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First records of albino Aesculapian snakes (*Zamenis longissimus*) in Hungary

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Abstract

Body color abnormalities can significantly affect reptile fitness, as coloration plays a key role in ecological interactions such as mate selection, predator avoidance, and protection from environmental factors. Albinism—one of the most well-known color abnormalities—is caused by the absence of melanin. In wild snake populations, albinism cases are rare. This study reports the first documented cases of albino Aesculapian snakes (*Zamenis longissimus*) in Hungary.

Key Words

Albinism, Central Europe, Colubridae, color abnormality

Albinism is a well-known pigmentation disorder in reptiles (Di Toro and Spadola 2007; Krecsák 2008; Borteiro et al. 2021; Dutta et al. 2022), marked by the absence of melanin production even though chromatophores are present and functioning normally. Albinism can take various forms due to the presence of multiple pigment cell types (Prüst 1984), including complete and partial albinism (Prüst 1984; Petreanu 2024). The lack of melanin results in animals having white or very pale skin. Additionally, because melanin is also missing from the iris, the underlying blood vessels become visible, giving the eyes a pink or reddish appearance.

Zamenis is a genus of Old World, nonvenomous snakes belonging to the family Colubridae. The Aesculapian snake [*Zamenis longissimus* (Laurenti, 1768)] occurs in Spain, France, Switzerland, Italy, Slovakia, Poland, Austria, Hungary, Romania, Moldova, Ukraine, Bulgaria, Slovenia, Croatia, Serbia, Bosnia and Herzegovina, Montenegro, Albania, North Macedonia, and Greece. In addition, isolated populations have been reported in Germany, the Czech Republic, Turkey, Georgia, and Russia, as well as introduced populations in Great Britain (Edgar and Bird 2006). The Aesculapian snake is a medium-to-long, slender species, typically measuring 1.4–1.6 m but reaching up to 1.8 m or even 2.25 m (Edgar and Bird 2006; Kurek et al. 2009). Adults and subadults are typically gray-brown, yellow-brown, or olive, with a lighter anterior body and occasionally white-edged dorsal scales arranged in bands (Fig. 1) (Edgar and Bird 2006; Kurek et al. 2009).

Albinism has been documented rarely in wild snake populations, especially among adults. In Europe, instances of albino snakes were summarized by Papežíková et al. (2020); the genus *Zamenis* accounted for the highest number of cases (30.3% of the reported European albino snake cases). Albino forms of *Z. longissimus* have been reported in Austria (Erber 1879; Sochurek 1995; Esterbauer 2014), Bosnia and Herzegovina (Ćurić 2019), Italy (Ferri and Bettiga 1992), Serbia (Radovanović 1941), Slovakia (Balthasar 1935; Gezova et al. 2018), and Slovenia (Krofel 2004). In addition to these, other color abnormalities such

Figure 1. A subadult Aesculapian snake (*Z. longissimus*) in characteristic coloration, including the distinctive yellow crescent-shaped blotch on the side of the neck and white mottled or blotched patterns along the dorsal surface. Photo by Boglárka Mészáros.

as melanism (Paterna 2024), axanthism (Cattaneo 2015), and leucism (Vlašín 2023) have also been reported in this species. Here, we report a new finding of an albino *Z. longissimus*. To the best of our knowledge, this is the first documented case of an albino Aesculapian snake in Hungary.

On 22 May 2025 at 7:26 (local time), a male albino Aesculapian snake was observed and captured by Krisztián Halász in the National Botanic Garden at Vácrátót, Hungary (47°42.4218'N, 19°14.1234'E; WGS84). The individual was pale, yellowish to light pink, with white or yellowish mottled or blotched patterns on its dorsal surface. The ventral side was distinctly yellow. Its head showed a pinkish hue with a yellow or cream crescent-shaped blotch on each side of the neck. The eyes were noticeably red—a characteristic feature that helps distinguish albinism from other melanin deficiencies. The individual measured 720 mm in snout–vent length (SVL) and 125 mm in tail length, with a body mass of 97 g, recorded using a measuring tape and a digital balance, respectively. Aesculapian snakes typically reach sexual maturity at a total body length of about 90 cm, around 4 years of age, while subadults measure 40–89 cm and are 2–4 years old (Kurek et al. 2019). Based on its size, dorsal patterning, and the presence of yellow crescent-shaped blotches on the sides of the neck, we identified the individual as a subadult, estimated to be 2–4 years old (Fig. 2). After photographs and measurements were taken, the individual was released back at the site of capture.

