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Polymelia in a Ladakh Toad, *Bufotes latastii* (Boulenger, 1882): a case of complex skeletal anomaly

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Polymelia is a congenital malformation characterized by the presence of fully or partially formed extra limbs (Henle et al., 2017). The causes of this abnormality in amphibians can be very diverse – from developmental disorders during embryogenesis to the effects of trematode infection (Johnson et al., 1999; Rajakaruna et al., 2008; Svinin et al., 2020). Cases of polymelia in amphibians have been documented across all continents. Although reports are most frequent in Europe and North America, this pattern likely reflects the greater research effort and more comprehensive amphibians monitoring in these regions rather than a true geographic bias in occurrence.

Bufotes latastii is an interesting species that is closely related to an ancestral parental allopolyploid *Bufotes* species (Betto-Colliard et al., 2015, 2018; Litvinchuk et al., 2016, 2019). Endemic to the Western Himalayas (Litvinchuk et al., 2018), *B. latastii* is one of the least studied representatives of the genus due to the remoteness of its habitat. The species occurs in the Indian Union Territory of Jammu and Kashmir as well as in three adjacent states of Pakistan, where it inhabits diverse biotopes ranging from coniferous forests and deforested grasslands to mountain deserts and anthropogenic landscapes, at elevations from 1506–3119 m (Dubois and Martens, 1977; Gruber, 1981; Verma et al., 1995; Sahi et al., 1996; Khan, 2006; Litvinchuk et al., 2018). Despite its broad ecological range, *B. latastii* remains poorly studied with limited field data available on its habitat (Litvinchuk et al., 2018), acoustic communication (Grosjean and Dubois, 2001), and age structure (Lyapkov et al., 2020). Data on reproductive biology, growth and development have mostly been obtained in the laboratory (Drozdova et al., 2015; Kidov et al., 2016; Matushkina et al., 2020). This study documents the first recorded case of polymelia and associated developmental anomalies in *B. latastii*.

On 30 April 2013, two pairs of adult *B. latastii* were collected in the vicinity of Tangmarg Village, Jammu and Kashmir, India. In 2014, these pairs were successfully bred in captivity for the first time (Kidov et al., 2016). Thirty offspring were raised to adults, among which one female exhibited distinct limb anomalies. This animal's pectoral girdle had an additional limb on the ventral side, consisting of a straight, non-articulated bone lacking musculature and terminal elements. (Fig. 1). The pelvic girdle showed marked asymmetry, with deformities on the right side. The right hind limb had a shortened tibia, foot, and toes, while the skeletal base of the first toe was absent. Additionally, the foot was rotated in the coronal plane rather than the axial plane (Fig. 1).

Polymelia of the fore- and hind limbs is not uncommon in amphibians (Henle et al., 2017), and it typically arises from the proximal segments of the bone (humerus or femur, forearm or tibia), both in symmetrical and asymmetrical cases. In the animal featured here, the supernumerary forelimb originated from the cranial part of the sternum, which is an extremely rare anomaly. Reports of such forelimb malformations are extremely scarce; we found only two such reports, both for *Bufotes viridis* (Laurenti, 1768) – one from Roßwag, Germany in 1980 (Henle et al., 2017a, b) and another from the Moscow region in Russia (Dunaev, 1997).

Despite the anomalies, the affected female was only slightly smaller than her siblings. She reproduced for the first time at two years of age and subsequently bred annually until she was seven years old, producing offspring that did not exhibit any abnormalities. Since the individual was reared in controlled laboratory conditions and no similar abnormalities were observed in other conspecifics, the influence of external environmental factors can likely be excluded. The probability of a hereditary origin of abnormalities is also low, due to the absence of similar malformations in either siblings or offspring. Hence, the anomaly can most like be attributed to an individual developmental failure during the embryonic period, possibly resulting from trauma.

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Figure 1. Developmental morphological anomalies of a *Bufotes latastii* individual exhibiting forelimb polymelia and structural deformities of the hind limbs (ventral view).

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References

Betto-Colliard, C., Sermier, R., Litvinchuk, S., Perrin, N., Stöck, M. (2015): Origin and genome evolution of polyploidy green toads in Central Asia: evidence from microsatellite markers. Heredity **114**: 300–308.

Betto-Colliard, C., Hofmann, S., Sermier, R., Perrin, N., Stöck, M. (2018): Profound genetic divergence and asymmetric parental genome contributions as hallmarks of hybrid speciation in polyploid toads. Proceedings of the Royal Society B **285**: 20172667.

