the equality of the two transference numbers but in writing their equation (b) they have made the further implicit assumption that these numbers are both 0.5 so that other ions, and particularly the charged colloidal ion, can not cross the boundary. Obviously both ions can have equal transference numbers (e.g., 0.4) and other ions non-zero ones [in this case $1-(2\times 0.4)=0.2$].

If the transference numbers of K^+ and Cl^- are both equal to 0.5, the system is poorly suited for the example given. As mentioned above, these equal mobilities imply zero electrical mobility of the charged colloid and therefore its inability to diffuse so that a system is present which needs no membrane to separate it from dilute KCl to form a Donnan system. A membrane is only needed if the colloidal ion is mobile and would otherwise diffuse into the KCl solution.

The assumption of equal transference of K^+ and Cl^- ions is not a reasonable one. In various solutions ions tend to retain their mobilities, and their transfer numbers depend on the product of mobility and concentration. In the example given the concentration of the K^+ ion compared to that of the Cl^- ion increases in going from the KCl solution to the colloid solution. The transfer numbers could therefore remain equal only by very radical and fortuitous departures from ideality.

The driving force of the cell is not only the transfer of salt into the suspension. The colloidal ion in a typical Donnan system can escape through the salt bridge but not through the membrane. It is this tendency to escape and reach uniform concentration that could be measured by the potential of the cell (equal to the restraining Donnan membrane potential) if all other junction potentials were nullified. Salt bridges are an imperfect tool for such nullification and it is because of this imperfection that the potential depends on their salt concentration.

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Dubious Experimental Procedures in Biology

IT is not the purpose of this writing to cast unwelcome reflections upon any particular report or field. It is assumed that most investigators are just as anxious to discover truth as self-appointed critics might be, therefore the considerations offered herewith may interest biologists who use poultry in some form in their experimental work. The writer has seen numerous experimental reports from time to time in which the results could be seriously questioned because of loose assumptions about eggs, chicks, or fowl. Dubious techniques are not limited to any particular academic branch of biology.

Some of the common sources of error may be classed as follows: Genetic, Environmental, and Sampling and Statistical.

Genetic. Investigators should recognize that there is inherent variability in eggs, chicks, and stock within and between breeds, strains, and families. Some of the embryos from some individual hens will die regardless of the treatment given them, whereas those from full sisters may live in spite of the same treatments. Hatchability of some hens is consistently low and vice versa.

Environmental. There is considerable lack of recognition of the possible influence of the environment on performance, including the environment of the parent stock which produces the eggs.

The following possibilities should be recognized more generally: incubation temperature affects embryonic growth rate and mortality; light and nutrition affect embryonic viability; health of hens may affect embryonic and postembryonic mortality; and serological variation has been demonstrated in chickens.

Sampling and Statistical Analysis. It is obviously possible in selecting a small sample of unpedigreed eggs to get all those eggs from a single dam. (A recent investigation report included 5 eggs as a test sample.) There are numerous cases where investigators have spent tremendous amounts of effort and money in refinement of chemical or biological material only to test the materials on small samples of eggs or chicks of unknown history.

The application of statistics in experimental procedures is increasing, but it is not universal as yet. There is room for improvement also in proper usage of statistics. Statistics will not correct mistakes in biological design, however. It should be recognized that a sample of any one breed is only a sample. A breed is merely a man-made specification and not necessarily a biological category.

It is difficult for one individual to acquire from many of our present-day graduate curricula an adequate knowledge of all the factors that might influence an experiment. It is not "cricket," of course, to find fault without suggesting possible remedies. The inclusion of scientifically minded poultry husbandry specialists in investigational teams might help somewhat. It should be recognized that there is a distinction between scientifically minded and academically trained. In some graduate curricula, objectivity is too often subordinated to academic tradition.

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