SCIENCE

VOL. 96 FRIDAY, AUGUST 28, 1942 No. 2487

SCIENCE: A Weekly Journal devoted to the Advancement of Science, edited by J. MCKEEN CATTELL and published every Friday by

THE SCIENCE PRESS

Lancaster, Pennsylvania

Annual Subscription, $6.00 Single Copies, 15 Cts.

SCIENCE is the official organ of the American Association for the Advancement of Science. Information regarding membership in the Association may be secured from the office of the permanent secretary in the Smithsonian Institution Building, Washington, D. C.

MOSQUITOES, MALARIA AND THE WAR IN THE PACIFIC[1]

By EDWARD PHILPOT MUMFORD

OXFORD UNIVERSITY AND STANFORD UNIVERSITY

THE recent fall of Bataan was attributed mainly to malaria and lack of quinine by the United Press correspondent, Frank Hewlett, writing in *The New York Times* for April 18, and other observers. In the last war malaria took first place among the diseases responsible for casualties. Even in normal times, it is one of our most important public health problems. With the Dutch East Indies now largely in enemy hands, the principal source of supply of the world's quinine is lost to the United Nations, and although synthetic anti-malarials have been in use for some time, one can not overestimate the seriousness of a quinine shortage. Because of a low toxicity, and the fact that careful medical supervision is not required, quinine is still the most valuable drug for malarial prophylaxis and the treatment of acute malaria. There is no drug known to-day which can completely replace quinine and the other cinchona alkaloids. Because of these and other factors which are obvious, it is particularly important at this time to consider

[1] "Studies on Faunal Distribution," No. 7. These studies have received the support of the Carnegie Corporation of New York, the National Academy of Sciences, the American Association for the Advancement of Science, the Society of Sigma Xi, the American Philosophical Society, the May Esther Bedford Fund, Incorporated, and various subscribers to the Oxford University Chest. See G. D. Hale Carpenter, SCIENCE, 95: 325–326, 1942.

Tubes of various sizes may be used. Best results have been obtained using tubes of 4 to 12 mm inside diameter and 100 cm long. The tube is mounted vertically. This is important, since otherwise the solid will tend to pile up unevenly on the bottom and will not settle uniformly through the solution. A small funnel is attached with a rubber tube to the top end and the bottom is closed with a cork. Placing a funnel at the top of the tube makes it easier to add the adsorbent to a small tube without spilling. It also allows the powder to be wetted by the solvent and to fall slowly through the narrow neck of the funnel in such a way that it does not enter the tube in lumps. Six or more inches of the tube (depending on the total length) are filled with pure solvent and the solution to be treated is carefully poured on top of it. The tube is filled completely, the liquid extending up into the small funnel to a depth of several centimeters. The powder is added in equal measured amounts of 0.2 to 1 gram. The accuracy of separation which is desired determines the size of the portions, and this in turn depends on the width of the tube, the quantity of substance to be adsorbed and the ease with which it is adsorbed.

In a solution containing three adsorbable substances, A, B and C, whose affinity for the adsorbent decreases in the same order, a portion of adsorbent settling through the solution will adsorb substance A first. The following portions will continue to adsorb A as long as any remains in solution. When A is removed further adsorbent will begin to adsorb B and finally C in succession. If such substances are colored, the column of the settled layers of adsorbent thus built up will be found to be colored by A on the bottom, then by B and finally by C, while the top layer will be entirely colorless if an excess of adsorbent has been added. It is interesting to observe by this method that more strongly adsorbed solutes are eluents for less strongly adsorbed substances. This is, of course, obvious by definition, but is clearly demonstrated in the apparatus described. When several portions of adsorbent have passed through the tube and have adsorbed all substance A from the upper part of the tube, some will still remain in the lower portion. The next portion of adsorbent will adsorb substance B in the upper part of the tube and, as it falls further, will lose the color due to B and assume the color due to A because the B has been eluted by the more strongly adsorbed A remaining in the lower part of the tube. When finally all the A is gone and B is only present in the lower parts of the tube, the process is repeated by C being adsorbed at the top and then being eluted by B as it falls into the lower end of the tube.

The relative adsorptive abilities of two different materials can easily be determined by adding first one and then the other. When colored materials are being adsorbed, the least effective adsorbent will be least colored and will also serve to mark the positions of adjacent portions of the more active adsorbent. This effect can be utilized by using a non-adsorbing white powder with colored substances and a colored non-adsorbent when colorless substances are being treated. The addition of a small amount of such inert material between portions of adsorbent in this way very clearly indicates their position in the column thus built up and is a help in correctly sectioning it at the end of the experiment.

After the last portion of adsorbent has settled, the solvent can be carefully poured off and the tube allowed to drain. Then the cork is removed and the whole core pushed out and sectioned into its components. It is better to add quite a little adsorbent above the last colored layer so that when the solvent is poured off, just a little of this unimportant material will slide down the tube with the solvent while the desired portion of the core is not disturbed.

Investigation of this matter has been an incidental result of other work, the more pressing nature of which has, as yet, precluded further development of its potentialities. However, it is thought that the method has wide possibilities as a research tool in the field of adsorption analysis and may prove to be applicable to cases not amenable to methods previously described. Consequently, this method is brought to the attention of other research workers with the hope that those having the knowledge of the pitfalls and advantages of adsorptive procedures will investigate and develop it further.

ARNOLD LOWMAN
CALIFORNIA PACKING CORPORATION,
EMERYVILLE, CALIF.

BOOKS RECEIVED

Advances in Internal Medicine. J. MURRAY STEELE, editor-in-chief. Illustrated. Pp. xi + 292. Interscience Publishers, Inc. $4.50.

Fading Trails: The Story of Endangered American Wildlife. Illustrated. Pp. xv + 279. $3.00.

FUSON, REYNOLD C. and HAROLD R. SNYDER. *Organic Chemistry.* Pp. viii + 506. John Wiley and Sons, Inc. $3.50.

GARDNER, VICTOR R. *Basic Horticulture.* Illustrated. Pp. x + 441. Macmillan. $3.75.

Organic Reactions. ROGER ADAMS, editor-in-chief. Pp. vii + 391. John Wiley and Sons, Inc. $4.00.

Organic Syntheses. Edited by L. I. SMITH. Pp. v + 114. Chapman and Hall, Ltd., London: John Wiley and Sons, Inc., New York. $1.75.

THOMPSON, SIR D'ARCY WENTWORTH. *On Growth and Form.* Revised edition. Illustrated. Pp. 1116. Cambridge University Press, England: Macmillan, New York. $12.50.

War Medicine. A Symposium. Edited by WINFIELD SCOTT PUGH. Illustrated. Pp. 565. Philosophical Library, New York. $7.50.