thought, imagination. It attempts to do for charity toward one's neighbor what many of the organized religions have done to man's thoughts about a deity, namely, make them less a personal and more an organizational responsibility.

Support of education and of research by taxation is much the same sort of process. One's taxes are rarely itemized in proposed expenditure although analyzed *ad nauseam* in origin of income. When one's Federal taxes are paid, personal interest in their expenditure promptly and unfortunately ceases for the average man unless some flagrant abuse or scandal is later unearthed or unless they are abruptly or extensively increased.

This country sorely needs more, rather than less, individual appreciation of its educational and research problems. It can gain this end best by forcing greater rather than less, individual participation in raising funds for these purposes.

The experience of the American Cancer Society is a large enough example of this principle to be significant and impressive. This Society has long recognized that cancer obviously and insistently requires individual responsibility, knowledge, and action for its ultimate conquest. The Society has gone far along the road toward arousing the American public to its essential part in the fight against this disease. The effort has required time, hard work, and faith in the average American citizen. It has, however, begun to prove its soundness by the results already obtained, and its permanency by the increased evidence of autocatalytic increase in interest by the public.

A democracy which could and did obtain its support of scientific research in the same way would send the roots of intelligent, personal giving deep into the soil of its citizenry. These roots in turn would make that soil more porous to education and more fertile in contributing succeeding generations of better-equipped and more cooperative men and women who would understand more completely and naturally their duties as citizens of a free state.

Government support of research involves no new principle. It has a long and distinguished record of achievement to its credit. It can well be greatly extended and broadened. It is only when it becomes too regimented, circumscribed, or handicapped by administrative methodology that it becomes dangerous in just the same way that these same impersonal and overorganizational factors can endanger individually supported research.

There is a very real place for government support of research but it might well be in cooperation with increased private and individual effort. Neither system alone is as strong as a combination of the two, for when both exist together there is a chance to compare the results and to supplement one another where mutual interests are involved. Each can learn by the mistakes of the other. Each can use the experience as a valuable "laboratory course" in the relationship between individual and Federal responsibility.

The main point is that both governmental and private support of research need and must have a continuing individual educational emphasis so that both may constantly be more intelligently and universally supported by citizens who know what they are supporting and why.

The time to establish this principle is now. If we delay we shall find it increasingly difficult to introduce it at a later date.

C. C. LITTLE

Roscoe B. Jackson Memorial Laboratory
Bar Harbor, Maine

Book Reviews

Pulmonary edema and inflammation. Cecil K. Drinker. Cambridge, Mass.: Harvard Univ. Press, 1945. Pp. viii + 106. (Illustrated.) $2.50.

This book is of particular importance because it is the only publication at present available in which the factors involved in the excessive accumulation and distribution of fluid within the pulmonary system are presented. Observations based on experimental technics devised by Drinker, Warren, and their associates for determining quantitatively the pulmonary lymph flow in the dog form the groundwork for a discussion of the mechanisms of pulmonary edema and its treatment. Four of the five chapters are based on the Nathalie Gray Bernard Lectures given by Dr. Drinker at the Bowman Gray School of Medicine. A fifth chapter on artificial respiration completes the book.

The anatomy and physiology of the lung are discussed in relation to transudation. It is pointed out that the pulmonary capillaries, unlike all other capillaries, depend for their oxygen supply on air reaching the individual alveoli and not on arterial blood. The presence of fluid in the alveoli or bronchioles excludes air and thereby produces anoxia of the involved pulmonary capillaries. Experimental observations in the dog are presented in detail and interpreted to show that anoxia produces excessive leakage of fluid from the pulmonary capillaries, whereas increased capillary pressure does not readily cause recognizable pulmonary edema. The pulmonary lymphatic system in the dog is extensive and drains into the right subclavian vein by way of the right lymphatic duct. The right lymph duct is small and limits the rate of pulmonary lymph flow. A new drug, related to thiourea, which is capable of producing pulmonary edema was used to demonstrate the inadequacy of the lymphatic

system in the dog as a means of removing excessive amounts of fluid from the lung. Variations in lung movement and expiratory and inspiratory resistances were found to affect the rate of pulmonary lymph flow. There is an excellent critique of various methods of artificial respiration in which a strong stand is taken against the use of mechanical resuscitators.

