exists between the resinosis disturbance and the injury caused by *P. Schweinitzii,* since the trees attacked by the latter may never show any, or very little, evidence of resinosis.

No sporophores of *P. Schweinitzii* have thus far been found in the plantings at Norwich, even though hundreds of trees have died from resinosis. The roots of trees which die from this disease may never show any traces of the reddish streaks. Resinosis has been found to be most severe where the pH of the soil is 6.0, or above, and the colloidal content 52 per cent. or more. Even though *P. Schweinitzii* has been found to be very abundant in such areas, it is also causing very severe damage where the pH of the soil is around 5.5 and the colloidal content varies from 46 to 50 per cent. or even less. The resinosis disease is of minor importance, as contrasted with the damage which is being caused by *P. Schweinitzii.*

Advanced stages of decay in the roots of living trees of white pine due to *P. Schweinitzii* were first observed in the summer of 1933. By the end of the summer of 1934, this root rot was found to be very wide-spread in plantings totalling about 1,200 acres of white and red pine in the Hemlock Lake region. Living trees whose roots were badly rotted had begun to fall over and have continued to fall in increasing numbers. At the present rate of destruction, not a single tree in this area will reach merchantable size. The losses from the damage caused by *P. Schweinitzii* along Hemlock and Canadice Lakes are the most serious which have thus far been reported in forest plantings in the United States, if not in the world. *P. Schweinitzii* was reported in 1925 as causing root rot in forest plantings of Douglas fir near Biltmore, N. C.[1]

Chemical analyses of soil extracts show that in plantings where *P. Schweinitzii* is present there is nearly 21 per cent. more calcium in the upper four inches of the soil than where the organism is not known to occur. A number of chemical analyses of the ash of the wood of infected trees show less calcium present than in the wood of normal trees. It occurred to the senior author that the activities of *P. Schweinitzii* in the soil may render the calcium less available to the trees.

Chemical analyses of a water extract of silica quartz sand from around the roots of three-year-old seedlings of eastern white pine in pot cultures, which were inoculated with *P. Schweinitzii* and supplied with a given nutrient by Wean's method,[2] showed twenty-five times more calcium where the fungus was present than in the controls. These cultures and inoculations were made by Wean while a graduate student in forest pathology at the University of Pennsylvania. He found that *P. Schweinitzii* was highly parasitic on the roots of one- and three-year-old seedlings of white pine. The hyphae readily penetrated both the epidermal and peridermal layers, especially in pot cultures with nutrient solutions at a pH of 6.0 and 7.0 and under conditions of a reduced supply of phosphorus. Reddish streaks were present in the central part of infected roots which were even less than two millimeters in diameter. These results are indicative of the possibility that *P. Schweinitzii* may be distributed in nursery stock.

In view of the possibility that *P. Schweinitzii* as found in the Hemlock Lake region might be of foreign origin, Childs, while a graduate student in forest pathology at the University of Pennsylvania, worked with cultures of this organism from various parts of the world, including many from the Hemlock Lake area. At present, it appears that *P. Schweinitzii,* which is causing root and butt rot in the forest plantings in question, is purely of local origin. He has found that within *P. Schweinitzii* there are a great many individuals which, when grown under a given set of conditions, show a wide range of cultural reactions. He has also found that a number of these individuals are definitely homothallic and fruit readily in culture; clamp connections have not been observed in any of these cultures.

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[1] G. G. Hedgcock, G. F. Gravatt and R. P. Marshall, *Phytopathology,* 15: 568–569, 1925.

[2] Robert E. Wean, SCIENCE, 82: 336, 1935.

PROLONGATION OF THE CORPUS LUTEUM IN THE PSEUDOPREGNANT RABBIT

IN the course of some experiments designed to study the effects of prolonged action of oestrin and progestin on the rabbit's uterus, it became necessary as one type of control experiment to inject oestrin for several days beginning on the eleventh day of pseudopregnancy. Under these conditions we were surprised to find that the corpora lutea persisted in a healthy state much longer than usual as judged by microscopic studies. The many possibilities of this finding have not as yet been fully explored, but by the continued injection of appropriate amounts of oestrin we have been able to prolong the corpora for as long as 25 days after a sterile mating.

