
Recent data on the distribution of lizards and snakes of the Seychelles

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THE Seychelles comprise 155 islands scattered across the western Indian Ocean at 4-11° S and 45-56° E. Traditionally divided into two main groups, the northern, granitic islands and the southern, coralline islands, they can in fact be differentiated into three geological categories: the inner (granitic islands), the low coralline islands and the raised coralline islands (Baker, 1963; Braithwaite, 1984a) (Fig. 1).

The granitic islands consist of a group of about 40, clustered together on an undersea shelf of granite, the Seychelles bank, and are remnants of the Seychelles microcontinent which was isolated following Gondwana breakup, roughly 65 million years ago (Plummer & Bell, 1995). These comprise the islands of North, Silhouette, Fregate, Mahé, Praslin, La Digue, Curieuse and several smaller islands encircling these (Fig. 1). The islands are generally high, some very mountainous, reaching 914 m above sea level (Morne Seychellois, Mahé). Such height results in great habitat diversity and rainfall. In periods of low sea levels during the Pleistocene and Pre-Pleistocene ice ages (Colonna et al., 1996; Rohling et al., 1998; Siddall et al., 2003; Camoin et al., 2004; Miller et al., 2005) most of the Seychelles Bank would have been exposed as a single large island, but even when global sea level was at its highest, most of the granitic islands remained above sea level, allowing the survival of

unique endemic species (Stoddart, 1971; Geyth et al., 1979; Braithwaite, 1984a; Montaggioni & Hoang, 1988; reviewed in Gardner, 1986).

The low coralline islands (Bird, Denis, Coëtivity and Platte, the Amirantes and the Farquhar groups) were formed very recently, probably less than 6,000 years ago, from marine sediments sometimes cemented by deposits of guano. Almost all are less than 3 m above sea level (Braithwaite, 1984b).

All of the Aldabra group (Aldabra, Cosmoledo and Astove atolls and Assumption island) are raised coralline islands. Like the low coralline islands, they are oceanic in origin, formed by reef-building corals acting on submerged volcanic seamounts that may have formed some 20 million years ago (Plummer, 1995) and have thus been submerged and emerged several times since their formation. Aldabra's last full submergence dates back to 125,000 years ago (Thomson & Walton, 1972). Remaining islands in the group, lower than Aldabra itself, were probably submerged during the last interglacial when sea level was 10 m higher than present, re-emerging slightly later than Aldabra (Taylor et al., 1979). In general the coralline islands have limited habitat variation and correspondingly lower species diversity. Aldabra is an exception, possibly due to its slightly older age and proximity to both continental Africa and Madagascar. As currently recognized, the native reptiles of the Seychelles

