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# *Congolius*, a new genus of African reed frog endemic to the central Congo: A potential case of convergent evolution

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## Supplementary material

**Content** **Page**


**Figure S1. Holotype and allotype of *Hyperolius robustus* Laurent, 1979.** (a) Holotype RMCA 79-24-B-4, male; (b) allotype RMCA 79-24-B-5, female. Scale = 20 mm. Photos by V. G.

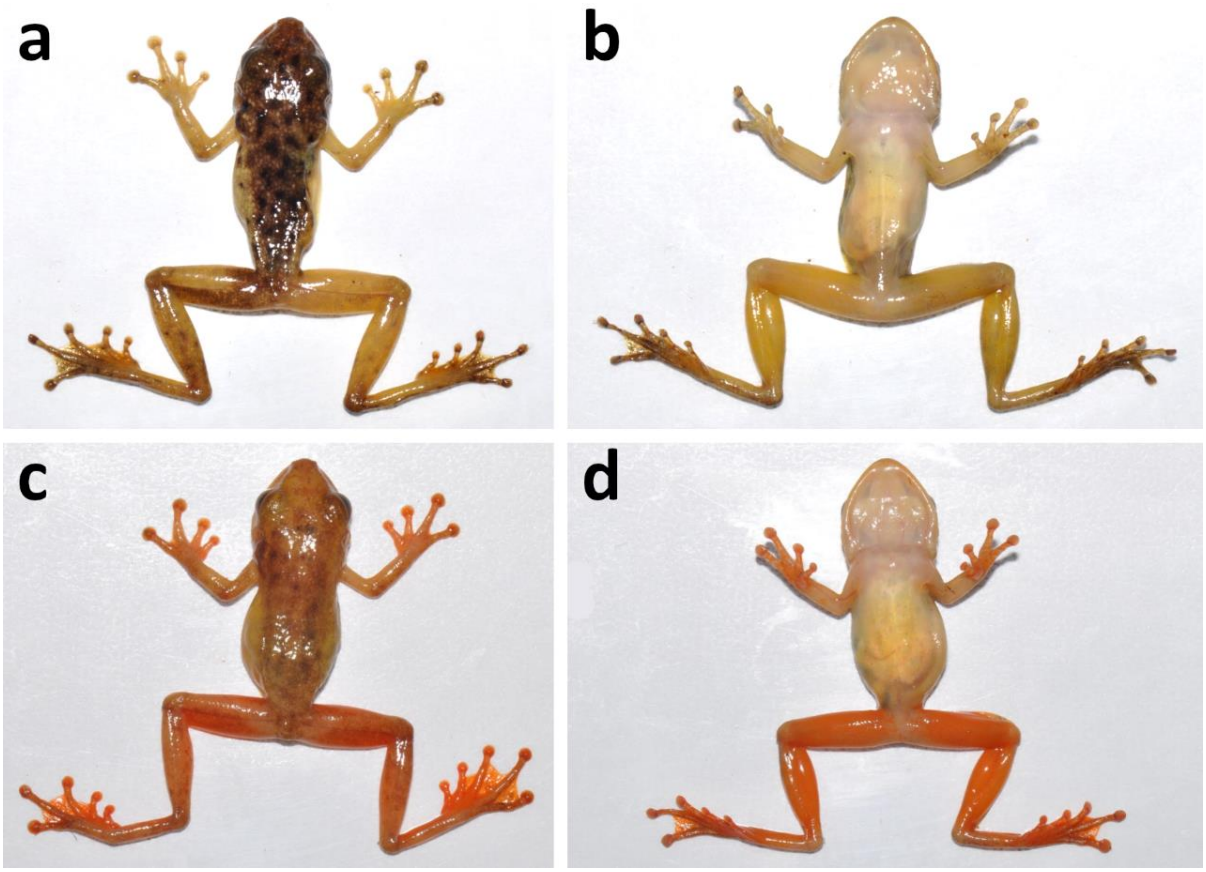



**Figure S2. Sexual dichromatism in *Congolius robustus* gen. et comb. n.** (a, b) Adult male IVB-H-CD18-301 and (c, d) adult female IVB-H-CD18-302 from the Kokolopori Bonobo Nature Reserve, Tshuapa, Democratic Republic of the Congo (DRC). Photos by V. G.

**Table S1. Main material examined.** Asterisk denotes specimens of *Congolius robustus* gen. et comb. n. included in phylogenetic analysis. "Morph" stands for external morphometric analyses; (+) denotes μCT scanned specimens that were not included in PCA of the cranial shape; CAR = Central African Republic.

