ON A NEW CLASS OF "CONTAGIOUS" DISTRIBUTIONS, APPLICABLE IN ENTOMOLOGY AND BACTERIOLOGY

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1. Introduction. There are a number of fields in which experimental data cannot be treated with any success by means of the usual "Student's" test and—very probably—by means of the more general analysis of variance z-test of Fisher. It is known in fact [1] that the t-test, as applied to two samples, is only valid when the populations from which the samples are drawn have equal variances. As the z-test is of a nature similar to the t-test, with the difference that it is applied to detect differentiation in means of more than two populations, a similar conclusion seems very likely. Thus, whenever we have to compare means of populations with distinctly different variances, we have to look for some new tests. It may be useful to mention at once two instances in which the situation mentioned actually arises.

As a first instance we may quote certain entomological experiments. Suppose it is desired to test the efficiency of several treatments intended to destroy certain larvae on a field. The experiments are arranged in the usual way. The treatments compared are applied to particular plots with several replications and then the plots (or smaller parts of them) are inspected and all the surviving larvae are counted. Thus the observations represent the numbers of surviving larvae in several equal areas. It happens frequently that, while there is room for doubt as to whether there is any significant difference between the average number of survivors corresponding to particular treatments, there is no doubt whatever that the variability of the observations differs from treatment to treatment.

We have another similar case in bacteriology. The experiments I have in mind consist in determining the bacterial density by the so called "plating method." This consists in taking a number of samples of the analyzed liquid