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New records of two riparian species of Labiduridae (Insecta, Dermaptera) from Guizhou Province, China

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Abstract. We report new provincial records of two riparian earwigs, *Forcipula decolyi* de Bormans, 1900 and *Nala lividipes* (Dufour, 1820), from Fanjingshan National Nature Reserve, Tongren City, Guizhou Province, China. The specimens conform to previously published diagnostic characters of these species, notably forceps and genital morphology. These records extend the known distributions of *F. decolyi* and *N. lividipes* within China and underscore the incompleteness of current faunal inventories. We also provide distribution maps for the two species.

Key words. Distribution, earwig, habitat, morphology, taxonomy

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Introduction

The earwig family Labiduridae is distributed worldwide and currently comprises three subfamilies, eight genera, and approximately 80 extant species (Hopkins et al. 2025). The two labidurid species treated here, *Forcipula decolyi* de Bormans, 1900 and *Nala lividipes* (Dufour, 1820), are morphologically distinct from their close relatives most notably in the morphology of the male forceps. Both taxa are associated with riparian microhabitats. *Forcipula decolyi* has been collected beneath stones on sandy riverbanks (Shrivastava 1968), whereas *N. lividipes* typically inhabits warm, humid microhabitats such as stream valleys (Mifsud and Vigna Taglianti 2008). These shared affinities for streamside sands sug-gest similar ecological requirements. As in other members of Labiduridae, both species are predators or scavengers in moist soil and detrital substrates; their local occurrence may, therefore, reflect the condition of riparian ecosystems, which are sensitive to anthropogenic disturbance and hydrological change (Fierro et al. 2017).

The two species have been reported from broad but sporadically sampled regions. *Forcipula decolyi* has been recorded across South and East Asia (Bhutan, India, Nepal, New Guinea, Sikkim, Vietnam, and several Chinese provinces including Fujian, Guangxi, Hubei, Sichuan, Xizang, and Yunnan) (Figure 1; Shrivastava 1968; Steinmann 1989; Chen and Ma 2004). *Nala lividipes* was originally described from Spain and is likely to be of Afrotropical origin (Figure 2). According to Steinmann (1989), its range extends from southern Europe and North Africa through sub-Saharan Africa, Arabia, and Iran, east-ward to India, Southeast Asia, China, Japan, the Philippine Islands, and Australia. The species has been further recorded from India, Bhutan, Nepal, and Sri Lanka (Srivastava 2003), and from Hainan and Yunnan provinces in China (Chen and Ma 2004). Additional reports by Mifsud and Vigna Taglianti (2008) document its wide distribution across the Mediterranean (Canary Islands, Portugal, Spain, North Africa, Sicily, Sardinia, and mainland Italy) and its presence in parts of Africa (Ethiopia, Uganda, Burkina Faso, Zambia, Mozambique, Madagascar), South and Southeast Asia (Bangladesh, Thailand, Afghanistan, India, Sri Lanka, Java, Sumatra, Sulawesi, China, Japan, Philippines), and southwestern Australia. There are introduced populations in Hawaii and the Nearctic and Neotropical regions. Most recently, Dey and Emiliyamma (2023) confirmed its occurrence in several Mediterranean countries, including Algeria, France, Italy (Sicily and Sardinia), Portugal, Malta, Morocco, Spain (Balearic and Canary Islands), Turkey, and Tunisia. Prior to the present work, neither species had been documented from Guizhou Province.