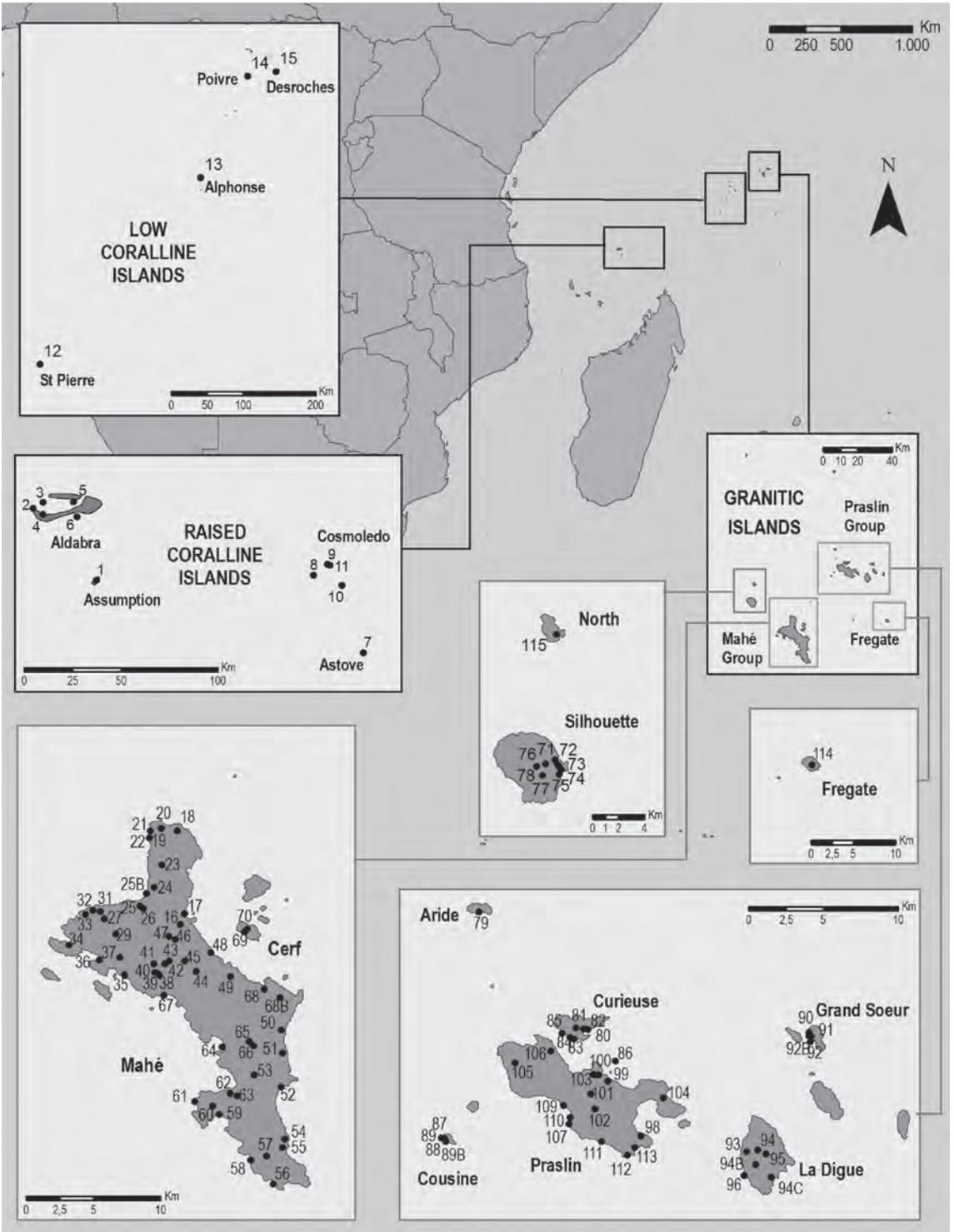


Figure 1. General map of the study area and the principal island groups sampled in this study.

comprise around 30 species, 70% of which are endemic (Gerlach, 2007). Systematic studies on vertebrate fauna at the Seychelles dates back from the late 1880s, but despite this and even after two very recent publications covering species accounts and tentative distributions (Bowler, 2006; Gerlach, 2007), precise distribution records are still lacking and many distributions are incomplete. Here we report data obtained during roughly 12 weeks of fieldwork between 2005 and 2008 that together, with the surveys undertaken as part of the Indian Ocean Biodiversity Assessment 2000-2005, and previous records, provide the most up-to-date distribution record of the lizards and snakes in the Seychelles. A total of 121 localities were sampled (Fig. 1 and Table 1 [Appendix]), covering a wide range of the coralline and granitic islands, resulting in approximately 900 observations. Specimens observed were located with GPS and identified to species level following the most recent taxonomic revisions in each case. Biogeographic and taxonomic remarks in respect of ongoing molecular work are also discussed.

REPTILIA

GEKKONIDAE

Phelsuma

The most conspicuous reptile group of the Seychelles, *Phelsuma* are brightly coloured, generally diurnal geckos, occurring in a wide range of habitats from high mountain forest to banana and coconut plantations. There are clearly two species in the granitic islands (*Phelsuma sundbergi* and *Phelsuma astriata*) and another one present on the southern atolls (*Phelsuma abbotti*). Alpha-taxonomy is still not clear for the group, mainly due to the highly variable nature of dorsal coloration patterns across the islands. A third form is sometimes recognised as a full species (*Phelsuma longinsulae*) and as many as three to four subspecies are sometimes recognized within *P. astriata* and *P. sundbergi* respectively. In this report only two subspecies within *P. sundbergi* (*P. sundbergi* and *P. longinsulae*) are provisionally used, and no subspecific divisions within *P. astriata*, recognizing only the forms that are easily distinguishable in the field. *Phelsuma sundbergi* and *P. astriata* are endemic to the Seychelles and

sister-taxa, having originated within the Seychelles. However, *P. abbotti* from Aldabra and Assumption are closely related to other *P. abbotti* subspecies from Northwestern Madagascar, resulting from an independent colonisation of the southern atolls (Rocha et al., 2009a). Ongoing molecular work should clarify the structure within these species.

Phelsuma sundbergi sundbergi (Fig. 2)

Localities: Grand Soeur 90; Poivre 14; Praslin 99, 102, 110; Curieuse 81; La Digue 93, 94B, 95, 96. Easily distinguished from its conspecific by being the largest species and predominantly green, with small, widespread, red freckles. It is abundant and widespread across its distribution. The individuals from La Digue (and Felicite, Cocos, Grand Soeur, Petite Soeur and Mariane) are often referred to as *Phelsuma sundbergi ladiguensis*. As they are not different from *P. sundbergi sundbergi* individuals in the field (except for the geographic criteria), we do not consider it as a different subspecies for now.

Phelsuma sundbergi longinsulae (Fig. 14)

Localities: Fregate 114; Mahé 16-18, 20, 22, 24-26, 25B, 29, 31, 34-36, 39, 40, 44, 45, 47-52, 55, 59, 62, 64-68, 68B; Cosmoledo 8; Cerf 69, 70; Silhouette 71, 75, 76; North Island 115. In Mahé, where it co-exists with *P. astriata*, *P. sundbergi* seems to be much more abundant (at least it is much more frequently observed), with *P. astriata* being much less conspicuous and predominantly found at higher altitudes in the canopy.

Phelsuma astriata (Fig. 11)

Localities: Mahé 29, 33, 39, 45, 53, 55, 59; Praslin 99, 100, 102, 103, 104, 105, 107, 109, 110, 113; La Digue 93, 94, 95, 99; Curieuse 80, 81, 82; Cerf 70; Cousine 87, 89; Grand Soeur 92; Fregate 114; Silhouette 74, 75; Aride 79; Astove 7; Alphonse 13. Cheke (1984) described *P. astriata* from Fregate (« Fregate form ») as an intermediate form between *P. a. astriata* (Mahé group, Silhouette, Astove and Alphonse) and *P. a. semicarinata* (Praslin group, D'Arros and St. Joseph). Ongoing studies with molecular markers should reveal patterns of genetic variation within this group and provide useful information for future taxonomic reappraisals.

