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EPIMELETIC VOMITING IN FEMALE DOGS DURING THE REARING PROCESS OF THEIR PUPPIES

Piotr KORDA

Department of Experimental Animals Breeding, Nencki Institute of Experimental Biology, Warszawa, Poland

Abstract. The epimeletic behavior consisting in vomiting the digested food in the presence of puppies was described in postpartum bitches. It begins at first month after the birth of puppies and may last up to five months. The main stimuli eliciting vomiting is the presence of the puppies close to the mother in the nest-pen, and their et-epimeletic behavior consisting of following the bitch, jumping upon her, and licking her mouth. When the puppies are removed from the nest-pen, the epimeletic vomiting of ingested food is stopped either immediately or after a few days. It is suggested that there exists a specific epimeletic drive whose consummatory response is vomiting. The biological role of this drive is to secure food to puppies before they are able to secure it by themselves.

INTRODUCTION

The extinction of lactation in female dogs and the end of the period of suckling by the puppies occurs between the 7th and 9th week of their age. At this age, as well as in a few subsequent weeks of the litter's life, the degree of their development is still so low that under the conditions of natural, free life, they are not capable for independent hunting and securing food. Obviously, the same is true of the wild species of the *Canidae* related to the dog (Schneider 1950), as well as of the domestic dogs which returned to their wild state (e.g., pariah dog, dingo, etc.).

In the ancestors of the dog, which lived freely, the state of a total incapability of the puppies to secure solid food long outlasted the extinction of lactation in the bitch. Presumably, their low degree of motor efficiency and poor development of their permanent dentition prevented the puppies from an active participation in hunting for at least 3.5 to 4 postnatal months. Consequently, it may be concluded that for a certain

period, beginning by the decline or disappearance of lactation of the female dog, the puppies — which were not supplied with solid food by man — had to be provided with such food by adult animals, most likely their parents. This was, beyond any doubt, a necessary requisite for the survival of the species in freedom.

This necessity has persisted in wild species of the *Canidae* to the present-day, and it is secured mainly by epimeletic [1] vomiting of the mother in the presence of the puppies. This behavior serves for supplying the puppies with solid food, previously ingested by adult animals and subsequently disgorged by them from the stomach. It was occasionally observed in wolves, *Canis lupus* (Świętorzecki 1926, Scott 1950, Mowat 1963), African jackals, *Thos mesomelas* (Eibl-Eibesfeldt 1967) and Cape hunting dog, *Lycaon pictus* (Sosnovskii 1959, Grzimek 1969).

The patterns of instinct behavior in a given species are stable (Lorenz 1958), in particular those which are not harmful and do not decrease the chance of survival of the population under modified conditions of its existence; it might be assumed, therefore, that the behavioral pattern under discussion — occurring in wild *Canidae* — can still be preserved in at least a certain percentage of domestic dogs. This seemed to be confirmed by the report of Martins (1949), who, in the course of other experiments performed on bitches who nursed their young, observed the symptom of vomiting repeatedly occurring in the nests in three bitches nursing their puppies. In one of these animals, the phenomenon occurred between the 24th and 39th day of the puppies lives, in the second between the 21st and 56th day respectively and in the third between the 22nd and 34th day. Conducting detailed studies for many months on the behavior of 17 bitches and their 17 litters, Scott and Marston (1950) observed repeated vomiting in only one of the animals under study, which might be indicative of a rather exceptional character of the phenomenon noticed by Martins. These authors suggested that this phenomenon might occur under other experimental conditions which, however, have not been specified by them. They also gave no detailed data concerning the case they observed.

In a previous paper Korda (1957) reported a few cases of epimeletic vomiting in bitches and in females of other *Canidae* kept in captivity. One dog displaying repeated epimeletic vomiting was also described by Rheingold (1963). All these authors did not give closer information on the conditions under which the phenomenon took place, on its character, duration and frequency of occurrence. No other original communications on the

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[1] Terms epimeletic and et-epimeletic introduced I. P. Scott and Mary-'Vesta Marston, mean respectively "protective" and "provoking a protective" behavior.

occurrence of epimeletic vomiting in the domestic dog could be found in the relevant literature. However, in the book on the genetics and social behavior of dogs, Scott and Fuller (1965) mention the epimeletic vomiting in bitches (which starts within three postpartum weeks) and the et-epimeletic behavior of puppies.

The aim of the present research, including both earlier, preliminary observations and systematic studies undertaken later was to find out whether and to what extent it is possible to elicit deliberately epimeletic vomiting in domestic dogs living under civilized environment. Furthermore, the aim of this research was to study the character of epimeletic vomiting, the agents by which it is elicited, the period of its occurrence, and the interaction between the adult dogs and the puppies in this period.

PRELIMINARY OBSERVATIONS

The results of observations, which were performed in 1953–1964, are given in Table I. In all these cases any possibility of morbid conditions has been precluded by a clinical examination and observation of the bitches and their litters for 6 days and even longer.

