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# First record of xanthism in the South American Leaf-toed Gecko, *Phyllodactylus gerrhopygus* (Wiegmann, 1834), and a review of colour abnormalities in wild Gekkota

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Xanthism is an anomalous colouration that appears randomly in a wide range of species. This condition, like leucism or albinism, is a pigmentation abnormality that affects the normal colouration (Delaugerre, 1981; Angus and Blanchard, 1991; Baling, 2015; Grisales-Martínez and Arias-Alvarez, 2018; Raw, 2021; Mayekar et al., 2022; Allain et al., 2023). Xanthism might occur through a mutation in the gene that suppresses melanophore development but does not interfere with xanthophore expression, resulting in a yellowish individual (Mayekar et al., 2022; Allain et al., 2023). Genetic anomalies related to colouration, including albinism, xanthism, and leucism, have been documented in different animal groups (Hoekstra, 2006).

These different phenotypes often pose ecological challenges for the affected individuals. Alterations in typical pigmentation can diminish critical non-signalling functions, including thermoregulation, protection against ultraviolet radiation, and camouflage. Consequently, this impairs an individual's ability to regulate body temperature, mitigate the effects of solar radiation, and blend into its surroundings to minimise the risk of predation (Raw, 2021; Cuervo et al., 2025). As a result, such phenotypes are generally rare in natural populations and often do not persist across multiple generations (Rocha and Rebelo, 2010; Fernández and Millán, 2022; Allain et al., 2023; Sierra-Serrano et al., 2024).

In Chile, chromatic aberrations have been well documented across various vertebrate groups, including fish, mammals, and birds (Acevedo and Aguayo, 2008; Fuentes and González-Acuña, 2011; Flores and Poblete, 2015). In reptiles, however, records are scarce and concentrated mainly in snakes of the genus *Tachymenis*, where cases of albinism and leucism have been documented in locations such as the Río Clarillo National Reserve and Chiloé Island (Urra et al., 2021).

The South American Leaf-toed Gecko, *Phyllodactylus gerrhopygus* (Wiegmann, 1834), is the only species in the family Phyllodactylidae with a geographic distribution ranging from northern Chile to southern Lima (Pérez and Balta, 2011). Within this hyper-arid system, the species primarily occupies rocky microhabitats and structures that provide refuge and prey availability, allowing it to persist under extreme environmental conditions (Mella and Reyes, 2022; Taucare-Ríos and Méndez-Yovera, 2026). From an ecological perspective, this species is predominantly insectivorous, feeding mainly on insects and arachnids. In both natural and human-modified environments, it uses rock crevices, cavities, human-made structures, and small garbage dumps (Pérez and Balta, 2011; Mella and Reyes, 2022) as daytime roosts and sites of nocturnal activity, where it can also find a greater availability of food resources. In the Tarapacá Region, *P. gerrhopygus* has been recorded in a wide variety of habitats, including areas devoid of vegetation, grasslands, scrublands, the high-Andean region, ravines, and coastal wetlands (Mella and Venegas, 2019).

One of the most intriguing aspects of *P. gerrhopygus* is the chromatic diversity exhibited among different populations. In this regard, Pincheira (2006), describes the colour patterns variations in *P. gerrhopygus* distributed in Peru and Chile, showing inter-population and ontogenetic variation. This study reports mainly grey, brown, dark, and pale or whitish colourations, with no yellowish tones recorded in any case (Pincheira, 2006).

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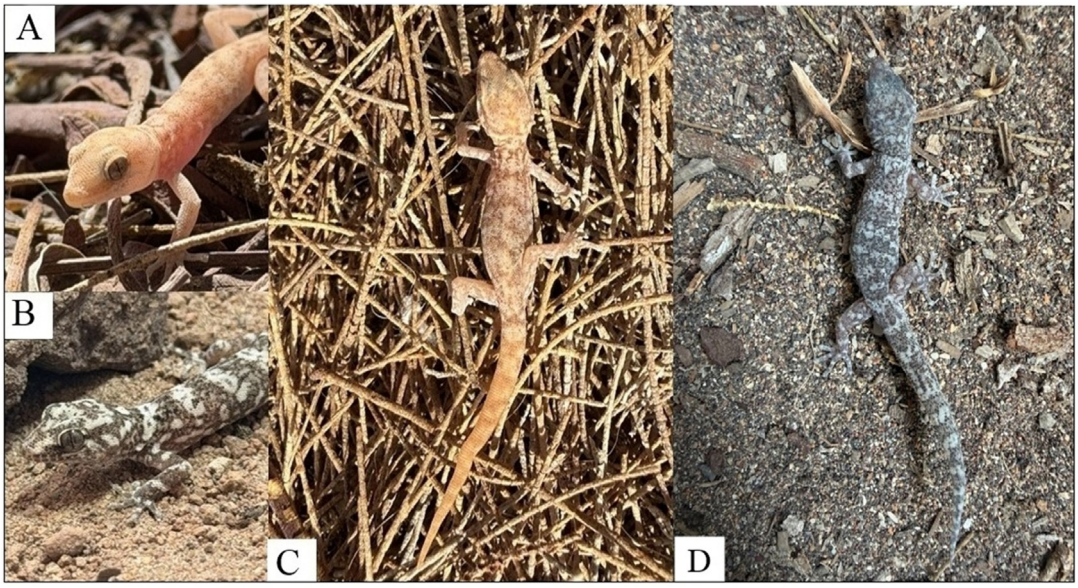



