Recent zoogeographical research in Central Europe: from mapping programs to ecological interpretations

by Jürgen H. JUNGBLUTH

The period of zoogeography prior to the beginning of modern mapping programs

Chorology (faunistics) and historical zoogeography are the oldest disciplines in zoogeographical research. Geologists and paleontologists were mainly interested in historical zoogeography for this discipline was expected to provide data concerning plate tectonics. However, because such data did not accumulate in a sufficiently rapid and reliable way, interest in historical zoogeography declined steadily.

Chorology research, on the contrary, developed from a discipline dealing with vague distributional data to a discipline in which precise locality data are processed by computer technology. Furthermore the fixation of areas was important, leading as well as from a more historical and statistical point of view to the definition of types of distribution while dynamical starts also led to the coining of centres of dispersal and types of dispersal (tendencies of dispersal). These are two important steps in the development of zoogeography.

This phase of zoogeography can essentially be characterized by the question: *Where does which animal species exist?* or in a zoogeographical-coenological way: *Where do which animal communities (coenoses) exist?*

The period of installing survey programs throughout different countries

In spite of the fact that in different sections of zoogeography several attempts had been undertaken to survey animal species or whole animal groups in a supranational way, these attempts have been restricted as a rule to selected species or geographically.

Different attempts to design, organize and carry out extensive mapping programs have been strengthened after the second World War only. These developments are found in Botany and in Zoology, at national and international levels. In some countries the attempts of international cooperation go along with the time of stagnation of faunistics to their prevailing declining development.

In numerous countries national mapping centres alongside with the European wide programs of the *European Invertebrate Survey* (E.I.S.) are being founded, they start with their work of coordination and enforcement and reach respectable mapping results in a relatively short period of time. The centres of Monks Wood (England), Gembloux (Belgium) and Leiden (the Netherlands) have to be named especially. Other such centres follow, e.g. Neuchâtel (Switzerland) or institutions fulfill similar tasks like the University of Linz (Austria). In other countries different trials to establish national mapping centres fail as in the Federal Republic of Germany (former countries, compare JUNGBLUTH, 1984; JUNGBLUTH, BÜRK & BERGER, 1982).

Work of national mapping centres can be promoted via the publication of results and by support of international societies in special fields. In this context the program of the survey on molluscs of *Unitas Malacologica* for Europe has to be cited. It is to hope that under the pression especially of heavy environmental changes up to catastrophical events (like tanker accidents or the pollution accidents of Sandoz in the river Rhine) understanding will grow. National mapping centres should be able to store and analyse biological data which could serve as a basic information for an estimation of developments of the environment of any kind and as an indispensable basis for the analysis and installation of counter concepts.

The work, so far being carried out at the national mapping centres should give reason for further and more intensive support and, at the same time, inspire the thougth to about where such centres do not exist so far. At a time of growing coordination between data banks and in respect to the fact of the establishment of the common market within the European Community, the establishment of national mapping centres within all the countries of the EC, should be initiated. Alongside with existing technical means and needs in respect to a basic change of environmental policies a coordination of national mapping centres to an European data bank of flora and fauna must be demanded. Naturally, this can only happen with the support of the European Commission.

The amount of knowledge and experience, which has been stored in the national centres for decades should be considered and efficiently utilized.

The "postfaunistical period" or the change of role of chorological mapping programs to a "Zoogeography on an ecological basis"

While in faunistics, the chorological section of zoogeography, distribution data have only been recorded in a global way at the beginning, locality data were more exact in later times. Locality records were reported not only in a more precise way, by description of the locality or its position in the geographical region or with geographical coordinates, but by report circumstances of the record, e.g. the mentioning of the accompanying plant and animal species or the societies (coenoses) etc. This means that first attempts are being made to record the habitat of an investigated species at the same time. This puts the question of such surveys from an autecological (idiographical) level to a synecological, or holographical, and therewith higher level. We herewith approach a holistical view, already demanded by THIENEMANN (1956) and others. At the same time zoogeography and geography get closer (compare JUNGBLUTH, 1978).

