SUMMARY

Distribution, biometrics and ecology of the adder *Vipera berus* L. in Upper Silesia and the Wyżyna Częstochowska Upland

The adder is widely spread throughout Poland, from sea level (Mierzeja Wiślana) to 1700 m a.s.l. in the Babia Góra massif, and 2000 m in the Tatra Mountains. Young individuals were found to 1650 m a.s.l. (Tatra Mts.). The viper occupies a variety of habitats as peat-bogs, heaths, woodland ridges and light woodland with sunny patches.

Field observations were conducted throughout the years 1995–2006 and in Spring (March – June) of 2007 in the northern and central parts of the present territory of the Silesian voivodship, as well as in the eastern part of the Opole voivodship area (southwestern Poland). The study area covered 98 basic mapping units (spanning over 10' of geographical longitude × 5' of latitude) of combined area of ca. 10 600 km². The main objective of the project was to study the distribution of the adder over large area as well as learning about selected aspects of the biology and ecology of the species. The biometric data (body length) of the Polish population as well as these of the studied subpopulation were compiled separately for the sexes.

The localities inhabited by adders were recorded in 93 basic mapping units, which corresponds to 95% of all grid fields with atlas coordinates (Fig. 1). The snakes were found in 390 localities (Fig. 2). The locality recorded when one or more individuals (and in one extreme case the number was as high as 59 individuals). The extremely large concentrations of adders were found in the Lublinieckie Forests where at least 110 sites inhabited by adders were identified in an area of 650 km². In 1 hectare of thin pine forest near Żuraw village (July 2000) 17 adult adders were counted, whereas in the "Stawki" Landscape Park within a one-hectare cenzus plot of young mixed coniferous forest with the Scotch pine *Pinus sylvestris,* birches *Betula* sp. and rowan trees *Sorbus aucuparia* as predominant species) as many as 59 adult adders were counted at once. This concentration ranks as the highest ever recorded in Central Europe.

The vipers living around Częstochowa and in the Lublinieckie Forests prefer wintering under the ground surface in dry sites and – as the rule – the sites facing south. Their hides are chiefly below the layer of freezing ground. In the forested areas this layer is covered by

leaf litter and for this reason freezes only up to depth of 20–25 cm, whereas in open spaces the freezing layer is much thicker, reaching up to 40–50 cm. The most numerous winter concentrations of adders numbered 17 and 43. On one occasion as many as 59 individuals were counted, but they were hiding in burrows under three hay stacks situated close to one another.

After hibernation, the first individuals appear on ground surface at the end of February or in March when the soil temperature is 2–3°C and air temperature is 3–5°C. Before entering their nuptial period, the adders converge on their traditional nuptial grounds of specific microclimate where they form characteristic concentrations with numbers ranging from 16 to ca. 100 individuals per 500 m² (n=6). In the Częstochowa area, the brown-coloured adders predominate markedly over the grey and black (melanistic) forms (Table 1).

The measurements of the body length were taken in 100 of adult adders (61 males and 39 females; Table 1). In males, the body length ranged from 29.8–68.4 cm while females were still longer (the range of 54.5–85.8 cm). The most numerous group of adult male adders was that of 50–55 cm length class, while the largest group of females was that of 55–60 cm length class (Fig. 3). To show the body size distribution against a wider background, it was compared with the data for both sexes of adders collected in the whole of Poland (Fig. 4) as well as with regional populations of Central Europe (Fig. 5). The lengths of individuals measured shortly after birth, ranged from 14–16.5 cm (n=20). The earliest births were recorded in the last ten days of July, while great number of young were born in August and September.

In the twilight or night time, 60 successful attacks by hunting adders were observed. It was either the attacks or the process of swallowing preys which were observed. Small rodents constituted the predominant type of animal preys, among them 32 mice of *Apodemus* sp., 9 voles (*Microtus arvalis/agrestis*), in six cases – viviparous lizards *Zootoca vivipara*, and four cases – bird nestlings. On two occasions these were sand lizards *Lacerta agilis*, on three other grass frogs *Rana temporaria*, and on single occasions: moor frog *R. arvalis*, common toad *Bufo bufo*, and a shrew of *Sorex* sp. and the European mole *Talpa europaea*. The sand lizard was swallowed for 15–20 minutes, while the swallowing of a grown nestling, mole or an adult vole took ca. 40–50 minutes.

The population of adders suffer high losses during hibernation as well as a result of predation. The adders are prayed upon by, *inter alia,*

hedgehogs, birds of prey, as well as by egrets and storks (e.g. Krapivny 1957). An adder was also found in the stomach of a brown bear *Ursus arctos* from Tatra Mts. (Jakuczun 1978).

At the beginning of the 20th century the adder was much more numerous in a number of regions of southern Poland (e.g. in the Bieszczady Mts.; fig. 6) than now. An indirect indication of the relatively high population density of these snakes in Upper Silesia over the period 1911–1920 can be inferred from the records of fees paid to 'adder-catchers' for adders they killed. The highest number was recorded in 1912 which was even termed to be a 'viper year'. The record number of 21 221 individuals were killed and fees paid in return for the heads of snakes but the number of snakes actually killed was estimated to be in excess of 75 000 individuals (Pax 1925).

The adder is subject to the protection (from 1984) by law in Poland because of the safety of other snake species that may be confused with it. Despite the protection regime, Man is still the greatest threat to adders, destroying their habitats.