| Taxon | Catalogue No. | Sex | Locality | GPS | | μCT | Morph |
|---|---|---|---|---|---|---|---|
| | | | | °N | °E | | |
| *Acanthixalus spinosus* | CAS 153800 | female | Sangmelima, Foulassi, Ngam, Sud Region, Cameroon | 2.9845 | 11.9612 | (+) | - |
| *Callixalus pictus* | CAS 145260 | male | Itombwe Highlands, upper Luvubu River, Kivu Prov., DRC, 2600 m | -3.2162 | 28.8612 | (+) | - |
| *Chrysobatrachus cupreonitens* | CAS 145263 | male | Itombwe Highlands, upper Luvubu River, Kivu Prov., DRC, 2600 m | -3.2162 | 28.8612 | (+) | - |
| *Congolius robustus* gen. et comb. n. | IVB-H-CD18-120 | male | Yetee, Loto stream, Kokolopori, Tshuapa, DRC, 460 m | 0.4080 | 22.9284 | - | + |
| *Congolius robustus** | IVB-H-CD18-255 | male | Yalokole, Iyoto stream, Kokolopori, Tshuapa, DRC, 400 m | 0.2136 | 22.8949 | - | + |
| *Congolius robustus* | NMP-P6V 76086/1 | male | Yalokole, Iyoto stream, Kokolopori, Tshuapa, DRC, 400 m | 0.2136 | 22.8949 | - | + |
| *Congolius robustus* | NMP-P6V 76086/2 | male | Yalokole, Iyoto stream, Kokolopori, Tshuapa, DRC, 400 m | 0.2136 | 22.8949 | - | + |
| *Congolius robustus* | NMP-P6V 76086/4 | male | Yalokole, Iyoto stream, Kokolopori, Tshuapa, DRC, 400 m | 0.2136 | 22.8949 | - | + |
| *Congolius robustus* | NMP-P6V 76086/5 | male | Yalokole, Iyoto stream, Kokolopori, Tshuapa, DRC, 400 m | 0.2136 | 22.8949 | - | + |
| *Congolius robustus* | NMP-P6V 76086/8 | male | Yalokole, Iyoto stream, Kokolopori,Tshuapa, DRC, 400 m | 0.2136 | 22.8949 | - | + |
| *Congolius robustus* | NMP-P6V 76086/9 | male | Yalokole, Iyoto stream, Kokolopori, Tshuapa, DRC, 400 m | 0.2136 | 22.8949 | - | + |
| *Congolius robustus* | NMP-P6V 76088 | male | Yambimbo, Sondo stream, Kokolopori, Tshuapa, DRC, 420 m | 0.2235 | 22.8627 | - | + |
| *Congolius robustus** | NMP-P6V 76089 | female | Mombongo, Luende stream, Tshopo, DRC | 1.64 | 23.15 | - | - |
| *Congolius robustus* | ZMUC-R.771175 | male | Kokolopori, Tshuapa, DRC | 0.25 | 22.87 | + | + |
| *Congolius robustus** | ZMUC-R.771176 | female | Kokolopori, Tshuapa, DRC | 0.25 | 22.87 | (+) | - |
| *Cryptothylax greshoffii* | IVB-H-CD15-162 | male | Lopori River, Matama, Lobeke swamp, Mongala, DRC, 365 m | 1.6366 | 21.4172 | - | + |
| *Cryptothylax greshoffii* | IVB-H-CD15-169 | male | Lopori River, Matama, Lobeke swamp, Mongala, DRC, 365 m | 1.6366 | 21.4172 | + | + |
| *Cryptothylax greshoffii* | IVB-H-CD15-170 | male | Lopori River, Matama, Lobeke swamp, Mongala, DRC, 365 m | 1.6366 | 21.4172 | - | + |
| *Cryptothylax greshoffii* | NMP-P6V 76074/1 | male | Sangha Lodge, swamp, Sangha-Mbaéré, Dzanga-Sangha NP, CAR, 380 m | 2.99 | 16.23 | - | + |
| *Cryptothylax greshoffii* | NMP-P6V 76075/1 | male | Sangha Lodge, forest pond, Sangha-Mbaéré, Dzanga-Sangha NP, CAR, 380 m | 2.9852 | 16.2327 | - | + |
| *Cryptothylax greshoffii* | NMP-P6V 76075/2 | male | Sangha Lodge, forest pond, Sangha-Mbaéré, Dzanga-Sangha NP, CAR, 380 m | 2.9852 | 16.2327 | - | + |
| *Cryptothylax greshoffii* | NMP-P6V 76076/1 | male | Mosite, pond, Tshopo, DRC, 420 m | 0.9594 | 23.5549 | - | + |
| *Cryptothylax greshoffii* | NMP-P6V 76076/2 | male | Mosite, pond, Tshopo, DRC, 420 m | 0.9594 | 23.5549 | - | + |

| Taxon | Catalogue No. | Sex | Locality | GPS | | µCT | Morph |
|---|---|---|---|---|---|---|---|
| | | | | °N | °E | | |
| *Cryptothylax greshoffii* | NMP-P6V 76077/7 | male | Yetee, Loto stream, Kokolopori, Tshuapa, DRC, 460 m | 0.408 | 22.9284 | - | + |
| *Cryptothylax greshoffii* | NMP-P6V 76078/1 | male | Yalofili, Bisolo stream, Tshuapa, DRC, 400 m | 0.2105 | 22.8186 | - | + |
| *Hyperolius balfouri* | IVB-H-CD15-061 | male | Lisala, swamp, Mongala, DRC, 348 m | 2.1503 | 21.5285 | + | - |
| *Hyperolius balfouri* | NMP-P6V 76079/1 | male | Baboungue, Sangha-Mbaéré, Dzanga-Sangha NP, CAR, 550 m | 3.2815 | 16.1854 | - | + |
| *Hyperolius balfouri* | NMP-P6V 76079/2 | male | Baboungue, Sangha-Mbaéré, Dzanga-Sangha NP, CAR, 550 m | 3.2815 | 16.1854 | - | + |
| *Hyperolius balfouri* | NMP-P6V 76080/1 | male | Baboungue, Sangha-Mbaéré, Dzanga-Sangha NP, CAR, 550 m | 3.2815 | 16.1854 | - | + |
| *Hyperolius balfouri* | NMP-P6V 76080/3 | male | Baboungue, Sangha-Mbaéré, Dzanga-Sangha NP, CAR, 550 m | 3.2815 | 16.1854 | - | + |
| *Hyperolius balfouri* | NMP-P6V 76080/4 | male | Baboungue, Sangha-Mbaéré, Dzanga-Sangha NP, CAR, 550 m | 3.2815 | 16.1854 | - | + |
| *Hyperolius balfouri* | NMP-P6V 76081/2 | male | Monasau, by road, Sangha-Mbaéré, Dzanga-Sangha NP, CAR, 530 m | 3.2487 | 16.2526 | - | + |
| *Hyperolius balfouri* | NMP-P6V 76081/1 | male | Monasau, by road, Sangha-Mbaéré, Dzanga-Sangha NP, CAR, 530 m | 3.2487 | 16.2526 | - | + |
| *Hyperolius balfouri* | NMP-P6V 76081/2 | male | Monasau, by road, Sangha-Mbaéré, Dzanga-Sangha NP, CAR, 530 m | 3.2487 | 16.2526 | - | + |
| *Hyperolius balfouri* | NMP-P6V 76081/3 | male | Monasau, by road, Sangha-Mbaéré, Dzanga-Sangha NP, CAR, 530 m | 3.2487 | 16.2526 | - | + |
| *Hyperolius balfouri* | NMP-P6V 76081/5 | male | Monasau, by road, Sangha-Mbaéré, Dzanga-Sangha NP, CAR, 530 m | 3.2487 | 16.2526 | - | + |
| *Hyperolius cinnamomeoventris* complex | IVB-H-CD18-092 | male | Yetee, spring, Kokolopori, Tshuapa, DRC, 470 m | 0.4033 | 22.9302 | - | + |
| *Hyperolius cinnamomeoventris* complex | IVB-H-CD18-107 | male | Yetee, Loto stream, Kokolopori, Tshuapa, DRC, 460 m | 0.408 | 22.9284 | - | + |
| *Hyperolius cinnamomeoventris* complex | IVB-H-CD18-129 | male | Yetee, Loto stream, Kokolopori, Tshuapa, DRC, 460 m | 0.408 | 22.9284 | - | + |
| *Hyperolius cinnamomeoventris* complex | IVB-H-CD18-130 | male | Yetee, Loto stream, Kokolopori, Tshuapa, DRC, 460 m | 0.408 | 22.9284 | - | + |
| *Hyperolius cinnamomeoventris* complex | IVB-H-CD18-131 | male | Yetee, Loto stream, Kokolopori, Tshuapa, DRC, 460 m | 0.408 | 22.9284 | - | + |
| *Hyperolius cinnamomeoventris* complex | IVB-H-CD18-132 | male | Yetee, Loto stream, Kokolopori, Tshuapa, DRC, 460 m | 0.408 | 22.9284 | - | + |
| *Hyperolius cinnamomeoventris* complex | IVB-H-CD18-133 | male | Yetee, Loto stream, Kokolopori, Tshuapa, DRC, 460 m | 0.408 | 22.9284 | - | + |
| *Hyperolius cinnamomeoventris* complex | IVB-H-CD18-134 | male | Yetee, Loto stream, Kokolopori, Tshuapa, DRC, 460 m | 0.408 | 22.9284 | - | + |
| *Hyperolius cinnamomeoventris* complex | IVB-H-CD18-357 | male | Yambimbo, Sondo stream, Kokolopori, Tshuapa, DRC, 420 m | 0.2255 | 22.8616 | - | + |
| *Hyperolius cinnamomeoventris* complex | IVB-H-CD18-358 | male | Yambimbo, Sondo stream, Kokolopori, Tshuapa, DRC, 430 m | 0.2255 | 22.8616 | - | + |