Phelsuma abbotti (Fig. 1)

Localities: Aldabra 2, 3, 6; Assumption 1. A northwestern Malagasy species. Traditionally two endemic subspecies are recognized as inhabiting the southern atolls of the Seychelles: *P. a. abbotti*, in Aldabra and *P. a. sumptio*, in Assumption. Both seem to exist at high densities but are presently considered as “Vulnerable” due to their restricted range (Gerlach, 2007). This species is usually observed on trunks, perching at low heights within tropical dry forest.

Ailuronyx

The genus is endemic to the Seychelles. The previous Malagasy record of *Ailuronyx trachygaster* (1981) is probably erroneous (Bauer, 1990). The species is believed to have a pre-Quaternary age in the islands (Cheke, 1984) and their phylogenetic affinities are unknown. Currently they are placed basal to a big Afro-Malagasy clade of geckos (A. Bauer, pers. comm.). Today, they are common only in palm forests on Praslin or rat-free islands like Aride, Cousine or Fregate. This may indicate that rats do have a major influence on their present distribution. Three species are recognized (Gerlach, 2002) although they can be difficult to distinguish. Of them, *Ailuronyx trachygaster* is rarely observed and known only from a few sightings from Praslin and Silhouette where it is usually found high in the forest canopy. Ongoing molecular work should shed further light on species differentiation levels and patterns. No specimens were observed that could clearly be assigned to *A. trachygaster* during the surveys herein.

Ailuronyx seychellensis (Fig. 4)

Localities: Praslin 102, 107; Cousine 88; Fregate 114; Silhouette 76; Aride 79.

Ailuronyx tachyscopaeus (Fig. 18)

Localities: Mahé 55; Cerf 70; Silhouette 75; Praslin 102; La Digue 96; Curieuse 81; Grand Soeur 92B. Previous records from Cerf were identified to genus as *Ailuronyx* sp. The species is tentatively suggested as *A. tachyscopaeus* in this report and is awaiting further, more rigorous morphological identification and more precise molecular investigation to clarify its identity.

Hemidactylus

At least two *Hemidactylus* species occur in the Seychelles: *Hemidactylus mercatorius* (sensu Kluge 2001) and *Hemidactylus frenatus*. Records for a third species, *Hemidactylus brookii*, exist for Desroches (Amirantes) but were not confirmed by surveys in this report. The relationship between the Seychelles populations of *H. mercatorius* with both East African and Malagasy specimens, and with East African *Hemidactylus mabouia* was recently studied using molecular data (Rocha et al., in press).

Hemidactylus mercatorius (Fig. 9)

Localities: Mahé 59, 68; Assumption 1; Aldabra 2, 3, 5, 6; Astove 7; Cosmoledo 8-11. Abundant and widespread in the southern atolls, there are some observations also in the granitics. This species is closely related to East African *H. mabouia*, and while individuals found in Mahé may be introductions from the East African mainland or the Comoros, the Aldabra group harbours a distinct, apparently autochthonous clade (Rocha et al., in press). Nevertheless, the taxonomy of this group remains controversial.

Hemidactylus frenatus

Localities: Mahé 16, 18, 25, 25B, 59, 62; Poivre 14; Desroches 15. This species is present throughout Indian Ocean islands without any signs of geographic structure and its presence in the region is possibly recent (Vences et al., 2004; Rocha et al., 2005).

Urocotyledon inexpectata (Fig. 6)

Localities: Praslin 99, 101, 110, 111, 112; Mahé 19, 27, 29, 32, 37, 41, 45, 46, 58, 60, 61; La Digue 94, 95; Curieuse 80; Grand Soeur 90, 92; Fregate 114; Silhouette 72, 73, 75, 76, 77; Aride 79; Cousine 89B. Particularly interesting from a biogeographic point of view, this species is rarely encountered and remains among the most poorly known gecko species. The few records in the literature suggested this was a rare species. However, its rarity may be due to its particular habitat and ecology; mainly nocturnal, hardly emerging from shelters (usually very small cracks in granitic boulders) and moving only a short distance from them. In the Seychelles

Figure 1. *Phelsuma abbotti*. ▶

Figure 2. *Phelsuma sundbergi* *sundbergi* (spotted venter with a V shape on chin). ▶ ▶

Figure 3. *Zonosaurus madagascariensis*. ▼



Figure 4. *Ailuronyx seychellensis*. ▼

Figure 5. *Lamprophis geometricus*. ▶ ▶



Figure 6. *Urocotyledon inexpectata* (clutch, in the interior of wasp nests and; distinctive sucker structure on tip of tail). ▲



Figure 7. *Calumma tigris*. ▲

Figure 8. *Pamelascincus gardineri*. ▲ ▲

Figure 9. *Hemidactylus mercatorius*. ▶



Figure 10. *Mabuya wrightii*. ▲



Figure 11. *Phelsuma astriata* (with characteristic pale white venter). ▲

Figure 12. *Janetaescincus* sp. ◀



Figure 13. *Ramphotyphlops braminus*. ▲



Figure 14. *Phelsuma sundbergi long-insulae* (spotted/V shape chin). ▲



Figure 15. *Gehyra mutilata*.



