Hemidactylus frenatus - Common House Gecko

Hemidactylus frenatus - Schlegel, 1836.

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Introduction
Hemidactylus frenatus is a reptile belonging to the family Gekkonidae. It is a native species of Southeast Asia and is commonly found in Singapore. It is also known as the Pacific House Gecko, Asian House Gecko, or simply, House Lizard. Hemidactylus frenatus is morphologically most similar to and often confused with the Mediterranean species of the same genus, Hemidactylus turcicus, the Mediterranean House Gecko. Although Hemidactylus frenatus is frequently known as the Common House Gecko. It inhabits many different countries and so it has many more different common names. These names include: Chichak, Bridled House Gecko, Wall Lizard, Spiney-tailed House Gecko, Gewöhnlicher Halbfingergecko, Asiatischer Hausgecko, Limpia Casas, Chee Chak, Chi Chak, Cicak, Butiki, Tiki, Chhipkali, Jing-jok(), Palli, , (www1 and www2).

Hemidactylus is the most species rich genus in the family geckkonidae. There are 80 described species of Hemidactylus. More are still being described in recent years. Hemidactylus frenatus is one of the 5 species largely responsible for the large geographical area coverage of the genus Hemidactylus. The others are: Hemidactylus mabouia, Hemidactylus turcicus, Hemidactylus brookii and Hemidactylus garnotii (www1).

Like most geckos, Hemidactylus frenatus is nocturnal. It generally hides during the day and can be seen climbing the walls of houses and other buildings in search of insects at night. It is often attracted to light sources on buildings and can be most easily observed nearby light sources in homes, hence the name –House Gecko (www2).

Description

Hemidactylus frenatus was first described by Hermann Schlegel in Dumeril & Bibron in 1836. Schlegel was a German naturalist whose work consisted mostly of ornithology (the study of birds) and herpetology (the study of amphibians) (www5).

Etymology

Hemidactylus meaning: "half-toe", frenatus meaning: "bridled" (www2).

Holotype

The original holotype specimen is unknown and presumed lost (Sang et al., 2009).

Synonyms


Due to misidentification as separate species, *Hemidactylus frenatus* has subsequently been identified and named many times. Here are all 43 of the synonyms, their authors and year of identification, as of 2013:

*Hemidactylus javanicus* FITZINGER 1826  
*Hemidactylus (Pnoepus) Bojeri* FITZINGER 1843  
*Hemidactylus vittatus* GRAY 1845  
*Hemidactylus punctatus* JERDON 1853  
*Hemidactylus fraenatus* BLEEKER 1857  
*Hemidactylus inornatus* HALLOWELL 1861  
*Hemidactylus pumilus* HALLOWELL 1861  
*Gecko caracal* TYTLER 1865  
*Gecko chaus* TYTLER 1865  
*Hemidactylus longiceps* COPE 1869  
*Hemidactylus hexapsis* COPE 1869  
*Hemidactylus papuensis* [MACLEAY] 1877  
*Hemidactylus tristis* SAUVAGE 1879  
*Hemidactylus frenatus* BOULENGER 1885  
*Hemidactylus nigriventris* IDITH DE JEUDE 1905  
*Hemidactylus bowringii* STEJNEGER 1907  
*Hemidactylus fragilis* CALABRESI 1915  
*Hemidactylus frenatus* DE ROOIJ 1915  
*Hemidactylus inornatus* DE ROOIJ 1915  
*Hemidactylus vandermeer-mohri* BRONGERSMA 1928  
*Hemidactylus mabouia* BARBOUR & LOVERIDGE 1929  
*Hemidactylus okinawensis* OKADA 1936  
*Hemidactylus vandermeer-mohri* WERMUTH 1965  
*Hemidactylus auritus* POEPPIG (in OBST) 1977  
*Pnoepus papuensis* WELLS & WELLINGTON 1985  
*Pnoepus frenatus* WELLS & WELLINGTON 1985  
*Pnoepus bojeri* WELLS & WELLINGTON 1985  
*Pnoepus vittatus* WELLS & WELLINGTON 1985  
*Pnoepus punctatus* WELLS & WELLINGTON 1985  
*Pnoepus inornatus* WELLS & WELLINGTON 1985  
*Pnoepus pumilus* WELLS & WELLINGTON 1985  
*Pnoepus caracal* WELLS & WELLINGTON 1985  
*Pnoepus fragilis* WELLS & WELLINGTON 1985  
*Hemidactylus fragilis* LANZA 1990  
*Hemidactylus frenatus* LANZA 1990  
*Hemidactylus frenatus* LINER 1994  
*Hemidactylus frenatus* GLAW & VENCES 1994  
*Hemidactylus frenatus* MANTHEY & GROSSMANN 1997  
*Hemidactylus frenatus* COX et al. 1998  
*Hemidactylus frenatus* COGGER 2000  
*Pnoepus frenatus* WELLS 2002  
*Hemidactylus cf. frenatus* ANDREONE et al. 2003  
*Hemidactylus cf. frenatus* JESTRZEMSKI et al. 2013 (www1).

