

# Protection of reptiles

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## 2. Human prejudices and enlightenment

*"But it's a sad era when it's easier to smash an atom than to destroy prejudice." Albert Einstein.*

"Yuck snake!" - the most common reaction of people when encountering a snake or a slow worm. Many people shudder only when somebody say that word or when they see a picture or photo of a snake. It is often a cultural reaction, but sometimes it can be a panic fear of snakes, so-called ophiophobia. It is sometimes called the more general term herpetophobia, fear of reptiles. The word comes from the Greek words "ophis" (ὄφις), ie snake, and "phobia" (φοβία), which means fear. The Polák et al 2016 study shows that approximately half of the human population is afraid of snakes. About 2-3 % of the population show signs of true phobia. The research also confirms our well-known belief that women are more concerned about snakes than men. The result that people without biological education are afraid of reptiles more than graduate biologists is just the expected icing on the cake.

Today's times show that herpetophobia can be treated, which means that it is not predominantly congenital, but acquired. Either way, the fear of snakes is a matter we must learn to work with, either with ourselves or with other people. We encounter snakes in various forms in the mythology of many nations. The negative perception of snakes in Euro-American civilization is probably rooted in Christian teaching. In the Old Testament, the serpent embodies the tempters in paradise, the one who led Eve to sin. "And the Lord God said unto the serpent, Because thou hast done this, thou shalt be cursed of all cattle, and of all beasts of the field; and thou shalt crawl on thy belly, and shalt devour the dust all thy days. And I will put enmity between thee and the woman, between thy seed and her seed To this day, the majority of the Czech population has imprinted this "curse of the snakes" as a cultural pattern, regardless of whether they are believers or non-believers. Superstition in this case is also supported by the fact that poisonous snakes have remained one of the few deadly dangers that man in the wild could not eliminate. Thus, resistance to snakes is strengthened by fear for life. Today, however, it is clear that this resistance to reptiles is not widespread: the first Europeans to enter the African continent were surprised by the snake cult that ruled there. He almost certainly grew out of totemism. Totemism did not just mean that people professed their animal ancestors. Humans usually did not hunt their totem animal, they protected it. The protection of snakes has even become a state affair in many African countries. Nigeria, for example, has exchanged a point in its agreements with the English, which guaranteed the inviolability and safety of pythons. The Bantu African tribes worshiped and often still do worship snakes as their ancestors. The more important the ancestor, the more dangerous

## 1. Why protect reptiles?

*"Lizards enliven the dry, sunny slopes and in the brightness of the summer sun their colors reach their place, but especially when they run away, they are disturbed by our steps. On the shores of the ponds, the common snakes crawl into the water in front of us in an elegant motion, crawling on the head, decorated with small crown (two yellow crescent spots). (...) Snakes are one of our most persecuted animals. The people are persecuting them because they think they are all poisonous. Few people know that there is only one venomous snake in our country, the Adder Viper (Vipera berus L.). We still find the common snake (Tropidonotus natrix L.) killed outside. Do either adults, believing that the snake is poisonous and that it has killed it, will do something to humanity; then school youth from exuberance or arbitrariness. Finally, even the blind man is considered a snake and beaten.*

Almost a hundred years ago, Miloš Záleský described his impressions of the decline and necessary protection of reptiles, especially snakes, so emotionally in the magazine Krásy naše domova. Unfortunately, he did not have any objective data to prove this impression. And we still lack such evidence for the rational protection of these animals. We know that reptiles are declining. But what's next? Although we can rely on decades-long network mapping of reptiles, we usually rely on qualified estimates for their population density. In the sense of the protectionist motto "Know and protect", it is necessary to approach the modern protection of reptiles through knowledge. In other words, without basic knowledge of the occurrence and behavior of our reptiles, we cannot ensure their meaningful protection. It's like driving without a speedometer and other indicators on the dashboard. Therefore, this publication also suggests how to monitor and effectively protect reptiles. And as we all know, it's harder with snakes because they try hard to see as little as possible.

snake. The chief is the dreaded and poisonous mamba, the wife and children are snakes. The Bantas thus believe that when the snake appeared, he came to visit some of their dead ancestors. Of course, the father, mother, grandparents and also the chief cannot be harmed, so the snake is untouchable.

They also attached great importance to snakes in ancient Egypt. The serpent had many forms and names here and embodied evil and good forces. The highest of the ancient Egyptian gods Re is depicted on the head with a disc that is supposed to depict the cobra-wrapped sun. Due to its close relationship with the sun god Re, the cobra became the heraldic animal of Lower Egypt. Personification of chaos

*Giant.*

Apop in the form of a huge snake with a body twisted into several loops. He was perceived as the bearer of evil and the main enemy of gods and people.

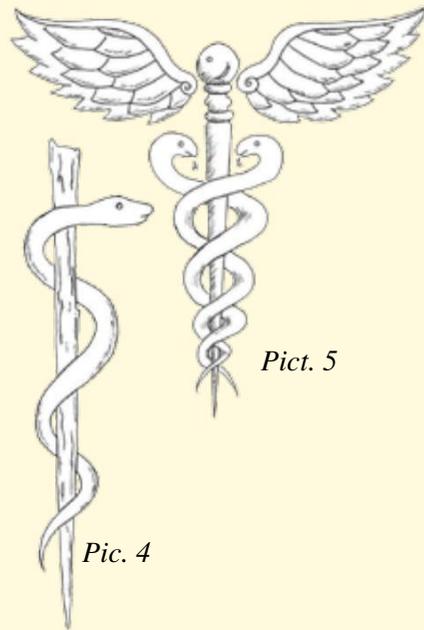
However, the snake cult is not just an African peculiarity. It also plays an important role in Buddhism and Hinduism, for example. The serpent's task is to guard the book of wisdom until people are able to accept it. The snake is also the master of the waters and is supposed to bring rain during various rituals during periods of drought. In Sri Lanka, for example, they still worship Ravana (the serpent god). Similarly, the cult of snakes persists in Myanmar (Burma) and cobras worship local priestesses in temples. The Indian god Shiva appeared in the company of sacred carpets, the Buddha was either wrapped in snakes or depicted in their company. In the peoples of the East, the serpent has long been a symbol of creative life force - the kundalini, which is said to lie coiled at the root of the spine. In Tantric Buddhism, the energy of the kundalini rises along the individual vertebrae of the spine and opens the chakras one by one until the last, seventh chakra conquers the head. If we also look at the South American Indians, the chief god of the Aztecs, Quetzalcoatl, he introduced the feathered serpent, to which many temples were dedicated.

Pic. 4



In the twentieth century, a giant Mesolithic bird lizard was described from Texas, which was given the family name Quetzalcoatlus after this deity. The Maya had a similar god, Kukulkan, or feathered serpent.

Even in Europe, snakes are intertwined with mythology. Suffice it to recall that the legendary founder of Athens, King Kekrops, was half human, half snake. The goddess Athena also had the form of a snake at first. In Scandinavian legends, the supreme god was Odin, who occasionally turned into a snake. In Russia, even after the adoption of Christianity, snakes always and everywhere accompanied the images of saints. Carved snakes adorned human dwellings and symbolized health and well-being. In German-speaking countries, in the Baltics, but also in other parts of Europe, people worshiped snakes, which often lived in houses with them. They believed that



*Pic. 1: The cobra was an important element of Egyptian mythology.*

*Pic 2: The Buddha was depicted in the company of a cobra.*

*Pict. 3: The feathered serpent Quetzalcoatl was an important god of the Aztecs.*

*Pic 4: Aesculape's staff surrounded by a Aesculapian Snake is a sign of life force and health. It is also traditionally a symbol of doctors and pharmacists.*

*Pic 5: The stick with the two wrapping snakes was the symbol of the god Hermes (Mercury).*

*Pic. 6: Sv. George kills a dragon who was the personification of evil (paganism).*

*(Orig. Š. Mikátová according to various sources).*

snakes protect the landlord from enemies and that if a snake appears in a village cottage, it means good luck. The Aesculapian Snake (also called Aeskulap's) has become a medical symbol and is still so today. Already in ancient times, the Aesculapian Snake was dedicated to the Greek medicine god Asclepius (Latin Aesculapius). According to legend, in 293 BC, ancient Rome was hit by a great epidemic of an unknown disease. It was allegedly driven away by the god of medicine Aesculapius, who came in the form of a tree snake. Out of gratitude, the Romans built temples for the snakes and began to keep them in them. Aesculape's staff with one or two coiled snakes as a symbol of medicine is said to be based on this event. (According to an alternative interpretation, the original feature of the medical guild in the Mediterranean was allegedly a spun parasite that was wound on a stick. Pulling out the parasite was a difficult medical task in ancient times and got into the "coat of arms" of doctors.) But also the Greek god Hermes (in Roman mythology Mercury) had a staff in his emblem with two wrapping snakes and its top was winged. Hermes is considered the protector of the roads and pilgrims, he is the god of trade, deceit and, last but not least, the messenger of the gods. The serpent and the staff in the hands of Moses are already found in the Old Testament: "But the Lord said to Moses," Bend down and take the serpent's tail by the hand. " "Elsewhere in the Bible, a bronze serpent on a pole erected by Moses in the wilderness is a foreshadowing of the crucified Savior. Carl Jung (Jung 2017) points out that the snake is often a symbol that appears in a dream. It is a worldwide widespread transcendental (archetype), ie. intuitive or overlapping experience. It can also mean a state of meditation connecting the earth and the sky, but it can also symbolize the primordial life forces and the afterlife. The Uroboros snake biting into its tail is particularly important in terms of symbolism. This symbol is associated with alchemy, Gnosticism and Hermeticism. It represents the cyclical nature of things, an endless return from end to beginning. In some depictions, Uroboros is half white (light) and half black (dark), suggesting a yin-yang symbolism depicting the duality of things; complementary opposite principles. It is also curled into a lying figure eight, a symbol of infinity. The snake changes its skin, which makes it a symbol of healing and resurrection. On the contrary, a snake as a symbol of death or destruction is derived from its danger of being bitten. But it is interesting

In addition to snakes, turtles in some nations also enjoyed, albeit to a much lesser extent, sacred reverence. Sometimes they symbolized longevity, other times pride or wealth. For the Aztecs, they were a symbol of silver, for the tribes inhabiting the coast of West Africa, they were a symbol of gold. Even crocodiles were untouchable in some nations. They were considered the rulers of the rivers, and human sacrifices were also made in many places to reconcile them. The bodies of dead or killed crocodiles were embalmed and buried in strange caves. The people of Brno are proud

to their stuffed crocodile (nicknamed the Brno Dragon) in the passage of the town hall, so they were far from the first to worship this animal posthumously. Brehm (1939) tells in his records of trips on the Nile that he visited caves where there were thousands of mummified crocodiles, resting there for ages. In many cases, people inserted scrolls of sacred papyri into the crocodile bodies to guard the crocodiles.

It took a long time for man to study reptiles scientifically, ie objectively and rationally. We can find the foundations already in ancient Rome at Pliny the Elder.