| Taxon | Catalogue No. | Sex | Locality | GPS | | µCT | Morph |
|---|---|---|---|---|---|---|---|
| | | | | °N | °E | | |
| *Hyperolius phantasticus* | IVB-H-CD18-192 | male | Yalokole, Iyoto stream, Kokolopori, Tshuapa, DRC, 400 m | 0.2136 | 22.8949 | - | + |
| *Hyperolius phantasticus* | IVB-H-CD18-202 | male | Yalofili, Bisolo stream, Kokolopori, Tshuapa, DRC, 400 m | 0.2105 | 22.8186 | - | + |
| *Hyperolius phantasticus* | IVB-H-CD18-492 | male | Yambimbo, Sondo stream, Kokolopori, Tshuapa, DRC, 420 m | 0.2269 | 22.8621 | - | + |
| *Hyperolius phantasticus* | IVB-H-CD18-493 | male | Yambimbo, Sondo stream, Kokolopori, Tshuapa, DRC, 420 m | 0.2269 | 22.8621 | - | + |
| *Hyperolius phantasticus* | IVB-H-CD18-508 | male | Yambimbo, Sondo stream, Kokolopori, Tshuapa, DRC, 420 m | 0.2269 | 22.8621 | - | + |
| *Hyperolius phantasticus* | IVB-H-CD18-518 | male | Yambimbo, Sondo stream, Kokolopori, Tshuapa, DRC, 420 m | 0.2269 | 22.8621 | - | + |
| *Hyperolius phantasticus* | IVB-H-CD18-519 | male | Yambimbo, Sondo stream, Kokolopori, Tshuapa, DRC, 420 m | 0.2269 | 22.8621 | - | + |
| *Hyperolius phantasticus* | IVB-H-CD18-523 | male | Yambimbo, Sondo stream, Kokolopori, Tshuapa, DRC, 420 m | 0.2269 | 22.8621 | - | + |
| *Hyperolius phantasticus* | IVB-H-CD18-526 | male | Yambimbo, Sondo stream, Kokolopori, Tshuapa, DRC, 420 m | 0.2269 | 22.8621 | - | + |
| *Hyperolius phantasticus* | IVB-H-CD18-528 | male | Yambimbo, Sondo stream, Kokolopori, Tshuapa, DRC, 420 m | 0.2269 | 22.8621 | - | + |
| *Hyperolius tuberculatus* complex | NMP-P6V 76082/1 | male | Mafamba, camp, Pool, Rep. Congo, 282 m | -4.2789 | 16.1973 | - | + |
| *Hyperolius tuberculatus* complex | NMP-P6V 76082/4 | male | Mafamba, camp, Pool, Rep. Congo, 282 m | -4.2789 | 16.1973 | - | + |
| *Hyperolius tuberculatus* complex | NMP-P6V 76082/5 | male | Mafamba, camp, Pool, Rep. Congo, 282 m | -4.2789 | 16.1973 | - | + |
| *Hyperolius tuberculatus* complex | NMP-P6V 76082/7 | male | Mafamba, camp, Pool, Rep. Congo, 282 m | -4.2789 | 16.1973 | - | + |
| *Hyperolius tuberculatus* complex | NMP-P6V 76082/8 | male | Mafamba, camp, Pool, Rep. Congo, 282 m | -4.2789 | 16.1973 | - | + |
| *Hyperolius tuberculatus* complex | NMP-P6V 76082/10 | male | Mafamba, camp, Pool, Rep. Congo, 282 m | -4.2789 | 16.1973 | - | + |
| *Hyperolius tuberculatus* complex | NMP-P6V 76082/11 | male | Mafamba, camp, Pool, Rep. Congo, 282 m | -4.2789 | 16.1973 | - | + |
| *Hyperolius tuberculatus* complex | NMP-P6V 76082/14 | male | Mafamba, camp, Pool, Rep. Congo, 282 m | -4.2789 | 16.1973 | - | + |
| *Hyperolius tuberculatus* complex | NMP-P6V 76083 | male | Mafamba, site 1, Pool, Rep. Congo, 274 m | -4.2789 | 16.1967 | - | + |
| *Hyperolius tuberculatus* complex | NMP-P6V 76084 | male | Mafamba, site 2, Pool, Rep. Congo, 271 m | -4.2789 | 16.1961 | - | + |
| *Hyperolius tuberculatus* complex | IVB-H-CD15-010 | male | Lisala, Congo River, Bapoto-Mongo, Mongala, DRC, 345 m | 2.1511 | 21.535 | + | - |

**Appendix S1. Additional material examined.**

*Afrixalus equatorialis*: NMP-P6V 76073/1 (Yalofili, Bisolo stream, Kokolopori, Tshuapa, DRC; 0.21°N 22.82°E).

*Callixalus pictus*: RMCA B.105145 (holotype; Lutsiro, 2600 m, Kisenyi Territory, Rwanda); CAS 104963, 104965–104967, 145261 (Upper Luvubu River, 2600–2800 m, Itombwe Highlands, Uvira Territory, South Kivu, DRC); MCZ A-64705–64714 (Upper Luvubu River, 2600 m, Itombwe Highlands, Uvira Territory, South Kivu, DRC).

*Chrysobatrachus cupreonitens*: RMCA B.109970 (holotype; Kitadjabukwe River 2800–2850 m, Uvira Territory, South Kivu, DRC); CAS 104968–104969, 104971–104972 (paratypes; Upper Kilungutwe swamp, 2650 m, Itombwe Highlands, Uvira Territory, South Kivu, DRC); MCZ A-64730–64739 (paratypes; Upper Kilungutwe swamps, 2650 m, Itombwe Highlands, Uvira Territory, South Kivu, DRC).