Figure 16. *Mabuya sechellensis*.

it can frequently be found in granitic boulders around empty wasp nests in which it frequently lays its eggs. Our recent records do not add new localities to the known distribution for this species, but it is now clear that it is more frequently encountered than previously thought. The species is rather inconspicuous and probably abundant, at least in many of the granitic islands, but sometimes difficult to detect.

Gehyra mutilata (Fig. 15)

Localities: Mahé 16, 19, 21, 23-25, 32, 34, 37, 57-59, 62, 66, 67; Aldabra 2; Alphonse 13; Praslin 103, 109; La Digue 93; Curieuse 80; Fregate 114; Silhouette 71. This species is native to southern Asia. Cryptic variation occurs in this species and possibly at least two species exist under *G. mutilata* designation (Rocha et al., 2009b). The

species recently spread across several Indian Ocean islands where it is mostly associated with housing and buildings. It has also been observed in more “pristine” habitat at Morne Seychellois mountains at Mahé and sometimes in syntopy with the endemic *Urocotyledon inexpectata*, suggesting that the species may be spreading fast into non-anthropogenic habitats.

SCINCIDAE

Mabuya (= *Trachylepis*)

The genus *Mabuya* comprises more than 100 species widespread across Asia, Africa and the Neotropics (Greer et al., 2000), and it is the only circumtropical skink genus (Mausfeld et al., 2002). The two endemic species from the Seychelles, *Mabuya wrightii* and *Mabuya sechellensis*, are apparently closely related to the African and Comoroan



Figure 17. *Cryptoblepharus boutonii aldabrae*. ◀

Figure 18. *Ailuronyx tachyscopaeus*. ▼



species *Mabuya maculilabris*, which is probably a species complex (Jesus et al., 2005), and basal to most of remaining Afro-Malagasy representatives of the genus (Carranza et al., 2001; Mausfeld et al., 2002; Carranza & Arnold, 2003, Jesus et al., 2005). Based on arguments outlined in Jesus et al. (2005) we still use the generic designation of *Mabuya* instead of the recently proposed genus, *Trachylepis* (Mausfeld et al., 2002; Bauer, 2003).

Mabuya wrightii (Fig. 10)

Localities: Saint Pierre 86; Cousine 87; Fregate 114; Aride 79. Easily recognizable from *M. sechellensis* by its size, this large, heavy bodied skink can reach up to 138 mm snout-vent length (Gerlach, 2005). It is endemic to the granitic islands occurring only in rat-free areas, possibly due to pressure from this introduced predator. Higher population densities are reached in islands with large seabird colonies and may take advantage of higher food availability associated to them.

Mabuya sechellensis (Fig. 16)

Localities: Mahé 16-18, 20-24, 25B, 27, 29-32, 34, 35, 38-41, 43-50, 54-60, 62-64, 66-68, 68B; Praslin 98, 99, 102, 104, 106, 107, 109; La Digue 93, 94B, 94C, 95, 96; Curieuse 80-84; Cerf 69; Grand Soeur 91, 92; Fregate 114; Silhouette 73, 75-77; Aride 79; North Island 115. This species is endemic and extremely widespread across all the granitic islands. It has also been introduced in some coralline islands such as Denis, Bird and some of the Amirantes (Gerlach, 2007). They are extremely common and can be found in virtually all kinds of habitats from woodland, plantations, gardens and housing from sea level to mid-altitudes. Ongoing studies using molecular tools are attempting to clarify interspecific relationships and inter-island variation across both species.

Pamelaescincus

Pamelaescincus is a monospecific genus endemic to the Seychelles. It is also a sister-taxa to another possibly monospecific genus from the Seychelles (*Janetaescincus*). Both seem to be basal to all remaining Afro-Malagasy scincines (Brandley et al., 2005) and are of significant biogeographic interest.

Pamelaescincus gardineri (Fig. 8)

Localities: La Digue 93, 95; Mahé 42, 46, 47, 58, 66; Praslin 102, 105; Grand Soeur 91; Fregate 114; Silhouette 73, 76,77; Aride 79.

Janetaescincus (Fig. 12)

Localities: Mahé 65; Praslin 102; La Digue 93, 95; Curieuse 85; Fregate 114; Silhouette 76, 77, 78. Two species are sometimes recognized (*Janetaescincus braueri* and *Janetaescincus veseyfitzgeraldi*) but they are often synonymised [Bowler, 2006]). Both species are very similar in body shape and limb size, and (eventual) taxonomic differences are found in the arrangement of head scales and coloration, both very difficult to determine in the field. This report considers only the generic identification but further molecular results may unveil patterns of variation within this group. Both *Janetaescincus* and *Pamelaescincus* are burrowing skinks with reduced limbs, always found among leaf litter, in more humid and darker places. *Janetaescincus* is much smaller, longer, slender, with a more elongate snout and usually darker than *Pamelaescincus*, which is generally a larger, stouter skink. *Pamelaescincus* has five toes in all limbs while *Janetaescincus* has four toes in the forelimbs. *Pamelaescincus* seems to be crepuscular, at least in some islands, and is more active at dawn. In the field, both species are easily recognized by their rapid, serpentiform movement among the leaf-litter. They are not usually confused with *Mabuya* spp., which are ground dwellers that consistently bask in sunlight.