As seen in the Table epimeletic vomits occurred in bitches of various breeds and in mongrels, and in some cases were regularly repeated for a long time (up to the 90th day postpartum by bitch 4). It should be noted that epimeletic vomits occurred in the bitches who bred and raised their puppies for the first time (bitch 2, 3, 5 and 6).

MATERIAL AND METHOD

Eleven female mongrels of unknown origin, bought at random in the state of pregnancy, were used for the study. However, since one of them, after raising her first litter, was fertilized once again and bred another litter, the observations included 12 litters. No selection was made from the viewpoint of their size and age. Depending on the bitches' state of nutrition and body size two to five puppies were left postpartum to individual animals. The remaining puppies were sacrificed on the 3rd to 10th postnatal day.

The bitches, together with their puppies, were kept in indoor warmed pens or outdoor pens, provided with coldproof kennels. Shallow, wooden boxes filled with hay served as nests in the indoor pens, and tightly constructed kennels with a window for observing the bitch and her puppies in the outdoor pens.

The bitches were fed with a mixture, composed of boiled pearl barley, porridge, wheat bran, boiled and raw meat, lean cottage cheese and meat broth. The meat and cheese made up 35 to 45% of the weight of mixture.

TABLE I

Epimeletic vomiting in bitches (preliminary observations)

Breed[a]	Age of the bitch (in years)	Number of parturitions	Days on which vomiting was observed (post-partum)	Total number of recorded acts of vomiting
Doberman pinscher	5	2	44, 46, 47, 50	4
Saint Bernard	2	1	63, 64, 65	3
A cross of dingo and mongrel	2	1	16, 20, 21, 22, 23, 24, 25, 27	8
St. Bernard	6	2	33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 63, 65, 68, 71, 74, 76, 78, 80, 83, 85, 87, 90	41
Dingo	1.5	1	21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32	12
A small, sleek-haired pinscher	3	1	27, 28	2
Boxer	4	?	40, 60	2
Boxer	4.5	?	72	1
Mongrel	about 3	?	57, 58, 60	3
Mongrel	about 5	?	36, 38, 39, 42	4

[a] Breeds determined on the basis of external characters.

This food was supplemented by vitamin additions and trace elements in the form of preparation called Polfamix Z. The food was supplied twice a day, beteween 8:00 and 9:15 AM and between 1:30 and 2:45 PM. Beginning from the 10th day of the puppies'age, the bitches were always fed at some distance from the nest-pen, in which the puppies were kept, so that the latter had as a rule no access to the food. After taking her food, the bitch returned to her puppies, and was observed as unobtrusively as

possible from a distance of at least several meters. The vomiting usually occurred within a few to a dozen or so minutes after eating. The food disgorged by the bitch before her young was promptly and voraciously devoured from the floor by the hungry puppies (Fig. 5 and 6). This occurred when the interaction between the bitch and the puppies was fully developed (*see* below). If, shortly afterwards, the bitch displayed a tendency to get out of the pen, in which she had just stayed with her litter, this usually indicated that she had a tendency to eat more food. In that case, the animal was let out of the pen, fed once again, let into the pen and continuously observed. Incessant postfeeding observation of the bitches always lasted for 25 min after the end of their morning and afternoon meals (together with possible additional portions).

As puppies developed, sooner or later the necessity arose for the laboratory assistants to give the puppies additional food. This operation was started as late as possible and only in the case when the amount of food supplied by their mothers in the form of vomits was already distinctly insufficient. The additional feeding of the puppies by a similar mixture to that given to the adult animals always took place not earlier than 25 min after the entrance of the satiated bitch to the nest pen. The development of the puppies was normal (Fig. 7 and 8). In an appropriate time, they were wormed and inoculated against canine distemper. The replacement of their milk dentition by permanent dendition took place regularly and at the proper time (Fig. 9). Except for two puppies, no symptoms of rachitis were recorded.

The state of nutrition and health of female dogs were kept within normal limits and the condition of the bitches, which were purchased in a state of emaciation, considerably improved. This indicated that, despite frequent (Fig. 1 and 2) and abundant epimeletic vomiting, the food which remained in their stomachs was sufficient to cover requirements.

The female dogs and their litters were divided into two groups. Group I consisting of seven bitches and seven litters (Fig. 1) was observed according to the regime described. During the entire observation period (100–160 days postpartum), the number of puppies nursed by individual female dogs remained unchanged.

In Group II, composed of five bitches and five litters, the regime of observation was similar to that of Group I except for the fact that with the lapse of time, the puppies were being gradually taken away from their mothers (Fig. 2). This procedure was done in order to test the effect of taking away the puppies from the bitch on the persistence of the phenomenon of epimeletic vomiting. One of the bitches, who bred her puppies twice, was observed, together with her first litter in Group I (bitch 2 in Fig. 1) and with her second litter in Group II (bitch 2B in Fig. 2).