*Congolius robustus* gen. et comb. n.: RMCA 79-24-B-4 (holotype; Gembe, Koiteko swamp, Sankuru, DRC; -3.48°N 23.43°E), 79-24-B-5 (allotype; same locality as holotype), B.61800 (Makaw, Kasai River, Maï-Ndombe, DRC; -3.47°N 18.30°E); NMP-P6V 76087/2 (Yalokole, Luo River, swamp, Kokolopori, Tshuapa, DRC; 0.21°N 22.89°E), IVB-H-CD18-301–302 (Kima Mpela, stream, Kokolopori, Tshuapa, DRC; 0.17°N 22.93°E); ZMUC-R.079697 (Monkoto, Tshuapa, DRC ; -1.58°N 20.67°E), R.771151 (Landu River, Lodja, Sankuru, DRC; -3.25°N 23.52°E), R.771174, R.771177–771179 (Kokolopori, Tshuapa, DRC; 0.25°N 22.87°E).

*Cryptothylax minutus*: RMCA B.117082 (holotype; Mabali, Bikoro, Lake Tumba, Équateur, DRC), specimen # 55 from series B.117083–117087 (no individual acc. no., allotype; same locality as holotype).

*Hyperolius balfouri*: IVB-H-CD15-062 (Lisala, swamp, Mongala, Equateur, DRC; 2.15°N 21.53°E).

*H.* cf. *adspersus*: IVB-H-CD15-139 (Bosolo, spring, Mongala, Equateur, DRC; 1.75°N 21.42°E).

*H. sankuruensis*: RMCA 79-24-B-1 (holotype; Omaniundu, Sankuru, DRC; -3.35°N 23.27°E), 79-24-B-2 (allotype; same locality as holotype); ZMUC-R.771205 (Mabali, Lake Tumba, old IRSAC station, Équateur, DRC; -0.88°N 18.13°E).

*Opisthothylax immaculatus*: NMP-P6V 76090/1 (Mindjong, Mbemba forest, site2, Sembé, Sangha, Rep. Congo; 1.49°N 14.37°E).

*Phlyctimantis verrucosus*: NMP-P6V 76085/1 (Yasaka, Kokolopori, Tshuapa, DRC; 0.24°N 22.87°E).

**Appendix S2. Distribution records of *Congolius robustus* gen. et comb. n.**

Based on literature, museum materials, and own unpublished data, we provide a list of distribution records of *Congolius robustus* gen. et comb. n., all in present-day DRC (coordinates are approximate; former provinces in parentheses; see Fig. 1a):
Gembe, Koiteko Swamp, Lodja Territory, type locality, -3.48°N 23.43°E, Sankuru (Kasaï-Oriental), Laurent (1979);
Musii River, Lodja Territory, -3.56°N, 23.65°E, Sankuru (Kasaï-Oriental), Laurent (1979);
Onema, Lodja Territory, -3.72°N 23.92°E, Sankuru (Kasaï-Oriental), Laurent (1979);
Omaniundu, Lodja Territory , -3.35°N 23.27°E, Sankuru (Kasaï-Oriental), Laurent (1979);
Lomami, Lomela Territory, -1.92°N 22.70°E, Sankuru (Kasaï-Oriental), Laurent (1979);
Landu River, Lodja, -3.25°N 23.52°E, Sankuru (Kasaï-Oriental), single specimen ZMUC-R.771151 (on exchange from RMCA);
Makaw, Kasai River, -3.47°N 18.30°E, Maï-Ndombe (Bandundu), single specimen RMCA B.61800, collected by E. Jans in 1958;
LuiKotale, Salonga National Park, -2.88°N 20.41°E, Maï-Ndombe (Bandundu), recorded by J. Kielgast in 2008 (pers. comm.);
Monkoto, -1.58°N 20.67°E, Tshuapa (Équateur), Schiøtz (1999, 2006);
Kokolopori Bonobo Nature Reserve, 0.25°N 22.87°E, Tshuapa (Équateur), Schiøtz (2006; the locality was given incorrectly as south of the Equator), several sites within the reserve (own unpublished data; see Supplementary Table S1 for details on investigated material);
Mombongo, Luende stream, 1.64°N 23.15°E, Tshopo (Orientale), this study;
Yawaka, Bechuchuu, 0.51°N 23.15°E, Tshopo (Orientale), this study.

