

A new taxonomically isolated species of the genus *Phelsuma* GRAY, 1825 from the Ampasindava peninsula, Madagascar

ACHIM LERNER

Beckingsweg 64, 46325 Borcken, Germany
[achim.lerner@siemens.com]

Abstract.— A new isolated species, *Phelsuma vanheygeni* sp. nov. is been described from the Ampasindava peninsula, Madagascar. This is the third species with a taxonomically isolated status that has been discovered in the Sambirano domain since 1987. *Phelsuma vanheygeni* sp. nov. reaches an overall maximum length of only 80 mm. Its dorsal coloration including head and tail is vivid green bordered by a yellowish lateral line. The ventral coloration is dirty white. This new species shares its habitat, patches of bamboo forests, with *Phelsuma madagascariensis grandis*, *P. klemmeri* and *P. seippi*.

Keywords.— *Phelsuma vanheygeni*, Reptilia: Squamata: Gekkonidae, Ampasindava peninsula, Sambirano domain

INTRODUCTION

In recent years two taxonomically isolated species within the genus *Phelsuma*, *Phelsuma seippi* (MEIER 1987) and *Phelsuma klemmeri* (SEIPP 1991), were described from the Sambirano domain in north western Madagascar. This paper describes a third independent and isolated species from this climatologically interesting region. This new form shares its habitat, the bamboo forests of the Ampasindava peninsula, with the two previously mentioned species and with *P. madagascariensis grandis*. During our herpetological survey in June 2004, my colleague EMMANUEL VAN HEYGEN and I were able to collect and photograph several animals. Two euthanized specimen were deposited in the herpetological collection of the Royal Museum for Central Africa in Tervuren, Belgium.

MATERIALS AND METHODS

The survey methods and details of the associated herpetofauna are described by VAN HEYGEN (2004). Specimen used in the description are deposited in the herpetological collection of the Royal Museum for Central Africa (RMCA) in Tervuren, Belgium. Scales and preanofemoral pores were examined using a LOMO SF-100 Stereo Microscope. Morphometrics were measured to the nearest 1mm.

RESULTS

Phelsuma vanheygeni sp. nov.

Fig. 1-6

Holotype

RMCA 2004-34-R-1; mature male, collected June 28th 2004, near the village of Kongony, S 13° 39' 45.7", E 48°04'23.7", 50 m elevation, Ampasindava peninsula, Ambanja Fivondronana, Antsiranana Province, Madagascar, deposited by E. VAN HEYGEN

Paratypes

RMCA 2004-34-R-2; unsexable juvenile, born in captivity, deposited by E. VAN HEYGEN and six life specimen, three adult males and three adult females, S 13° 39' 45.7", E 48°04'23.7", 50 m elevation, Ampasindava peninsula, Ambanja Fivondronana, Antsiranana Province, Madagascar, will be deposited in the herpetological collection of the RMCA (by LERNER, A. & E. VAN HEYGEN).



Fig. 1 ♂ *Phelsuma vanheygeni* sp. nov. (life paratype)

All photographs by E. VAN HEYGEN



Fig. 2 ♀ *Phelsuma vanheygeni* sp. nov. (life paratype)

Diagnosis

A small, somewhat slender *Phelsuma* GRAY 1825 with a total length of 75-80 mm (snout-vent length 31-35 mm), head, body and tail are rather flattened. In life, the dorsal coloration, including the head, neck, limbs and tail, is vivid green. Some small red dots irregularly positioned on the lower back and upper tail, usually slightly bigger red dots in males. The green dorsal coloration is bordered by a yellowish stripe, beginning at the rostral scale, over the supralabialia, under the ear opening, widening at the axilla, towards the groin. The ventral coloration is dirty white, the subcaudal scales have at the tips a brown to black pigmentation (Fig. 4). Ventral and subcaudal scales are smooth (not keeled).

Description of the Holotype

All scales are smooth, slightly enlarged scales from the rostral to the eyes and on the tale, the dorsal and dorsolateral scales are small and homogenous (part of the dorsal skin missing, shed while captured). Cleft in the upper part of the rostral, nostril positioned above the suture between the rostral and the first supralabial, the centre of the nostril however is positioned above the first supralabial of the 9/8 supralabials. The nostril is surrounded by 4/3 nasalia with a strongly enlarged prenasal, adjoining over 50% of the nostril. The mental is followed by 7/7 infralabialia, the 3 first infralabialia are larger than the subsequent. The triangular postmental scale is followed by each 3 sublabialia. Four enlarged gular scales contain 22 smaller gular scales between the postmental and the sublabialia. 12/14 Preanofemoral pores, subcaudalia enlarged, one strongly enlarged scale,

three times as wide as long, alternates with two normal enlarged scales, twice as wide as long. The Subcaudalia are in a strait row, smooth and imbricate.

