

Keeping of Veiled chameleon (*Chamaeleo calytratus* Dumeril & Dumeril, 1851) at BION Terrarium Center

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Veiled chameleons (*Chamaeleo calytratus* Dumeril & Dumeril, 1851) also known as Yemen chameleons or cone-head chameleons inhabiting border lands between Yemen and Saudi Arabia. They occupy mainly inland river valleys as well as high, dry plateaus to an elevation of almost 3,000 feet (Fig. 1). These arboreal reptiles prefer to live high up in trees or lower near the ground in bushes and shrubs. They can live in dry areas and are found on plateaus of mountainous regions, forests and valleys (https://animaldiversity.org/accounts/Chamaeleo_calytratus/). The temperature range that they tolerate is from +24 °C (75.0 F) to +35 °C (95.0 F).

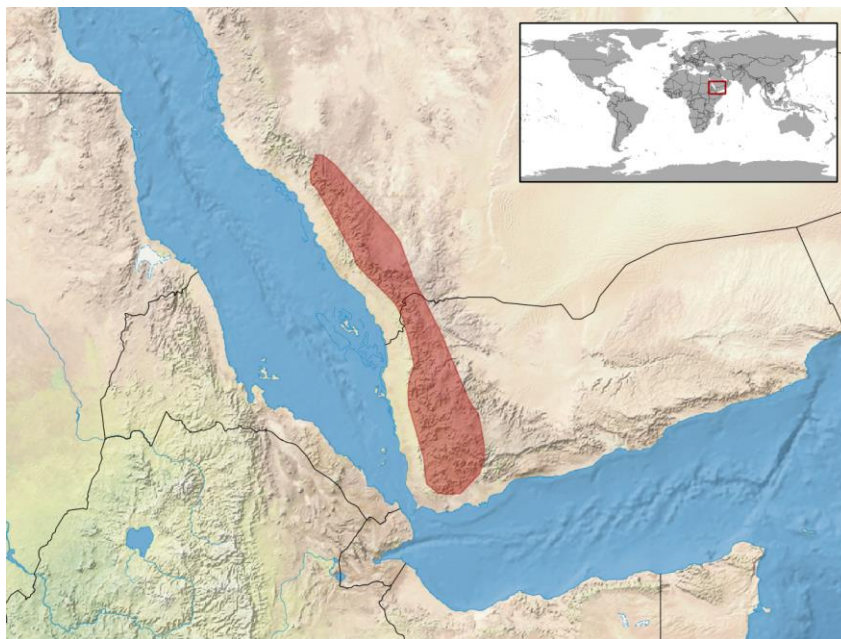


Figure 1. *Ch. calytratus* natural range (https://en.wikipedia.org/wiki/Veiled_chameleon)

Adult veiled chameleons are quite big, reaching total length of 45 cm (17.7 in) for males and 30 cm (11.8 in) for females. Their coloration usually includes bold circling bands primarily of bright gold, green and blue mixed with yellow, orange or black. Background coloration is green and in rare cases (bad health, gravidity) – grey. They

also have very long cones on their gular crest. Of particular interest in herpetoculture worldwide are so-called “piebald” morphs of veiled chameleons. Most of the coloration types that change according to the animal’s intention have communicative function and corresponds to a specific situation.

Piebald animals have patterns of pigmented spots on an unpigmented (white) background scales. The word “piebald” is made of combination of “pie” and “bald”, meaning “white patch” or spot. The reference is to the distinctive black-and-white plumage of the magpie. Such animals usually are the result of mutation but are still healthy and can reproduce. Due to their unusual appearance some people think that these animals suffer from mould (it looks alike) but that’s obviously not true. Piebald *Ch. calypttratus* show white (sometimes combined with black spots) or translucent areas on head, limbs and tail. Such animals are extremely popular among hobbyists in recent decades.

At BION *Ch. calypttratus* of piebald morphs are bred on regular base by our expert – Sergii Prokopiev. In 2014, 22 veiled chameleons with insignificant mutations in skin pigmentation were purchased for work. The mutations were seen as white, black and translucent (depigmented) areas of the body coloration (Fig. 2, 3). The above group consisted of animals with clearly seen inbred depression: small and medium in size, some of the individuals had congenital deformities of the tails. In addition, all chameleons had poor health. The poor quality of the breeding stock undoubtedly affected reproduction; we registered a significant loss of eggs during incubation, low hatching rate of babies, high mortality during raising.



Figure 2. *Ch. calypttratus* babies of “piebald” morph.

As a result, we faced the need to develop new approaches in working with this breeding group. This concerned the methods of caring for the stock, making some changes to the algorithms for raising babies. In addition, breeding activities were carried out to identify the most favorable variants of crossing animals in order to increase the viability, as well as to identify signs of inheritance of all mutant color variations.

