

# Vipera berus

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Common vipers with normal coloration are best camouflaged in the light and shadows of their habitat

## Common Vipers of the Northern Black Forest



The European common viper, or cross adder, *Vipera berus*, is a truly remarkable snake. As a result of its high adaptability, even to extreme climate conditions, this species has the largest range of any snake species in the world. It also occurs farther north than any other species of snake, even north of the Arctic Circle. Fundamental characteristics that contribute to its ability to survive in such cold climates are its efficient thermoregulation and ovoviviparous reproductive strategy (females give birth to live young rather than laying eggs).

The distribution range of *Vipera berus* stretches from Scotland in the west (6 degrees west longitude) to the Pacific island of Sachalin (Russia) in the east (143 degrees east longitude); and from Inari, Finland, and Murmansk, Russia in the north (69 degrees north latitude) to Albania in the south (42 degrees north latitude). However, the distribution of the species does not uniformly cover the range — instead

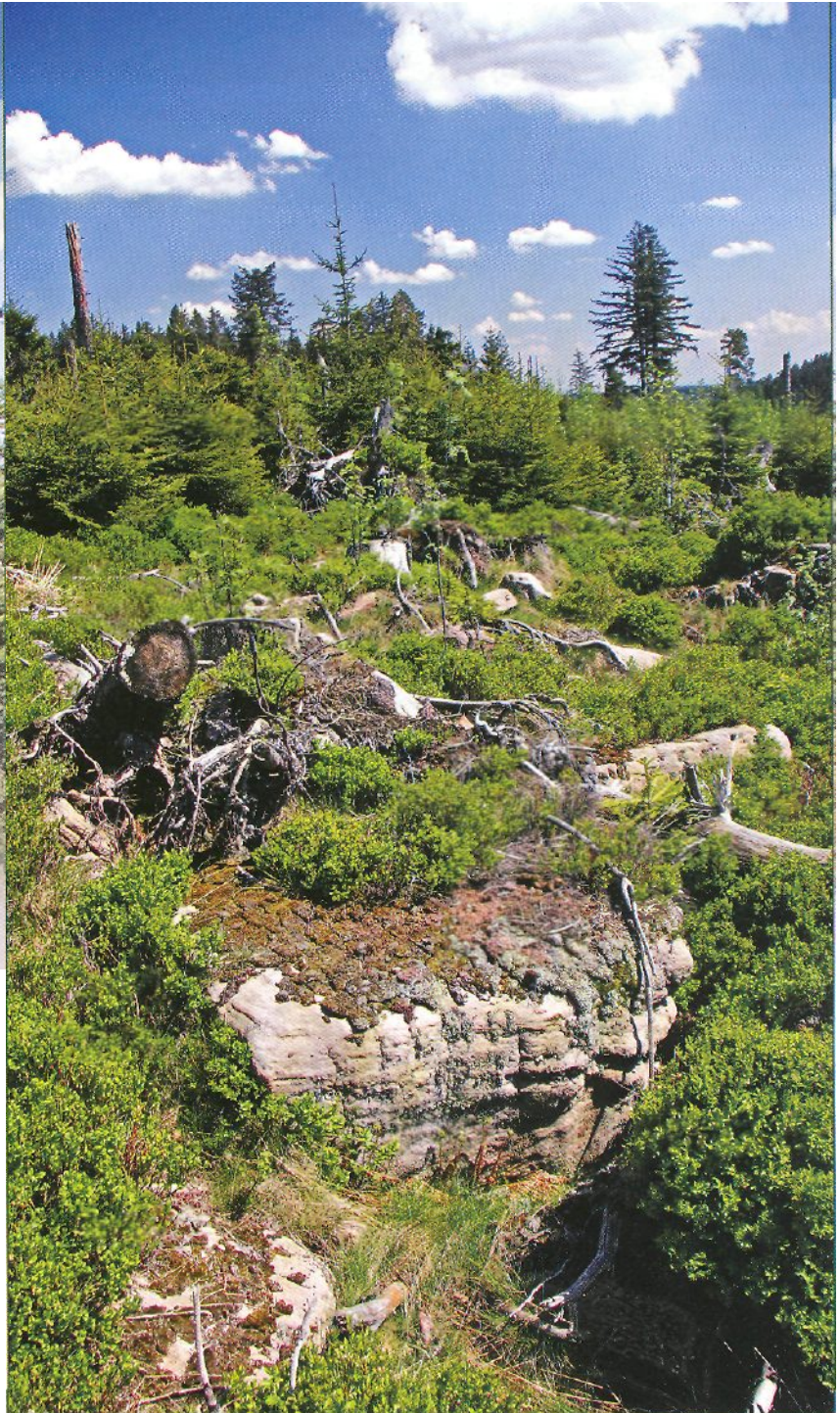
there are many isolated populations and large gaps. In central Europe, this fragmentation is largely due to climate changes following the last ice age, but human influence is also considered a factor. *Vipera berus* can be found at elevations from as low as sea level to as high as 2,600 meters above sea level in the Swiss Alps (GASC et al., 1997).

