



Partial Albinism in a Malaysian Painted Frog, *Kaloula pulchra* Gray 1831, from Mizoram, Northeast India

Vanlal Siammawii, Lal Muansanga, Fanai Malsawmdawngliana, C. Lalhmingmawii, and Hmar Tlawmte Lalremsanga

Developmental Biology and Herpetology Laboratory, Department of Zoology, Mizoram University, Aizawl, 796004, Mizoram, India (htlrsa@yahoo.co.in)

Finding abnormally pigmented amphibians in a population provides interesting insights on intraspecific phenotypic erraticism as well as on variation among populations inhabiting different habitats (Lunghi et al. 2017). A number of reports have cited albinism and leucism as the most common forms of peculiar coloration among wild amphibians. In albinism, animals completely lack dark pigmentation because of the absence of integumentary pigments. Complete albinos are identified by the presence of either white or yellowish coloration of their skin and red irises whereas leucism is a specific form of albinism, showing white or pinkish body color with dark eyes (Pabijan et al. 2004; López and Ghirardi 2011; Escoriza 2012). Pinto- and partial-albinism are subcategories of albinism in which normal pigmentation covers small and larger scattered spots, respectively (Henle et al. 2017).

The Malaysian Painted Frog, *Kaloula pulchra* Gray 1831, is a narrow-mouthed frog (family Microhylidae), native to Southeast Asia (Frost 2022). It occurs naturally in a wide variety of habitats ranging from populated villages to rice fields and leaf-covered forest floors and can efficiently burrow into the soil with its hindlimbs. Its breeding season occurs from late February until June (Lalremsanga 2011).

During a recent herpetofaunal survey at about 2000 h on 22 April 2022, we encountered an amplexing pair of *K. pulchra* (Fig. 1A) adjacent to exposed boulders in Tuichhuahen Stream in the vicinity of the Kolasib-Bairabi Road (NH6), Kolasib District (24.203250°N, 92.637944°E; elev. 75 m asl), Mizoram, India, in which the male exhibited a specific form of aberrant coloration. The individuals were identified based on the original morphological description provided by

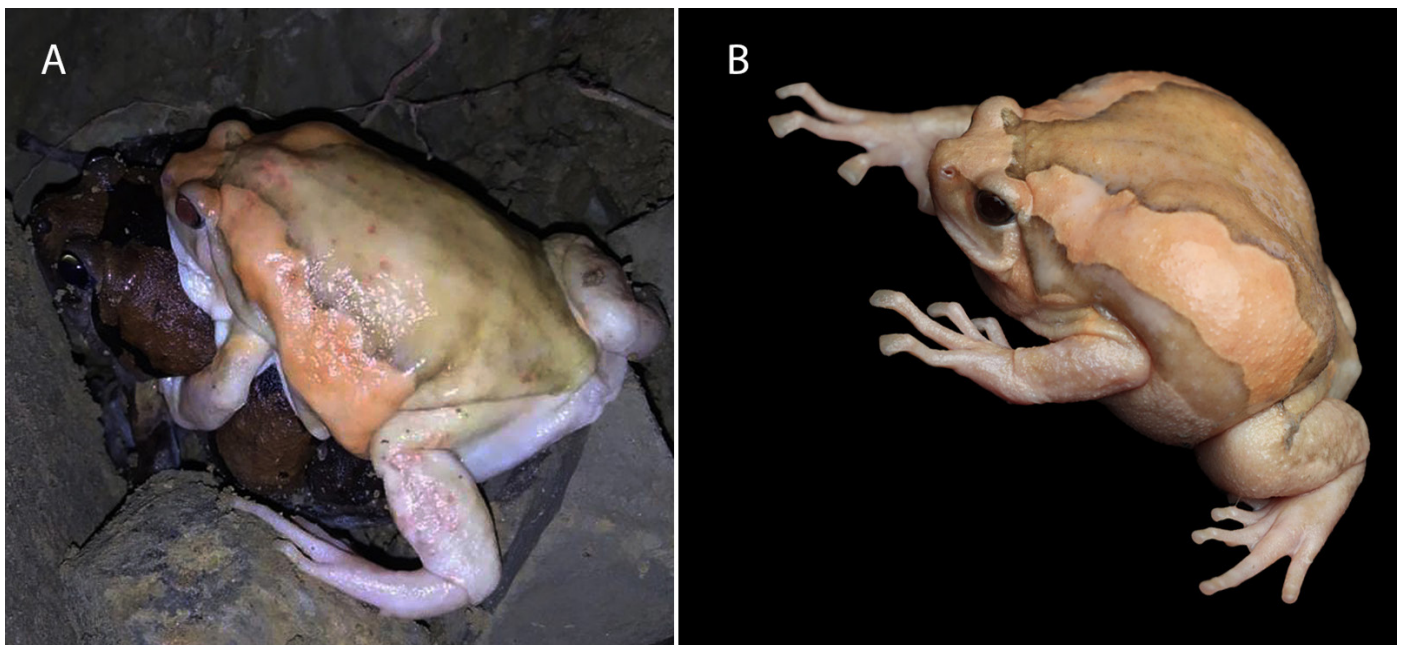


Fig. 1. A partial albino male Malaysian Painted Frog (*Kaloula pulchra*) in amplexus with a wildtype female (A) and in dorsolateral view (B). Photograph for Panel A by Lalsipaia and Panel B by Lal Muansanga.

