The Principles of Humane Experimental Technique

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CHAPTER 4

THE SOURCES, INCIDENCE, AND REMOVAL OF INHUMANITY

The three chief principles stated...

Direct and Contingent Inhumanity

After ascertaining the nature of all experimental procedures practiced, and the quantity of animals each employs, the logical next step would be the examination of each procedure in turn, by precise criteria developed along the lines of Chapter 2, for its degree of inhumanity. The former task is barely begun, and the latter will be a long and difficult one. Nevertheless, we may clear the ground by some general considerations, and glance at some of the major procedures shown to be in use. If really general principles could be established, the detailed ad hoc analysis of each special case might turn out to be superfluous.

We must first distinguish direct and contingent inhumanity. By the former, we mean the infliction of distress as an unavoidable consequence of the procedure employed, as such, even if it is conducted with perfect efficiency and completely freed of operations irrelevant to the object in view. (It does not, of course, follow that a given procedure is the only means of obtaining the desired information, or that it cannot be replaced by a less directly inhumane method--cf. Chapter 7.)

By contingent inhumanity, on the other hand, we mean the infliction of distress as an incidental and inadvertent by-product of the use of the procedure, which is not necessary for its success. In fact contingent inhumanity is almost always detrimental to the object of the experiment, since it introduces psychosomatic disturbance likely to confuse almost any biological investigation (cf. Chapters 1, 2, 6 and 7).

The incidence of contingent inhumanity will include the results of every conceivable kind of imperfection in the husbandry of laboratory animals (including such special but important cases as that of animal transport). Where chronic experiments over days or months are concerned, we cannot even in principle separate husbandry from the conduct of the experiment itself. For husbandry means keeping the animals alive and healthy for long periods, and this is an essential part of, say, a nutritional experiment. This is why the contribution of animal technicians is so important for the progress of humane experimentation, even when they do not themselves carry out actual experimental procedures such as the administration of drugs. In connection with husbandry, the UFAW Handbook (Worden, ed., 1947; Worden and Lane-Petter, 1957) has performed a supreme service. Moreover, the activities of the L.A.B. itself (cf. its annual Collected Papers) are constantly directed to reducing contingent inhumanity due to imperfect husbandry, which has long been recognized to be wholly undesirable from every point of view (e.g. Parish, 1953). We shall not discuss it here, except to note its interactions with the problems and policies of humane experimental technique.

Husbandry is a factor for contingent inhumanity in all types of experiment. But this form of inhumanity may also arise in a great many special ways, associated with particular procedures, and of varying degrees of generality. For instance, postoperative shock is a contingent hazard in all procedures employing surgery. In this context, the development of anesthetics has been the greatest advance in the removal of contingent inhumanity, but their use raises many new problems (cf. Croft, 1957a, d, e). Again, where procedures inevitably impose physiological stress upon the anima (Selye, 1949; Sayers, 1950), something even more may be required (peculiar to each instance) than even "perfect" husbandry, in the sense of husbandry of unstressed animals. The sort of savoir faire and special consideration required is an important aspect of experimental efficiency, not at present as prominent as it could be in the formal training of experimental biologists. This is really separate from our main theme, and warrants investigation in its own right. The encouragement of information exchange and general education in this field would be a problem intermediate between the general one of husbandry and our present study of experimental procedures as such. Bridging the two, it might well assume great importance. We shall, in fact, consider some aspects of this problem later, especially as they have been brought into focus by the work and ideas of Chance (see Chapter 6).

Of considerable interest here is the problem of contingent mortality--that is, mortality which is not part of the experimental intention. This may be brought about by defects in husbandry (cf. Lane-Petter, 1956, 1957a; too many rats, in particular, seem to die from 'natural causes'). It may also depend on details of experimental procedure, which can be altered to reduce it. We may mention in this context some data derived (by

W.M.S.R.) from the L.A.B. survey returns. Questions were asked about losses of animals (apart from deliberate killing for experimental purposes, or as a specific result of administering test pathogens). Among the replies, the following observations were reported from seven laboratories (one from each):

Guinea Pigs

Out of 4,357 inoculated (milk: 3,878; human material: 479) 105 died. In the same year, 110 stock animals (unused) died out of about 200.
Out of 840 inoculated, 21 died (cause unspecified). In the same year, out of a smaller number, 57 stock animal died.
Out of 628 inoculated for TB, 38 died--"mostly" due to the inoculation.
Out of 1,200 inoculated, four died of pneumonia (not necessarily as a result of the inoculation).
Out of 1,800 inoculated with milk for TB, 14 died "from contamination of inoculate--old, dirty milk etc."
Out of 145 inoculated for TB, 18 died "after injection".

Mice

Out of 2,050 mice used for Ascheim-Zondek (human pregnancy diagnosis), 123 died on account of toxic urines.

These examples show that when certain procedures are competently carried out, contingent mortality can be gratifyingly small. In several cases, what there was of it did not differ significantly between test and unused animals, and can, therefore, be ascribed to very slight defect in husbandry, rather than in the experimental procedure itself. Deaths in P.D. tests due to toxic urines can, however, be largely eliminated by suitable chemical treatment of the urine, such as is regularly applied in the Hogben test (Landgrebe and Samson, 1944; Hobson, 1952). As a final example, we may cite from the same source another return:

One laboratory using rabbits for antiserum production "at one time had a few losses from anaphylaxis. This is now avoided by careful grading of antigen doses." They also encountered sterile abscesses when alum precipitated proteins were injected intramuscularly. This was solved by substituting alginate injections intraperitoneally.

Here is an excellent example of the removal of special contingent inhumanity. Much of the history of experimental biology has turned on such improvements in technique.

In assessing and classifying procedures for their degree of direct inhumanity, we cannot take into account the risk of the contingent type. (There is one important exception to this principle.) The simplest and most innocuous procedure applied to small numbers of animals can obviously result in distress when in incompetent hands. For instance, if hygiene is imperfect, animals used for the relatively trivially inhumane purpose of bleeding or innocuous serum production can develop unpleasant sores at the injection or bleeding site. But it would be illogical and confusing to condemn a reasonably humane procedure on this ground. In a rational program of improvement, two policies would be combined: every effort to spread the blessings of general experimental efficiency, and a reasonable scale of priorities in the scrutiny and improvement of procedures in themselves. In the analysis of direct inhumanity, therefore, we assume a priori that any procedure to be classified and discussed is conducted with perfect efficiency.