From this figure, it will be seen that 18 of the 30 subjects used one hand (9 used right; 9, left) in more than 90 per cent. (720) of the 800 trials, and that 25 used one hand (11 used right; 14, left) in more than 80 per cent. (640) of the 800 trials. Examination of the protocols of the 5 animals (Gamma, Lita, Fifi, Bimba, Beta) who exhibited least-pronounced unilateral preference, shows that their detected low-handedness scores are largely attributable to low inter-test agreement, although low single-test reliability also contributes to their attenuation.

Admittedly, increasing the number of test-situations should result in a more adequate determination of chimpanzee handedness; however, the present work does not pretend to explore more than a rather narrowly limited aspect of chimpanzee lateral organization. So far as test-reliability is concerned, precise mathematical statement is difficult because of the bimodality of the distributions involved; test-retest scores of Situations *C* and *D* each show handedness shifts for one subject, *A* for 5, *B* for 6 subjects (*i.e.*, subjects used one hand for more than 50 of the first 100 trials of a given situation, the same hand for fewer than 50 of the second 100 trials of the same situation). Twenty animals gave no such inversions, 7 gave only one each, while the other 3 animals each gave two inversions.

Summary: (1) Of 30 chimpanzees tested, 25 exhibited marked handedness. (2) Detected right- and left-handedness were almost equally distributed in the group of animals. (3) Each of 9 chimpanzees used right hand, 9 used left hand, in more than 90 per cent. (720) of 800 trials (4 test-situations); each of 11 chimpanzees used right hand, 14 used left hand, in more than 80 per cent. (640) of 800 trials.

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CHANGE FROM SELF-INCOMPATIBILITY TO SELF-COMPATIBILITY ACCOMPANYING CHANGE FROM DIPLOIDY TO TETRAPLOIDY

IT has very recently been determined for fifteen different self-incompatible plants of *Petunia axillaris* (Lam.) B. S. P. (*P. nyctaginifolia* Juss.) that the change from a diploid condition (2n = 14 chromosomes) to a tetraploid condition (4n = 28 chromosomes) was accompanied by a change to self-compatibility in fertilization and seed formation.

These plants were grown from seeds. By treatment with solutions of colchicine from one to three tetraploid branches were obtained on each plant while the other branches remained diploid. The flowers on the tetraploid branches were somewhat larger than those on the diploid branches and their pollen grains were larger and many had four germinal pores instead of three. The diploid and the tetraploid conditions were verified for several of the plants by counts of the chromosomes in pollen mother cells during stages of the reduction divisions.

For all these plants the results of controlled and proper pollinations demonstrated that the normal and potentially highly fertile flowers of the diploid branches were self-incompatible and produced no seeds or even rudimentary capsules to normal self-pollination but that the self-pollinated flowers of tetraploid branches on the same plants produced extra large capsules that were well filled with seeds.

Pistils of flowers on the self-incompatible diploid branches developed into capsules with many seeds when pollinated from flowers of tetraploid branches on the same plant. But all tests thus far made for tetraploid × diploid combinations on the same plant have failed to yield any seeds. Also unpollinated pistils of emasculated flowers set no seed either on diploid or on tetraploid branches.

Numerous studies in recent years have demonstrated that the physiological reactions of both self-incompatibility and cross-incompatibility within many species of homomorphic flowering plants are correlated with, and determined by, special hereditary factors and that incompatible reactions involve genetic similarity in respect to special factors or combinations of them.

For the fifteen plants here reported each is self-incompatible in its diploid branches. In the cells of the tetraploid branches on each of these plants there is a duplication of the chromosomes and also, presumably, of the genetic factors which produce self-incompatibility. But this duplication results in a reversal in the reactions of fertilization, and at least one, if not more, of the classes of pollen that segregate from the tetraploid complex is able to function in the production of seed after self-pollination.

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THE PHOTOCHEMICAL SPECTRUM OF CYTOCHROME OXIDASE IN HEART MUSCLE[1]

THE respiratory ferment of yeast and acetic acid bacteria has been shown by Warburg and his associates[2] to exhibit a photochemical absorption spectrum

[1] This work was carried out by the author during the tenure of a Finney-Howell Research Foundation Fellowship (1939–41). It was aided by a grant made to Dr. Kurt G. Stern by the Jane Coffin Childs Memorial Fund for Medical Research.

[2] O. Warburg and E. Negelein, *Biochem. Zeitschr.*, 214: 64, 1929. F. Kubowitz and E. Haas, *ibid.*, 255: 247, 1932.

typical for pheohemin proteins. The values obtained by these workers[3] for rat retina represent points on the spectrum of the Pasteur enzyme (Stern and Melnick[4]). The respiratory ferment in animal tissues is generally identified with cytochrome oxidase, which catalyzes the oxidation of cytochrome c.

