture earnestly to recommend the subject to the attention equally of the physician and the veterinarian, of all who come in contact with the lower, and especially the domesticated animals, in order that more, and more authentic, materials may be collected towards a knowledge of the phenomena of animal insanity, of a fullness and accuracy commensurable with its importance. — — — I have only to add, in conclusion, that I know of no department of psychology, which, at present, promises so rich reward to the investigator as that relating to the 'Physiology and Pathology of mind in lower animals'.»

Besides literature specified in the text the following works have been cited.

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### Summary.

The author, having collected a great number of descriptions of diseases etc., occurring in dogs in the Polar tracts, points out that deficiency in fat, minerals and vitamins in the food, combined with cold and dampness, can produce symptoms like those of rabies. The symptoms disappear and the dogs recover when the deficient nutrients are replaced. Attention is called to the importance of identical causes in certain ailments of nervous origin in man.

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### Arktiske nervøse sykdomme.

Av

J. Baashuus-Jessen.

### Sammendrag.

Forfatteren, som har samlet et stort antal sykdomsbeskrivelser m. m. hos hunder i polaregnene, påpeker at mangel på fett, mineralier og vitaminer i føden i forbindelse med kulde og fuktighet kan gi symptomer av rabieslignende natur. Symptomene forsvinner og hundene blir atter friske når de manglende stoffer erstattes. Opmerksomheten henledes på samme årsakers betydning for visse lidelser av nervøs art hos mennesket.

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*Reprinted without change of pageing from Skandinavisk Veterinærtidskrift 1935, no. 6.*

Manuscript received May 29th 1935.

# NORGES SVALBARD- OG ISHAVS-UNDERSØKELSER

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