With the advent of Christianity, there was a stagnation in the field of natural sciences, which deepened significantly in the Middle Ages. Popular bestiaries, a kind of chi-tanks, books about animals without the author were created. They brought something from Aristotle, something from Pliny, they referred to the Bible, they contained verses and prose, and they were full of superstition and error. These books have enjoyed popularity for centuries and with them survived even the wildest reptiles of reptiles. However, toys appeared not only in anonymous books. For example, the Dominican monk Vincent of Beauvais, in his book *The Mirror of Nature* (*Speculum naturale*), directly claimed that a snake, like a bear, serves the devil. The cult of St. George, who is most often depicted killing a dragon (Fig. No. 6). Also, the adage "Snakes and scorpions climb on St. George's" (scorpions = lizards) do not indicate the popularity of this group of animals. St. Patrick is celebrated in Ireland not only for bringing Christianity, but also for exterminating snakes throughout Ireland. However, he overlooked the huge and venomous snake Paiste. Shortly after St. Patrick's death, the snake began destroying the area around Lough Foyle. The locals eventually turned to a holy man named Murrough. He defeated the snake and imprisoned him underground at the headwaters of the Foyle River, where he remains to this day. Unusual floods and torrents of this river The locals eventually turned to a holy man named Murrough. He defeated the snake and imprisoned him underground at the headwaters of the Foyle River, where he remains to this day. Unusual floods and torrents of this river



*Photo 1: A poster "warning" of the alleged planting of vipers appeared in the Třeboň region. This is a false and alarming message, and therefore such calls are always without mentioning the author or other verifiable source.*

*(Photo: Simona Poláková)*

are considered the movements of the Paiste snake. But also st. Francis of Assisi and his teachings failed to change the negative attitude towards reptiles. Francis had an unusually positive attitude towards animals. He also liked wolves and snakes, animals considered evil and dangerous at the time. Therefore, he is also considered the patron saint of nature conservationists.

However, few species are still entwined with such superstitions and mistakes as the Adder Viper. Our only venomous snake is common only by name. In fact, it is quite rightly included among the critically endangered species. In the past, the viper was threatened by senseless killing for fear of being bitten, today it is mainly the loss of habitats, the transformation and fragmentation of the landscape, the drying up of wetlands and the like. An equally important reason is the chemicalization of both forest and field crops.

*Vipers are often written in beautiful literature, especially children's. For example, in the novel by Kája Mařík or in the book Gabra a Málinka. Kaja was directly celebrated for killing the viper: He recognized her immediately by the dark stripe on his back. He took a stone, a sharp stone — a crack — after a while. She just cut her tail... The inspector stroked Kája's head and said, "You are a guy; You're not afraid, see? " (Háj 1943) Similarly to Gabra "It was so. Gabra caught a viper. A dark stripe all over his back proved it. Daddy shouted, "Hold on - don't let go!" And Macek shouts, "I'm going for alcohol - watch out for God - watch out!" He grabs Gabra's hand, sticks the snake's head into a bottle of alcohol, and then pushes his entire body there. (...) "Do you already have a viper in the collection?" Shield school has not had this yet. So write "Gabra adder" on that bottle. "(Kutinová 2009).*

The viper is also entwined with various legends of the urban (urban) myth. For example, in this form: "A parachute box descends from the helicopter, it hits the surface, it opens - a viper crawls in all directions." These are stories that have been told in pubs and now appear on social networks. It is also common to see that ecologists have a farm where they breed vipers, which they then transmit to the wild in buckets. Such rumors occur in the Beskydy Mountains, in the White Carpathians, in the Třeboň region or in the Hradec Králové region. According to the French sociologist of JN Kapeferere (an expert on rumors and legends), these legends originated in 1976 in France and spread from there to the surrounding countries. They are called "Viper Release Legends" and can be found in almost all European countries (Janeček 2007). The structure of the urban legend is built so that the listener will believe that the story is truly true, and as true it is also passed on. A typical introduction to such a story is the fact that this story has become the narrator's friend (friend, family member, etc.), but it is never the narrator himself.

### 3. Legal protection of reptiles

"Woe to the blasphemers or savages who have reached out to an argument or even killed him. Before he met year after year, he also had a violent death." Jiří Svoboda: The Legends of Znojmo.

#### 3.1 Legislation in the conditions of the Czech Republic

He remembers several laws to protect our reptiles: the Nature and Landscape Protection Act, the Fisheries Act and the Animal Cruelty Act. In the general consciousness is most Act 114/92 Coll. on nature and landscape protection, as amended, which is the most important for the protection of reptiles. We will deal with the protection of reptiles according to this law in a separate subchapter below. However, it is less known that the protection of reptiles is partially ensured by Act No. 99/2004 Coll. (on fisheries), which states in § 12, paragraph 9: "A person handling surface waters is obliged not to disturb the protection of fish and aquatic organisms, or their food sources. Everyone must act in such a way as to avoid unnecessarily endangering, injuring or disturbing fish and aquatic organisms and damaging their living conditions. ' a typical example is a snake. Law 246/1992 (for the protection of animals against cruelty) states in § 1, paragraph 1, that "The purpose of the law is to protect animals that are living creatures capable of suffering pain and suffering from cruelty, damage to their health and their killing for no reason; if they were caused, even negligently, by man. "The law thus protects not only reptiles in human care (in captivity), but also wild ones. The protection of specially protected reptile species is also addressed by the Criminal Code (Act No. 40/2009 Coll.), Which in Sections 299 and 300 regulates the legislative framework on how to deal with individuals of these species. by damaging their health and killing them for no reason if they were caused, even negligently, by humans. "The law thus protects not only reptiles in human care (in captivity), but also wild ones. The protection of specially protected reptile species is also addressed by the Criminal Code (Act No. 40/2009 Coll.), Which in Sections 299 and 300 regulates the legislative framework on how to deal with individuals of these species. by damaging their health and killing them for no reason if they were caused, even negligently, by humans. "The law thus protects not only reptiles in human care (in captivity), but also wild ones. The protection of specially protected reptile species is also addressed by the Criminal Code (Act No. 40/2009 Coll.), Which in Sections 299 and 300 regulates the legislative framework on how to deal with individuals of these species.

##### 3.1.1 Basic conditions for the protection of specially protected animals

(according to Act 114/92 Coll. on nature and landscape protection, highlighted by the authors). Particularly protected animals (particularly protected species, SPAs) are protected at all stages of their development. The natural and artificial settlements they use and their habitat are protected. According to Decree 395/95 Coll. (as amended), which implements some

provisions of Act 114/92 Coll., the following reptiles are especially protected in the Czech Republic:

#### **Critically endangered species**

Common Wall Lizard (*Podarcis muralis*)  
European Pond Turtle (*Emys orbicularis*)

#### **Highly endangered species**

Sand Lizard (*Lacerta agilis*)  
Viviparous Lizard (*Zootoca vivipara*),  
Slow-worm (*Anguis fragilis*)  
Smooth Snake (*Coronella austriaca*)

#### **Endangered species**

Grass Snake (*Natrix natrix*)

Almost all species of our reptiles are therefore subject to particularly strict protection under Section 50 of the cited Act. However, there are two exceptions. Over time, the species *Anguis fragilis* was divided into two separate species on the basis of new findings, namely the fragile cobra and the eastern cobra (*Anguis colchica*) (Gvoždík et al 2010). Both species live in our territory, but legal protection applies to only one. The second exception relates to the species of Balkan Wall Lizard (*Podarcis tauricus*), which was not known in the Czech Republic until recently. In 2019, a viable population was discovered near Bzenec (Fischer et al. 2019), bringing the number of our wild reptile species to 13. The Balkan Wall Lizard together with the eastern blind lizard are the only species of our wild reptiles that do not enjoy special legal protection. .

The said law stipulates that it is forbidden to interfere in the natural development of specially protected animals, in particular to catch, keep them in captivity, disturb, injure or kill them. It is not allowed to collect, destroy, damage or relocate their development stages or the settlements they use. More detailed conditions for the protection of protected animals, especially in the case of zoos, rescue farms, care for injured animals and authorization to prepare dead animals, were set by the Ministry of the Environment by Decree 395/92 Coll., (Highlighted by the authors of the publication):

**The basis of animal protection** is a comprehensive protection of their habitats. Rescue breeding means the keeping of a large number of individuals of specially protected animals for the purpose of their reproduction. Rescue may only be authorized in accordance with the rescue program established for the species concerned. For species that are also wild, the conservation permit will

Eastern Green Lizard (*Lacerta viridis*)  
Aesculapian Snake (*Zamenis longissimus*),  
Dice Snake *Natrix tessellata*  
Adder Viper (*Vipera berus*)

discuss the nature protection authority with the state hunting administration body. Part of the permit

for rescue breeding is the determination of more detailed conditions of rescue breeding, especially the keeping of adequate records and other data on the course of breeding.

**Animal husbandry in zoosis** a special purpose farm. The main mission of zoos is to provide breeding for endangered species protected by international conventions, rescue breeding for specially protected species, especially critically endangered species, and to fulfill important scientific, research, educational and aesthetic functions. For the provision of rescue farms, zoos shall be issued a permit in accordance with paragraph 2.

For specially protected animals incapable of injury or other circumstances of independent existence in nature, stations may be set up in which they are provided with the necessary care.

Specially protected animal species are possible only on the basis of an exemption granted by the nature protection authority pursuant to Section 56 of the Act. The authority granting the exemption sets out the conditions and the scope of the

necessary data, including data on the method of acquisition and further use of the prepared protected animal preparation, etc. This data is kept in the form of a record book registered and inspected by the nature protection authority that issued the exemption. (If you hand over a dead reptile to a nearby museum for preparation, you will never make a mistake. This will contribute to the research and it is up to the relevant museum (or other institution) to have an exception for preparation for collection purposes. Pos. Aut.)

Photograph specially protected animal species, if disturbed by natural development, are possible only by way of exception.

What follows from these points? No species of our reptiles can be kept in captivity without permission, but if you find handicapped individuals in the wild, you can return them to the appropriate rescue station. Ordinary photography of reptiles in nature is not a distraction and you do not need any exceptions for them. However, in the case of capture and photography, for example in a terrarium, this is already a clear violation of the decree. In short, in the case of specially protected species, it must be borne in mind that all manipulations must be discussed with nature conservation authorities. Other species of our wild reptiles (only the Balkan Wall Lizard and the eastern hen, see above) are covered only by the so-called general protection according to § 5 of Act 114/92 Coll.: "All species of plants and animals are protected from destruction, damage, collection or capture,

Another crucial issue in the protection of specially protected animals is the return of the animals to the places where they lived before. Reintroduction or repatriation in which

If reptiles are transmitted over long distances, they must never be carried out without the prior consent of the nature conservation authority. It is doubly true here that the worst in nature protection is "good intentions". The assumption that ecological damage caused by erroneous introductions cannot occur in our nature is completely wrong; for example, in the case of reptiles, the populations of Eastern Green Lizards around Prague have changed significantly over the last decades through the import and introduction of Balkan individuals. It is known that southern populations of this species have genetically fixed other incubation conditions (Böhme, 1989). In our climatic conditions, the incubation slows down and the chicks are either not enough to hatch at all or they hatch very late. In this case, it is not enough to properly fatten until winter, so they will die during the winter. Therefore, if the Balkan lizards intend to strengthen our populations, the result is quite the opposite. When crossing with local individuals, the proportion of such affected pups increases. This results in a reduction in the number or disappearance of the population.

