

Conserving the hip hoppers: Amphibian research at Greater Manchester Universities

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Characterising Greater Manchester is not an easy task. As a hotbed of radical ideas, the rise of Greater Manchester during the industrial revolution was followed by a significant economic and population decline. As one of the fastest-growing regions in the United Kingdom of the 21st century, contemporary Greater Manchester is shaped by a conglomerate of different influences. The dynamic history of the area is also reflected in emerging herpetological research activities. Without a pronounced tradition in organismal herpetology, Greater Manchester has recently developed into a national hotspot for academic research on amphibian conservation. Perhaps most importantly, the emerged activities are largely shaped through efforts led by postgraduate students. The present overview summarises these developments.

A main home of amphibian research activities in Greater Manchester is represented by the Manchester Amphibian Research Group (MARG, <http://amphibianresearch.org>), with a main goal to “advance both ex situ and in situ amphibian conservation through evidence-based research”. The first MARG meeting took place at the University of Manchester in 2010, and convened the principal investigators R. Preziosi, C. Klingenberg and C. Walton (University of Manchester), A. Gray (Manchester Museum), E. Harris (Manchester Metropolitan University), and R. Jehle (University of Salford) together with their graduate students. After a series of meetings and presentations at the Universities of Manchester and Salford, MARG continues to be an informal platform for meetings and exchange of contacts among local researchers. The research interests of MARG members span from field survey methods, disease susceptibility, life histories and population genetics to morphometrics and phylogeography. The perhaps most prolific field of MARG, however, is the advancements of modern approaches towards ex-situ conservation strategies for endangered anurans. Since the foundation of MARG in 2010, its members have (co-)authored more than three dozen refereed scientific journal articles related to the conservation of amphibians from all three orders (Table 1), as well as a monographic book on a flagship species of the British amphibian fauna (the great crested newt, Jehle et al. 2011).

Apart from producing scientific outputs, Greater Manchester has also been the home of the Herpetological Journal, the flagship journal of the British Herpetological



Figure 1. Participants of the 2015 Amphibian Conservation Research Symposium in Cambridge. The conference series started in Manchester in 2012.

Table 1. Amphibian conservation-related research outputs (indexed journal articles) produced at Greater Manchester Universities since the first MARG meeting in 2010.

Research area	References
Advances in husbandry and captive breeding to aid in ex-situ conservation	Ogilvy et al. 2012, Antwis et al. 2014abcd, Michaels & Preziosi 2014, Michaels et al. 2014abc, Michaels & Preziosi 2015, Antwis et al. 2015, Bland 2013, Bland 2015, Ogilvy et al. 2011, Ogilvy & Preziosi 2012
In-situ conservation and conservation genetics	Arntzen et al. 2010, Jehle 2010ab, Madden & Jehle 2013, Balacs et al. 2014, O'Brien et al. 2015, Roth & Jehle 2016
Life-histories and sexual selection	Liao et al. 2013, Liao et al. 2014, Liao et al. 2016, Michaels & Preziosi 2013, Rausch et al. 2014, Zeng et al. 2014, Jiang et al. 2015, Ursprung et al. 2011ab, Ursprung et al. 2012
Development of genetic markers	Barratt et al. 2012, Petchey et al. 2014
Caecilian morphometrics	Sherratt et al. 2012, Sherratt et al. 2014

Society (BHS) which received in excess of 700 manuscripts between April 2009 (when the journal editorship moved from the University of Bangor to the University of Salford) and September 2015 (when the journal editorship moved from the University of Salford to the University of Brighton). In both 2013 and 2014, the Herpetological Journal held the highest scientific impact factor (a metrics based on the number of citations per article over a given timeframe) of all quarterly journals devoted to herpetology globally, and is thus well embedded in the main phalanx of research outlets advancing amphibian conservation research (see also e.g. the editorial Perry et. al 2012, which was jointly published with seven journals based at other herpetological societies in North America, South America, Europe and Africa).

A further main hub of amphibian conservation activities and research in Greater Manchester is represented by the vivarium at Manchester Museum, led by A. Gray and his team (A. Bland, M. O'Donnell, and a large number of volunteers). Since its launch, the Frog Blog Manchester initiated by A. Gray (<http://frogblogmanchester.com/>) has received in the order of 450 000 hits so far - this number is not far off the entire population number of the city of Manchester, and a remarkable figure for a group of vertebrates which is otherwise seen as underrepresented in the perception of the general public. A main flagship project at Manchester Museum is centred around the charismatic Central American lemur leaf frog *Agalychnis lemur* (www.lemurfrog.org, see also Petchey et. al 2015), a species which is close to extinction in the wild and which has, for example, played a prominent role in the BBC 2 documentary *Fabulous Frogs* presented by Sir David Attenborough in 2014. In March 2015, Manchester Museum also hosted the 68th AGM of the BHS, the first ever held outside London.

A final front of activities stems from the initiation and organisation of a series of scientific meetings devoted to amphibian conservation. The first Amphibian Conservation Research Symposium (ACRS, organised by R. Antwis and C. Michaels, at the time PhD students with R. Preziosi) took place at the University of Manchester in 2012, and kick-started an annual series at other venues across the country (2013: London Natural History Museum, jointly with the British Herpetological Symposium; 2014: Zoological Society of London, 2015: Department of Zoology, University of Cambridge, Figure 1). Remarkably, ACRS has now been adopted by two major global organisations for amphibian conservation (the Amphibian Survival Alliance and the IUCN Amphibian Specialist Group), with a 2016 meeting held at the North-West University, Potchefstroom, South Africa. ACRS will continue to be held in international locations, in addition to the ongoing development of a "Future Leaders of Amphibian Conservation" programme, more information on both can be found at www.amphibians.org/acrs/.

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