Including the present record, four observations of the species have been made in the National Botanic Garden over the past 5 years. The first was also documented by Krisztián Halász on 20 July 2020, when an individual was found on a dirt road after being struck by a vehicle (Fig. 3C). A second individual was observed in 2022, again by Krisztián Halász, but it was neither captured nor photographed. The third observation was made by Csongor Halász on 15 July 2024, but it was not photographed. All of these observations were plotted on a map using their recorded coordinates (Fig. 4C). The high number of albino individuals observed in the National Botanic Garden may be related to the relative isolation of this population, potentially influenced by urbanization barriers. Additionally, as a well-protected area, the botanical garden likely experiences reduced predation, enhancing individual survival and contributing to the higher number of records in this location.

Images of albino Aesculapian snakes are also present in local identification-focused social media groups (MME KHVSZ 2017; Vadonleső 2021 Facebook groups) (Table 1, Fig. 3A, B). We contacted the observers of other specimens in Hungary and, with their permission, included their photos in our study. In addition, we reviewed the iNaturalist database on 10 July 2025 for further Hungarian records, finding 1,158 observations of *Z. longissimus*, none of which involved albino individuals.

Reports of albino individuals of snakes in Europe are exceptionally rare. Nonetheless, a few cases have been reported, including a *Vipera berus* in Slovakia (Gezova et al. 2018), a partially albino *Natrix natrix* in the Czech Republic (Musilova et al. 2006), a completely albino *N. natrix* in Romania (Petreanu 2024), and a case of partial albinism in *Natrix tessellata* (Papežíková et al. 2020). In addition to our observations, to the best of our knowledge, we compiled all reported European cases of albinism in *Z. longissimus* from the literature and social media groups into a table (Table 1) and illustrated them on a map (Fig. 4).