### ***What is a population?***

*A population is a group of individuals of the same species living in the same place. This definition seems simple, but population is often difficult to grasp. The term "one place" is often very vague and subjective. It is often difficult to say whether it is one large or more smaller populations. Usually, only the populations existing on the residual habitats that form the isolated islands in a completely different type of environment that forms the barrier are clearly defined. Thus, although it is difficult to define a population, its characteristics are very important in terms of species protection. The most important characteristic of a population is its size, ie how many individuals it contains. Since it is often not clear where a population begins and ends, its size is usually expressed by the so-called population density, ie the number of individuals per area. Therefore, except in exceptional cases, the absolute number of individuals is not stated. Population size development depends on four factors: birth rate (number of individuals born), mortality (number of individuals who die), immigration (number of individuals who come from other populations) and emigration (number of individuals who leave the population). In each population, some individuals increase (birth rate, immigration) and some decrease in population (mortality, emigration). The size of the population fluctuates more or less over time and it depends on which of the above processes is the most important. However, for many populations, these processes are roughly in balance, so there are no significant changes. who come from other populations) and emigration (the number of individuals who leave the population). In each population, some individuals increase (birth rate, immigration) and some decrease in population (mortality, emigration). The size of the population fluctuates more or less over time and it depends on which of the above processes is the most important. However, for many populations, these processes are roughly in balance, so there are no significant changes. who come from other populations) and emigration (the number of individuals who leave the population). In each population, some individuals increase (birth rate, immigration) and some decrease in population (mortality, emigration). The size of the population*

*fluctuates more or less over time and it depends on which of the above processes is the most important. However, for many populations, these processes are roughly in balance, so there are no significant changes.*

However, this does not apply in cases where, for example, the lizards are moved from the liquidated sandpit just before it is buried or when the hen needs to be transferred from the road where the cars drive. However, even in these cases, it is more practical to agree with an expert. Given that most conservationists perform transfers and reintroductions from deep emotional motives (otherwise

it is not necessary to emphasize the need for a good emotional relationship with the reptiles being transmitted and the effort to harm the animals as little as possible during the transmission and to minimize their stress. All the more, however, the rational side of the whole process needs to be emphasized again and again; carefully consider all aspects before the event - always consult the matter with professional institutions and always treat the transfer and reintroduction as the last, ie emergency option, provided that all possibilities for other solutions are exhausted. However, the situation is somewhat different for non-native species of reptiles, in our conditions especially for the beautiful tortoise (*Trachemys scripta*). This species is listed in the European Commission Regulation (EU 2016/1141) as an invasive species, with a significant negative impact. An invasive species is a species that is not native to the territory, introduced by man, which is spreading uncontrollably here, aggressively displacing native species. With some invasions, the species may begin to spread so uncontrollably that it disrupts entire communities or ecosystems. This species of tortoise has been found to have a significant negative effect on local populations of some amphibians. Each EU Member State should develop and implement a separate action plan to address the issue of invasive species. Such a plan is still lacking in the Czech Republic. Each EU Member State should develop and implement a separate action plan to address the issue of invasive species. Such a plan is still lacking in the Czech Republic. Each EU Member State should develop and implement a separate action plan to address the issue of invasive species. Such a plan is still lacking in the Czech Republic.

Therefore, if you find this turtle in the wild, it is necessary (from the point of view of nature protection) to capture it (if possible) and hand it over to the nearest rescue station or some other breeding facility (eg terrariums of interest). Those interested can also keep it at home. Releasing this turtle (albeit guided by good intentions and trying to "save" it) into the wild is not appropriate. If necessary, her humane killing is a better alternative. These turtles are predators and are capable of causing significant problems in our aquatic ecosystems.

### **Specially protected areas**

According to the Nature and Landscape Protection Act, we distinguish six categories of specially protected areas (SPAs), of which nature reserves, national nature reserves, natural monuments and national natural monuments can be used for direct protection of reptiles. Little is known about the fact that any citizen of the Czech Republic can submit a proposal for the declaration of a protected area. The hitherto underappreciated form of protection is the establishment of temporarily protected areas (Section 13 of the Act). Another form of possible reptile protection is the registration of certain areas as significant landscape elements (VKP) according to § 6 of the cited Act. Wetlands, steppe grasslands, landslides, borders, permanent grasslands, mineral and fossil deposits, artificial and natural rock formations, outcrops or outcrops, or even valuable areas of vegetation in the settlement can be important landscape elements, e.g.

### **Specially protected areas suitable for reptiles**

#### **National Nature Reserve (NPR) and National Natural Monument**

**(NPP)** These categories are not very suitable for targeted protection of reptile habitats. Firstly, these categories are intended for areas with high conservation value, ie for more than one group of organisms, and secondly, they are declared by the Ministry of the Environment and the process of their declaration is very lengthy.

#### **Nature reserve (PR) and natural monument (PP)**

These categories are more suitable for targeted protection of reptile habitats. Their founder is always the regional authority. The presence of several species of specially protected reptiles may be a reason to declare them.

When intending to designate a protected area, it is appropriate to reflect on the objective of the protected area and to consider future conservation conditions. "A natural monument is a natural formation of a smaller area, especially a geological or geomorphological formation, deposits of rare minerals or endangered species in fragments of ecosystems with regional ecological, scientific or aesthetic significance, even those formed by man in addition to nature. A nature reserve is a smaller area of concentrated natural values with a representation of ecosystems typical and significant for the relevant geographical area. " The protective conditions imposed by law also result from this division. In the natural monument, it is possible to walk off the road, but also to study species that are not particularly protected. Thus, for example, it is possible to use conventional entomological methods if they are not the target of CHD. It is not allowed to collect or capture plants and animals in the nature reserve, except for the exercise of hunting and fishing rights or the collection of forest fruits. Hunting of animals, but also their capture for demonstrations to students or the public, is possible only with the exception granted by the regional authority.

Small-scale specially protected areas are provided with so-called basic protection conditions and have their own protection zone. Unless otherwise declared, the protection zone is the entire territory within a distance of 50 meters from the borders of the MZCHÚ. A so-called care plan is prepared for the care of small specially protected areas, which, based on data on the development and current state of the area, proposes measures to maintain or improve the state of protection in the specially protected area and to secure the specially protected area from adverse environmental influences. its protection zone. The usual validity of the care plan is 10 years. Care plans can be important for the protection of reptile populations. Appropriate interventions for the benefit of the population can be described here and its monitoring planned. Alternatively, a way can be suggested to inform the public about the importance of the site (information boards,

## ***Additional territorial protection***

### ***Significant landscape element (VKP)***

*By VKP we mean an ecologically, geomorphologically or aesthetically valuable part of the landscape that shapes its typical appearance or contributes to its stability (meaning ecological stability).*

*By law, all forests, peat bogs, watercourses, ponds, lakes, floodplains are declared VKP (these VKP are referred to as "VKP by law").*

*If we think about the list of VKP from the law, it is possible to notice that the law protects the so-called "real" or "true" nature. The forest (even the purely commercial one) is considered to be here. Aquatic and wetland habitats are still viewed in a friendly way. Forest-free habitats, such as steppes, borders or rocks, are completely absent. This type of habitat is generally seen as something inferior and insignificant. Fortunately, it is possible to declare another type of VKP (so-called "registered VKP"). These can be various formations - steppe grasslands, draws, borders, old orchards, wetlands, rocks, etc. Protection in the form of VKP can be provided to very small landscape structures, such as a stone plain, border or a group of boulders. Conservation and protection of even small formations is of great importance for reptiles.*

*It is forbidden to damage or destroy all significant landscape elements and interventions in the VKP can only be carried out with the consent of the nature protection authority. However, this does not apply to normal management, such as logging in commercial forests. However, it is no longer possible to drain the peat bog or plow the boundary without the appropriate permission to intervene in the VKP.*

### ***Temporary Protected Area (PCHP)***

*Targeted for the protection of habitats of endangered species, nature protection authorities may provide protection in the form of a temporarily protected area, including periodic protection (eg for the winter of reptiles). This may be an area with a temporary or unforeseen occurrence of important species. Such territory may be protected in this way for a predetermined period of time. The decision on the declaration of a temporarily protected area shall limit such land use that would mean the destruction, damage or disruption of the development of the subject of protection. The competent nature protection authorities for temporarily protected areas are (among other things the types of protected areas) municipal authorities of municipalities with extended powers or district authorities (in the territory of military districts).*

*A temporary protected area is a very good way to provide protection for populations. It is a relatively flexible measure (but it depends a lot on the helpfulness of the local authority). We can thus protect the reptile population temporarily, but quickly. It is thus possible to gain time for a more permanent solution, eg by declaring a protected area a natural monument or for a more detailed survey of the area, and thus better*

*evaluation of its significance. Periodic announcements for a certain period of the year can also be of great importance. In such cases, it may be, for example, the protection of a place of mating or wintering, or even the protection of a natural hatchery.*

### **3.2 European legislation**

The Treaty of Amsterdam extending the provisions of the Treaty on European Union also provides. Integration of environmental protection interests into EU legislation. In nature protection, there are two legislative norms: the Birds Directive and the Habitats Directive. The second issue concerns our issue, which provides the legislative framework for the so-called Natura 2000, which is a system of protected areas that all the states of the European Union create on their territory according to uniform principles. The aim of this system is to ensure the protection of those species of animals, plants and habitat types which, from the European point of view, are the most valuable, most endangered, rare or limited by their occurrence to a certain area. The obligation to create a Natura 2000 system is incorporated into Act 114/92 Coll. From the point of view of the reptiles' own protection, the European directive has two important annexes, Annex II and Annex IV.

Annex II lists the species of animals and plants whose protection requires the designation of Special Areas of Conservation (EIA). These are finally summarized in a so-called national list, which is approved by the government as a whole and published in the form of its regulation. In our country, this happened by Government Decree No. 318/2013 Coll. (as amended by No. 73/2016 Coll. and No. 207/2016 Coll.). There are a total of 1,112 localities in the Czech Republic that fall under the column of European importance. These areas have a total area of 7,951 km<sup>2</sup>, which represents 10% of the territory of the Czech Republic. Of our reptiles in Annex II, we find only the mud turtle (*Emys orbicularis*). However, this species is considered almost extinct in the Czech Republic, so no specific locality has been identified for its protection. Even so, many EVLs provide protection for some species of reptiles, even if they are not directly protected.

