rats and rabbits produced by the dipiperidine biuret resembles that of pentobarbital but is less disturbed.

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## FLUORINE ACQUIRED BY MATURE DOG'S TEETH[1]

THE post-eruptive deposition of fluorine in the enamel[2,3,4] and dentine[3,4] of molar teeth of young rats has been reported. A similar study on a mature dog supports this finding particularly with regard to the dentine. At the beginning of this study a two-year-old mongrel dog with full dentition had three representative teeth extracted. Sodium fluoride was then given via food and drinking water for definite periods, each period terminating with the extraction of two or three comparable teeth. Food and drinking water were consumed ad libitum. The pooled teeth representing each period of exposure to fluoride were separated into dentine and enamel and analyzed for ash and fluorine.

TABLE I

EFFECT OF EXPOSURE TO FLUORIDE ON THE FLUORINE CONTENT OF THE DENTINE AND ENAMEL OF A MATURE DOG'S TEETH

| | | I | II | III | IV | V |
|---|---|---|---|---|---|---|
| Pooled teeth sample number | | | | | | |
| Age of dog at time teeth were extracted. | (days) | 730 | 796 | 900 | 1,145 | 1,289 |
| Total number of days exposed to fluoride in food and water prior to tooth extraction | (days) | 0 | 66 | 170 | 415 | 559 |
| Exposure to fluoride immediately prior to tooth extraction. | | | | | | |
| Fluoride in food and water | (ppm) | 0 | 15 | 45 | 100 | 500 |
| Total time fed | (days) | 0 | 66 | 104 | 245 | 144 |
| Composition of dentine | | | | | | |
| Ash | (per cent.) | 71.90 | 71.88 | 73.15 | 73.35 | 73.21 |
| Fluorine | (per cent.) | .018 | .022 | .039 | .059 | .072 |
| Composition of enamel | | | | | | |
| Ash | (per cent.) | 95.20 | 95.75 | 95.72 | 96.32 | 95.96 |
| Fluorine | (per cent.) | .006 | .007 | .009 | .007 | .011 |

The results for each successive sample of dentine show that the mature dentine increased in fluorine decisively. The enamel does not show a similarly consistent nor equal percentage-increase. The final sample of enamel, however, contained 0.011 per cent. fluorine as compared with 0.006 per cent. fluorine in the initial or control enamel. In this connection it is interesting to note that the enamel of carious human teeth and the enamel of non-carious human teeth have been reported to contain 0.0069 per cent. and 0.0111 per cent. fluorine, respectively.[5] A distinction possibly may be made in tooth fluoride acquired post-eruptively and fluoride which is acquired during the formative period of the tooth.[3,4] Fluoride given during gestation and lactation to mother rats, *i.e.*, during the period of tooth formation in their young, appears to diminish susceptibility to caries in the offspring.[6] There is certain limited epidemiological evidence with respect to human dental caries,[7] which seems to agree with this latter finding in rats.[6]

These results for the dog's teeth and similar results based on young rats[2,3,4] advance speculation regarding post-eruptive chemical modification, as a property of calcified dentine and enamel. Fluoride retention may prove a useful tool in studying individual variations in dentine and enamel in relation to tooth age and susceptibility to dental caries. In the results for the enamel fluoride the property of the enamel to adsorb fluoride on the oral surface[2] may receive further support, although a systemic retention via the dentine can not be discounted.[3,4]

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## FURTHER NOTES ON THE INCUBATION PERIOD OF THE PEACH MOSAIC VIRUS[1]

ADDITIONAL information regarding the seasonal spread of peach mosaic from diseased to healthy trees and the incubation period of the causal virus has been obtained during the 1941 growing season.

Seeds from "natural" peach seedlings are used in

[1] The author is indebted to Passed Assistant Dental Surgeon Francis A. Arnold, Jr., for assistance in the experimental work.

[2] M. W. Perry and W. D. Armstrong, *Jour. Nutrition*, 21: 35, 1941.

[3] F. J. McClure, *Jour. Nutrition*, 22: 391, 1941.

[4] F. A. Arnold, Jr., and F. J. McClure, *Jour. Dent. Rsh.*, 20: page 457, 1941.

[5] W. D. Armstrong and P. J. Brekhus, *Jour. Dent. Rsh.*, 17: 393, 1938.

