

Identification guide for the *Goniurosaurus* eyelid geckos endemic to Japan regulated by CITES appendix III

This guide helps to identify the *Goniurosaurus* species distributed in Japan based on external morphology, by distinguishing them from other species at (1) family level, (2) genus level, and (3) species-group and/or species level. A camera (cellphone or other) with macro mode and/or a magnifying glass can help to observe key morphological characteristics. It should be noted that this guide may not be complete for species identification, and it is difficult to visually identify the juvenile (young), and egg specimens at the species level. Please consult experts for identification.

Simple summary : Japanese *Goniurosaurus* species can be distinguished from all other geckos by their movable eyelids, the claws exposed and bordered with five or six small scales, and black and white banding patterns of the tail.

Basic information

Taxonomy

▶ Class	Reptilia
▶ Order	Squamata
▶ Family	Eublepharidae
▶ Genus	<i>Goniurosaurus</i> Barbour, 1908

▶ Species endemic to Japan

- Goniurosaurus kuroiwae* (Namiye, 1912)
- Goniurosaurus orientalis* (Maki, 1930)
- Goniurosaurus sengokui* (Honda et Ota, 2017)
- Goniurosaurus splendens* (Nakamura et Uéno, 1959)
- Goniurosaurus toyamai* (Grismer, Ota et Tanaka, 1994)
- Goniurosaurus yamashinae* (Okada, 1936)

Species information

Scientific name (Synonym)	Common name ²	Distribution	Body size (SVL: snout-vent length)
<i>G. kuroiwae</i> (<i>G. kuroiwae kuroiwae</i> ^{*1})	Kuroiwa's ground gecko	Okinawa Is., Sesoko Is., Kouri Is., Yagaji Is. and Ie Is. (Okinawa Prefecture, Japan)	SVL: 75-100mm
<i>G. orientalis</i> (<i>G. k. orientalis</i> ^{*1})	Spotted ground gecko	Tonaki Is. (Okinawa Prefecture, Japan)	SVL: 75-105mm
<i>G. sengokui</i> (<i>G. k. sengokui</i> ^{*1})	Sengoku's ground gecko, Kerama ground gecko	Tokashiki Is., and Aka Is. (Okinawa Prefecture, Japan)	SVL: 75-95mm
<i>G. splendens</i>	Banded ground gecko	Tokunoshima Is. (Kagoshima Prefecture, Japan)	SVL: 75-90mm
<i>G. toyamai</i> (<i>G. k. toyamai</i> ^{*1})	Toyama's ground gecko	Iheya Is. (Okinawa Prefecture, Japan)	SVL: 75-90mm
<i>G. yamashinae</i> (<i>G. k. yamashinae</i> ^{*1})	Yamashina's ground gecko	Kume Is. (Okinawa Prefecture, Japan)	SVL: 75-95mm

^{*1} The classification is according to the IUCN Redlist. Please also note that *Goniurosaurus orientalis*, *G. sengokui*, *G. toyamai*, and *G. yamashinae* are often treated as subspecies of *G. kuroiwae*. The latter classification is currently applied in the domestic law of Japan.

^{*2} *Goniurosaurus* is also called as "ground gecko", "cave gecko", "tiger gecko", "leopard gecko" and others.

In Japan, the all taxon are designated as "National Endangered Species" (hereinafter referred to as "NES") under the Act on Conservation of Endangered Species of Wild Fauna and Flora (hereinafter referred to as "ACES"). Under the ACES, the hunting, gathering, killing, damaging or transfer of live NES are prohibited, and domestic trade in NES including designated parts and derivatives is therefore not permitted. Furthermore, the export of NES is also prohibited under the Foreign Exchange and Foreign Trade Act.

How to distinguish from similar geckos and lizards

Family Level

Check whether it is a member of the eyelid geckos (family Eublepharidae) or not

Eyelid geckos (family Eublepharidae) can be distinguished from other lizards and geckos by a combination of the following characteristics.

