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Claes Andrén and Göran Nilson (eds.)

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28–29 JANUARY 1982 (11 ABSTRACTS)

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Edited by

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ABSTRACT

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The first symposium day was devoted to presentations of European herpetological congresses held during 1981 and to mapping projects going on in the Nordic countries. Symposium reports were given from the "First herpetological conference of socialist countries" in Budapest (Wolfgang Böhme, Bonn), "First ordinary general meeting of Societas Europea Herpetologica (SEH)" and "Annual meeting of Deutsche Gesellschaft für Herpetologie und Terrarienkunde (DGHT)" in Vienna (Göran Nilson, Göteborg) and from the "International herpetological Congress" and "2nd European chelonian symposium" in Oxford (Torkel Hagström, Göteborg). Contributions during the second symposium day included general Nordic herpetology.

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CONTENTS

Theories about the distribution of the Agile Frog *Rana dalmatina* in Sweden

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The Agile Frog *Rana dalmatina* has its main distribution south of 50°N in Europe. Small isolated populations occur in northern Germany, southern Denmark and southern Sweden (Arnold & Burton 1978). The distribution in Sweden covers one isolated area in southeastern Skåne, an area in Blekinge and southeasternmost Småland and finally the island of Öland where the species extends just beyond 57°N (Gislén & Kauri 1959, Berglund 1976, Ahlén & Berglund 1980).

According to Pfaff (1945) the Agile Frog probably reached Denmark and Sweden in the period of land connection with the continent and when deciduous forests prevailed. The former more continuous distribution was believed to shrink to the present fragmented areas as a result of climate deteriorations. Starting from this theory there seems to be no easy explanation to the present day distribution in Sweden. Why is it, e.g., lacking in the area of deciduous woodlands of southwestern Skåne? Why is the remaining population in eastern Skåne living just only in the actual area where it is found today?.

The distribution area in eastern Skåne was surveyed in detail during 1978-1981, resulting in 48 breeding localities, at least 29 of which were judged to be regularly used. The area is probably divided in two sub-populations, one covering 65 km^2 and the other 10 km^2. The habitats surrounding the breeding waters were studied as to topography, vegetation and local climate.

The breeding localities are generally found in more or less open deciduous woodland or in open ground close to such forest. Spruce plantations occur in some localities but in no case was the water surrounded by spruce.

The Agile Frog is the earliest frog to breed in spring in Skåne, and it was found that the waters used by the species often lost their ice and warmed up earlier than many other similar sized waters in the neighbourhood. The importance of early breeding could

be seen against the fact that larval development takes a longer time than in *Rana arvalis* and *Rana temporaria*. The early phenology and favourable local climate in the *Rana dalmatina* waters could to some extent be explained by surrounding vegetation, but also to topography and in a few cases to ground water coming out in slopes.

Meteorological measurements were carried out in 1980 and 1981 including data on temperature (in air and soil), wind, humidity and radiation. The investigation in 1981, carried out by Mattsson, Olsson & Tundo (1982), was designed to compare the local climate in a deciduous wood (including an Agile Frog locality) with a spruce wood and an open grass meadow.

The temperature, both day and night, was generally higher in the deciduous wood. The difference was most pronounced in periods of good weather in the spring before leaf-burst. The naked twigs do not hinder insolation but keep the air relatively still in days with low air velocity and retain the warmed up air throughout the night. The difference in local climate between this type of deciduous woodland as compared to open land and spruce forests was at most in the range 3-4^{o}C, which corresponds to a macroclimate difference in spring between areas approximately 7 latitude degrees apart (Ångström 1958).

This could explain why the species can exist in isolated areas far to the north of its main range in Europe. However, the absence of the species in areas with similar habitats, e.g., in southwestern Skåne, needs an explanation.

It is proposed that the present distribution area in northeastern Skåne, lying on the slopes of a mountain plateau, represents an area where suitable habitats have existed with historical continuity. The southwestern deciduous forest area in Skåne, however, to a large extent consists of secondary woodlands and plantations established on more or less open ground. It is known that cultivation and excessive grazing devastated much of the ancient woodlands of this area 100-200 years ago.

The last part of this theory includes an alternative. The increasing lack of wood as fuel that followed devastation of woodland probably resulted in increased exploitation of peat in small bogs and fens. Almost all small water bodies in the forests of this area that exist today have an open water table due to peat digging. This means that the number of waters suitable for breeding might have been very limited before 1850 and in any case most small wetlands were severely affected.

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The importance of protection of isolated endangered reptiles and amphibians.

