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The Communications Lines and Problems of a Toxicology Laboratory Working for Industry

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The fact that a toxicology laboratory is working for industry has no bearing on the purposes of its work. Like any other toxicology laboratory, it is concerned with the quantitative and the qualitative actions of a chemical in the body. It estimates the magnitudes of tolerated and of excessive contact with or absorption of a chemical, and it elucidates the nature of injury which will result from excessive exposure. It predicts the signs and symptoms by which response to exposure can be recognized and the degree of response to an exposure which is just short of injurious. It furnishes information allowing therapy for excessive exposure to be rational rather than symptomatic.

Unlike other toxicology laboratories, those working for industry have not discharged their obligation when they have published their results in the scientific literature. In industry, toxicological investigation is a staff function, furnishing information which guides the actions of many specialists. The laboratory is a member of a team. The purpose of the entire team is to make a profit by satisfying human needs. The purpose of the toxicology laboratory itself is to see that the commerce and technological advance which the team produces shall not be at the expense of human health. For success it is essential that the laboratory communicate its results and judgments to each specialist on the team in terms which he will understand and act upon intelligently.

The toxicology laboratory is not fulfilling its obligations toward the rest of the industrial team if its work is restricted to successful products which are sold at a profit. Toxicological data are one factor in determining in advance whether or not a chemical can be made safely on an industrial scale, whether it can be packed for safe shipment at a reasonable cost, whether it can be utilized without injuring workmen or endangering the public. The toxicologist should make predictions while the team is deciding whether or not the chemical might be a profitable product, and he must furnish increasingly definite facts, based upon experimental studies, while the rest of the team is exploring the possibilities of making the chemical and the potential value it would have if it became an article of commerce. Using his special knowledge of toxicity, he should suggest modifications in molecules which will reduce handling hazards, in the hope that technical utility will remain. An active industrial team will start the development of many more products than it finally markets. Therefore, the toxicologist, if he serves the team to the maximum,

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Because industry is still conducted by humans, the digital computer not yet having completed its conquest, the development of new product is not always so well integrated with toxicological study as in the previous example. In another hypothetical instance, in the hopes of securing a large annual business with good profits, a firm contracts to supply 100,000 lb. of a completely new, unstudied chemical within 90 days. The toxicological laboratory predicts that handling the material will be quite hazardous and that inhalation must be prevented at all costs. While the first toxicological studies are under way, production planning has to proceed on the basis of the rather alarming prediction. In this instance almost daily communication by telephone must be resorted to in order that adequate precautions may be taken or that modification of the prediction, justified by experimental results, can allow changes in production plans soon enough to meet the promised delivery time.

Communication

It should be clear from the two examples that the toxicology laboratory working for industry must have ready communication with all other members of the industrial team. The most penetrating and thorough toxicological study is useless if its results never reach the man who needs them, if they do not reach him soon enough, or if they reach him in terms he does not understand. Communication can well be a full-time job. There are four basic problems to be solved:

1. What compounds shall be studied?
2. How much work shall be done on each?
3. Who shall be told the results?
4. How shall the results be expressed?

Probably every compound planned or made by research and development laboratories should be considered by the toxicology laboratory, at least to the extent of making predictions about handling hazards. If the compound is of sufficient interest for the firm to offer samples to customers, then its acute toxicity should be estimated by range-finding methods. This should be completed and predictions should be made about chronic toxicity before any of the compound is sold. The toxicology laboratory must have communication lines with research, development, and sales personnel good enough so that it can furnish predictions and start studies before possible ignorance leads to injury. These lines may well pass through a central medical department, although the exact routing is not important as long as free undistorted communication takes place in both directions. Whatever the formal routes of communication, frequent personal contacts are necessary to allow communication of attitudes, inferences, and speculations too vague to be put onto paper. One must be on guard against a feeling of security from past satisfactory verbal contact, because rapid promotions in industry often take a thoroughly indoctrinated chemist out of a key position where he directly applies toxicological facts and bring in one to whom the toxicological laboratory is a stranger.

The amount of more detailed toxicological study which a product receives should be proportioned to its probable uses, to the degree of human exposure in its use, to the degree to which it reaches the consuming public, and to the magnitude and subtlety of its toxic effects. In advance of actual handling of the product, there should be obtained sufficient information to demonstrate the degree of care required to make that handling safe.

The results of toxicological study should be widely disseminated within the specific industrial establishment, so that they are available to everyone who is responsible for safe handling and to everyone who makes decisions upon the sales and the future of the product. It is easy to reach the man who knows he needs toxicological opinion, but only constant vigilance will reach the man who is not aware of his need. Toxicological information should be furnished to every customer, because the supplier is responsible for seeing that the customer has the facts to allow safe use. The more direct

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One of the greatest scientific problems of any toxicology laboratory, not uniquely the industrial laboratory, is the question of joint toxic action. Is the new chemical under study simply additive in toxicity to those already being handled, or does it potentiate the effects of something already in the environment of some persons? There are as yet no rules for predicting potentiation. In the face of the insuperable task of testing a new chemical in combination with every other chemical, the industrial toxicologist, like his academic brother, usually can do nothing except try a few particularly suspicious or frequent combinations.

Summary

In summary, over and above the question of sound technical methods, there are three outstanding problems of a toxicology laboratory working for industry which are absent or trivial in other toxicology laboratories. Its work must be paid for with profits, but it should have the freedom to study many compounds which will never earn a profit. In order to handle urgent problems expeditiously, its staff and facilities should be larger than can ordinarily be utilized fully. It should learn of the plans of research and development laboratories before these groups believe they require toxicological opinion, and it should see that toxicological data are in the hands of all who require these data in terms which are meaningful to the recipients, even when they do not recognize their need. Only when some approximation to the solution of these problems is attained is the industrial toxicology laboratory reasonably well fulfilling its functions.

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