

MITIGATING SINGLE PATHOGEN AND  
CO-INFECTIONS THAT THREATEN  
AMPHIBIAN BIODIVERSITY

24 – 25 April 2019



ZSL SYMPOSIUM

Zoological Society of London

Regents Park, London, NW1 4RY

## 18. *BATRACHOCHYTRIUM SALAMANDRIVORANS* IN ITALY: FIRST DATA FROM WILD POPULATIONS AND CAPTIVE COLLECTIONS

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Italy hosts one of the most diverse amphibian fauna of the entire Mediterranean, and several endemic salamander species are found in the Alps, along the Apennines and in Sardinia. Therefore, the introduction of the highly pathogenic chytrid fungus *Batrachochytrium salamandrivorans* (*Bsal*) could threaten Italian amphibian diversity and cause the loss of many unique evolutionary lineages of salamanders. To counteract and prevent the spread of this pathogen in Italy, a preliminary molecular screening was performed on wild salamanders from different parts of the country and also from four live collections owned by private keepers. Salamanders' skin swabs were obtained following a standard protocol and samples were analysed for the presence of both *Batrachochytrium dendrobatidis* (*Bd*) and *Bsal* DNA, using a duplex quantitative polymerase chain reaction (qPCR). Overall 189 skin swabs were analysed: 136 from seven wild native species, and 53 from seven Asian, two North-American and one European salamanders bred in captivity. All samples were negative for *Bsal* (prevalence 0%, confidence interval 0 – 2%), while 4 out of 136 wild salamanders were positive for *Bd* (prevalence 3%, confidence interval 1 – 7%), with low individual *Bd* loads ( $68 \leq$  genome equivalents). Although our findings are not sufficient to infer with confidence about the presence or absence of this pathogen in Italy, they may possibly contribute to increase awareness of professional herpetologists and also among amphibian private keepers.

## 19. TITLE OF POSTER *BATRACHOCHYTRIUM DENDROBATIDIS* PRESENCE WITHIN SPECIES: A REVIEW ON ECOLOGICAL SCALES AND INFLUENTIAL VARIABLES

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Since the identification of the infectious agent *Batrachochytrium dendrobatidis* (*Bd*) 20 years ago, numerous studies have helped to build solid documentation on the impact of chytridiomycosis worldwide. *Bd* presence in frogs has been investigated over a broad range of ecological scales. Studies have extended from differences in infection load within individuals, disease prevalence among populations, as well as presence of *Bd* across the landscape level. These studies have examined both environmental and intrinsic species-specific factors to explain the variable occurrence of *Bd* within species. The scale of interest has a profound influence on our understanding of which processes underpin the disease dynamics and on the scope of our conclusions and predictions. To evaluate the breadth of studies performed to date we quantitatively reviewed the *Bd* literature, and classified studies with regard to the spatial scale explored, methodological design and overall findings. We systematized which variables were most strongly associated with heterogeneity of disease occurrence. Among the 80 peer reviewed papers published between 2004 and 2018 that fitted our criteria, air temperature and rainfall or humidity were commonly investigated environmental parameters. Variables such as life stage, distance to urban areas or zooplankton composition were seldom investigated, but were shown to influence *Bd* prevalence among different populations of the same species. Chytridiomycosis remains a dire threat to amphibians worldwide, and an intricacy of factors influences its occurrence and consequently its effects. Our review emphasises that understanding the complexity of *Bd* impact requires an integration of studies tackling *Bd*-host interaction at multiple scales and perspectives.