servations must reflect an alteration in the integrity of the protein-rRNA complex. Further study is required in order to determine whether these changes are the result of a loss in the complementary fidelity of the ribosomal protein for the rRNA, or vice versa or both, through any number of mechanisms which would alter the strength of ionic bonding within the complex. However, an analysis of the 80S ribosomal proteins (56 basic and 11 acidic) by 2 dimensional polyacrylamide electrophoresis revealed no major detectable quantitative or qualitative differences between the ribosomal proteins of the 4-day- and 30-day-old flies[11].

With regard to the decreased content of ribosomes observed in older flies, a selective loss of genes coding for ribosomal RNA has been reported in postmitotic tissues of the dog with age[12]. This is, however, apparently not a contributing factor in the present observations as no significant differences in the saturation values of DNA/RNA hybridization in RNA excess with ribosomal ^{128}I-rRNA from adult flies or ^{3}H-rRNA from a *Drosophila* cell culture ribosomes were detectable between 4 and 30 days of age (MÖRMANN, BAKER and HENNIG, unpublished). Recently, there was observed a 29% decrease in the amount of extractable DNA from the brain of 30-day-old flies, as well as histological evidence of cellular deterioration in brain tissue with age which could, at least in part, account for the loss of ribosomal material[13].

Studies on the in vitro translational ability of ribosomes from *Drosophila* with age have not yet been completed; however, it is more than likely that such pronounced changes in the integrity of the ribosomal protein-RNA complex would not be without deleterious effect. Thus it is suggested that the quantitative loss as well as the alterations in structural stability in ribosomes from older flies may be contributing factors in the age-dependent decreases in net protein synthesis reported for *D. melanogaster*[14] as well as for other dipteran species[15, 16].

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Light Stimulated 'Shunt-Metabolism' Succinate-α-Ketoglutarate-Isocitrate Cycle and Accumulation of Citric Acid in *Aspergillus niger*

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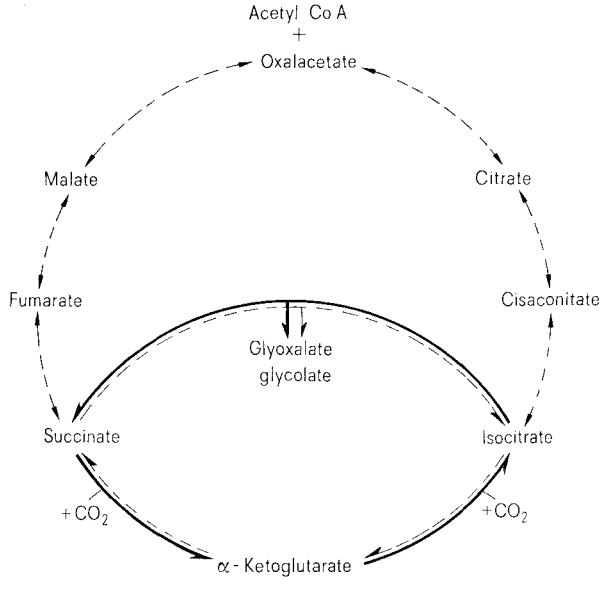
Summary. Studies with light of the visible range had shown that light plays a significant role in the biosynthesis and accumulation of citric acid in *Aspergillus niger*. Accumulation of ^{14}C-labelled carbon atoms in α-ketoglutaric, isocitric, succinic and glycolic acids in the cultures grown under illumination suggest a probable 'shunt-metabolism' leading to the succinate-α-ketoglutarate-isocitrate (SKI) cycle. This shunt metabolism minimizes the accumulation of citric acid in cultures due to depletion of intermediates.

Influence of light of the visible range on mycelial growth (HUSKINS and WESTON[2]; CANTINO and HORENSTEIN[3]), spore germination (HUTCHINSON and ASHTON[4]) and other phenomena (NEERGAARD and NEWHALL[5]) associated with the metabolism of fungal organisms was reported earlier. The present investigation was taken up, since little had been reported as yet on the effect of light on fermentation of citric acid by *Aspergillus niger*.



SKI-cycle proposed by CANTINO and HORENSTEIN[3].

