



## Relationships, evolution and biogeography of Semaphore geckos, *Pristurus* (Squamata, Sphaerodactylidae) based on morphology

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### Abstract

The Sphaerodactylid gecko genus *Pristurus* has at least 20 recognised species in Arabia, the Socotra archipelago, and northeast Africa with an isolate 4500km away in Mauritania. Analysis of nineteen variable morphological characters in the Sphaerodactylidae suggests *Pristurus* is most closely related to *Quedenfeldtia* of Morocco and then successively to the Sphaerodactylini and *Saurodactylus*. This contrasts with recent studies using nuclear DNA, which place *Pristurus* in a basal polychotomy in the family. If the molecular tree is correct, there must have been considerable parallelism in anatomy in these taxa. Within *Pristurus*, parsimony analysis was carried out on a set of 72 variable morphological characters (equivalent to 86 binary ones) from external features, skeleton, musculature and behaviour. Apparent relationships are as follows: *P. celerrimus* (*P. insignis*, *P. insignoides*) (*P. guichardi* (*P. socotranus* (*P. abdelkuri* (*P. rupestris*, *P. popovi*, *P. flavipunctatus*, *P. gallagheri*, *P. adraensis*, the *Spatalura* clade))))). Relationships within the *Spatalura* clade are: (*P. minimus*, *P. simonettae*) (*P. crucifer*, *P. phillipsi* (*P. somalicus* (*P. saada* (*P. collaris* (*P. ornithocephalus*, *P. carteri*))))). The more basal *Pristurus* were apparently primitively heliothermic rock climbers with one lineage becoming tree dwelling. These forms are now confined to the North Oman mountains of eastern Arabia and the Socotra archipelago and may have been replaced elsewhere in Arabia and perhaps northern Africa by a radiation of more morphologically advanced species. Most of these have similar niches to the more primitive forms, but one lineage that gave rise to the *Spatalura* clade became ground dwelling and partly nocturnal. Many morphological changes on the phylogeny of *Pristurus* may be functionally associated with shifts in ecology and behaviour.

**Key words:** *Pristurus*, Semaphore gecko, Sphaerodactylidae, evolution, biogeography

### Introduction

Semaphore geckos (*Pristurus* Rüppell, 1835, type species *P. flavipunctatus*) are a discrete group of at least 21 species found in Arabia, the Socotra archipelago, and northeast Africa, with an isolated species in Mauritania (Geniez and Arnold, 2006) and another extending from Arabia to the coast of Iran and Pakistan (see Fig. 1). Unlike most other geckos they are diurnal and, as their name suggests, they are distinctive in making visual signals with the body and the tail. Here, morphological evidence for the relationships of *Pristurus* to other geckos is assessed and compared with recent results using nuclear DNA sequence (Gamble *et al.*, 2008a) and an estimate of the phylogeny of the species of *Pristurus* is also made using some 72 variable morphological characters (equivalent to 86 binary ones). In this paper, the family and tribe classification of geckos proposed by Gamble *et al.* (2008a, 2008b) is followed.

### Distinctive features of *Pristurus*

*Pristurus* is part of the Sphaerodactylidae (Gamble *et al.*, 2008a) and possesses distinctive features that this group shares with other Sphaerodactylidae, Gekkonidae and Phyllodactylidae, namely: a single premaxilla, a large cervical extension of endolymphatic system, and more or less round eggs with calcareous shells.