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Several Europaen reptiles and amphibians have their northernmost limit in southern and western Sweden. These populations are often small and scattered and in some cases isolated from the continental range. Certain species, which are endangered, are morpholocically and or ecolocically distinctive, these are the natterjack (*Bufo calamita*), the sand lizard (*Lacerta agilis*) and the smooth snake (*Coronella austriaca*).

The natterjack has an isolated range in the outermost archipelago at the west coast. The habitat of these toads is rocky and sparsely vegetated small islands and they breed in small rock pools with highly variable chemico-physical composition, which are quite different from the south Swedish and Continental populations. The west coast populations also differ significantly in some morphological characters such as the size of the eye and the shape of the head.

The sand lizard was widely distributed in central and southern Sweden during the post-glacial warm period, 7000 to 500 B.C. The distribution today in western and central Sweden is restricted to small and isolated populations. Some of these populations are found in aberrant habitats on sparsely vegetated and exposed rocky slopes and on bed rocks, sometimes very close to the sea. Body pattern differing from the normal one has been observed in west coast populations.

The Nordic populations of the smooth snake are isolated from the Continental range at least since about 8000 years ago. A typical Nordic smooth snake habitat (about 90%) is found on exposed bed rock, and less than 8% on pore sandy soils, which is typical for Continental populations. The prey items taken by Swedish smooth snakes are other reptiles including the adder, while Continental populations mostly feed on rodents.

Endangered reptiles and amhibians isolated from the Continental range, found in aberrant habitats, having different prey

preference and in som cases being morphologically distinctive need careful protection. A possible future reintroduction of these species must be from genetically distant populations.

Herpetological mapping in Norway

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A good deal of herpetological mapping has been done in Norway since the 1st Nordic Symposium on Herpetology, in Göteborg 1975; most of this before 1978, however. Herpetological mapping is not easy in Norway because of the topography of the country and the very few herpetologists. Various problems meant that the "Natur og Ungdom" organisation, first intended to carry out the mapping project, never got started.

The author, therefore, after having made inquiries to the museums of natural sciences, went through all the most important literature on herpetology in Norway, popular woorks, reports etc. in order to produce a survey of reports and records of herpetiles in Norway up to the present day. This was published in 1978 (*Fauna 31*). A key booklet to the Norwegian amphibians and reptiles with ecological/ethological data, and photos by lecturer Per Hafslund, was meant to help amateurs in a future mapping project (*K. norske Vidensk. Selsk. Mus. Rapport Zool. Ser. 1978-10*). The records have been plotted on to a modified 50 x 50 km UTM square map and records before 1950 have been separated visually from those from 1950 onwerds. Likewise were records based on museum collections separated from literature records. Many of the northern records are based on literature information only, and for that reason some of them are probably dubious. A fairly good response to the 1978 publication has resulted in some new information which is to be published.

The mapping of newts (*Triturus*) was given special importance and was done with the aid of questionaires, newspaper articles, local broadcasting, and own field work. Most of the still-existing newt localities have been seen personally, and water samples have been taken for hydrographical analyses. Parts of the results from these investigations were dealt with at the Oxford symposium, publ. 1981. (*Proc. Euro. Herp. Symp. C.W.L.P. Oxford 1980*), other parts will be published in the near future (in manus).

Microhabitat selection and food & feeding habits of newts (*Triturus*)

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The two sympatric newt species *Triturus vulgaris* and *T. cristatus* very often inhabit the same ponds and tarns. Experiments in aquaria equipped with IR light beams and photocells in two different vertical levels show, however, that the vertical positions of the species in the water differ both as larva and adult. (The interruption of the IR beams, showing the newts' position in the water, were registered by an event graph.) *T. vulgaris* larvae are mainly benthic, while *T. cristatus* larvae are highly nektonic, except for old larvae, which are more benthic. Adult *T. vulgaris* are also much more nektonic than adult *T. cristatus*, which are particularly benthic. These situations can also easily be observed in nature.

A corresponding vertical division of the newts' habitat can be seen from the feeding habitats of adult newts and larvae within the same locality. Stomach contents revealed that *T. cristatus* larvae and adult *T. vulgaris* eat much more planktonic Crustacea and free-swimming prey than do *T. vulgaris* larvae and adult *T. cristatus*, respectively. Plant remains and bottom mud were found in the stomachs of *T. vulgaris* larvae, old *T. cristatus* larvae and adult *T. cristatus*; they are thought to enter when the newts catch their prey on the bottom substrate. The feeding habits thus underline the findings on the newts' microhabitat selection in the aquarium experiments.