For an investigation of the spectrum of cytochrome oxidase in mammalian tissue, phosphate extracts (pH 7.3) of rat heart muscle were chosen; succinate served as substrate. The extracts contained an excess of cytochrome c. Although the overall reaction is the oxidation of succinate to fumarate, there is ample evidence to show that this reaction is mediated by the cytochrome-cytochrome oxidase system.[5] CO is a strong inhibitor of cytochrome oxidase in the absence of cells[6]; this inhibition may be relieved by light. Such extracts exhibit a vigorous O_2 uptake in the presence of succinate at temperatures as low as 10°, and consequently lend themselves to the photochemical technique.

The arrangement of the photochemical apparatus and the method of charting photochemical absorption spectra have already been described.[2,4] In the present case the photochemical effect consists of an increase in O_2 uptake when rat heart muscle extract, in the presence of succinate and a gas phase of 95 per cent. CO and 5 per cent. O_2, is subjected to strong monochromatic illumination. The relative light absorption coefficients as referred to a standard wave-length ($\beta\lambda/\beta_{436}$) were calculated for twenty-three wavelengths.

The data show that cytochrome oxidase from a mammalian source, like the respiratory ferment in yeast and in bacteria, exhibits a spectrum characteristic of pheohemin compounds. There is a steep Soret or γ-band in the blue at 450 mμ, and two secondary maxima, the β-band in the blue-green at 510 mμ and the α-band in the yellow at 589 mμ. The thermolability of the enzyme suggests that the hemin grouping is combined with a protein. In spite of the similarity of the spectral patterns of these enzymes, there exist significant differences in details, indicating that they are not identical. Thus the position of the main absorption band is at 450 mμ in the instance of the enzyme of heart muscle and at 430 mμ for that in acetic acid bacteria and in yeast.[2,7]

It is of interest to note that the Pasteur enzyme of rat retina also has its main absorption band at 450 mμ[4]; however, its non-identity with rat heart muscle cytochrome oxidase is indicated by the fact that the α-bands are located at different positions, namely, at 578 mμ for the Pasteur enzyme and at 589 mμ for cytochrome oxidase. A similar situation exists in the yeast cell where the γ-bands of the Pasteur enzyme and the respiratory ferment coincide, whereas the structure of the α-bands differs significantly.[7]

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[3] O. Warburg and E. Negelein, *ibid.*, 214: 101, 1929.
[4] K. G. Stern and J. L. Melnick, *Jour. Biol. Chem.*, 139: 301, 1941.
[5] D. Keilin and E. F. Hartree, *Proc. Roy. Soc. Series B*, 127: 167, 1939.
[6] *Ibid.*, 125: 171, 1938.
[7] J. L. Melnick, *Proc. Am. Soc. Biol. Chem., 35th Annual Meeting*, 1941, p. 90.

SCIENTIFIC APPARATUS AND LABORATORY METHODS

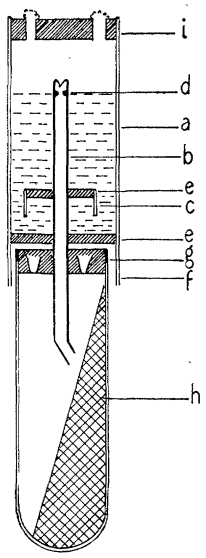
THE EXAMINATION OF CONTAMINATED WATERS[1]

A RAPID method has been devised to speed up the routine bacteriological examination of water from an average of 48 to 96 hours to 8 to 10 hours. The sample is inoculated into routine presumptive lactose broth, then transferred at the optimum time to a confirmation media, either liquid or solid. No difficulty has been experienced in obtaining discrete colonies. The ordinary laboratory glassware is used to assemble this very simple apparatus. Both presumptive and confirmation media can be sterilized and handled as a single unit. Other types have been developed for special purposes.

The principle of this method is the utilization of gas produced by fermentation in the presumptive media to cause a small amount of enriched inoculum to overflow into a conductor tube, automatically inoculating the

FIG. 1

"a" Presumptive tube containing Lactose Broth.
"b" Conductor tube.
"c" Fermentation vial.
"d" Limiting level mark; = height of water + media.
"e" One hole rubber stoppers.
"f" Glass skirt; continuation of presumptive tube.
"g" Rubber stopper notched along edge to admit air.
"h" Confirmation media; solid E.M.B. slant, or liquid B.G.B.
"i" Two-hole rubber stopper with cotton plugs.



[1] Preliminary report.