

### I The *berus* type of reproduction

The *berus* type of reproduction is characterized by the spermatocytogenesis taking place in autumn, and the spermiogenesis only after hibernation in spring. This means that mature sperm cells become available only shortly before the mating season begins. In order for the males to develop fertile sperm, they need to absorb as much solar warmth as they can. By flattening their bodies during basking, they make the most of the available solar energy even on days with only moderately good weather.

The males of this grouping always shed four to five weeks after emerging from hibernation and will only engage in mating activity thereafter. The females, on the other hand, usually leave their winter quarters two to three weeks after the males and shed only after the mating season.



**Fig. 18** As soon as the snow has melted, common adders (*Vipera berus berus*) appear to use the first rays of the sun for basking. The photograph shows eight specimens and was taken near Haukipudas in Finland.

### ■ The *aspis* type of reproduction

Autumn is the most important time for spermatogenetic activity in the *aspis* type. It is characterized by a period of spermatocytogenesis and spermiogenesis in summer and in early autumn each. In contrast to the *berus* type, mature sperm thus becomes available already in autumn and once again in spring. Species with these reproductive characteristics are therefore able to mate in both autumn and spring, although autumn mating is generally less intense.

In the *aspis* type of reproduction, posthibernal shedding of the male vipers takes place only after the mating season.

### ■ Spermatocytogenesis and spermiogenesis

I will try and keep this explanation as simple as possible. For detailed scientific information, see the papers mentioned above or consult a biology textbook.

Spermatocytogenesis is the formation (production) of spermatocytes. It takes place in the testicles. Spermatocytes (germ cells) are sexual cells that contain a twin set of chromosomes also known as diploids. These diploids contain all hereditary traits of the respective species. Spermiogenesis, on the other hand, describes the maturation process of the spermatocytes during which a reduction division, also known as meiosis, takes place. This process serves to split the twin set of chromosomes into two so that each cell is now left with only one set of chromosomes. Now termed haploid, such a cell guarantees a “healthy” mix of genes when it fuses with the haploid of a female egg cell. A fusion of two diploid cells (one from the mother and one from the father animal) would produce embryos with twin-diploid sets of chromosomes, but a fusion of two haploid cells during fertilization produces another healthy diploid cell from which new life will now start to develop.

NILSON & ANDRÉN (1997) published an in-depth study of the two types of reproduction. This treatise also analysed the geographical distribution of these types within the genus *Vipera* on the basis of the three subgenera plus the species of the genera *Macrovipera* and *Daboia*. Their results confirmed that *V. berus* and closely related forms plus the European alpine species of the *V. ursinii* complex all share the *V. berus* type of reproduction. *V. aspis*, *V. latastei* and *V. monticola*, on the other hand, represented the *aspis* type. Previously it had been presumed that *V. seoanei* would also follow the principles of the *berus* type, but meanwhile it has been demonstrated that it actually adheres to the *aspis* type. *V. kaznakovi* as well as *V. a. meridionalis* and *V. a. montandoni* are known to mate in spring and in autumn, which would also indicate the *aspis* type. These species have always been thought to follow the principles of the *berus* type (SAINT GIRONS 1980, 1982). This demonstrates that the subspecies of a species may have developed different reproductive strategies. Autumnal mating has also been recorded from the Asiatic populations of *V. renardi* in captivity, which renders its reproductive modality uncertain at present. The species of the subgenus *Montivipera* and the oviparous (egg-laying) species of the genus *Macrovipera* all follow the principles of the *berus* type.