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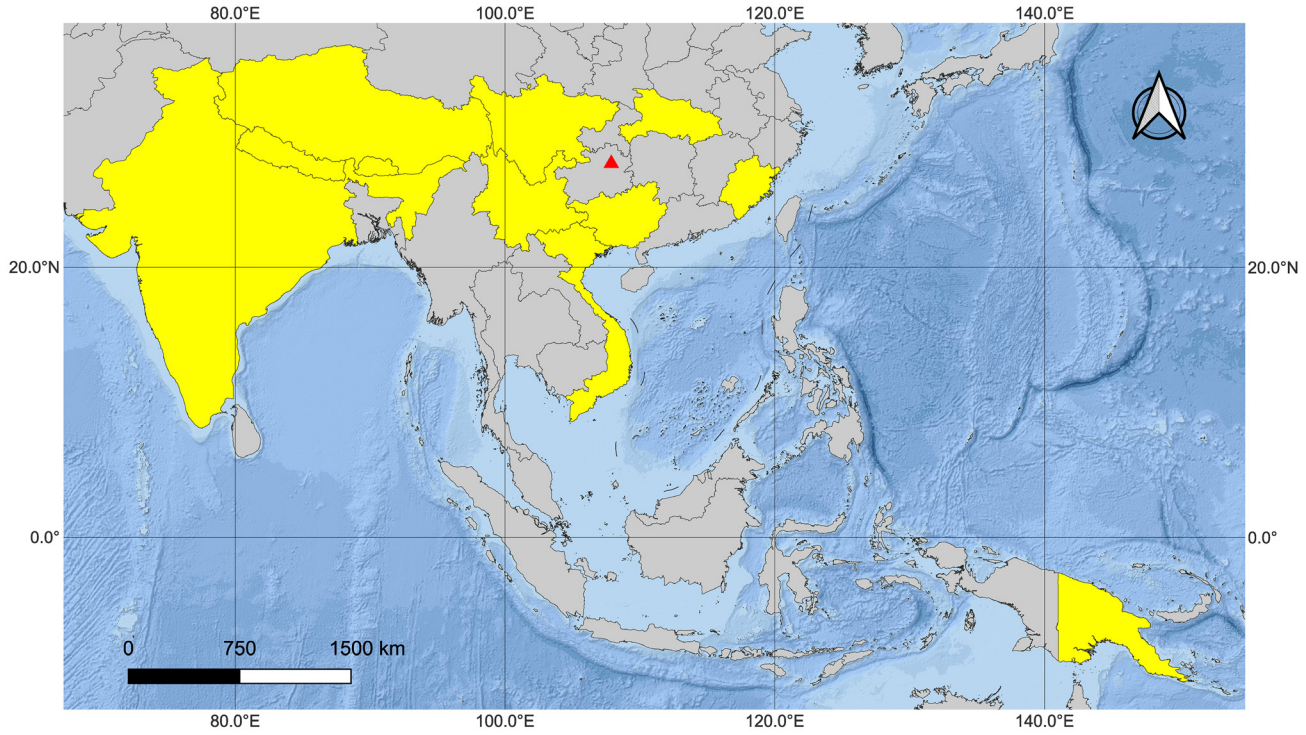

Figure 1. Distribution of *Forcipula decolyi* de Bormans, 1900. The yellow colour indicates the previously known records and the red triangle indicates the new records from Guizhou Province, China.

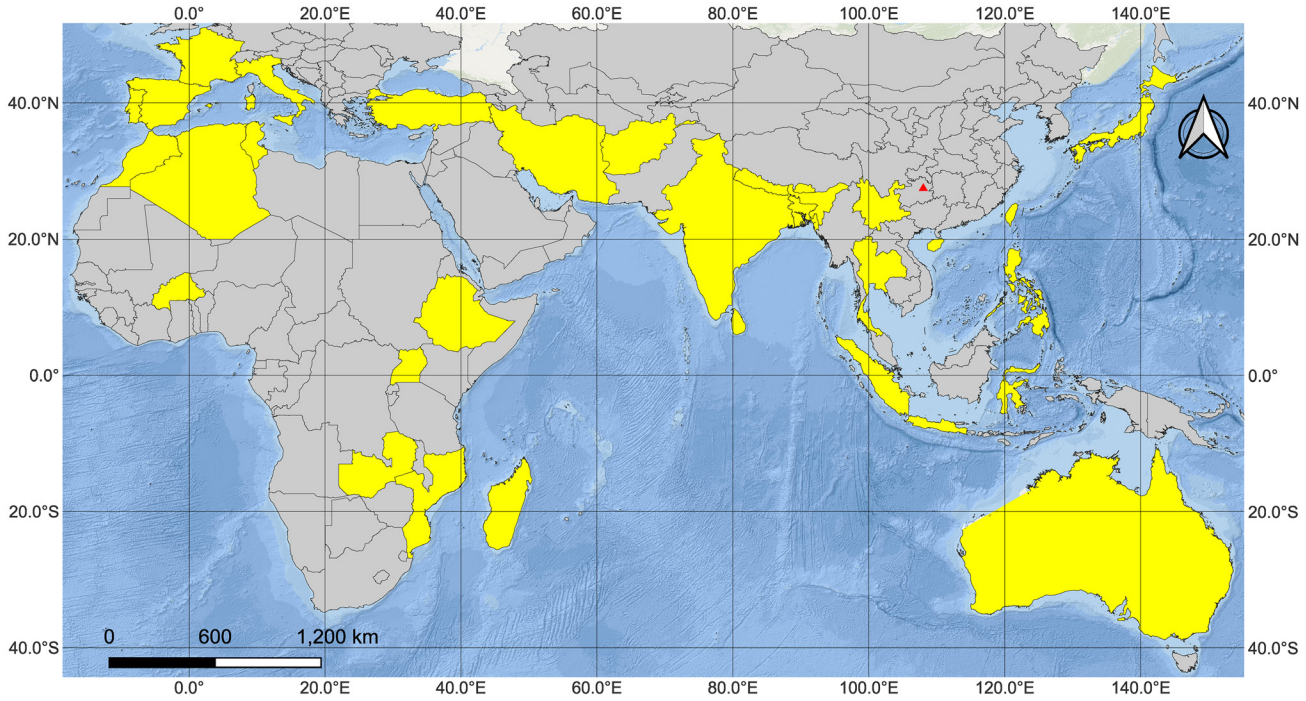

Figure 2. Distribution of *Nala lividipes* (Dufour, 1820). The yellow colour indicates the previously known records and the red triangle indicates the new records from Guizhou Province, China.

