THE EUROPEAN RED MITE

DURING the past two or three years, the European red mite has gradually been worming its way into Massachusetts until now it is here in sufficient numbers to become a major pest this summer. Although orchardists have seen examples of its treacherous work during the past season or two, they have just begun to realize the seriousness of this invasion and are taking steps to combat this foe which threatens to become the most insidious of all those pests with which fruit-growers have to contend.

At present in its dormant state, the mite will hatch in two or three weeks, and enter immediately in an attack upon the apple trees, discoloring the foliage, hindering the development of the fruit and in many cases impairing the setting of buds for the 1929 fruit crop. It does its work without being much in evidence, the first sign of its presence being the bronzing of the leaves. The tree, under its attack, begins to wither, the apples develop slowly, fail to reach their natural size and take on no colors; and are consequently sold in the market at unprofitable prices.

According to reports, there is probably no orchard in the state that is not infested with the mite; and as very little is known about it, it is difficult to determine what measures should be employed to control it, although it has been found by recent experiments that a certain oil mixture applied to the eggs will prevent about 95 per cent. of them from hatching. It is evident, however, that more must be known about the mite and its different stages to combat it successfully so that danger from it may be anticipated and prevented.

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"THE ABILITIES OF MAN"

MAY I add a few lines to the able, original and instructive review of my book, "The Abilities of Man," by Professor Edwin B. Wilson (SCIENCE, March 2, 1928). He points out truly enough that the solution of the "general factor" in ability is obtained by setting—

$$g_x = r_{ag} \cdot m_{ax'}. \quad (1)$$

which is only a regression equation and, as such, leaves scope for different true values of g_x; a scope, in fact, whose extent is measured by the usual $(1-r^2_{ag})^{\frac{1}{2}}$. Thus viewed, g_x can hardly be said to be "measured" in anything like the degree that a physicist would demand.

But all this is just my point. I am protesting against the common so-called measurements of "general intelligence" which, when cleared of misconceptions, reduce in fact to equation (1) with an r_{ag} only about .80; often, far less. My plea is that r_{ag} ought to be raised to nearly unity; indeed, for most purposes, it ought to be not less than .99. Whereupon, (1) approximates to an *ordinary* equation, and does give a measurement in the same general sense at any rate that readings from a thermometer measure temperature.

As regards Professor Wilson's suggestions arising from the transformation of correlations, I hope to say something about this later on. At present, his development of the topic seems to me full of interest and of future, but I still find some difficulties in it. In particular, I am troubled about his making all the correlations between the transformed variables equal to zero, and would like to know how far he regards this as essential to his standpoint.

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SCIENTIFIC APPARATUS AND LABORATORY METHODS

A McLEOD GAUGE OF WIDE RANGE

ONE disadvantage of the ordinary form of the McLeod gauge is that the range of pressures it is capable of indicating is too small for many purposes. From Boyle's law the pressure measured by the gauge is given by

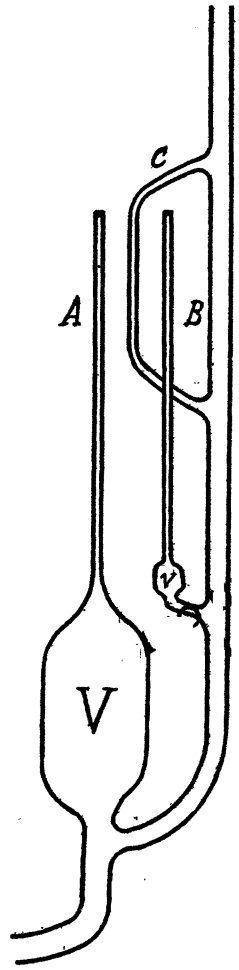
$$P = h^2a/V \quad (1)$$

where V is the volume of the air in the bulb forced by mercury into the capillary of area a to occupy a space of h cms against a pressure of h cms of mercury. It is evident from the formula that h is the only factor that is varying with the pressure of the gas in the apparatus. This factor, the length of the capillary, can not be made much larger than 20 cms without making the gauge very cumbersome. The smallest reliable reading of the height of the mercury column is about 1 mm. A capillary 20 cms long is capable of indicating pressures up to 4×10^4 times this reading. In an instrument capable of indicating a vacuum of 10^{-6} mms the highest measurable pressure would be 4×10^{-2} mms, which is too small for many purposes.

Attempts have been made to overcome this defect by varying the second factor of the right-hand side of equation (1), the area of the capillary sealed to the reservoir V.[1] This is done by sealing on to the reservoir several tubes of different sizes one on top of the other instead of a single capillary. In this manner the range could be extended to any desired value. A gauge like this is, however, difficult to calibrate be-

[1] See: L. Dunoyer: "Vacuum Practice." (Translated by J. H. Smith.)

cause of the distortions of the capillaries at the junctions. Moreover, elaborate corrections for the difference in the surface tension of mercury in the various tubes must be made before the instrument can be used.



It is much more convenient to extend the range of the gauge by varying the third factor of the right-hand side of equation (1), $-V$, the volume of the reservoir. This can be done by having another vessel and capillary sealed parallel to the main one in the manner shown in the figure. The usefulness of this form of gauge could be greatly increased if a few points be taken into consideration in the design of the apparatus.

In experiments requiring frequent admission of the outside air it is impractical to have the capillary tube smaller than 0.5 mm², as the mercury is liable to stick to the glass unless the gauge is baked out after every run. It is also inconvenient to have the reservoir much larger than 300 cc. With a capillary 20 cms long the range of the gauge would be from 1.66×10^{-6} mms down to 6.6×10^{-2} mms. Now if the volume v of the smaller reservoir be made .01 that of V and a similar capillary tube be sealed on to it the highest and lowest readings on this additional gauge would be 1.66×10^{-4} and 6.6 mms respectively. The addition of a reservoir of three cc extends the range of the gauge down to pressures which can easily be measured with an ordinary mercury manometer.

If the three capillaries A, B and C are of the same diameter no corrections for surface tension need be applied. Moreover, if the capillaries A and B end at the same level and the volume v be .01 that of V the same calibration chart could be used for the combined gauge, the difference for each being only in the decimal point. The volume of the smaller reservoir could be adjusted to the proper capacity by varying the length of the connecting tube. Even if its size is not quite the proper fraction of V the overlapping of the ranges of the separate gauges enables one to determine the proper correction factor by means of the larger gauge.

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A FIELD PHOTOMICROGRAPHIC APPARATUS

IN the course of investigation of the Sockeye Salmon at Cultus Lake, British Columbia, there was arranged a unique and simple means of photographing small organisms, for example, parasitic copepoda adhering to the host yearling Sockeye. Inasmuch as the apparatus may be readily carried and used in the field and may solve some of the difficulties encountered in recording observations it is herewith described.

The camera used in all cases was an Eastman Graflex, with 4.7 anastigmatic lens. The largest image possible with this lens was much too small to bring out the distinguishing features. To the face of the camera lens was applied an ordinary watchmaker's eyeglass, held in place by a strip of black paper fitted tightly around the front of the camera and attached at the sides with gummed labels. The aperture in the black paper through which the eyeglass projected was made slightly smaller than the circumference of the outer edge of the tube of the eyeglass, so that the flared tube would completely fill the opening. By this means the lens could be brought to within three inches of the object. Excellent photographs were obtained at comparatively short exposure, giving a magnification of approximately five times. In the example above mentioned the parasitic copepods were clearly displayed attached to the gills of the host yearling Sockeye.

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BIOLOGICAL BOARD OF CANADA