



H U S B A N D R Y

Artificial Incubation and Mold Treatment of European Glass Lizard (*Pseudopus apodus*) Eggs in a Home-made Incubator

Alvand Mohammadalizadegan¹ and Pourya Sardari²

¹Homa Educational Complex, Tehran, Iran (alizadegan.alvand2004@gmail.com)

²Port Coquitlam, British Columbia, Canada (pourya.sardari3@gmail.com [corresponding author])

All photographs by the senior author.

The European Glass Lizard (*Pseudopus apodus*) is a limbless anguid that ranges from the Balkan and Crimean Peninsulas and Ciscaucasia in Europe through Asia Minor and into the Middle East (Telenchev et al. 2014; Glavaš et al. 2020), where it inhabits a wide range of habitats ranging from rocky slopes with dense vegetation to forest floors, grasslands, and shrubby vegetation, often near streams (Nasrabadi et al. 2018; Kamali 2021). Although listed as being of Least Concern (LC) on the IUCN Red List (Aghasyan et al. 2021), the species has experienced some anthropogenic disturbances in its habitats such as, urbanization, farming, and logging, as well as climate change during the past years (Nasrabadi et al. 2018). These lizards are oviparous and lay as many as 12 eggs (Kamali 2021).

A gravid Glass Lizard was rescued from an urban area in northern Iran (Mazandaran Province) and transferred to the first author’s personal collection quarantine room in Tehran, Iran. She was held in a PVC enclosure (100 × 60 × 60 cm) with a mixture of cocopeat and sanitized sand as substrate for about six weeks prior to being released in suitable habitat. Temperature in the enclosure was 25–35 °C and relative humidity was kept at about 80%. She was fed with live roaches (*Blaptica dubia*), crickets (*Teleogryllus commodus*), snails, and quail (*Conturnix conturnix*). She laid seven eggs on 14 July 2020 (Fig. 1). The eggs were found under the water dish and were candled for viability (Fig. 2); all were found to be viable. Eggs were placed in two incubation groups, the first incubated on Perlite and the second on a screen over a container of water (Table 1). On 20 July 2020, the female was released into suitable habitat in the species’ natural range in Mazandaran Province.

The incubator was a 45 × 25 × 20 cm Styrofoam Uline cooler with a 14 × 15 cm ReptiZoo 5-W heating mat attached to its lid (Fig. 3). Eggs in group 2 were placed on the bottom of the incubator and eggs in group 1 were placed on the

top of them. After two days of incubation, mold developed on one of the eggs in group 1 (Fig. 4). Shortly thereafter we noticed mold on the other eggs in both groups. Only one egg from group 2 was not affected.

On 4 August 2020, we treated the infected eggs with miconazole nitrate, which is commonly used to treat mold infections (Bowman et al. 2007; Hellebuyck et al. 2010). The treatment was approved by veterinarians and was used under their supervision. Miconazole nitrate in powder form was applied topically to the mold-infected eggs with a small paint brush. After treatment all spoiled eggs from both groups were removed from the incubator, but the remaining eggs were not separated from each other and remained in place.



Fig. 1. A captive adult female European Glass Lizard (*Pseudopus apodus*) and her eggs.

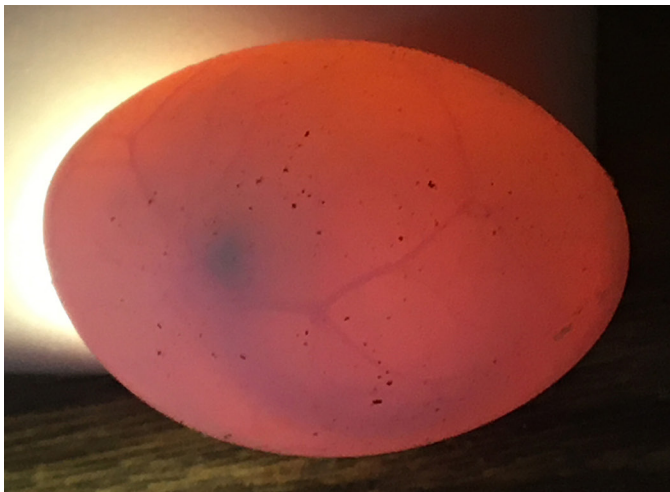


Fig. 2. A fertile European Glass Lizard (*Pseudopus apodus*) egg.



Fig. 3. Homemade Styrofoam Uline incubator with a heating mat on its lid.