Cryptoblepharus boutonii aldabrae (Fig. 17)

Localities: Assumption 1; Aldabra 2-6; Astove 7; Cosmoledo 8-11; Saint Pierre 12. A small, slender skink, frequently found under trunks or rocks. It has a disjunct Indo-Pacific distribution with Western Indian Ocean populations that are a result of an ancient colonization from the Australian region (Rocha et al., 2006). The origins of the Seychelles populations remain unknown. Conversely to other islands in the Western Indian Ocean and the African coast, these skinks have been observed not only in the intertidal area but also in open habitats inland, where they are found on trunks and plant debris.

CHAMAELEONIDAE

Calumma tigris (Fig. 7)

Localities: Mahé 37, 46, 47. All the other members of this genus occur in Madagascar, from where the ancestor of this species presumably originated. This species is a very difficult lizard to observe in the field and is possibly more abundant than currently realised from our surveys. Two of the observations reported to us were road kills.

CORDYLIDAE

Zonosaurus madagascariensis (Fig. 3)

Localities: Cosmoledo 9. This species is widespread in Madagascar. In the Seychelles it inhabits only Cosmoledo. Ongoing genetic studies reveal no significant differentiation between Malagasy and Cosmoledo individuals (A. Raselimanana, pers. comm.).

COLUBRIDAE

Lamprophis geometricus (Fig. 5)

Localities: Fregate 114; Praslin 102. *Lamprophis* is an African genus, with isolated populations in Arabia and the Seychelles. *L. geometricus* is nocturnal and was rarely seen, except on Fregate Island, where very high densities were observed. Gerlach (2007) states maximum sizes of 91.4 cm but individuals little over 1.0 m were observed on Fregate Island. Its evolutionary relationships are currently unknown, but it is not particularly distinct from some of its African congeners being possibly introduced (Nussbaum, 1984; Dowling, 1990).

Lycognathophis seychellensis (Edition cover)

Localities: Mahé 29; La Digue 95, 96; Fregate 114; Silhouette 76; Praslin 102. This monotypic genus is apparently related to Ethiopian and Oriental natricines (Dowling, 1990; Vidal et al., 2008). Our observations extend previous records to La Digue, where it seems to be abundant.

TYPHLOPIDAE

Ramphotyphlops braminus (Fig. 13)

Localities: Assumption 1; Mahé 66, 67; La Digue 93; Curieuse 85; Cerf 69; Cousine 87. This fossorial and parthenogenetic snake is widely distributed in the tropics and many Carribean, Indian and

Pacific Ocean islands where it is easily introduced. It has been recently reported around the Gulf of Guinea and the Comoro islands (Jesus et al., 2003; Carretero et al., 2005). It has also been introduced in recent times in the Seychelles (Nussbaum, 1984). The observations herein extend distribution records to Alphonse, Curieuse and Cerf.

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REFERENCES

- Baker, B.H. (1963). Geology and mineral resources of the Seychelles Archipelago. *Geol. Survey of Kenya* 3, 1-140.
 Bauer, A. (1990). Phylogeny and biogeography of