In this study, we report new provincial records of *F. decolyi* and *N. lividipes* based on field surveys in Fanjingshan National Nature Reserve, Guizhou Province, China. Our records do not describe new species, but they expand the knowledge of Chinese labidurid fauna. Adding Guizhou Province to their distribution emphasizes the need for continued and expanded biodiversity monitoring in China.

Methods

The specimens were hand-collected from beneath riparian rocks in Fanjingshan National Nature Reserve, Tongren City, Guizhou Province, China, during 2025 field surveys (Figure 3A–C). Collected individuals were preserved in 75% ethanol and deposited in the Insect Collection of Jiangsu University of Science and Technology (ICJUST), Jiangsu Province, China. Morphological examinations and identifications were performed using an SDPTOP SZM45 stereomicroscope (Sunny Optical Technology (Group) Co., Ltd., Zhejiang, China). Photographs were taken with a Canon EOS 5DSR camera (Canon, Tokyo, Japan) and a Canon MP-E 2.8/65 mm macro lens (Canon, Tokyo, Japan). Focus-stacked images were produced with Zerene Stacker v. 1.04 (Zerene Systems, Richland, WA, USA) and final plates prepared in Adobe Photoshop v. 26.4.1 (Adobe Inc., San Jose, CA, USA). A distribution map was produced in QGIS v. 3.40.11-Bratislava (QGIS 2025). Body length was measured from the anterior margin of the head to the posterior tip of the forceps. Taxonomic identification of specimens at the family, genus, and species levels was performed according to the related descriptions and publications (Steinmann 1980, 1989; Srivastava 1986, 2003; Chen and Ma 2004; Matzke 2012). Morphological terminology follows Steinmann (1989).

Results

***Forcipula decolyi* de Bormans, 1900**

Figures 4–6

New records. CHINA — **Guizhou** • Tongren City, Fanjingshan National Nature Reserve, Jiaohuang; 27.7601°N, 108.7222°E; 500 m alt.; 13.VIII.2025; Zhi-Teng Chen leg.; 2♂, 3♀, 75% alcohol, ICJUST No. gcm20250813 • Same locality as preceding; 21.IX.2025; 1♂, 1♀, 75% alcohol, ICJUST No. gcm20250921 • Tongren City, Fanjingshan National Nature Reserve, Shibanzhai; 27.9844°N, 108.6734°E; 1080 m alt.; 24.IX.2025; 2♂, 2♀, 75% alcohol, ICJUST No. gcm20250924.

Identification. The specimens from Guizhou Province, China matched well with the descriptions and illustrations from previous studies (Steinmann 1980, 1989; Srivastava 1986; Chen and Ma 2004). The males are identified by the following characters: body length with forceps around 30–40 mm (Figure 4A, B). Head dark, nearly as long as wide, with weakly emarginate posterior margin; frontal and

