added to make a final concentration of 25 ppm. Sixteen cucumber seeds were placed on a filter paper in a Petri dish and 5 cc of this solution was added to each dish. In addition, a distilled water solution of indoleacetic acid at 25 ppm and distilled water alone were used as controls. Each treatment was replicated five times. The cucumber seedlings were allowed to germinate at constant temperature in darkness. Four days after treatment root measurements were recorded.

It was repeatedly observed that the inhibitory effects of indoleacetic acid on cucumber roots were reduced much less by the extract from the F_1 than by the extracts from either parent. This may suggest that the parents inactivated indoleacetic acid more effectively than did their hybrid (Table 3).

The degree of heterosis in the experimental plants of *Antirrhinum majus* L. was greatly influenced by the amount of solar radiation. Heterotic ability of the F_1 to retain the indoleacetic acid has been demonstrated. The greater ability of the hybrids to retain and utilize growth substance under high light conditions permits greater expansion of plant tissue and thus gives the additional growth increment that can cumulatively result in heterosis.

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The Prevention of Dental Caries by Rock Phosphate in the Diet of the Rat

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The trend toward the fluoridation of communal water supplies offers little for caries prevention in areas where fluoridation of water is impracticable. As a means of supplying extra fluorine in a vehicle other than water, rock phosphate was chosen by us for testing because of its additional high calcium and phosphorus content.

The cariogenic diet, Diet I, which was used contained 800 g cracked yellow corn, 30 g alfalfa meal, 60 g linseed meal, 250 g sucrose, 80 g corn oil, 500 g active dry yeast, and 10 g sodium chloride.

All the caries prevention diets were the same and similar to Diet I except that they also contained Tennessee brown rock phosphate in varying amounts from 5 to 35 g. In several experiments, it was found that the addition of 15 g or less of rock phosphate had little or no caries prevention effect; but above 15 g, the caries prevention effect progressively increased until an optimum effect was reached with approximately 35 g. For this reason the results of only two diets are reported here, namely, Diet II which contained 20 g and Diet III which contained 34 g rock phosphate.

In these experiments 210 Wistar rats were used, one half of each litter being fed one of the diets. The rats were placed on these diets 20–22 days after birth and observed until they died naturally.

Of 105 rats on Diet I, caries appeared in 382 teeth or 61%, mostly lower molars; of 49 rats on Diet II (containing 20 g rock phosphate) caries appeared in 62 or 21% of the lower molars; of 56 rats on Diet III (containing 34 g rock phosphate) caries occurred in 19 or 5% of the lower molars (Table 1).

TABLE 1

DENTAL CARIES IN LITTER MATE RATS ON DIETS CONTAINING BROWN ROCK PHOSPHATE

Diets	No. of rats	Number carious lower molars	Percentage
Diet I	105	382	61
Diet II	49	62	21
Diet III	56	19	5

The upper incisors of the rats on the caries prevention diets were overgrown and curved. Growth lines were seen on many of these teeth. Calcification not only of the jaw bones, but also of the entire skeleton was better in the rats on Diets II and III than in rats on Diet I. The death rate of the rats on the caries prevention diets was normal whereas all the rats on Diet I died between the 4th and 7th months of age.

The rock phosphate used in these diets contains 5.9% calcium fluoride. The concentration of fluorine in Diet II was approximately 350 ppm and in Diet III, it was 700 ppm. Compared to 1–2 ppm of sodium fluoride recommended for use in communal water supplies, this seems like an extraordinarily excessive amount of dietary fluorine for the prevention of caries. But in the rat, it has been established in numerous experiments summarized by Hodge and Sognnaes (*1*) that at least 125–200 ppm of the more soluble sodium salt of fluorine must be present in the rat's diet before an appreciable caries resistant effect can be obtained. Miller (*2*) used 500 ppm dietary calcium fluoride in order to prevent dental caries in the rat. The fluorapatite used in our experimental caries prevention diets is far more insoluble than sodium fluoride, but we preferred to use fluorine in this form because of the extra benefit that might be derived from the additional calcium, phosphorus and other trace minerals present in brown rock phosphate.

Successful cariostasis in the posteruptive phase of dental development as recorded here already has been documented by McClure (*3*).

In experiments on humans, McClendon and Foster (*4*) each ingested daily 2.5 g of rock phosphate containing 75.5 mg of fluorine for three weeks and then reduced the daily intake for three years to 1 g rock phosphate containing 31 mg fluorine. Measuring the

total output of fluorine in the excreta, they calculated a retention of only 1.7 mg/day. More balance studies of this type are needed before safe dosage levels of rock phosphate for human consumption can be considered.