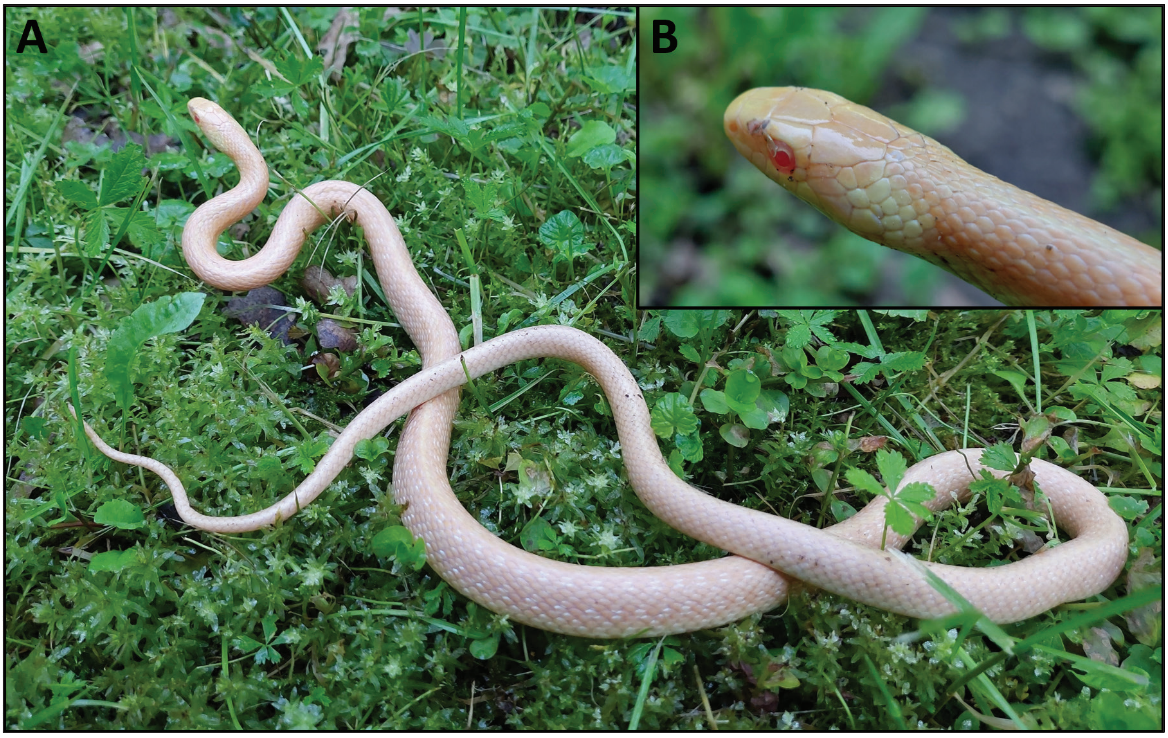

Figure 2. A male albino Aesculapian snake (*Z. longissimus*) exhibiting a pale coloration ranging from yellowish to light pink (**A**) and a close-up of the head showing the red eyes (**B**). Photo by Éva Szakács.