Drozdova, L.S., Kidov, A.A., Matushkina, K.A., Kornienkov, P.I., Kudryavtseva, N.A., Pashina, M.M., et al. (2015): Техническая окупаемость живых кормов и рост молоди жабы Латаста, *Bufotes latastii* (Boulenger, 1882) в искусственных условиях [Technical payback of live food in the growth of juveniles of Latast's toad, *Bufotes latastii* (Boulenger, 1882) in artificial conditions]. Вестник Московского Государственного Областного Университета. Серия Естественные Науки [Bulletin of Moscow State Regional University, Natural Sciences Series] **3**: 25–32. [in Russian]

Dubois, A., Martens, J. (1977): Sur les crapauds du groupe de *Bufo viridis* (Amphibiens, Anoures) del'Himalaya Occidental (Cachemire et Ladakh). Bulletin de la Société Zoologique de France **102**: 459–465.

Dunaev, E.A. (1997): A record of the Green Toad (*Bufo viridis*) with five legs in Moscow Province. Advances in Amphibian Research in the Former Soviet Union **2**: 169–171.

Grosjean, S., Dubois, A. (2001): Description of advertisement calls of five *Bufo* species (Bufonidae) from South and South-East Asia. Hamadryad **26**: 247–258.

Gruber, U. (1981): Notes on the herpetofauna of Kashmir and Ladakh. British Journal of Herpetology **6**: 145–150.

Henle, K., Dubois, A., Vershinin, V. (2017a): A review of anomalies in natural populations of amphibians and their potential causes. Mertensiella **25**: 57–164.

Henle, K., Dubois, A., Rimpp, K., Vershinin, V. (2017b): Mass anomalies in green toads (*Bufotes viridis*) at a quarry in Roßwag, Germany: inbred hybrids, radioactivity or an unresolved case? Mertensiella **25**: 185–242.

Johnson, P.T, Lunde, K.B, Ritchie, E.G, Launer, A.E. (1999): The effect of trematode infection on amphibian limb development and survivorship. Science **284**: 802–804.

Khan, M.S. (2006): The Amphibians and Reptiles of Pakistan, Malabar, Florida, USA, Krieger Publishing.

Kidov, A.A., Matushkina, K.A., Litvinchuk, S.N., Blinova, S.A., Afrin, K.A., Kovrina, E. G. (2016): Первый случай размножения жабы Латаста, *Bufotes latastii* (Boulenger, 1882) в лабораторных условиях [First captive breeding of Lataste's toad, *Bufotes latastii* (Boulenger, 1882), in laboratory

conditions]. Современная Герпетология [Current Studies in Herpetology] **16**: 20–26. [in Russian]

Litvinchuk, S.N., Borkin, L.J., Skorinov, D.V., Pasynkova, R.A., Rosanov, J.M. (2016): Природная полиплоидия у амфибий [Natural polyploidy in amphibians]. Вестник Санкт-Петербургского университета, Серия 3, Биология [Bulletin of St. Petersburg University, Series 3, Biology] **3**: 77–86. [in Russian]

Litvinchuk, S.N., Skorinov, D.V., Mazepa, G.O., Borkin, L.J. (2018): Distribution of *Bufotes latastii* (Boulenger, 1882), endemic to the Western Himalaya. Alytes **36**: 314–327.

Litvinchuk, S.N., Skorinov, D.V., Pasynkova, R.A., Kidov, A.A., Matushkina, K.A., Borkin, L.J., Rosanov, J.M. (2019): Полиплоидное видообразованиеу Азиатских зеленых жаброда *Bufotes* (Bufonidae) [Polyploid speciation in Asian green toads of the genus *Bufotes* (Bufonidae)]. Известия Высших Учебных Заведений, Поволжский Регион [News of Higher Education Institutions in the Volga Region] **1**: 80–93. [in Russian]

Lyapkov, S.M., Kidov, A.A., Stepankova, I.V., Afrin, K.A., Litvinchuk, S.N. (2020): Age structure and growth in the Lataste's toad, *Bufotes latastii* (Anura: Bufonidae). Russian Journal of Herpetology **27**: 165–171.

Matushkina, K.A., Kidov, A.A., Litvinchuk, S.N. (2020): Keeping, breeding, and maintenance of zooculture of the Ladakh Toad, *Bufotes latastii* (Boulenger, 1882). Russian Journal of Herpetology **47**: 284–290.

Rajakaruna, R.S., Piyatissa, P.M.J.R., Jayawardena, U.A., Navaratne, A.N., Amerasinghe, P.H. (2008): Trematode infection induced malformations in the common hourglass treefrogs. Journal of Zoology **275**: 89–95.

Sahi, D.N., Abrol, B., Verma, A.K. (1996): Ecological notes on the herpetofauna of Ladakh region in J&K State (India). Cobra **26**:1–9.

Svinin, A.O, Bashinskiy, I.V, Litvinchuk, S.N, Ermakov, O.A, Ivanov, A.Y, Neymark, L.A, et al. (2020): *Strigea robusta* causes polydactyly and severe forms of Rostand's anomaly P in water frogs. Parasites & Vectors **13**: 381.

Verma, A.K., Sahi, D.N., Verma, K. (1995): The amphibian fauna of Jammu and Kashmir State, India. Cobra **20**: 2–6.

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