- geckos of Southern Africa and the islands of the western Indian Ocean: Ocean: a preliminary analysis. In: *Vertebrates in the Tropics*, pp. 275-283. Peters, G. & Hutterer, R. (Eds.). Bonn: Museum Alexander Koenig.
- Bauer, A.M. (2003). On the identity of *Lacerta punctata* Linnaeus, 1758, the type species of the genus *Euprepis* Wagler, 1830, and the generic assignment of Afro-Malagasy skinks. *Afr. J. Herpetol.* **52**, 1-7.
- Braithwaite, C.J.R. (1984a). Geology of the Seychelles. In: *Biogeography of the Seychelles Islands*, pp. 17-38. Stoddart, D.R. & Junk, W. (Eds.). Netherlands: The Hague.
- Braithwaite, C.J.R. (1984b). Scientific studies in the Seychelles. In: *Biogeography of the Seychelles Islands*, pp. 17-38. Stoddart, D.R. & Junk, W. (Eds.). Netherlands: The Hague.
- Brandley, M.C., Schmitz, A. & Reeder, T.W. (2005). Partitioned Bayesian analyses, partition choice, and the phylogenetic relationships of scincid lizards. *Syst. Biol.* **54**, 373-390.
- Bowler, J. (2006). Wildlife of the Seychelles. Hampshire: WildGuides.
- Camoin, G. F., Montaggioni, L.F., Braithwaite, C.J.R. (2004). Late glacial to post glacial sea levels in the Western Indian Ocean. *Marine Geology* **206**, 119-146.
- Carranza, S. & Arnold, E.N. (2003). Investigating the origin of transoceanic distributions: mtDNA shows *Mabuya* lizards (Reptilia: Scincidae) crossed the Atlantic twice. *Syst. and Biod.* **1**, 275-282.
- Carranza, S., Arnold, E.N., Mateo, J.A. & López-Jurado, L.F. (2001). Parallel gigantism and complex colonization patterns in the Cape Verde scincid lizards *Mabuya* and *Macroscincus* (Reptilia: Scincidae) revealed by mitochondrial DNA sequences. *Proc. R. Soc. Lond. B.* **268**, 1595-1603.
- Carretero M.A., Harris, D.J. & Rocha, S. (2005). Recent observations of reptiles in the Comoro islands (Western Indian Ocean). *Herpetol. Bull.* **91**, 19-28.
- Cheke, A.S. (1984). Lizards of the Seychelles. In: *Biogeography and ecology of the Seychelles*, pp. 331-360. Stoddart, D.R. & Junk, W. (Eds.). Netherlands: The Hague.
- Colonna, M., Casanova, J., Dullo, W.C. & Camoin, G. (1996). Sea-level changes and record for the past 34,000 yr from Mayotte reef, Indian Ocean. *Quaternary Research* **46**, 335-339.
- Dowling, H. (1990). Taxonomic status and relationships of the genus *Lycognathophis*. *Herpetologica* **46**, 60-66.
- Gardner, A. (1986). The Biogeography of the lizards of the Seychelles Islands. *J. Biogeog.* **13**, 237-253.
- Gerlach, J. (2002). The enigmatic Giant Bronze Gecko *Ailuroonyx trachygaster* Part 1: Identity. *Gekko* **1**, 29-38.
- Gerlach, J. (2005). Inter-island variation and taxonomy of Seychelles *Trachylepis*. *Afr. J. Herpetol.* **54**, 31-42.
- Gerlach, J. (2007). *Terrestrial and freshwater vertebrates of the Seychelles Islands*. Leiden, The Netherlands: Backhuys Publishers.
- Geyth, M.A., Kudrass, H.R. & Streiff, H. (1979). Sea level changes during the late Pleistocene and Holocene in the Straits of Malaca. *Nature* **278**, 441-443.
- Greer, A.E., Arnold, C. & Arnold, E.N. (2000). The systematic significance of the number of presacral vertebrae in scincid lizard genus *Mabuya*. *Amphibia-Reptilia* **21**, 121-126.
- Jesus, J., Brehm, A. & Harris, D.J. (2003). The herpetofauna of Annobon island, Gulf of Guinea, West Africa. *Herpetol. Bull.* **86**, 20-22.
- Jesus, J., Brehm, A. & Harris, D.J. (2005). Relationships of scincid lizards (*Mabuya* spp.) from the islands of the Gulf of Guinea based on mtDNA sequence data. *Amphibia-Reptilia* **26**, 467-474.
- Kluge, A.G. (2001). Gekkotan lizard taxonomy. *Hamadryad* **26**, 1-209.
- Mausfeld, P., Schmitz, A., Böhme, W., Misof, B., Vrcibradic, D. & Rocha, C.F.D. (2002). Phylogenetic affinities of *Mabuya atlantica* Schmidt, 1945, endemic to the Atlantic Ocean archipelago of Fernando de Noronha (Brazil): Necessity of partitioning the genus *Mabuya* Fitzinger, 1826 (Scincidae: Lygosominae). *Zool. Anz.* **241**, 281-293.
- Miller, K.G., Kominz, M.A., Browning, J.V., Wright, J.D., Mountain, G.S., Katz, M.E., Sugarman, P.J., Cramer, B.S., Christie-Blick, N.