European Pond Turtle (*Emys orbicularis*)  
Eastern Green Lizard (*Lacerta viridis*)  
Common Wall Lizard (*Podarcis muralis*)  
Balkan Wall Lizard (*Podarcis tauricus*)  
Sand Lizard (*Lacerta agilis*)  
Aesculapian Snake (*Zamenis longissimus*)  
Dice Snake (*Natrix tessellata*)  
Smooth Snake (*Coronella austriaca*)

20

Annex IV lists the species of animals and plants that require strict protection. Here we find our following species of reptiles:

It is therefore clear that more than half of our wild reptile species enjoy protection at EU level. If the reptile is subject to protection under European Community law, this means stricter conditions for granting a possible exemption (see Section 56 of Act 114/1992 Coll.). The Czech Republic has formally fulfilled its obligations to the Directive by stating that all these species are specially protected (the Balkan Wall Lizard is temporarily absent).

### **3.3 Global legislation**

The reptile fauna is relatively well researched worldwide. Nevertheless, a comprehensive study of reptile vulnerability (Böhm et al. 2013) found that about 20% of all world reptiles are threatened with extinction and 20% of species lack data, ie information on whether or not a species is endangered. Freshwater reptiles (eg turtles), tropical forest species (eg boyas) and endemic oceanic species (eg lizards) have been shown to be among the most endangered. That is why many countries accede to various international conventions, such as the Ramsar Convention (Convention on the Protection of Wetlands) or the Berne Convention (Convention on the Protection of Endangered Species and their Habitats). In terms of species protection of reptiles and regulation of trade in them, the most important is the so-called Washington Convention.

#### **3.3.1 Washington Convention (CITES)**

Since 1992, Czechoslovakia has become a CITES country, ie it has acceded to the "Convention on International Trade in Endangered Species of Wild Fauna and Flora", which is also called the Washington Convention according to the place where it originated. After the partition of Czechoslovakia, the convention passed to the successor states, including the Czech Republic. This Convention is also referred to in the Nature and Landscape Protection Act (Section 54), which stipulates that whoever keeps, offers for sale or processes an animal protected under international conventions is obliged to prove the permitted method of acquisition at the request of the nature protection authority. It is therefore necessary to always make sure of the legal origin of these animals. The ethics of the Defender of Fauna should also include the fact that he never buys a so-called "paperless" animal, even when he is driven by an effort to save the bred individual from the influence of an unconscious breeder. In such cases, it is better to use the Act on the Protection of Animals against Cruelty (No. 246/92 Coll.), When the animal can be taken away from the breeder. According to statistics, illegal trade is the second most serious cause of biodiversity loss on our planet, after the destruction of natural habitats. Globally, the European Union is the largest importer of wildlife products, followed by the United States, the Far East (China, Japan, Korea), Arab countries and Australia. An acute problem is the smuggling of extinct species or their killing in the wild, which includes reptiles. The Washington Convention is currently protected by more than 5,000 animal species, According to statistics, illegal trade is the second most serious cause of biodiversity loss on our planet, after the destruction of natural habitats. Globally, the European Union is the largest importer of wildlife products, followed by

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of which over 200 species of reptiles. According to the degree of threat to their existence in nature, they are divided into three categories:

*Annex I*- species directly endangered;

*Annex II*- species whose natural situation is not critical but which could be endangered if use for international trade is not regulated;

*Annex III*- endangered species in the territory of a State which has requested the regulation of international trade in them.

The Washington Convention has created a global network that controls international trade in specific endangered species of animals and plants, mainly through permits that must accompany each international shipment of the organisms or products concerned. These permits, known as "CITES permits", are issued by the executive authorities of each party and are controlled by the customs authorities of all countries of the Conventions. It is a kind of proof that the export or import of a certain consignment that contains plants or animals is in order from the point of view of nature protection. The Convention means any export or import of protected organisms, their bodies, parts and articles thereof. It therefore also applies, for example, to a crocodile leather handbag, etc. The convention applies to both real traders and tourists.

Within the European Union, the Washington Convention is implemented in a uniform manner on the basis of Council Regulation (EC) No 338/97. EU rules are in many respects stricter than the Convention itself. EU legislation places a large number of species in a stricter category than the Convention. However, individual EU Member States may have even stricter measures, in particular as regards the keeping of specimens under nature or public health regulations (veterinary and phytosanitary regulations). In the Czech Republic, this applies to animals from our nature, which are specially protected species under the Nature and Landscape Protection Act. The breeding of some exotic animals protected by the Convention is subject to mandatory registration under Act No. 100/2004 Coll. and owners of specimens of endangered species have a duty to prove the legal origin of the specimens held. Violation of EU regulations and our laws on the protection of endangered species can at least lead to the seizure of specimens. According to Act No. 100/2004 Coll. it is possible to impose a fine of up to CZK 1.5 million on law offenders. Smuggling and illicit trafficking in endangered species can also be assessed as a criminal offense with the possibility of imposing a custodial sentence of up to 8 years, a fine or a ban on activity (Sections 299 and 300 of the Criminal Code No. 40/2009 Sb.).

### **Orientation overview of CITES protected reptile species**

You will receive an up-to-date and complete list of species protected under the Washington Convention (CITES) and EU regulations at the Ministry of the Environment. Given these lists

changes, we list here only the most typical species that are the subject of trade (legal and illegal) in the Czech Republic.

### **Turtles**

The tortoise (*Testudo graeca*), the tortoise (*Testudo marginata*) and the green tortoise (*Testudo hermanni*) are the dominant species in the turtle trade in Europe. The yellow-brown tortoise was the subject of trade even in the 19th century. Although turtles were exported annually from Algeria and Morocco to Western Europe. All these species are now protected by both CITES and EU regulations.

### **Lizards**

Endemic island lizards such as the Lilford lizard (*Podarcis lilfordi*) and the Canary lizard (*Gallotia simonyi*) are very endangered. Their global population is made up of only a limited number of individuals living on a single island, where their microevolution has also taken place. These populations are then easily vulnerable. These lizards are mainly protected by EU regulations. The groups of species whose trade is regulated include chameleons (*Chamaeleonidae*), geckos (*Gekkonidae*), iguanas (*Iguanidae*) and skinks (*Scincidae*).

### **Snakes**

Of the more than three dozen European snakes, the vast majority are endangered in one way or another. Trapping for terrarium purposes is another factor that increases the pressure on vulnerable populations. Among European species of vipers, the spotted viper (*Vipera aspis*) is a frequent subject of trade. The most endangered are especially island taxa. The catch is significantly affected, for example, by the endemic *Macrovipera schweizeri* from the Cyclades. The total population of this species is estimated to be about 6,000 individuals. On the largest of the islands

- Milós is caught from 100,000 to 150 snakes each year in a population of around 3,000. This dwarf among *Macrovipera* vipers is therefore very rare.

The lesser viper (*Vipera ursini*) is endangered throughout its range (steppe biome from Hungary to Mongolia) and is protected by EU regulations. The EU regulation also includes, for example, the Wagner's viper (*Montivipera wagneri*) and the Latif's viper (*Montivipera latifii*). Among snake-like snakes, trade is limited, for example, with the Asian fishing snake (*Xenochrophis piscator*).

*However, the danger for reptiles is not only trade, but also extensive changes in bio-tops. The destruction of the natural environment, which takes place on a relatively large scale, is currently exposed to, for example, the Wagner's viper. The newly built Alpaslan-2 Dam on the Murat River in the province of Mus in eastern Turkey is a major problem. Its construction has caused the destruction of large habitats of the local herpetofauna and its unique habitats are fragmented.*

## Crocodiles:

Crocodiles are also common trade-threatening species, such as the Cuban crocodile (*Crocodylus rhombifer*) and the Indian gaviol (*Gavialis gangeticus*). Trade is regulated by the Convention and EU regulations for the entire group of crocodiles.

### 3.3.2 Red Book and Red List

Efforts to assess changes in biodiversity and endangered species are long-term. The result was often the so-called Red Lists or Red Books, which were to list the currently endangered species. However, the evaluation was often very subjective, and until the early 1990s, the preparation of the Red Lists and books was based more on the opinion of individual specialists. The red lists of individual taxonomic units or the same taxa from different countries were thus not comparable. It also often happened that various authors did not agree on the extent to which the evaluated species is really endangered. In an effort to address this problem, the IUCN adopted new Red List categories in 1994, along with more objective and scientifically stringent criteria. IUCN categories are determined by quantitative,

- 1) population decline.
- 2) small area of expansion and decline or fluctuations in population size.
- 3) low population size and population decline.
- 4) very low population and limited distribution area.
- 5) mathematical modeling of population viability.

The IUCN Red List of Threatened Species is a biennial list of endangered animals and plants issued by the International Union for Conservation of Nature (IUCN). The degree of threat is determined by several categories and subcategories, from the category of extinct (or extinct) through medium levels of threat to the category of such species that are not endangered at all. These categories are given to globally endangered species as well as those that are regional threats. Such lists may be issued for individual continents, biogeographical regions or countries. In the Czech Republic, the Red Lists have so far been compiled for various systematic groups. In 2017, an update of the Red List of Endangered Species was published in the Nature magazine, including for reptiles (Jeřábková et al. 2017).

The IUCN Red data book is created on the basis of the Red Lists, to document the loss of global, national and local biodiversity at the species level. These are popular scientific editions of inventories of endangered species of plants and animals, divided into categories according to the degree of threat according to

IUCN classification. The Red Books are basically comprehensive lists of all known endangered or rare species. They are an important tool for the conservation work of governments, government agencies and conservation associations. They have become the most comprehensible and accessible scientific resource for the public. It also serves as a measure of the success of species protection activities.

Red lists and books are published on the basis of the latest scientific knowledge. They are regularly updated to reflect the status of the species. It therefore serves as a basis for practical and legal protection of reptiles. However, they are not a legal norm and the fact that a certain animal is on the red list does not affect its legal protection. Only after the species enters the annex to the relevant decree can it be referred to as a specially protected species (in various categories of protection).

### Brief characteristics of IUCN categories for listing species on the red lists

- 1) *Extinct or extinct (EX)*- a species for which extensive surveys do not call into question the fact that the last individual died.
- 2) *Extinct or extinct in the wild (EW)*- a species that survives only in human care (cultivation, cultivation, breeding).
- 3) Critically Endangered (CR) - a species that faces an exceptionally high risk of extinction in the wild.
- 4) Endangered (EN) - a species that faces a very high risk of extinction in the wild.
- 5) Vulnerable (VU) - a species that faces a high risk of extinction in the wild.
- 6) *Near-threatened (NT)*- a species which we do not yet classify as critically endangered, endangered or vulnerable, but which is close to this classification or is likely to be included in one of these categories in the near future.
- 7) *Little Affected (LC)*- widespread and numerous species.
- 8) *Insufficient data (DD) species*- species for which they are not information is available to assess the risk of disappearance,
- 9) *Not evaluated (NO)*- a species that has not yet been evaluated according to IUCN criteria.