Gray (1831). The anomalous individual was identified following the terminology provided by Henle et al. (2017).

The male *K. pulchra* (Fig. 1B) has not completely lost all the integumentary pigmentations. The dorsolateral coloration was peach, interrupted by a dorsal broad band of nude brownish color running from the interorbitals along the vent, fading posteriorly and extending to the hind limbs; digits pale pinkish; venter uniform creamy white separated from dorsolateral peach by a faint lateral brownish beige streak that extends from post-orbital and decreasing towards the insertion of hind limbs. The observed pattern of coloration differs from the wild phenotype (below) having a dark triangular spot occupying the whole back from the middle of the eyelids and a lateral streak of the same color from the posterior corner of the eye, the two being separated by a brownish yellow dorsolateral stripe (Lalremsanga 2011). Despite the albinistic color, the frog appeared viable and active. To the best of our knowledge, this study reports the first case of partial albinism in *K. pulchra*.

Multiple limbs, missing limbs, and facial abnormalities are the main malformations seen among amphibians (Hall and Henry 1992; Lunde and Johnson 2012; Ashaharaza and Mahapatra 2020; Regmi et al. 2021; Siammawii et al. 2021a, 2021b, 2021c; Lalremsanga 2022). Albinism is quite rare as compared to other anomalies with only a few reported cases (e.g., Lessona 1880; Capanna 1969; Capanna and Foresti 1974; Corsini et al. 2002; Spadola and Insacco 2010; Modesti et al. 2011; Dyrkacz 1981; Lunghi et al. 2017). Albinism usually results from gene mutations which affect the development and distribution of chromatophores and/or skin pigment production (Duellman and Trueb 1994; Bechtel 1995). Chromatophores are pigment-containing cells, usually classified into six types, considering the chemical composition of the pigment granules and observing their color under white light (Duellman and Trueb 1994). The distribution and occurrence of these chromatophores in the epidermis generally change from species to species (Pough et al. 2016). Further investigation of the causative agents for skin aberration among amphibians and their consequences on reproduction are necessary in future research.

Acknowledgements

We express our heartfelt gratitude to the Principal Chief Conservator of Forests, Government of Mizoram, for issuing permit No. A.33011/2/99-CWLW/225 to collect herpetofauna in Mizoram and the Defence Research Development Organisation (DRDO), Ministry of Defence (No. DFTM/07/3606/NESTC/ABR/M/P-01), Department of Science and Technology (No. DST-SERB/EEQ/2021/000243) and the Department of Biotechnology (DBT), Ministry of Science and Technology (No. DBT-NER/AAB/64/2017), Government of India, New Delhi,

for financial support. The award of UGC-MZU fellowship for Vanlal Siammawii and Fanai Masawmdawngliana, and International Herpetological Symposium (IHS) Grant award, USA to H.T. Lalremsanga are highly appreciated. We sincerely appreciated the work of Lalsipaia for helping us in collecting the specimens.