**Distribution**

*Hemidactylus frenatus* is an ectotherm. This means it cannot produce its own heat. It can only survive in places with sufficiently high temperatures. For this reason *Hemidactylus frenatus* is only distributed in areas of warm climate, in tropical and sub-tropical regions. Its physiological processes are largely influenced by ambient temperature. Despite these restrictions, *Hemidactylus frenatus* has become one of the most successful reptiles. It is widely distributed across the world. *Hemidactylus frenatus* is found across tropical Asia and has even formed a stable population in Australia, Africa and the Americas as an invasive species (Lei & Booth, 2014). *Hemidactylus frenatus* thrives between sea level and 1,600 m above sea level (Spawls et al., 2002).
Habitat

*Hemidactylus frenatus* is solely terrestrial. It is mostly found where there is human habitation; in cities, urban areas and villages where the lights attract it. It is found on building walls, but also on trees, rotting logs, and on or under boulders. *Hemidactylus frenatus* is an arboreal species. It can perch at a height of greater than one metre (Crandell et al., 2014). As seen in the photograph below, it can live inside as well as on the outside of buildings.

Photograph by Doireann Ferris
Biology/Anatomy

The average lifespan of *Hemidactylus frenatus* is 5 years. It becomes sexually mature at 1 year. Similar to most lizards, *Hemidactylus frenatus* has four well developed legs, a long tail and a prehensile tongue to catch moving prey (DeVoe, 2015).

The modification of its eyes allows it to see very well in the dark, the time when it is most active. The eyes are binocular with a low convergence ratio and a high visual cell density. This increases visual sensitivity in the dark (Roll, 2001).

Adult *Hemidactylus frenatus* can measure between 3-6 inches (975-1500 mm). A significant adaptation of its anatomy is the modification of its foot to climb along walls and ceilings. The claws are enlarged and the toes have adhesive toe-pads (Crandell et al., 2014).

*Hemidactylus frenatus* foot close-up. ©Jonathan Hakim 2011. (permission granted)

*All Hemidactylus* conserved many primitive morphological features. These include the skull structure and the presence of 26 presacral vertebrae. Some derived features include a laterally expanded un-regenerated tail, enlargement of dorsal scales and the reduction or loss of dorsal tubercles and femoral pores (Carranza, 2006).

Reproduction
*Hemidactylus frenatus* reproduce sexually. This method of reproduction is key to the success of *Hemidactylus frenatus*. In Pacific Islands it had been observed that *Hemidactylus frenatus*, as an alien species, is out-competing the native ecological similar species. The native species is parthenogenetic, this means it reproduces asexually (Dame & Petren, 2006). Proceeding successful reproduction, *Hemidactylus frenatus* will produce young. *Hemidactylus frenatus* is oviparous. This means that it produces its young by laying eggs which will mature and hatch outside the maternal body. As with all reptiles the sex of the young is determined by the environmental temperature. The eggs are layed in crevices for protection against predators. The gecko can produce eggs all year round. Incubation time can range from 53-88 days, depending on geographical location, as warmer temperatures lead to shorter incubation times. Usually 2 eggs are layed at a time. The egg it produces is ten or more times richer in calcium than eggs of birds or turtles (Jenkins & Simkiss, 1968).

It has been demonstrated that for island populations, natural or anthropogenic disturbance of habitat will result in more eggs being layed. This helps safeguard survival of the population (Ineich, 2010).
Feeding/Diet

*Hemidactylus frenatus* eats a variety of arthropods such as insects and arachnids. It can survive without eating for relatively long period of time due to the morphological and functional plasticity of hepatocytes (de Brito-Gitirana & Storch, 1998\(^1\)). Temperature has a huge effect on the feeding habits of *Hemidactylus frenatus*. In the wild *Hemidactylus frenatus* is unable to feed below the temperature of 17-15 C. In the laboratory *Hemidactylus frenatus* will stop feeding at 17 C or below. The reason for this, is that at these temperatures or below, *Hemidactylus frenatus* is unable to digest food. Above these temperatures the efficiency of their feeding does not change with change in temperature (Lei & Booth, 2014\(^2\)).

