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DENTAL DISEASE IN ANIMALS

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(Continued from p. 10.)

PARODONTAL DISEASE.

The other common affection of the teeth—parodontal disease—is a chronic infection of the gingiva and adjacent tissues and is characterised by a progressive destruction of the supporting structures of the teeth. In the animal living under natural conditions the disease is rare, but it is common, far commoner than caries, in the captive and the domestic animal. The disease is seen in a wide range of captive wild animals including Marsupials, Rodents, Lemurs, Monkeys, Ungulates, Edentates, Carnivores, and Insectivores.

Localised destruction of the bone due to food packing between the teeth is seen in the wild animal in the natural state but it is uncommon and is almost entirely confined to the Apes and Monkeys. In these " pockets " the surface of the bone is smooth and signs of rarefying osteitis are seldom seen. In the skull (fig. 18), the food is still in position in the pockets.

The process in the captive animal resembles that seen in Man. The septa between the teeth are usually the first portions of the bone to give way, the whole tooth socket becoming gradually involved ; the rarefaction of the bone being generally more marked in the maxillæ than in the mandible.

Of our domestic animals the dog, cat, and horse are most liable to the disease. In the dog and cat

FIG. 18.—*Colobus badius tephrosceles* (Uganda Red Colobus).—Brit. Mus. 30.8.1.3. A skull with " pockets" between the teeth. Food is present in the pocket between the mandibular first and second molars.

FIG. 19.—*Canis familiaris* (Domestic Dog).—Royal College of Surgeons' Museum, Odontological Section. G 145.6. A skull showing the condition of the bone in an advanced stage of parodontal disease.

it starts as a marginal gingivitis due to the lodgment of soft pappy foods around the necks of the teeth ; infection spreads to the bone, which is gradually lost. An idea of the appalling state of some of these animals can be formed from the skull of a dog shown in fig. 19. The disease is mostly seen in pet animals which are often fed on a diet which makes very little, if any, demand on the teeth before it is swallowed. Cats and dogs which lead a freer life and obtain a diet more nearly approaching their natural food, are practically free from the disease.

Lesions of the periodontal membrane are common in the horse. In the examination of the series of skulls of the horse, to which reference has already been made, approximately one-third presented some degree of parodontal disease ranging from a slight destruction of the gum to the most aggravated form of the disease. The first stage of the disease is the loss of the little tag of gum at the interproximal areas. In the triangular cavity thus formed a grain of corn, a little chaffed hay, or other material may be found. The triangular cavity gradually increases in size, the periodontal membrane becomes more and more involved, and with the increase in the size of the space there is a greater accumulation of débris. The muco-periosteum becomes thickened and there is a profuse muco-purulent discharge around the teeth, the breath becoming extremely offensive. As the trouble advances the teeth tend to separate and food wedges between them ; the destruction of the bone continues ; the teeth loosen the infection spreads in the maxilla to the sinus where it sets up suppuration, and in the mandible where it causes an abscess in the bone. These various stages are illustrated in figs. 10, 20, 21, 22, 23, 24, 25.

To what cause or causes can we attribute this almost complete immunity to the disease of the wild animal in the natural state and the frequency of the disease in the captive animal and the domestic animal ?

From the fact that the disease is rare in wild animals living under natural conditions it is evident that their food is of such a character that a healthy condition of the dental tissues is maintained.

If, therefore, wild animals in captivity were

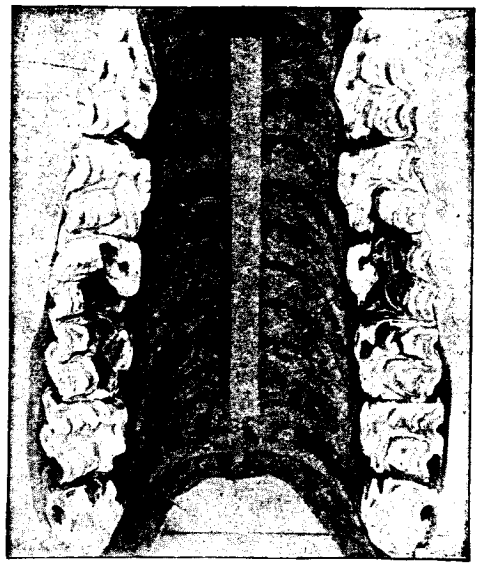

FIG. 20.—*Equus caballus* (Horse).—Royal College of Surgeons' Museum, Odontological Section. G 157.01. A specimen with the muco-periosteum of the palate in position. The first stage of parodontal disease is shown in the slight destruction of the muco-periosteum between the last two molars on the right side of the illustration.

