Keeping of spotted toad-headed agama (*Phrynocephalus guttatus alpherakii* Bedriaga 1906) at BION Terrarium Center

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Spotted toad-headed agama *Phrynocephalus guttatus* (Gmelin, 1789) is an agama species native to Kazakhstan (Ili River Hollow) and China. These animals are typical inhabitants of dried ecosystems of deserts and semi-deserts (Банников et al., 1985; Ananjeva et al., 2006). The genus has been named after the Greek words *phrynos* = toad and "*kephale*" = head.

Morphological characteristics of *Phrynocephalus guttatus alpherakii* Bedriaga 1906 are almost similar to those of *Phrynocephalus guttatus*. However, some researchers describe the single *P. g. alpherakii* population in China as separate species *Phrynocephalus alpherakii* (Sinervo, 2018). But as of now, *P. g. alpherakii* subspecies status is confirmed by molecular analysis. Therefore the information of *Ph. guttatus* keeping and breeding given in this article will definitely be useful for people who keep other *Ph. guttatus* subspecies as well.

Adults' average SVL is about 6,0 cm (2.4 in), TL – about 8 cm (3.2 in). Average total length is 12-20 cm (4.7 – 7.9 in). Average total length of hatchlings is 6-8 cm (2.4 – 3.2 in) (Fig. 1) (https://web.archive.org/web/20121011105217/http://herpeto-volga.ru/reptilia/91-phrynocephalus-guttatus.html).

Figure 1. *P. g. alpherakii* group of adult animals and a hatchling.

Coloration is variable. Dorsal part of the body is sandy gray with numerous fine spots and lines that often form little dark rings (Банников, 1985). Tail coloration is yellowish at the base and black to its end. Heads are round, with sloping edge. Scales are smooth, but often ribbed along the spine (Fig. 1). Ventral part of the body is white.

A male can be distinguished from a female thanks to a well-seen thickening at the base of the tail (due to presence of hemipenises), that appears only after sexual maturity at the age of about 8 - 12 months.

They feed mainly on different invertebrates, predominantly ants, bugs, representatives of Orthoptera, Diptera, Lepidoptera and various spiders. Plant debris (leaves and seeds) as well as sand and pebbles are found in their stomachs. These agamas are often killed by various birds of prey and snakes. They are also caught by domestic animals such as dogs and cats. The number of these lizards has been sharply reduced in recent years and due to overgrowing of sand massifs, spread of invasive species, poaching and smuggling. That is why it is important to maintain healthy breeding stock in controlled laboratory conditions in order to meet the needs of the market and save the species if it suddenly disappears in the wild.

An extensive distribution range of *Ph. guttatus* spreads from western borders of China across the whole northern sub-zone of deserts to the western coast of the Caspian Sea. In Europe the subspecies is distributed in Dagestan, Kalmykia, Stavropol Territory, Astrakhan and Volgograd regions. The main part of the distribution range is situated in Kazakhstan, it occurs also in Uzbekistan (Kara-Kalpakia) and Turkmenistan (Ananjeva et al., 2006). Distribution of *Ph. g. alpherakii* is limited by Ili River Hollow in Kazakhstan (Fig. 2). One isolated population is also found in China (http://reptile-database.reptarium.cz/species?genus=Phrynocephalus&species=guttatus).

These lizards can live on different forms of sands. But they prefer to live on fixed sand among rare vegetation, especially between bushes near rivers and they avoid shifting dunes. These agamas are able to bury in sand with the help of fast oscillatory movements of the body. They dig holes up to 10 - 20 cm long, in the form of an inclined course, ending with a small expansion. They usually do it at the base of the bushes. In summer, holes are almost never used. At night *Ph. guttatus* just cover themselves with sand. They are pretty fast runners and able to jump to a height of 20 cm (7.87 in). *Ph. guttatus* leads a sedentary lifestyle. Each individual occupies an individual site with an area of several square meters. However it should be mentioned that these toad-headed agamas don't strictly protect their territories unlike *Ph. mystaceus*. Females have significantly smaller sites than males.

The most interesting characteristic feature of *Ph. guttatus* behavior is the frequent twisting of the tail, which plays an important role in their communication with each other. The masking coloration makes them hardly noticeable on the sand, not only for possible enemies, but also for the congeners. Therefore, specific movements of the raised tail with a bright and contrasting white and black color on its underside allow them to detect each other, transmit information and communicate in the distance (https://web.archive.org/web/20121011105217/http://herpeto-volga.ru/reptilia/91-phrynocephalus-guttatus.html).

