

THE BIOGEOGRAPHY OF AUCHENORRHYNCHA OF THE MEDITERRANEAN REGION

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ABSTRACT

A general account of biogeographical problems amongst Homoptera Auchenorrhyncha of the Mediterranean Region is given. The different approaches to the problems of distribution are discussed with particular reference to the difficulties in species recognition, phylogenetic relationships and ecology.

INTRODUCTION

When I was asked to give a contribution on the Biogeography of Auchenorrhyncha of the Mediterranean Region, I have to admit that I was not very happy about that subject, because in my opinion our knowledge about nearly all details concerning the biogeography of Auchenorrhyncha in the Mediterranean Region is not yet sufficient to permit a general review. So my contribution might have been very short, containing just that statement. But thinking it over again, I thought it might be useful - at least for colleagues who are not that familiar with biogeographical research - to give some details where and why our knowledge is still that insufficient, and what might be done to improve the situation.

As already known, Biogeography may be approached on two methodical lines which should be kept well separated. First, the "descriptive" line of approach, collecting facts as accurate and complete as possible, and second, the "causal" line, where we try to explain why the facts are as they are. Whereas the first, descriptive line is purely research work, the second line contains many hypothetical elements and is thus much more subject to controversial opinions. As an example, the question as to whether the present-day distribution of certain taxa can be explained by the assumption of ancient land-bridges alone or perhaps just by presently unknown techniques of long-range dispersal possessed by these taxa.

Let us start with the first, the descriptive line, as far as the Auchenorrhyncha are concerned.

One of the aspects of this line is to find out the distribution of each species, that is the area, in which this species thrives continuously. That seems simple, but apparently is not: especially in the Mediterranean Region there are only very few species of Auchenorrhyncha of which we may say that we know their area sufficiently well. This may be due to the fact that there are many regions around the Mediterranean in which no one has ever systematically and thoroughly searched for Auchenorrhyncha - and to find a certain species in a certain region sometimes one has to know how and when to find it. For

example, the Juncus-feeding Delphacid Conomelus anceps (Germar) was not recorded from the Iberian Peninsula by Nast (1972) but my own collections in recent years has shown it to be present in most of the mountain districts and along the Atlantic parts down south to Tarifa. But it is not only a matter of collecting: one should remember, of course, that the basic condition for correct area-recognition of a species is clarity about the taxonomic situation: as soon as we discover that a taxon which was up to now taken for a single species in fact is a group of two or even more species, all former distribution data need to be revised. Again, taking Conomelus as an example: until 1948 this genus was monospecific with C. anceps recorded from many European countries and Algeria. Recent research (for instance Ribaut, 1948, Nast 1965, Remane & Asche 1979) has shown the former C. anceps to be a group of species. The "anceps" records from Italy, the Balkan Peninsula and Asia Minor apparently do not belong to anceps, but to several of the newly described species.

Besides these changes due to progress in research one has to be aware, of course, of a certain number of traps and difficulties when trying to find out a species area. Some of these are:

1. Inaccurate locality records. An example for this are apparently many of the records from Tunisia and Algeria published by Fokker (1900), Melichar (1899) on specimens collected by Schmiedeknecht - his samples from the Mediterranean seem to have been mixed with specimens collected near his home in Thuringia, Central Germany.
2. Incorrect identifications. Some of them are just due to carelessness. All records of Metropis latifrons Kbm. given by Servadei (1968) from Italy are in fact Metropis latinus Linnavuori. How did that happen? Metropis latinus was described by Linnavuori after specimens which had been sent to him by Servadei. Well, these specimens were recorded by Servadei as latinus - the specimens he had not sent were recorded by him as latifrons: by this there exist records of a broad sympatric occurrence of both Metropis latifrons and latinus in Italy. This does not meet the facts: these species replace each other geographically. Another reason for misidentifications are specimens, whose size, colour, genital structures and even drumming organs have failed to develop perfectly due to parasitic castration commenced in their larval stage. In some cases seasonal variation or polymorphism in shape and colour have led to misidentifications as well: records of Euscelis lineolatus (Brullé) based on "short day morphs" (Müller, 1954) very often concern other Euscelis-species with short day morphs such as alsius Ribaut, ononidis Remane, remanei Strübing. Finally, we should remember that some specimens cannot be identified at all. In several systematic groups females and nymphs cannot be identified down to species-level at present.

3. Incorrect synonymies. Just one example: Liburnia segetum Haupt, 1927, from Palestine, was synonymised by Nast (1975) with Corbulo tangira (Mats. 1940) from Morocco - a re-examination of the type specimen has shown this synonymy to be incorrect (unpublished). We have no records of Corbulo tangira in Palestine.
4. Incorrect descriptions. These, published even by recent authors, do not permit a safe identification of that taxon. Sometimes new species are described on specimens with teratological structures, very often caused by parasitic castration, as mentioned before.