Key 1

Head scales and skin

Granular scales cover head without clear symmetry. Skin is soft and not adherent to skull.

- **Similar:** most geckos
- **Dissimilar:** most lizards

Key 2

Eyelid

Movable eyelids are present and eyes can be closed.

- **Similar:** almost all lizards
- **Dissimilar:** typical geckos

Key 3

Pupil shape

Pupils are vertically elongated in bright conditions.

- **Similar:** many nocturnal geckos
- **Dissimilar:** lizards and diurnal geckos

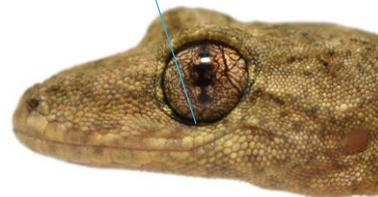
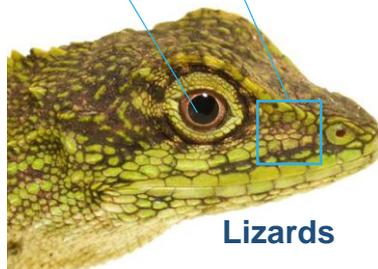
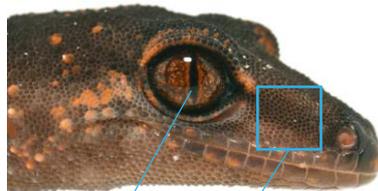
Key 4

Eye licking behavior

Geckos lick their eyes by the tongue to clean. Spray clean water to the head to observe.

- **Similar:** most geckos
- **Dissimilar:** lizards

Eyelid geckos



Lizards

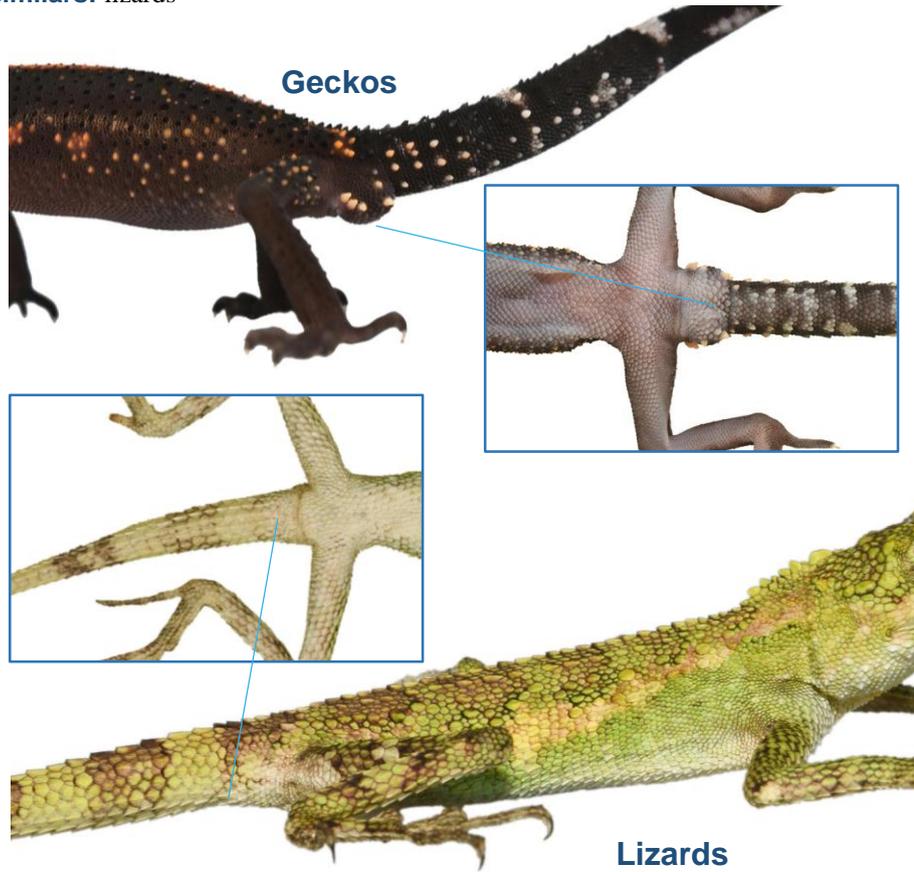
Typical geckos

Key 5

Base of tail

Adult males have a prominently swollen portion at the ventral side of the base of the tail (hemipenial bulges).