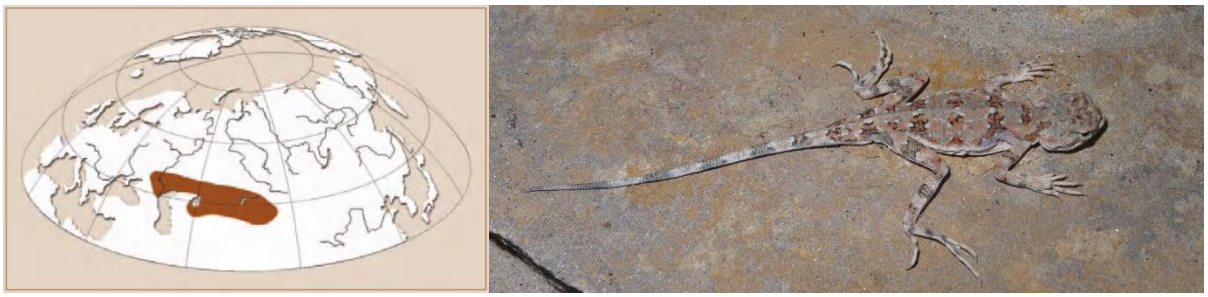

Figure 2. *P. guttatus* natural range (Ananjeva et al., 2006) and adult *P. g. alpherakii.*

Keeping and breeding requirements

Keeping. We keep adults and babies at 50*100*45 cm (19.7*39.4*17.7 in) horizontally oriented terrariums. Adult individuals are kept in groups that consist of one male and several females. Babies (until sexual maturity) can be kept individually or in groups (6-8 unsexed individuals). The decoration of the terrarium includes clear river sand (5-10 cm (2.0-4.0 in) and decorative rocks. Tree branches and logs are used as shelters.

Lighting. Zoo Med 5 UVB lamp is used during breeding season for 12-14 hours per day (9:00-23:00); during winter dormancy – for 4 - 6 hours per day. Additionally, 40W incandescent lamp is used for heating in the warm end of the terrarium. The opposite end is always cooler in order to make a temperature gradient.

Temperature. Daytime temperature is +28 - +32 °C (82.4 - 89.6 F), nighttime temperature – +23 – +27 °C (73.4 - 80.6 F). The highest temperature at the basking point is +45 °C (113.0 F). UVB is important for successful breeding.

Humidity. Humidity level is maintained at 30-60% with light double spraying (morning and evening) during the day.

Diet. The main rule: diet should be as variable as possible. We use the same diet for adults and babies. The diet consists of house crickets (*Acheta domesticus*), Jamaican field crickets (*Gryllus assimilis*), two-spotted crickets (*Gryllus bimaculatus*) and Turkestan cockroaches (*Blatta lateralis*) of appropriate size (5-6 insects per head). We feed adults every other day while babies are fed daily. All insects should be gut loaded and dusted with vitamin-mineral supplementation every other feeding. Sepia or cuttlefish “bone” powder works well as a source of calcium. We gut load the insects with fruit, greens and vegetables and sometimes bee pollen as an additional source of vitamins and bioactive elements.

Animals get water during daily spraying in the morning, so water dish is not necessary inside the terrarium.

References

1. Ananjeva, N. B, Orlov N. L., Khalikov R. G., Darevsky I. S., Ryabov I. S., Barabanov A. V. 2006. The Reptiles of North Eurasia. Taxonomic Diversity, Distribution, Conservation Status [this comprises the territory of the former Soviet Union and Mongolia]. Pensoft Series Faunistica 47, 250 pp.
2. Sinervo, B., Miles, D. B., Wu, Y., Méndez-de la Cruz, F. R., Kirchhof, S., & Qi, Y. (2018). Climate change, thermal niches, extinction risk and maternal-effect rescue of toad-headed lizards, Phrynocephalus , in thermal extremes of the Arabian Peninsula to the Qinghai-Tibetan Plateau. Integrative Zoology, 13(4), 450–470. doi:10.1111/1749-4877.12315
3. Банников А. Г., Даревский И. С., Денисова М. Н., Дроздов Н. Н., Иорданский И. И. 1985 Жизнь животных. В 7-ми т. Т.5 Земноводные. Пресмыкающиеся. М.: Просвещение, 399 с.

4. http://reptile-database.reptarium.cz/species?genus=Phrynocephalus&species=guttatus
5. http://www.sevin.ru/vertebrates/index.html?Reptiles/10.html
6. https://web.archive.org/web/20121011105217/http://herpeto-volga.ru/reptilia/91-phrynocephalus-guttatus.html