To summarise: more work will be necessary until we know sufficiently well the distribution of many of the Auchenorrhyncha species of the Mediterranean Region - but all that gives correct results only if the taxonomic base is in a correct state, and that, in my opinion, needs a lot of improvement as well.

A second aspect of Biogeography is "Systematic Biogeography" which seeks to examine the distribution pattern of groups of related species, for instance the question whether two closely related species occur in the same site or not (sympatric or allopatric type of distribution), or the question, in which geographical region there is to be found the greatest number of species of a systematic group.

To do so, all questions mentioned under the first aspect have to be taken into consideration. In addition, phylogenetic research must have been done to prove not only the monophyletic status of the respective systematic unit, but to find out the phylogenetic interrelationships of its members. I am convinced that the only way to do this is by a careful cladistic analysis, as demonstrated by Hennig (1966): only characters which are to be secured as synapomorphic (that is, common derived) are apt to prove the closer relationship of the taxa possessing these special characters. Auchenorrhyncha systematics in general do not yet meet this standard: to a great extent it is a mere classification, not apt to be used as basic data for research in Systematic Biogeography. Creation of new supraspecific taxa not based on cladistic analysis is not very helpful, for instance those new tribal and generic units recently published by Dlabola in the Issidae (Dlabola, 1980).

A third aspect of descriptive Zoogeography is the faunistical: a selected region is examined to find out the number and kind of taxa inhabiting it. An analysis can be given of the taxa living in this district as to their distribution - for instance, whether they live only within that region (endemic), or show a wider distribution or may have been artificially introduced. Here again, the basic knowledge mentioned under the first aspect has to be available, as well as that about phylogenetic relationship, if relevant faunistic analysis is supposed to result. As mentioned before, the present-day situation in faunistic research is very unequal: some countries are well worked, others are not. If, for instance, you take the Nast 1972 checklist and start counting how many - let's say Delphacid - species are

recorded from each of the Mediterranean countries, the species-numbers given for some of these countries will be far from reality: the number of Greek Delphacid species given by Nast (1972) is thirteen - recent research by Drosopoulos, Asche, Hoch and myself has brought this number up to more than one hundred by now. The Mediterranean Region as a whole cannot be classified as "well worked", as I have already mentioned at the beginning of this contribution. So far for now on the descriptive line of Biogeographical approach - as shown, in my opinion a lot of careful, reliable basic research will be needed until we may say we now know the present-day distribution of single species as well as of supraspecific phylogenetic units. This knowledge is needed for recognising changes in the distribution of species, for instance extensions or regressions of their area. Such changes in distribution need to be explained as well as the distribution-pattern of a species or of the taxa of a phylogenetic unit - and now we are in the midst of the second approach to Biogeography, that is the causal one.

In most of the cases the present-day distribution of a taxon can be explained by the distribution of the ecological situation recognised by that taxon - the taxon is to be found in all those places where ecological conditions are suitable for it, its spread potential is sufficiently high to reach new favourable sites very soon. Nearly all our crop pest-species like Laodelphax, Sogatella, Cicadulina, belong to these species with a high spread potential.

But finding out the ecological requirements of a taxon is a time-consuming task - quite a lot of experimental work has to be done, even if we assume the specimens of a species all to react in the same way - which they certainly do not. Very few Mediterranean Auchenorrhyncha species have been examined to that extent so far. As you may know, it is not only necessary to know a taxon's requirement concerning abiotic conditions and foodplants - diseases, parasites and competition with other species might be at least as important.

Sometimes a taxon is missing in places where we would expect to find it and sometimes we find a taxon having a "disjunct area": it is found in two or more sites so far from each other that we hardly can imagine specimens of that taxon to travel regularly or even at all from one site to the other - sometimes closely related taxa are distributed in a way as if their areas were remnants of a larger one, united in former times. Well, all these facts seem to need a historical explanation rather than an ecological one, though ecology is always involved: a low spread potential possessed by a taxon is one of its ecological characters.

Especially the latter cases mentioned here are to be explained mainly historically. Changes in the ecological environment have been quicker than these taxa were able to keep up with by evolutionary change towards the new situation: they stayed in the remains of their former biotopes, now showing a "relict-type" of distribution. In some cases speciation has occurred amongst the separated populations of what formerly had been a single species. How and when these events - regression as well as speciation - took place, can be guessed only,

and for Europe and the Mediterranean region the glaciation periods might have played an important role. Nevertheless, extreme caution is advisable in trying historical explanations for present-day distribution-patterns - historical changes might have been far more complex than we can imagine today.

In spite of all these difficulties - biogeographical research on Auchenorrhyncha of the Mediterranean Region could be an interesting and rewarding task. A lot of research is still to be done!

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