and protective substances. No serum antibodies were demonstrated. In view of the publication of Kitt[3] and others, these results were anticipated and other methods must be developed to prove more conclusively the local character of the cuti-immunity. It is reasonable to assume that the subcutaneous test inoculation (pocket method) with a pasteurella organism is too massive to demonstrate the delicate general immunity which might have developed on the 5th and 8th day. Even if such a possibility is admitted one would encounter difficulties in explaining the striking protection of the skin 18 hours after the injection of the filtrate containing a growth inhibiting substance. Experiments are in progress to shed light on the nature of the "antivirus", the duration and mechanism of the cuti-immunity.

Conclusion: Although the skin is not the main receptive organ for the bacteria of the pasteurella group, experiments conducted on guinea pigs have established the possibility of protecting the entire integumentum of the animals inside of 18 hours, but not the subcutaneous tissues, when non-toxic filtrates prepared from seven days old cultures grown in shallow layers, containing a growth inhibiting substance or "antivirus", are inoculated intracutaneously.

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Changes in the alveolar process about the teeth in dogs on experimental diets.

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Studies on inorganic salt metabolism in dogs conducted by one of us (M. R. J.)[1] have shown that skeletal changes and dental defects may be induced in normal puppies on diets which appear

[3] Handbuch d. pathogen. Mikroorgan., 2nd Ed., 1913, vi, 56.

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[1] Jones, Martha R., PROC. SOC. EXP. BIOL. AND MED., 1924, xxi, 199.

to be adequate in respect to protein, fat, carbohydrate, inorganic salts and vitamins (bread, meat, milk, butter fat, orange juice and salt mixture based on ash analysis of milk), but which contain an excess of basic ions through additions of sodium carbonate. To date, microscopic sections have been prepared from

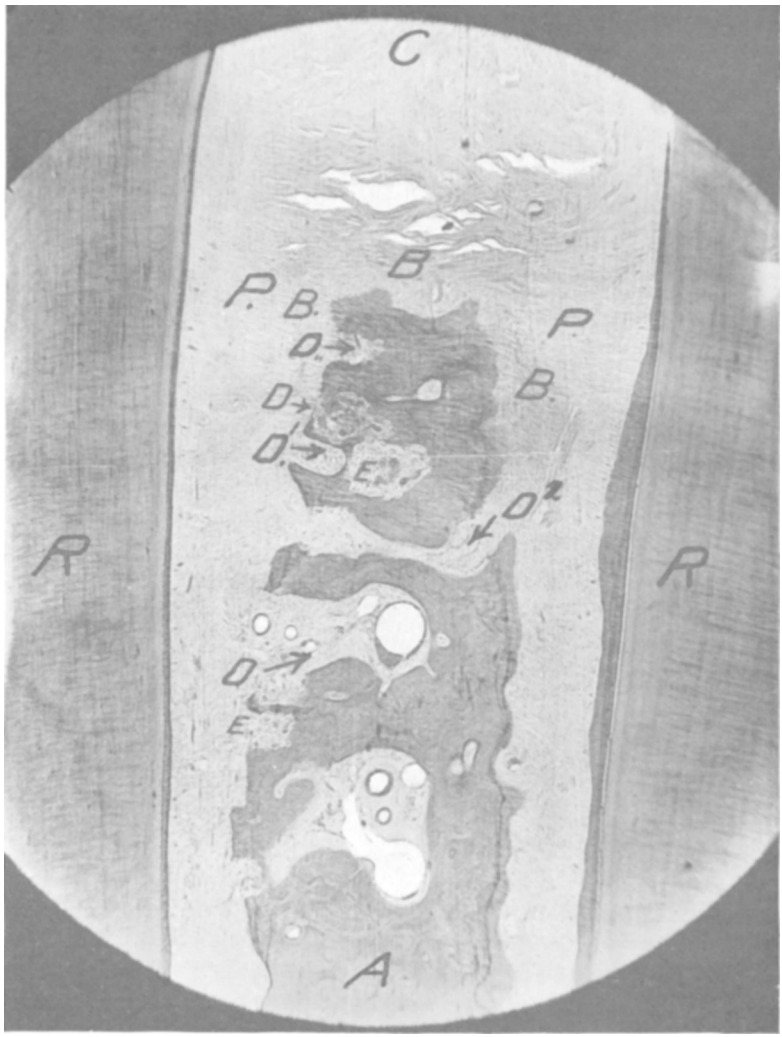

FIG. 1.