Investigations of the Swedish green frogs (*Rana esculenta* complex)

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An accunt is given for recent studies of the hybrid complex of green frogs.

Frogs were collected at four Swedish localities for establishing morphometric indices and electrophoretic patterns of serum albumin. Electrophoresis of lactate dehydrogenase (LDH) and phosphoglucomutase (PGM) from muscle tissue was performed by Dr. Nils Ryman, Dept. of Genetics, University of Stockholm. Immunological distance in serum albumins was measured by Dr. Thomas Uzzell, Academy of Natural Sciences, Philadelphia.

The existance of an isolated population of pure *R. lessonae* on the N coast of Uppland in C Sweden was confirmed. These were the only frogs examined that were homozygotes for LDH and PGM. The other Swedish populations of green frogs appeared to consist exclusively of the hybrid *R. esculenta* and had a high frequency of triploid individuals as determined from the larger size of their erythrocytes and from gene dosage effects in serum albumins. In the population from SW Skåne (S Sweden) the triploids evidently had two *lessonae* and one *ridibunda* genome (LLR) and were by morphology difficult to distinguish from *R. esculenta* diploids. In contrast, triploids found in populations from SE Skåne and from C Uppland near the city of Uppsala showed a tendency for *ridibunda* morphology and most likely carried one *Lessonae* and two *ridibunda* genomes (RRL). Measurement of immunological distance in the albumins resulted in the clear resolution of five groups of the frogs: the two parental species (*R. ridibunda* only represented by imported control frogs), the diploid hybrids and the two triploid hybrids (LLR and RRL). No evidence was found for the presence of *R. ridibunda* in Sweden either from the frogs presently collected or from the preserved green frogs in the Swedish natural museums. It is difficult to rule out, however, that one or both of the parental species exist at low frequency in the hybrid populations.

Marking and spring migration of *Rana temporaria* and *Rana arvalis*

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Herpetological investigations have been done by the author in northern Sweden during 1977-1981. They include for example a study of two frog populations in Umeå (63°50'N 20°15'E). A new method of marking anurans has been developed and as a result the activity of individual frogs on a mating locality has been followed over a period of three years. The other population has been used to clearify the nature and probable reasons of the spring migration to the mating localities.

At the first locality, Tvärån in Umeå, about 200 frogs (*R. temporaria* and *R. arvalis*) have been marked by tying minute numbered plastic tags to the knee of the frog with elastic and durable strings. Almost 60% of the marked animals have been recaptured once or more, about 35% two seasons or more, and 12% all three seasons. Growth and activities of each marked individual in the mating pond has been registred.

It has been shown that male *R. temporaria* are able to exhibit a certain degree of territoriality. Som individuals have actively returned to their calling sites after being removed up to 10 times, and they also seem not to tolerate other males coming in their immediate vicinity.

It has also been shown that female *R. temporaria* are able to breed every year also at this relatively northerly latitude. Both species winter in a stream close to the breeding pond, and resume activity in the end of April.

The migration studies at the other locality, Västerslätt in Umeå, were done in 1980 and 1981. In 1980, the migration of *R. temporaria* and *R. arvalis* was checked in detail. The migration was included by a spring rain on April 27, when about two thirds of the population moved to the breeding pond from the vintering stream about 100 meters away. The migration contined for about two weeks. Around 300 frogs were caught.

Rana temporaria had its migration peak about two days before *R. arvalis*, and in both species the females arrived 1-2 days

later than the males. Movements were registred at all times of the day and at ground temperatures between -2 and 24°C, but most frequently at night. Lower predatory pressure and higher humidity may be the reasons for this. As it was noted that the migration was very determinated, there were reasons to investigate the orientational capabilities of the frogs.

This was done in 1981, when 130 *R. temporaria* were used in a removal experiment. Newly emerged and migrating frogs were caught and displaced in the four cardinal directions around the pond (homing distance 50-200 meters). At three of the four releasal sites there were physical and visual obstacles in most directions. Newertheless, the results show that the frogs will compensate for the displacement. At three of the four releasal sites, the mean vector of the moving frogs did not deviate significantly from the expected home direction. The mechanisms involving the orientational ability are poorly known. Local conditions as the light nights and day-to-day changing horizon in the industrial area where the breeding pond is located, may rule out stellar and certain visual ones.

