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STUDIES ON "KASEN" OF HORSES IN HOKKAIDO

III. RESEARCH ON THE ACTUAL STATE OF THE DISEASE

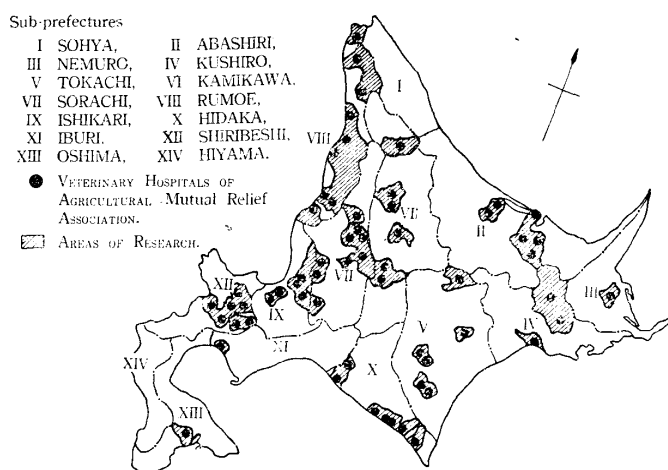
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INTRODUCTION

Although many opinions have been put forward, the real nature of "kasen" of horses is not yet exactly known. For several years, the authors have conducted etiological and therapeutical studies on "kasen". On the basis of results obtained from the previous investigations, they have reached an opinion that the disease may be related to a certain allergic reaction because of the similarity of this disease to Queensland itch or allergic dermatitis in Australia.⁵⁻⁸⁾ Despite the need for investigating the cause and therapy of this disease, no actual case in the field has been studied with sufficient thoroughness fully to clarify the associated problems. Accordingly, during the period from September to November, 1955, the present authors on the basis of veterinarians' reports, conducted an inquiry into the relation between "kasen" and its possible causal factors.

CHART 1. *Areas of Research*



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The areas of research, as was shown in chart 1, included the jurisdictions of 61 veterinary hospitals of the Agricultural Mutual Relief Association in 13 sub-prefectures, Hokkaido. The total horses numbered in the jurisdictions of the 61 hospitals are 48,736, among which 1,632 horses (4.43%) were affected with "kasen". Out of that number 200 were chosen as subjects for close individual examination by the veterinarians of the hospitals. The present paper is based on the data collected from the reports of those veterinarians.

STATISTICAL DESCRIPTIONS

Two hundred patients were examined for information on the possible relations between their feed, care, environment and the epidemic conditions of the disease. Especially, observation on the appearance of bloodsucking insects was found to be worth special attention.

1. Ages at the Initial Attack

The onset of the disease was mostly found in horses of young ages. Statistical numbers of the 200 examined patients are as follows: 2~4 years 107 cases (53.5%); 5~7 years 25 cases (12.5%); 8~17 years 14 cases (7.0%); under 1 year 9 cases (4.5%); uncertainty as to the date of the initial attack, 45 cases (22.5%).

It may be seen from these data that the young horses are easy to get sick, but also the adults and old horses were affected.

2. Hair Color

The patients were classified into 4 color groups: black, black-brown, chestnut and white. It was found that 108 cases (54.0%) were black horses; 69 cases (34.5%) were brown and black-brown; 21 cases (10.5%) were chestnut and 2 cases (1.0%) were white respectively.

It is rare for a white horse to be attacked; in the present writers' personal observations up to date, no horses covered with white hairs were found having this disease.

3. Feed, Care and Environment

A total of 128 cases (64.0%) were fed in the stables and 64 cases (32.0%) had been grazing on native pasture throughout the whole year. In the former group, after their days' work was finished, the horses were brought into the stables by the owners and were fed with no pasturing. In the latter group, they were pastured in almost all seasons in the field. However, there was a small number of 8 cases (4.0%) which were fed both in the stables and in the field.

So the majority of the patients seems to have been fed in the stables. As for the types, a large number of horses belonged to heavy, draft and carriage, whilst there were no cases among light horses and saddle horses.