### 3.3.3 Reptiles as flag species

Reptiles can become flagship types of traditional cultural landscapes. Flagged species are organisms which, thanks to their beautiful or otherwise interesting appearance and connection to a particular habitat, arouse the interest of the public, which then accepts not only the need for their protection, but also the protection of their entire environment (habitat, habitat) with all others. second. Reptiles can be very good

types of traditional cultural landscape, due to the link to its diversity. They often inhabit small but landscape-significant habitats (stone drifts, borders, dry walls, field manures). These include conspicuous species such as the green or common lizard. The Znojmo region, for example, is sometimes called the region of the Eastern Green Lizard, and the Znovín winery also has the *Lacerta viridis* brand. Wine bottles are marked with a sticker with this lizard. Even the Sand Lizard is considered cute and people like to see the lizards sunbathing in the field between. It can therefore be a symbol of the return of this element to the landscape. An important flag species in the regions where it occurs is the tree snake. It was traditionally considered a housekeeper's snake and in the White Carpathian Bojkovice it also has a wooden sculpture.

Based on data on the previous common occurrence of reptiles and their current decline, it is possible to argue in favor of the protection of the traditional agricultural landscape - smaller units of fields and meadows, divided by borders and other dividing elements. The flag species has the most effective effect on the public where it appears as a spontaneous part of folk creativity (see, for example, rumors of a snake farming in areas with a tree snake).

#### 4. **Monitoring and occurrence of mapping and monitoring**

"Monitoring is the collection of information that takes place systematically and over a period of time. Interestingly, it comes from the Latin "monito", which means warning. Monitoring can therefore provide information and warnings based on it."

Bedřich Vypera.

One of the basics of reptile protection is the knowledge of their occurrence sites. Reptiles have long been an unattractive group for zoologists. Older data (approximately before 1960) are generally very general and thus inaccurate. The fact that, as a result of changes in the landscape, there has been and still is a rapid decline in populations and a reduction in their abundance is also significant. It is therefore important to constantly monitor their occurrence, check known sites and record new ones.

A summary work on the distribution of our reptiles was published by Mikátová et al. (2001). The publication gives a picture of the distribution of individual species within the Czech Republic. It has been 20 years since this Atlas was published. The collection of data at the Agency for Nature and

Landscape Protection of the Czech Republic (AOPK CR) continues, both through regular monitoring of already known populations and through the collection and mapping of new data.

Reliable information on the occurrence of animals has an irreplaceable place in nature conservation. They are used in a number of different activities, such as administrative

management, biological evaluations, active care of specially protected areas, etc. The collected data are stored in the NDOP (Nature Conservation Findings Database). Part of the entry in the database is also the most accurate location with a map. If necessary, it is possible to obtain information on the occurrence and distribution of a certain species, or, conversely, on the species representation in a certain area (locality, cadastral area, district, region, etc.). The more accurate and detailed the data and circumstances of the finding available, the more valuable and useful the observation will be. But even a brief notation is useful if it contains at least this basic information.

### **Basic data**

- 1) Scientific or Czech name of the species;
- 2) Locality description: Name of the nearest village or its part (eg Horní Jelení, Brno Bystrc). We will specify this basic location with other data (eg 1 km NE of the village, Bubák pond - dam). However, the most accurate is to find out the geographical coordinates of GPS, for example, using digital maps on a mobile phone. We will also state the basic characteristics of the place of discovery (song, field boundary, etc.);
- 3) Region: If we do not provide coordinates, it is advisable to state the region or district. This is because a large number of municipalities have a name that occurs repeatedly. It can easily be confused;
- 4) Date of finding: We state the day, month and year of the finding. If we do not know the exact date, we mark the time interval in which the observation was made (eg from 1 to 9 May 2019) or at least the year of observation. For older data, we can also state the range of years (eg 1945-1948);
- 5) Author of the observation or source of information: We will state the name of the observer or collector (preferably with contact details, (eg e-mail, telephone)). literature (with its exact citation);

Entering data is easy if we use the Bio-Log internet application, where we fill in the data according to the form. The location of the find, if we are directly on it, will be marked automatically. Of course, it can happen that interesting findings occur in places where there is no signal and the application does not work. Then it is necessary to fill in the data additionally.

### **Additional Information:**

- 1) The number of individuals can be stated in two ways. If the observed animals can be easily counted, we write a specific number. If this is not possible, we give an estimate, eg tens, hundreds, 20-30;
- 2) Gender, i.e. male, female, undetermined;
- 3) Age: juvenile, subadult, adult.

## Mapping and monitoring

Mapping is the finding of the current distribution of species, which usually takes place by a one-off survey of the defined area. The aim of the mapping is to determine the distribution of the species (or other taxonomic group) in a certain territory (state, region, geographical unit...). Monitoring deals with regular and long-term monitoring of the state of populations. Monitoring is about capturing changes in populations or changes in the distribution of a selected taxon. Monitoring can only be based on a representative selection of populations. Therefore, the overall expansion does not have to be monitored as part of the monitoring. The main difference between monitoring and mapping is that mapping is a one-off action to find out whether the monitored species occurs in the area or not. Monitoring is a regularly repeated survey according to the same methodology, which records changes in the distribution or qualitative parameters of populations. These can be both a trend in population size and, for example, intraspecific dynamics, or changes in the range of the species. The results obtained by mapping and monitoring are an essential basis for evaluating the threat to the species and the direction of practical protection.

For reptiles, the appropriate timing of field work significantly determines the success of observations. Another important factor is a well-chosen methodology. These two factors largely determine the results obtained.

Individual reptile species differ in their way of life and environmental requirements. The choice of a particular method therefore depends on whether the aim of the study is to map or obtain results on the state of the relevant population. An important factor is also the season, which affects the behavior of reptiles and their occurrence in different types of habitats. For example, the submerged snake can be found in the spring and late summer or autumn in rocky slopes and far from the water, in the high spring and most of the summer we find it in close proximity to the water for a change. The study methods are described in more detail below.

In the study of reptiles (especially in mapping), it is possible to use methods that do not manipulate animals (observation, search for snake snakes) or methods that require the capture of individuals (trapping by hand) or methods that are on the border (control artificial shelters). Exceptions are needed if we are dealing with representatives of specially protected species. We should always prefer non-invasive alternatives, even at the cost of less accurate data. Reptile and handling of reptiles should only occur exceptionally and in justified cases.

## Monitoring methods

In all zoological disciplines, we can observe a constant effort to develop and anchor a standardized method of monitoring, ie repeated monitoring of species diversity and density of individual populations. Monitoring should be conducted in such a way that it does not affect natural processes and can be repeated many times, which would make it possible to compare changes over time.

While in botany standardized methods stabilized as early as the 1930s, in zoology they became much slower. The reasons are clear: the animals are motile and morphologically highly heterogeneous. Also, very different lifestyles of aquatic and terrestrial organisms usually make it impossible to use the same methods. Obviously, in such circumstances, a wide variety of methodologies need to be developed. In entomology, such methods first appeared (standardized sliding, falling traps, light traps). The situation in vertebrate research (vertebratology) has become more complex, especially in terrestrial vertebrates. The research of terrestrial vertebrate fauna had to be based on a very diverse biology of individual groups (birds, bats, ungulates, amphibians, etc.). From the beginning, it was clear that a single methodology is out of the question. However, there was a consensus on the need to monitor the spread of vertebrates using standardized methods, both in individual countries and across continents.

## 4.1 Network Mapping

Network or square mapping consists in recording the occurrence of species by the presence x absence system in a large area divided into smaller sections. In principle, this method can be used for all taxonomic groups. However, its effectiveness depends on the number of observers. It should also be noted that this is a semi-quantitative method that works on a macro scale (in the order of tens of km<sup>2</sup>). In Central Europe, a map field with trapezoids is generally used, where the individual fields measure 10 minutes longitude and 6 minutes longitude, ie approximately 11.2 x 12.0 km at the Czech level (Buchar 1982). Fields with an edge of up to 50 km are used for Europe (Gasc 1997).

AOPK CR currently has a more detailed mapping methodology (Jeřábková 2011). The network mapping field is divided into four quarters and the mapper verifies the presence of all expected species in all individual quarters by visiting one or more sites of their choice. The mapper's effort is to confirm the occurrence of the expected species at at least one locality in a quarter of the network mapping field, which means at 4 localities in one network mapping field = 1st order network mapping field. If the species is not found at the first suitable site for the species, the mapper must visit other suitable sites, but if the species is not found, the mapper must visit at least three suitable sites within one quarter of the network mapping field. It is very likely that the mapper will find more than one species at the same location. Assumed,

The timing of the mapping must be adapted to the life cycle of each species. More detailed information on timing is available

in monitoring methodologies for reptiles, the current versions of which can be downloaded at [www. biomonitoring.cz](http://www.biomonitoring.cz).

#### 4.2 Capture

It is mainly about catching birds or bats in nets or small mammals in traps. By standardizing these methods, it is possible to obtain good quantitative results which can be statistically evaluated. These methods have been relatively standardized, for example, in small mammals (eg Pelican 1975). For example, CES (Constant Effort Site) and RAS (Recapture of Adults for Survival) methods use bird capture in nets combined with ringing. At present, mammalian trap-mark-recapture (CMR) is being widely used. The use of these traps has the advantage of less intervention in the studied populations (Wilson et al., 1996). This method is also used for reptiles. Reptiles are most often caught and marked with scales, tattoos or microchips. It is also possible to personalize with photographs of important characters, such as head tags,



*Photo 2: Preserved exuvia (slugs) of snakes can usually be well determined, so they are credible evidence of the occurrence of the species.*

#### 4.3 Direct monitoring methods

Line and point transects or audiovisual methods (photo traps, sound recordings) are mainly used here. The so-called line transect method enables relatively reliable monitoring of the abundance of individual bird species based on the record of the number of heard or seen individuals (Janda, Řepa 1986). The observer records all species detected visually and acoustically in a belt of a certain width and length. It is well suited, for example, for comparing the relative abundance of birds in different places. The method is relatively simple and time consuming. It can be used to cover large spaces; it allows work practically all year round, but it is not very accurate (risks are estimates of the width of the transect and the marching speed). The oldest searchable method of tracking reptiles was developed by Andruško (1936, in Novikov 1953), who proposes for counting lines, where findings three meters wide are taken into account. While the numbers of animals found do not necessarily reflect reality (some species are easier to observe than others), changes in abundance are reliably detectable at fixed points and by the same observer. This method is used in reptiles to this day. Because reptiles usually try to hide from the observer, the effectiveness of these observations, especially in snakes, is low. However, the line transect method gives good results in lizards. especially in snakes, small. However, the line transect method gives good results in lizards.

#### 4.4 Indirect monitoring methods

The methods detect the presence of animals indirectly, using various products or traces of their activity. They are based on the registration of products (droppings, undresses, etc.), monitoring of occurrence based on tracks and footprints. Other methods are based on the registration of residence signs (counting of swallows, bites). This method is very useful for beaver, for example (eg Vlašín 1992). The occurrence of reptiles (especially snakes) is evidenced by their exuvia, which are relatively easy to find.