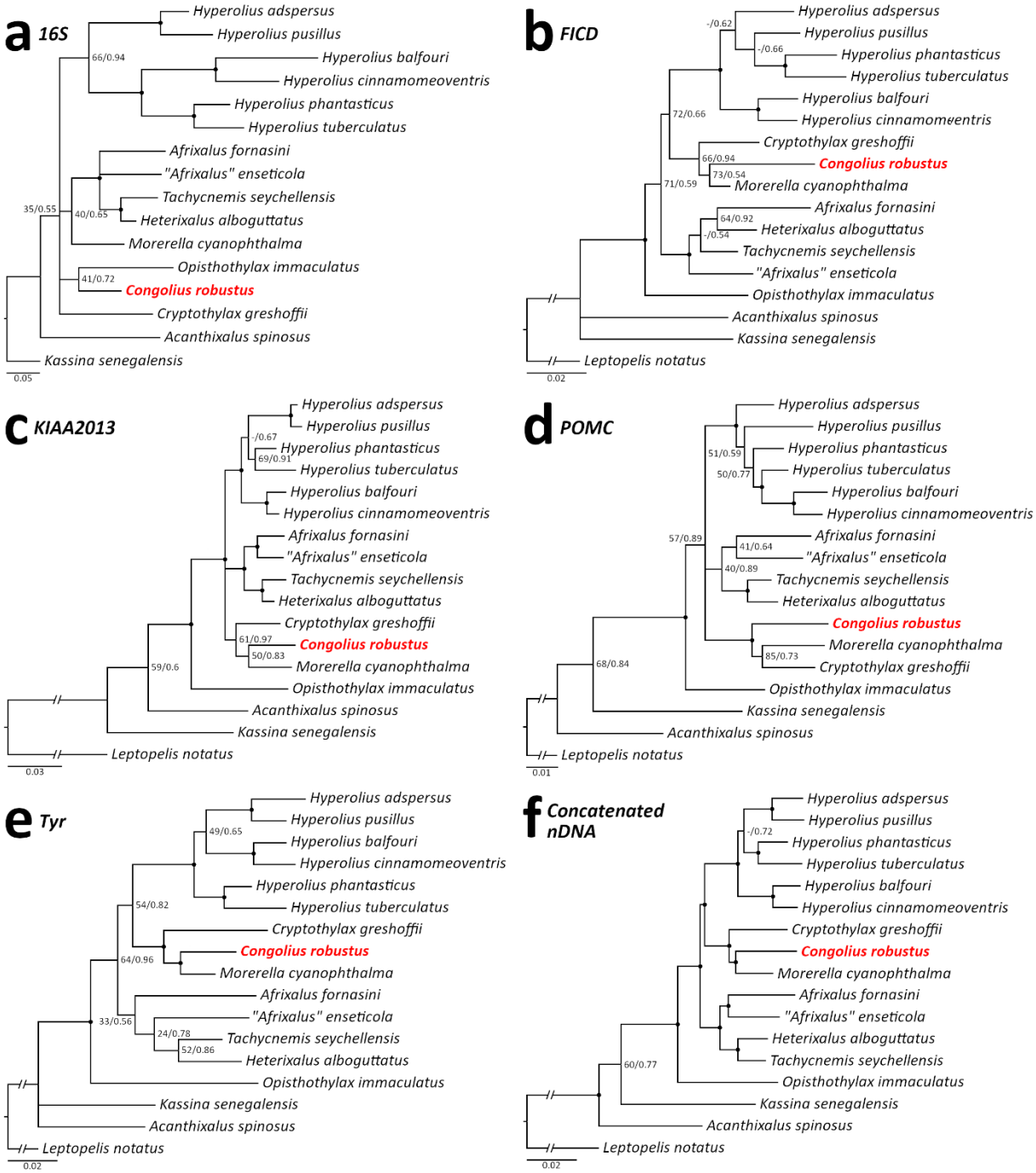



**Figure S3. Bayesian phylogenetic trees of (a–e) individual genetic markers, and (f) concatenated data set based on four nuclear markers.** (a) Mitochondrial *16S rRNA*, (b) *FICD*, (c) *KIAA2013*, (d) *POMC*, (e) *Tyr*, and (f) concatenated nuclear data set. Dots at nodes represent high supports (ML bootstrap ≥ 70/Bayesian posterior probabilities ≥ 0.95), and numbers show support values for nodes with lower support. GenBank accession numbers are provided in Supplementary Table S5.

**Appendix S3. Resources for comparative diagnosis of *Congolius* gen. n. with other genera of the family Hyperoliidae.**

Morphological characters were taken from Amiet (2000, *Alexteroon*; 2012), Channing *et al*. (2013, *Hyperolius*), Drewes (1984, *Heterixalus*, *Paracassina*, *Semnodactylus*, and other genera), Largen (1975, *Kassina*), Laurent (1940, *Kassinula*; 1950, *Callixalus*; 1951, *Chrysobatrachus*; 1964, *Callixalus*, *Chrysobatrachus*; 1976, *Cryptothylax, Phlyctimantis*, *Kassina*; 1982, *Afrixalus*), Laurent & Combaz (1950, *Cryptothylax*, *Phlyctimantis*), Liem (1970), Nussbaum & Wu (1995, *Tachycnemis*), Perret (1988, *Alexteroon*, *Arlequinus*), Rödel *et al*. (2003, *Acanthixalus*; 2009, *Morerella*), Schiøtz (1975; 1999; 2006, *Hyperolius*; 2007), and own unpublished data. See Supplementary Appendix S4 for references.

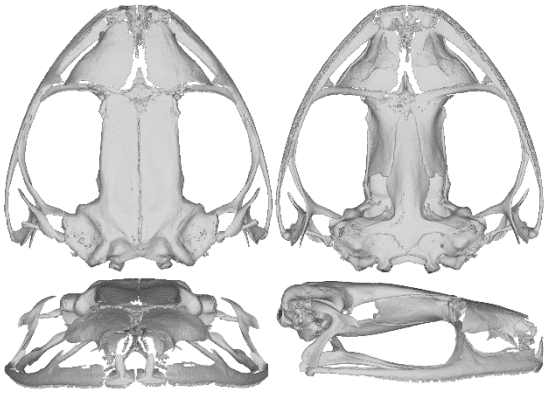
**Table S2. Uncorrected *p*-distances based on a fragment of the *16S rRNA* gene.** Asterisk denotes specimens of *Congolius robustus* gen. et comb. n. from the same locality (Kokolopori Bonobo Nature Reserve, DRC).

| | Species | GenBank acc. numbers | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | *Congolius robustus* gen. et comb. n.* ZMUC-R.771176 | MW626928 | - | | | | | | | | | | | | | | | | | |
| 2 | *Congolius robustus** IVB-H-CD18-255 | MW626930 | 0.0 | - | | | | | | | | | | | | | | | | |
| 3 | *Congolius robustus* NMP-P6V 76089 | MW626929 | 0.4 | 0.4 | - | | | | | | | | | | | | | | | |
| 4 | *Morerella cyanophthalma* | MK498163 | 11.8 | 11.6 | 11.6 | - | | | | | | | | | | | | | | |
| 5 | *Cryptothylax greshoffii* | MK509715 | 15.0 | 15.0 | 13.6 | 13.8 | - | | | | | | | | | | | | | |
| 6 | *Hyperolius adspersus* | MK509502 | 17.8 | 17.1 | 17.5 | 17.2 | 18.8 | - | | | | | | | | | | | | |
| 7 | *Hyperolius pusillus* | MK509496 | 18.0 | 16.8 | 17.3 | 17.2 | 20.2 | 8.5 | - | | | | | | | | | | | |
| 8 | *Hyperolius balfouri* | MK509719 | 20.6 | 19.8 | 20.2 | 20.3 | 19.9 | 19.5 | 19.0 | - | | | | | | | | | | |
| 9 | *Hyperolius cinnamomeoventris* | MK509566 | 20.6 | 20.2 | 20.6 | 20.7 | 19.7 | 19.1 | 17.9 | 14.5 | - | | | | | | | | | |
| 10 | *Hyperolius phantasticus* | MK509672 | 19.2 | 19.2 | 19.6 | 15.8 | 19.5 | 17.1 | 17.8 | 19.0 | 17.9 | - | | | | | | | | |
| 11 | *Hyperolius tuberculatus* | MK509553 | 20.2 | 19.8 | 20.2 | 16.0 | 19.9 | 18.6 | 17.6 | 20.0 | 19.2 | 9.0 | - | | | | | | | |
| 12 | *Afrixalus fornasini* | MK509484 | 14.1 | 14.1 | 14.5 | 13.5 | 16.9 | 17.1 | 18.2 | 21.4 | 19.8 | 18.8 | 19.1 | - | | | | | | |
| 13 | "*Afrixalus*" *enseticola* | MK509689 | 13.6 | 13.5 | 13.5 | 11.9 | 15.4 | 17.0 | 17.9 | 21.3 | 20.1 | 17.8 | 16.3 | 11.7 | - | | | | | |
| 14 | *Heterixalus alboguttatus* | MK509492 | 13.6 | 13.5 | 13.9 | 9.8 | 14.4 | 16.4 | 16.9 | 21.6 | 20.5 | 16.7 | 17.3 | 11.0 | 9.7 | - | | | | |
| 15 | *Tachycnemis seychellensis* | MK509675 | 13.6 | 15.4 | 15.9 | 11.4 | 14.8 | 19.5 | 19.9 | 22.8 | 19.8 | 18.3 | 17.9 | 10.8 | 10.2 | 6.8 | - | | | |
| 16 | *Opisthothylax immaculatus* | MK509570 | 12.8 | 12.0 | 12.4 | 13.2 | 15.1 | 17.6 | 18.1 | 20.9 | 18.6 | 18.9 | 19.0 | 15.1 | 12.8 | 13.4 | 14.6 | - | | |
| 17 | *Acanthixalus spinosus* | MK509618 | 16.5 | 16.1 | 16.1 | 11.9 | 18.2 | 19.7 | 19.7 | 21.7 | 20.7 | 19.0 | 19.2 | 16.9 | 18.0 | 15.3 | 17.8 | 18.4 | - | |
| 18 | *Kassina senegalensis* | MK509663 | 13.6 | 13.1 | 13.5 | 13.6 | 13.7 | 17.5 | 18.6 | 20.0 | 19.4 | 17.7 | 19.1 | 14.5 | 15.9 | 14.1 | 15.5 | 13.2 | 15.2 | - |