Literature Cited

- Ashaharaza, K. and C. Mahapatra. 2020. Anophthalmia in a Common Asian Toad, *Duttaphrynus melanostictus* (Amphibia: Anura: Bufonidae), from the Eastern Ghats of India. *Reptiles & Amphibians* 27: 44–45. <https://doi.org/10.17161/randa.v27i1.14446>.
- Bechtel, H.B. 1995. *Reptile and Amphibian Variants: Colors, Patterns, and Scales*. Krieger Publishing Company, Malabar, Florida.
- Capanna, E. 1969. Albinismo parziale in una popolazione insulare di *Discoglossus sardus* Tschudi. *Bollettino di Zoologia* 36: 135–141.
- Capanna, E. and V. Foresti. 1974. Analisi dello sviluppo di un mutante semialbino di *Triturus cristatus* / Developmental analysis of a semialbino mutant of *Triturus cristatus*. *Rivista di Biologia* 67: 19–45.
- Corsini, S., M. Ferretti, M.V. Pastorino, A. Prati, G. Alario, and S. Salvidio. 2002. *Speleomantes ambrosii* (Ambrosi's Cave Salamander). Albinism. *Herpetological Review* 33: 123.
- Duellman, W.E and L. Trueb. 1994. *Biology of Amphibians*. John Hopkins University Press, Baltimore, Maryland, USA.
- Dyrkacz, S. 1981. Recent instances of albinism in North American amphibians and reptiles. *SSAR. Herpetological Circular* 11: 1–31.
- Escoriza, D. 2012. Description of a case of albinism in a tadpole of *Discoglossus pictus pictus* (Anura: Discoglossidae) in Sicily. *Herpetology Notes* 5: 311–312.
- Frost, D.R. 2022. *Amphibian Species of the World: An Online Reference*. Version 6.1. American Museum of Natural History, New York. <https://amphibiansoftwareworld.amnh.org/index.php>.
- Gray, J.E. 1831. Description of two new genera of frogs discovered by John Reeves, Esq. in China. *Zoological Miscellany* Part 1: 38.
- Hall, R.J. and P.F.P. Henry. 1992. Assessing effects of pesticides on amphibians and reptiles. *Herpetological Journal* 2: 65–71.
- Henle, K., A. Dubois, and V. Vershinin. 2017. Commented glossary, terminology and synonyms of anomalies in natural populations of amphibians, pp. 9–48. In: K. Henle and A. Dubois (eds.), *Studies on Anomalies in Natural Populations of Amphibians*. Mertensiella 25. Frankfurt am Main, Germany
- Lalremsanga, H.T. 2011. Studies on the ecology, breeding behavior and development of ranid and microhylid anurans prevalent in Mizoram, Northeast India. Unpublished Ph.D. Thesis. North Eastern Hill University, Shillong, Meghalaya, India.
- Lalremsanga, H.T. 2022. Anophthalmia in a Greater Stream Horned Frog, *Xenophrys major* (Boulenger 1908), from Tamdil National Wetland, Mizoram, India: Pollution-induced or Predator-mediated? *Reptiles & Amphibians* 29: 201–203. <https://doi.org/10.17161/randa.v29i1.16451>.
- Lessona, M. 1880. Dello albinismo nei girini della *Rana temporaria* Linn. *Atti dell'Accademia delle Scienze di Torino*. 16: 94–98.
- López, J.A. and R. Ghirardi. 2011. First record of albinism in *Rhinella fernandezae* (Gellardo, 1957). *Belgian Journal of Zoology* 141: 59–61.
- Lunde, K.B. and P.T.J. Johnson. 2012. A practical guide for the study of malformed amphibians and their causes. *Journal of Herpetology* 46: 429–441. <https://doi.org/10.2307/23327156>.
- Lunghi, E., A. Monti, A. Binda, I. Piazzi, M. Salvadori, R. Cogoni, L.A. Riefole, C. Biancardi, S. Mezzadri, D. Avitabile, and G.F. Ficetola. 2017. Cases of albinism and leucism in amphibians in Italy: new reports. *Natural History Sciences* 4(1): 73–80. <https://doi.org/10.4081/nhs.2017.311>.
- Modesti A., S. Aguzzi, and R. Manenti. 2011. A case of complete albinism in *Lissotriton vulgaris meridionalis*. *Herpetology Notes* 4: 395–396.
- Pabijan, M., E. Czarniewska, and L. Berger 2004. Amelanistic phenotypes in western palearctic water frogs from Poland. *Herpetozoa* 17: 127–134.
- Pough, F.H., R.M. Andrews, M.L. Crump, A.H. Savitzky, K.D. Wells, and M.C. Brandley. 2016. *Herpetology*. Fourth Edition. Sinauer Associates, Inc., Sunderland, MA, USA.

- Regmi, T., J. Maheta and D. Prajapati. 2021. Anophthalmia in a Marbled Globular Frog, *Uperodon systoma* (Schneider 1799), from Gujarat, India. *Reptiles & Amphibians* 28: 314–315. <https://doi.org/10.17161/randa.v28i2.15270>.
- Siammawii, V., L. Biakzuala, and H.T. Lalremsanga. 2021a. *Duttaphrynus chandai* (Nagaland Montane Torrent Toad). Hindlimb malformation. *Herpetological Review* 52: 823.
- Siammawii, V., M.V. Malsawmtluangi, L. Muansanga, L. Biakzuala, and H.T. Lalremsanga. 2021b. Brachyphalangy in a Tamenglong Horned Frog, *Xenophrys numbbumaeng* (Mahony, Kamei, Teeling, and Biju 2020) (Megophryidae), from Mizoram, India. *Reptiles & Amphibians* 28: 322–323. <https://doi.org/10.17161/randa.v28i2.15245>.
- Siammawii, V., M.V. Malsawmtluangi, L. Muansanga, L. Biakzuala, and H.T. Lalremsanga. 2021c. Adactyly in a Mawphlang Odorous Frog, *Odorrana mawphlangensis* (Pillai and Chanda 1977) (Ranidae), from Mizoram, India. *Reptiles & Amphibians* 28: 324–325. <https://doi.org/10.17161/randa.v28i2.15598>.
- Spadola F. and G. Insacco. 2010. Incomplete albinism in *Discoglossus pictus* (Oth, 1837). *Acta Herpetologica* 5: 245–253. https://doi.org/10.13128/Acta_Herpetol-9029.