Stimulation of Oleoresin Flow in Pines by a Fungus

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A species of *Fusarium* has recently been found which causes very pitchy cankers on young branches and stems of Virginia pine (*Pinus virginiana* Mill.) and, to a much lesser extent, on those of shortleaf and pitch pines (*P. echinata* Mill. and *P. rigida* Mill.) in the Carolinas (*1*). A few attacks have been noted on the larger trunks of some Virginia pines, and while these trunk attacks have been less severe than those on younger shoots, copious and long-continued gum flow occurred. It seemed conceivable that, since this *Fusarium* so stimulated the flow of oleoresin, it might have application in the naval stores industry, provided the trees are not killed or seriously damaged by the inoculation, provided the widespread use of this organism results in no other unforeseen dangers, and provided the method has commercial advantages. Some preliminary tests have therefore been made of the effect on gum flow of the application to wounds of spore suspensions and filtrates of solutions upon which the fungus grew.

In June 1945, the *Fusarium* was grown on Tochinai liquid medium for a few weeks. The medium was then run through filter paper, which removed the larger mycelial masses but not the spores. One lot of this spore suspension was boiled and one was not. Twelve Virginia pines were then gouged on two sides, in the manner of turpentining streaks, one streak on each tree remaining untreated. The unboiled suspension was added to one streak on each of 8 trees, and the boiled to one streak on each of 4 other trees. During the next year and a half, a continuous pitch flow exuded from the streaks receiving unboiled suspensions, and very little flow, of short duration, exuded from the wounds receiving the boiled suspensions and from those receiving no application.

The 1945 liquid cultures were kept until 1946. On August 6 the cultures were run through filter paper, half of this filtrate then being run through a Jenkins porcelain filter. The following day these solutions were applied to punch holes made through the bark and just to the wood surface of the trunks of four Virginia pines, 7.4–8.2 inches in diameter, breast high; four shortleaf pines, 6.7–8.4 inches; and two longleaf pines, 6.2–6.4 inches, growing on the Bent Creek Experimental Forest near Asheville. Five holes were punched spirally around each tree, the lowest at 1 foot above ground, and the highest at 6 feet. The holes were made with a steel punch, $\frac{7}{8}$ inch in diameter. Small metal aprons were placed under the holes and glass vials under the aprons, to catch the gum, after a method devised by Ostrom and True (*2*). Culture solutions containing active spores were brushed into two of the holes on each tree, culture solutions sterilized by passage through porcelain filters were brushed into two other holes, and the remaining hole on each tree was untreated. The order of treatment was randomized on each tree.

[1]E. R. Roth, Division of Forest Pathology, assisted in the field work, facilities for which were made available through the cooperation of the Southeastern Forest Experiment Station, Asheville.

Fig. 1 shows gum yields for the different species and treatments between August 6 and October 19. All untreated holes and those treated with porcelain-filtered culture solution showed a small initial gum yield during the first few days, after which the flow ceased. The holes treated with solutions containing viable spores have shown marked stimulation of

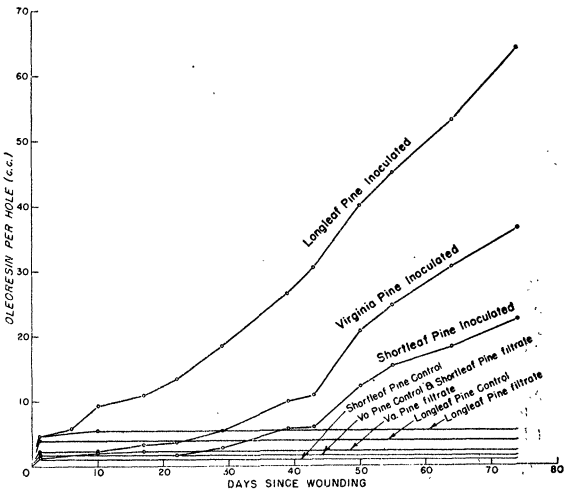

FIG. 1. Mean cumulative volumes of oleoresin produced from untreated holes, from holes receiving sterile culture filtrate, and from holes receiving application of *Fusarium* spores.

gum flow, particularly in longleaf pine. Average gum production for the two inoculated holes on one of the longleaf pines was 120 cc. per hole over the 74-day period. The untreated holes on this tree yielded 4 cc. each.

The advantages of any such method of gum stimulation, giving high yields and providing a continuous gum flow without need of repeated chipping, are obvious. Gum stimulation by the pitch canker *Fusarium* will be investigated further to determine the ultimate effect of inoculation on the trees, the effect on gum yield over a period of years, and the many other factors connected with the possible use of this fungus in turpentining operations.