### 5. Methods of reptile monitoring

"You are a strange animal, as thin as a finger. But I am more powerful than the king's finger," said the serpent. "Antoine de Saint-Exupéry, Little Prince

Reptiles are a group of vertebrates that have long lacked a suitable and widespread standardized method (apart from network mapping). There are a number of reasons for this. There is an ethological-ecological difference between reptiles (walking lizards) and reptiles that crawl - crawling (snakes and hens). There are still other characteristics of turtles (with a little

exaggeration, their movement can be called silly walking). Another major obstacle is the fact that the activity of reptiles is highly dependent on the weather, not only on the weather during the observation itself, but also on the weather during the previous days and hours. Low but also very high temperatures can mean that snakes (and lizards) in particular seek shelter and are not active. For example, birds sing even when it is very cold, bats fly even in light rain, and amphibians continue to mate even in adverse temperatures. At unfavorable temperatures, reptiles reduce their activity to such an extent that their observability at the site is negligible. However, not only temperature but also humidity or photoperiod play a role. Humidity is a factor that is often overlooked in reptiles. During prolonged drought, reptiles activate less.

Photoperiod changes cause changes in temperature preference throughout the day. For example, the Eastern Green Lizard (*Lacerta viridis*) responds to the long-term photoperiod by significantly increasing the preferred body temperature. In the marginal parts of the season, on shorter days, the temperature requirements are lower, but the activity nevertheless decreases. Rismiller & Heldmaier (1982) state that the importance of the photoperiod as a seasonal factor is clear from the fact that the Eastern Green Lizard gradually stopped activating during the short photoperiod and began to overwinter even when the activation temperatures and food availability were sufficient. Thus, the photoperiod not only plays an important role in the selection of daily preferred temperatures, but can also act as a primary stimulus for seasonal changes (Rismiller & Heldmaier, 1982).

The error caused by these factors can then completely overlap the usability of the obtained data for long-term monitoring.

When observing reptiles, direct observation was and is being used as the basic method. The observer walks through the terrain and tries to find out as many species and individuals as possible. The so-called peeking under the shelters is added to this method. Thus, the characteristic tendency of all reptiles to hide in small random shelters, where they rest or warm up (tempering, basking), is used. This is applied in the British reptile monitoring methodology (eg Gent, T. & Gibson, S., eds.1998), which proposes the location of artificial shelters. The zoologist places artificial shelters on the area, but not accidentally, but where he assumes the greatest probability of finding. During the visit, he bypasses the individual shelters and records the reptiles found under the shelters, on the shelters and along the route between the shelters. The methodology recommends a minimum of 7 visits per year for basic research, up to 20 visits are recommended for detailed research. However, the method is not aimed at determining the population density in different places, but is set to determine as many species as possible at the site. The zoologist therefore avoids places with a low probability of finding reptiles. We consider this to be the biggest shortcoming of the methodology, as this may overestimate the occurrence of reptiles as an artifact. In addition, the method does not allow comparisons between different areas.

Guilfoyle (2010) tried to standardize the methodologies.

Reptiles suggested monitoring 32

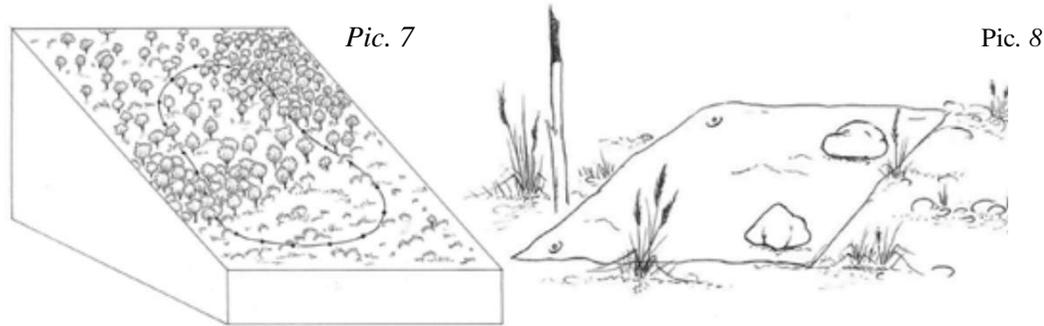
either by exploring the area for a predetermined amount of time, similar to CES methods (time-limited surveys), or by observing animals in permanent standardized areas (space-limited surveys). For time-limited surveys, Guilfoyle proposes a standard time of thirty minutes. He recommends so-called active research, ie turning over stones, wood, leaf fall and other objects on the site. The problem with this method is that with a high number of findings (associated with their recording), the time spent on the route is reduced. In spatially limited surveys, the size of areas according to the author can vary from  $1\text{ m} \times 1\text{ m}$  up to  $50\text{ m} \times 50\text{ m}$ . The process of active search for animals (eg turning of wood and stones) must be standardized and must be repeated during the inventory. Using standard area sizes, population density can be calculated, and these data can be used for long-term monitoring in different habitats, under different weather and seasonal conditions. A variant is to use a standard length transect. However, all authors work only with natural shelters. During surveys of the tree snake, both in the Podyjí National Park and in the White Carpathians Protected Landscape Area, we have included the installation of artificial shelters as an integral part of our research. For practical reasons, we settled on squares of various materials measuring  $1 \times 1$  meter. This size is still small enough to be handled well and large enough to provide adequate shelter for even large snakes (tree snakes). In the early stages of the research, we focused on different types of material and unsystematically tested different types of such artificial shelters. Without being able to claim the validity of our observations, we can divide shelters into suitable, less suitable and unsuitable. Suitable shelters include pond foil and gurt squares (pond foil is a plastic or rubber belt used to create garden ponds in permeable material, gurt is a rigid conveyor belt made of rubberized textile used in the extraction of minerals, the thickness of this material is 1 cm and more). Less suitable are tarpaulins, studded foil, corrugated sheet metal and jekor (jekor is a non-woven carpet, thickness usually 3 mm), and the following materials can be marked as unsuitable: thin translucent plastic foil, wood, textile (blinds), garden foil and reed mat. Unsuitable materials either do not provide suitable shelters for reptiles or they disintegrate rapidly in the field. From the appropriate materials, we then selected the one that produced the best results in terms of easy installation, and that was the pond foil. Beaune & Savier (2019), for example, also studied various materials for bait shelters, especially sheet metal and rubber squares. They found that tin shelters heat up faster in sunny weather, while rubber shelters stay warm longer. However, they did not find statistically significant differences in the capture of the species spectrum of reptiles between the examined materials.

For a long time, it has proved successful for us to fasten these foils in the two corners and load the stone in the other two corners. During the survey, we therefore proceeded in such a way that we went around the foils in a steady way and recorded all the reptiles,

which we saw during the patrol outside the foils and on the foils. Upon arrival at the foil, we carefully removed both stones and raised the foil sharply. We either only recorded the found reptiles or caught them in the hand for further research. Based on these many years of experience (2000–2014), we have developed the following methodology.

### 5.1 Standardized point transect method for reptiles

It is a method of spatially limited research. For the research of a certain area (reservation, research area, biological evaluation object, etc.) it is necessary



*Pic. 7: Schematic representation of a point transect. The points are placed so that they proportionally represent the basic habitats (sparse forest, dense forest, meadow, etc.).*

*Pic. 8: Schematic representation of one of the transect points. Foil 1 × 1 m, nails fixed on the left (length 200 mm), stones on the right, color-coded pin (height 1 m).*

to draw a transect 100 to 1000 m long and to fix 10 points on its route. For larger areas (over 10 ha) it is necessary to place more such lines. One bait foil is placed at each point as an artificial shelter (see below). The points are placed so that they represent all habitats and microhabitats, ie not only where we expect the largest occurrence of snakes. Experience has shown us that even a point placed at first sight inappropriately (wet shaded gorge) can work very well under extreme climatic conditions (eg prolonged drought and heat). It is obvious that the transect will not be guided along a straight line, but along a curve, which may even have a circular or elliptical characteristic. The points do not have to be evenly spaced, but the minimum distance should be 10 and the longest 200 meters.

A bait foil measuring 1 m × 1 m will be placed on each permanent point, fixed in two corners with 200 mm long nails with a wide base and loaded with stone in the remaining two corners. On the rocky subsoil, it is possible to secure the stones with stones in all four corners. Pond foil made of black polyethylene with a thickness of 0.6 mm is used as the material. Depending on the nature of the terrain, it is possible to place crushed bark, wood chips, small stones and the like under the foil,

that the foil does not lie directly on the surface, but that small crevices remain between it and the surface of the earth. Each point of the transect should be marked in the field with a 1 m high end with a signal-colored end so that the point in the field can be found at the time of peak vegetation. A period of at least 1 month should elapse between the installation of the foil transect and the first monitoring. It is optimal to install the line in the fall and start research in the spring. This is because reptiles only start using such areas after they have been lying in the field for a long time. During the monitoring, the researcher bypasses the foils in a steady manner (still along the same route) and first records all reptiles seen during the patrol outside the foils and on the surface of the foils. Only then will it be removed

*Photo 3a (Correct!): Correct and easy installation of an artificial shelter. It is also important to mark the foil in the field so that the place can be easily traced. A suitable designation is, for example, a wooden pole with a colored tip.*

*Photo 3b (Correct!): Detail of attaching the foil with a nail.*

*Photo 4 (Incorrect!): The foil placed in this way is an unsuitable solution for several reasons. The transparent foil does not act as a shelter on the reptiles, it is laid on the mature vegetation, which will mold under the foil, thus again an environment unsuitable for reptiles. Its size is also undesirable. The elongated shape, which must be attached in the middle, does not allow quick and easy inspection. More complicated handling of the stones would scare the animals under the foil, so that even in the case of a more suitable shelter material, the occurrence would not be verified.*

*Photo 5 (Incorrect!): This black foil is thin and can easily be damaged. Again, it has an unsuitable shape and is poorly installed. By removing more of the load, the reptiles will soon be scared off and easily escape.*



carefully lift both stones and the foil sharply. Reptiles are either only visually (or photographically) recorded or captured in the hand for further research (in which case it is already a combination with the capture method). For each walk, the air temperature at the beginning and end of the monitoring visit is indicated, as well as other important parameters (clouds, precipitation, time...). For faunal research, it is sufficient if the line transect is inspected 6 times per season, at the optimal time. In the case of quantitative research, it is necessary to count on 12 visits per season (April - September), namely 2 inspections per month, regardless of the current weather.

