

The large group of chlorinated hydrocarbons used in the rapidly growing cellulose lacquer and plastics industry show very clearly this variation in toxic effect according to chemical constitution. Halogenation appears to be closely related to liver damage, and increase in the chlorine molecule, though compensated to some extent by decrease in volatility, generally increases the toxic effect. Thus tetrachloroethane, no longer used as an aeroplane dope on account of its high toxicity, is about four times as toxic as carbon tetrachloride, while trichloroethylene is much less likely to attack the liver than either.

Recent investigations on the biological effects of toxic substances are described less fully. Only a very brief reference is made to an investigation on the mode of action of carbon tetrachloride when exposure is relatively mild and of long duration, as opposed to the better-known acute intoxication arising in connexion with its use as a fire extinguisher. Much light was thrown by this investigation on the true origin of the gastro-intestinal symptoms frequently observed in workers using tetrachloride as an industrial solvent.

A slightly more detailed account is given of an examination of the effects of trinitrotoluene, the experimental subjects being a number of students who volunteered to fill shells during their vacation. Very valuable information was thus gained as to the reaction of living tissue to T.N.T. without the accompaniment of severe or irreparable injury.

Of the newest group of industrial agents, the glycols, comparatively few have been fully investigated, but some, including ethylene chlorhydrin and diethylene dioxide (dioxan), have already given proof of their potency for causing damage. The cases of fatal dioxan poisoning which occurred in 1934 should act as a special warning against the assumption that substances which have never actually proved toxic can be regarded as harmless. Dioxan had not only been shown to be comparatively innocuous to animals, but the five men who died from hemorrhagic nephritis had been exposed to it for nearly sixteen months without apparent ill-effect. It was only when exposure to the vapour was intensified by the speeding up of the machine and by the necessity for the men to put their heads into the vat containing dioxan that severe injury to the kidneys occurred.

The new aliphatic chemical industry, which has made great strides since 1925, may be expected to expand still further in the post-war years, and many substances of the group to which dioxan belongs may then reveal their true biological effects. At present their chemical and physical properties are better known than their potential toxic action, and it is to be hoped that this knowledge will be applied on the basis described in this review.

ETHEL BROWNING.

A SURVEY OF STATISTICS

Statistics

By L. H. C. Tippett. (Home University Library of Modern Knowledge, No. 156.) Pp. v+184. (London, New York and Toronto: Oxford University Press, 1943.) 3s. net.

FEW sciences are more difficult to present in a concise and readable manner than statistics, which is regarded as a symbol of all that is dull and devoid of human interest. "What you've got," says

Idaho Green in one of O. Henry's stories, "is statistics, the lowest grade of information that exists." To give the general reader an idea of the fascination of astronomy, biology and even mathematics is relatively easy; but this is the first attempt I have seen to perform that very useful function for statistics.

Mr. Tippett is to be congratulated on having made a success of his undertaking; and indeed, it is hard to think of anyone better qualified to attempt it. His familiarity with both the theoretical and practical sides of his subject, coupled with his interest and experience in the teaching of statistics, have contributed to an excellent Pisgah-view of a complex, dry and extensive domain. He is never at a loss for a practical illustration in point, but does not lose the thread of the main argument as is so easily done in a discussion of statistical examples. Within the limitations imposed by its length—about 50,000 words with a few tables and no algebraic symbols—he appears to me to have done just what is wanted of volumes in the Home University Library, to have given a general review of his subject for those who want to know what it is about and sufficient enticement to those who are likely to want to extend their knowledge further.

Mr. Tippett begins with four chapters on raw statistical material and its arrangement, presentation and summarization. The points he makes about pitfalls in the interpretation of numerical data, elementary as they seem, are so important to the average citizen that one wonders whether some part of this branch of the subject should not be taught in schools. I do not quite share his view about the readiness with which unpublished official information is put at the disposal of the private research worker. There seems to be a school of thought which holds that any material collected at the public expense by public servants for the public benefit should on no account be made public. But perhaps this feeling is coloured by war-time experience. It is to be hoped that after the War the State will realize that as much as possible of the information it collects should be published, or at least put at the disposal of 'unofficial' research workers.

The next group of chapters deals with sampling, probability and statistical laws. A further chapter on statistical reasoning is exceptionally good, and it is a real relief to see someone having a tilt at the prevailing methods of presenting numerical information about the progress of the War. One gets very tired of statements that our production of something or other is ten times what it was a year ago (which means that a year ago it was only one tenth of what it is now) or that the total tonnage of bombs dropped on Germany in some selected period is four times the weight dropped on England in some other period. Considerations of secrecy are admittedly paramount; but all the same censorship covers a multitude of statistical sins.

The concluding chapters deal with statistics in affairs and statistics and the other sciences. Mr. Tippett has only the space to deal with these topics in broad outline, but he contrives to give a very fair impression of the enormously wide interests of the statistician at the present day.

One criticism may be advanced. In the list of books for further reading at the end Mr. Tippett, with misplaced modesty, omits a reference to his own book on "The Methods of Statistics", a useful work which has done a good deal to spread the newer methods among scientific workers.

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