References

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Electrometric Studies in Women With Malignancy of Cervix Uteri

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A study is being made of the relatively steady state voltage gradient between the symphysis pubis and the cervix uteri in women with malignant and nonmalignant disease of the genital tract. A microvoltmeter, a recording galvanometer,

and Ag-AgCl electrodes were used in the determinations. One electrode was strapped on the lower abdomen above the symphysis pubis; the other, placed on or alongside the cervix. Using a chart speed of 1 inch in 2 minutes, records were taken for periods of 10–15 minutes. The results for the malignancies are shown in Table 1; for the nonmalignancies, in Table 2.

TABLE 1

MALIGNANCY

Case	Age	Diagnosis	Mv	
			Initial P.D.	Mean P.D.
SR	54	Metastatic vagina T	−6	−12
MK	94	Stage IV	−21	−27
SR	(Repeat)		−9	−9
RW	65	Stage IV	−27	−28
CB	63	Stage IV	−10	−11
MM	54	Stage II	−36	−33
MP	45	Stage IV	−30	−22
ET	63	Stage IV T	−36	−37
TD	53	Metastatic bladder Stage IV T	−45	−45
MM	54	Stage II T	−27	−27
CB	63	Stage IV	−10	−13
LJ	51	Fibroids–ovarian cyst Stage II	−3	−6
MD	63	Stage I	−21	−25
AS	54	Carcinoma of fundus	−3	−7

T = Treated

The cases were selected from patients on the gynecological service in Bellevue Hospital and number 30. It will be noted that all the cases of malignancy showed a marked negativity of the region of the cervix with respect to the symphysis. In these patients the diagnosis was confirmed by pathological examination.

TABLE 2

NONMALIGNANCY

Case	Age	Diagnosis	Mv	
			Initial P.D.	Mean P.D.
TM		Fibroids	+9	−3
SR	44	Fibroids	+33	+28
LB	32	Pap serous cyst Adenoma	+33	+27
AD	43	Bleeding fibroids	−24	−28
WD	22	I.D. abscess P.I.D.	+6	−12
TD	22	Cystic ovary	+16	+16
FL	22	Menorrhagia	+6	−3
EJ	27	Fibroids P.I.D.	+3	−3
BM	25	Salpingitis Menorrhagia	+30	+26
MJ	34	Salpingitis Fibroids	−6	−14
MB	57	Bleeding from estrogen withdrawal	+30	+30
MR	27	Pregnancy, 3 months	+6	−9
TW	28	Pregnancy with bleeding	+21	+17
ER	46	Amenorrhea	+30	+28
SE	35	Fibroids	+39	+35
MF	22	Condylomata	−21	−25
HL	28	Pregnancy, 5½ months Mild P.I.D. ovarian cyst	+24	+20

By contrast, the patients with nonmalignancy showed, under the same conditions, an almost uniform positivity of considerable magnitude in the region of the cervix. Three exceptions are to be noted, explanations for which require further study.

Treatment by X-ray therapy or by radium apparently does not affect the measurements.

The method employed in this study is obviously an adjunct to other diagnostic procedures, and in no sense should it be construed as a substitute for them. The study is being continued, and a full report will be made at a later date.

This preliminary account is offered in the hope that it will stimulate studies by others.

The Effect of Combining Sodium Benzoate With Oral Penicillins[1]

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Diodrast (*8*), para-aminohippuric acid (*1*, *6*), benzoic acid (*3*), and sodium benzoate (*2*) have been reported as effective in elevating and prolonging penicillin serum levels, possibly by competition for renal tubular excretion. Bronfenbrenner and Favour (*3*) obtained at least a 2-fold increase by combining benzoic acid orally with intramuscular injections of sodium penicillin. Bohls and co-workers (*2*), using a total dose of 8.4 grams of sodium benzoate orally and a mixture of aluminum potassium sulfate and penicillin intramuscularly, reported assayable serum levels 28 hours following a single 50,000-unit injection. These same authors made determinations on an oral tablet containing alum-precipitated penicillin and sodium benzoate. The published data show assayable levels in 6 out of 10 individuals 24 hours after a single 100,000-unit dose. Both groups of investigators used infected individuals as subjects.

During the course of studies on oral penicillin the authors examined several preparations in combination with sodium benzoate. The present communication deals primarily with the effects observed. The subjects were 10 healthy adults who, with one exception to be mentioned later, participated in the entire study. Neither the diet nor the fluid intake was restricted; but food and fluids were avoided for a minimum of 1½ hours before administration of penicillin. The compounds were tested at one-week intervals. In all instances the test dose was 100,000 units of penicillin either alone or together with 1.2 gram of sodium benzoate. Blood was collected ½, 1, 1½, 3, and 6 hours later for serum level determinations, which were carried out by the method of Randall, *et al.* (*9*) and controlled for antisubtilis factor as described by Chandler and co-workers (*4*).

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