On the diet of *Rana temporaria* L. and *Rana arvalis* Nilss. in central Finland

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The stomach content of 171 common frogs (*Rana temporaria* L.) collected in different seasons and habitats in Northern Finland and Southern Germany was analyzed. In Northern Finland the common frog feeds only between the spawning season and wintering, i.e., from May to September. The food, all of which is terrestric, varies regionally and seasonally. It consists, on average, of 85% animal prey, and the rest being mainly plant material (conifer needles, fragments of grass, etc.). The principal animal prey consists of beetless (Coleoptera; 23.3%), flies (Diptera; 21.9%) and molluscs (Pulmonata; 10.0%). The average number of prey animals was 13.4 per stomach.

The stomach content of 41 specimens of the moor frog (*Rana arvalis* Nilss.) collected at Hailuoto, a peninsula in the front of the town Oulu, Central Finland (65^{o}M, 24^{o}E) were investigated. The frogs were devided into four size groups: < 24 mm, 24-29 mm, 30-39 mm and $\geq$ 40 mm. Diptera dominated in the stomac of the smallest groups (38.8% and 40.4%) with Coleoptera (31.6 and 36.8%), which turned to dominating in the two largest groups (Diptera 23.2 and 9.3%, Coleoptera 41.7 and 46.7%). In frogs over 40 mm Araneae (26.7%) prooved to be secondmost favoured in the diet, Diptera staying far below these.

Average number of food items eaten in a size group was significantly lower in the large frogs as compared to the smaller ones. The average number of prey animals in total material was 13.9 per stomach.

General ecology of Danish reptiles, with special reference to *Lacerta vivipara*, *Lacerta agilis* and *Anguis fragilis*

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An autecological investigation has been made on Danish reptiles at the Mols Laboratory.

Growth, mating, sloping, population size, temperature, hibernation, food and reproduction were studied.

The animals were marked, lizards by toe clipping, snakes by scale clipping and slow-worms by filing scar on their backs. Food in Sauria were examined by examining the stomach content of killed animals, in snakes by cooling till they disgorged. Clutch sizes were found by keeping pregnant females indoors till after birth. For all species good relationship between size of clutch and female was found.

Main results as regards the different species are the following. All dates are in month and decade.

Lacerta vivipara was active from 4.1 to 9.3 for males and 4.3 to 9.3 for females. They mated in late April and May and gave birth from 7.2 to 8.1. Clutch size was 3-10 (mean 6.5). Length when newborn (S-V) 20 mm, 1 year male 42 mm and female 46 mm. Females matured at a size of 50 mm. 90 per cent of them reached this size in their second year. Principal food were Arachmida 43.6%, Cicadinea 13.7%, Isopoda 12.4% and larvae 7%. Optimal temperature was 32.9°C.

Lacerta agilis was active from 4.2 to 9.1 for males and 5.2 to 9.1 for females and to 10.1 for juveniles. They mated in May and the eggs were laid from 6.1 to 7.1. Clutch size was 5-17 (mean 9.2). One second clutch was observed. The eggs hatched in September. Length when newborn 25, and 1 year 59 mm for males and 64 for females. Females matured around 70 mm, and 34% reached this size around 20 months old. Main food was larvae 20%, Ortoptera 18%, Coleoptera 11%, Araneae 10%, Isopoda and Dermapthera 7%. Optimal temperature was 34.0°C.

Anguis fragilis mated in April - May and give birth from 8.3 to 10.1. Clutch size was 2-12 (mean 7.9). Length when newborn

41 mm, 1 year 70 mm, 2 years 96 mm and 3 years 128 mm. Maturity is reached at a size around 125 mm for females. Not all adults breed. Principal food was *Glomeris* 28%, small snails 24%, Lumbricidae 21%, slugs 18% and larvae 8%. Population density in two areas were 1 animal per 24 and 45 m^2.

Vipera berus was active from 3.1 to 9.3 for males and 4.1 to 10.2 for females. Mating took place in late April and May, after the animals had left their hibernation sites. The young were born in August. Clutch size was 1-14 (mean 9.3). Principal food was suckling mammals 27%, *Microtus* 23%, *Lacerta* 17% and *Sorex* 13%. *Juvenile vipers eat mostly lizards and adults mostly mammals. Optimal temperature was 30.8°C.*

Natrix natric was rare and gave few informations. Clutch size was 10-27 (mean 18.1). Small females laid more slender eggs than bigger ones. Optimal temperature was 28.2°C.

Seasonal distribution and movements in a population of grass snakes (*Natrix natrix*) in southern Sweden

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The seasonal distribution and indivudual movements of grass snakes have been studied since April 1976 in an area situated approximately 15 km East of Lund (55^{o} 44'N; 13^{o} 22'E).

