to radiation, or to certain organic compounds. In all probability there is more than one mechanism involved when the inhibition is produced by these several means, even though the end result is the same, that is, cell division is inhibited and, where phosphorus analyses have been made, no changes in phosphorus metabolism have been noted. Such reasoning, however, does not preclude the possibility that *ultimately* a single sensitive locus might be affected in order to form filamentous cells.

It is clear from the data available here and in the literature (*1*) that interference with the synthesis of DNA or of RNA is not the causative mechanism responsible for filament formation. It is pertinent to make this point clear because the results of earlier investigators leave the impression that nucleic acid inhibition is involved in cell division inhibition. This seems true only when growth and division are inhibited and does not hold under conditions where only division inhibition occurs.

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Humidity Responsive Organics

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The electric resistance of strips cut from thin sheets of gelatin, agar, pectin, polyvinyl alcohol, and so forth, depends on the relative humidity of the surrounding atmosphere in the way shown in Fig. 1.

Strips used in obtaining data were made by cutting rectangles 2 by 0.5 cm from sheets 0.075 mm thick. Each end of a rectangle was slid between adjacent turns of a spiral of thin tinned copper wire that served as an electrode. To improve electric contact and hold the wires mechanically to the strip at each end, the wire-to-strip junction was painted on both sides with conducting paint (*1*). The sensitive region of the assembly was then 1 by 0.5 cm on each of its two sides. The charge flowed in the long direction.

Sheets were made by mixing a quantity of solid material with water, heating it in a double boiler until the liquid was clear, pouring it on a level paraffin-coated glass plate, and allowing it to dry at room temperature. All resistances were measured at 27°C by charging a condenser through the prepared strip, using a potential difference of 255 v, and measuring the time required to charge the condenser to 180 v (*2*). The circuit was calibrated with Victoreen resistors (*3*) and frequently tested to prove that leakage resistance across the supports was negligible. All materials tested have negative temperature coefficients of resistance. The atmospheres at various values of relative humidity were obtained by using saturated solutions of inorganic salts (*4*).

The graph of a unit made from a half-and-half mixture (by dry weight) of different materials is about halfway between those of the two components, as is shown in Fig. 1 for gelatin and pectin. Figure 1 also shows that a relatively small quantity of glycerol added to gelatin tends to move its graph to the left.

If a unit that has reached equilibrium in a chamber having a certain constant humidity is suddenly changed to one having a different humidity, a new state of equilibrium will be attained in about the same time that would be required for a hair hygrometer.

In view of the chemical complexity of most of the materials and the difficulty of making units having the same dimensions, reproducibility from unit to unit is not great.

Units made from various materials have been used successfully for the control of humidity of chambers

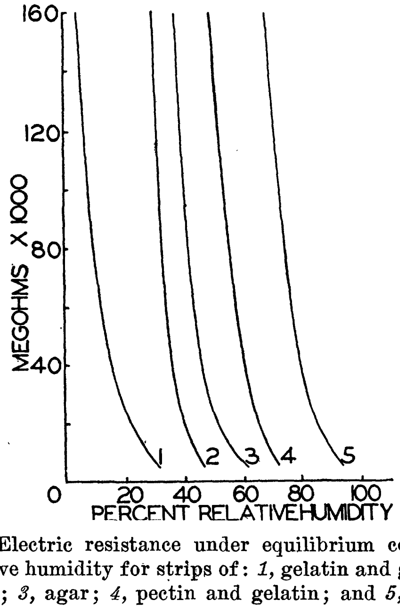

Fig. 1. Electric resistance under equilibrium conditions *vs.* relative humidity for strips of: *1*, gelatin and glycerol; *2*, pectin; *3*, agar; *4*, pectin and gelatin; and *5*, gelatin.

in connection with a suitable electronic circuit. Delay in coming to equilibrium is not a disadvantage for control purposes because the control circuit tends immediately to correct humidity, leaving the unit always in a region of substantially constant humidity, and also because materials may be selected from Fig. 1 so that operation occurs where the curve is so steep that the unit responds with almost triggerlike action.