Retrograde changes in the alveolar process in an adult dog on diets which appear to be adequate in respect to protein, fat, carbohydrate, inorganic salts and vitamins, but containing an excess of basic ions.

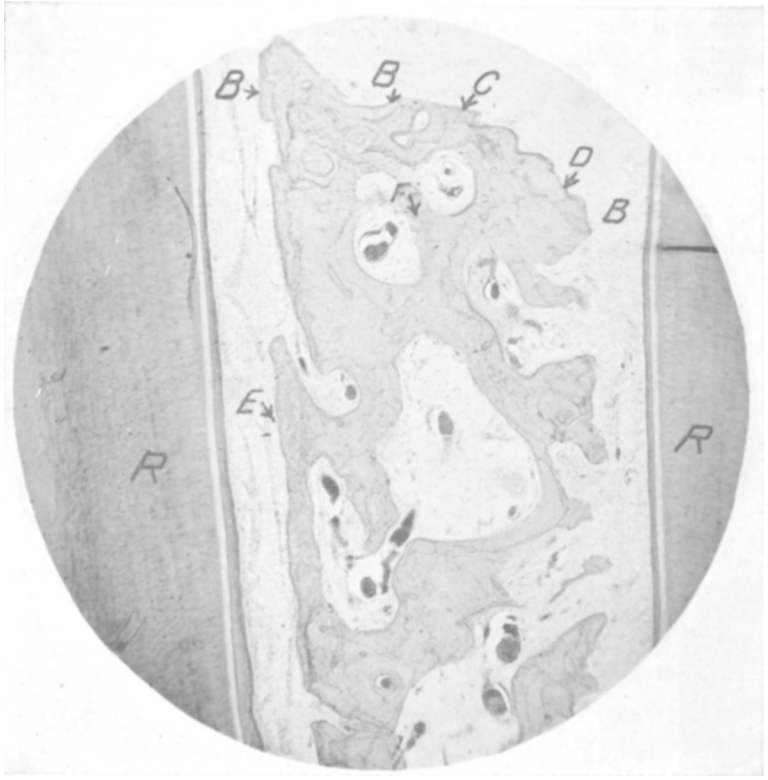

FIG. 2.

Changes in the alveolar process, corresponding section, from the same animal, subsequent to a change in diet in which the soda was omitted and rice substituted for potato, resulting in an excess of acid ions.

six of these puppies and in all cases show retrograde changes in the alveolar process. Marked clinical evidence, such as loosening and migration of the teeth and softening of the bone of the process to the extent that the tissues can be excised with a knife, exists in other cases from which microscopic sections are now being prepared. Inquiries into the dietary preferences of a number of persons suffering from parodontoclasia[2] have shown that alveolar atrophy occurs, in the majority of cases, on diets which are relatively low in protein and minerals and contain a preponderance of base. In the light of these observations, a group of normal adult dogs, ranging in age from 3 to 7 years,

[2] Simonton, F. V., *Dental Cosmos*, February, 1926.