In Germany the greatest abundance of European common vipers is found in the moors and heath landscapes of the northern lowland plains, wooded regions of central and southern Germany, and in the foothills of the Alps (BIELLA and VOLKL, 1993). In Baden-Württemberg there are abundant populations especially in the higher elevations of the Black Forest and the Swabian Alb, as well as in moors and heath landscapes of Upper Swabia and the Allgäu. Thus the distribution of *Vipera berus* overlaps the distribution of the viviparous lizard, *Zootoca vivipara*. Both species prefer cool climates, and avoid regions with hot summers and mild winters.

### Coloration and melanism

Common vipers show sexual dichromatism: females with normal coloration have a dark longitudinal zigzag dorsal pattern on a brown to reddish background color; males with normal coloration have a black pattern on a gray background. The intensity of the coloration varies with the season. On emerging from hibernation, the snakes have dull colors and weakly contrasting patterns. Following the spring shed, especially males have very bright colors and highly contrasting markings, but after the mating season, the coloration fades again considerably. Newborn common vipers are often brownish, with little or no sexual dichromatism. However, there are populations in which juveniles do show sexual dichromatism. The function of the zigzag pattern is interpreted differently by different authors, but generally is assumed to be cryptic. WÜSTER et al. (2004) observed that the pattern may serve to frighten potential predators.

Where high winds blow down trees, new habitat is created for common vipers



In many populations, black specimens are not uncommon. The percentage of these melanistic individuals varies depending on geographic location and habitat. In southwestern Germany, the percentage of black individuals in common viper populations varies from 30 to 90 percent (LEHNERT and FRITZ, 1993). An increased incidence of melanistic individuals is linked to ecological factors, and is especially associated with northern latitudes, high elevations, and wet habitats. Melanistic individuals are not black at birth, but become darker as they age, often with the onset of sexual maturity (THIESMEIER and VOLKL, 2002).

Melanism represents both advantages and disadvantages for a snake. On the one hand, the dark color is thought to enable more efficient thermoregulation by absorbing heat quicker, thereby allowing for longer periods of activity and higher metabolic rate. Melanistic snakes grow faster than snakes with normal coloration.

Faster growth may give snakes a reproductive advantage — larger males could be more successful in combat for the chance to mate, and larger females could produce greater numbers of offspring. Observations and field studies in numerous populations support this theory, but in other populations, there is no evidence to support it. On the other hand, uniform coloration is not as cryptic as a pattern in most habitats, leaving melanistic snakes more vulnerable to predation than snakes with

normal coloration. Nonetheless, because they warm up and reach their optimum body temperatures faster, the melanistic snakes need not spend as much time basking in exposed places. And snakes that are warmer can react to threats faster with defense behavior or flight.

### **Common vipers in the northern Black Forest**

Despite human intrusion, the Black Forest is one of the last largely uncut forest regions in



The change to darker coloration takes place with increasing age. In many individuals, the pattern still shows through

Germany. It is a mix of deciduous and evergreen trees with the characteristic silver fir (*Abies alba*). Especially the northern Black Forest is not dark and gloomy as the name would indicate, but rather consists of a mosaic of wooded areas, sunny border regions, meadows, springs, streams, marshes, lakes, and open highland heath. There are also moors where high precipitation and impermeable sandstone layers have resulted in stagnant moisture and acidification. The edges of the moors are characterized by meadows of rnat-gras (*Nardus*) and moor grass (*Molinia*) alternating with cotton grass (*Eriophorum*), mountain pine (*Pinus mugo*), and birch (*Betula*). Many of these habitats are extremely delicate and protected. Many

species found here are also especially vulnerable to habitat alteration, including the wood grouse (*Tetrao urogallus*), lynx (*Lynx lynx*), pygmy owl (*Glaucidium passerinum*), and three-toed woodpecker (*Picoides tridactylus*). According to LEHNERT and FRITZ (1993), the European common viper in the northern Black Forest is found especially in cool areas with plenty of precipitation at elevations of up to about 1,100 meters above sea level, and valleys of similar climate conditions down to elevations of about 500 meters. The most abundant populations are found in areas of high wet heath on

flattened sandstone ridges, characteristic of the northern Black Forest, and the adjacent region of the headwaters of the Enz River (FRITZ et al., 2007). The snakes prefer open habitat near woodland as well as the border areas just inside the trees, along roadways, fire corridors, areas of low trees and shrubs, along the borders of moors, and in and around log piles. Created through centuries of livestock grazing, the, high wet heath clearings provide ideal conditions for the vipers. Occasional fierce storms blow

trees down and create additional open areas that the snakes then colonize before vegetation fills in again and the cycle continues. In this way, storms such as the devastating Hurricane Lothar (on 26 December 1999) have a positive effect on viper populations by creating new habitat for them. However, although the snakes progressively occupy cleared spaces for hunting and basking activity, they are much slower in adapting to new areas for mating and hibernation (VÖLKL 1991; NILSON et al., 2005).

