GROWTH OF THE NORTHERN RATTLESNAKES

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INTRODUCTION

In population research a 'community' of animals in a certain area is trouroughly studied. Important questions concerning this subject are, for instance: how many animals are concerned in this population? How is this population built up as regards age and sex? What do the animals eat? What is their growth ratio? When are they mature? What are their natural enemies in this area? It will be evident that this kind of research is difficult.

It would be ideal when researching populations of snakes to know the exact age of each individual one finds. However, in snakes this is impossible because one cannot tell their age by looking at them. In rattlesnake one at least can count the number of segments of its rattle, but this only works when the rattle is undamaged and one knows the number of moults per year.

In most cases this problem is solved in an incomplete manner by assuming a certain correlation between age and body length. Normally this correlation does exist in most cases, where animals in a natural environment are concerned. One cannot on the whole tell the ages of captive bred snakes. The most important factor is the food supply given by the owner. Thus there is a major difference between the potential and real speed in growth of snakes. The real growth rate of a snake depends on the temperature factor and the possibility of obtaining prey (how much available, how much competition). These factors can vary according to year and area.

When one wants to establish the average growth rate of the average snake in a certain population, one repeatedly has to measure as many species in as many years as possible. This kind of research is not done often, mainly because most research projects have a short duration.

THE GREEN RATTLER

Malcolm et al. (1990) have carried out such research: during six years they researched four populations of rattlesnakes *(Crotalus viridis oreganus)* which lived close together in the middle/-south of British Columbia (50° North, 119° West, at a height of 425 m) on the northern border of their range. The summers in this area are warm and dry (with an average maximum temperature in July of 27°C, minimum 11°C), and winters are cold and dry (average maximum temperatures during day time in January are -3°C, minimum -9°C. The snakes were taken out of their hibernation sites, which often contained between 8 and 226 snakes, at favourable times. On average, the animals from this area were in their winter-hiding places 210 days per year. Above the ground they were active from the beginning of April until mid-October. All snakes were caught, weighed, examined, measured and sexed, and the number of segments on the rattle was determined.

Thereafter they were marked by using a unique combination of cutting the belly and tail scales and marking them on the head and rattle with nail varnish and then releasing them. In total more than two thousand animals were examined.

JUVENILES

Juveniles were born between mid-September and mid-October. The average head-body-length (HBL), this is without the tail, of the juveniles was 267 mm for females and 270 mm for males. The differences between the sexes were not significant; this means that it is uncertain whether the measured differences were due to sex, or perhaps to coincidence.

On average the first sloughing of skin took place after 24 days. During this period the animals did not feed and hardly any growth occurred. After between one and fifteen days from the first sloughing they all went into hibernation.

GROWTH OF JUVENILES

On average younger animals grew faster every year than older ones. The majority of juveniles sloughed their skins once in their first growing season, the others twice. The last mentioned animals grew faster as a result of this. After their first growing season the snakes had, apart from the 'button' (the basic element of the rattle), one or two rattle segments. In fact there proved to be a strong correlation between age and HBL. Males grew a little faster than females, about 7%.

SEXUAL MATURITY

The presence of live sperm during rinsings of the cloaca in males proved to be an indication of the sexual maturity of the animals. The smallest male in which this was the case proved to be about 535 mm in length (HBL) and was living in his third growing period.

The smallest female, that proved to have enlarged follicles was about 650 mm in length. Enlarged follicles were found in three fifths of all females at the end of their fifth growing season. Most females proved to be between 700 and 760 mm HBL before they were sexually mature and had young. In animals from this area sexual maturity occurs later than in animals from other, more southern populations.

GROWTH OF MATURE ANIMALS

As a rule mature animals only slough their skins once a year. The difference in growth rate between males and females remained: mature males grew a little faster than mature females that were not gravid. Females that became gravid did not grow during that season. The longest animals in the population that was researched were 1170 mm (male) and 950 mm (female) HBL. In general, in rattlesnakes one speaks of sexual dimorphism in the sense of males growing larger than females. In the researched population this was hardly the case in young animals. The difference in size can be explained, apart by males growing faster, by the fact that females do not feed in the year in which they are gravid.

SLOUGHINGS

The period of sloughing lasted on average some 18 days. Gravid females sloughed their skins once a year any earlier in the season than most other snakes, except for adult males. Some adult males sloughed their skins for a second time at the end of summer. Non-gravid females in general sloughed their skins up to 1 or 2 weeks later tham most adult males. A peak in sloughings occurred in the first week of August.

DIFFERENCES

In 1982 the snakes grew less than in 1981. In that year a cool and wet autumn was followed by a hot and dry summer, whilst in 1982 a warm and dry autumn preceded a wet summer. So 1981 provided better opportunities for growth for plants and bushes in the researched area (the Okanagan Valley). This might well have provided better opportunities for survival of prey and with it more food for the reptiles. This could not be proved as no research has been done on how much prey was available.

Platt (1984) found a direct relation between the availability of prey and the yearly growth of Bull snakes *(Pituophis melanoleucus)*. It was odd, however, that during the research on rattlesnakes in 1981 less animals were caught with prey in their stomach than in 1982. The reasons for this remain unclear.

That the matter is complicated, can be derived from the outcome of the following research project. Charland & Gregory (1989) discovered that the weight of females of *Crotalus viridis* which had given birth and which ate a great deal in captivity did not necessarily increase more than that of females which were offered less prey. These researches suggested that snakes could well be reacting to little food being offered by actively keeping their body temperature at a low level, causing the reduction of energy loss.

In that case, weather conditions and food availability can cause a subtle interaction with each other regarding the influence they have on the growth of the animals. These facts underline the experiences of terrarium keepers (unfortunately not recorded as actual research data) that snakes which are kept under warm conditions and are given a lot of food seem, relatively, to have little benefit from that amount of food. Giving snakes in terrariums a plentiful supply of food is described by them as 'foodspilling' in times when mice are scarce. Conversely, snakes that voluntarily choose to stop feeding for a long period hardly loose any or no weight. As for the rattlers of British Columbia, small lizards and amphibians, which are a main part of the diet of young *Crotalus viridis* in California, were rare during the research period. The juveniles must on the whole have fed on other prey. One year old snakes were caught which weighed less, and had grown very little, since their birth.

NORTH AND SOUTH

Comparisons between the growth rate of rattlesnakes from different populations that were far apart show that there is a major difference according to the climate. In southern California rattlesnakes are active during some nine months of the year, in central California for some seven or eight months, and in northern areas like British Columbia for not more than five to seven months. Apart from this, in southern areas the winter rest is frequently interrupted, whilst this is not the case in the north. This can be clearly seen in the growth rate of juveniles. The average growth rate of young rattlesnakes in California is about 24 mm per month, that figure being some 13 mm in British Columbia. Also, the newly hatched animals in southern California have

a couple of months for feeding, whilst in the north they almost immediately start to hibernate after their first sloughing.

GENETIC DETERMINATION

It is not clear whether differences in growth rate between northern and southern populations are also partly genetically determined. This could be researched by rearing large numbers of animals from different populations under different conditions, so that the effect of different factors could be measured.

The last observation shows that a large area of research still lies open for the individual herpetologist. The present case is about rattlesnakes, however this type of research has not been done at all for most other snakes either.

LITERATURE

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