- & Pekar, S.F. (2005). The Phanerozoic record of global sea-level change. *Science* **310**, 1293-1298.
- Montaggioni, L.F. & Hoang, C.T. (1988). The last interglacial high sea level in the granitic Seychelles, Indian Ocean. *Paleogeogr. Paleoclimat. & Paleoecol.* **64**, 79-81.
- Nussbaum, R.A. (1984). Snakes of the Seychelles. In: *Biogeography of the Seychelles Islands*, pp. 361-377. Stoddart, D.R. & Junk, W. (Eds.). Netherlands: The Hague.
- Plummer, P. (1995). Planet Aldabra. In: *Aldabra World Heritage Site*, pp. 49-70. Amin, M., Willetts, D. & Skerrett, A (Eds.). Nairobi, Kenya: Camerapix Publishers International.
- Plummer, P.S. & Belle, E.R. (1995). Mesozoic tectono-stratigraphic evolution of the Seychelles microcontinent. *Sedimentary Geology* **96**, 73-91.
- Rocha, S., Carretero, M.A. & Harris, D.J. (2005). Diversity and phylogenetic relationships of *Hemidactylus* geckos from the Comoro islands. *Mol. Phylogenet. Evol.* **35**, 292-299.
- Rocha, S., Carretero, M., Vences, M., Glaw, F. & Harris, D.J. (2006). Deciphering patterns of transoceanic dispersal: the evolutionary origin and biogeography of coastal lizards (*Cryptoblepharus*) in the Western Indian Ocean region. *J. Biogeog.* **33**, 13-22.
- Rocha S., Vences M., Glaw F., Posada D. & Harris, D. J. (2009a). Multigene Phylogeny of Malagasy day geckos of the genus *Phelsuma*. *Mol. Phylog. and Evol.* **52**, 530-537.
- Rocha S., Ineich I. & Harris, D.J. (2009b). Cryptic variation and recent bipolar range expansion within the Stumped-Toed Gecko *Gehyra mutilata* (Wiegmann, 1834) across Indian and Pacific Ocean Islands. *Contrib. Zool.* **78**, 1-8.
- Rocha, S., Carretero, M. & Harris, D.J. (2010). On the diversity, colonization patterns and status of *Hemidactylus* spp. (Reptilia: Gekkonidae) from the Western Indian Ocean Islands. *Herpetol. Jour.* In press.
- Rohling, E.J., Fenton, M., Jorissen, F.J., Bertrand, P., Ganssen, G. & Caulet, J.P. (1998). Magnitudes of sea-level lowstands of the past 500,000 years. *Nature* **394**, 162-165.
- Siddall, M., Rohling, E.J., Almogi-Labin, A., Hemleben, C., Meischner, D., Schmelzer, I., Smeed, D.A. (2003). Sea-level fluctuations during the last glacial cycle. *Nature* **423**, 853-858.
- Stoddart, D.R. (1971) Environment and history in Indian Ocean reef morphology. *Sumpt. Zool. Soc. Lond.* **28**, 3-38.
- Taylor, J.D., Braithwaite, C.J.R., Peake, J.F. & Arnold, E.N. (1979). Terrestrial faunas and habitats of Aldabra during the Pleistocene. *Phil. Trans. Roy. Soc. Lond. B* **286**, 47-66.
- Thomson, J. & Walton, A. (1972). Redetermination of the chronology of the Aldabra Atoll by Th/U dating. *Nature* **240**, 145-146.
- Vences, M., Wanke, S., Vieites, D.R., Branch, W.R., Glaw, F. & Meyer, A. (2004). Natural colonization or introduction? Phylogeographical relationships and morphological differentiation of house geckos (*Hemidactylus*) from Madagascar. *Biol. J. Linn. Soc.* **83**, 115-130.
- Vidal, N., Branch, W.B., Pauwels, O.S.G., Hedges, S.B., Broadley, D.G., Wink, M., Cruaud, C., Joger, U. & Nagy, Z.T. (2008). Dissecting the major African snake radiation: a molecular phylogeny of the Lamprophiidae (Serpentes, Caenophidia). *Zootaxa* **1945**, 51-66.

APPENDIX

Table 1. Localities sampled (WGS84 Coordinate System). Due to the large number of localities sampled, records very close together were grouped. More detailed individual records can be obtained from the authors.

No.	Locality	Island	Longitude	Latitude
1	Assumption	Assumption	46,500333	-9,734167
2	Picard	Picard, Aldabra	46,206000	-9,401056
3	Polymnie Island	Polymnie Island, Aldabra	46,251369	-9,372633
4	Ile Esprit	Ile Esprit, Aldabra	46,250650	-9,427336
5	Malabar	Malabar, Aldabra	46,394119	-9,369458
6	Grand Terre	Grand Terre, Aldabra	46,410275	-9,439361

7	Astove Island	Astove Island	47,739000 -0,070194
8	Menai Island	Menai Island, Cosmoledo	47,507889 -9,709972
9	NorthWest Island	NorthWest Island, Cosmoledo	47,572597 -9,660986
10	Wizard Island	Wizard Island, Cosmoledo	47,640819 -9,758050
11	NorthEast Island	NorthEast Island, Cosmoledo	47,584583 -9,664536
12	Saint Pierre	Saint Pierre, Amirantes	50,725719 -9,328497
13	Alphonse	Alphonse, Amirantes	52,730667 -7,008861
14	Poivre	Poivre, Amirantes	53,310336 -5,746003
15	Desroches	Desroches, Amirantes	53,666194 -5,692111
16	Mont Fleuri, Victoria	Mahé	55,454756 -4,628367
17	Port, Victoria	Mahé	55,457414 -4,621339
18	NorthEast Point	Mahé	55,452650 -4,565878
19	North 1	Mahé	55,441961 -4,564258
20	North 2	Mahé	55,441961 -4,564475
21	Glacis 2	Mahé	55,434467 -4,565919
22	Glacis 1	Mahé	55,434050 -4,570619
23	Reservoir, La Gogue	Mahé	55,442239 -4,588675
24	Mare Anglaise	Mahé	55,437264 -4,603708
25	Beau Vallon (beach) 1	Mahé	55,427656 -4,616028
25B	Beau Vallon (beach) 2	Mahé	55,431878 -4,607639
26	Beau Vallon 3	Mahé	55,429961 -4,617803
27	Danzil 3	Mahé	55,404036 -4,624647
29	Mare aux Cochons	Mahé	55,411584 -4,634866
30	Danzil 4	Mahé	55,407980 -4,630331
31	Danzil 1	Mahé	55,401178 -4,619889
32	Danzil 2	Mahé	55,396097 -4,619050
33	Anse Major	Mahé	55,391142 -4,621767
34	Cap Ternay	Mahé	55,380247 -4,642239
35	Port Glaud 1	Mahé	55,417342 -4,662019
36	Port Glaud 2	Mahé	55,400403 -4,651961
37	Port Glaud 3	Mahé	55,414219 -4,650506
38	Tea factory	Mahé	55,440425 -4,662481
39	Tea plantation	Mahé	55,439539 -4,661169
40	Morne Blanc	Mahé	55,437692 -4,660319
41	Casse Dent	Mahé	55,436964 -4,654786
42	Mission	Mahé	55,444411 -4,654869
43	Salazie	Mahé	55,447375 -4,652661
44	Fairview	Mahé	55,465178 -4,659708
45	Copolia	Mahé	55,457617 -4,652894
46	Trois Frères 1	Mahé	55,451158 -4,638611
47	Trois Frères 2	Mahé	55,446989 -4,636489
48	Brilliant	Mahé	55,474800 -4,646967
49	Cascade	Mahé	55,488308 -4,663222
50	Anse aux Pins 1	Mahé	55,522139 -4,698908
51	Anse aux Pins 2	Mahé	55,522889 -4,714061
52	Anse Royale	Mahé	55,522092 -4,736867
53	Anse Louis	Mahé	55,503958 -4,728744
54	Anse aux Forbans 2	Mahé	55,524428 -4,771742
55	Anse aux Forbans 1	Mahé	55,523133 -4,777383
56	Ptit Police	Mahé	55,516714 -4,801739
57	Quatre Bornes	Mahé	55,512339 -4,782778
58	Anse Intendance	Mahé	55,501625 -4,785728
59	Baie Lazare	Mahé	55,480728 -4,755383
60	road to Anse Soleil	Mahé	55,476269 -4,749483
61	Anse Soleil	Mahé	55,464217 -4,746544
62	Anse a la Mouche 1	Mahé	55,487914 -4,741072