European common vipers utilize border or transition features of ecological structure such as bushes or evergreen branches that hang low to the ground. Such places offer both basking sites and shelter from the sun for easy thermoregulation. Ideal viper habitat consists of layers of herbaceous ground cover, low shrubs, and higher trees, as well as open spaces for basking. The best basking spots have quickly heating ground of humus, peat, dry moss pads, rock, dry grass, or dead wood. Logs and stumps on the ground serve not only



Black common viper basking in early spring weather near its winter den

for basking, but also for daytime hiding places, as do clumps of moss or stones. Habitat used by *Vipera berus* is usually relatively high in ground moisture. This satisfies the moisture requirements of the snakes themselves, and also supports a plentiful supply of lizards, frogs, and small mammals.

#### **In search of *Vipera berus***

European common vipers occur in many parts of the northern Black Forest, and they are not difficult to find in suitable habitat. *Vipera berus* prefers different habitats at different times of year and depending on age and sex, and on reproductive phase.

In the nature reserve it is strictly forbidden to leave the marked

paths and walkways, thereby protecting highly specialized and delicate plant species and rare fauna. The general rule of nature observation applies: Take nothing but pictures, leave nothing but footprints.

The common viper hibernates for about 5-7 months, ending when temperature and weather conditions permit. Males leave the winter quarters before females, and start basking in nearby wind-protected sunny spots as early as late February to mid March. Some of the viper hibernacula in the northern Black Forest are very close to parking lots, hiking trails, and ski-lifts. In fact, the first males to leave hibernation may be basking on warm spots where the snow has melted, while skiers are still using adjacent snowpacked slopes. When approached

Black common vipers are a feast for the eyes — but the black color is not always an advantage for the snake



Distinct sexual dichromatism: Females have a dark zigzag band on a brown background  
 ... whereas males usually have a black pattern on a light gray background



by a human, a common viper often remains on its basking spot for a surprisingly long time without fleeing. Many vipers will not flee until the shadow of the person passes over them.

After their spring shed, the males begin looking for females, and move to special breeding grounds, some of which have been used by these vipers for many generations. At these sites, mating usually takes place from late April into May. Gravid females often remain in the same area for the rest of the summer, but males and non-reproductive

females move away to summer habitat where food is more abundant. Most of the babies are born during July and August, but some can be born as late as October. A female bears 6-11 offspring at a time depending on her length and weight. In late August and September, and after the birth of the young, the vipers move to autumn basking spots, which are often the same as the ones used in spring.

The vipers hibernate in dens at depths of 40-200 centimeters, depending on elevation and the structure of the ground. Suitable

hibernacula are found in spaces under rockpiles or tree stumps, or in rock crevices or rodent burrows. The best places may be used by several snakes, and repeatedly for many years.

Success finding common vipers depends on weather conditions and time of day. There is no sense looking for these snakes at midday during the heat of summer, or at 8 a.m. in February when the high ground is covered with frost. On the other hand, chances of finding vipers are especially good in the spring, in April and May. During these cool months, the snakes often bask for long periods of time in the middle of the day. In order to warm themselves most effectively, they flatten themselves by spreading their ribs. During this season, the snakes may also be seen in ritual combat or mating. In summer, activity is considerably reduced — basking takes place in the early morning and for shorter periods, before the sun gets too warm. Chances of seeing the snakes in summer are best just after dawn, or when the weather is cloudy or warm and humid and partly cloudy. When it is windy, the snakes move to sheltered spots behind rocks or logs, or retreat into their shelters.

### Threat

In many places, human influences have caused viper populations to decline or die out, but in the northern Black Forest the species is still quite abundant. But even here, Time is against the snakes. At lower elevations, the greatest threat is destruction of moors and heath. Ironically, in the high country of the northern Black Forest, the moor and heath was originally formed by human activity, for the purpose of grazing livestock. Today however, maintenance of these high pastures has decreased, and without continual use, the open areas are filling in with new tree growth — consequently the viper habitat is

disappearing. In 1750, the open areas covered more than 1,500 hectares; today only about 150 hectares of moor, heath, pastures, meadows, and ski slopes (FRITZ et al., 2007).

...It is hoped that effective conservation measures will be taken to protect viper habitat and allow for the long-term survival of *Vipera berus* populations in the northern Black Forest. Indeed the Black Forest would be a poorer place without these fascinating vipers. •

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