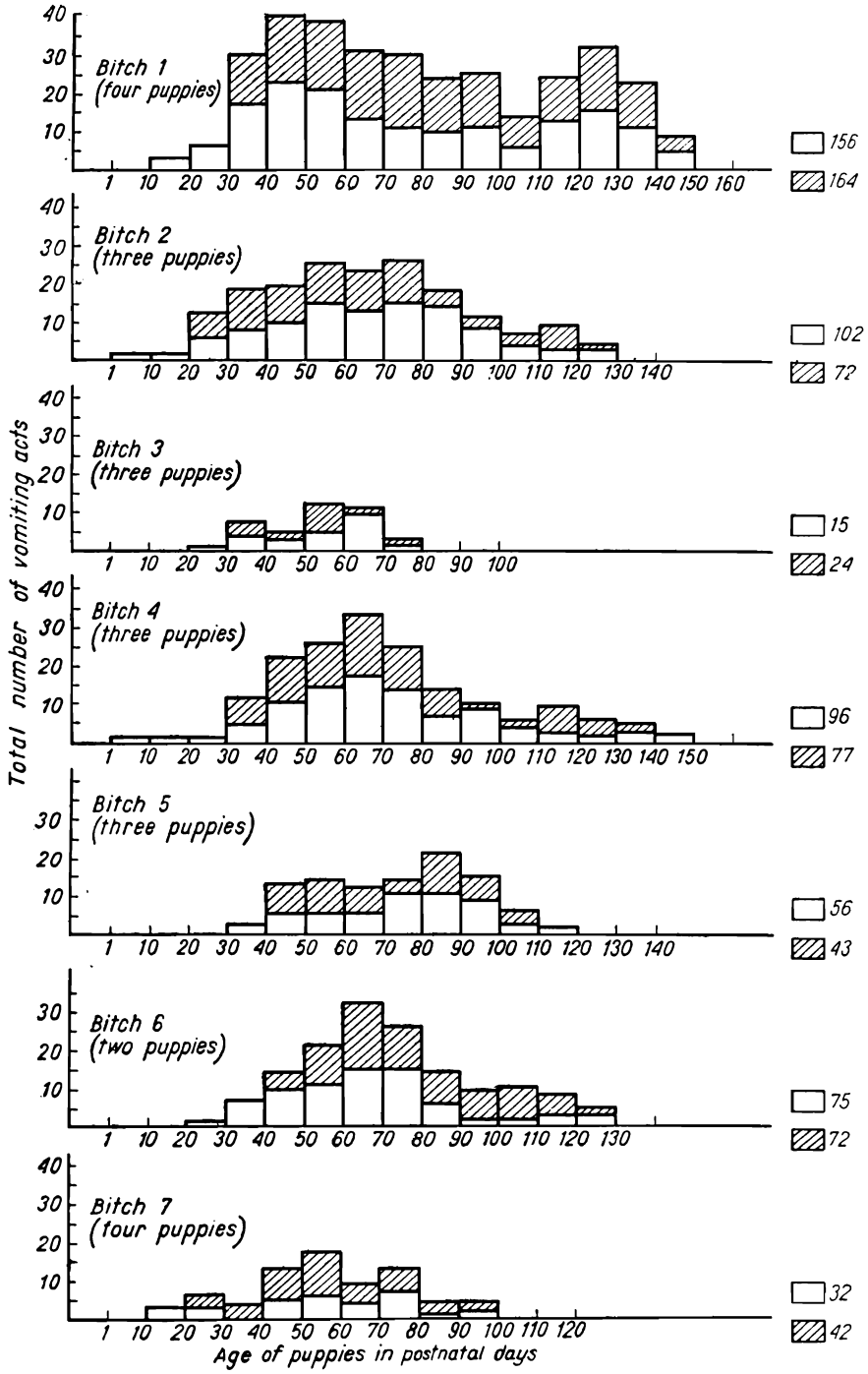

Fig. 1. Frequency and period of occurrence of epimeletic vomiting in the bitches of Group I. Empty rectangles indicate the vomiting acts observed in the morning; and shaded rectangles, the number of and vomiting acts in the afternoon.