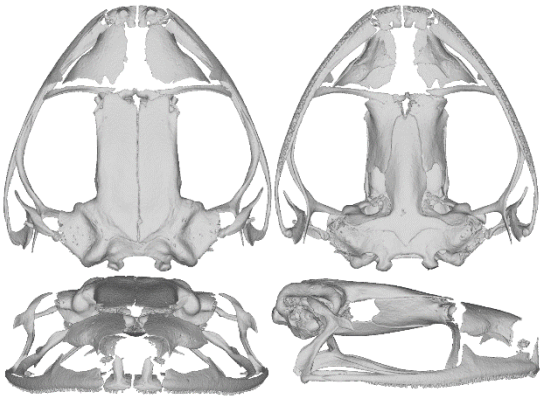
**Table S3. Factor loadings of the first three principal components of PCA of body shape.**
Values of the most contributing variables in bold.

| Component | HW | HDL | IOD | ED | ENL | IND | SL | HL | RL | HaL | DW | FL | TL | FoL | MANOVA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PC1 (31.7%) | -0.24 | **-1.12** | 0.86 | 0.87 | **-1.11** | **1.14** | **-1.14** | 0.49 | 0.37 | -0.44 | 0.76 | 0.25 | 0.72 | -0.87 | $F_{5,15} = 57.07$ |
| PC2 (20.3%) | **1.00** | 0.15 | 0.74 | 0.18 | -0.38 | 0.68 | 0.02 | **-1.03** | **-0.94** | 0.36 | 0.15 | -0.78 | **-0.94** | -0.22 | $p = <2.2e-16$ |
| PC3 (12.9%) | **-0.68** | 0.25 | 0.22 | 0.59 | **0.69** | -0.12 | 0.47 | -0.41 | -0.40 | **-0.98** | -0.01 | -0.30 | 0.17 | **-0.83** | |

***Congolius robustus*** gen. et comb. n.
ZMUC-R.771175

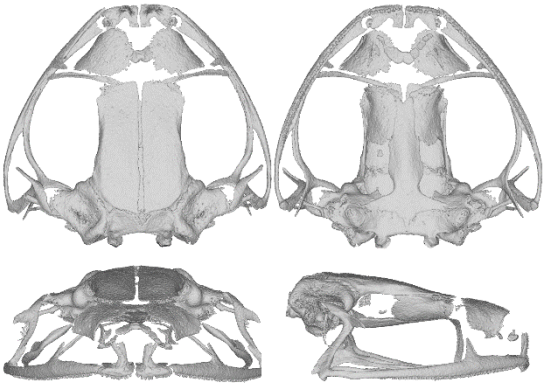


***Congolius robustus*** gen. et comb. n.
ZMUC-R.771176



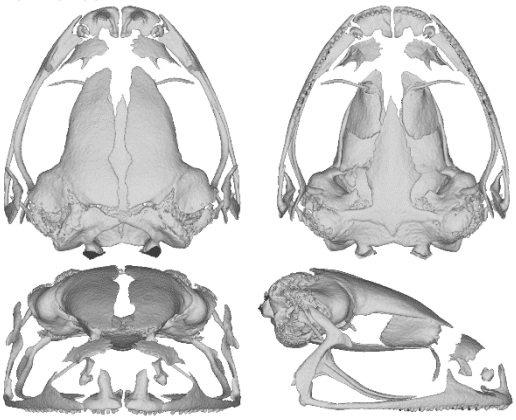
***Hyperolius balfouri***
IVB-H-CD15-061

***Hyperolius tuberculatus***
IVB-H-CD15-010

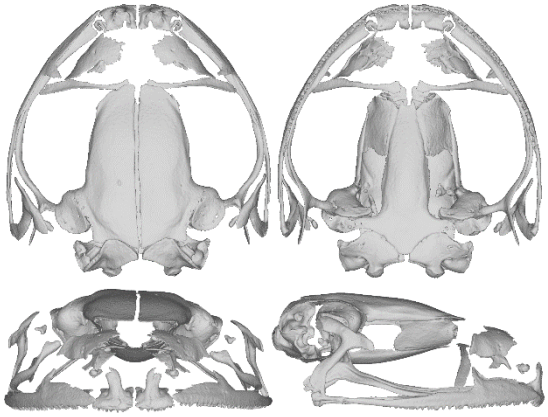


***Cryptothylax greshoffii***
IVB-H-CD15-169

***Chrysobatrachus cupreonitens***
CAS 145263



***Callixalus pictus***
CAS 145260



***Acanthixalus spinosus***
CAS 153800

**Figure S4. Cranial morphology of all examined specimens.** From top left: *Congolius robustus* gen. et comb. n. (ZMUC-R.771175, male), *C. robustus* (ZMUC-R.771176, female), *Hyperolius balfouri* (IVB-H-CD15-061, male), *H.* cf. *tuberculatus* (IVB-H-CD15-010, male), *Cryptothylax greshoffii* (IVB-H-CD15-169, male), *Chrysobatrachus cupreonitens* (CAS 145263, male), *Callixalus pictus* (CAS 145260, male), and *Acanthixalus spinosus* (CAS 153800, female). Reconstructions in dorsal, ventral, frontal, and lateral views are based on high-resolution X-ray microcomputed tomography. Skull views are scaled to a similar size among the specimens.