Foils have different meanings for reptiles in the field. Within the habitat, they create a new structure that differs from the surrounding environment and create artificial shelters. They are important in a relatively homogeneous environment (eg meadow), but for their specific properties they are also used in a very fragmented and diversified environment (eg sunny slope with rocky outcrops). It is obvious that watching reptiles under foils can also be an artifact to some extent, ie that it artificially increases the number (density) of reptiles by creating shelters. However, given the generally low mobility of reptiles, we believe that if the snake is recorded under the foil for a long time and in a certain place, it must have occurred there (or in the vicinity) before. In general, foils are perceived by all types of reptiles as a place suitable for heating in a shelter, without the risk of predation, other times they serve as a shelter from the rain. Given the circumstances that the foils are often used by small tericolial (ie soil-dwelling) mammals, the space below them can serve as a place for hunting. Lizards, especially in the early spring, hunt insects that fly onto the surface of the foils (Vlašín & Mikátová, 2015).

*Photo 6: Incorrect! This foil is installed completely improperly. It is laid on growing vegetation, its dimensions are too large for only 4 stones to be loaded. The use of multiple stones makes it impossible to successfully control the reptiles under the foil. Just remove the reptiles before removing the stones.*

*Photo 7: Right! More individuals often gather under the foils. The blinds are most often found in large numbers.*

Foils are used by all species of Central European reptiles (ie reptiles living a terrestrial lifestyle). However, they are essential for detecting snakes and lizards. Due to their high physical activity, lizards can be detected approximately as well by a line transect. However, in the blind, 90–95% of the findings under the foils and only 5–10% were the result of a walk on the transect. In snakes, 81–93% of individuals were recorded under the foils. The proportion of detected snakes outside the foil also changed during the season. The highest percentage of snakes found on the transect outside the foil (almost 20%) was in the spring, when their activity is the highest (migration from wintering grounds to seasonal habitats, epigamous behavior, ie related to reproduction, etc.). Foils were used by all age categories of snakes. It is also interesting that under the foil, both different age categories hide together, as well as different types of snakes. In Podyjí, all four species of snakes occurring in the locality were found under one foil at the same time. At the same time, the Adder Viper (*Vipera berus*), the Grass Snake (*Natrix natrix*) and the brittle snake (*Anguis fragilis*) were recorded at the site of Plachta in eastern Bohemia. These results show that the use of foils in reptile research is an essential method, especially in lizards and snakes, both to determine the species spectrum and to evaluate the characteristics of the population.

### ***Importance of reptile mapping and monitoring***

*The main purpose of reptile monitoring is to assess the status in terms of protection of individual European important species and to prepare an evaluation report for each of them at regular six-year intervals to the European Commission (EC). For example, in 2007, evaluation reports were submitted for a total of 6 reptile species. In one species the condition was evaluated as favorable in terms of protection, in four as less favorable and in one species as unfavorable. Monitoring in general is therefore repeated monitoring of a species (or species) using the same methodology over a period of time.*

*Reptiles are a group for which nationwide mapping has been designed. It aims to update knowledge about these species. The last such extensive mapping took place during the creation of enlargement atlases in the 1990s (Mikátová et al., 2001). The main purpose of the detailed mapping was to confirm the recent (as recent) occurrence of species in all fields of so-called network mapping with a fauna record (see, for example, Pruner and Mika 1996). Priority was given to mapping based on the search for localities that individual species of amphibians and reptiles use for reproduction, but random finds are also considered to be full-fledged. When mapping reptiles, the methodology was based primarily on observation and census of individuals, for example in a line patrol. The findings of snake slugs were also considered a full-fledged record. In the years 2008 to 2014, all fields of network mapping in the Czech Republic were mapped. Approximately 27,000 data on the occurrence of reptiles were obtained.*

## 5.2 Determination of reptiles

Although the Czechia is not rich in reptile species, determining them is not an easy task. With a few exceptions, the reptile must either be caught and determined in the hand, or seen up close. Exceptions may be good photographs and finds of undresses (stripped skins, exuvia), according to which most species can be identified in complete safety. For those interested in the ranks of amateurs, i.e. lovers of nature in general and reptiles in particular, there is a wide opportunity to participate in the research of these animals without having to train in determining them according to their physical characteristics. In addition, when the vast majority of species are specially protected, it is impossible for a layman to legally capture and identify reptiles. However, photography and collection of exuvia is possible. In some cases, the species can be determined by a layman. Either identification keys (eg Vlašín, 2007) or books with photographs of reptiles (eg Moravec, 2019). The Internet, such as the BioLib and BioLog sites (see below), can also help determine this. However, it should be noted that self-determination, especially if we have no experience, may not be correct. Often, even with the help of pictures, comical errors occur, which are revealed only when the observer sends the photo to an experienced herpetologist.

### Fear of snakes helps research

It was possible to test on a wide sample of the public whether and to what extent it is possible to use photographs taken by lay people in a reptile survey. The panicked fear of snakes helped. In our culture, based largely on Hebrew-Christian symbolism, the serpent is often identified with evil. Most Czechs have a resistance to strong fear of snakes as a cultural pattern. In addition, poisonous snakes have remained one of the few deadly dangers that man in the wild has been unable to eliminate, and so resistance to snakes is reinforced by fear for life. Even though only one original venomous snake lives in our country, real (clinical) ophiophobics cannot overcome their fear even if they know that the particular snake is not venomous. This is about 2-3% of the population. The vast majority of people are afraid of snakes, but after finding out that it is a harmless snake, they often take a friendly attitude towards them. In the electronic version of the daily Dnes (MFD), a call was published in 2011 for everyone who encounters a snake in their garden or anywhere in nature to photograph it. If they are worried that this well-documented snake is a viper, they can send a photo to the author of the call for identification. And indeed, in the 10 years since the publication, over 650 photos sent by email and 6 undresses sent by mail have gathered. The article's encouragement for the authors of the photos to send the date and exact location along with the image often went unheard, so the poor determinant had to write off everyone to send him this important information. However, the answers were rare. Also, not all photos were sufficient to determine the snake, so only about 60% of the photos sent could be used as a document together with information about the place and time of the find and could help In the electronic version of the daily Dnes (MFD), a call was published in 2011 for everyone who encounters a snake in their garden or anywhere in nature to photograph it. If they are worried that this well-documented snake is a viper, they can send a photo to the

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snake distribution survey. Even so, the results obtained are remarkable. These are often records from private gardens, courtyards and courtyards, where it is difficult for a herpetologist to reach. The structure of this data is interesting. 388 valid data were collected in this way. Of these, 4 findings were determined according to exuvia, the rest on the basis of photographs. As expected, more than half of the findings thus obtained were smooth snakes (202 findings, 52%), followed by the Grass Snake(94 findings, 24%) and only in the third place did the Adder Viper appear (51 findings, 13%); The submerged snake included 13 findings (3%) and the Aesculapian Snake2 findings (0.5%). Blinds were also considered vipers (26 findings, 7%).

The panic fear of snakes (ophiophobia) in this case helped to significantly expand knowledge about the occurrence of snakes in the Czech Republic. Even if you do not suffer from this phobia, you can help the author with snake research by sending a photo ( [mojmir.vlasin @ gmail.com](mailto:mojmir.vlasin@gmail.com)). It is important not to forget the exact location of the finding (preferably GPS or the address of the house or land) and the date of the photo. If the author of the photo differs from the person who sends it, the author of the photo must also be mentioned.

Amateur zoology, especially entomology and ornithology, has a long tradition in the Czech Republic and a stable professional background. In recent years, there has been an interest in herpetology. Data on the occurrence of species are an important basis for their protection. For this reason, a number of specialized databases and their application interfaces were created. Here it is possible to use and view the data, but it is also necessary to obtain and enter it. A wide amateur base can make a significant contribution to obtaining data. There is a huge potential among amateurs. This is already a tradition in the Czech lands. The local amateurs have contributed and continue to contribute to the knowledge of the occurrence of insects, birds, but also amphibians and reptiles. The application is targeting these users. Due to their number, the professional value of knowledge about the occurrence of common and rare species is also growing among these users.

The BioLib project (Biological Library, <http://www.biolib.cz>) has been operating on the Czech Internet for several years now. It is a freely available non-commercial and non-profit encyclopedia of plants, mushrooms and animals, which is one of the largest projects of its kind on the Internet. BioLib allows users to obtain information on a variety of species and groups of organisms. Those interested can also participate in the data collection with their findings.

The BioLog application is very suitable for those interested in nature. Data from this application and the BioLib application are supplied to the Nature Conservation Findings Database, which is managed by the Nature Conservation Agency. The data will reach those who often decide on appropriate or inappropriate interventions in the localities.

**Nature Conservation Finding Database (NDOP)**, which is created and managed by the Nature and Landscape Protection Agency of the Czech Republic (AOPK CR), is a very important helper

for nature conservation workers. It allows you to effectively sort extensive information about the current and historical occurrence of species in our territory. NDOP is a valuable source of information especially for authorities and experts. It currently stores approximately 27 million pieces of data. Data on the occurrence of plants predominate among the records, data on animals make up a quarter of the total number, and fungi and lichens account for less than a hundredth of the total data. Approximately 77,000 data are involved in reptiles, ie only 0.3% of the total. The numerical number of reptile finds thus looks massive, but it is not too much for the entire territory of the republic and the time cross-section from the second half of the 19th century to the present. Most of the records come from experts on individual groups of organisms, who most often fulfilled the assignment of the AOPK CR, but the database also includes data from older and current publications, solved research projects as well as the results of surveys commissioned by other entities. The finding database is a good basis, but it is necessary to warn against its overestimation. Validated data is used to inform that at a given time the species was occurring at a given place. If data on the occurrence of any species at the site are missing from previous periods and subsequent years, it only means that the data are missing. By no means does it say that there was no species at that time.

The involvement of lay people is also of growing importance, mainly thanks to the BioLog mobile application (Zárybnický et al., 2015) or cooperation with the BioLib server (Zicha et Chobot, 2010). The BioLog mobile application allows everyone to record their observations in the field. At the same time, you can find out what other species have already been seen in the area. The BioLog application also serves as a species occurrence atlas, allowing you to load and view species observations from the last 10 years in any user-selected area. Data can be viewed using the My Neighborhood feature. Species names are linked in the application to Google panels, which summarize basic information and photos of the species.

"Aeskulap's staff, surrounded by a snake, is a sign of vitality and health. So let them help the health of reptiles as well." Zdeněk Knotek.

### **Manipulation of reptiles and evaluation of their health status**

In some acute cases, we cannot do without basic reptile handling. However, under normal circumstances, it is advisable to leave this activity to experienced zoologists or veterinarians. The area for reptile examinations must be well lit and at the same time free of interfering factors that would limit our concentration and cause stress for reptiles. For lizards it is necessary

Avoid injuries to the tail or fingers and the removal of claws caught in the fabric or mesh when handling. First we see the position of the animal and fix its head. There is an unpleasant bite from larger lizards ( Eastern Green Lizard) and smooth snakes. For Adder Vipers, it is advisable to handle in protective gloves. Transfer to veterinary treatment should be done in a securely furnished and closed plastic box.