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Synergistic Actions of Carbon Dioxide with DDT in the Central Nervous System

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From clinical observations, physiologic, electroencephalographic, and pathologic studies of cats, monkeys, and dogs, it appears that the cerebellum is the chief portion of the nervous system on which DDT acts (*1, 2*). Histologic degenerative changes resulting from DDT are usually restricted to the cerebellum, especially the dentate and roof nuclei (*1*). Previous investigation of compounds which acted initially on the cerebellum revealed the definite synergistic convulsant activity of the inhalation of carbon dioxide with these compounds (*3*). Accordingly, it was decided to investigate the actions of carbon dioxide on the central nervous system in animals that had ingested DDT.

Thirty-two normal cats, weighing 1.5–3.0 kg, were placed on an ample diet and observed carefully for a week. Then 300–500 mg/kg of DDT, carefully mixed with the diet, was consumed at a single meal. Usually within 24 hr the animals were seen to have generalized, fine tremors and were markedly ataxic. When they were held by the nape of the neck, "running movements" were observed, but no grand mal convulsions were seen. These animals were prepared for acute electroencephalographic recording in the following manner. Under divinyl ether anesthesia, a tracheal cannula was introduced, the femoral veins isolated, and the skull including the area over the cerebellum exposed. Ether anesthesia was then discontinued and paralysis induced with 20 mg/kg of dihydro-β-erythroidine intravenously. Respiration was maintained artificially through a Palmer respirator designed to allow adjustment of stroke volume and rate and the introduction of any desired gas mixture. Screw electrodes were placed bilaterally, 2 over the cerebellum, 2 over the parietal cortex, and 2 over the frontal cortex. Bipolar and monopolar (reference electrode usually on nose) recordings of the electrical activity of the brain and the electrocardiogram were obtained on a Grass 8-channel electroencephalograph. Gas mix-

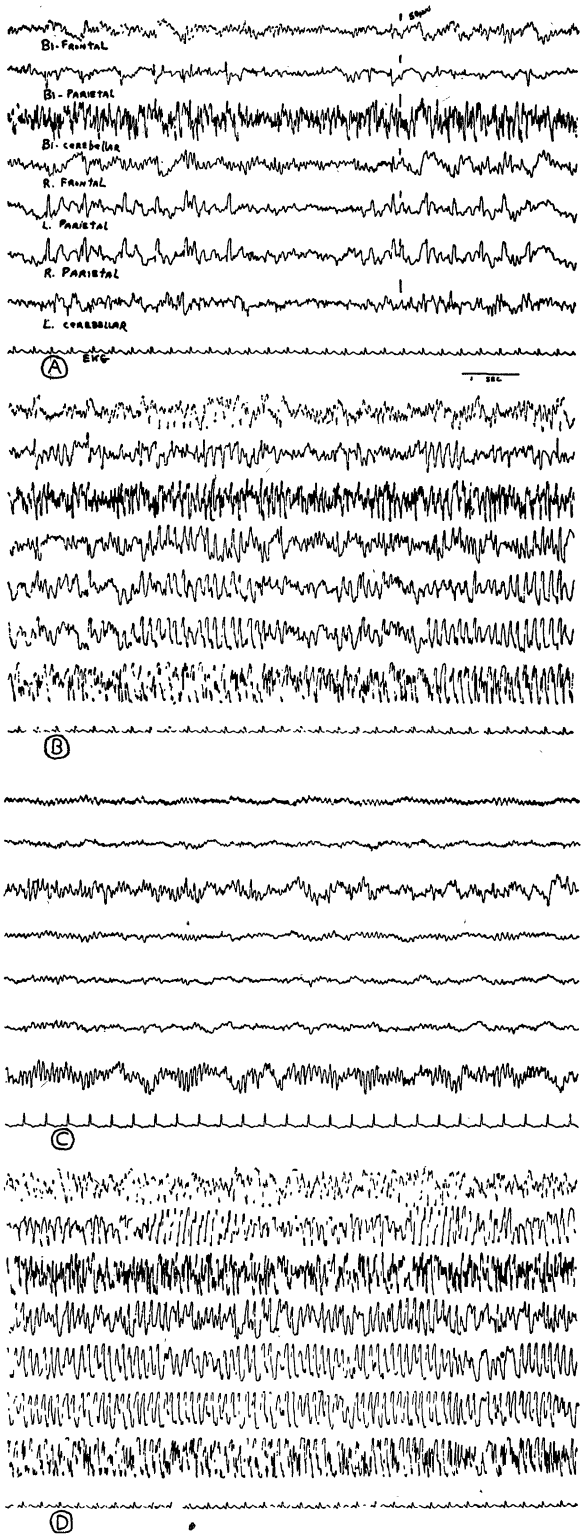

FIG. 1. A. Pre-CO_2 record of a cat that had been fed 400 mg/kg of DDT a day previously. B. Record shortly after the administration of 30% CO_2–70% O_2. C. 30% CO_2–70% O_2 administered for 3 min. D. Record shortly after the removal of the gas mixture.