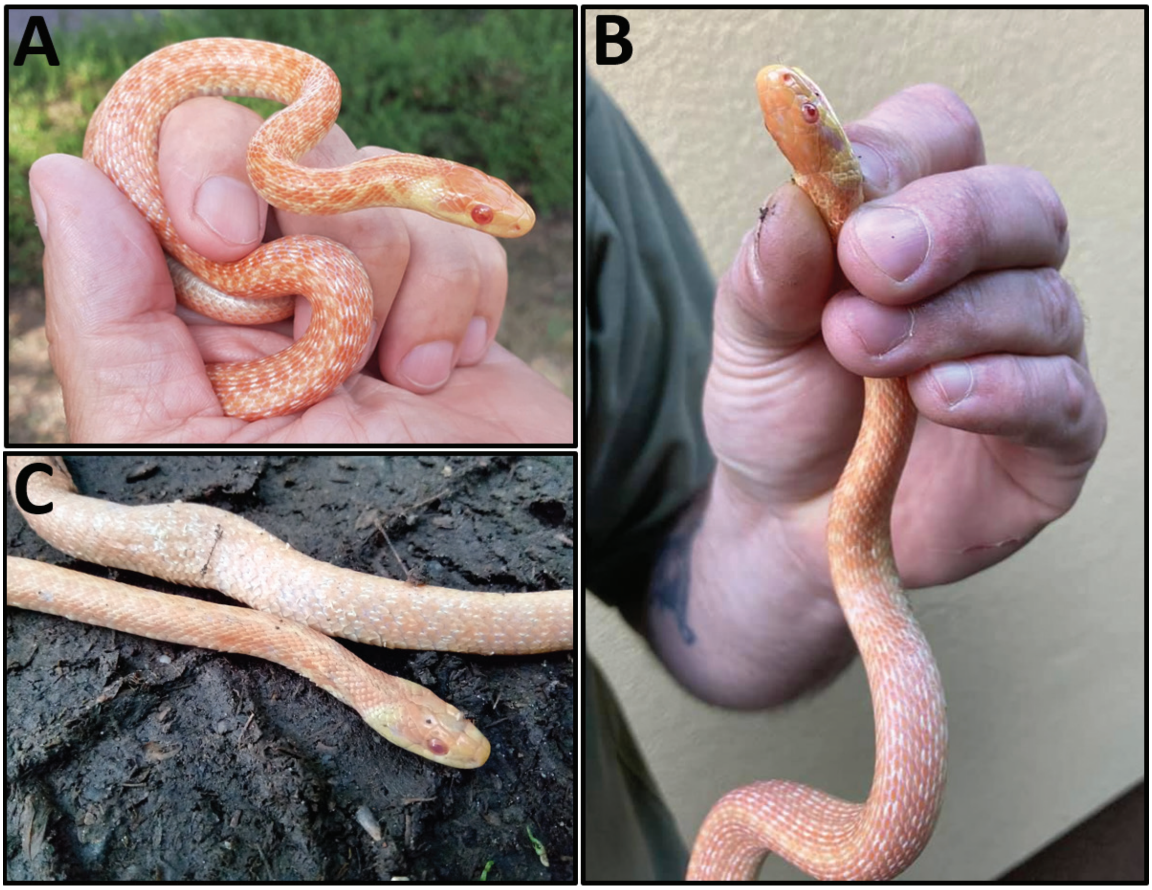

Figure 3. Additional *Z. longissimus* records from Hungary documented via social media and our earlier observations. **A.** Record from Szekszárd, Hungary (observers: Nikoletta Kerek-Oláh and Zsuzsa Ballók; photo: Gergely Babocsay); **B.** Record from Medina, Hungary (observer and photo: Péter Schilli); **C.** Road-killed specimen from the National Botanic Garden, Vácrátót, Hungary (observer and photo: Krisztián Halász). None of these specimens were measured or preserved.

Table 1. Records from Europe with geographic coordinates (WGS84) and references. FB = Facebook.

Date	Country	Site	Latitude, Longitude	Observers	Reference
1991.06.05	Italy	Colico	46.126194°N, 9.350829°E	Vincenzo Ferri, Maurizio Bettiga	Ferri and Bettiga (1992)
1995	Austria	Altenberg	48.342364°N, 16.230311°E	Eric Sochurek	Sochurek E (1995)
2003.06.01	Slovenia	Brestrnica	46.576762°N, 15.573915°E	Miha Krofel	Krofel (2004)
2013	Austria	Garsten	48.025989°N, 14.400694°E	Hans Esterbauer	Esterbauer (2014)
2014	Bosnia and Herzegovina	Teslic	44.600674°N, 17.820065°E	Ana Ćurić	Ćurić (2019)
2016.05.29	Slovakia	Hlohovec	48.421000°N, 17.790000°E	Gezova et al. (2018)	Gezova et al. (2018)
2016.10.09	Slovakia	Pezinok	48.306000°N, 17.274000°E	Gezova et al. (2018)	Gezova et al. (2018)
2017.05.04	Hungary	Szekszárd	46.353277°N, 18.689336°E	Tibor Komjáti	MME KHVSZ FB group
2020.04.28	Hungary	Abasár	47.796422°N, 20.008672°E	Nikoletta Kerek-Oláh, Zsuzsa Ballók	Gergely Babocsay FB
2020.06.09	Hungary	Vácrátót	47.709828°N, 19.231703°E	Krisztián Halász	current study
2021.06.02	Hungary	Medina	46.453074°N, 18.602788°E	Péter Schilli	Vadonleső FB group
2022	Hungary	Vácrátót	47.708967°N, 19.230461°E	Krisztián Halász	current study
2024.06.15	Hungary	Vácrátót	47.707733°N, 19.230603°E	Csongor Halász	current study
2025.05.22	Hungary	Vácrátót	47.707030°N, 19.235390°E	Krisztián Halász	current study

