# The Principles of Humane Experimental Technique


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## CHAPTER 7

## REFINEMENT

... endless forms most beautiful and most wonderful have been, and are being evolved.

## The Choice of Species

Among the most important variables in the determination of procedures is that of the *species* of animal to be used. It is just because it includes a wide knowledge of the special advantages of particular species for particular purposes, that a formal or informal training in zoology has again and again proved its mettle in the progress of medical research. (One need only consider how many years the progress of neurophysiology would have been retarded, if a zoologist called J.Z. Young had not gone to Naples in the thirties to study the comparative cytology of cephalopods.) As Pantin has stressed (1952), nature has been inexhaustibly prodigal in supplying us animals specially fitted for almost any conceivable experimental purpose. Where these rich ores are concerned, it becomes vital to know where to tap.

In choosing between procedures, indeed, one problem is of special importance, and we shall single it out for attention in this chapter. This is the question of matching the choice of animal species used with the requirements of the investigation. (It is another expression of the principle employed in planned breeding *within* species.) Matching does not, of course, stop here. The choice of species may, in turn, dictate the finer details of procedure. To take a simple example, if we choose to work on a clawed frog, and wish to destroy its brain, we should be ill-advised to pith it by the method perfectly suitable for the common frog, which has a different kind of neck articulation (Murray and Russell, 1951).

This subtle matching of procedure to species, and species in turn to objectives, is more significant than appears at first sight for the humanity of technique. For the only alternative is to try to correct the mistaken choice of a wrong species by forcing it to conform to the requirements of the investigation. This results in just those roundabout methods we should guard against, and is all too liable to end in gross inhumanity. It is

the method of Procrustes, and Procrustes would have been less deservedly unpopular if he had selected his guests instead of dissecting them.

With all this in mind, we cannot but marvel at the present large-scale choice of laboratory species. Out of the almost astronomical number of vertebrate species, only a minute selection is employed. Reference to the tables (Tables 4 and 5) makes this assertion more precise. The list includes about 20 mammal species, three bird species, about four reptile species, half a dozen or so amphibia, and half a dozen or so fish. Of the mammals, only about half the species are used in numbers over 1,000 *per annum,* of these in turn the overwhelming bulk is made up of the four chief species (mouse, rat, guinea pig, rabbit), and of these, finally, more than two-thirds are mice. The degree of concentration is astonishing.

One special aspect of this may further be noticed--the trivial use of the lower vertebrates, which make up, on the most generous estimate and allowing for failure to return some of them, less than 5% of the total. The bulk of even this small contingent is again made up by a few species, notably chickens, pigeons, frog species, and clawed frogs. The use of these favorites is extremely specialized; thus chickens are used very largely for nutritional and chemotherapeutic work, and clawed frogs in pregnancy diagnosis and endocrinological research. This very division of labor is itself an application of the principle of matching species to objective, and applies to most of the species in use, mammalian and non-mammalian (Tables 10, 11, 12, 13). The wonder is that since the principle is applied at all it is not applied on a more generous scale.

The vastly greater usage of the commoner mammal species, when compared with the variety of lower vertebrate species available, cannot be ascribed simply to the relative ease with which they are to be kept and bred. If this property were not also found in many bird and fish species, there could hardly be such flourishing bird and fish fancies. The predominance of mammals can, indeed, only be explained, (Russell, 1957b) as yet another expression of the high-fidelity fallacy. But all the arguments we adduced for the use of discriminative models apply with no less force to the choice of vertebrate species than to that of absolute replacing techniques.

Thus far we have generalized. We shall now seek to illustrate some of these ideas, by systematic discussion of a concrete problem (based largely on Russell, 1957b).