Table 1. Incubation of European Glass Lizard (*Pseudopus apodus*) eggs.

| Group | Number of Eggs | Incubation Type | Humidity (%) | Temperature (°C) | Incubation Period (days) | Number Hatched |
|-------|----------------|-----------------|--------------|------------------|--------------------------|----------------|
| 1 | 3 | Perlite | 85 | 28 | 50 | 1 |
| 2 | 4 | Over water | 95 | 27 | 52 | 2 |

Unfortunately, because the infection started from group 1, the majority of the eggs in that group were inviable.

On 1 September 2020, after 50 days of incubation the first egg in group 1 hatched (Fig. 5). Two days later, two eggs in group 2 hatched. Average length and weight of the three hatchlings were 180 mm and 12 g, respectively.

Hatchlings were transferred individually into 40 × 27 × 20 cm plastic containers lined with moist paper towels. They began feeding after one week and readily accepted roaches (*Blattica dubia*), crickets (*Teleogryllus commodus*), and snails. Hatchlings were released into suitable habitat in Mazandaran Province.



Fig. 4. A European Glass Lizard (*Pseudopus apodus*) egg with mold on its shell.



Fig. 5. A European Glass Lizard (*Pseudopus apodus*) hatching in captivity.

Acknowledgements

We thank Ali Habibkhoda and Foad Zohari for their help with some of the technical aspects of this project.

Literature Cited

- Aghasyan, A., A. Avci, B. Tuniyev, J. Crnobrnja-Isailovic, P. Lymberakis, C. Andr n, D. Cogalniceanu, J. Wilkinson, N.B. Ananjeva, N.  z m, N.L. Orlov, R. Podloucky, S. Tuniyev, U. Kaya, A.M. Disi, S. Hraoui-Bloquet, R. Sadek, V. Tok, I.H. Ugurtas, M. Sevin , I. Haxhiu, L. Borkin, A. Shestapol, T. Dujsebeyeva, E. Golynsky, M. Chirikova, and D. Nuridjanov. 2021. *Pseudopus apodus*. *The IUCN Red List of Threatened Species* 2021: e.T157263A745759. <https://dx.doi.org/10.2305/IUCN.UK.2021-3.RLTS.T157263A745759.en>.
- Bowman, M.R., J.A. Par , L. Sigler, J.P. Naeser, K.K. Sladky, C.S. Hanley, P. Helmer, L.A. Phillips, A. Brower, and R. Porter. 2007. Deep fungal dermatitis in three inland bearded dragons (*Pogona vitticeps*) caused by the *Chryso sporium* anamorph of *Nannizziopsis vriesii*. *Medical Mycology* 45: 371–376. <https://doi.org/10.1080/13693780601188610>.
- Glavaš, O.J., P. Po ani , V. Lovri , L. Derežanin, Z. Tadi , and D. Lisi i . 2020. Morphological and ecological divergence in two populations of European glass lizard, *Pseudopus apodus* (Squamata: Anguillidae). *Zoological Research* 41: 172–181. <https://doi.org/10.24272/zj.issn.2095-8137.2020.025>.
- Hellebuyck, T., K. Baert, F. Pasmans, L. Van Waeyenberghe, L. Beernaert, K. Chiers, K., P. de Backer, F. Haesebrouk, and A. Martel. 2010. Cutaneous hyalohyphomycosis in a girdled lizard (*Cordylus giganteus*) caused by the *Chryso sporium* anamorph of *Nannizziopsis vriesii* and successful treatment with voriconazole. *Veterinary Dermatology* 21: 429–433. <https://doi.org/10.1111/j.1365-3164.2010.00880.x>.
- Kamali, K. 2021. *A Guide to the Reptiles and Amphibians of Iran*. Edition Chimaira, Frankfurt am Main, Germany.
- Nasrabadi, R., N. Rastegar-Pouyani, E.R. Pouyani, H.G. Kami, A. Gharzi, and S.H. Yousefkhani. 2018. The effects of climate change on the distribution of European glass lizard *Pseudopus apodus* (Pallas 1775) in Eurasia. *Ecological Research* 33: 199–204. <https://doi.org/10.1007/s11284-017-1530-8>.
- Telenchev, I. D. Simeonovska-Nikolova, N. Natchev, and N. Tzankov, 2015. A preliminary study on the habitat selection of European glass lizard (*Pseudopus apodus*) in southeast Bulgaria, pp. 280–290. In: M. Okjakova (editor-in-chief), *Annuaire de l'Universit  de Sofia "St. Kliment Ohridski."* Facult  de Biologie. *Livre 4 – First National Conference of Biotechnology, Sofia 2014. Tome 100*. Presses Univeritaires "St. Kliment Ohridski," Sofia, Bulgaria.