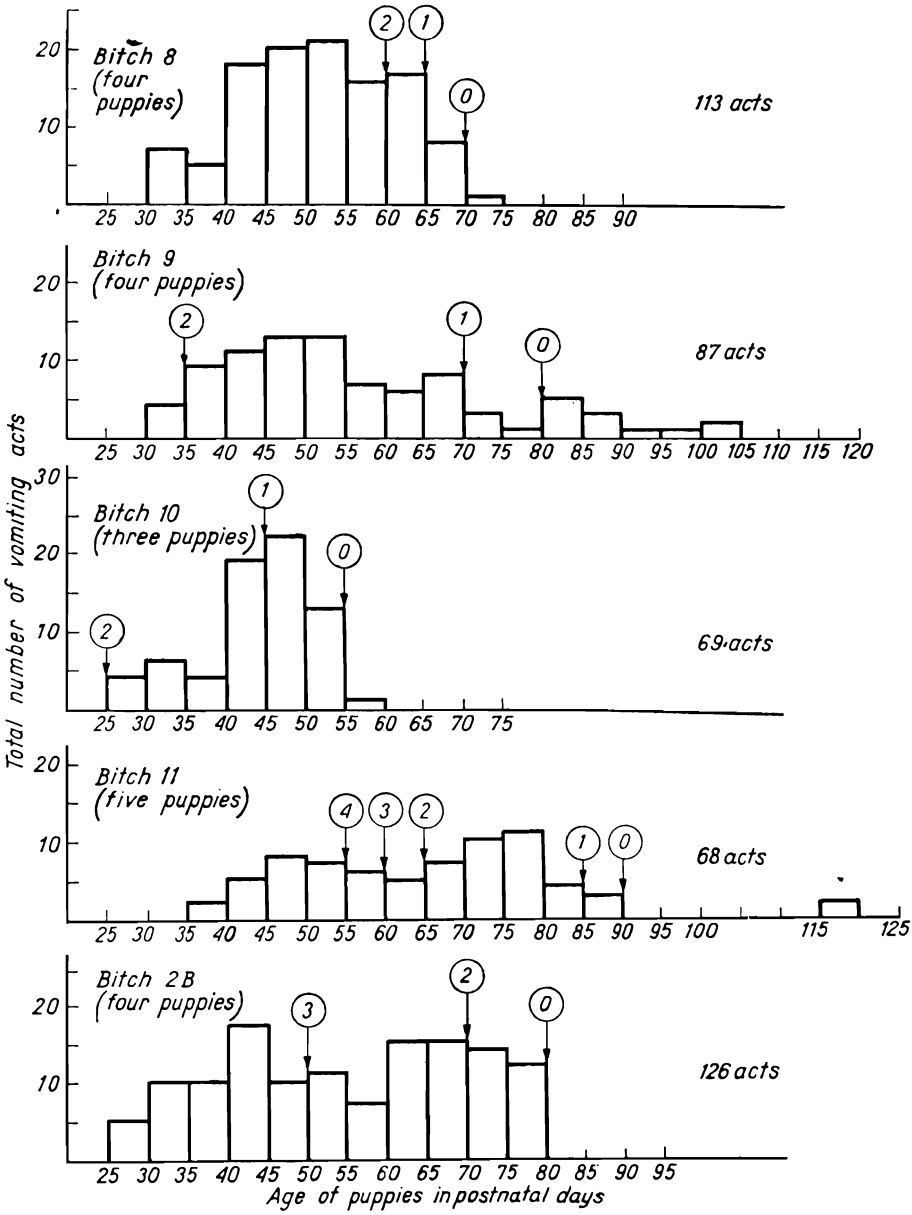

Fig. 2. The effect of the irretrievable taking away of the puppies from their mothers (Group II) on the persistence of the epimeletic vomiting. Arrows indicate days on which successive puppies were taken away from the bitches; numbers in circles above arrows, the current number of puppies left with the bitch. The total number of acts of vomiting observed in individual bitches is given on the right-hand side by each diagram.

RESULTS

Regularly occurring epimeletic vomiting was observed in all the 11 bitches (12 litters). The time, regularity, and frequency of the occurrence of this phenomenon are given in Fig. 1 and 2, presenting all the observed acts of disgorging food by animals. These figures do not include acts of vomiting which took place later than 25 min after the ingestion of food offered twice daily. The occurrence of these "delayed" vomitings is confirmed by the fact that sometimes distinct traces of vomits were observed late in the evening. A total of 1,026 acts of vomiting were recorded in the bitches of Group I and 463 in Group II.

It should be noted that none of the vomitings occurred outside the nest-pens, despite the fact that the regime and place of feeding the bitches theoretically provided such a possibility.

The course of the animals' behavior, in particular the mutual interaction between the bitch and her puppies was variable and strictly dependent on the age and development of the puppies. There were three distinct phases of epimeletic vomiting markedly differing from each other in the animals' behavior.

In the first period, further called a *phase of preliminary vomiting* (Phase I), the puppies living so far only on their mothers' milk, did not pay any attention on the presence of vomits. This phase was observed in all the bitches under study (Table II). Disgorging of food always took place near the puppies in the nest. The bitches usually consumed the vomits either immediately or after several minutes. Burying the disgorged food in the hay lining the nest, observed in two animals, was a rather exceptional behavior. In doing this, the bitch used her nose and not her paws.

In all the bitches and litters observed, the phase of preliminary vomiting was followed by a subsequent phase, called *transitional phase of vomiting* (Phase II). This fairly brief phase was marked by the fact that both the bitch and her puppies simultaneously ate the disgorged food. The beginning of this phase was recorded between the 24th and the 40th day postpartum (Table II).

The period of a common feeding of the bitch and her puppies on the disgorged food usually included only a few acts of vomiting. It seems that the extension of this phase to a dozen or so acts was mostly due to a still abundant lactation of the bitch and, consequently, a small hunger in the puppies approaching the vomits was persistently displayed only by one bitches ceased to ingest it. A markedly aggressive reaction towards the puppies approaching the vomits was persistently displayed only by one bitch (bitch 9).

