



Systematics of north African *Agama* (Reptilia: Agamidae): a new species from the central Saharan mountains

PHILIPPE GENIEZ¹, JOSÉ M. PADIAL² & PIERRE-ANDRÉ CROCHET^{3,4}

¹EPHE-UMR 5175, Centre d'Ecologie Fonctionnelle et Evolutive, 1919 Route de Mende, 34293 Montpellier cedex 5, France.
E-mail: philippe.geniez@cefe.cnrs.fr

²Division of Vertebrate Zoology (Herpetology), American Museum of Natural History, Central Park West at 79th Street, New York, 10024-5192 NY, USA. E-mail: jpadial@amnh.org

³CNRS-UMR 5175, Centre d'Ecologie Fonctionnelle et Evolutive, 1919 Route de Mende, 34293 Montpellier cedex 5, France

⁴Corresponding author

Abstract

We studied the taxonomic status of the north African *Agama* species *A. impalearis*, *A. castroviejoii*, and *A. boueti*. The study of recently collected specimens and museum material, as well as phylogenetic analyses of a short 16S ribosomal RNA gene fragment, revealed the presence of an undescribed species in Adrar des Ifoghas (Mali), Aïr Mountains (Niger), Ahaggar Mountains (Algeria) and Tassili n'Ajjer (Algeria, Lybia), previously mistaken either as *A. impalearis* or *A. agama*. The new species, *Agama tassiliensis* n. sp., clearly belongs to the *impalearis* – *boueti* – *spinosa* species group but differs from these species, among other characters, by its red, reddish-orange or orange vertebral stripe in males, long and angular head, long limbs and toes (with 4th toe usually slightly longer than 3rd toe), long but low nuchal crest made of 10 to 15 spines (rarely 8–9 spines) and large number of supralabials (10–16, usually around 12). Interspecific uncorrected *p*-distances based on the 16S rDNA gene fragment are high, ranging from 3.9% between *A. boueti* and *A. impalearis* to 7.9% between *A. spinosa* and *A. impalearis*. The new species is sympatric with *A. boueti* at least in the Aïr Mountains and exhibits average mtDNA divergences of 6.2%, 7.4%, and 7.6% with *A. spinosa*, *A. impalearis*, and *A. boueti*, respectively. *Agama boueti* is paraphyletic relative to *A. castroviejoii* in the mtDNA tree, and mtDNA genetic divergences between populations of both species are lower than 1.0%, suggesting that *A. castroviejoii* is better treated as a junior synonym of *A. boueti* pending more detailed analyses. Scattered mountain ranges in the Sahara seem to have promoted lineage divergence and ultimately speciation in this group. Further work should be done to study species taxonomy and evolution in those areas.

Key words: Ahaggar, Aïr, Algeria, Mauritania, Lybia, Niger, Mali, Sahara, Tassili n'Ajjer, taxonomy

Introduction

Although the most evocative images of the Sahara desert are vast expanses of dunes, the Saharan environment is largely occupied by scattered but large mountain ranges. In the western parts of the Sahara, the most important in extension and altitude are the Ahaggar (or Hoggar) Mountains in Algeria, the Tassili n'Ajjer in Algeria and Acacus Mountains (= Tadrart Acacus) in south-western Libya, the Aïr Mountains in northern Niger, the Adrar des Ifoghas in Mali and the Adrar Plateau (or Adrar Atar) and Tagant Plateau in Mauritania. These areas now constitute remarkable biogeographical crossroads for vertebrates, having acted as refugia for Sahelian (Dekeyser & Villiers 1956; Joger 1981; Kriska 2001; Lamarche 1988; Padial & de la Riva 2004; Padial 2006; Isenmann *et al.* 2010), Mediterranean (Dekeyser & Villiers 1956; Joger 1981) and even East African - Arabian species (Geniez & Gauthier 2008; Crochet *et al.* 2008). They also harbour several endemic species, a testimony to their role in the diversification of the Saharan vertebrate fauna (for reptiles see Wilms & Böhme 2001; Geniez & Arnold 2006). However, these mountain ranges have remained largely unexplored and have only recently received increased attention (for example Brito *et al.* 2011).