The findings in respect to the character of the locality when the horse patients were living were divided into 6 categories on the basis of botanical and geological conditions, viz.: The districts of waste land and paddy field presented 66 (33.0%) and 61 cases (30.5%) respectively, while 33 cases (16.5%) were living in mountainous regions. From swamp, neighbouring seashore and in farm field districts, there were found to be 19 cases (8.5%), 11 (5.5%) and 10 cases (5.0%) respectively.

Considering from the data, it will be seen that a large proportion of the patients were fed in the areas of waste land and paddy field.

4. Course of the Disease

As indicated in table 1, the usual course of the disease falls into three periods: initial, climax and cessational. The first occurrence of itchiness was almost always found in early summer, or May and June, viz., 88 cases (44.0%) in June, 80 cases (40.0%) in May, 30 cases (15.0%) in July, 2 cases (1.0%) in April. So a large majority of the present 200 showed the initial symptom of "kasen" in May or June. Then the eczematous dermatitis gradually aggravated from late July to August in accordance with increase the itchiness. The incidence of the severest stage was: 104 cases (52.0%) in August, 85 cases (42.5%) in July, 11 cases (5.5%) in June. The condition of the disease in most cases was indisposed in August.

TABLE 1. *Course of the Disease*

	OCCURRENCE IN INITIAL STAGE				PATIENTS IN SEVEREST STAGE			NUMBERS RECOVERED IN CESSATIONAL STAGE			
	April	May	June	July	June	July	Aug.	Aug.	Sept.	Oct.	Nov.
Cases	2	80	88	30	11	85	104	16	50	105	29
Percentage	1.0	40.0	44.0	15.0	5.5	42.5	52.0	8.0	25.0	52.5	14.5

As the weather commenced to become cooler the itchiness began to disappear beginning with a small number of cases from late August; the sickness in 155 cases (77.5%) had disappeared by September and October. It disappeared entirely in winter only to recur the following summer, year after year.

5. A View of the Causal Agents of the Disease

General veterinarians and farmers have several views on the causal agents of the disease. The results obtained from the inquiries concerning 200 patients were as follows: The causes were considered to be hereditary disposition in 22 cases (11.0%), dietary allergy in 18 cases (9.0%), bites of bloodsucking insects in 16 cases (8.0%), simple dermatitis in 13 cases (6.5%), some infectious disease in 10 cases (5.0%), dermo-filariasis in 10 cases (5.0%) and negligence care of skin in 4 cases (2.0%). However, no pertinent replies were collected from 107 cases (53.5%).

As one reviews the data, it is seen, interestingly, that the veterinarians and farmers have several opinions on the causal agents of the disease as hereditary

disposition, bloodsucking insects and dietary allergy.

6. Relation Between the Disease and Feed

As the matter of dietary allergy was pointed out as a causal agent, an analysis was conducted concerning a possible relationship between feed and the disease. Out of the 200 patients 134 cases (67.0%) were customarily fed with only green feed on the field and 57 cases (28.5%) were given several kinds of mixed feed in the stables.

Many people have believed that when the patients were fed with green pastures in late spring or in early summer the itchiness always appears and then that when the green pastures were changed to hay it soon disappears. The kind of the grass was not taken into consideration at all. In the opinion of the present writers "dietary allergy" as a causal agent seems doubtful.

7. Relation Between the Disease and Bloodsucking Insects

Season of Appearance of Bloodsucking Insects The insects of this type are the horse fly, black fly, biting stable fly, biting midge and others. Depending on the gross seasonal observations by the veterinarians and farmers, the first appearance of the blood-sucking insects, as indicated in table 2, was found in 163 cases (81.5%) in early June while first appearance occurred in 23 cases (11.5%) from late May.

TABLE 2. *Month of Appearance of Bloodsucking Insects*

	MONTH			
	May	June	July	Unknown
Cases	23	163	6	8
Percentage	11.5	81.5	3.0	4.0

Relation Between the Weather and Itchiness There seems to be a connection between the weather and the appearance of bloodsucking insects. For the sake of convenience, in this study the sorts of weather were named clear, cloudy, before rain and after rain. Infestation by "kasen" in the studied cases and the type of weather at the time are shown in table 3. On the gross classification, 50 (25.0%) and 30 cases (15.0%) were infested at the after and before rain periods respectively. In the period of clear weather, the infestation was found to have occurred in 35 cases (17.5%), but there were only 7 cases (3.5%) in the cloudy day. However, 78 cases (39.0%) did not yield useful information because the veterinarians and farmers failed to give serious attention to this item in the research.

