Fig. 1. Demonstration of light shield: 75-w bulb at 2-ft distance, shining directly onto oscilloscope face, with (left) and without (right) red baffle in place. Without the baffle in place the image is obscured by the over-all exposure of the recording film, resulting in a completely black record.

cathode-ray tube, and yet not large enough to interfere with any of the controls on the front panel of the scope. The small opening of the pyramid was made just large enough to receive the lens of the camera. The base of the pyramid was made just large enough to telescope into the box. By telescoping in this manner the entire assembly may be removed or set in place with ease. During use the small aperture rests on the camera lens, and the large aperture rests on the shield encircling the tube face.

A horizontal rod may be used to support the baffle in place. Set screws may be used in place of the horizontal rod. We used one of the scrap triangles left over from cutting the sides of the pyramid fastened at right angles to the upper surface of the pyramid to prevent the baffle from telescoping after it had been set in place. Slots may be made for the insertion of data cards to be photographed from the face of the cathode-ray tube.

If a P11 (blue fluorescing) tube is used, the baffle should be made of blue Plexiglas, since the red filter will not transmit blue light and, therefore, does not permit continuous visual monitoring of the oscilloscope during the experiment.

Blue filters do not shield the effects of direct illumination of the screen as well as red plastic; however, the blue baffle has proved adequate to shield the film from the effects of indirect light.

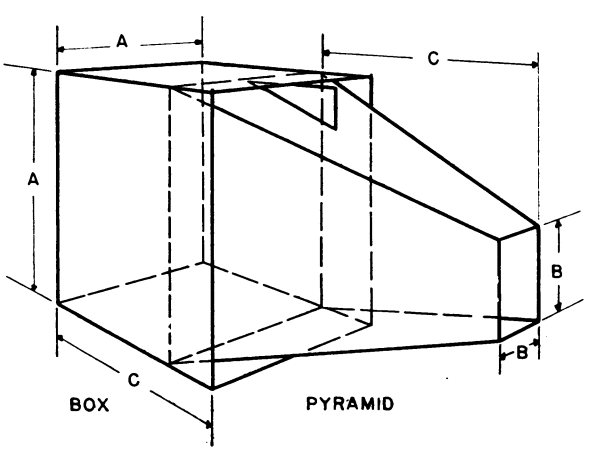

Fig. 2. Diagram of transparent light baffle. Dimensions: *A*, outside diameter of oscilloscope bezel; *B*, outside diameter of lens mount; *C*, approximately 5/8 lens to oscilloscope distance.

In summary, a plastic light baffle is here described for use with an oscilloscope that permits continuous observation of the cathode-ray tube while a photographic record is being obtained from the face of the same cathode-ray tube. This baffle shields the tube face and film from both direct and ambient light.

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Conversion of 3-Hydroxykynurenine to 4,8-Dihydroxyquinoline by Mouse Liver Homogenate

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When incubated with mouse liver homogenate, 3-hydroxykynurenine was degraded in various ways. Paper chromatographic analysis of the reaction mixture revealed the presence of several diazo-positive substances, two of which were identified as xanthurenic acid and 4,8-dihydroxyquinoline, respectively.

Recently Makino and Takahashi (*1*), in this laboratory, detected 4,6-dihydroxyquinoline and 4,6-dihydroxyquinoline-2-carboxylic acid in the incubation mixture of 5-hydroxykynurenine with liver homogenate of mice. The present finding (*2*) may be considered to be analogous to that of Makino and Takahashi.

3-Hydroxykynurenine, synthesized by the method of Sakan (*3*) *et al.* with a slight modification was incubated with mouse liver homogenate in Krebs-Ringer-phosphate buffer of *p*H 7.4 at 37°C. After 3 hr the reaction mixture formed a dark red pigment, which on a paper chromatogram moved very little from the starting line. The substances that were produced from 3-hydroxykynurenine by the incubation with liver homogenate were investigated by paper chromatography (solvent: butanol, acetic acid, water, 4:1:5). After 3 hr of incubation there appeared, under ultraviolet irradiation, four fluorescent substances at Rf values of 0.61, 0.48, 0.41, 0.32, respectively, and three spots (Rf = 0.45, 0.32, 0.12) detectable with diazo-reagent. A dark green fluorescent spot showing Rf 0.32 and positive diazoreaction was the residual 3-hydroxykynurenine. Other fluorescent spots and a diazo-positive spot having Rf 0.12 are now under investigation.