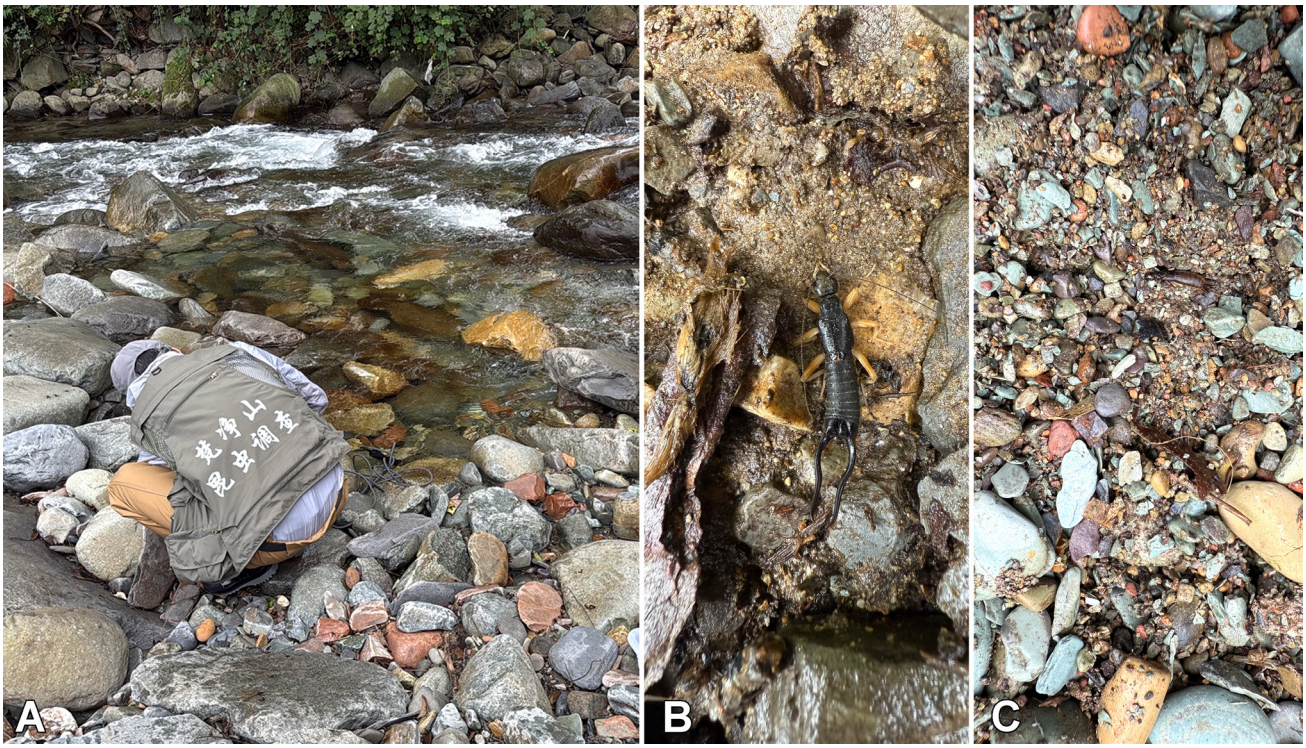

Figure 3. Field survey in Fanjingshan National Nature Reserve, Guizhou Province, China. **A.** Riparian sampling. **B.** Microhabitat of *Forcipula decolyi* de Bormans, 1900. **C.** Microhabitat of *Nala lividipes* (Dufour, 1820).

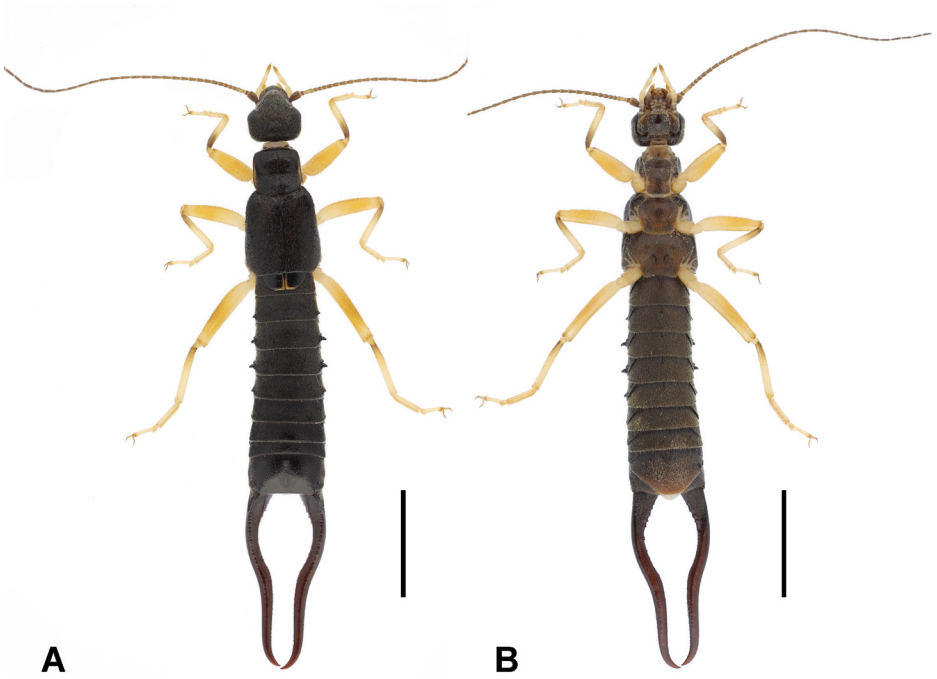

Figure 4. *Forcipula decolyi* de Bormans, 1900 from Guizhou Province, China. **A.** Male habitus, dorsal view. **B.** Male habitus, ventral view. Scale bars: 5 mm.