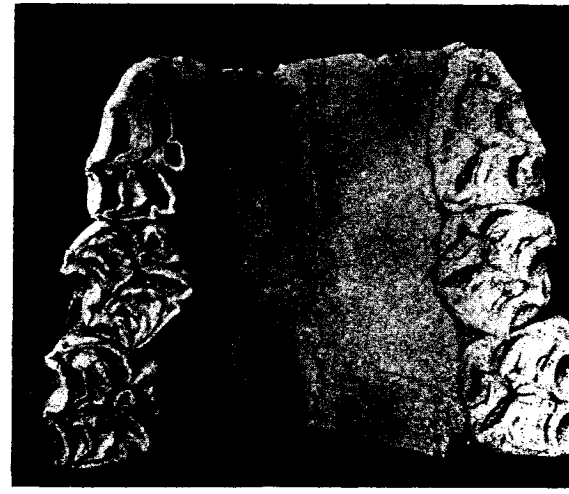

FIG. 21.—*Equus caballus* (Horse).—Royal College of Surgeons' Museum, Odontological Section. G 67.41 The condition of the bone at the stage shown in fig. 20

FIG. 22.—*Equus caballus* (Horse).—Royal College of Surgeons' Museum, Odontological Section. G 157.3. A specimen showing an early stage of the bone destruction in parodontal disease.

supplied with food which in character and consistency does not differ from their natural food, the healthy condition of the tissues should be maintained. But, as a matter of fact, in captivity the normal and natural food of the animal is not always forthcoming, and the environment of the teeth in these cases is altered and it is in this altered environment of the teeth due to change of diet that we must seek the cause of the disease. It may be of interest, therefore, to contrast the natural food of animals with the diet supplied to them in captivity.

Hedgehogs when kept in captivity frequently develop parodontal disease in a severe form ; in the wild state they are free from the disease. Their natural diet is a varied collection of material including "insects, worms, snails, birds' eggs, rats, mice and other small mammals, while roots and fruit are consumed to a certain extent.[1] In the captive state they are given raw minced meat with milk, as well as bread and milk. Here, although the diet in captivity is partly of a carnivorous type, the mincing has altered its physical character and in the bread we have a fermentable carbohydrate.

Rodents in captivity develop the disease in a severe form ; in the wild state they are immune. These animals in the natural state are vegetable feeders but in captivity in addition to green stuffs they are given crushed oats, potatoes, and such sticky food as biscuits.

The disease is fairly common in captive lemurs, and usually commences around the procumbent incisors. In the wild state where the diet is composed of leaves, fruit, insects, birds and birds' eggs the animals are free from the disease. In captivity they are given vegetables, fruit, dates, and cooked potatoes.

Mongooses and Suricates seem particularly liable to develop the disease. The food of the mongoose in nature is varied. It lives upon rats, mice, snakes and lizards, birds and insects, but at times eats fruit. The Suricates "feed chiefly on succulent bulbs which they scratch up with the long claws on their forefeet." In the captive state Mongooses and Suricates are given minced and small chunks of raw or cooked meat and bananas. Mincing and cooking the meat renders it more liable to cling about the teeth.

The Suricate affords an excellent illustration of the relation between the arrangement of the teeth and the development of the disease. In this animal and its allies the mandible is affected at an earlier stage than the maxilla. The external surfaces of the cheek teeth in the maxilla present an even and regular line, but in the mandible the teeth overlap slightly. Food is, therefore, more likely to lodge around the mandibular teeth than about the maxillary teeth. Suricates in the wild state are immune from the disease. It is clear that in the wild state an irregular arrangement of the teeth is not in itself harmful to the animal, at any rate as long as the diet is of a suitable character and does not cling about the teeth.

FIG. 23.—*Equus caballus* (Horse).—Royal College of Surgeons' Museum, Odontological Section. G 157.4. A specimen showing parodontal disease. The bone destruction has advanced sufficiently to loosen the attachment of the first molar.

[1] The data relating to the food of animals in the wild state is taken from the Royal Natural History.

In the case of the Wolf, Fox, Racoon, Coati and other animals developing parodontal disease in captivity it is the same story, a different form of diet in the captive to that obtained in the natural state.

The diet of our domestic animals is often quite different from their natural food. Cats, particularly pet animals, instead of a purely flesh diet obtain food which has a tendency to cling about their teeth and start a marginal gingivitis. Cats which lead a freer life and obtain a diet more nearly approaching their natural food are practically free from the disease. Wild cats with their natural diet of fresh flesh are free from the disease. The dogs affected with parodontal disease are those fed on soft pappy food ; those fed on a diet which necessitates the use of their teeth for the rending of their food are free from the disease. In five skulls of foxhounds between the ages of four and six years from a well-known pack there was definite evidence of parodontal disease. The master of the hunt informed me that the bulk of the pack was only used during the prime of life ; when they were four to six years of age they often became too slow, and by that time their teeth had loosened and in many cases fallen out. The diet of these animals was Scotch oatmeal and molassine hound meal boiled together in a cauldron and, when set and cold, cut up