[6] G. J. Cox, M. C. Matuschak, S. F. Dixon, M. L. Dodds and W. E. Walker, *Jour. Dent. Rsh.*, 18: 481, 1939

[7] H. T. Dean, P. Jay, F. A. Arnold, Jr., and E. Elvove, *Pub. Health Rep.*, 56: 365, 1941.

[1] Published with the approval of the director as paper number 130, Scientific Journal Series, Colorado Agricultural Experiment Station.

our experimental plots because the virus of peach mosaic is not transmitted through the seed of the peach.[2] Seeds were planted in November, 1940, at Whitewater, Mesa County, Colorado. On May 15, 1941, the seedlings were approximately from 4 to 6 inches in height. On this date Elberta peach nursery trees in this area were well leaved. Twenty feet to the west of the seedling plot, which totaled approximately 400 trees, was a row of 30 three-year-old Elberta trees affected with the severe strain of the peach mosaic virus. Fifteen of the seedling trees on August 25, 1941, showed symptoms of the severe strain of the peach mosaic virus. These symptoms were evident in the new growth. Under these conditions of natural spread the incubation period was approximately 100 days or less and the spread of the disease occurred in the spring. This natural spread of the disease has never been observed in one-year-old Elberta peach trees in commercial orchards. It has been recorded in only a very few instances in the past in two- and three-year-old Elberta trees.[3]

Approximately the same length of time for the incubation of the virus has been demonstrated when bud and graft inoculations have been made in the spring.[2] In these latter cases symptoms of mosaic were shown by inoculated trees during the same growing season. On the other hand, trees inoculated in mid-summer or later did not show symptoms of mosaic until the following spring.

These studies re-emphasize the need for the immediate removal of all diseased trees as soon as leaf symptoms are evident.

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# SCIENTIFIC APPARATUS AND LABORATORY METHODS

## A SIMPLE MECHANICAL SHAKER

A NUMBER of mechanical shaking devices are reported in the literature.[1-10] Some of these are of excellent design but involve considerable expense as well as the services of a trained mechanic in their construction. This places them beyond the means of many small projects.

Schwarz and Shapiro[9] have pointed out the advantages of the reciprocating type of shaker as compared to the rotating type, since the rapid changes in momentum of the liquid produce greater agitation. The reciprocating type, however, is subjected to considerably more strain in operation, and unless very good alignment is obtained the machine soon breaks down.

An almost ideal combination of advantages in construction, design and type of action is furnished by an ordinary sewing machine head. From it a mechanical shaker can easily be built which is compact, convenient and quite inexpensive. Following is a description of the shaker designed for use in this laboratory:

The sewing needle is detached and a thin strip of iron eight inches long by five-eighths inch wide is welded into its place. To this strip is fastened a wooden rack twelve inches long by seven inches wide. This rack is designed to hold flasks during shaking and is equipped with appropriate fittings. The wheel of the sewing machine is replaced by a pulley of desired size and the shaker is then powered by a belt drive from a 1/16 h.p. motor. The accompanying diagram (Fig. 1) illustrates its construction.

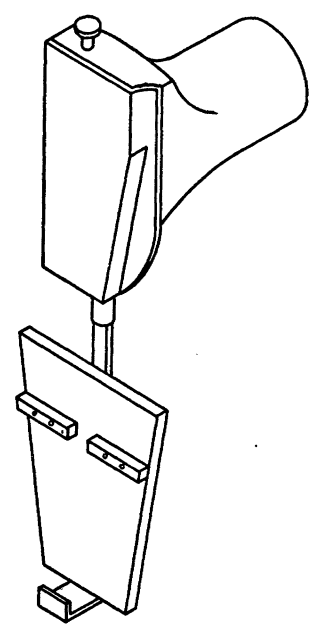

FIG. 1.

In order to reduce excessive noise and vibration at high speeds (200 strokes per minute), the shaker is made to operate against a slightly stretched screen door spring which is fastened to a stationary object (in this case the floor). A rubber eraser fastened to the shaker stand is placed so as to make a sliding contact with the flat surface of the moving flask carriage. The eraser thus acts as a guide for the carriage and effectively eliminates horizontal vibration. Care should be taken not to

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