From F2 and F3 (2016-2017) generations, “tough”, viable animals were obtained with stable, insignificant manifestation of color mutations. Further work was aimed at enhancement of the phenotypic manifestations of the mutation. Due to autosomal dominant type of inheritance, since 2018 we began to receive chameleons with a high degree of severity of the specified signs of skin pigmentation, and in a wide range of their manifestations. Further, the most desirable type of coloration was specified, where the priority was the symmetry in the distribution of white and black pigments, as well as translucent areas, which made the animals looking more harmonious. As a result, in 2020 we came to “white-headed morph” of veiled chameleons, which is obviously a success. The distinctive features for this line include presence of predominantly white and depigmented skin areas on most of the head, all four limbs and a significant part of the tail. The color of the iris is often black. In addition, it is necessary to note the bright, unique coloration and patterns of other parts of the body. Nowadays in 2020, after years of cross-breeding animals with some color mutations and so-called “wild-type” colored individuals we have obtained healthy, viable babies growing up to be large, spectacular adult chameleons. In the last generations, a few individuals have white coloration of the abdomen and this is the next landmark in our work with this line of veiled chameleons. *Ch. calyptratus* have casques found on top of their heads. A casque is a tiny swelling when a hatchling, but grows to 2 in (5 cm) in height (https://animaldiversity.org/accounts/Chamaeleo_calyptratus/). Their average lifespan in the wild is from 1 to 3 years, while in captivity – up to 15 years (https://chameleons.info/files/200001735-b0140b0142/USA_Chamaeleo%20calyptratus%20Profile-7.pdf).



Figure 3. *Ch. calyptratus* piebald (left) and normal (right)

Males can be easily distinguished from females due to presence of well seen spurs - prominent knob-like protuberances on the heels, while female don't. This feature can be seen immediately after the hatching. However it should be mentioned that through inbreeding and improper incubation temperatures and regime, sometimes more and more females hatch with differently developed spurs as well as males with small or lacking spurs (https://chameleons.info/files/200000047-e814ee8150/Chameleo%20calyptratus_Dimorphism%20EN%203.pdf). Adult males are much bigger than females, while females are more slender and have considerably smaller heads (Fig. 4). Males also have a thicker zone at the tail base where hemipenes are located. The conical scales on the dorsal crest are relatively much bigger in males. The conical scales on the gular crest are relatively much bigger in males, and they are usually orange in males and white in females. Additionally, the casque in males is much higher than in females (https://chameleons.info/files/200000047-e814ee8150/Chameleo%20calyptratus_Dimorphism%20EN%203.pdf).

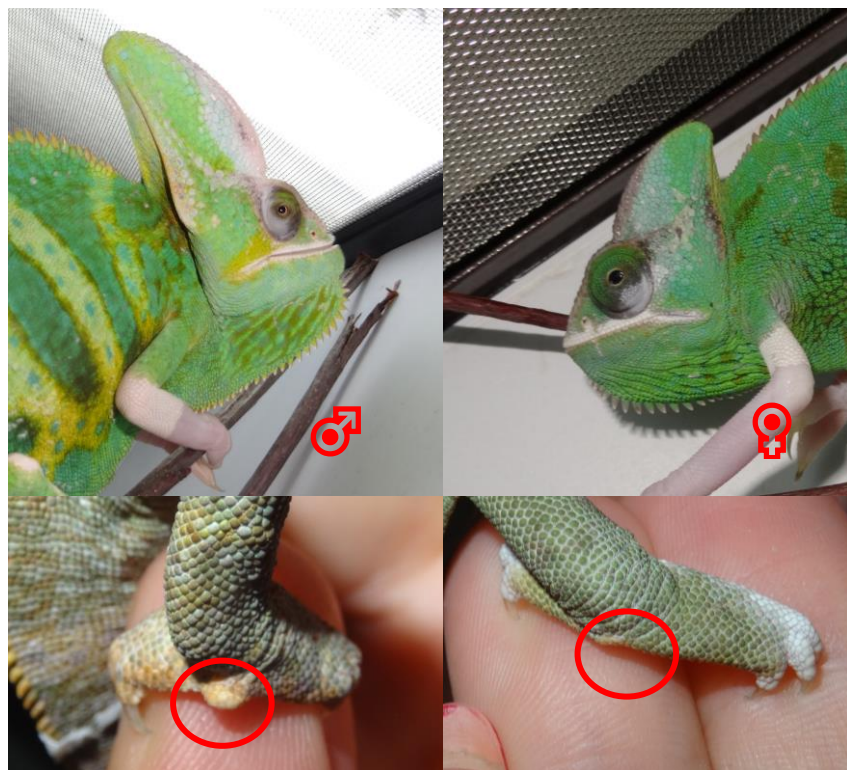


Figure 4. *Ch. calyptratus* male (left) and female (right). Notice the spurs on hind limbs, that males have since hatching.

