Of course expression is physiological primarily, but more or less separate from its emotional side, there are a number of purely physical conditions either permanent or transitory which influence to a large degree our judgment of character. The appearance of good or ill health and the changes which may take place in a face due to the adaptations of the body to environment. Under the last come such changes as might take place in the nostrils with variation in altitude, in the development of the jaw muscles due to change of food, and many others.

Wm. A. Hilton

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Occurrence of Euthrips pyri Daniel in New York State

For several years pear growers in various localities in this state have observed a peculiar blighting of blossoms, which is usually attended by a considerable loss in the fruit yields. In some orchards where this condition has prevailed the crops for the past three years have been almost complete failures. This spring we received specimens of injured blossom clusters from Germantown and other localities along the Hudson River, and we have found that an insect is responsible for this damage. It is known as the pear thrips (*Euthrips pyri* Daniel), and for the determination of the species we are indebted to Dr. W. E. Hinds, of the Alabama Polytechnic Institute. The insect has attracted considerable attention in recent years in California because of its destructiveness to various deciduous fruits, but its occurrence in eastern states was not suspected. The adult is a small, brown, winged insect, about one twentieth of an inch long, which makes its appearance when the buds are opening, attacking the tenderest of the flower parts. Pears, especially, seem to be very susceptible to the attacks of the thrips, and many blossoms are killed before the clusters open. This pest has proved a difficult one to control by spraying, but tests which we have conducted indicate that the thrips may be efficiently combated by slight changes in the scheme of spraying which we are encouraging growers to adopt for the control of the pear psylla.

P. J. Parrott

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Blue Stain on Lumber

Each year a great deal of money is lost by lumber companies through the staining of the freshly cut sap yellow pine and red gum stacked in the mill yards. One of the commonest of these stains is the so-called "blue-stain," which is caused by a number of fungi, many of them belonging to the Pyrenomycetes, especially *Ceratostomella* and *Graphium*. This stain is usually blue or black, due, very likely, to the presence of the brown-colored mycelium which grows in the cells of the sap wood only, and does not injure the strength of the wood. The hyphæ of the fungi live on the food stuff within the wood cells and do not destroy the walls of the cells. It is the stained appearance of the lumber which seriously decreases its money value.

The lumber companies try to prevent this stain by various methods, a common one being to dip the freshly sawed lumber into a solution of either sodium bicarbonate or sodium carbonate. This soda dipping process is still uncertain in results; at one time preventing the blue-stain from appearing on the wood, at another having no beneficial effect.

The varying and often unsatisfactory results obtained in the mill yards where soda dipping has been tried, led to certain investigations being taken up in the laboratory. The problem was to find why the soda solution sometimes prevented the growth of the wood-infecting fungus and its spores and sometimes did not. Since the factors determining the growth of *Ceratostomella* and of *Graphium* are as yet imperfectly understood, it was thought that a better knowledge of the relation of the fungus to its substratum might lead to a more satisfactory method of destroying it.

As it is well known that many fungi grow best on a slightly acid substratum, it was thought that the growth of the blue-stain

fungi might be influenced if not determined by the acidity of the boards.

In order to determine the relation of species of *Ceratostomella* to various quantities of acids and alkalies in the medium upon which they grow, a number of experiments were made with definite additions of acids and alkalies to a medium of known character.

Laboratory Experiments.—A nutrient medium of .5 per cent. Liebig's extract, 1 per cent. malt extract and 2 per cent. agar agar neutralized to phenolphthalein with NaOH was prepared, to which .5, 1, 1.5 and 2 per cent. sodium carbonate c.p. (Na_2CO_3) and .5, 1, 1.5 and 2 per cent. citric acid ($C_6H_8O_7 + H_2O$) were respectively added. To these media and to the neutralized medium the mycelium of actively growing *Ceratostomella echinella* E. & E. was transferred. There was excellent growth on the acid and neutral media, but none on that containing excess sodium carbonate. The spores of *C. echinella* germinated on the media containing .5 per cent. Na_2CO_3, but 1 per cent. Na_2CO_3 inhibited growth.

After this fresh sap boards of yellow pine (*Pinus palustris*) and of red gum (*Liquidambar styraciflua*) were dipped in various solutions of sodium carbonate and of sodium bicarbonate. The boards were inoculated with spores of *Ceratostomella echinella* and then stacked in compartments whose temperature averaged about 77° F. and whose atmosphere was so moist water collected in drops on the sides of the compartments (optimum conditions for blue stain). The result of the experiment is tabulated below. Fungus infection is indicated by +, sterility by 0. The number of boards dipped in a solution varied. There were always two at least.