- **Similar:** most geckos
- **Dissimilar:** lizards



Key 6

Digit shape

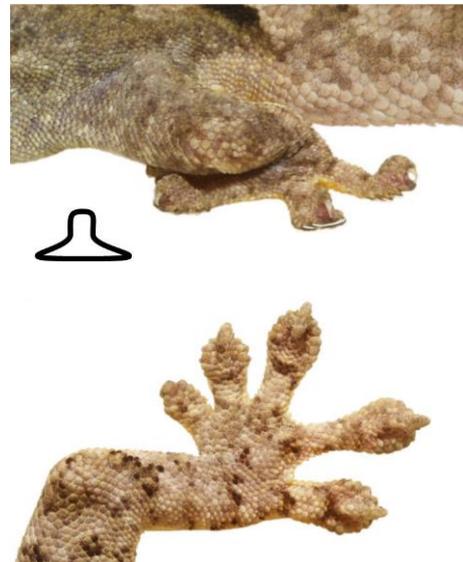
Digits are cylindrical in cross-section and not horizontally-dilated.

- **Similar:** most lizards and some geckos such as bent-toed geckos (*Cyrtodactylus*), wonder geckos (*Teratoscincus*), and knob tailed geckos (*Underwoodisaurus* and *Nephrurus*).
- **Dissimilar:** many arboreal and saxicolous geckos as well as some terrestrial species

Eyelid geckos



Some other geckos



**Genus Level,
Regional Group Level**

Check whether it is the genus *Goniurosaurus* or other genera, and distinguish the Japanese species from the continental species

Species of genus *Goniurosaurus* can be distinguished from other genera by a combination of Keys 1-3 below. In addition, the Japanese species can be distinguished from the other eyelid geckos as well as the continental congeners referring to "Key 4: Claws and adjacent scales".

**Key 1
Shape of rostral scale**

The posterior (upper) edge of the rostral scale is flat and has cleft and notch in the middle. Meanwhile, some of the other genera do not have cleft/notch or the posterior edge project posteriorly.