Coloration after three months in preservative yellowish green. The yellow lateral stripes bordering the dorsal and ventral coloration are still very well visible. Dark pigment in subcaudalia still present.

Table 1 Morphometric parameters of RMCA 2004-34-R-1 (Holotype)

Character	Measurement to the nearest mm
Total length	75
Snout—Vent length (tip—cloaca)	31
Tail length (cloaca—tip)	44
Head length (tip to ear opening)	9
Snout length (tip to eye opening)	5
Internarial	2
Nostril—Orbit	4
Orbit—Ear opening	3
Orbit—Orbit	6

Coloration in life

The dorsal, dorsolateral, head, tail and limbs coloration is vivid green, bordered by a yellowish lateral stripe forming an abrupt transition between dorsal and ventral coloration. The dorsal and ventral skin is iridescent, not seen in other members of the genus. Some red dots are present on the lower back and tail, mostly consisting of a single scale. No further sexual dichromatism. A head pattern is very faintly visible, a lighter band crossing before the orbits. The ventral colour is dirty white while the subcaudal region and the limbs are more translucent, resulting in a white-yellowish colour. The preanofemoral region is deep yellow in males. The limbs show some dark brown dots consisting of a single scale.



Fig. 3 ♂ *Phelsuma vanheygeni* sp. nov. (life paratype), showing five longitudinal rows of red dots on the lower back. The lighter spots are healing skin tissue.



Fig. 4 ♀ *Phelsuma vanheygeni* (life paratype) showing dark brown pigmentation on the original and regenerated part of the tail and ♂ *Phelsuma vanheygeni* (holotype), preanofemoral zone (inset)

Variation

Variation in same sex adults is limited.

Juveniles.— There is a strong ontogenetic variation, hatchlings are gold brown, with a dark lateral stripe from the eye to the groin, four green longitudinal stripes and an irregular head pattern. A green transverse before the orbits is present (VAN HEYGEN 2004).

Sexual dichromatism and dimorphism.— Differences between the sexes are limited to a more intense red lower back pattern, often forming five longitudinal rows (Fig. 3), and the yellow preanofemoral zone (Fig. 4) in males. Regenerated tails are usually lighter green in colour. Morphometric variation is minimal.

Gular scalation.— The holotype has a single postmental while two of the paratypes have a pair of postmentalia. The amount of the enclosed scales also varies.

Etymology

Named after EMMANUEL VAN HEYGEN, who discovered the species in June 2004.

Distribution

Phelsuma vanheygeni is so far only known from the Ampasindava peninsula. It is not unlikely that the species equally occurs in other parts of the Sambirano domain with similar habitats.

Habitat

All specimen of *Phelsuma vanheygeni* were collected on medium sized bamboo (ø 5cm). These bamboo patches were found at the edge of the primary forest, within the forest as well as in secondary vegetation areas. *Phelsuma vanheygeni* shares its habitat with *P. klemmeri*, *P. seippi*, *P. laticauda laticauda* and *P. madagascariensis grandis*.

Remarks

The integument.—The integument is extremely fragile and easily autotomized at the slightest pressure, the subcutaneous tissue is grey. *P. breviceps* is the only other member with this degree of integument fragility. Regenerated integument takes noticeably longer to get its original colour than with other species of the genus (Fig. 3). Integumentary loss is considered to have been evolved in response to predators. RAXWORTHY and NUSSBAUM (1994) suggest colubrid snakes as predators, but at the type locality a black unidentified bird was recorded hunting for bamboo dwellers, rapidly moving its head from one side to the other side of the bamboo stem. Both snakes and birds are possible predators.

Gular scales.— The arrangement of the gular scales of *P. vanheygeni* (Fig. 5), four enlarged scales containing several smaller scales between the postmental and the sublabilia is so far only reported from *P. guttata* (LOVERIDGE 1942) and *P. seippi* (VAN HEYGEN *pers. comm.*).

Iridescence.— The dorsal and part of the ventral skin is very iridescent, slightly changing colour depending on the observation angle (Fig 6).

Reproduction.— *Phelsuma vanheygeni* is an egg gluer, 6 mm eggs were found attached to the inner side of bamboo in pairs (VAN HEYGEN 2004). The eggshell is extremely thin. Egg gluing is found in only 8 of the 24 typical Malagasy species; *P. barbouri*, *P. berghofi*, *P. dubia*, *P. flavigularis*, *P. hielscheri*, *P. malamakibo*, *P. modesta* and *P. pronki*.



