

# Lassen sich Wasserfrösche phänotypisch bestimmen? Eine Feld- und Laborstudie an 765 Wasserfröschen aus Westfalen

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## Are water frogs phenotypically determinable?

### A field and laboratory study on 765 water frogs from Westphalia, Germany

During the reproductive periods of 1995 and 1996, 801 water frogs belonging to five different population systems ( $n = 7\text{--}53$  specimens per population): 10 *esculenta-lessonae*-, 7 *esculenta*-, 9 *esculenta-ridibunda*-, 6 *ridibunda*-, and 1 *ridibunda-esculenta-lessonae*-populations were caught at 36 breeding sites in Westphalia. All specimens were diploid. A total of 765 adults (141 *R. lessonae*, 392 *R. kl. esculenta*, 232 *R. ridibunda*) was determined by allozyme analysis of six diagnostic gene loci to ascertain the diagnostic significance of five phenotypic characters (shape of the Callus internus, relative length of the hind legs (heel test), colouring of the vocal sacs, dorsal speckling, backside-colouring) and four longitudinal measurements (tibia length (USL), metatarsal tubercle length (FHL), first toe length (ZL), and head-body length (KRL)). The body length of female *R. lessonae* exceeded that of males by 12,2 %. This dimorphism does not exist in *R. ridibunda* but was present in *R. kl. esculenta* to a lesser degree (3,7 % difference). Further sexual dimorphisms were found in *R. lessonae* (KRL/USL, 3,0 % difference) and *R. kl. esculenta* (KRL/FHL, 3,4 % difference). 87–95 % of *R. kl. esculenta* and *R. ridibunda* could be identified by phenotypic characters. Identification of *R. lessonae* was much more difficult; using the five phenotypic characters mentioned above 31 % of the *lessonae* females could not be determined correctly. Backside speckling and dorsal colouring were the largest sources of error. The morphometric parameters and phenotype characters allowed to separate the parent species completely. Only the shape of the Callus internus, heel test, and colouring of the vocal sacs (males) provided adequate results to separate the three genotypes from each other, but only 79,6 % of all *R. lessonae* could be identified by these characteristics. The different length indices KRL/USL, KRL/FHL, USL/FHL, and ZL/FHL provided a reliable tool to determine the three genotypes. The classification success amounts 81 % as revealed by a stepwise discriminant analysis. This percentage is similar to the total success rate of 86 % obtained by the five phenotypic characters. Diagrammatic representation of the USL/FHL versus ZL/FHL and USL/FHL versus KRL/FHL provided acceptable results in some populations. However, the results of this method varied strongly in different populations. To obtain reliable *lessonae*-specific results genetic identification (e.g. electrophoresis) of the investigated specimens is indispensable.

**Key words:** Amphibia, Anura, Ranidae, *Rana lessonae*, *R. ridibunda*, *R. kl. esculenta*, morphology, determination problems, allozym analysis, Westphalia, Germany.

## Zusammenfassung

801 Wasserfrösche wurden in den Fortpflanzungszeiträumen der Jahre 1995 und 1996 an 36 westfälischen Laichplätzen gefangen. Im Rahmen der Untersuchung wurden fünf verschiedene Populationssysteme erfaßt ( $n = 7\text{--}53$  Individuen pro Po-