observation on the quantum yield of cytochrome *c* oxidation, as catalysed by plastocyanin and *P*–700 (ref. 8), and the requirement for copper in photoreduction as indicated by the data presented here suggests that copper is an essential component of the electron transport mechanism of pigment system I.

I recognize that the reduced photosynthetic and photoreductive activity associated with the nutrient deficiency does not demonstrate conclusively the precise function of the element in question. Although the effects observed may be due to a secondary response of the nutrient's direct action, normal rates of photosynthesis and photoreduction are recovered within 24–36 h after addition of copper. This recovery precedes the restoration of the chlorosis which also accompanies copper deficiency.

A more detailed description of these results will be published later. This investigation was aided by the U.S. Atomic Energy Commission (contract *AT*. (45–1)–1783).

Norman I. Bishop

Department of Botany,
Oregon State University,
Corvallis.

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MICROBIOLOGY

Pigment Formation by *Acetobacter acetigenum* in a Lactate-buffered Glycerol Medium

Few observations have been recorded on pigmentation in *Acetobacter* species. Among them *A. melanogenum* forms a black pigment and *A. roseum* a red pigment[1]. Carr and Shimwell[2] have reported the production of dark brown, water-soluble pigment by *A. aceti*. This communication reports the formation of a wine-red pigment by *Acetobacter acetigenum* in a lactate-buffered glycerol medium.

The medium (referred to as Medium *C*) was made up as follows: to 1 l. distilled water was added 2·0 g potassium dihydrogen phosphate, 1·0 g crystalline magnesium sulphate, 0·01 g crystalline ferrous sulphate, 2·5 g ammonium hydrogen phosphate, 0·002 g calcium D-pantothenate, 0·002 g riboflavin, 0·0001 g biotin, 10·2 g lactic acid, and 30·0 glycerol. After dissolving the lactic acid and salts, the *p*H was adjusted to 4·6 with potassium hydroxide and the solution was sterilized at 10 lb./in.^{2} for 15 min. Finally, the vitamins were added in 2 ml. aqueous ethanol (50 per cent by volume). One l. of Medium *C* was dispensed in each of twenty-five 250-ml. conical flasks previously sterilized for 20 min at 15 lb./in.^{2}, and inoculated with an active culture of *A. acetigenum* N.C.I.B. 8132, a cellulose-forming micro-organism. Seven 'Pyrex' tubes, containing exactly 8 ml. of Medium *C* (uninoculated), served as controls. The inoculated conical flasks and the seven 'Pyrex' tubes were maintained at 30° C. At the end of 7, 10, 13, 14, 17 and 21 days, 8 ml. of the culture medium from the conical flasks were carefully released by a sterilized pipette and its optical density was measured against the contents of the 'Pyrex' tubes serving as controls. For this purpose a Hilger Spekker was used fitted with spectrum violet No. 606 Ilford colour filters.

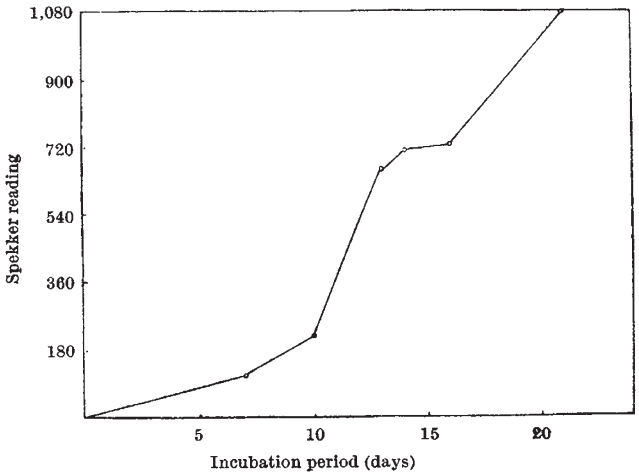

Fig. 1. Pigment formation during the growth of *Acetobacter acetigenum* in glycerol medium

The relationship between the number of days of incubation and accumulation of pigment is shown in Fig. 1; the elaboration of the colouring material seems to increase progressively.

In further experiments 1 l. of Medium *C* was prepared and dispensed aseptically into twenty-five 250-ml. conical flasks and inoculated with a growing culture of *A. acetigenum*. The cultures were maintained statically at 30° C for 21 days. The culture fluid was then pooled, Seitz-filtered and concentrated ten-fold, yielding a wine-red liquid. After preliminary trials with various solvents, isoamyl alcohol was found to be the most promising solvent for the extraction of the colouring matter.

In collateral investigations we have noticed a progressive loss of colour (greenish yellow) of Medium *C* (with ethylene glycol as the primary carbon source) during the dissimilation of ethylene glycol by *A. acetigenum*, ultimately becoming colourless after three weeks. It may be noted that the wine-red colour developed only in static cultures of *A. acetigenum* maintained on glycerol medium and not in the shaken cultures on glycerol. No attempt has been made at isolation, analysis and chemical characterization of the colouring matter, as our efforts were mainly directed towards the isolation of sugars[3] formed by the action of *A. acetigenum* on lactate-buffered glycerol medium, during the synthesis of cellulose. The pigment is presumably a manifestation of some metabolic by-product.

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K. Ramamurti *
C. P. Jackson †

College of Science and Technology,
University of Manchester.

* Present address: Faculty of Science, University of Libya, Tripoli.
† Present address: Bolton Technical College, Bolton, Lancashire.

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ENTOMOLOGY

Fossil Diptera and Continental Drift

It is well known that many plant and animal taxa have what has been termed an 'Antarctic' or 'Antarctogaean' distribution, that is, they are mainly or entirely restricted to southern Australia and/or New Zealand, southern South America, and, in some cases, South Africa. This