Figure 5. *Forcipula decolyi* de Bormans, 1900 from Guizhou Province, China. **A.** Apical half of male genitalia, dorsal view. **B.** Basal half of male genitalia, dorsal view. **C.** Apical half of male genitalia, ventral view. **D.** Basal half of male genitalia, ventral view. Scale bars: 0.5 mm.

coronal sutures obscure. Eyes small, slightly shorter than post-ocular region. Antennae brown, slender; first segment near half of distance between antennal bases, constricted basally; segment 2 short, near as long as wide; segment 3 three times as long as wide; subsequent segments gradually elongated toward apex. Pronotum dark, as wide as head, as long as wide; lateral margins with pale areas, slightly diverging posteriad; posterior margin rounded; median longitudinal furrow distinct. Tegmina dark, near twice as long as pronotum, posterior margin near truncate. Scales of hind wings dark, smooth, small, with pale inner and posterior margins, truncate posteriorly. Legs slender, yellowish; first tarsal segment longer than combined length of second and third. Abdomen dark, gradually expanded to ultimate tergite. Abdominal tergites 3–5 with both giant and small spines near posterolateral margins. Ultimate tergite transverse, subquadrate, mostly glabrous, median longitudinal furrow distinct. Pygidium hidden. Penultimate sternite transverse, nearly 1.5 times as wide as long, lateral margins obliquely truncate, posterior margin slightly rounded. Forceps dark brown, sinuate, slightly depressed basally, apex conical; base of forceps with oblique ridge dorsally; inner margin of basal half with 6–10 small teeth and numerous small tubercles; without tooth medially. Genitalia slender (Figure 5A–D),

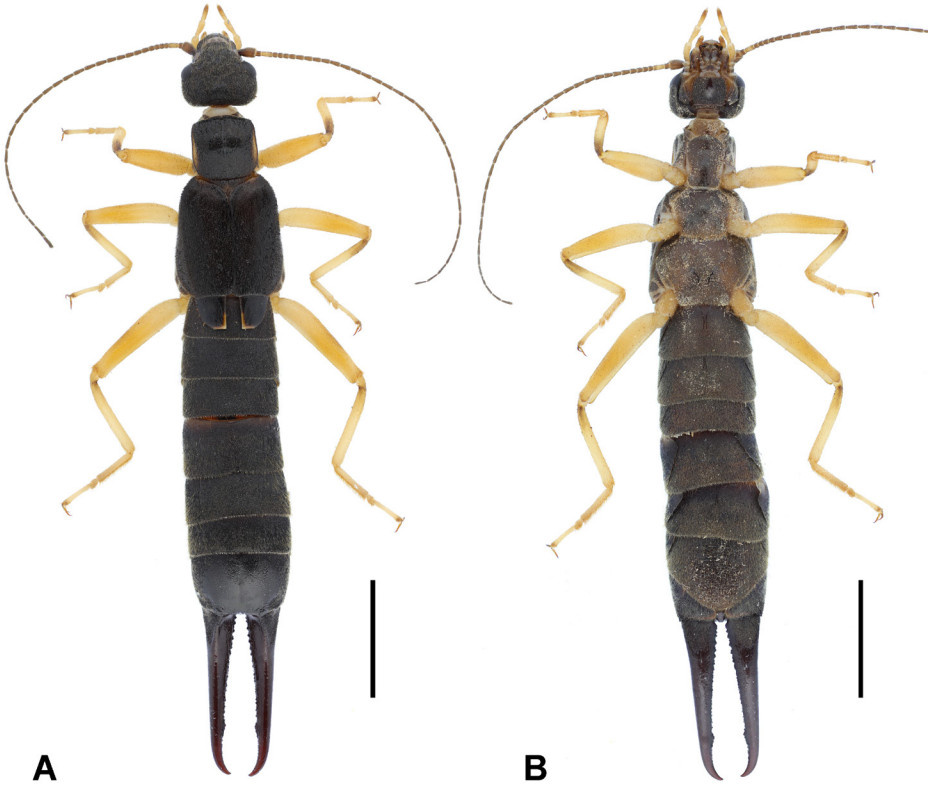

Figure 6. *Forcipula decolyi* de Bormans, 1900 from Guizhou Province, China. **A.** Female habitus, dorsal view. **B.** Female habitus, ventral view. Scale bars: 5 mm.

median incision of anterior margin deep; paired genital lobes well developed; virga curved medially; basal vesicle small, fusiform, darkly sclerotised. Paired external parameres long, inner margins almost straight, outer margins convex; epimerite at tip of external paramere slender, pointed apically. The females are identified by the following characters (Figure 6A, B): body length with forceps around 30 mm; colour pattern similar to male; abdominal tergites without lateral spines; penultimate sternite more rounded than male; pygidium small, subtrapezoidal, with emarginate posteromedian margin; forceps mostly straight; inner margin denticulate, with a subtriangular tooth at apical ¼.

Biology. The species inhabits sandy substrates along stream margins, typically sheltering beneath stones. Its diet likely consists of small invertebrates, including isopods, cockroaches, and late-instar aquatic insect larvae that leave the water to emerge. When disturbed, individuals can escape rapidly across the water surface, a behaviour facilitated by their dense hydrophobic body setae that enhance buoyancy and prevent wetting.