TABLE II

The earliest vomiting observed in bitches and the age of the puppies on the first time of ingesting the food disgorged by the bitches

Bitch	The days postpartum on which vomiting was observed while the food was not ingested by the puppies	The postnatal day, on which the puppy ingested for the first time the food disgorged by the mother[a]
1	14, 17, 18, 21, 22, 25	27
2	7, 19, 21, 22, 23	24
3	27	29
4	6, 11, 30	40
5	32	38
6	1, 29	34
7	15, 26	27
8	31, 33	34
9	17	33
10	28	29
11	3, 38	38
2B	23	26

[a] In the first stage of ingesting, the disgorged food was eaten by the puppies and the bitch as well.

The third successive phase, denoted as *phase of complete epimeletic vomiting* (Phase III), started during the period of the extinction of lactation in the bitch, in general between the 40th and 55th postnatal days. It coincided with a markedly increased frequency of vomiting (*see* Fig. 1 and 2) and lasted on the whole in an unchanged form up to the extinction of the bitches' epimeletic behavior towards her puppies, that is, up to the 100th to 150th day of their life. The occurrence of an appropriate et-epimeletic behavior of the puppies and a close correlation between their behavior and that of the bitch was a characteristic feature of this phase.

The behavior of the bitches and the puppies in the phase of complete epimeletic vomiting was as follows:

After ingesting food, both in the morning and afternoon, a bitch did not immediately display the inclination to join her puppies in the nest. Released from a separate pen, in which they were fed, the bitch usually at first ran about freely for a few minutes and only afterwards she entered

the nest pen, and smelled for a moment at one or two puppies. At the same time, the puppies displayed a marked restlessness, started to jump to her muzzle, rested their paws on her shoulders and sought to touch or slightly muzzle up to the region of the outer part of the bitch's lips (Fig. 3*ABC*). Usually only one or two puppies succeeded in doing so (Fig. 3*ABC*), while the other ones satisfied themselves with jumping up to her muzzle. This activity of poking their noses against the outer labial part of the bitch's muzzle was fairly difficult for the puppies, since the bitch also displayed a distinct motor excitement. Followed by the puppies, she ran or walked aimlessly around the pen giving the impression of looking for something. This behavior resembled a motor excitement, observed frequently in dogs just before the act of defecation. When this motor hyperactivity continued without the act of vomiting, the puppies more energetically attacked their mother and kept jumpuing to her muzzle. Sometimes, puppies of 7 to 9 weeks old also manifested their hyperactivity by vocalization. Usually, after 3–9 min, sometimes 12 or even 20 min, the bitch came to a standstill (Fig. 4), inclined her head and, as the puppies were standing motionless and looking intently and expectantly at her mouth, quickly disgorged the food. After one or a few movements of the abdominal muscles, the food was forced out of the stomach and expelled outwards through a widely open mouth (Fig. 5). It was usual that the act of vomiting took place in the corner of the pen, distant from the observer and best screened (for instance, behind the kennel).

In the phase of complete epimeletic vomiting, the puppies voraciously devoured the food disgorged by the bitch (Fig. 5 and 6) and afterwards frequently attacked their mother once again. Some of the bitches (particularly, bitches 1, 2 and 4), when once more exposed to the et-epimeletic behavior of the puppies, vomited an additional portion of food (Fig. 6). Some others, attacked once again by their young, tried to get out of the nest-pen and, when released, ran to the place where they were previously fed. After a repeated ingestion of food, a bitch immediately returned to the puppies and, as an effect of their resumed et-epimeletic behavior, disgorged close to them a new portion of food. However, the repeated ingestion of food by the bitch did not always lead to vomiting. On the other hand, there were fairly numerous cases, in which, within 20 min, the bitch ingested food three times and, let into the pen with the puppies, vomited each time.

Observing the bitches and puppies in the phase of complete vomiting, it may be supposed that the abundance, frequency and promptness of the occurrence of vomiting were directly related to the amount of food ingested by the bitch and to the intensity of the et-epimeletic behavior of the puppies.

The results of taking away the puppies from the bitches, shown in Fig. 2, indicate that the regularity of the occurrence of epimeletic vomiting was not disturbed when at least two puppies were left with the bitch. Leaving only one puppy with the bitch may disturb the regularity and decrease the frequency of vomiting but does not abolish the phenomenon (Fig. 2, bitches 8, 9, 10 and 11). On the other hand, the removal of all puppies causes immediate or almost immediate extinction of vomiting. The comparison of the behavior of a bitch used for the experiments with two litters is here very illustrative: when the puppies were not taken away (Fig. 1, bitch 2), vomiting occurred in the bitch up to the 130th day postpartum and its frequency only slightly decreased after 80 days, whereas when the puppies were taken away after 80 days vomiting ceased completely (Fig. 2, bitch 2*B*). In bitches 8 and 10 (Fig. 2), after removal of all their puppies vomiting was observed only once.

The only exception from this rule was bitch 9, in which, after removal of all her puppies, vomiting still occurred 12 times (Fig. 2). It seems that the behavior of this bitch should be considered non-typical. This conclusion is reached by her aggressive attitude towards the puppies as they approached the disgorged food or when their et-epimeletic behavior became more active. This could be a reason why in the phase of complete epimeletic vomiting this response was not as closely bound with the puppies attacking her, as it was with other mothers.