**Figure 1.** Individuals of *Phyllodactylus gerrhopygus* from Canchones, Tarapacá. A. Frontal view of a specimen affected by xantism. B. Frontal view of a specimen with normal colouration. C. Dorsal view of the individual with xantism. D. Dorsal view of a second specimen with a normal colouration observed at the same location. Photos by Jesús Zegarra.

On 12 March 2026, during an expedition to the Canchones Experimental Station (20.2638°S, 69.3205°W; 993 m elevation), a young specimen of *P. gerrhopygus* was found under rocks, showing signs of xanthism. We photographed the specimen with an iPhone 17 Pro in dorsal, ventral, and lateral views. We examined it, measured its snout-vent length (SVL = 25 mm) (Fig. 1), and released it at the capture site. The individual had a typical white ventral colouration. Its dorsal pattern was the typical one described by Dixon and Huey (1970), although with a clear replacement of brown and grey tones by yellow colours in frontal (Fig. 1A) and dorsal view (Fig. 1C). These characteristics are consistent with a case of xanthism, according to Allain et al. (2023). Two additional specimens with normal colouration were photographed at the same location to compare morphological and colour characteristics. The overall appearance of these specimens was greyish or

**Table 1.** Overview of gecko species for which colour abnormalities in the wild have been reported in scientific literature.

| Species | Family | Declared anomaly | Age class (sex) | References |
|---|---|---|---|---|
| *Woodworthia maculata* | Diplodactylidae | Leucism | Adult (female) | Baling, 2015 |
| *Cyrtodactylus deccanensis* | Gekkonidae | Xanthism | Unspecified | Mayekar et al., 2022 |
| *Hemidactylus turcicus* | Gekkonidae | Albinism | Unspecified | Rivera et al., 2001 |
| *Lygodactylus capensis* | Gekkonidae | Amelanism | Unspecified | Raw, 2021 |
| *Homonota taragui* | Phyllodactylidae | Partial albinism | Unspecified | Courtis et al., 2015 |
| *Phyllodactylus gerrhopygus* | Phyllodactylidae | Xanthism | Juvenile | This study |
| *Tarentola boettgeri* | Phyllodactylidae | Piebaldism | Adult (male) | Rocha and Rebelo, 2010 |
| *Tarentola mauritanica* | Phyllodactylidae | Amelanism | Juvenile | Faraone et al., 2023 |
| *Euleptes europaea* | Sphaerodactylidae | Albinism | Juvenile | Delaugerre, 1981 |
| *Gonatodes albogularis* | Sphaerodactylidae | Leucism | Adult (female) | Grisalez-Martínez and Arias-Álvarez, 2018 |

light brown (Fig. 1B). They had irregular dark spots and/or transverse bands on the dorsum (Fig. 1D), and a whitish belly.

Numerous cases of albinism with heterogeneous distribution of melanin (dark colouration) and xanthine (yellowish colouration) pigments have been described in reptiles (Allain et al., 2023; Faraone et al., 2023). Among Phyllodactylidae, cases of amelanism, leucism and piebaldism have been documented, but cases of xanthism had never been observed (Rocha and Rebelo, 2010; Courtis et al., 2015; Faraone et al., 2023). In this sense, our finding stands out for being the first to document a case of xanthism in this family. The implications of this rare phenotype for thermoregulation in this specimen, as well as its fitness in the environment, remain largely unknown.

Here we provide the first report of a chromatic aberration characterised by yellowish tones in the genus *Phyllodactylus*, thereby expanding the known spectrum of phenotypic variation within the genus. This finding suggests the possible existence of previously undescribed underlying mechanisms, whether genetic, ontogenetic, or environmental, that could influence colour expression in this species. Further studies are required to understand the relevance of these colouration abnormalities in *Phyllodactylus* species.

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