SAP YELLOW PINE

Inoculated with *Ceratostomella* spores

Dipped in boiling H_2O +	
1% Na_2CO_3 +	1% $HNaCO_3$ +
3% Na_2CO_3 +	3% $HNaCO_3$ +
5% Na_2CO_3 +	5% $HNaCO_3$ +
7% Na_2CO_3 0	7% $HNaCO_3$ +
8% Na_2CO_3 0	8% $HNaCO_3$ 0
10% Na_2CO_3 + slightly.	10% $HNaCO_3$ + slightly.
Dipped in cold solutions of:	
6% Na_2CO_3 +	6% $HNaCO_3$ +
8% Na_2CO_3 +	8% $HNaCO_3$ +
10% Na_2CO_3 +	10% $HNaCO_3$ +
H_2O +	

SAP RED GUM

Inoculated with *Ceratostomella* spores

Dipped in boiling H_2O +	
1% Na_2CO_3 +	1% $HNaCO_3$ +
3% Na_2CO_3 +	3% $HNaCO_3$ +
5% Na_2CO_3 +	5% $HNaCO_3$ +
7% Na_2CO_3 + slightly.	7% $HNaCO_3$ +
	8% $HNaCO_3$ + slightly
	10% $HNaCO_3$ + slightly.
Dipped in cold solutions of:	
3% Na_2CO_3 +	3% $HNaCO_3$ +
5% Na_2CO_3 +	5% $HNaCO_3$ +
	7% $HNaCO_3$ +
H_2O +	

SAP RED GUM

Inoculated with *Ceratostomella* spores

Dipped in H_2O +		
5% H_2SO_4 +	7% H_2SO_4 +	All boards equally infected.

The cold soda solutions were found not to be as effective as the hot solutions. This may have been because the boiling solutions by removing air bubbles came more in contact with the wood fibers, and because they penetrate the wood. According to the laboratory test of the board-dipping process, 7 and 8 per cent. solutions of sodium carbonate and 8 and 10 per cent. of sodium bicarbonate gave the best results. Spores germinated on these boards, but the mycelium did not grow so that it could be seen by the naked eye.

To summarize the results of the laboratory experiments:

Ceratostomella echinella spores germinated on a nutrient agar medium which had been neutralized to phenolphthalein with sodium hydroxide when .5 per cent. sodium carbonate had been added to the medium.

One per cent. sodium carbonate added to the neutralized agar medium did prevent the germination of the spores.

Red gum boards dipped in a 7 per cent.

sulphuric acid solution stained as readily as the controls dipped in water.

Red gum and yellow pine sap boards dipped in a hot 7 and 8 per cent. solution of sodium carbonate and a hot 8 and 10 per cent. solution of sodium bicarbonate did not stain.

After these laboratory experiments, the experiments with the boards was repeated in the field. That with the yellow pine in a lumber yard in Louisiana from which the yellow pine used in the laboratory had been received. The red gum experiments were made in a hardwood mill in Mississippi from which the red gum boards experimented with came. In the field experiments the sodium carbonate used was the commercial soda ash, and the sodium bicarbonate the Thistle Brand Soda.

The tests were as follows:

In a Louisiana lumber yard where the pine boards were staining just where the boards crossed in the open stack, the remainder of the boards clean. Dry weather.

Green yellow pine—

5.3% sodium carbonate 2,184 ft. B.M. dipped.
4% sodium bicarbonate 3,136 ft. B.M. dipped.

The treated lumber was stacked wet one board on top of the other, and held for observation for seventeen days. The boards remained unstained.

In a Mississippi lumber yard where the stacked boards were staining. Rainy weather.

Green red gum—

8% sodium carbonate 3,012 ft. B.M. dipped.
11% sodium bicarbonate 3,000 ft. B.M. dipped.

The treated lumber was stacked wet one board on top of the other, and held for observation fourteen days. Some of the sodium bicarbonate boards were stained in spots. A very few of the boards dipped in sodium carbonate were stained on the ends. It was found that the percentage of alkalinity of the solution in the dipping vat was the same or was a little greater at the end of the "day's run" than at the beginning.

Briefly stated the results of the field experiments were as follows: An 8 per cent. solution of Na_2CO_3 was as effective as 11 per cent. $HNaCO_3$. These soda solutions prevented the blue stain on red gum when the weather was rainy. In dry weather 5 per cent. Na_2CO_3 and 4 per cent. $HNaCO_3$ kept yellow pine boards clean.

In these experiments, laboratory and field, the blue staining fungus showed itself sensitive to alkalies in the medium on which it grew. The amount of alkalies necessary to inhibit the growth of the fungus varied with the substratum. An increase in the acidity of the medium did not prevent fungus growth. Freshly cut red gum and yellow pine sap boards required 8 per cent. Na_2CO_3 or 10 per cent. $HNaCO_3$ to prevent them from being stained when the blue-stain fungi were growing vigorously.

Considering that the blue-stain fungus thrives on a substratum containing a large amount of acid and is sensitive to alkali in the substratum, the acidity of the surface of the boards just after being cut and the vigor in the first growth of the fungus seem correlated. It is probable that a large amount of acid is generated on the surfaces of the sap boards when such strongly alkaline solutions must be used to prevent the blue stain.

This acidity of the boards, greater than has probably been realized, may be the answer to the problem as to why a soda solution of a given strength is not always successful in preventing the blue stain. A weak alkaline solution may be successful in keeping the boards clean when the atmospheric conditions are not favorable to the growth of the fungus; when these conditions favor fungus growth, the soda solution has not sufficiently neutralized the board acids to stop the germination of the spores and their mycelial growth.

A greater resistance to the alkali in the medium was shown by the spores of *Ceratostomella* than by the mycelium. If this is the case with the wood-staining fungi, it is advisable when determining the value of wood-impregnating materials, to test them with the spores of the wood-destroying fungi, not alone with the mycelium as has generally been done hitherto.

CAROLINE RUMBOLD
MISSOURI BOTANICAL GARDEN,
ST. LOUIS, MO.