**Key 2
Scales on dorsal surface of upper eyelids, body, and limbs**

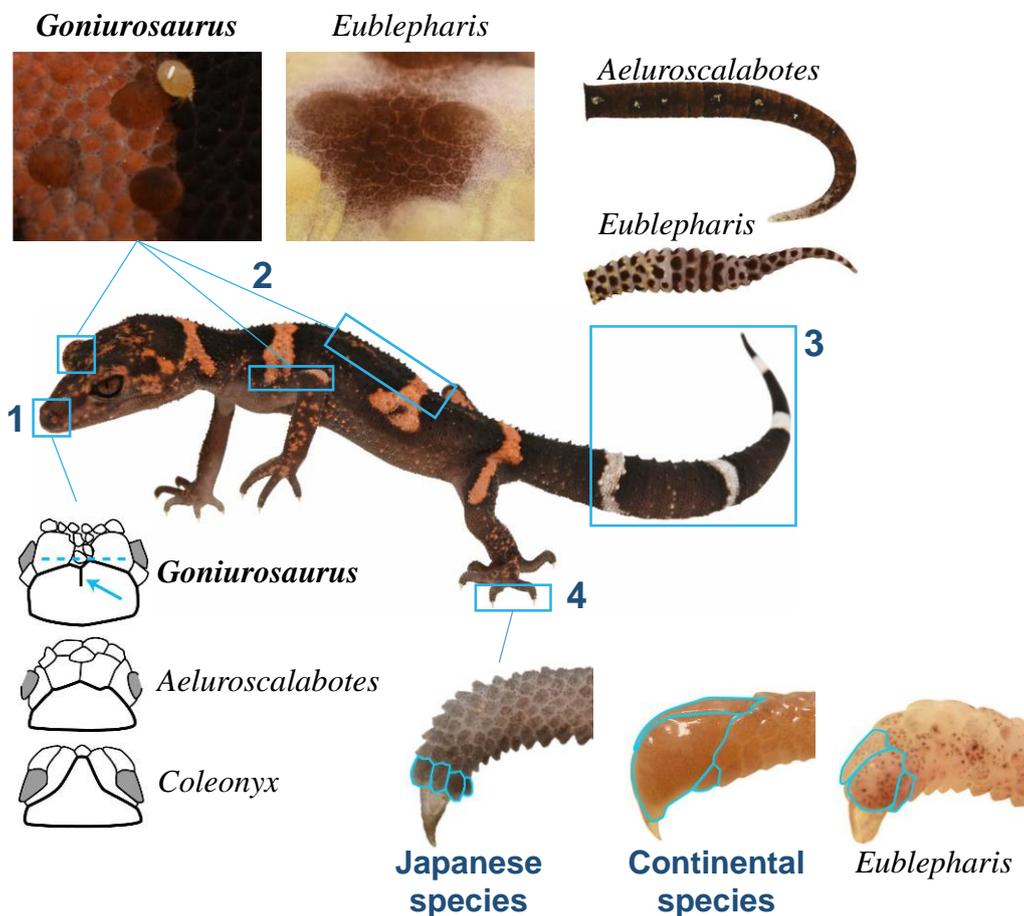
Dorsal surfaces of upper eyelids, trunk, and limbs are covered with small strongly-tuberculated scales interspaced with large tubercles. Scales are dome-shaped. Conversely, the other eyelid geckos has small flat scales.

**Key 3
Tail color pattern in adults**

The original tail of adults are black-and-white banding pattern. The white parts are sometimes reddish or yellowish. Meanwhile, some of the other genera have different color pattern.

**Key 4
Claws and adjacent scales**

Claws are entirely exposed and bordered by five or six small scales in Japanese *Goniurosaurus* species. Four scales come in sight in lateral view. In contrast, the other eyelid geckos, including the continental congeners, have four scales and in many species claws are entirely or largely covered by enlarged lateral scales. Three scales in lateral view.



Characteristics of each eublepharid genus

Genus		Shape of rostral scale	Scales on dorsal surface of upper eyelids, body and limbs	Tail color pattern in adults	Claws and adjacent scales
<i>Goniurosaurus</i>	Japanese species Appendix III	Posterior (upper) edge of the rostral scale is flat and has cleft and notch in the middle.	Dorsal surfaces of upper eyelids, trunk, and limbs are covered with small strongly-tuberculated scales interspersed with large strongly-raised tubercles.	The original tail of adults are black and white (or bright color) banding pattern.	Claws are entirely exposed and bordered by five or six small scales.
	Continental species Appendix II				
<i>Aeluroscalabotes</i>		No cleft/notch or the posterior edge.	Small flat scales interspersed with larger flat scales.	Uniformly brown, or with white and/or dark blotches.	Claws are bordered by four scales and entirely or largely covered by enlarged lateral scales.
<i>Coleonyx</i>		The posterior edge of rostral scale elongates posteriorly.	Small flat scales. Interspersed tubercles are present or absent.	Yellowish and purplish irregular pattern or black and white banding.	
<i>Eublepharis</i>		Posterior (upper) edge of the rostral scale is flat and has cleft and notch in the middle.	Small flat scales interspersed with large raised or flatten tubercles.	White and purplish bands with dark blotches.	
<i>Hemitheconyx</i>			Small flat scales interspersed with large raised tubercles. Head scales are large and hexagonal.	Bright and dark brown irregular pattern, sometimes with white vertebral stripe.	
<i>Holodactylus</i>			Small flat scales. Interspersed tubercles are present or absent. Head scales are large and hexagonal.		
How to observe		Taking photographs of head from front using macro mode.	Watching directly or taking photographs using macro mode.	Watching directly.	Taking photographs of fingers and toes from the lateral side using macro mode.