During and shortly after the period when the frequency of vomiting reached its peak, the amount of food ingested by the bitches in one meal often reached as much as 25% of the animal's body weight. Thus, for instance, bitch 2, weighing about 20 kg, frequently ingested at one sitting 4.3 kg of the food and bitch 4, weighing 9 kg, even 2.8 kg.

DISCUSSION

The experimental data described in this paper show that both the epimeletic behavior of the bitches and the et-epimeletic responses of the puppies should be regarded as normal behavioral patterns, occurring in domestic dogs. These patterns are phylogenetically fixed, and are manifested only under definite conditions of environment and feeding. They could be elicited in all the bitches and puppies used in these experiments.

Since all the dogs used in the main part of the experiments were mongrels, we have no indubitable evidence to show that the occurrence of epimeletic vomiting is also present in dogs of pure breed. However, since in our preliminary observations epimeletic vomiting was found in one Doberman pinscher, St. Bernard, rattler pinscher, boxer, and dingo

(*see* Table I), it may be supposed, that in a considerable number of dogs of pure breed the behavioral pattern under discussion is also present.

Below we present a tentative interpretation of the behavior observed in our study.

We have seen that the epimeletic vomiting may be divided into three phases. In the first phase the bitches vomit when brought to the nest-pen in spite of the fact that the puppies are not yet interested in the vomits and the mothers themselves consume them. This fact indicates that vomiting in this condition is an unconditioned reflex elicited by special environmental stimuli.

In the second phase the puppies quite suddenly begin to consume the vomits together with their mother. Finally, in the third phase the puppies take an initiative in demanding food by attacking their mother and licking her muzzle. This behavior of puppies should be certainly regarded as a food conditioned reflex elicited by the sight and/or the smell of the bitch, and particularly of her muzzle.

The present experiments throw some light on the conditions in which the epimeletic behavior in the bitches is elicited. It is clear that simple ingestion of food does not evoke epimeletic vomiting, because when the animals are retained in the pen, in which they receive food, vomiting does not occur. Only when they are brought to the nest-pen in which puppies are placed, then after a period of motor excitement the animals suddenly calm down and begin to vomit. This course of events indicates that in the presence of puppies in the nest-pen the *epimeletic drive* is elicited in the bitches, which ends with the consummatory response of vomiting (*see* Konorski 1970).

What are the factors inducing this epimeletic drive. Probably the presence of the puppies plays here a decisive role, as shown in experiments with group II, in which, after all puppies had been removed, the drive momentarily disappeared. The fact that in two bitches it was present one time after removal of puppies, and in another bitch even for a longer time may be considered as a epimeletic conditioned reflex established to the nest-pen.

Furthermore, according to our observations, the epimeletic drive is further increased by the et-epimeletic behavior of the puppies consisting in attacking the mother and licking her mouth. This behavior of puppies promptly leads in the mother to the consummatory reaction manifested by vomiting. Thus the active attitude of puppies increases even more the epimeletic drive in the bitch and makes her whole behavior regular and reliable.

It is interesting to note that in the first phase, when the puppies still fail to take the vomited food, and in the transitory phase, when they begin

to take it, the mother readily eats the vomits. However, in the third phase when the puppies clearly beg for the vomited food the mother does not compete with them, but she withdraws and even may take a protective attitude with regard to the puppies. This observation clearly shows that in the period of full development of epimeletic drive in the presence of puppies the hunger drive of the bitch is inhibited. This drive can reappear when the vomits are consumed by the puppies, and it is manifested by the tendency of the bitch to return to the feeding pen. It is interesting to note that in one bitch, perhaps the most voracious one, the hunger drive was not inhibited by the epimeletic drive, and in consequence she competed with the puppies in the food intake to the degree of driving them away from the vomits.

The last problem to be discussed is why the phenomenon of epimeletic vomiting in dogs almost completely escaped the attention of both the owners of the dogs and zootechnicians, to such a degree that vomiting in this situation was usually regarded as a pathological symptom of indigestion.

The following factors seem to account for this state of affairs. First, epimeletic vomiting may be easily inhibited by the animal's orientation reaction elicited by the presence of an observer or other distracting stimuli. Secondly, the act of vomiting itself is a very brief phenomenon (a few seconds) and the bitch has a tendency to disgorge the food in an isolated place, for instance inside the kennel; this fact makes the observation of the act of vomiting difficult. Thirdly, under the conditions of contemporary civilization, there are on the whole no environmental conditions favorable to the manifestation of the epimeletic behavior, since the bitch is usually fed near her nest. Finally, the puppies are mostly taken away from their mothers as early as their 6th postnatal week (the 40th to 42nd day of life), that is, at the age at which the behavioral interrelations between the mother and puppies are usually not yet fully developed and individually fixed. Furthermore, modern civilized man, taking care of the puppies and feeding them, extinguishes their drive for food and, consequently, stops both their et-epimeletic behavior towards their mothers and adequate responses of the latter.