63	Anse a la Mouche 2	Mahé	55,492553 -4,743033
64	Anse Boileau	Mahé	55,482528 -4,710100
65	La Reserve 1	Mahé	55,500694 -4,706583
66	La Reserve 2	Mahé	55,503500 -4,709614
67	Grand Anse	Mahé	55,443744 -4,675850
68	Airport	Mahé	55,510811 -4,671667
68B	South Airport	Mahé	55,521192 -4,677047
69	Cerf Island 1	Cerf Island	55,497742 -4,633408
70	Cerf Island 2	Cerf Island	55,499175 -4,631353
71	La Passe 1	Silhouette	55,250833 -4,484694
72	La Passe 2	Silhouette	55,248983 -4,481867
73	La Passe 3	Silhouette	55,251897 -4,486283
74	road to Anse Lascars	Silhouette	55,253033 -4,488350
75	Anse Lascars	Silhouette	55,251931 -4,491681
76	around GB rock	Silhouette	55,242600 -4,484500
77	Gratte Fesse	Silhouette	55,240319 -4,492272
78	trail to Jardin Marron	Silhouette	55,236111 -4,486061
79	Aride Island	Aride Island	55,667958 -4,213183
80	Point1	Curieuse	55,733267 -4,283700
81	Turtle Pond	Curieuse	55,726294 -4,282981
82	Trail	Curieuse	55,730661 -4,283331
83	Doctor House	Curieuse	55,724883 -4,289472
84	Leper Colony 1	Curieuse	55,722572 -4,288703
85	Leper Colony 2	Curieuse	55,717700 -4,286222
86	Saint Pierre	Saint Pierre	55,749831 -4,302614
87	office	Cousine	55,647827 -4,351152
88	Plateau	Cousine	55,646894 -4,349383
89	To Cave	Cousine	55,644889 -4,348917
89B	East Cousine	Cousine	55,648214 -4,352300
90	Point 1	Grand Soeur	55,867578 -4,291023
91	North path 1	Grand Soeur	55,866485 -4,287730
92	North path 2	Grand Soeur	55,866503 -4,285678
92B	East path	Grand Soeur	55,867863 -4,287635
93	La Veuve Reserve 1	La Digue	55,828915 -4,357142
94	La Veuve Reserve 2	La Digue	55,835572 -4,356106
94B	To Grand Anse 1	La Digue	55,834464 -4,364803
94C	To Grand Anse 2	La Digue	55,843603 -4,372575
95	Belle Vue	La Digue	55,840623 -4,358718
96	Anse Source d'Argent	La Digue	55,827408 -4,371450
98	Baie Ste. Anne	Praslin	55,765086 -4,347797
99	Anse Volbert 1	Praslin	55,745347 -4,314867
100	Anse Volbert 2	Praslin	55,739703 -4,311256
101	Salazie	Praslin	55,735300 -4,322683
102	Vallé de Mai	Praslin	55,737617 -4,331433
103	Anse Volbert 3	Praslin	55,736650 -4,310825
104	Anse La Blague	Praslin	55,778797 -4,325111
105	Mont Plaisir	Praslin	55,689440 -4,303940
106	Anse Boudin	Praslin	55,710981 -4,296669
107	Anse Citron	Praslin	55,722047 -4,340547
109	Grand Anse	Praslin	55,718666 -4,329337
110	Fonde de L'Anse	Praslin	55,722460 -4,336602
111	Anse Bois de Rose	Praslin	55,741578 -4,351137
112	Anse Consolation	Praslin	55,757230 -4,359378
113	Anse Marie Louise	Praslin	55,761690 -4,354670
114	Fregate	Fregate	55,943872 -4,585808
115	North Island	North Island	55,249950 -4,395272