*Genera without appendix information are not currently listed in the CITES appendices.

How to identify the species of Japan

Species Level

Identify species among the genus *Goniurosaurus* in Japan

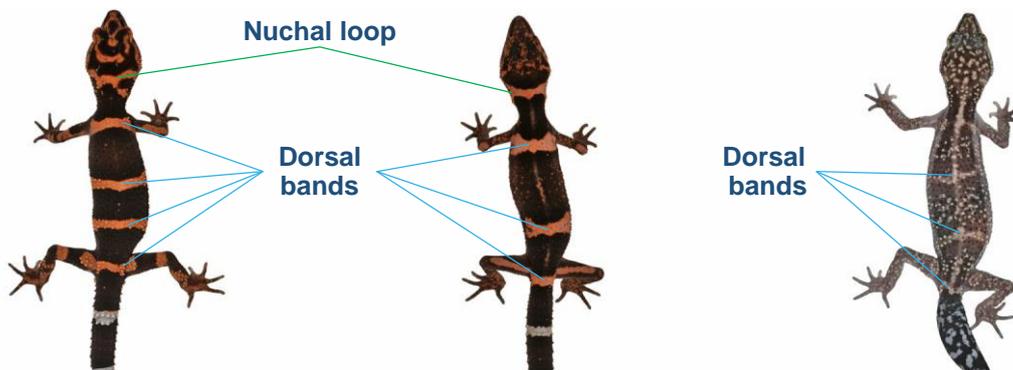
The Japanese species of genus *Goniurosaurus* can be identified by combinations of the following conditions of characteristics. Due to significant variations in these characteristics, contact experts in case of any doubt.

Key
1

Dorsal banding

Shape, position, and number of dorsal bands, excluding nuchal loop.

e.g. Four bands (left) or three bands (middle and right).

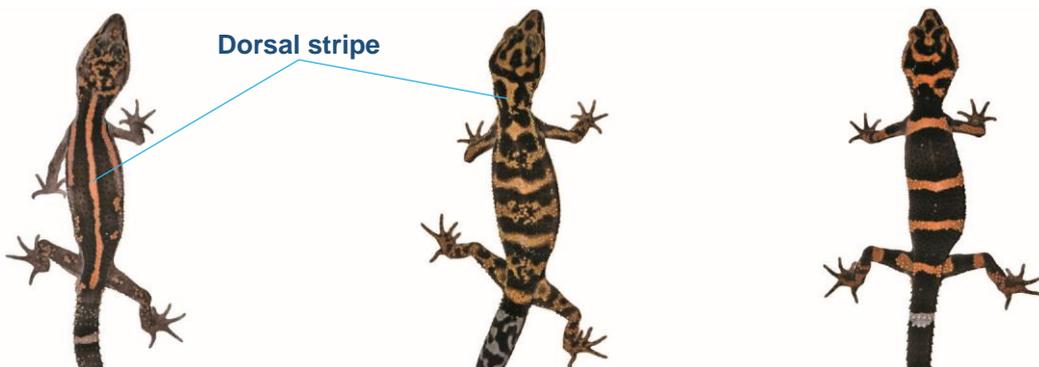


Key
2

Dorsal stripe

Presence or absence and shape of middorsal stripe or such component on vertebral region.

e.g. Present completely (left), present partially (middle), or absent (right).

