around 3½ to 4 inches in diameter, and is borne singly or in small clusters on stems 4 to 6 inches long. Most of the blooms possess 20 large, recurved petals. The blossom buds are medium large, ovoid acute and of Hybrid Tea form.

The plant has bloomed only in May under Fayetteville, Ark., climatic conditions. In more northern latitudes it may be expected to bloom in June or July.

In addition to showing relative freedom from mildew and from low temperature injury, it possesses considerable vigor and at least a fair degree of tolerance to heat and drought.

During the 1938 and 1939 growing seasons, both characterized by extreme heat and drought at Fayetteville from July on through the summer, this hybrid made satisfactory growth and kept most of its leaves when many other varieties were badly defoliated. It passed through the severe 1939–40 winter with very little injury when Paul's Scarlet Climber, growing close by, lost approximately 50 per cent. of its wood and less hardy varieties were killed to the ground level. Albertine, one of the hardiest of climbers, lost all its canes this winter (lowest temperature −7° F.). Aside from its resistance to low-temperature injury when in a dormant condition, it withstood April freezes, both in 1939 and in 1940, when many varieties, including this hybrid, were full of new, tender growth and when such varieties as Black Boy, Countess of Stradbroke, Souv. Claudius Denoyel, Kitty Kinninmonth and many others were severely injured.

This new hybrid, which is to be made available through responsible nurserymen, is named Stephen Foster, after America's beloved song writer.

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THE EFFECT OF IMBALANCE IN THE "FILTRATE FRACTION" OF THE VITAMIN B COMPLEX IN DOGS[1]

THE graying of fur and damage to the adrenal cortex of rats first reported[2] from this laboratory as due to deficiency in the "filtrate fraction" of the vitamin B complex has been confirmed and extended in several other laboratories. Long-continued experiments are required for adequate observation of these deficiencies in dogs and these have now been under way in this laboratory for about two years. Even in very young animals several months are required for the development of overt symptoms of deficiency in any of the B vitamins, with the possible exception of B_1. Since these experiments appear to be the first in which dogs have been reared exclusively on crystalline vitamins and since some unexpected failures of nutrition occurred when certain vitamins were added to the deficient diet it seems desirable to offer this preliminary report.

Four lots of pure-bred cocker spaniels have been reared from weaning at four to six weeks of age on purified diet of washed casein, sucrose, crisco, salt mix, carotene and codliver oil, wheat germ oil and crystalline thiamin chloride, vitamin B_6 (pyridoxin) and riboflavin. The variables in all cases were (a) filtrate factor, that is the concentrated filtrate from fuller's earth-treated acetone extracts of yeast, (b) nicotinic acid and (c) pantothenic acid.[3] The filtrate factor preparation contained pantothenic acid, 0.6 mg per cc by rat growth comparison and traces of nicotinic acid. At first only filtrate fraction and nicotinic acid were used, but later crystalline synthetic calcium pantothenate was administered in some cases, either with or without the filtrate preparation. One litter of four dogs has been on the diet for nineteen months, a second group of six dogs for twelve months, the third litter of three dogs for eight months and the fourth litter of six dogs for six months.

There were nineteen dogs in the four experiments, but on three of these dogs, we will not report at this time. These three dogs were placed on salt-free (NaCl-free) diet, and this complicated the effect of the vitamin deficiencies in an unexpected way. The other sixteen dogs were found to react as described below.

(I) Three which were positive controls, receiving adequate amounts of all vitamins, are alive and well, although not quite as heavy as stock dogs of the same age.

(II) Two of which received no nicotinic acid, no pantothenic acid and no anti-gray preparation are alive and well, but with progressively graying fur. No black tongue sypmptoms have been seen, but inactivity, impaired digestion and sedate elderly behavior characterize these dogs. The third died of an infection after 6 months on the diet.

(III) Four received an ample amount of nicotinic acid but no pantothenic acid or "filtrate factor." Three of these are dead of progressive flaccid paralysis; one when helpless and near death was cured with filtrate fraction and is now, a year later, alive and well, her fur darkened.

(IV) Four were given ample amounts of "filtrate factor" and/or pantothenic acid but no nicotinic acid. Two of these are dead, one after showing slowly progressing paralysis over five or six months' time and one within three months. The third is now plainly

[1] We acknowledge the valuable assistance of Work Projects Administration Official Project 65-1-08-62-Unit A-24 assigned to the University of California, and of a grant from the Josiah Macy Jr. Foundation.

[2] Morgan, Cook and Davison, *Jour. Nutrition,* 15: 27, 1938; Morgan and Simms, *Jour. Nutrition,* 19: 233, 1940.