After 4 hr of incubation, 3-hydroxykynurenine and the fluorescent spot at Rf 0.41 disappeared, but on testing with the diazo-reagent, two other faster moving spots (Rf = 0.79, 0.64) were found. The spot at Rf 0.64 gave a brown-red color with diazo-reagent, while the one at Rf 0.79, which gave with ultraviolet light a greenish-blue fluorescence when present in sufficient amount, showed an orange-red color with the diazo-reagent. The behavior of the latter was the same as that of 4,8-dihydroxyquinoline. The diazo-positive spot at Rf 0.45 turned spontaneously green in color

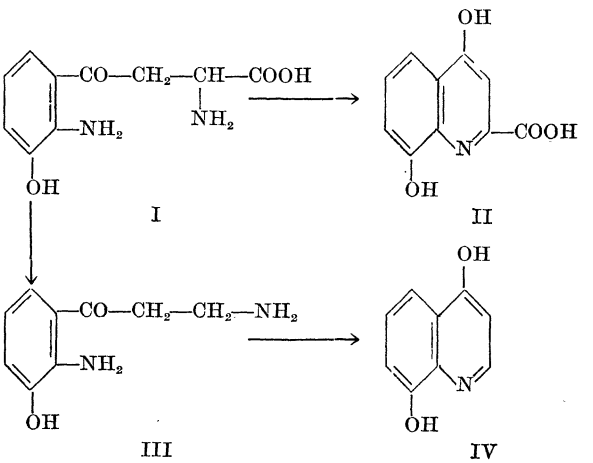
Table 1.

Sample \ Solvent	1	2	3	4	5	6	7	8
Substance A	0.79	0.79	0.04	0.69	0.64	0.09	0.68	0.75
4,8-Dihydroxyquinoline	.79	.78	.04	.68	.64	.09	.60	.77
Substance B	.45	.72	.00	.19	.05	.00	.15	.55
Xanthurenic acid	.45	.74	.00	.18	.05	.00	.15	.54

Solvent systems: (1) butanol, acetic acid, water (4 : 1 : 5); (2) methanol, butanol, benzene, water (4 : 2 : 2 : 2); (3) butanol saturated with 1-percent NH_4OH; (4) butanol saturated with 0.2-percent acetic acid; (5) iso-amyl alcohol saturated with 1-percent acetic acid; (6) iso-amyl alcohol saturated with 0.5-percent NH_4OH; (7) ethyl acetate, acetic acid water (5 : 1 : 5); (8) 2-percent acetic acid, isopropanol (3 : 7).

on exposure to the air and gave a vivid pink color with diazo-reagent. This behavior was the same as that of xanthurenic acid. So the two spots at Rf 0.79 (substance A) and Rf 0.45 (substance B) were more precisely identified by paper chromatography using seven other solvent systems, as indicated in Table 1, thus demonstrating complete coincidence of their Rf values with those of 4,8-dihydroxyquinoline and xanthurenic acid, respectively.

Since the incubation of xanthurenic acid (II) with mouse liver homogenate never led to the formation of 4,8-dihydroxyquinoline, the production of the latter from 3-hydroxykynurenine (I) may be considered to go by way of 3-hydroxykynurenamine (III), the oxidation of which seems to lead to 4,8-dihydroxyquinoline (IV), as follows.



References and Notes

1. K. Makino and H. Takahashi, XXVIth annual meeting of the Japanese Biochemical Society, 27 Apr. 1954.

2. This work was aided by the Scientific Research Fund of the Department of Education. We wish to thank T. Sakan for the gift of xanthurenic acid.

3. M. Kotake and T. Sakan, *Proc. Imp. Acad.* (*Tokyo*) **18**, 191 (1942).

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Communications

On the Intranuclear Environment

The success that has attended metabolic studies of mitochondria has naturally heightened desires in many cell physiologists to accomplish as much in the field of nuclear metabolism. Yet, in spite of all the studies of nuclear enzymatic composition, the results have been unimpressive. There is available a short list of the enzymes that have been classified as "nuclear," but, with one exception (a pyrophosphorylase), these enzymes are found in the cytoplasm as well. Hopes that nuclei, like mitochondria, would show a complement of uniquely localized enzymes, and thereby reveal directly the metabolic pattern of chromosome function, have remained unfulfilled. Some students of the problem, because of these results, have favored the conclusion that the interphase nucleus is the seat of few enzymatic catalyses. Other attitudes of mind have resisted the negative interpretation; occasionally a single enzyme has been chosen, and attempts have been made to wring out a special physiological significance from its presence in the nucleus. Alkaline phosphatase and adenosinetriphosphatase have been so used, but no workable perspectives of nuclear metabolism have resulted from such treatments. The most coherent—and probably the most fruitful—speculations on a pattern of nuclear metabolism have come, not from studies of nuclear enzymatic composition, but from studies of enucleation as interpreted by Brachet (*1*). In his scheme the nucleus is believed to exercise a direct and immediate influence on ribonucleic acid synthesis and phosphate esterification. Yet, the scheme skips, and does not solve, the question of an internal metabolic organization of the nucleus. To be sure, the results of present cytochemical research cannot provide a mechanism for the biochemical activities of the nucleus postulated by Brachet; but, if one avoids the objectives—borrowed from mitochondrial studies—of finding *the* important nuclear enzymes or of deciding the arithmetic contributions of the nucleus to the enzyme activities of the whole cell, some light can be thrown on the nature of the metabolic environment in which chromosomes operate.

Data on the intracellular distribution of enzymes point to the conclusion that chromosomes function in an anaerobic environment. It was first definitely demonstrated by Hogeboom *et al.* (*2*) that cytochrome oxidase is entirely absent from nuclei, a fact that has been shown to hold for a number of tissues. Thus, it