Skupina	Bližší charakteristika	Způsob fixace
Ještěři	Ještěrka živorodá, ještěrka obecná, ještěrka zelená	velmi jemná manipulace v dlani nebo ponechat v malém plastovém boxu
Hadi	Mláďata	využití snahy hadů navinout se mezi prsty a ukryt se do dlaně, uchopením za hlavou a podložení těla dlaní druhé ruky
	Dospělí	uchopením hlavy a podložení těla druhou rukou
	Jedovatí	použití ochranných prostředků – rukavic, háčků

Tab. No. 1 Manipulation with different groups of reptiles

### Assessment of general health

The basic assessment of health status is based on the evaluation of nutritional status, evaluation of defensive reflexes and natural movement. Weight determination complements the data on the nutritional status of reptiles and is also useful for possible drug dosing. In snakes, poor nutritional status is manifested by an emphasis on the drawing of the ribs and spinal vertebrae. The weakening of the root of the tail is noticeable. Inflation of the body is a natural defensive reflex of lizards and it is more appropriate to monitor the musculature of the limbs and the root of the tail to assess nutritional status. Free wrinkling of the skin and protruding contours of the vertebrae and ribs indicate a chronic course of the disease and long-term starvation.

### Gender methods

Reliable sex determination of reptiles is important information. Sexual dimorphism develops in all species of our lizards, and determining sex in adults is easy. Upon careful examination, the typical formation of scales around the cloaca and on the pelvic limbs (femoral pores) of males can be noted. Especially during the period of sexual activity (spring), the presence of copulatory organs in males can be distinguished as significant swelling on the ventral side of the base of the tail

behind the cloak. Special methods must be used for snakes. To some extent, information on the different tail lengths (number of rows of ventral tail scales) of males and females can be used. Gender determination can be performed using a probe. However, it is already a more complicated procedure and cannot be recommended without prior instruction and supervision by an expert.

Also in both species of our hens there is a relatively pronounced sexual dichromatism in adulthood - while females have a more or less youthful coloration throughout their lives - light back black hips and "eel stripe" in the middle of the back, males adult discoloration gray-brown with varying amounts of blue spots (whose representation depends not only on the species, the colchica has more of them, but also on age). During manipulation, the bats undergo defensive defecation, during which most males are ejected by hemipenis.

### **Oriental evaluation of activity, movement and reflexes**

Healthy snakes and lizards explore the odor conditions of the new environment (tongue movements). Common reptile defenses include biting, urinating, and hardening, and in lizards, inflating the body and throat and flicking the tail. When examining the body surface, we assess the color, elasticity and shine of the skin. We notice scars, wounds, ulcers and nodular formations in the subcutaneous tissue. We carefully examine the dorsal and abdominal labels of the snakes. The eye of reptiles is bright and shiny. Milky or gray-blue clouding of the eyes is a completely physiological phenomenon in snakes during ecdysis (a designation for the separation of the old upper skin layer), a few days before the separation of the old spectacle (designation for a layer of skin that rests directly on the eye surface in snakes). Pregnant female reptiles limit physical activity and look for quiet nooks and crannies. In small female lizards, the contours of the eggs can be easily observed on the tense abdomen.

### **Clinical manifestations of reptile diseases**

The health of the snakes is much indicated by the appearance of the skin, which reflects the way the exuvia (old layer of skin) is separated. In healthy snakes, the process is very fast and the exuvia is completely separated. Conversely, the drying remnants of the old skin surface layer can be considered as a possible manifestation of an internal, covert disease or as a result of ectoparasites. In lizards, the old layer of skin is separated in individual lines. The most common case of neoplasms in lizards is cutaneous papilloma (a sign-like body or wart). Skin papillomatosis is known in European lizards (*Lacerta agilis*, *L. trilineata*, *L. viridis*, *Podarcis muralis*). Some reptile viruses (herpesvirus, papillomavirus and poxvirus) are expected to be involved. The proportion of external parasites with subsequent bacterial contamination is not excluded. A possible mode of transmission is temptation during mating and male fights. Papillomas are located at

limbs, neck and head. They form dark cauliflower formations. Solid spherical structures in the skin and subcutaneous tissue (granulomas) are a typical manifestation of skin and subcutaneous tissue infection. Skin and subcutaneous granulomas have a firm consistency. Skin mycoses and skin derivatives occur in all members of the Reptilia class. Extensive fungal deposits are the result of secondary contamination of injured and damaged skin at the same time as stress. The ectoparasites of our reptiles can be ticks and mites. They cause restlessness and cause dermatitis, dehydration in small reptiles and disruption of the overall health condition. Fly larvae penetrate skin wounds contaminated with soil and faeces.

Information on the health status of reptiles will be specified by data on the frequency of stool deposition and its consistency. The consistency of faeces and urine in reptiles is directly related to the way of life in nature. It reflects the form of food processing and the efficiency Tab. No. 4 Population density changes of the Eastern Green Lizard in the area burned in 1993 and in the control area (Elbing, 2000) Group boxing Snakes Cubs use the effort of snakes to coil between the fingers and hide in the palm, grasping the head and supporting the body with the palm of the other hand Adults grasping the head and supporting the body with the other hand Toxic use of protective equipment - gloves, hooks fluid management. Soft and foul-smelling dung is common in snakes, who inhabit the edges of rivers and lakes (collared snake, snake). In other species, such as the Aesculapian Snake or most lizards, loose stools should be considered as suspected intestinal complications. Diarrhea is an accompanying feature of various gastrointestinal infections. These are primary gastrointestinal infections (inflammation of the intestines) and general septic conditions. Diarrhea accompanies bacterial infections caused by microorganisms (*Salmonella* sp., *Proteus* sp., *Pseudomonas* sp.). Parasites can also be the cause of diarrheal diseases. In addition to protozoa, they are also various representatives of intestinal worms. In connection with the presence of parasites and subsequent bacterial infections, the character of the intestinal mucosa changes. The inflammatory process is accompanied by congestion of the affected area, the resorption absorption function of the intestine is reduced and the osmotic conditions in the fine vascular plexuses and enterocytes change. In this case, the contents of the intestine are liquid, with a mixture of mucus and blood. The patient loses fluids, minerals and proteins.

### **Fungal infections**

In 2009, fatal fungal infections, known as snake fungal disease (SFD), caused by the fungus *Ophidiomyces ophiodiicola*, were described in wild snakes abroad (especially in the USA). This infection has already been reported in the Czech Republic (Franklinos et al., 2017). In the years 2010–2016, samples were collected from dead individuals and snake snakes from Great Britain and the Czech Republic. These samples were examined for the presence of

macroscopic skin lesions and *O. ophioidiicola*. The fungus was detected by PCR in 8.6% of samples. The disease is manifested by swelling and swelling of the skin with the subsequent formation of blisters and granulomas. Although the skin lesions were mild in most cases, they were severe in some snakes and were considered likely to contribute to mortality. Transmission through contact between snakes is expected, but the possibility of transmission through environmental contamination and ectoparasites cannot be clearly ruled out. The causative agent of this disease has also been found in dead fish, insects, fungi and soil. Affected snakes have cloudy eyes, rough skin without shine and show defects in the separation of the old surface layer of skin.

### **Bacterial infections**

Bacterial infections are divided according to the extent of the involvement of individual reptile tissues into local infections (e.g., skin infections, oral infections, gallbladder infections, eye infections, etc.) and general infections. In reptiles, abscesses are the most common response to a bacterial infection. The formation of a tightly encapsulated inflammatory deposit with a semi-solid content is a typical response of reptiles to the penetration of bacteria. Skin infections, especially injured skin, are very common in reptiles. The site of fungal infections has a semi-rigid center around which there is a fibrous sheath. The gradual spread of the pathological process to the surrounding tissues is typical.

Inflammation of the trachea in reptiles occurs most often as a complication of oral infections. They can also be part of a general septic disease or as a result of a local injury. Typical symptoms are labored breathing associated with oral opening and wheezing. Patients do not show interest in food and fall into apathy after initial increased physical activity.

Bacterial inflammation of nervous tissue, including the brain, occurs as both primary and secondary infections. They are a complication of respiratory infections. The pathogens are bacteria. In the event of infectious foci, in brain tissue and other organs, the presence of mycobacteria should be ruled out. Fungal inflammation of the nervous tissue is usually the result of injury and development of fungal granulomas (ingrowth of the lesion from the nasal cavity, the oral cavity or the eye). Parasitic infections of the nervous system, manifested by vomiting of the head, have been reported in several species of snakes. The presence of protozoa (*Acanthamoeba*) has been demonstrated in the cerebrospinal fluid of affected reptiles. *Nosema* sp. and *Toxoplasma gondii*. *Absamoeba invadens* in the snakes, causing convulsions and gradual paralysis.

### **Viral infections**

Several viruses have been described in imported reptiles that are capable of causing extensive brain and nerve tissue damage with clinical manifestations. Among them

mainly include arenavirus (formerly known as retrovirus, IBD - inclusion body disease), ferlavirus (formerly known as paramyxovirus, OPMV - ophidian paramyxovirus), and sunshinevirus (belonging to paramyxoviruses). Ferlavir was also isolated from the viper genus *Viper*, where the disease often progressed very rapidly. The virus was isolated from the kidneys and lungs. Subsequent bacterial infections have often been detected. The autopsy showed diffuse bleeding, lung involvement and the presence of effusion in the airways. Renal damage was a common finding. Ectoparasites, mites, ticks or blood-sucking insects are also thought to be involved in the transmission of viruses. The transmission of these infections from exotic snake species to our reptiles has not yet been proven, but it cannot be ruled out unequivocally and this risk must be considered separately for vipers! The release of exotic species of snakes from private farms into our nature must be considered a very serious risk of possible spread of infections and damage to the original population. At the same time, it is an activity that is against the law.

In general, the risk of introduction or transmission of infections between populations of our reptile species during transfers and reintroductions is not currently known to be too high. In any case, the health status of the relocated reptiles should be carefully assessed at such events. Individuals who have behavioral changes or abnormalities in which the risk of infection may be considered should be quarantined and released only after the necessary examination.

The basic precondition for the protection of our reptiles against the introduction of viral infections from reptiles from surrogate farms is a thorough quarantine of reared reptiles (minimum 60-90 days) and preventive laboratory tests.

### **Conservation of dead reptiles**

It is important to keep dead individuals to determine the cause of death. The ideal form of storing the cadaver before autopsy is short-term placement in the refrigerator (approximately 24 hours at 4-10 °C), not in the freezer compartment! Dead animals are transported as infectious material, ie in properly marked, strong and impermeable packaging. However, dead reptiles can be stored for potential museum collections even at low temperatures (freezer box) or in alcohol.

### **General principles of first aid**

The principle of first aid for reptiles is to place the patient in a clean box, in which the optimal temperature is maintained and an improvised space for shelter is provided. We disinfect minor injuries with disinfectant solutions (eg povidone iodide, dilute potassium permanganate). We never use backfills, as these lead to the closure of the wound by a wetting scab, under which putrefaction processes take place. The causes of prolapse of the end sections of the intestine and cloaca are the pressures accompanying the intestinal infection.