**Table S4. Factor scores of the first two principal components of PCA of cranial shape.** Taxa in bold are similar in the shape of their skulls.

| Component | *Hyperolius tuberculatus* | ***Hyperolius balfouri*** | ***Congolius robustus*** gen. et comb. n. | *Cryptothylax greshoffii* |
|---|---|---|---|---|
| PC1 (65.1%) | -0.064 | **-0.018** | **0.007** | 0.076 |
| PC2 (28.5%) | 0.038 | **-0.031** | **-0.036** | 0.028 |

**Table S5. Taxa and samples included in phylogenetic analyses with GenBank accession numbers.** Asterisk denotes outgroups.

| Species | *16S* | *FICD* | *KIAA2013* | *POMC* | *Tyr* |
|---|---|---|---|---|---|
| **Acanthixalus spinosus* | MK509618 | MK498693 | MK498898 | MK499174 | MK498413 |
| *Afrixalus enseticola* | MK509689 | MK498520 | MK498923 | MK498959 | MK498374 |
| *Afrixalus fornasini* | MK509484 | MK498507 | MK498804 | MK499057 | MK498390 |
| *Congolius robustus* gen. et. comb. n. ZMUC-R.771176 | MW626928 | MW626916 | MW626919 | MW626922 | MW626925 |
| *Congolius robustus* NMP-P6V 76089 | MW626929 | MW626917 | MW626920 | MW626923 | MW626926 |
| *Congolius robustus* IVB-H-CD18-255 | MW626930 | MW626918 | MW626921 | MW626924 | MW626927 |
| *Cryptothylax greshoffii* | MK509715 | MK498689 | MK498705 | MK498956 | MK498434 |
| *Heterixalus alboguttatus* | MK509492 | MK498523 | MK498893 | MK499154 | MK498371 |
| *Hyperolius adspersus* | MK509502 | MK498632 | MK498931 | MK498992 | MK498264 |
| *Hyperolius balfouri* | MK509719 | MK498481 | MK498869 | MK499101 | MK498032 |
| *Hyperolius cinnamomeoventris* | MK509566 | MK498473 | MK498811 | MK499132 | MK498272 |
| *Hyperolius phantasticus* | MK509672 | MK498677 | MK498794 | MK498998 | MK498265 |
| *Hyperolius pusillus* | MK509496 | MK498603 | MK498887 | MK499047 | MK498225 |
| *Hyperolius tuberculatus* | MK509553 | MK498635 | MK498878 | MK499111 | MK498206 |
| **Kassina senegalensis* | MK509663 | MK498621 | MK498940 | MK499186 | MK498427 |
| **Leptopelis notatus* | - | KX492679 | KX492732 | KX492782 | KX492876 |
| *Morerella cyanophthalma* | MK498163 | MK498608 | MK498915 | MK499159 | MK498411 |
| *Opisthothylax immaculatus* | MK509570 | MK498629 | MK498946 | MK499171 | MK498430 |
| *Tachycnemis seychellensis* | MK509675 | MK498585 | MK498924 | MK499156 | MK498396 |

**Table S6. Primers used to amplify selected markers.**

| Marker | Primer | Sequence (5'–3') | Source |
|---|---|---|---|
| *16S* | 16SL1 | CGC CTG TTT AAC AAA AAC AT | Palumbi *et al*. 1991 (modified) |
| *16S* | 16SH1 | CCG GTC TGA ACT CAG ATC ACG T | Palumbi *et al*. 1991 |
| *FICD* | FICD F1 | CCK CTN GTN GAR ATH GAY CA | Shen *et al*. 2013 |
| *FICD* | FICD R1 | TYT CNG TRC AYT TNG CDA TRA A | Shen *et al*. 2013 |
| *FICD* | FICD F2 | AGG GTT TTC CCA GTX ACG ACT ACT AYC AYC AYA THT AYC AYA C | Shen *et al*. 2013 |
| *FICD* | FICD R2 | AGA TAA CAA TTT CAC ACA GGA ARG GCC KVA CRT CNC CYT CRT T | Shen *et al*. 2013 |
| *KIAA2013* | KIAA2013 F1 | CTS AAN TAY GCN GAY CAY TGY TT | Shen *et al*. 2013 |
| *KIAA2013* | KIAA2013 R1 | CCN GGN CCR CAR TAY TCR TTR TA | Shen *et al*. 2013 |
| *KIAA2013* | KIAA2013 F2 | AGG GTT TTC CCA GTC ACG ACA CYA TGC AYG CNG AGA AYY TGT GG | Shen *et al*. 2013 |
| *KIAA2013* | KIAA2013 R2 | AGA TAA CAA TTT CAC ACA GGG ANG CCA CNC TRA ACC ARA A | Shen *et al*. 2013 |
| *POMC* | POMC-1 | GAA TGT ATY AAA GMM TGC AAG ATG GWC CT | Wiens *et al*. 2005 |
| *POMC* | POMC-7 | TGG CAT TTT TGA AAA GAG TCA T | Smith *et al*. 2005 |
| *Tyr* | Tyr 1C | GGC AGA GGA WCR TGC CAA GAT GT | Bossuyt & Milinkovitch 2000 |
| *Tyr* | Tyr 1G | TGC TGG CRT CTC TCC ART CCC A | Bossuyt & Milinkovitch 2000 |

**Table S7. Substitution models used in phylogenetic analyses.**

| Separate analysis | MrBayes and RAxML-NG | | | StarBEAST2 | | |
|---|---|---|---|---|---|---|
| | 1st | 2nd | 3rd | 1st | 2nd | 3rd |
| *16S* | GTR+I+G | | | - | | |
| *FICD* | K80+I | F81+I | K80+G | K80+I | F81+I | K80+G |
| *KIAA2013* | K80+G | | HKY+G | K80+G | | HKY+G |
| *POMC* | HKY+I | | K80+G | HKY+I | | K80+G |
| *Tyr* | K80+I+G | | HKY+G | K80+I+G | | HKY+G |
| Concatenated nDNA data set | MrBayes and RAxML-NG | | | StarBEAST2 | | |
| | 1st | 2nd | 3rd | | | |
| *FICD* | HKY+I+G | HKY+I | K80+G | - | | |
| *KIAA2013* | K80 | HKY+I | HKY+G | - | | |
| *POMC* | HKY+I+G | | K80+G | - | | |
| *Tyr* | HKY+I+G | | HKY+G | - | | |
| Concatenated nDNA + *16S* dataset | MrBayes and RAxML-NG | | | StarBEAST2 | | |
| | 1st | 2nd | 3rd | | | |
| *16S* | GTR+I+G | | | - | | |
| *FICD* | HKY+I | K80+G | HKY+I+G | - | | |
| *KIAA2013* | K80 | HKY+I | HKY+G | - | | |
| *POMC* | HKY+I+G | | K80+G | - | | |
| *Tyr* | HKY+I+G | | HKY+G | - | | |