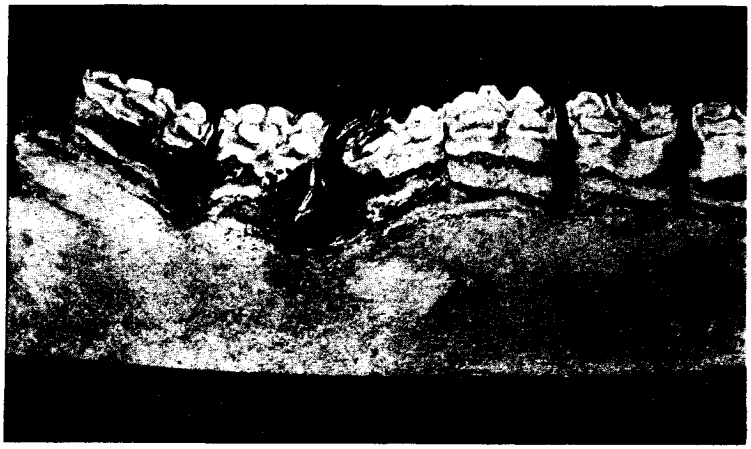

FIG. 24.—*Equus caballus* (Horse).—Royal College of Surgeons' Museum, Odontological Section. G 157.53. A specimen of parodontal disease showing spaces between the teeth filled with fodder.

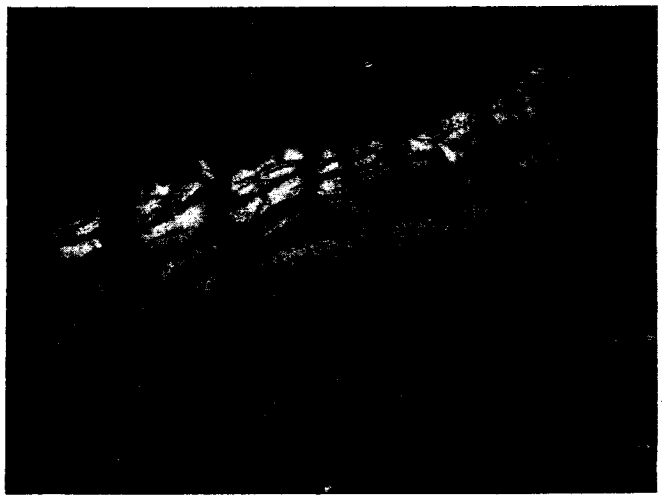

FIG. 25.—*Equus caballus* (Horse).—Royal College of Surgeons' Museum, Odontological Section. G 157.6. A specimen showing suppuration in the body of the mandible from a case of parodontal disease.

with a spade. He stated that care was taken that no bones were served, as the hounds will fight to death over a bone. Here we have a diet entirely different from the natural food of dogs and one likely to cling about the teeth.

That the physical character of the food is an important factor in the production of the disease is well exemplified in the case of the horse. In the wild state the horse lives on grass which it breaks off in long strands which lie across the cheek teeth; and in the process of mastication no damage ensues to the soft tissues. To obtain more work out of the horse it is often fed intensively. The hay, straw, etc., are cut into short lengths (chaff). The short lengths of chaff are apt to cause injury to the muco-periosteum by being pressed up into the interproximal spaces during mastication. When a cavity, however small, has once been formed, food tends to clog it, with the inevitable result that the cavity increases in size. The cavities become filled with food débris, and to this condition infection is added. The disease in the horse is thus to be traced to an alteration in the physical character of the food rather than to an alteration in the composition of the food. This view of the causation of the disease in horses is supported by the fact that the disease is prevalent wherever the conditions are such that fragments of thorns, etc., become mixed with the food. Major Kirby[1] informed me that he had seen many cases of "alveolar periodontitis" in England and other countries. The disease he found was caused "largely by the awns of worthless grasses in hay of inferior quality, e.g. brome grass, false brome, barley grass, couch grass, etc." In India he had seen it from the use of spear grass, and in South Africa from stik grass. In America needle grass or porcupine grass causes the same condition.

Horses running almost wild in countries where there are prolonged droughts, according to G. Thomson,[2] die more from parodontal disease than actual starvation. The horses dig up roots, and when chewing these, grit and sand get between the gum and teeth and set up disease.

Conclusion.

From the facts given above it is evident that caries and parodontal disease are always associated with an alteration in the physical or chemical character of the diet of the animal—in other words with a departure from natural diet and conditions. If this is the case with the lower animals there is no reason why the same should not be true of the animal Man. Expressed in biological terms caries and parodontal disease are due to an alteration in the environment of the teeth.

Correction.—Figs. 14 and 16 in the first part of Sir Frank Colyer's Lecture, pp. 9 and 10, *B.D.J.*, Jan. 3, 1947, were unfortunately transposed.

[1] Private communication.

[2] *Transactions Odontological Society*, 1905-06, xxxviii, 78.