Dr. Drinker recommends the administration of oxygen under higher than atmospheric pressure for the treatment of pulmonary edema, on the ground that the added pressure will oppose filtration from the pulmonary capillaries. To this reviewer it does not appear that the application of the recommended 6 cm. of water pressure at the mouth of a patient will oppose capillary filtration to a significant degree. We have found that the pressure available for opposing capillary filtration cannot be assumed to be equal to that applied at the mouth, since roughly half of the applied pressure is transmitted to the intrapleural space, this transmitted portion increasing the pressure in the pulmonary artery and vein. It is improbable that the resulting pressure increase, which would amount to 2 to 3 cm. of water, would exert significant counterpressure to oppose capillary filtration.

A discussion of the pathogenesis of pulmonary edema in man is a difficult one to write at this time, because blood pressure in the pulmonary capillaries, oncotic pressure of the plasma proteins in the pulmonary circulation, and tissue tension have not been measured quantitatively in man, nor are the factors governing variations in the passage of fluid through the capillary wall understood. Perhaps the application of the right heart catheterization technic in man will be productive of significant quantitative data on pressure relationships in the lesser circulation in relation to the problem of pulmonary edema. Dr. Drinker has performed a difficult task well. *Pulmonary edema and inflammation* is stimulating and fills a gap in medical literature. The book is highly recommended.

HERBERT CHASIS
New York University College of Medicine

Insect dietary: an account of the food habits of insects. **Charles T. Brues. Cambridge, Mass.: Harvard Univ. Press, 1946. Pp. xxvi + 466. (Illustrated.) $5.00.**

In this book the author presents an account of the food habits of insects which is very comprehensive in coverage and quite readable. Each chapter is supplemented with an excellent bibliography of the special subject under discussion, thus bringing together a great many resources for the student of insects not hitherto of easy access.

The book does not, as might be expected from the title, go into the chemical phases of insect food or into insect metabolism, which might have interested some students more, but which would have made the book less interesting to the inquirer about insect food habits. The chapter on abundance and diversity of insects assembles many estimates of insect populations under diverse specific conditions. The stupendous numbers per acre in many of these estimates would be hard to believe if they were not the conscientious estimates of many observers. Dr. Brues then proceeds to analyze the food habits in relation to structure and environment, follows with separate chapters on the herbivorous insects, the gall makers, and the predators and parasites. An interesting chapter is that on the use of fungi and microbes as food of insects, and the insect symbiosis with such microorganisms. This is a subject seldom treated in textbooks, and consequently the long bibliography will be of great use. The parasitic insects are divided into the external parasites of vertebrates and the internal parasites of insects and vertebrates. The final chapter considers the insects as food of microorganisms, of insectivorous plants, and of lizards, amphibians, birds, mammals, and man.

On the whole, this is a very useful book, packed with information and references to stimulate further research. It will be invaluable to lecturers.

W. DWIGHT PIERCE
Los Angeles County Museum
Los Angeles, California

Dvorine color perception testing and training charts. **(Vol. I: Testing charts; Vol. II: Training charts.) Israel Dvorine. Baltimore: Israel Dvorine, 1944. $25.00.**

This work consists of two volumes of color plates and a brief pamphlet of instructions. Although the jacket states that these are "the first set of pseudo-isochromatic charts developed by an American," the construction of the plates follows that of the Ishihara, Rabkin, and Stilling plates, retaining most of their faults but lacking valuable diagnostic features of the older plates. It appears that the fundamental researches of the last half century, including those of Pitt, Wright, and Judd, have been ignored.

The Introduction states: "The colors of these charts are based on the subtractive color theory; that is, that the primary colors are red, yellow and blue. . . ." This is a useful working principle for mixing printing inks, but it bears no relation to the design of a color system which diagnoses color blindness.

The claim that the system "selects individuals who are not color blind but who merely become visually confused by certain color combinations" is a dangerous play on words. The Navy, for instance, cannot afford to use men who "visually confuse" red and green light signals.

It is claimed that the second volume is useful in the training of color vision. There is no doubt that men can be "trained" to improve their scores on pseudo-isochromatic tests, but there is no indication that men are less color blind as the result of such training. Rather, this proves that such tests are defective as measuring instruments. The net result of the present widespread teaching of "how to pass the plates" is merely that better and less learnable methods for testing color vision will be developed and substituted.

DEAN FARNSWORTH, LT. CDR., USNR
U. S. Submarine Base, New London, Connecticut