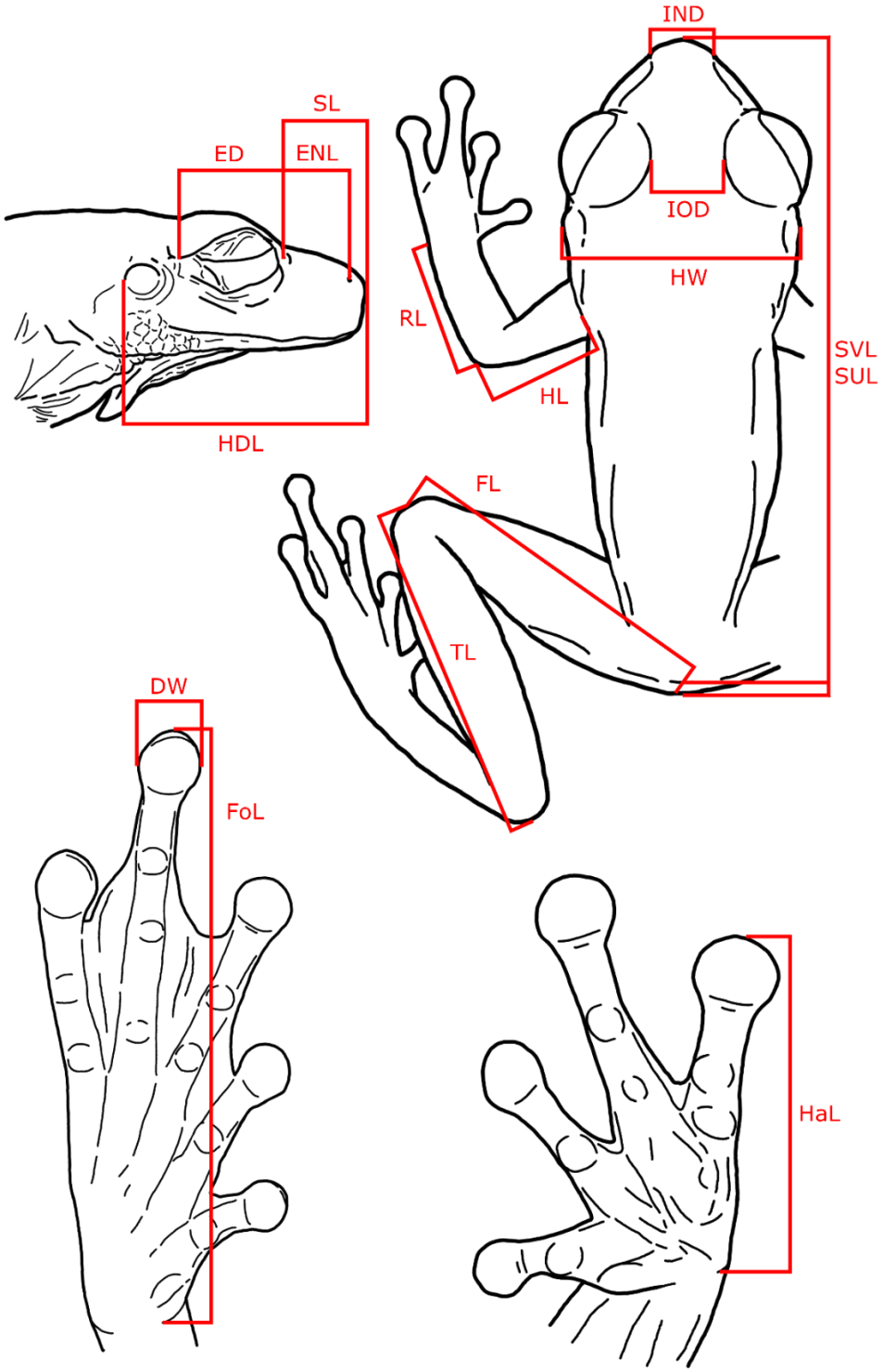



**Figure S5. Visualization of 16 measured characters:** snout-vent length (SVL), snout-urostyle length (SUL), head width (HW), head length (HDL), interorbital distance (IOD), eye diameter (ED), eye-nostril length (ENL), internarial distance (IND), snout length (SL), humerus length (HL), radioulna length (RL), hand length (HaL), femur length (FL), tibiofibula length (TL), foot length (FoL), disc width (DW). Illustration based on *Congolius robustus* gen. et comb. n. by T.N.

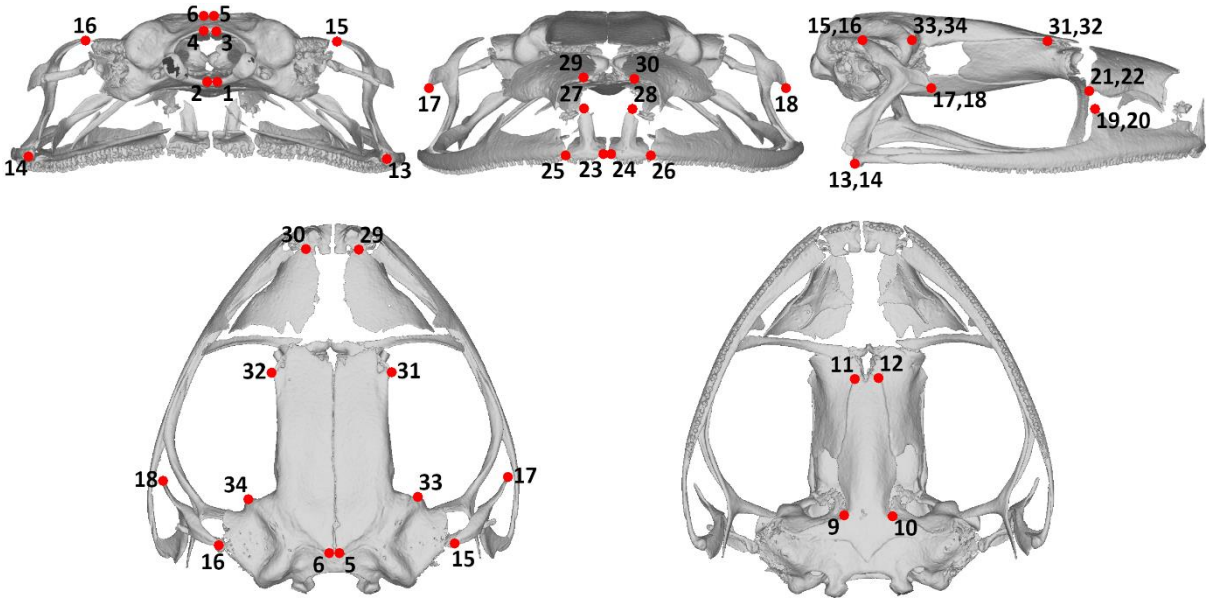



**Figure S6. Visualization of 32 digitized landmarks.** Adapted and modified from Paluh *et al*. (2020), displayed on a skull µCT scan of a female *Congolius robustus* gen. et comb. n. (ZMUC-R.771176). Views from top left: posterior, anterior, lateral, dorsal, and ventral.

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