First attempts within zoogeography to overcome the level of idiographical view to higher levels by putting a [syn]ecological question in the foreground date from DAHL (1921-1923) and HESSE (1924). HESSE described the difference betweeen an ecological and zoogeographical proceeding as follows: "... Not every locality of a biocoenosis is at the same time a habitat in a biogeographical sense ..." and furthermore: "... biogeography cannot split as far as ecology can when considering a biocoenosis. The habitat as a biogeographical unit is a feature in the face of the earth, it covers an area of certain physiognomical value like a landscape which more or less shows us within a different environment as a characteristical singularity of the description of a piece of the surface of the earth ...". In this context it may be mentioned, that DE LATTIN (1967) has also pointed out that historical and ecological zoogeography are not contrary but rather supplementary towards a complete understanding of causalities of organisms.

Going back to concepts of an ecological zoogeography which can be summarized by the question: "*Why does a species exist at a certain locality?*" it has to be asked, why didn't ecological zoogeography proceed in addition to first concepts after the publication of the two basic works of F. DAHL and R. HESSE? Shortly afterwards the vehement development and subdivision of biology into special disciplines took place, primarily concentrated in physiological fields, and later on studies of ultrastructures etc. Classical disciplines, to which zoogeography belongs, lost influence and importance in research and education at the universities (the institutions of education in these fields). Another reason might have been a difficulty of its own. Zoogeographical work demands, as a prerequisite apart from a knowledge of geography, a comprehensive knowledge of the groups of animals concerned which implies a knowledge of a species and the ability to determinate it.

Once more within Germany, an increase of zoogeographical studies can be registered after the Second World War, which however, did not last. Within the Federal Republic of Germany a breaking off of faunistical tradition in numerous sections of special zoology as well as for numerous groups of animals can be registered, beginning by the end of the sixties at the latest. For this reason efforts for a sufficient German participation in the EIS-program, which started at Saarbrücken in the beginning of the seventies must have failed (MÜLLER, 1977).

Knowing this, one might ask the question, whether the elaboration of distribution maps can be the only goal of national and international mapping programs?

Let us first examine which kind of work is necessary to achieve maps of distribution? They demand comprehensive surveys and interpretations of data. Data come from museums and private collections, records of private excursions, oral information and letters, literature and the so called "grey literature" [unpublished studies, samplings by governmental offices, unpublished expertises, etc.].

Costs and efforts to be undertaken, for a so limited and singular utilization can't justify the expense.

Here we have to follow the direction of an ecological zoogeography already shown by F. DAHL and R. HESSE and also by G. DE LATTIN and energeticly go on. To the question, asked in the beginning "*Why does a species occur at a certain locality?*", another question arises increasingly: "*Why doesn't a species occur at a certain locality anymore today?*". Disappearance of species, with an increasing tendency, are well known, the causes are frequently unknown. This has lead to the publication of Red Lists, which get larger with every edition. In this case ecological zoogeography can produce results which can help to understand these phenomena.

This means, that ecological questions have to be followed alongside with chorology which by no means has to come to an end. Once more I would like to cite DE LATTIN (1967), who distinctly gave his opinion on the decrease of species and on the necessary consequences already at that time:

> "There is only one solution - which admittedly must be a measure of emergency. It is important to come very rapidly to inventories of species as closemeshed as possibly in all areas threatened at different localities to be able to use later on maps of distribution (possibly stored in a central archif [sic !]) for all kind of biogeographical work, going beyond mere chorology. This is a kind of work with no spectacular scientific merits to achieve, but which must be done in order not to allow that the basis of an entire discipline of natural science gets lost. It is to be hoped, that enough suitable scientists are prepared for this task." (DE LATTIN, 1967: 447-448).

DE LATTIN also has distinctly pointed out, that the necessary financial means would have to come from national and international authorities in charge, for without means such comprehensive problems couldn't be countered. This so far has happened in some countries only, an international unit - with international support - has still to come. I won't conceal to you that the success of mapping centres and programs basically depends on the scientists involved. They have to engage clearly in administration beyond to the duties in their specific scientific field and when necessary, also in politics. Otherwise they won't find support and sponsors.

Prospects: What does the forgoing exactly mean in respect to the work of national mapping centres and mapping groups?

> They have to make it clear to the public, to their employers and especially their sponsors, that their work doesn't consist in making dots on distributions maps. But they must not forget on the other hand, that this is a presupposition for further steps in the framework of ecological zoogeography.
>
> By extension of the mapping conception to a *survey- and biomonitoring conception*, using modern methods of data handling, data stocks could be build up and be kept ready. In running them regularly they could supply information about the situation of flora and fauna at any time. Up-to-date information of the situation and the quality of habitats, biocoenosis and ecosystems could finally be asked for by getting hold of species, which serve as bioindicators.