Fig. 5 *Phelsuma vanheygeni* sp. nov. (holotype) gular scale arrangement and iridescence.



Fig. 6 ♀ *Phelsuma vanheygeni* sp. nov. (life paratype) showing dorsal iridescence

DISCUSSION

Phelsuma vanheygeni sp. nov. holds a taxonomically isolated position within the genus and a sister species neither can be identified, nor can it be assigned to one of the nine Malagasy species groups suggested by GLAW *et al.* (1999). These groups are constituted on alpha taxonomical grounds, no thorough and complete phylogenetic analyses has been done (NUSSBAUM *et al.* 2000). AUSTIN *et al.* (2004) only investigated the relationships of eight Malagasy taxa, two Seychellois taxa and one Andaman species, with the Mascarene taxa. Out of these non-Mascarene species, only *P. andamanensis* glues its eggs to a surface. Three of the groups suggested by GLAW *et al.* (1999) consist only of egg gluing species, the *P. barbouri*-group, *P. dubia*-group and the *P. modesta*-group. The other Malagasy groups contain none.

Due to the fact that *P. vanheygeni* is an egg gluer, the following groups and their members can be excluded as sister taxa; *P. guttata*-group, *P. madagascariensis*-group, *P. lineata*-group, *P. mutabilis* group, *P. laticauda*-group and *P. klemmeri*-group. The remaining possibilities are the *P. dubia*-group, *P. modesta*-group, *P. barbouri*-group and some non-Malagasy species from the Mascarenes and Andaman Islands. The other non-Malagasy forms from Seychelles and the Comoros are all egg layers and can be excluded.

Phelsuma dubia-group.— The members of this group, *P. berghofi*, *P. dubia* and *P. flavigularis* (GLAW *et al.* 1999), are all egg gluers, have enlarged dorsolateral scales and possess no widened subcaudalia. *Phelsuma vanheygeni* differs from *P. dubia* and its sister taxa by its size, by the scale arrangement on the throat (Fig. 3), by the enlarged subcaudalia and by the homogenous dorsal and dorsolateral scales, consequently *P. vanheygeni* can not be assigned to this group as it is not closely related to its members.

The recently described *P. hielscheri* and *P. malamakibo* show similarities with the members of the *P. dubia*-group (Van Heygen 2004b) Both species possess however keeled ventral scales (ROESLER *et al.* 2000, Nussbaum *et al.* 2000). and thus can not be considered as sister taxa of *P. vanheygeni* whose ventral scalation is smooth.

Phelsuma modesta-group.— *Phelsuma cepediana* should not be considered as a member of this group since its close relationship to all other Mascarene taxa. *P. modesta* is characterised by the position of the nostril, smooth ventral scales, strong ontogenetic variation and sexual dichromatism. The centre of the nostril lies above the suture of the rostral and the first supralabial (MERTENS 1970). The juvenile coloration differs from the adults like in *P. vanheygeni* (VAN HEYGEN 2004a). There is a possible distant relationship with *P. modesta* but *P. vanheygeni* can not be classified as a sister taxon since it differs by its characteristic gular scale arrangement and its alternating enlarged subcaudalia.

Phelsuma barbouri-group.— *P. barbouri* is the only member of this group since *P. pronki* is an egg layer and is classified within the *P. klemmeri*-group (VAN HEYGEN 2004b). The subcaudalia of *P. barbouri* are not enlarged whereas those of *P. vanheygeni* are. Other morphological differences like the chin scalation and habitus do not permit to classify *P. vanheygeni* into this group.

The Mascarene-group.— The living Mascarene species include *P. borbonica*, *P. cepediana*, *P. guentheri*, *P. guimbeaui*, *P. inexpectata*, *P. ornata* and *P. rosagularis*, and form a separate group within the genus (AUSTIN *et al.* 2004). *Phelsuma cepediana*, endemic to Mauritius is reported from a single specimen near Ambanja, Madagascar (RAXWORTHY & NUSSBAUM 1993). Its placement within the *P. modesta*-group (GLAW & VENCES 1994) is questionable. Unfortunately, *P. modesta* was not included in the DNA analysis conducted by AUSTIN *et al.* (2004) as it is suggested that *P. modesta* is closely related to the Mascarene-group. Extended research concerning the relationship between Malagasy and Mascarene species is necessary. The members of the Mascarene-group have to be excluded as sister taxa of *P. vanheygeni* based on the habitus, alternating enlarged subcaudalia versus no enlarged subcaudalia in the Mascarene group, the different gular scale arrangement of *P. vanheygeni* and the geographic location of the Mascarenes. The islands are located 800

km east of eastern Madagascar while the type locality of *P. vanheygeni* lies on the north western side of Madagascar.