As follows from the literature, the observations of the experimenters, concerned with the social and maternal behavior of the dogs, have been conducted under these unfavorable conditions. Besides, these observations included on the whole only one or a few experimental daily sessions lasting for a short period of time. This was the reason why the probability of the occurrence of epimeletic vomiting in its complete form, as well as the probability of noticing particular acts of vomiting by the observers were relatively small.

SUMMARY

The aim of the present paper is to elucidate the causes, and to present the process, of the phenomena of vomiting, sporadically observed in bitches rearing their puppies.

Besides the preliminary observations, 11 mongrel bitches, together with their puppies were used for the experiments.

Vomiting could be induced in all the 11 bitches and during all the 12 cycles of rearing the puppies. (One of the bitches bred and reared her young twice). It was a regularly occurring behavior accompanied in its developed form by a corresponding behavior of the puppies.

The phenomenon observed had a character of an epimeletic behavior of the bitches towards their puppies and was evidently aimed at supplying them with food.

Regularly repeated vomiting occurred in the bitches in variable periods: the shortest up to 80th day of the puppies' age and the longest up to the 150th postnatal day.

During the period of maximal frequency of vomiting, in some of the bitches the number of acts amounted to six per day and to more than 40 per 10 days.

Three developmental phases of this phenomenon might be distinguished. In Phase I, the vomiting of the bitch seemed to be independent of the behavior of her puppies. Phase II is a transitional form of behavior of both the bitch and her puppies. In Phase III the vomiting seemed to be closely dependent not only on the presence of the puppies, but also on their appropriate provoking behavior. In 4 out of the 5 bitches used in this experiment, in which all their puppies were irretrievably taken away, the reaction of vomiting was extinguished.

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Piotr KORDA, Department of Experimental Animals Breeding, Nencki Institute of Experimental Biology, Pasteura 3, Warszawa 22, Poland.

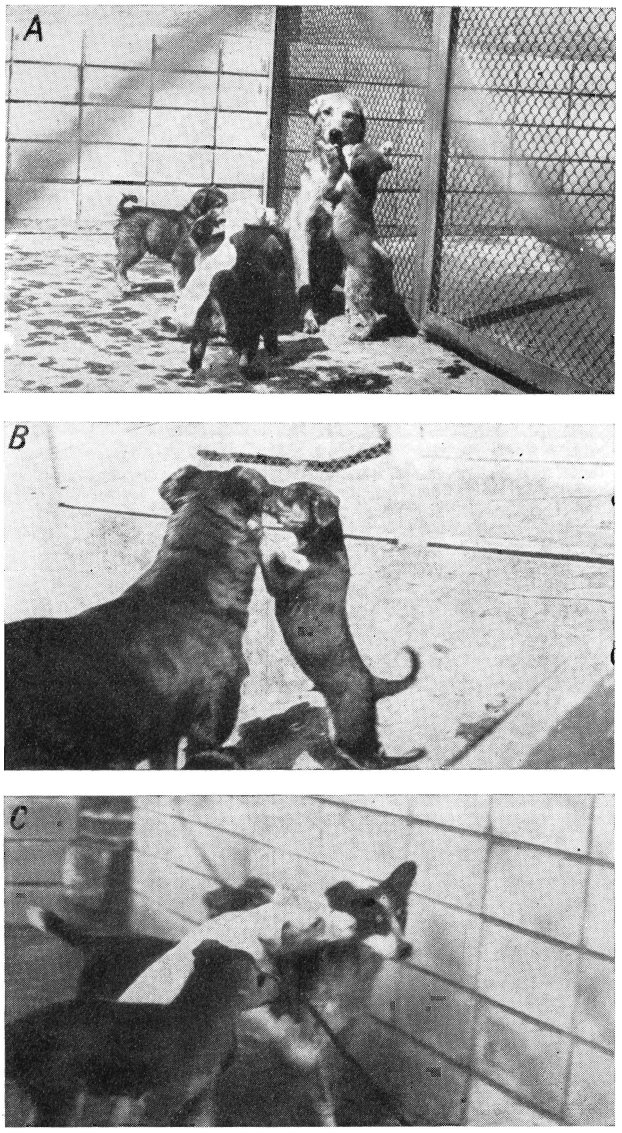

Fig. 3. The et-epimeletic behavior of the puppies of varius bitches in the phase of complete vomiting. *A*, puppies of 58 days of age; *B*, puppy of 65 days of age; *C*, puppies of 110 days of age.

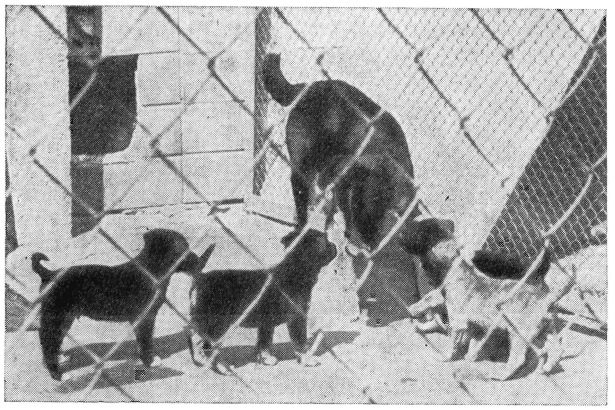

Fig. 4. The position of a bitch at the moment directly preceding the act of vomiting. The puppies are waiting motionlessly for the food to be disgorged by their mother.