The seasonal distribution of male and female grass snakes has been investigated by noting the exact location of capture (or recapture) of each specimen on maps, each map representing at least one of the six months of activity (April-September).

The males had only one central area in common namely the hibernation area, which they left in the middle part of May and returned to in August or September. During the rest of their activity season the males were more or less evenly distributed West and East of this hibernation area. Females had a distribution pattern in which two areas caused high concentrations of female activity, namely the hibernation area where females were found in April to the middle part of May and the ovipositioning site where a high concentration of females were observed during June, July and partly in August.

Between April and September from 1976 to 1981 a total of 430 male and 511 female captures were made.

In order to investigate individual movements of grass snakes during most of the activity season 1981, four males and six females were monitored with small (12 x 17 x 7 mm) 27 Mhz radiotransmittors. The transmittors were surgically implanted in the posterior part of the snakes. Life-span of the transmittors were 2.5 months and range approximately 75 m. The batteries were changed after two months.

During May and the beginning of June males travelled over large areas in search of females. After this mating period their movements decreased and each male "settled down" in one or two, more or less restricted areas where they stayed until they returned to the hibernation area in the end of August or during September.

All of the radiotracked females left the hibernation area directly after emerging from hibernation and moved to their "preovipositional" feeding areas. In these areas the females hunted until the first two weeks in june and the rest of the period before ovipositioning was spent basking. During July all the tracked females left these areas and moved to one of the two ovipositioning sites (two manure-hills) were each female stayed for one or two weeks. After having laid their eggs the females left the ovipositioning sites and travelled to a new, or in some cases the same areas as they had occupied before egg-lying. Again a feeding period started and all females had reached their "May-weight" in the end of August or September when they returned to the hibernation area.

Autecological investigation of *Rana dalmatina* on Funen

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The following is some preliminary results of an investigation of the distribution and autecology of the agile frog (*Rana dalmatina* Bonaparte) in the areas of southern Funen.

R. dalmatina has been found breeding in 78 ponds: on the southernmost Funen (19) and the smaller islands Thurø (2), Tåsinge (16), Hjortø (2) and Aerø (39). The breeding ponds are shallow and have surface areas below 1000 m^2. Only about 30% are partly overshadowed by scrubs. *R. dalmatina* is the only brown frog that has been found on the smaller islands. On Funen *R. dalmatina* has not yet been found breeding in the same ponds as *Rana temporaria* og *Rana arvalis* although these species breed in the same area.

The breeding period in each pond lasts one week at most. The breeding started in 1980 on 1st April and in 1981 on 22nd March, but the activity is concealed. The males usually croaks at the bottom and only in sunny weather do the frogs float on the surface.

R. dalmatina has an amazing ability to change colour. The males are blackish brown during the breeding period while all frogs are light orange-brown on sunny sommerdays. The colour darkens on chilly days. The colour change seems to serve both in camouflage and regulation of body temperature.

During the summer *R. dalmatina* may be found on biotopes like outskirts of hardwood forests, hedgerows, herbs and in dry as well as moist grass. The occurence of *R. dalmatina* in woodless areas is demonstrated by the populations on Hjortø and Aerø.

It is claimed by some writers that hibernation takes place on the bottom of ponds. We fenced a breeding pond in the beginning of October 1981, but there has not been any imigration although frogs were found on surrounding sites until the end of October.

In nature the tadpoles metamorphose late June/late July. In an ouudoor terrarium the average length of three month old frogs was 26 mm, while 15 month old frogs had an average length of 51 mm. This corresponds to the minimal length of breeding males which in-

dicates that males of *R. dalmatina* may reach sexual maturity at the age of 21 months.

Application of enquiries in gathering data for the provisional atlas of the Finnish amphibian and reptile species

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In 1974 the Zoological Museum of the University of Helsinki launched a project to gather faunistical records of the amphibian and reptile species in Finland. It aimed at working out up-to-day provisional atlas for the Finnish herpetofauna.

It turned out soon that the herpetological records in the litterature and the data of the collections and the files in our zoological institutes were not enough for the provisional dot-mapping of the species, and that is why enquiries had to be carried out among the Finnish biologists and friends of nature. The adoption of enquiries for this purpose was supported by the following facts; 1) the number of the amphibian and reptile species in Finland is low - today only 10 species can be found there, 2) most of the species are easy to identify and those which may be difficult in this respect have very limited ranges in Finland, 3) there is a great number of people interested in Finnish nature and they usually respond positively to the enquiries, 4) we have no herpetological societies.

