In view of this, any further attempt to prove that the nerve fiber conducts impulses in the same way that a wire conducts an electric current is merely a waste of time.

I do not mean to imply that the considerations mentioned in the paper of Hughes and King about two-phase systems of immiscible liquids and interfacial tension are not significant. They are doubtless highly significant. A careful study of recent papers by Lillie and Adrian will show the strong probability that the conduction of the nerve impulse depends on a semi-permeable state of the membrane surrounding the fiber and on the electrical difference of potential resulting therefrom. This semi-permeable state of the membrane in turn may probably depend in part on certain features of a two-phase system. Furthermore, experiments with narcotics are among the most likely to throw light on the important problem of the ultimate nature of the nerve impulse, but they should be conducted with due consideration for the great mass of facts already accumulated by a number of the ablest scientists of modern times—facts and principles which have already gone a long way towards giving us a picture of the nerve impulse. The neuropathologists and the psychologists already have something of a basis on which to work; but future research, coordinated with past research, will greatly strengthen this basis. In this work there is room for chemists, physicists and physiologists alike, if their work be properly coordinated.

ALEXANDER FORBES

WHAT IS A WEED?

THE word "weed" is usually defined as a plant growing out of place. This conception is not easily tangible for the following reasons:

(1) An innocent inquirer may think of a plant being out of place, in one or two respects—(a) As out of its natural habitat; for example, Jack-in-the-Pulpit in an open dry field, or, pigweed in a moist shaded forest; (b) As growing where some human being wishes it not to grow; for example, Bouncing Bet in the cabbage patch, or, rye in the wheat field. This latter conception (b) doubtless expresses the virgin idea of the formal definition, "A weed is a plant growing out of place."

(2) If so, we have an odd rule, under which any plant in the universe may instantly become a weed without the slightest change in character, habitat or position. Under this rule, a plant is a weed, not according to specific qualities nor by a definite concept in the mind of any man, but by human caprice; for example, the sugar maple trees become weeds when some man wishes to convert the grove into a corn field.

(3) To say that a weed is a plant growing out of place is to include in the weed realm all obnoxious parasitic plants. This is objectionable for two reasons: (a) In actual practice no person thinks of those dependent plants that cause wheat rust, corn smut, etc., as weeds. However, these species constantly grow where human beings wish them not to grow, but they are *parasites*. (b) A parasite has the definite distinction of drawing its food detrimentally and directly from a host, but to speak teleologically a weed is an honest, independent competitor for food materials in the "struggle for existence."

What seems, therefore, to be a more workable conception of a weed may be stated as follows: "A weed is an independent plant whose species is persistently obnoxious on cultivation areas." The salient words in this statement are "independent species persistently obnoxious," and these four words may be taken as a definition of a weed, as against the salient words in the old definition—"A plant growing out of place." In this new definition all parasites are excluded, and weed-craft is confined definitely to independent species that are repeatedly obnoxious to phytocultural operations.

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QUOTATIONS

REWARDS FOR SCIENTIFIC RESEARCH

SHOULD the Canadian Parliament take the action which the Canadian Premier, Mackenzie King, has announced the intention to propose, and award to Dr. F. G. Banting, the discoverer of "insulin," a life annuity of $7,500, it will be an event of importance both in itself and as an example for other nations. [Parliament has unanimously voted the annuity.] Incidentally, it will give convincing proof that the Canadian lawmakers have an intelligent appreciation of a service to the world such as has been rendered by the Toronto physician and an equally intelligent understanding of the best way to reward that service.

Professional ethics as understood among the English-speaking peoples, and most others except the Germans, will prevent Dr. Banting from exploiting the large commercial possibilities of his remedy, and the fame acquired from his achievement will be confined rather closely to his colleagues and will not pay grocers' bills. It is therefore the wisest of generosity for Canada to give to the son whose honors she shares enough to permit the devotion, without material anxieties, of the rest of his life to the form of research for which he has demonstrated his competence. Even though he never should find another specific for one of humanity's scourges, his work is sure to increase the general stock of medical knowledge.