Nala lividipes **(Dufour, 1820)**

Figures 7–9

New records. CHINA — **Guizhou** • Tongren City, Fanjingshan National Nature Reserve, Yuao; 27.8909°N, 108.7257°E; 970 m alt.; 14.VIII.2025; Zhi-Teng Chen leg.; 2♂, 2♀, 75% alcohol, ICJUST No. gcm20250814.

Identification. The specimens from Guizhou Province, China matched well with the descriptions and illustrations from previous studies (Steinmann 1989; Srivastava 2003; Chen and Ma 2004; Matzke 2012). The males are identified by the following characters: body length with forceps around 13 mm (Figure 7). Head dark brown, near as long as wide, with weakly emarginate posterior margin; frontal and coronal sutures obscure. Eyes small, near half in length of post-ocular region. Antennae brown, slender; first segment shorter than distance between antennal bases, constricted basally; segment 2 short, nearly as long as wide; segment 3 twice as long as wide; subsequent segments gradually elongated toward apex. Pronotum mostly dark brown, as wide as head, as long as wide; lateral margins rounded, with broad pale areas; posterior margin rounded; median longitudinal furrow distinct. Tegmina dark brown, nearly twice as long as pronotum, lateral margins carinate, posterior margin truncate. Scales of hind wings dark brown, twice as long as wide, with pale anterior and posterior areas, truncate posteriorly. Legs short, yellowish; first tarsal segment subequal in length to combined length of second and third. Abdomen dark brown, gradually expanded to ultimate tergite. Ultimate tergite transverse,

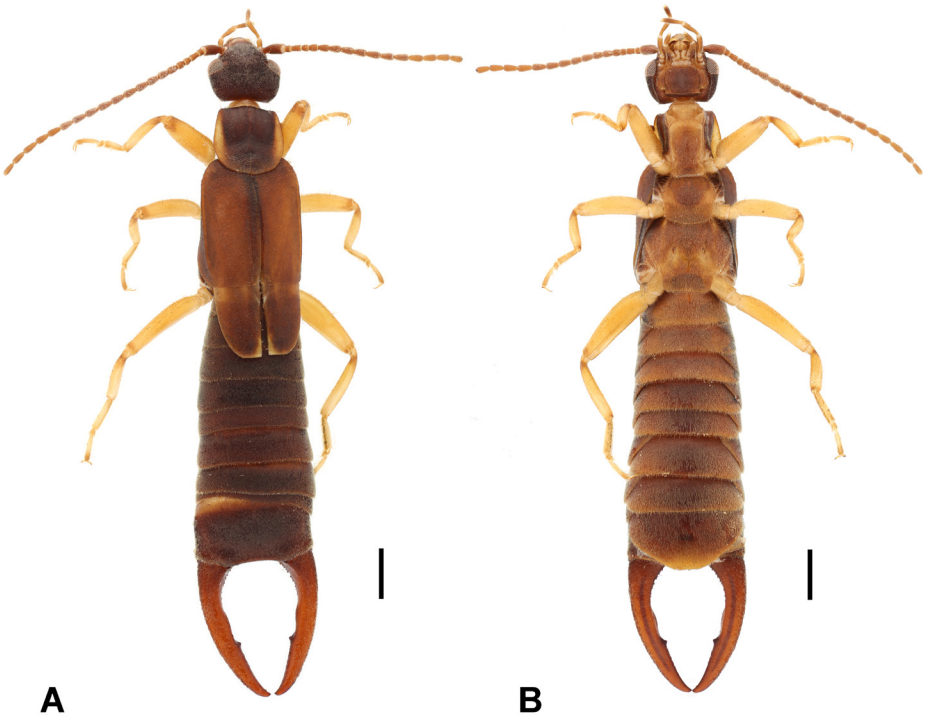

Figure 7. *Nala lividipes* (Dufour, 1820) from Guizhou Province, China. **A.** Male habitus, dorsal view. **B.** Male habitus, ventral view. Scale bars: 1 mm.