In the first phase of the project the forms were sent to the menbers of different biological societies and to the teachers and clubs of biology at schools. The staff of the biological museums, research institutes and field stations were also contacted in order to receive their records and the data of the specimens in the collections. Many nature magazines and some TV and radio programmes supported the study by transmitting the enquiries to many friends of nature in Finland. Moreover, a great number of records referring to the species in the frontier zone were received from those people employed in the Finnish frontier guard. Also the literature records on the Finnish herpetofauna were considered.

Up to the end of 1976 9046 records were received and those considered to be correct were located to the 10 x 10 km squares of the universal grid (Grid 27°E) system, and the preliminary maps for the species were prepaired. Altogether 1479 10 x 10 km squares had

one or more records of an amphibian or reptile species at that time. This corresponds to 38.6% of all the 10 x 10 km squares with a piece of dry land in the 1:400 000 map of Finland.

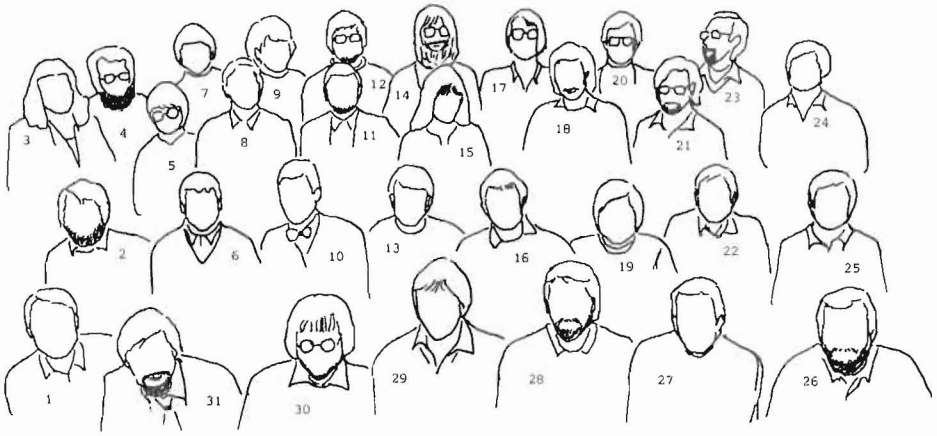
In the second phase of the project a reprint of the distributional maps for the species was sent to all those having contributed the study up to the end of 1976, and supplementary records and estimations on the local population status of the species were asked. Up to the end of 1979 we had 11.831 records and the number of the 10 x 10 km squares (n = 1900) was equal to 49.6% of all the squares (for the final maps see Terhiviuo 1981, Ann. Zool. Fennici 18: 139-164).

The majority of records of the species were received through many different types of enquiries. By informing the contributions in identification of the species the efficiency of the enquiries could be improved. For instance information about the identification of the moor frog (*Rana arvalis*) by its voice in springtime resulted a great number of new records for that species. Moreover, in many localities it proved to be equal or even superior in number to the common frog (*Rana temporaria*).

In order to re-check faunistically noteworthy records, especially those referring to the great crested newt (*Triturus cristatus*) and the smooth snake (*Coronella austriaca*) as well as to northern records of the grass snake (*Natrix natrix*) and the common toad (*Bufo bufo*), the observers were contacted once more to get as detailed data as possible.

In Finland the herpetological enquiries proved to be an effective method for acquiring records from all parts of the country within a reasonable time. In the future the data received can be used among others in assessing the possible changes in the ranges of the species.

1. Lennart Edsman
2. Göran Nilson
3. Kerstin holmberg
4. Juhani Itämies
5. Anne Groth Larsen
6. Dag Holmen
7. Niels Riis
8. Juhani Terivuo
9. Johan Elmberg
10. Thomas Cedhagen
11. Torkel Hagström
12. Jan Kjaergaard Jensen
13. Mats Höggren
14. John Loman
15. Helene Rundgren
16. Oskar Kindvall
17. Thomas Madsen
18. Kurt Elmqvist
19. Boris Berglund
20. Ted Ebendal
21. Kåre Fog
22. Etienne Edberg
23. Carl Edelstam
24. Mats Olsson
25. Ingemar Ahlén
26. Claes Andrén
27. Fredrik Strömfelt
28. Erich Wederkinch
29. Dan Abrahamsson
30. Jens Rasmussen
31. Wolfgang Böhme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