were placed on diets consisting essentially of bread, meat and potato—the latter predominating. In certain cases beef suet was added to the food mixture, in others, sodium carbonate to further increase the alkalinity. The case reported below was one of two animals placed on the diet as described with the addition of sodium carbonate. In spite of the high potential alkalinity of the food mixture, both animals excreted urines which varied around the neutral point (pH 7.0)—the amount of soda having to be continually increased in order to maintain the desired urinary reaction. After 130 days on the alkaline diet the upper second and third incisors were removed at biopsy from both animals. Histologic sections, one of which is shown in Fig. 1, indicated retrograde changes in the alveolar process. These were quite comparable in the two dogs. At the time of biopsy, the animals were robust, well nourished, and appeared to be in good health. Referring to Fig. 1, the roots of the upper second right and third incisors are shown at *R* and *R*. *C* lies in the direction of the crowns, *A* toward the apices of the roots. The septum of the alveolar process shows marked retrogressive changes. Halisteresis has occurred at *B-B-B*. Lacunar resorptions are evident at *D-D*. At D^1 some resolution with fibrosis has occurred. At D^2 a complete division of the septum (in the plane of this particular section) has occurred. Osteoporotic changes are evident in the marrow spaces. Multinuclear osteoclasts may be seen at *E-E*. Widening of the peridental membrane is apparent at *P-P*. This results from the narrowing of the septum through resorptive changes. The freedom of the soft tissues from any evidence of inflammatory processes is notable.

Subsequent to the biopsy, omission was made of the soda from the food mixture during the following 48 days, resulting in a prompt increase in the acidity of the urine, the pH dropping as low as 6.6, in spite of the potential alkalinity of the diet. Reversal of the dietary reaction by the substitution of an equivalent amount of rice for the potato resulted in a further increase in urinary acidity during the first few days. Subsequently, both animals went into convulsions and died.[3] The one reported, died on the 28th day after the change in diet. Corresponding tissue (the upper left second and third incisors, Fig. 2) was removed post mortem.

[3] Jones, Martha R. (In press.)

Referring to Fig. 2, marked reconstructive changes are evident. The roots of the upper left second and third incisors are shown at *R* and *R*. The subperiosteal bone *(B-B)* is fairly abundant. Along the crest *(C)* new bone formation is taking place. Under higher magnification, osteoblasts may be seen being embedded along the margin as bone corpuscles, many appearing between the margin of the bone and the outlying blood vessels. The superficial bone corpuscles are large and their nuclei regular in outline and clearly defined. At *E* may be seen old dead bone overlaid by new. At *F* two marrow spaces which had previously coalesced have been separated by bone growth between them.

Sections from the long bones showed no apparent recent changes of the osseous tissue. Complete histologic studies of the entire group of animals are in course of preparation and will be given in detail later.

SUMMARY.

1. The condition shown in Fig. 1 represents a non-inflammatory type of parodontoclasia in a dog.

2. The occurrence of the retrograde changes in Fig. 1 in relation to a diet known to produce osseous degeneration, together with a reversal of the type of bone change with a reversal of the dietary fault, postulates that nutrition is an important etiologic factor.

3. The microscopic appearance of the tissues shown in Fig. 1 resembles diffuse atrophy in human tissues as described by Gottlieb.[4]

4. The condition described as resulting from the basic diet occurred without any obvious degenerative changes in the long bones and in an animal apparently in good health, robust and well-nourished. This is in conformity with the occurrence of parodontoclasia in humans who seem to be in perfect health.

5. The freedom from inflammatory reaction of the soft tissues may be due in part to the high resistance to infection characteristic of the tissues of the dog, and in part to lack of function. The dogs were fed on pap, requiring practically no mastication. It is possible that vigorous use of the tissues in which the skeletal support was so defective would lead to trauma, hemorrhage, and invasion of micro-organisms.

[4] Gottlieb, B., *Zeitsch. fur Stomat.*, 1923, iv, 195.

6. The bone changes represented in Fig. 1, namely, resorption of the crest of the alveolar septum, lateral excavations, opening of the bone marrow spaces to the side, osteoporosis, coalescing of marrow spaces and widening of the sockets of the teeth crownwise, all compare with the appearances familiar to parodontists in roentgenographs of human parodontoclasia.