The amount suggested as his honorarium seems large only because such appropriations of public funds are so rare. After all, it is only the interest on $150,000, and, compared with the fortunes made by other inventors—the Fords, the Edisons, the McCormicks and their like—it seems absurdly small. But it is enough, for the needs of the scientific investigator are small and, assured for himself and his family against the necessity of earning a livelihood by immediately profitable work, he will be content—will count himself, indeed, among the luckiest of mortals.

That the action of Canada in the case of Dr. Banting, if taken, will be exemplary, is not too much to hope. It will call world-wide attention to the fact that there are discoveries and inventions which should not be made the basis of a monopoly by the issuance of a patent or copyright, though, on the other hand, they should not be allowed to go unrewarded.

National governments have a duty in this matter, and one which they rarely have recognized. For the most part they have left the maintenance of scientific research to the generosity of individuals or of the few private corporations which have arrived at realization of what "pure science" can do for them. This, however, implies either the acceptance of something very much like charity—the taking of favors for which thanks must be given—or the receipt of a salary that at any moment may cease.

A government, if conducted with sufficient intelligence, would change all this. It would establish facilities for determining just what men had rendered or were likely to render services so widely beneficial that everybody should be expected to pay for them. Then it should make due provision for acquiring a discovery or invention of general benefit and offering it freely to anybody in the country, or in the world, who wants to use it.

Once, at least, our own Congress did just this—it appropriated what it considered a sufficient amount to pay the inventor of "babbitt metal" what that excellent alloy was worth, made its manufacture and use free to all, and so prevented the imposition on all users of a tax continuing as long as a patent would run. If more of this wisdom were displayed, fewer enormous fortunes would be made, perhaps, but that would be no great calamity.—*The New York Times.*

SCIENTIFIC BOOKS

The Mathematical Theory of Probabilities and its Application to Frequency Curves and Statistical Methods. By ARNE FISHER. Vol. I., *Mathematical Probabilities, Frequency Curves, Homograde and Heterograde Statistics.* Second Edition. The Macmillan Company, New York, 1922, pp. xxix + 289.

A Treatise on Probability. By JOHN MAYNARD KEYNES. The Macmillan Company, London, 1921, pp. xi + 466.

THE literature of probability, honorable in the history of science as it is, is not so extensive but that the appearance of two major works on the subject within a year of each other is a notable event. It seems appropriate to review these two books together, because they represent so perfectly what have been, throughout the history of the subject, two diametrically opposed schools of thought about the theory of probability. On the one hand we have the point of view of the person who sees in the theory of probability one of the most potent tools the human mind has ever devised for penetrating deeper into the relations and laws of phenomenal nature. This is the point of view, in short, of the natural scientist who wishes to *use* the theory of probability in the conduct of the practical business of his life in the manner of approach of Laplace, Clerk Maxwell, Willard Gibbs, Karl Pearson and a host of the greatest figures in the history of science. On the other hand is the point of view of the person who regards the theory of probability as essentially only a branch of metaphysics, and finds its usefulness in the fact that it furnishes an entertaining and involved subject to speculate and talk about.

The first of these viewpoints is represented in the book, already well known to statisticians from its first edition, of the distinguished Danish mathematician and actuary, Arne Fisher. It is a sound treatise, of excellent workmanship, on the mathematical theory of probability and its application to practical statistical problems, developed mainly from the standpoint of the Scandinavian school of Thiele, Charlier, etc. It is extremely valuable to have the ideas of this school thoroughly and clearly presented to English and American students, as is done in Fisher's book. Furthermore, there is a freshness and originality in the author's mode of exposition which is highly stimulating and entertaining to the student. Whether the methods and ideas of the Scandinavian school will supplant those of the English school, which derives from Karl Pearson, seems doubtful, so far as concerns American workers, at least. But it is a fine indication of the healthy, vigorous condition of the subject to have these two lines of great activity flourishing at the same time. This second edition of Fisher's book is considerably expanded and improved over the first. It should be in every statistical library. Not the least entertaining feature about it is the commendably vigorous language in which Fisher flays Keynes and tacks his integument up for public inspection and ridicule.