Veiled chameleons feed exclusively on insects. They capture prey by projecting their sticky tongue. Their tongues are also used for smell and taste. They have also been observed as having a preference for certain prey types. Green insects seem to be

a favorite. However, they are one of the few chameleons that also enjoy the taste of plants. They adapted to eating leaves of plants as a source of water during the dry seasons (Crabtree, 1999).

Veiled chameleons are shy in nature. When startled or feeling threatened they may curl into a tight fetal position, darken in color, and "play possum". Like opossums, it takes a considerable time until they feel secure enough to unfold and begin moving about again. However, veiled chameleons are very aggressive towards each other. They prefer to live a solitary life. Males (Fig. 5) are very territorial and should always be separated. However, females can be in close proximity of each other at any time except during breeding season. Males and females only tolerate each other when ready to breed (https://animaldiversity.org/accounts/Chamaeleo_calyptrotus/).



Figure 5. *Ch. calyptratus* young male

Now the species is available in quantities for sale in many countries, as it is easy to keep and breed. Many people and breeding centers breed hundreds and thousands of veiled chameleons in order to meet the needs of the pet market. This has led to the situation, when smuggling of this species in the wild is no longer profitable. Thus the press of smuggling is significantly reduced thanks to world's herpetoculture, the species still suffers from massive loss of natural habitats and urbanization.

Keeping and breeding requirements

Keeping. We keep adult veiled chameleons in pairs or separately in 90*45*90 cm (35.43*7.08*35.43 in) vertical glass or plastic terrariums. However the bigger space

can be provided for a chameleon the better it would feel. The walls of the terrarium can be made of plastic, mesh or hybrid (combination of mesh and glass or plastic panel). We use no substrate for easier cleaning of the enclosure and control of excrements. It is also safer for the chameleons as they will not intake substrate when foraging for occasional free moving insects inside the enclosure. Interior decoration includes branches of appropriate thickness, water bowl; living plants in pots are preferable. We didn't witness any harm from artificial plants, but according to most of the world's chameleon keepers they are not a good decision. So we use them in very rare cases. One can make an automatic water dripping system to let the water drops fall down the leaves and branches imitating natural moving of water. This is useful since not all the chameleons get used to drink from water bowls. Our labs (Fig. 6) are also equipped with small fans in order to provide good air moving and therefore prevent the animals from respiratory diseases (Diaz et al., 2015).



Figure 6. Laboratory keeping facilities for *Ch. calyptratus*, where they can be kept in groups. However these terrariums are good for individual keeping as well.

Lighting. Lighting period is 12/12 hours. We use UV lamps ("Zoomed" UV-10 tubes outside) and incandescent heat lamps. Heat lamps turned on automatically when the temperature controller register lowering of the temperature below the figures preferable for this particular species. Exposing animals to the natural sunlight would be also a big plus.

Temperature. Ambient temperature is +27 - +29,5 °C (80 – 80.5 F) at daytime and are not lower than +22 °C (70.0 F) at nighttime. At basking place temperature is about +32 - +38 °C (90.0 – 100.0 F) under the lamp. One branch should be placed just under the lamp to enable the animal to bask, but on a safe distance from the mesh to avoid burns.

Humidity. Humidity level is 40-60% at daytime and up to 90% at night. We provide light misting sessions in the morning and in the evening. We use fogger (“Zoomed” Repti-Fogger) in the night to provide high humidity.

Diet. *Ch. calyptratus* are insectivorous. Diet for adults contains Turkestan cockroaches (*Shelfordella tartara*), crickets (Jamaican field crickets (*Gryllus assimilis*) and Mediterranean field cricket (*Gryllus bimaculatus*), locusts (*Locusta migratoria*) and mealworms larvae (*Tenebrio molitor*) and zophobas in rare cases as dainty. We offer 4–5 insects per head 1–2 times per week for adults while juveniles are fed daily. If the animal shows signs of obesity, the frequency of feeding is reduced to 1 time per 2 weeks. It is strictly recommended not to use wild caught insects. Sometimes if an animal is still hungry we can offer one or two additional feeding items. 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. Insects are dusted with it prior to the feeding session. We gut load the insects with fruit, greens and vegetables and sometimes bee pollen as an additional source of vitamins and bioactive elements. Diet for babies is the same as for adults. We use insects of appropriate size.

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