Materials and methods. Aspergillus niger 6N3 isolated from the soil of Naihati, West Bengal, India, was grown in 100 ml capacity Erlenmeyer flasks containing 25 ml of SHU and JOHNSON's medium[6] at 30 °C under light, dark and alternate light and dark conditions. Control cultures were kept in an incubator at 30 °C. On the 7th day of incubation 1-^{14}C sodium acetate having an activity of 20 μCi each was added to the flasks and incubated for 1 h. Organic acids accumulated in the culture filtrate were extracted in ether and separated by the thin layer chromatographic methods of MEYERS and KEN-YEN-HUANG[7]. Radioactive acidic spots appearing on the autoradiograms were compared with the known acids. For quantitative estimation of the acids accumulated, cpm/ml of the radioactive spots were taken in a Beckman

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Incorporation of 1-^{14}C-sodium acetate into different organic acids accumulated in the culture filtrates of *A. niger* 6N3 grown under light, dark and alternate light and dark conditions

Environmental conditions	Acids (cpm/ml)								
	Oxalic	Oxalacetic	Isocitric	Citric	Glycolic	Malic	Fumaric	Succinic	α-ketoglutaric
Control	628	–	216	2400	–	–	–	–	–
Light	–	–	2681	286	2767	500	785	2755	2297
Dark	–	–	–	2903	–	629	704	947	–
Light–dark	–	783	–	1281	–	–	–	614	–
Dark–light	–	612	–	683	–	–	–	1008	–

L.S.100 liquid scintillation counter using toluene fluor[8] as the counting liquid.

Results and discussion. Cultures grown under light conditions showed the presence of α-ketoglutaric, isocitric, glycolic, succinic, fumaric and malic acids. Incorporation of radioactivity was found to be more in isocitric, succinic, α-ketoglutaric and glycolic acids. It was noticed that succinic acid and citric acid accumulated in cultures grown under all the conditions. Accumulation of citric acid was less when succinic acid accumulated in large quantities. Cultures grown in the dark showed a greater accumulation of ^{14}C-labelled carbon atoms in citric acid, while it was found to be the lowest in cultures grown in the light. When dark treatment was followed by alternate light treatment, the labelled carbon atoms showed a lesser accumulation of citric acid compared to the cultures grown in light followed by dark (Table).

Accumulation of ^{14}C in succinic, α-ketoglutaric, isocitric and glycolic acids in large quantities compared to other acids accumulated in cultures grown in the light suggests the functioning of a 'shunt-metabolism'. From the metabolites accumulated, this might correspond to a short cycle within the TCA cycle, viz. the SKI-cycle (Figure) proposed by CANTINO and HORENSTEIN[3] as functioning in light-grown *Blastocladiella emersoni*.

The low radioactive counts given by fumaric acid and malic acid indicate that the normal conversion of intermediates to the next step does not occur properly after the formation of succinic acid, instead the succinic acid shows a tendency for reversible reaction and in turn gets converted to α-ketoglutaric acid or to glyoxalic acid (in turn to glycolic acid) to enter the SKI-cycle. The low accumulation of citric acid in cultures grown under light condition also shows that depletion of intermediates takes place to facilitate the functioning of a short SKI-cycle within the TCA-cycle. Results of the experiment clearly show that light of the visible range to a great extent inhibits or decreases the biosynthesis and accumulation of citric acid in *Aspergillus niger*.

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Heritability of Adult Weight in the Tsetse Fly *Glossina morsitans morsitans* Westw. (Diptera: Glossinidae)

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Summary. By assortative mating the heritability of teneral adult weight in a laboratory colony of *Glossina morsitans morsitans* Westw. was estimated to be 0.09 to 0.16. This finding is discussed briefly in relation to published reports on selection against certain size classes in natural populations of tsetses and on the importance of maternal nutrition in determining larval and pupal size.

GLASGOW[2] discussed the variations of tsetses in nature and reviewed evidence that small male *Glossina morsitans morsitans* are removed from natural populations and that there is selection against both large and small female *Glossina swynnertoni* in nature. More recently, PHELPS and CLARKE[3] have shown that there is selection against the smallest males in a natural population of *G. m. morsitans*. This selection eliminates up to 35% of the smallest quartile during the cool months and up to 75% in the hot months.

In view of this selection against certain sizes of tsetses in nature and because of the present search for new methods of control of the tsetse, we undertook this preliminary study to determine the heritability of adult weight in our colony of *G. morsitans morsitans* Westw.

Heritability (h^2) of a trait is defined as the ratio of additive genetic variance (V_A) to phenotypic variance (V_P) (i.e. $h^2 = V_A/V_P$). Theoretical considerations and methods for estimating variance are discussed by FALCONER[4].

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