High-elevational areas such as the Tibetan Plateau — the highest and largest plateau on earth (Royden et al., 2008) — are typically inhabited by highly specialized biota, which are adapted to the prevailing extreme environmental conditions (see Körner, 2001; Favre et al., 2015). These conditions represent a significant challenge particularly for aquatic organisms occurring in freshwater habitats within alpine ecosystems. The Tibetan Plateau freshwater fauna is, besides several fish species, mainly composed of invertebrate taxa such as molluscs, insects and crustaceans. Whereas, for example, the phylogenetic and biogeographic history of the plateau molluscs is comparatively well studied (Von Oheimb et al., 2011, 2013; Clewing et al., 2013, 2014, 2015), the freshwater crustacean fauna has received less attention.

The Holarctic amphipod genus *Gammarus* Fabricius, 1775, comprising about 204 species (Barnard & Barnard, 1983; Väinölä et al., 2008), is one of the most diverse crustacean genera with a comparatively high degree of endemism (Hou et al., 2014), and five species are described from the plateau: *G. lacustris* Sars, 1863, *G. lasaensis* Barnard & Dai, 1988, *G. frigidus* Hou & Li, 2004, *G. jaspidus* Hou & Li, 2004 and *G. sinuolatus* Hou & Li, 2004. The latter four species are endemic and, until today, only known from a single location (Hou & Li, 2004).

Based on a comprehensive sampling and genetic data from two mitochondrial markers, the aim of this study was to investigate (i) the distribution patterns with special reference to altitudinal ranges, (ii) the genetic diversity and (iii) the phylogenetic affinities and colonization histories of gammarids across the Tibetan Plateau. This study represents the first phylogenetic or phylogeographic analysis of plateau-wide distributed crustaceans.

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Gammarid specimens were collected at locations scattered across the plateau (see fig. 1 and table I) during five expeditions conducted between 2008 and 2012. All specimens were preserved in 80% ethanol and vouchers are stored at the Systematics and Biodiversity collection of the University Giessen, Germany (UGSB, see table I).

At the 61 sites sampled, gammarids had been mainly found in sympatry with molluscs, insects and annelids. At three locations (TP10, TP11 and TP39) gammarids were found exclusively (see table I). Remarkably, location TP11 represents the highest sampling site in the present Tibetan Plateau dataset with an elevation of approx. 5090 m a.s.l. (altitude information obtained with Google Earth Pro) and is, thus, one of the highest records currently known for gammarid species.

Genomic DNA was extracted from dorsal abdominal tissues of individual gammarids using the CTAB protocol described by Wilke et al. (2006). For PCR (polymerase chain reaction) amplification of the cytochrome c oxidase subunit I (COI) and LSU rRNA (16S) genes, the following primers (forward/reverse) were used: LCO1490/HCO2198 (Folmer et al., 1994) and 12-2F/16S-650R (Hou et al., 2007), respectively. Touchdown-PCR conditions for both fragments were as follows: an initial denaturation step at 95°C for 60 s, followed by 7 cycles of 45 s at 95°C, 45 s at 50°C (minus 1°C per cycle), and 60 s at 72°C, then 33 cycles of 45 s at 95°C, 45 s at 44°C, and 60 s at 72°C, and a final extension step at 72°C.