7. 2. 37

Dear Fisher

The parts of your paper in the P.R.S. which I can understand interest me very much but I could wish that you had spent some space over the meaning of "common" - "rare" etc. You say for instance that environmental variation is not likely to be influenced by density of population and seem to imply that a dense population is equivalent to a common or abundant species. But suppose a species is abundant because it is able to live in a great variety of habitats - is not this just the thing that would encourage environmental variation? And would you reflect further on the terms which have long distracted naturalists. One "common" species may be more or less universally present through various in any great numbers anywhere from a sea beach to the top of the mountains; another may be "common" because under restricted environmental conditions which are not frequent it is present in large numbers. The house sparrow.

My particular interest in the matter
comes from fiddling with snail shells and
some time ago I came across the enclosed
example which I have not followed up -
but I was much struck with the low
variability of a rare species.

I hope all goes well with you

Yours sincerely

A. L. Bagnall.

§ 22. We have dealt so far with the inhabitants of single loci: the study of them is the groundwork of conchometry and a necessary approach to the examination of species. The mean dimension of a *species* is the mean of the means of as many populations as we can examine, aiming again at something like 100. We know enough to be sure that sizes vary considerably even in apparently similar and in adjacent loci. To get the specific size therefore it is not legitimate to mix all the specimens from different loci together, and take the mean unless the numbers from each locus are the same: if, as is hardly avoidable in practical work, they are not, such a procedure gives an unfair bias in favour of the sizes prevailing in the loci represented by the larger samples. And just as the shells we measure are samples of populations, so the populations from which we collect are a sample of all the populations of that species. It is laborious and rather difficult to make this sample adequate and fair: practically populations are needed from loci of different kinds scattered over the geographical area occupied by the species without any undue preponderance of some kinds of loci and some topographical districts. The loci which are likely to be represented in excess are those in which the species is easily obtained in large numbers. We must do the best we can: surveys of districts are a useful step.

Of variabilities a shell dimension of a species has three: (*a*) the coefficient of variation of the mean sizes of many populations (which might be called the "interlocal variability"), (*b*) the mean of the coefficients of variation of many populations (the "intralocal variability"), and (*c*) the coefficient of variation of the coefficients of variation of many populations (the variability of the intralocal

variability). When the data are available it will be of much interest, and I think of considerable biological importance, to determine how far these variabilities are associated with one another in different species. For example, does a high intralocal variability go with a high interlocal variability, i.e. does a species which varies much inside one locus also vary much from one locus to another? As a preliminary example of the kind of data which are needed, multiplied twenty-fold, to answer such questions contrast some figures for *Clausilia biplicata* with some for *Cl. rugosa* (Table X). The former

TABLE X.

	Altitude. Mean.	*V* %	*Diameter.* Mean.	*V* %
Clausilia biplicata.				
Chiswick	16·636	4·8	3·760	2·8
Purfleet	16·745	4·2	3·891	3·2
Cambridge	16·991	4·3	3·741	2·7
Clausilia rugosa.				
Tarleton [1]	8·059	6·1	2·642	2·7
Tower Hill	9·059	6·1	2·538	4·1
Daneshury	9·995	5·6	2·586	3·7
Portmadoc C	10·241	7·1	2·463	4·2
Beddgelert	10·896	5·2	2·450	3·1
Portmadoc D	11·034	7·2	2·568	3·3
Marple [2]	11·169	6·5	2·325	3·7
Portmadoc H	11·473	5·7	2·617	3·9

[1] Collected by the late W. H. Heathcote.
[2] Collected by J. W. Jackson.

seems to be much the less variable species, intralocally and interlocally. The shells from the three loci might indeed have come from the same place as far as their altitude is concerned. Are rare snails less variable than common ones? How do *H. obvoluta* and *H. lapicida* compare?