Corpora prolonged by this means appear to be functional; the uterus remains refractory to pituitrin for as long as 21 days after mating, and the mammary glands do not regress as they do normally at the end of pseudopregnancy. Further, when the ovaries are removed at either the sixteenth or twenty-fifth day, but the oestrin continued at the same or increased level, lactation has occurred in every case and nesting in sev-

eral cases within three or four days of the time of castration. In no case, however, has the mammary gland been as thick as that obtained at the end of pregnancy, the thickest lactating gland obtained by this means being about one third as thick as glands obtained at parturition or a few days before.

No attempt has been made to assay the pituitaries in these rabbits to see what effect the oestrin may have had on them, but it is probable that the effect on the corpora is an indirect one, since many observers have shown that oestrin alters the gonadotropic activity of the pituitary.

These findings may explain the persistence of the corpora lutea during pregnancy in the rabbit. We have assumed, as many others working in the field of reproduction undoubtedly have also, that during pregnancy the placenta elaborates a gonadotropic hormone which, either directly or indirectly through the pituitary, causes the corpora to persist. This assumption is not based on direct evidence from the rabbit but rather by analogy because of the finding of pituitary-like substances in human pregnancy urine and placenta. In the light of these experiments it is much more likely that in the rabbit the placenta elaborates oestrin and that this rather than a placental gonadotropic hormone causes the corpora to persist.

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SOME POSSIBLE EFFECTS OF NURSING ON THE MAMMARY GLAND TUMOR INCIDENCE IN MICE[1]

FOLLOWING the publication[2] by the staff of the Jackson Memorial Laboratory (1933) on the extrachromosomal influence in the etiology of breast tumors, several experiments were designed in an attempt to determine the basis of such an effect. In this note the writer presents a preliminary report on the foster-nursing of the young cast by females of a high mammary gland tumor line by females of a low tumor stock and its possible effects on the incidence of that type of tumor.

Three litters of mice from the inbred A strain of mice, which has a mammary gland tumor incidence of 88 per cent.,[3] were fostered by females of the X stock (Strong's CBA race). The breast tumor incidence in the latter strain is approximately 10 per cent. The young were removed from their A stock mothers as soon as noticed—none were more than twenty-four hours old.

In the three litters of fostered A stock mice were nine females. They were used as breeders as well as forty of their progeny. Hence, the mice were subjected to all the irritation factors considered essential for the development of breast tumors in individuals having such an inherited constitution.

Of the nine A stock females fostered by CBA stock females, three developed mammary gland tumors, four had primary lung tumors and two died non-tumorous. Among 40 of their progeny which were not fostered, there were observed 12 with breast tumors only, two with breast and pulmonary cancers, 13 with primary lung tumors and 13 died non-tumorous. The proportion for each group was 30.6 per cent., 4.1 per cent., 34.7 per cent. and 30.6 per cent., respectively. The average age at death or observation of the various classes was: breast cancer, 12 months; lung cancer, 17 months; and non-cancer, 15 months.

Ten of the 13 progeny of fostered females which had breast cancer developed similar growths as compared with four of the 24 progeny from fostered females which had lung tumors. The respective proportions were 77 per cent. and 17 per cent.

The three fostered litters were descended from one subline of the A stock. All had from 16 to 18 successive generations of mammary gland tumors in their direct ancestry. Prior to the birth of the litters 78 mice had been observed, of which 92.3 per cent. had developed breast tumors. In later generations 219 mice, exclusive of the fostered females and their progeny, have died from various causes. The proportion developing mammary carcinoma was 88.1 per cent.

While the number of animals used in the preliminary work has been small, a larger group of females fostered by C_{57} Black stock mice are giving observations which are indicative of similar results. Should further study demonstrate that the incidence of mammary gland tumors in mice may be affected by nursing, an explanation may be offered for the so-called extrachromosomal influence as a cause in the development of this type of neoplasm.

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BONE ASH IN PREVENTION AND HEALING OF EXPERIMENTAL RAT RICKETS

THE very extensive use of rickets curative technique in judging the effects of vitamin D in both rats and human subjects, where the conclusions are based on subjective estimates of the degree of healing, makes it desirable to supplement the information, if possible, with more objective measurements.

The ash content of the normal rat femur (stock diet)

[1] Preliminary report.
[2] Staff, Jackson Memorial Laboratory, SCIENCE, 78: 465, 1933.
[3] J. J. Bittner, *Amer. Jour. Cancer*, 25: 791, 1935.