Dalhousie University, worked out a method for the assay of allantoin in blood in which the Rimini-Schryver reaction for allantoin was applied to its colorimetric estimation. This method allows the estimation of allantoin in 5 ml of blood with a probable accuracy of within 10 per cent., using an ordinary colorimeter.

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SPECIAL ARTICLES

BREEDING A DISEASE-RESISTANT RED CLIMBING ROSE[1]

NOTWITHSTANDING the great popularity of "everblooming" small, bush roses, climbing roses have a greater range of usefulness in making the roadside, home and its adjoining grounds more attractive. The chief hindrance to a greater utilization of climbing roses has been a lack of disease resistance, although many climbers are far more tolerant to disease than small bush roses as a group.

Two of the most common diseases afflicting climbers over large areas in the United States are powdery mildew and low-temperature injury. (The parasitic disease, black spot, is not so destructive on most climbers as it is on small, bush varieties.) Of the two serious diseases, powdery mildew is frequently so abundant on Dorothy Perkins, Crimson Rambler, Excelsa and other varieties having small blossoms in large clusters (multiflora types), that their usefulness as decorative plants is seriously impaired. Thus, while this type of climber possesses a considerable degree of hardiness and remarkable beauty when free from powdery mildew, the necessity of frequent dusting or spraying with fungicides to control mildew imposes a task which often is not very successful.

Contrasted with the multiflora-type of climbers, those with large blossoms generally show a greater freedom from powdery mildew but are more subject to low-temperature injury. Thus among large-blossomed, red climbers, Paul's Scarlet Climber, Dr. Huey and Climbing American Beauty, three of the hardiest and best known red climbers, frequently suffer considerable injury either from low winter temperatures or from late spring frosts, unless they are partly protected by a building or by covers.

The problem of breeding a red climbing rose to combine disease resistance with good blooming qualities has resolved itself largely in attempts to find disease-resistant parents. Other qualities are not difficult to secure. To find such parents, the writer has investigated many different varieties and species of roses, including our own wild roses. In the latter group, two species are outstanding for vigor, hardiness and tolerance of heat and drought in Arkansas. They are *Rosa setigera* and *R. Eglanteria* (*R. rubiginosa*). In addition, both of these species possess marked abilities to escape from attacks of powdery mildew, although when artificially inoculated, they become subject to infection. *Rosa setigera* has also shown a fair degree of resistance to black spot in some individuals but not in others, while *R. Eglanteria* appears to be uniformly susceptible to this disease.

Among the plants under observation for disease resistance were 100-odd hybrids, very kindly sent by the pioneer rose breeder, M. H. Horvath. This group largely represents crosses between *R. setigera* and various cultivated varieties, and four of them were found to combine resistance to or escape from both powdery mildew and black spot. Although not outstanding in floral qualities, they are very hardy and possess much vigor. The most disease resistant of these is a pink-blossomed climber, which unfortunately was received without designation of parentage or name or number (writer's acc. No. 31). It is probably a hybrid of *Rosa setigera* and offered, for breeding purposes, a distinct advantage over the original wild parent. Its blossoms possess some 30 attractive petals. Its main disadvantage is that it is not homozygous for resistance to either black spot or to low-temperature injury, since selflings show much variation in these characters.

Utilizing No. 31 as the female parent, and Black Knight, an exceedingly beautiful red Hybrid Tea, "everblooming" small bush variety, as the male parent, a climber has been obtained which combines, under Arkansas conditions, mildew-escaping qualities and hardiness with attractive red blossoms. However, like most large-blossomed climbers, it is not completely immune to mildew. While it has escaped this disease under natural conditions when nearby, highly susceptible varieties were severely infected, this hybrid showed some susceptibility when it was artificially inoculated. It is not resistant to black spot, although the effects of this disease are no more severe than on such varieties as Mary Wallace, Paul's Scarlet Climber, Dr. W. Van Fleet and Dr. Huey. Its fragrant blossoms are of a brilliant red color, approaching Ridgway's Tyrian Rose or Maerz and Paul's Plate 1 D6, the red being replaced by white at the extreme base of the petals. The stamens are very numerous and showy. The average blossom is large,

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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

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[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.