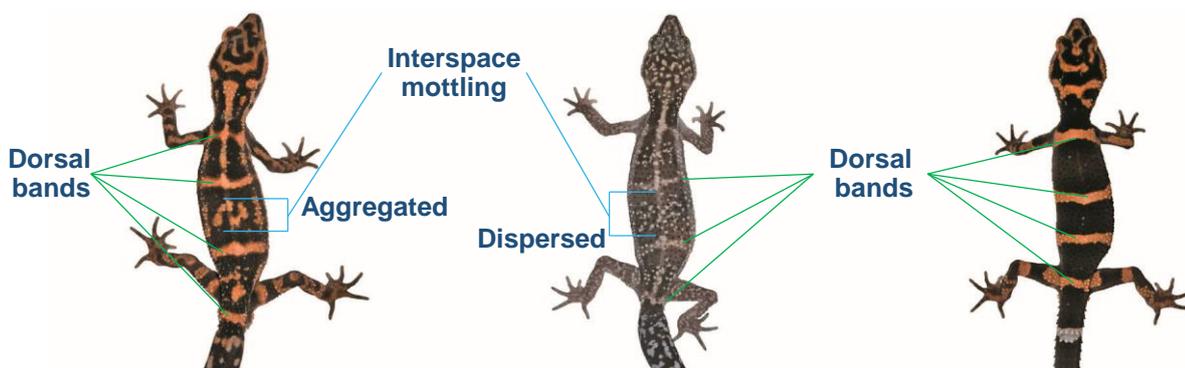


Key
3

Interspace mottling / freckles

Presence or absence and distribution of mottling/freckles between dorsal bands.

e.g. Aggregated (left), dispersed (middle), or absent (right).

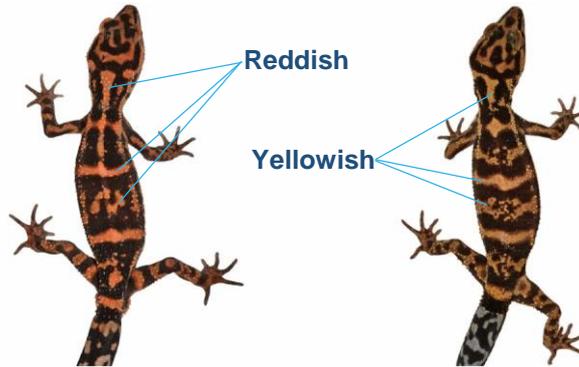


Key
4

Color of bands, stripe, and mottling / freckles

Whether coloration of dorsal bands, stripe, and mottling/freckles is reddish or yellowish.

e.g. Reddish (left) or yellowish (right).

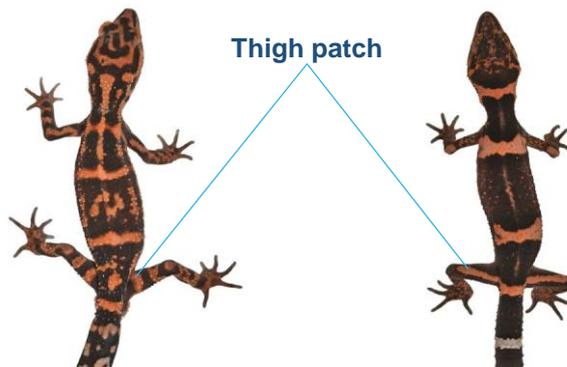


Key
5

Thigh patch

Shape of bright color patch on thighs.

e.g. Oval in head-tail direction (left) or elongated along with thigh (right).



Key
6

Color of iris

Whether coloration of iris is reddish or yellowish.

e.g. Yellowish (upper left) or reddish (lower right).



Graphic key for the six species of Japan

Check

1

Key
1

Dorsal banding

Shape, position, and number of dorsal bands, excluding nuchal loop.