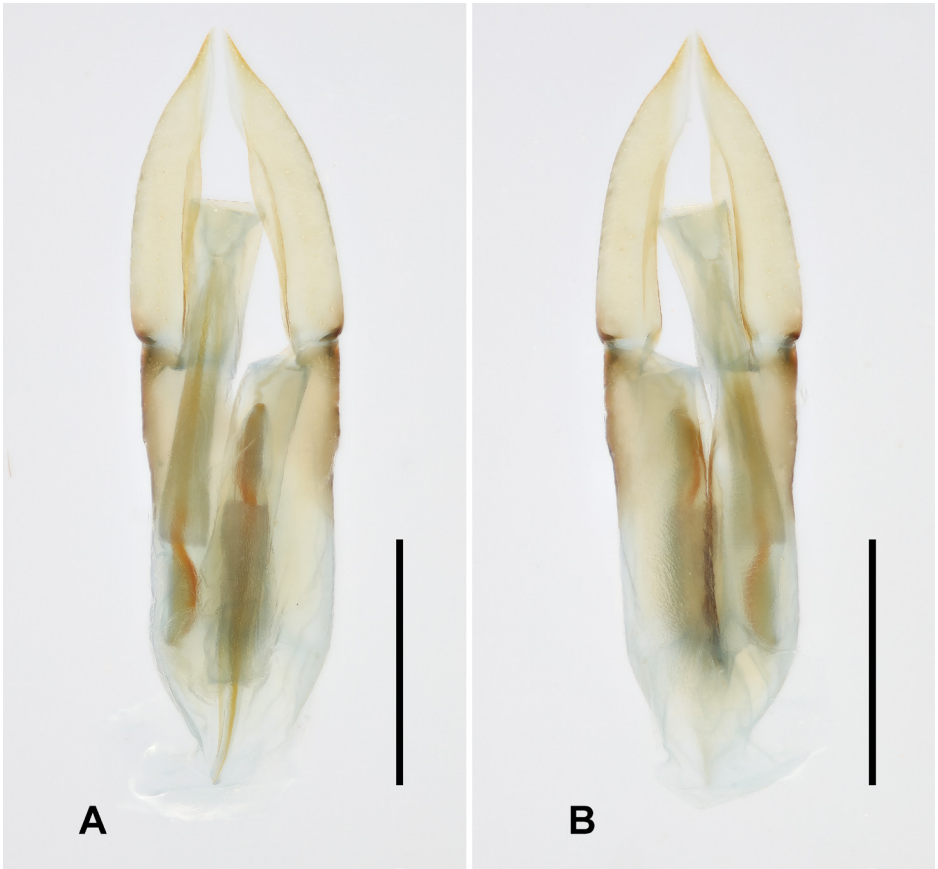

Figure 8. *Nala lividipes* (Dufour, 1820) from Guizhou Province, China. **A.** Male genitalia, dorsal view. **B.** Male genitalia, ventral view. Scale bars: 0.5 mm.

subquadrate, hairy, median longitudinal furrow obscure, posteromedial margin emarginate. Pygidium hidden. Penultimate sternite transverse, twice as wide as long, lateral margins rounded, posterior margin slightly emarginate. Forceps dark brown, with branches stout, basally remote, gently incurved, each tapering with apices pointed; inner margin denticulate ventrally, slightly swollen medially, with a distinct tooth at apical third. Genitalia robust (Figure 8A, B), median incision of anterior margin deep; paired genital lobes well developed, slender; virga slender, tubular, gradually tapered toward apex;

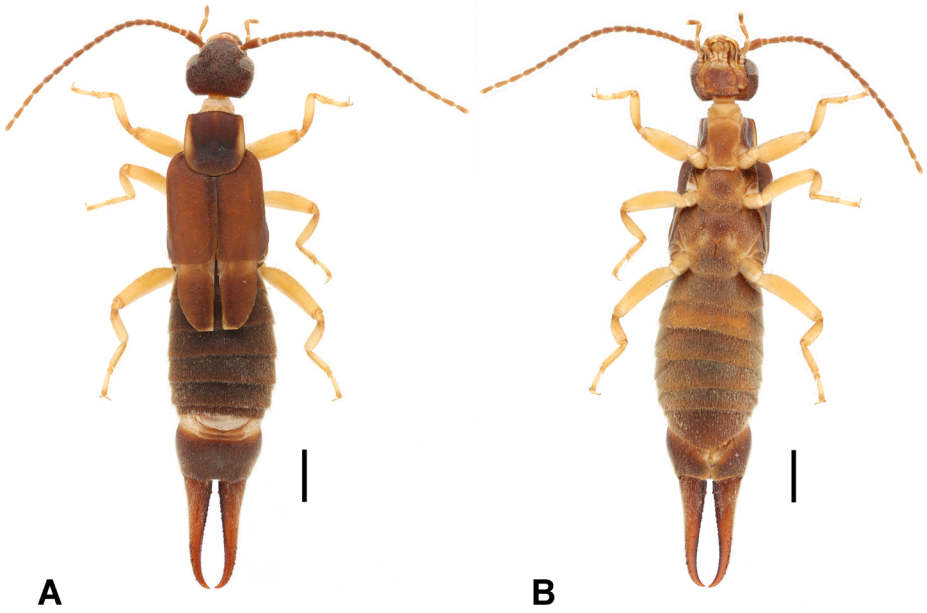

Figure 9. *Nala lividipes* (Dufour, 1820) from Guizhou Province, China. **A.** Female habitus, dorsal view. **B.** Female habitus, ventral view. Scale bars: 1 mm.

basal vesicle sclerotised, with one margin convex and another straight. Paired external parameres long, about five times longer than broad, inner margin sinuate, outer margin convex, pointed apically. The females are identified by the following characters (Figure 9A, B): body length with forceps around 11 mm; color pattern similar to male; ultimate tergite subtrapezoidal, narrowed posteriorly; penultimate sternite with convex posterior margin; pygidium hidden; forceps almost straight, incurved apically, inner margin denticulate, with a subtriangular tooth near base.