With regard to the relation between the itchiness and the weather, excepting the 78 cases just mentioned, the most severe itchiness was observed at the after rain period in the highest per cent followed by clear, before rain and cloudy weather. So the insects are apt to appear at the times of before and after rain and of the clear weather.

TABLE 3. *Relation Between the Weather and Itchiness*

		WEATHER				
		Clear	Cloudy	Before Rain	After Rain	Unknown
Appearance of Insects	Cases	35	7	30	50	78
	Percentage	17.5	3.5	15.0	25.0	39.0
Feeling of Itchiness	Cases	21	14	17	48	100
	Percentage	10.5	7.0	8.5	24.0	50.0

Therefore, the appearance of the insects may be considered to be closely related to the weather as well as to the itchiness.

Relation Between the Appearance Time of Insects and the Itchiness In the next place, data were assembled as tabulated in table 4, respecting the relation between the time of appearance of the insects and of the itchiness in different parts of the day in summer. The rough results were as follows: 42.0% of the patients were infested in the daytime; in 35.0% of them, the disease seemed to be infested by the insects in the period shortly before sunset (perhaps at 6~7 p.m.); in 12.0%, an estimate for infestation after sunset (perhaps at 7~8 p.m.) may be set up because the insects flew about together around the patients. The time from sunrise to sundown in summer days is very long in Hokkaido.

TABLE 4. *Appearance Time of Insects and Itchiness*

		APPEARANCE TIME				
		Morning	Day-Time	Before Sunset	After Sunset	Unknown
Appearance Time	Cases	1	84	70	24	21
	Percentage	0.5	42.0	35.0	12.0	10.5
Feeling of Itchiness	Cases	4	43	57	52	44
	Percentage	2.0	21.5	28.5	26.0	22.0

As for the time of feeling the severest itchiness, 54.5% of the patients were approximately found at 6~8 p.m., according to the observations of the farmers and the veterinarians, and 21.5% were in the daytime. Seeing the data, the contrariety between the appearance time and the itchiness in the dark existing in the data, may be thought to be owing to error in observing the state of the appearance of the insects at that time.

8. Relation Between the Occurrence of the Disease and Atmospheric Temperature

As already noted above, the disease occurred in late spring or in early summer and

gradually disappeared towards the cool season. Consequently, the relationship between the occurrence of the disease and atmospheric temperature was observed for the purpose of studying the appearance of bloodsucking insects. The liberal results were shown in table 5.

Temperature at the Time of the Initial Period of the Disease As employed in the present work, the "initial stage" corresponds to the period from late April to July. This season displays very changeable weather in Hokkaido, so that the atmospheric temperatures are different among the various areas. Temperatures ranged from under 9°C to over 30 C through the summer, however the patients were affected at the time of 20°~25°C in the highest per cent (27.5%).

Temperature of the Severest Stage of the Disease This season corresponds to the period from late June to August, and it is, especially in July, very sultry weather. Since the condition of the disease mostly aggravates in this season, the itchiness in the lesions is severest. The patients, as shown in table 5, were more numerous (28.0~34.5%) at the period of 26°~30°C.

TABLE 5. *Relation Between Atmospheric Temperature and Occurrence of the Disease*

		ATMOSPHERIC TEMPERATURE (C)						
		< 9	10~15	16~19	20~25	26~29	30<	Unknown
Initial Stage	Cases	31	16	36	55	32	5	25
	Percentage	15.5	8.0	18.0	27.5	16.0	2.5	12.5
Severest Stage	Cases	—	—	4	44	69	56	27
	Percentage	—	—	2.0	22.0	34.5	28.0	13.5
Cessational Stage	Cases	10	97	40	22	4	3	24
	Percentage	5.0	48.5	20.0	11.0	2.0	1.5	12.0

Temperature of the Cessational Stage of the Disease The stage of decline is generally from late August to early November, but it somewhat differs with each sub-prefecture. When it turns to cool, the itchiness naturally disappears and gradual recovery from the disease is observed.