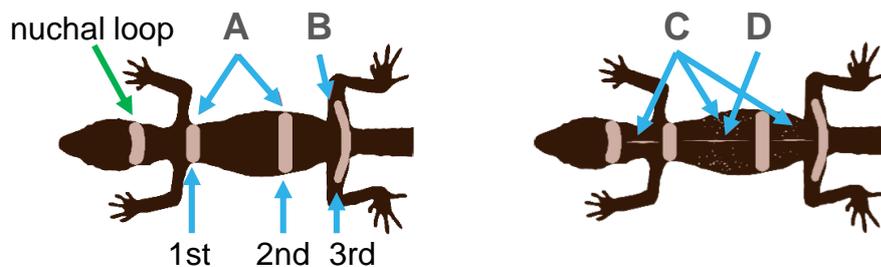
1a

- A. The first and second bands are on the posterior part of shoulder and the posterior half of trunk, respectively.
- B. The third band extends to thighs and thigh patches are long in longitudinal axis of thighs.

..... *Goniurosaurus splendens*

▼ Major variations

- C. Small freckles are present or absent on dorsum.
- D. Middorsal stripes are present or absent on vertebral region.



1b

- A. Dorsal banding is absent or the positions of the first and second bands are different from (1a).
- B. The third band does not extend to thighs and thigh patches are long anteroposteriorly (but see the variation of *G.orientalis*).

..... 2

Check

2

Key 3 Interspace mottling / freckles

Presence or absence and distribution of mottling/freckles between dorsal bands.

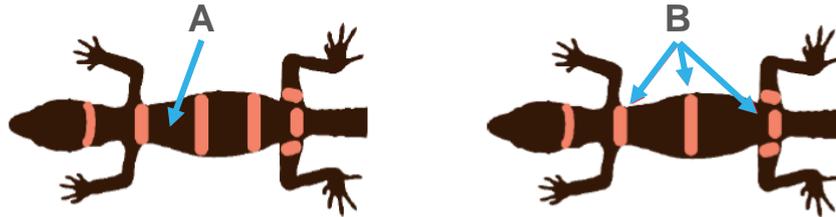
2a

A. Mottling and freckles between dorsal bands are absent; when it is present, only a few.

..... *Goniurosaurus toyamai*

▼ Major variations

B. The number of dorsal bands are four in general but rarely three. If it is three, the second band are on the middle of trunk.



2b

A. Mottling or freckles are present to some extent.

3

Check

3

Key 4 Color of bands, stripe, and mottling / freckles

Whether coloration of dorsal bands, stripe, and mottling/freckles is reddish or yellowish.

Key 6 Color of iris

Whether coloration of iris is reddish or yellowish.

3a

A. Coloration of iris, dorsal bands, mottling, and freckles are yellowish than reddish.

4

3b

A. Coloration of iris, dorsal bands, mottling, and freckles are reddish than yellowish.

→ see 5a (D for exception)

5

4

Key 2

Dorsal stripe

Presence or absence and shape of middorsal stripe or such component on vertebral region.

Key 3

Interspace mottling / freckles

Presence or absence and distribution of mottling/freckles between dorsal bands.

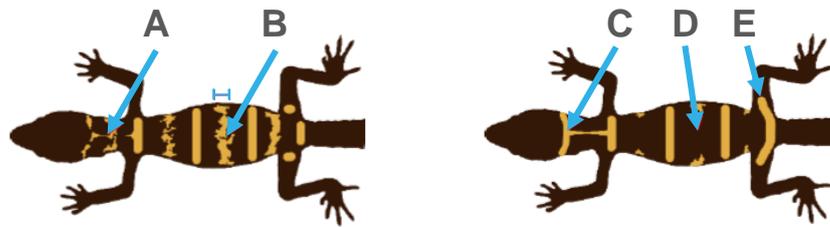
4a

- A. Middorsal stripe component is present on nape.
- B. Interspace mottling is concentrated in narrow areas and sometimes looks like bands.