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Estimation of Basicity with a Novel Thermochromic Indicator

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In the course of extending the analytic utility of iron-III compounds many striking cases of solvochromism (*1*) and thermochromism have been discovered (*2*). These phenomena have been observed particularly with the iron-III chelates of hydroxamic acids, amidoximes, and a variety of orthosubstituted phenols. For example, solutions of ferric chloride, propyl gallate, and *m*-chloroaniline may be blue, green, or yellow at room temperature, depending on the solvent.

Water, hydrocarbons and their halogen derivatives, alcohols, mercaptans, carboxylic acids, and diaryl ethers yield blue solutions; some arylalkyl ethers, acetals, and orthoesters give green solutions; aliphatic and heterocyclic ethers, esters, aldehydes, ketones, nitriles, and nitro compounds yield yellow solutions (*3*). These solutions change color reversibly with temperature in the order blue ⇄ green ⇄ yellow. Substitution of progressively weaker or stronger bases for *m*-chloroaniline in a given solvent produces the same chromic order as increasing or decreasing the temperature respectively. These findings may be summarized by the equation

$$\begin{matrix}\text{Propyl}\\ \text{gallate}\end{matrix} + \begin{matrix}\text{ferric}\\ \text{chloride}\\ \text{(yellow)}\end{matrix} + \text{base} \underset{\text{increasing temperature}}{\overset{\substack{\text{increasing strength of base}\\ \text{increasing ``basicity'' of solvent}}}{\rightleftarrows}} \begin{matrix}\text{chelate}\\ \text{(blue)}\end{matrix} + (\text{H base})^+$$

For the purpose of indicating the function of the base, the products are shown as separate entities. In reality they are probably linked as an ion pair or a hydrogen bonded complex in the low dielectric mediums in which this system was studied.

Table 1. Basicity constants of aromatic amines from thermochromic measurements.

Aromatic amine	Critical thermochromic temp. (°C)	Calculated pK_b	Literature pK_b*	ΔpK_b
Diphenylamine	−12	13.5	13.1	0.4
2,5-Dichloraniline	5	12.9		
o-Bromoaniline	26	12.2		
o-Chloroaniline	34	12.0	12.0	.0
m-Bromoaniline	79	10.5		
m-Chloroaniline	81	10.4	10.4	.0
Dimethylaniline	98	9.8	9.6	.2
p-Chloroaniline	102	9.7	9.8	.1
p-Bromoaniline	102	9.7	10.0	.3
p-Toluidine	105	9.6	9.7	.1
m-Toluidine	105	9.6	9.3	.3
Aniline	105	9.6	9.3	.3
o-Toluidine	110	9.4	9.5	.1
Pyridine†	110	9.4	8.6	.8
6-Methyl quinoline	113	9.3		

* These pK_b values were calculated from tables of dissociation constants in the *Handbook of Physics and Chemistry* (ed. 34), p. 1560 and in various works on organic chemistry.

† The temperature value for pyridine is relatively lower than the others because of an appreciable loss through evaporation during measurement. This was the only base tried whose boiling point was lower (by 40°C) than that of the solvent. Hence the statement in the text that this method can give pK_b values to ± 0.4 unit refers to those bases whose boiling points exceed that of the solvent.

A quantitative study of this observed interdependence of temperature, solvent, and strength of added base on the extent of chelate formation led to the finding that the classical ionization constant of aromatic amines could be estimated to ± 0.4 pK_b unit at worst. It was observed that the temperature at which the blue color of the chelate just reappeared on allowing a momentarily boiled solution to cool slowly in the atmosphere could be reproduced to ± 2°C. Using bromobenzene as a solvent, we studied the critical thermochromic temperature as a function of the base strength of aromatic amines. A plot of these temperatures against the aqueous pK_b values resulted in an approximately linear relationship. The analytic expression for the straight line passed among the points is given by the equation $pK_b = 13.1 - (T/30)$. Table 1 gives the experimental data and the deviations of the measured values from the calculated pK_b values.

The measurements were carried out in the following manner. To 7.5 ml of bromobenzene were added 5 drops (0.05 ml/drop) of ferric chloride-propyl gallate indicator, and 5 drops or 150–170 mg of base in a test tube (o.d., 29 mm). The indicator solution consists of 2 g anhydrous ferric chloride and 4 g propyl gallate dissolved in 100 ml glacial acetic acid and 1 ml