Biology. The species inhabits sandy substrates along stream margins, typically sheltering beneath stones. Its diet likely consists of small invertebrates, including isopods, cockroaches, and late-instar aquatic insect larvae that leave the water to emerge. When disturbed, individuals can escape rapidly across the water surface, a behaviour facilitated by their dense hydrophobic body setae that enhance buoyancy and prevent wetting.

Discussion

The new Guizhou provincial records highlight ongoing taxonomic challenges in the genera *Forcipula* and *Nala*. These genera are still understudied as other earwigs and often diagnosed by few traits (notably male forceps shape), which can obscure species limits when intraspecific polymorphism and sexual dimorphism are present (Simpson and Mayer 1990; Stuart et al. 2019). *Nala lividipes* is a notable example of male polymorphism (distinct forceps morphs), and female morphology is frequently underreported despite its potential diagnostic value (Simpson and Mayer 1990). The specimens recorded here provide additional morphological material from a previously unsampled province; such broadened sampling is essential to distinguish geographical variation from interspecific differences and to refine diagnostic characters for both sexes.

Our records extend the scientifically documented ranges of *F. decolyi* and *N. lividipes* within China and demonstrate that current faunal inventories are incomplete in many provinces. Filling gaps in the knowledge of distribution allows improved assessment of species' ecological amplitudes, altitudinal preferences, and potential dispersal pathways. Comparative analyses across multiple populations may reveal clinal variation or cryptic diversity, particularly in widely distributed taxa such as *N. lividipes* (Steinmann 1989; Mifsud and Vigna Taglianti 2008; Dey and Emiliyamma 2023).

Both species collected at Fanjingshan National Nature Reserve were found in sandy substrates at stream margins, which is consistent with previous habitat records for other populations (Shrivastava 1968; Mifsud and Vigna Taglianti 2008). In addition to our observations, several earlier studies report that at least some earwig taxa can inhabit shoreline or other sandy-substrate environments and can flee across open water when disturbed (Hincks 1947; Herter 1960; Julka and Purohit 1983; Yamazaki and Sugiura 2006; Küttner et al. 2023). These observations suggest that the combination of loose, sandy substrate, available shelter, and proximity to water is sufficient for survival, regardless of permanent aquatic dependence. Likewise, the widely distributed *Labidura riparia* (Pallas, 1773) occurs in

a variety of sandy habitats (coastal dunes, inland dunes, sandpits, mining sites, sandy riverbanks) and is not strictly confined to streams or rivers (Gueth et al. 2021). These findings support the hypothesis that soil moisture and substrate texture, rather than proximity to flowing water per se, constitute the primary ecological requirements for many psammophilous labidurids.

Riparian zones, however, remain ecologically important because they couple terrestrial and aquatic processes and are highly sensitive to land-use change, pollution, and hydrological alteration. Macroinvertebrate assemblages in intact riparian systems are typically more taxonomically rich and functionally diverse than those in degraded catchments (Fierro et al. 2017). Although earwigs are not obligatory aquatic insects and do not replace established freshwater bioindicators such as Ephemeroptera, Plecoptera, and Trichoptera (Griffiths et al. 2015), their reliance on moist, shaded microhabitats at stream margins in our case suggests that their local presence or absence may reflect aspects of riparian habitat integrity. Therefore, integrating occurrence records of riparian earwigs with standard aquatic and terrestrial indices, together with water-quality measurements, could yield a more comprehensive assessment of stream-corridor condition.

In conclusion, the new provincial records from Guizhou underscore the importance of continued surveys of China's Dermaptera. Such records expand the empirical basis for taxonomic, phylogeographic, and ecological study, and demonstrate that even relatively well-known insect groups can produce unexpected faunal discoveries in understudied regions. Continued integrative and ecological research combining expanded sampling, comparative morphology, and molecular data, together with targeted habitat monitoring will deepen our understanding of the diversity, biology, and functional role of these species in riparian ecosystems.

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Additional information

Conflict of interest

The authors declare that no competing interests exist.

Ethical statement

No ethical statement is reported.

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Author contributions

Conceptualisation: ZTC. Data curation: CY, ZTC. Formal analysis: YT, HBL. Investigation: CY, ZTC. Methodology: YT, HBL. Supervision: CY, ZTC. Visualisation: YT, ZTC. Writing – original draft: YT, CY, HBL. Writing – review and editing: ZTC.

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Data availability

All data that support the findings of this study are available in the main text.

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