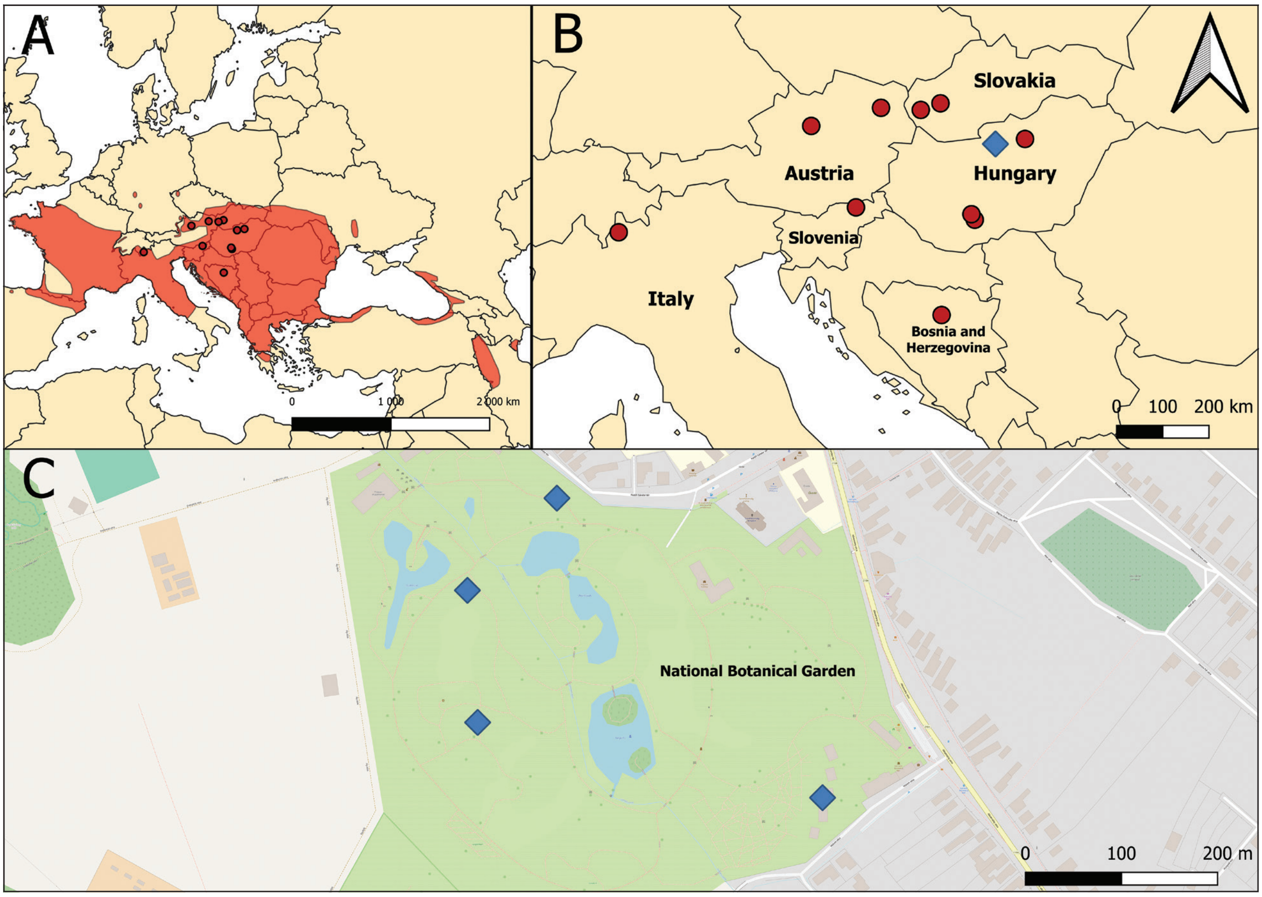

Figure 4. Distribution of *Z. longissimus* (**A**) and observations of albino specimens from Europe (**B**) and the National Botanic Garden of Hungary, Vácrátót (**C**). Coordinates for these records are provided in Table 1. The *Z. longissimus* distribution shapefile was obtained from Agasyan et al. (2017), *The IUCN Red List of Threatened Species*, Version 2017–2. Downloaded on 6 October 2025.

Documenting such cases may extend the known geographic distribution of albinism in *Z. longissimus*, offering a foundation for future studies on its prevalence and underlying causes in natural populations.

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