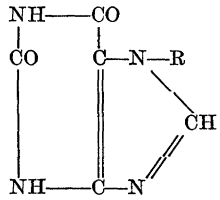
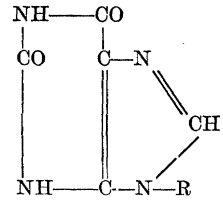
ence of certain catalysts. Both purines, suspended in glacial acetic acid, were recovered unaltered after exposure to hydrogen gas for 8 hours in the presence of Adam's platinum catalyst and under 1.5–2.0 atmospheres pressures. Reduction experiments were also applied by substituting absolute alcohol for glacial acetic acid as solvent and shaking in an atmosphere of hydrogen gas in presence of Raney nickel as the catalyst, under 160–200 atmospheres pressure at 200° for 10 hours. Both purines were partially destroyed by this treatment. In the case of 3-methylxanthine 60 per cent. of the purine was recovered unaltered. Its identity was established by the results of analysis (calc. for $C_6H_6O_2N_4$: N, 33.72 per cent. Found, N, 33.60 per cent.) and by conversion to caffeine by alkylation according to the directions of Emil Fischer.[5]

Exposure of xanthine (V) to catalytic hydrogenation at different hydrogen pressures and temperatures in the presence of copper-chromium-oxide catalyst led to such extensive decomposition of the purine that this reduction technique proved to be of no value and consequently was not applied with 3-methylxanthine. In none of our experiments did we obtain any evidence of the reduction of carbonyl to methylene in position —6, or any hydrogenation of the unsaturated imidazole nucleus of the xanthine molecule. These results are in marked contrast to those reported for *toxoflavin* (I) when exposed to the action of hydrogen under similar experimental conditions.

The resistance of hydrogenation of 3-methylxanthine (IV) is in accordance with the behavior of imidazoles which have previously been investigated. Although 2,4,5-triphenylimidazole[6] (lophin) is reduced with difficulty in the presence of platinum black[7] to 2,4,5-tricyclohexyl-4,5-dihydroimidazole, and 2,4,5-triphenyl-4,5,-dihydroimidazole to this same dihydro-derivative and finally to 2,4,5-tricyclohexylimidazoline, the same experimental conditions were ineffective when applied to imidazole itself, 2,4,5-trimethylimidazole, histidine, lysidine and to benzimidazole. The authors were also unable to hydrogenate benzimidazole-benzimide with Adam's platinum, Raney nickel or copper-chromium-oxide catalysts. It will be of interest to determine whether isomers of the xanthine (VII) and isoxanthine (VIII) types will differ in their behavior on catalytic reduction.



VII



VIII

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JOSEPH C. AMBELANG,
Sterling professorship of chemistry research assistant, 1938–39
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SCIENTIFIC APPARATUS AND LABORATORY METHODS

LABELING MUSEUM SPECIMENS

To workers engaged in museum or natural science activities the labeling of specimens is generally a necessary but time-consuming task. A quick and efficient method is always sought. The writer has developed a method which has proved to be very satisfactory.

The complete series of symbols to be used are hand-printed with black drawing ink or typed on strips of tough white or brown gummed paper. Brown or Cellophane "Scotch" tape may be used if the symbols are to be hand-printed, but the tape does not make as satisfactory a label as the gummed paper. Sufficient space is left between the symbols to permit cutting to the desired size. When completely marked the individual labels are cut from the strips. The single label is moistened on the gummed side and fastened to the specimen by a little pressure. A perfect attachment at this stage is not necessary as it serves only to hold the label while the "varnish" is being applied. By the time a number of labels have been attached to their respective specimens the first ones are entirely dry and are ready for the "varnish." A coating of Cenco Label Varnish[1] is applied so as to cover the paper label and to overlap about one sixteenth to one eighth of an inch on the adjacent portion of the specimen. The overlap serves as a seal of attachment. The dauber that is attached to the stopper of the bottle is too large and clumsy for this purpose. A small sliver of wood cut to a chisel end about one eighth of an inch across serves as the best means of application; although a small brush may be used. The "varnish" dries sufficiently upon application to prevent running so that it is not necessary to place the labeled portion of the specimen in better than an approximately horizontal position while drying. The specimens are ready for use in less than an hour but are generally let stand over night.