As a last point I would like to present a result of something from my own conception.

> The E.I.S.-Symposium in Saarbrücken in 1972 initiated a conception of mapping molluscs in the Federal Republic of Germany, which comes to its final phase today. Asking for necessary funds was most difficult while there is still no trend for zoogeography in this country. For this reason we have thought very early about what to do with the data and to whom they might be useful.
> We first thought about nature conservation authorities as adressee for our results. For this reason "Preliminary Atlases", "Preliminary Red Lists" and "Regional Malacozoological Bibliographies" were prepared and published.
> Similar to the British Atlases we first published maps and data sources. This started about 15 years ago. We are able today, our first "Preliminary Atlases" at hand, to publish "Preliminary Atlases" somehow more complete together with explanations and illustrations. This will further be improved when the mapping scheme comes to an end. The "Preliminary Red Lists" have been a good advertisement because they were based on a considerable amount of data due to the mapping schemes. They are not to be missed as an instrument to raise funds. The "Regional Malacozoological Bibliographies" are now funded by means of responsibles from the documentary section.

We still have thougths about whether these results are sufficient for the target of a mapping scheme and whether they justify the efforts and costs. We do believe that it isn't enough, it still has to be more.

Our considerations and experience led us again to the demands of F. DAHL, R. HESSE and G. DE LATTIN.

We look at the mapping work, being done so far as this basic step to collect, study and evaluate data. While this has to be called chorological work we have extended our conception. We see three stages at the moment:

I. To secure Chorological Proof
- to survey, study and evaluate all kind of data, including such of own field research for species distribution.

II. Examination of the Ecological Situation of Habitat
- to examine the distribution data of a species in the field - sampled by securing chorological proof - together with the investigations of populations and the situation of the habitat.

III. Projects of Species Conservation
- the results of examination of the ecological situation of the habitat deliver data for the installation of projects of species protection which then have to be accompanied by scientific studies.

By this, work also being done in national mapping centres, is transferred from the chorological level to ecological zoogeography as the next higher level and gets close to a holistic view in the sense of August THIENEMANN.

It is my opinion, that this is the future path of zoogeography - namely *ecological zoogeography* - and that it will lead to successful work of national mapping centres on the way to an international union. Following this path, it would at the same time enclosure them of a better acceptance by their employers and funders and should lead to the prompt establishment of such centres in those countries of the European Community that are still lacking them.

Acknowledgements

I'm indebted to Dr. Harald SCHREIBER, Schwerpunkt Biogeographie der Universität des Saarlandes, Saarbrücken for the English translation of this paper and more to my wife Christa for leaving time to prepare it and to take part in this symposium.

References

DAHL, F., 1921-1923. Grundlagen einer ökologischen Tiergeographie. Jena, Teil 1, 113 pp., Teil 2, 122 pp.

HESSE, R., 1924. Tiergeographie auf ökologischer Grundlage. Jena, 613 pp.

JUNGBLUTH, J.H., 1984. Zur Problematik der Durchführung faunistischer Länderkartierungen bei Wirbellosen mit Beispielen aus der malakozoologischen Kartierung der Bundesrepublik Deutschland. *Verh. Ges. Ökologie (Bern, 1982)*, Göttingen, 12: 331-336.

JUNGBLUTH, J.H., 1978. Der tiergeographische Beitrag zur ökologischen Landschaftsforschung. *Biogeographica*, 13, 345 pp.

JUNGBLUTH, J.H., BÜRK, R. & BERGER, J., 1982. Zehn Jahre Molluskenkartierung in der Bundesrepublik Deutschland. Beispiel einer faunistischen Modellkartierung. *Natur u. Landschaft*, 57: 309-318.

LATTIN, G. DE, 1967. Grundriss der Zoogeographie. Stuttgart, 602 pp.

MÜLLER, P., 1977. Erfassung der westpalaearktischen Tiergruppen in der Bundesrepublik Deutschland. *Decheniana*, 130: 229-253.

THIENEMANN, A., 1956. Leben und Umwelt. Hamburg.

Jürgen H. JUNGBLUTH
Projektgruppe Molluskenkartierung
Am Vogelsang 16
D- 6918 NECKARSTEINACH