9. Therapeutic Treatment

Many methods have been adopted to date by many veterinarians in Hokkaido for treating and controlling the disease. An epitome may be offered as follows.

As for the chemotherapeutic treatment, antimony and arsenic compounds, piperazine derivative and antihistamine preparation were used respectively. Out of these, antimony and arsenic compounds, especially the former, have been generally applied since early colonization times. These compounds were used for treating the dermofilariae in the belief that the disease might be caused by them, however, the results of each use were

indefinite. In the experiments,^{2,3)} antimony compound was somewhat effective, but arsenic compound and piperazine derivative did not yield beneficial results. Even if there were good results from the use of antimony compound, relapse of the disease soon occurred after discontinuance of its injection. Recently, experiments using antihistamine preparation and insecticides were conducted.^{3,4)} Considering from the results, the use of such medicines seems more effective than that of many other therapeutic methods. Further examination is required.

Besides, all sorts of medicine for dermatitis (ointment, magma, liquid, powder) and chemical substances (alcohol, formalin, cresol, cresol-soapsuds, phenol, creolin, wood-tar, petroleum, corrosive agents, and, etc.) have been applied respectively by veterinarians and owners. In one case which may seem laughable a farmer rubbed rabbit's urine on the lesions.

SUMMARY AND CONSIDERATIONS

As far as shown by the above described data, the cause and treatment of "kasen" are not yet entirely known. Microfilaria of *Onchocerca cervicalis* had been thought to be a causal agent of "kasen" for many years. However, the mechanism of the occurrence of the itchiness is not defined at all. As the investigations relating the microfilaria need the enormous expenditures and many hours, they have not yet been carried through. From many years ago, all possible therapeutic methods have been used in Hokkaido for treating the disease during the period of affection. Then, since no entire healing was found, the owners gave up all hope of recovery. Unexpectedly, the authors obtained good results^{3,4)} by using antihistamine preparation as was also tried by RIEK.^{5,7)} So the authors have come to suspect that the disease may be related to a certain allergic reaction as RIEK and ISHIHARA and UENO¹⁾ are also thinking.

What is the cause of the allergic reaction? From the view point of this question, the research on the actual state of the disease was conducted. The results thus obtained from the 200 patients are summarized as follows.

1. The sickness occurs from late spring or early summer and disappears naturally towards the cool season.
2. The patients are found more often in districts of paddy field and waste land.
3. The young horses are easy to get sick, but also the adults and old horses were affected.
4. The degree of the itchiness runs parallel with the rise and fall of atmospheric temperature.
5. Further, the itchiness runs also parallel to the increase and decrease in appearance of bloodsucking insects.
6. The bloodsucking insects appear from late spring and disappear towards the cool season.

7. The bloodsucking insects are apt to appear at the time of after and before rain and that of clear weather and the serious itchiness may be found at those times.

8. The bloodsucking insects appear more frequently from before sunset to dark and the severest itchiness are observed in parallel to their appearance.

9. The insects are horse fly, black fly, biting stable fly, biting midge and, etc. However, the relation between the insects and the disease has not yet been clarified in Hokkaido.

10. The coat hairs of almost all the patients are black or black-brown and white color was found in only 2 cases. Bloodsucking insects are apt to be more strongly attacked by an object colored black or black-brown than by one of other colors.

11. Injection of antihistamine preparation and spray of insecticides may have some effectiveness for treating and controlling the disease. However, further examination may be needed.

Considering from above summary, the disease may have a close connection with bloodsucking insects. If it is related to an allergic reaction, "kasen" may be caused by the development of a hypersensitivity to the bites of some insects. YAMASHITA et al.⁵⁾ collected 3 kinds of sandflies infesting the lesions of the patients, viz., *Culicoides obsoletus*, *Culicoides pulicaris* var. *ocellaris* and *Culicoides* sp. But the relation between the disease and these sandflies is unknown. Therefore, parasitological and immunological investigations will need to be conducted for complete understanding of the disease. If the present work furnishes some information to further the research on the cause and therapy, the present writers will be very happy.

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