Recently two articles in this journal[2] described other

[5] Fischer and Bromberg, *Ber.*, 30: 221, 1897.

[6] Waser and Gratsos, *Helv. Chim. Acta.*, 11: 944, 1928.

[7] Willstatter and Waldschmid-Leitz, *Ber.*, 54: 113, 1921; Waser and Gratsos, *Helv. Chim Acta.*, 6: 200, 1923.

[1] This may be obtained in small bottles from the Central Scientific Company, Chicago, Ill.

[2] E. E. Jacobs and Mary Auten, SCIENCE, 84: 210, 1936; I. P. Tolmachoff, SCIENCE, 84: 464, 1936.

methods of labeling specimens. The first requires the use of an electric stylus and transfer paper. The second employs the more usual materials of quick-drying enamel, turpentine and a fine brush. Although both are excellent methods the author considers the one herein described to have many additional merits to recommend it. The printing or typing of the symbols is done on paper under normal conditions of a typewriter or smooth table top; thus assuring that they will be well formed and legible. All printing or typing can be done at one time. The label and "varnish" are both easily and simply applied. The "varnish" does not smear the symbols. The "varnish" is acid, alkali, alcohol and waterproof, thus permanently preserving the surface of the label in addition to holding it to the specimen. The equipment and materials employed are simple, cheap and easily obtained. The surface of a specimen needs no previous preparation, such as filing a rough surface or etching glass, as the "varnish" will stick to anything.

This method has been in use in the author's laboratory for a number of years. The labels on specimens of fossils and rocks, some with rough and porous surfaces, in constant use in student exercises show no signs of damage after several years' handling.

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A SIMPLE DEMONSTRATION OF THE CONDITIONED RESPONSE

WHILE the technique of establishing a conditioned response is theoretically simple, laboratory manuals usually omit this important principle in their experiments on learning. The reason for the omission is probably to be found in the difficulty encountered in securing unequivocal results within a short space of time by means of equipment ordinarily available.

The writer has regularly employed the following procedure in demonstrating conditioning to groups of students. Because of the ease and speed of the technique, it has been a useful adjunct to lectures on learning. The necessary apparatus includes a golf ball, a screen, consisting of an 8- by 10-inch cardboard clamped to an 18-inch support, and a "clicker" (any device capable of making a sharp click). The subject seats himself by a table upon which he extends his right arm palm downward. The experimenter holds the golf ball in full view about 14 inches above the extended hand and instructs the subject to avoid inhibiting his natural response to the falling ball. Having dropped the ball several times, allowing the subject to withdraw his hand to avoid being hit, the experimenter next drops the ball from behind the screen which is fixed at about the same height. It is important to have the screen so adjusted that the subject has just time enough to respond to the sight of the falling ball. This is the response to be conditioned. The experimenter now makes several clicks from behind the screen as the subject's hand lies extended, and all may observe that the sound by itself elicits no visible withdrawing reaction. At this point the experimenter gives eight to twelve simultaneous presentations of the original and substitute stimuli. This is accomplished by holding the "clicker" in one hand and the ball in the other, both hands being behind the screen. The coordination may take a small amount of practice, but it is easily learned. The click alone is then capable of eliciting the withdrawing reaction. By repeatedly presenting the click without reinforcement from the falling ball, it is possible to demonstrate extinction. A few additional reinforcements can then re-establish the conditioning. Should the subject voluntarily inhibit the conditioned response, the fact may be revealed by dropping the ball without the accompaniment of the auditory stimulus. In this case the ball will strike the extended hand.

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