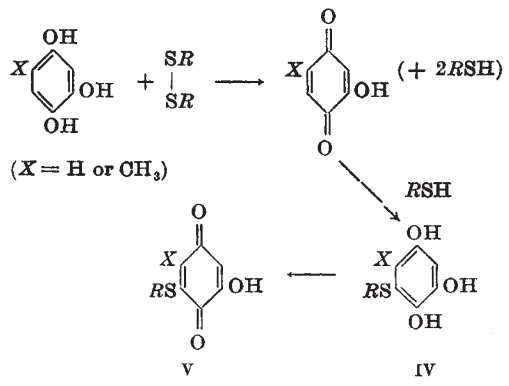
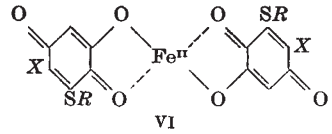
to give a thio-compound (as IV). This could then undergo oxidation to the thio-quinone (V), which



might also add the second *R*SH in the manner indicated. In either case, the quinone molecule would be incorporated into the protein chain. The colour of the stains, however, appeared to us to be too black for a quinonoid structure of the above type, and we surmised that iron present in the skin[4] or in the blood supply to the skin was being incorporated into the final structure to give a co-ordinated iron



complex of the type (VI) (an Fe^{III} complex is, of course, not excluded). Our subsequent work with wool indicates that this is probably the correct explanation, although the over-all reactions may not be so simple as we have suggested. Thus, wool can be dyed various shades of brown by aqueous solutions of the two trihydroxy-compounds. Simultaneous treatment with various metal salts (for example, ferrous, cupric, cobalt) causes a marked darkening in the shade, which becomes almost black when ferrous iron is used. The above process on living skin can thus be separated into two distinct stages with wool.

The experimental evidence supporting the incorporation of the colourless triphenols into wool to give dyed materials, and the mode of combination suggested, will be presented shortly in a paper which we are submitting for publication in the *Journal of the Society of Dyers and Colourists*. We would point out that the work, which is being continued, has a direct bearing on (*a*) the oxidative dyeing of keratinous proteins, and (*b*) the production of pigments (other than melanins) in both the animal and vegetable kingdoms.

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[1] Brown, *Nature*, **165**, 275 (1950).
[2] Compare Raper, *Biochem. J.*, **21**, 89 (1927).
[3] Thiele and Winter, *Annalen*, **311**, 341 (1900).
[4] Compare Mitchell and Hamilton, *J. Biol. Chem.*, **178**, 345 (1949).

Quinone Tanning in the Cocoon-Shell of *Dendrocœlum lacteum*

Dr. C. H. Brown, in her letter in *Nature* of February 17, suggests that the 'winter egg case' (cocoon-shell) of planarians may be a tanned protein. Vialli[1,2] has shown that the vitelline cells of *Distomum hepaticum* and *Dendrocœlum lacteum* contain a substance in which there is a di- or poly-phenol. Later, Stevenson[3] showed that the egg-shell of *Distomum hepaticum* is composed of a quinone-tanned protein, similar to the sclerotin of the cockroach ootheca[4], and derived from the granules or globules in the vitelline cells. During my investigation of cocoon formation in *Dendrocœlum lacteum*, I have found that the cocoon-shell, as in Trematodes, has the phenolic precursor in the globules of the vitelline cells. Evidence for this arises from histochemical tests carried out on sections of whole animals and of both tanned and untanned cocoon-shells. Both the globules in the vitelline cells and the untanned shell of a forming cocoon show a positive reaction to the argentaffine test[5], and also show definite green coloration when tested with ferric chloride; this changes to pink on the addition of sodium carbonate, indicating the presence of an *o*-dihydroxyphenol. Standard protein tests carried out on the cocoon-shell were also positive. The origin of the protein present in the cocoon-shell and of the oxidase necessary to produce quinone from phenol is now being investigated.

It is hoped to publish a further account of cocoon formation in planarians later.

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[1] Vialli, M., *Boll. Zool.* (*Naples*), **4**, 135 (1933).
[2] Vialli, M., *Boll. Zool.* (*Turin*), **5**, 21 (1934).
[3] Stevenson, W., *Parasit.*, **38**, 128 (1947–48).
[4] Pryor, M. C. M., *Proc. Roy. Soc.*, B, **128**, 378 (1940).
[5] Lison, L., "Histochimie Animale" (Paris, 1936).

Weed Control in Root Crops by Pre-sowing Applications of *iso*-Propylphenylcarbamate and Mixtures of that Substance and 'Methoxone' or 2,4-Dichlorophenoxyacetic Acid

Preliminary trials during the past two years, which aimed at replacing costly cultivations in root crops by chemical methods of weed control, have now been completed at Jealott's Hill. *iso*-Propylphenylcarbamate, 'Methoxone' (2,methyl-4,chlorophenoxyacetic acid) and 2,4-dichlorophenoxyacetic acid were known to prevent the germination of certain plant species when applied as pre-emergence dressings[1,2], and the species response to *iso*-propylphenylcarbamate was different from that of the other two compounds. Therefore, mixtures of *iso*-propylphenylcarbamate with 'Methoxone' and with 2,4-dichlorophenoxyacetic acid were examined alongside pre-emergence dressings of the individual components.

In both years the compounds were applied by hand, intimately mixed with 2 cwt. of fine china clay per acre to ensure even distribution. The *iso*-propylphenylcarbamate used was practically pure, the 'Methoxone' contained 46 per cent 'Methoxone' acid, some of which was present as sodium salt, and the 2,4-dichloro-