..... *Goniurosaurus orientalis*

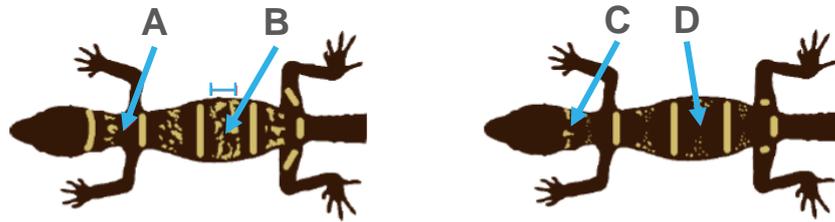
▼ Major variations

- C. Nuchal loop is incomplete or occasionally complete.
- D. Mottling is limited on the dorsolateral sides of trunk (especially in immature individuals).
- E. The band on the caudal base does or does not extend to thighs. Thigh patches are long anteroposteriorly or occasionally in longitudinal axis.



4b

- A. Middorsal stripe component is absent.
- B. Interspace mottling is spread between the bands. *Goniurosaurus yamashinae*
 - ▼ Major variations
 - C. Nuchal loop is complete or occasionally incomplete.
 - D. Mottling is limited on the dorsolateral sides of trunk (especially in immature individuals).



5

Key 1 Dorsal banding

Shape, position, and number of dorsal bands, excluding nuchal loop.

Key 2 Dorsal stripe

Presence or absence and shape of middorsal stripe or such component on vertebral region.

Key 3 Interspace mottling / freckles

Presence or absence and distribution of mottling/freckles between dorsal bands.

5a

- A. Bands are absent on trunk.
- B. Middorsal stripe, which is complete or often partially interrupted, is present from occiput to lumbar. *Goniurosaurus kuroiwae* → see also 6a
 - ▼ Major variations
- C. Middorsal stripe, as well as other patches on trunk and limbs, are faded or rudimental.
- D. Coloration of middorsal stripe varies from vivid orange to cream yellow (not shown)



5b

- A. Transverse bands are more or less present.
- B. Middorsal stripe is limited to nape, anterior half of trunk, and lumbar, while absent on the middle part of trunk.

6

6

Key 1 Dorsal banding

Shape, position, and number of dorsal bands, excluding nuchal loop.

Key 3 Interspace mottling / freckles

Presence or absence and distribution of mottling/freckles between dorsal bands.

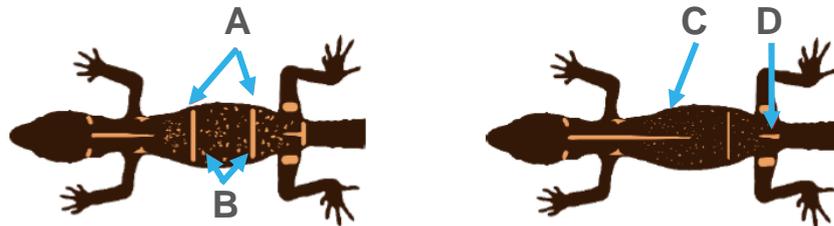
6a

- A. The second and third bands of trunk are narrow and frequently corrupted in shape. The coloration is dull orange. Edge of the bands against dark regions are faded.
- B. Interspace mottling, if any, is spread between the transverse bands and vacancy between banding and mottling is not obvious (variation present).

..... *Goniurosaurus kuroiwae* → see also **5a**

▼ Major variations

- C. The band on anterior half of trunk is present in typical individuals, but often incomplete or absent.
- D. The band on lumbar is present but sometimes absent.



6b

- A. The second and third bands of trunk are bold and vivid orange. Edge of the bands against dark regions are distinct.
- B. Interspace mottling is distributed in limited areas and distinct vacant margins are present between the bands and mottling.

..... *Goniurosaurus sengokui*

▼ Major variations

- C. Nuchal loop is incomplete but rarely complete or absent.
- D. The first band of trunk is complete in general but sometimes incomplete or absent.
- E. Middorsal stripe component is present or absent on lumbar.