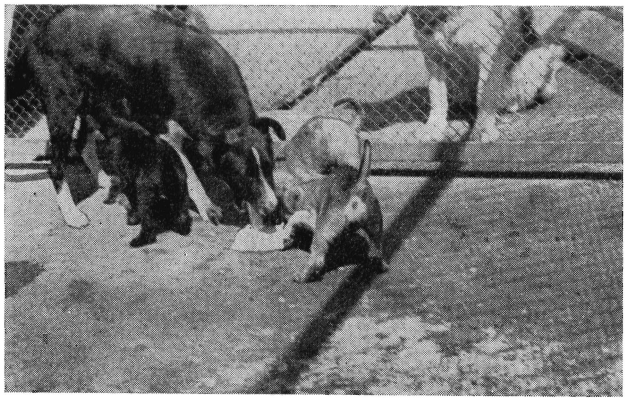

Fig. 5. The act of epimeletic vomiting in a bitch. The puppies start to ingest the disgorged food before the act of vomiting is completed.

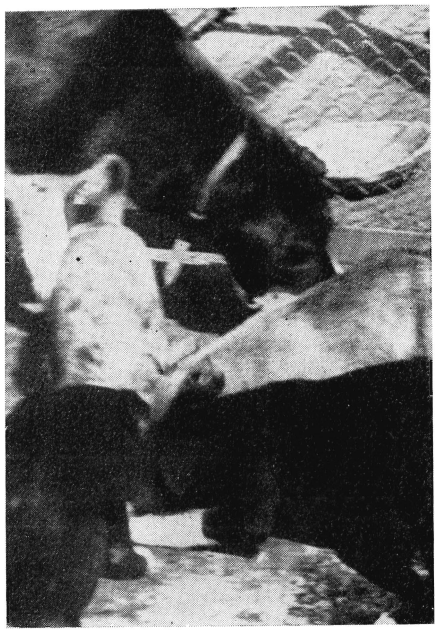

Fig. 6. Repeated vomiting in a bitch. The puppies are still ingesting from the floor the food disgorged 20 sec earlier. The repeatedly vomiting bitch in the background.

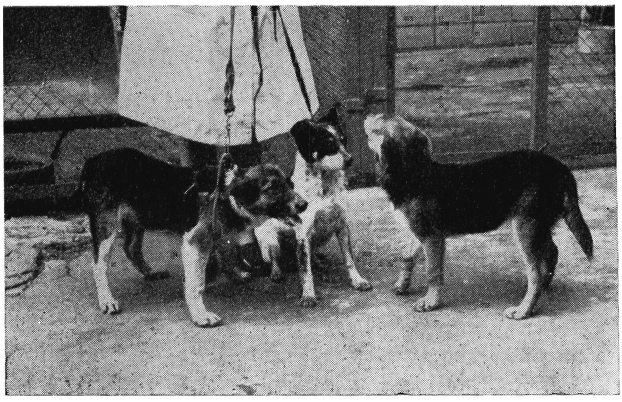

Fig. 7. Puppies of 140 days of age. The phenomenon of epimeletic vomiting still occurs in their mother (center).

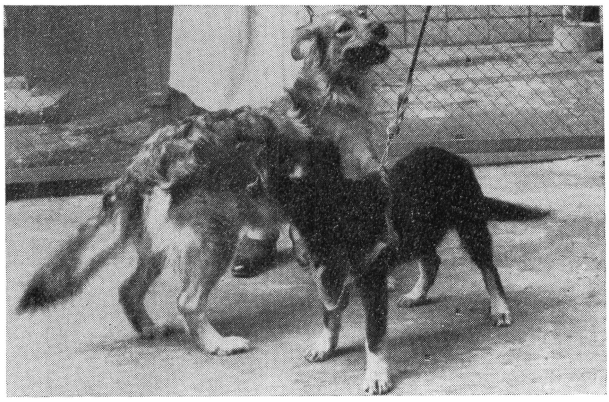

Fig. 8. A puppy of 132 days of age. The last act of epimeletic vomiting was recorded in his mother (on the left) 3 days before, that is when the puppies were 129 days old.

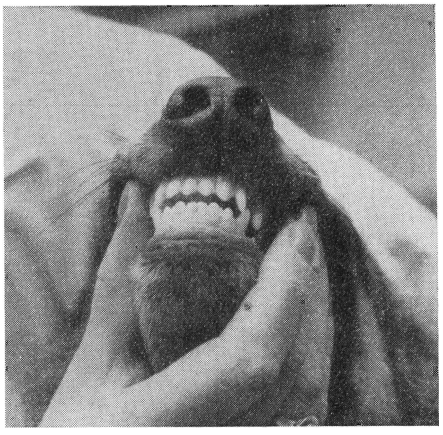

Fig. 9. The dentition of a puppy of 140 days of age, still fed by the bitch with disgorged food (the same individual is shown in Fig. 7, left).