Phelsuma andamanensis.— an endemic to the Andaman shows most morphological similarities with *P. vanheygeni*; habitus, vivid green coloration, unkeeled ventralia, subcaudalia strongly enlarged, centre of the nostril above the first supralabial and egg gluing. *P. andamanensis* only differs from *P. vanheygeni* by its habitus, size, head and dorsal patterns and minimal ontogenetic variation (hatchlings are green). There is a possible ancestral relationship between *P. andamanensis* and *P. vanheygeni* but the morphometrics of the head are too diverse, *P. andamanensis*' proportional head length is 1.3 the size of *P. vanheygeni*, to consider it a sister taxon.

ACKNOWLEDGEMENTS

I would like to thank EMMANUEL VAN HEYGEN for the use of his specimens collection, literature support and reading through the manuscript. I am also grateful to DR. DANNY MEIRTE of the Royal Museum for Central Africa for his assistance in various matters.

REFERENCES

- AUSTIN, J.J., ARNOLD, E. N. AND JONES, C. G. 2004. Reconstructing an island radiation using ancient and recent DNA: the extinct and living day geckos (*Phelsuma*) of the Mascarene islands. *Molecular Phylogenetics and Evolution* 31 (1):109-122.
- GLAW, F. & M. VENCES 1994. *A Fieldguide to the Amphibians and Reptiles of Madagascar*. Second edition. Vences & Glaw Verlags GbR, Köln.
- GLAW, F., M. VENCES & T. ZIEGLER 1999. Bemerkungen zu *Phelsuma dubia* (Boettger, 1881): Wiederentdeckung des Holotypus, Verwandtschaftsbeziehungen und Daten zur Fortpflanzung. *Salamandra* 35(4):267-278.
- HALLMANN, G., J. KRÜGER & G. TRAUTMANN 1997. *Faszinierende Taggeckos. Die Gattung Phelsuma*. Natur und Tier, Münster.
- HENKEL, F.-W. & W. SCHMIDT 1995. *Amphibien und Reptilien Madagaskars, der Maskarenen, Seychellen und Komoren*. Ulmer, Stuttgart.
- LOVERIDGE, A. 1942. Revision of the Afro-oriental geckos of the genus *Phelsuma*. Bull. Mus. Comp. Zoöl. 89(10):439-482
- MEIER, H. 1987. Vorläufige beschreibung einer neuen art der gattung *Phelsuma* von Madagaskar. *Salamandra* 23(4): 204-211.
- MERTENS, R. 1962. Die Arten und Unterarten der Geckonengattung *Phelsuma*. *Senckenb. biol.* 43(2):81-127.
- MERTENS, R. 1970. Neues über einige Taxa der Geckonengattung *Phelsuma*. *Senckenb. biol.* 51(1/2):1-13.
- NUSSBAUM, R. A., C.J. RAXWORTHY, A.P. RASELIMANANA & J.B. RAMANAMANJATO 2000. New Species of Day Gecko, *Phelsuma* GRAY (Reptilia: Squamata: Gekkonidae), from the Reserve Naturelle Integrale d'Andohahela, Southern Madagascar *Copeia* 2000(3):763-770.
- RAXWORTHY, C. J. & R. A. NUSSBAUM 1993. A new Madagascan *Phelsuma*, with a review of *Phelsuma trilineata* and comments on *Phelsuma cepediana* in Madagascar (Squamata, Gekkonidae) *Herpetologica* 49(3):342-349.

- ROESLER, H., F.J. OBST & R. SEIPP 2000. Eine neue Taggecko-Art von Westmadagaskar: *Phelsuma hielscheri* sp.n. (Reptilia: Sauria: Gekkonidae). *Zool. Abh. Staatl. Mus. Tierkunde Dresden* **51**(6):51-60.
- SEIPP, R. 1991. Eine neue Art der Gattung *Phelsuma* GRAY, 1825 von Madagaskar (Reptilia: Sauria: Gekkonidae) *Senckenb. Biol.* **71**(1/3):11-14.
- SEIPP, R. 1994. Eine neue Art der Gattung *Phelsuma* GRAY 1825 aus Zentral-Madagaskar (Reptilia: Sauria: Gekkonidae). *Senckenb. biol.* **74**(1/2):193-197.
- VAN HEYGEN, E. 2004 a. The genus *Phelsuma* GRAY, 1825 on the Ampasindava peninsula, Madagascar. *Phelsuma* **12**:97-112.
- VAN HEYGEN, E. 2004 b. Remarks on the *Phelsuma barbouri*— and *Phelsuma klemmeri*— phenetic groups. *Phelsuma* **12**:153-154