Behaviour

*Hemidactylus frenatus* is a nocturnal species. It is non-venomous and harmless to humans. Large individuals may bite if stressed, but the bite is weak and may not even break human skin. Like most geckos, *Hemidactylus frenatus* can lose its tail when alarmed. It does this in order to distract its predator and escape danger. It emits multiple chirp calls and this sound resembles the word "gecko" repeated 3 times (Marcellini, 1977\(^3\)).

Interspecific Relationships

*Hemidactylus frenatus* is responsible for the decline in population of 6 species of Nactus gecko and linked with the extinction of 3. These reduction and extinctions occurred after the introduction of *Hemidactylus frenatus* to the Mascarene Islands. The remainder of these Nactus gecko are limited to small populations on the offshore islets of Mauritius (Arnold, 2000\(^4\), Cole et al., 2005\(^5\) and Carranza, 2006\(^6\)).

Conservation Status

*Hemidactylus frenatus* was last assessed for its conservation status on 30/06/2009. The conclusion of this assessment was that *Hemidactylus frenatus* is in the category secure, least concern (LC). The justification behind this status is that *Hemidactylus frenatus* is a widely distributed species, it is commonly found in its habitat, it is not being negatively impacted by any process and populations are not declining. This assessment was carried out by Ota, H. & Whitaker, A.H. for The IUCN Red List of Threatened Species (www3).

Taxonomy

Taxonomy work on the genus *Hemidactylus* is particularly difficult. Most taxonomic work of DNA sequencing is done on remote small species on remote islands. External features alone are not suitable for taxonomic identification since they are plastic in appearance and often their features appear differently within species and across geo-locations. This results in the difficulty of producing unambiguous identity keys based on morphology (Carranza, 2006\(^7\)).

Classification/Phylogeny

Kingdom: Animalia
Phylum: Chordata
Subphylum: Vertebrata
Class: Reptilia
Order: Squamata
Suborder: Sauria
Family: Gekkonidae
Genus: Hemidactylus
Species: frenatus
(www3).
This figure is adapted from Bauer et al., 2010. It shows the “Phylogeny of tropical Asian and other Hemidactylus geckos.” It is a “Maximum-likelihood topology with parsimony bootstrap, likelihood bootstrap, and Bayesian posterior probability values indicated for each branch”. The position of Hemidactylus frenatus in its phylogenetic tree has been highlighted.

Genome Sequencing
Atrophic Association/ Pet Trade

*Hemidactylus frenatus* is often used in experiments and as a model for lab testing temperature effects on biological systems (de Brito-Gitirana & Storch, 2002[16]). In America *Hemidactylus frenatus* and other geckos are a welcome sight in most houses since it helps to reduce the amount of insects in houses, by eating them (www1). *Hemidactylus frenatus* can be kept as pets in a vivarium. In order to keep it as a pet it requires moisture, heat source, live food and clean substrate. Human activity is largely responsible for the spread of *Hemidactylus frenatus* from its native area, resulting in its wide range around the world (Carranza & Arnold, 2006[7], and Jesus et al., 2005[17]).
There are many superstitions regarding geckos. Geckos are falsely considered poisonous in many parts of the world. In Southeast Asia geckos are believed to be carriers of good omen.

In Yemen and other Arab countries, people falsely believe that skin diseases occur from geckos running over the face when someone is asleep. According to the mashithantu dictionary, in India there is system of predicting good and bad omens based on the sounds made by geckos, their movements and the rare times when they may fall from roofs.

In some parts of India, the sound made by geckos is thought to be a bad omen; whereas in Bangladesh it is considered to be a sign of the truth of whatever statement was made just before the sound, because the sound it makes is similar to "tik tik tik" which, in Bengali means "right right right". The noise made by a gecko from an east wall as one is about to go on a journey is thought to be auspicious, but a chirp from any other wall is supposed to be a bad omen. A gecko falling on someone's right shoulder is considered good omen, but a bad one if it drops on the left shoulder.

In Punjab, it is believed that contact with the urine of a gecko will cause leprosy. (www1).

Useful Links

**http://eol.org/pages/793350/overview**
**http://reptile-database.reptarium.cz/**
**http://www.gbif.org/species/5959976**
**http://www.iucnredlist.org/details/176130/0**
http://en.wikipedia.org/wiki/Common_house_gecko

References

5. DeVoe. R. S., 2015, Chapter 7 – Lacertilia (Lizards, Skinks, Geckos) and Amphibiaenids (Worm Lizards), Fowler's Zoo and Wild Animal Medicine, Volume 8, Pages 52-60.

Websites:


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