[3] We are grateful for gifts of crystalline pyridoxin and of calcium pantothenate from Merck and Company, Rahway, New Jersey.

showing the beginnings of the same condition and the fourth, which has received filtrate fraction for eighteen months, is still alive and apparently well. This dog has now been placed on pantothenic acid instead of filtrate fraction, since the latter is not entirely free from nicotinic acid.

(V) The two remaining dogs receive pantothenic and nicotinic acids but no "filtrate factor." After six months on the diet one of these dogs, the male, is still well, growing and so far showing no graying of the fur. However, the fur is dull and powdery instead of glistening black and the dog is beginning to show some failure of neuro-muscular control. The other animal, a female, has lost appetite and weight, and is exhibiting much more advanced failure of neuro-muscular control. Her condition is not as good as that of her brother which has at no time received any of the filtrate factors (Group II above).

The following conclusions appear to be justified by these results:

1. Dogs require one or more of the vitamins of the B complex in addition to thiamin, riboflavin, pyridoxin, nicotinic acid and pantothenic acid.

2. Young dogs which receive none of the filtrate fraction, that is, no nicotinic acid, pantothenic acid or so-far unidentified factors, survive, grow moderately well but exhibit gradual depigmentation of hair, lack of activity and elderly behavior.

3. The administration of nicotinic acid or pantothenic acid alone to animals receiving ample amounts of all necessary vitamins except those of the "filtrate fraction" results in their gradual loss of neuro-muscular control and sometimes sudden death.

Attention should be given to the possible danger of the administration of large amounts of certain vitamins such as nicotinic acid to persons subsisting on diets having multiple deficiencies. Fortification of foods with those vitamins such as thiamin or nicotinic acid which are available in large quantities may precipitate conditions worse than the subacute deficiency state produced by the usual diet balanced in its inadequacies. Improvement in all directions equally is essential.

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THE EXAMINATION OF TISSUES FOR CARCINOGENIC FACTORS

IN a recent publication[1] Menke has reported sarcoma production in mice following injection with fatty extracts of human breast cancer tissue. Somewhat similar experiments have been in progress in this institute since 1938 and it seems appropriate to give a résumé of our experiments at this stage as under the present conditions here it is not possible to breed Dilute Brown mice upon the scale required for a repetition and extension of the work described below.

The mammary glands of female mice of the Dilute Brown (DLB) strain are among the few tissues which can be labelled with some degree of certainty "precancerous." In the experiments described here these mammae have been tested for the presence of a carcinogenic factor. The possibility exists that such a factor might be extractable and capable of initiating or facilitating mammary carcinoma in other mice.

EXPERIMENTAL

1. Mammary tissue was removed from 7 DLB lactating does when their litters were almost weaned. At this stage the mammae are engorged and can be very easily dissected out. The tissue was finely minced with scissors and shaken with distilled ether for about twenty minutes, stored in the refrigerator over night, the ether changed and the whole process repeated twice more. The ether extracts were pooled, evaporated at low pressure and diluted with an equal volume of sterile olive oil. Thirty female mice 6–8 weeks old, of ordinary commercial stock, received intraperitoneally 0.1 cc of the olive oil solution per mouse per injection. Thirty control females of similar stock received 0.05 cc sterile olive oil. Usually a fresh batch of DLB mammae was worked up for each series of injections. After nine injections spread over four months the does were mated; of the thirty injected with the extract fourteen littered, of the twenty-nine controls nineteen littered. The animals lived in all twenty-five months, but neither local reaction nor mammary carcinoma were observed.

2. Experiment 1 was repeated with modifications; this time each series consisted of fifty-two mice; the mammary tissue for each preparation was removed from eight to fifteen DLB lactating does and the injections were made sub cutem. The does (6–8 weeks old) receiving the injections were from the same commercial source as in Experiment 1. Eighteen sets of injections were spread over five months at roughly equal intervals. After the last injection the does were allowed to breed. Of the fifty-one does receiving extract forty-two littered, of forty-seven controls receiving olive oil alone thirty-two littered.

When the experiment had been in progress twenty-two months mammary carcinoma had developed in four olive oil control mice (three at the nineteenth and one at the twenty-second month) while the series injected with tissue extract had developed similar mammary tumors in two animals (seventeenth and twenty-first month) and also a spindle-celled sarcoma in one animal (nineteenth month). The sarcoma has been grafted and is growing in the second generation.

The ratio of experimental to control animals has remained fairly constant throughout the experiment.

[1] SCIENCE, 92: 290.