

Distribution and habitats of *Bulinus depressus* and possible role as intermediate host of economically important helminth parasites in South Africa

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Abstract

This article documents the large-scale spatial distribution and ecological descriptors of associated habitats of *Bulinus depressus* by analysis of samples taken from 552 collection sites on record in the database of the National Freshwater Snail Collection (NFSC) at the Potchefstroom Campus of the North-West University. This snail species is experimentally susceptible to *Schistosoma margrebowiei*, a helminth parasite of game animals and cattle and can possibly also exploit humans as definitive hosts. The 125 different loci ($1/16$ degree squares) on record reflect a geographical distribution that is largely limited to the central and western part of the Limpopo Province and westwards down the basins of the Vaal and Orange Rivers. Details of each habitat as described by collectors during surveys, as well as altitude and mean annual air temperature and rainfall for each locality, were processed and chi-square and effect size values calculated. A decision tree constructed from all the available data indicated that temperature and altitude, followed by the type of water-body, seemed to be the more important factors that significantly influenced the distribution of this species in South Africa. The possible role of this species as intermediate host of economically important helminth species is briefly looked at and the urgent need to update the geographical distribution of host snails is emphasised. It is recommended that efforts be made to determine the exact role of *B. depressus* in the epidemiology of economically important helminth parasites.

Keywords: *Bulinus depressus*, geographical distribution, habitat preferences, *Schistosoma margrebowiei*

Introduction

Bulinus depressus belongs to the family Planorbidae that has a wide geological distribution and is the most heterogeneous group of snails in the Basommatophora (Demian, 1960). Originally described by Haas (1936) from Lake Bangweulu, Zambia, this author drew attention only to those conchological characteristics that to him seemed distinctive of the new species. These features unfortunately subsequently proved to be insufficient to characterise it and resulted in a disagreement between malacologists as to what *B. depressus* actually was (Hamilton-Attwell and Van Eeden, 1969). Mandahl-Barth (1968) regarded *B. depressus* as a subspecies of *Bulinus tropicus* after examining similar snails from Zambia with non-angular mesocones on the radula. However, in the course of large-scale freshwater snail surveys conducted in South Africa since 1956 many samples identified as *B. depressus* (Van Eeden et al., 1965), were found to have strongly angular mesocones and to be often apallid (Schutte, 1966; Hamilton-Attwell and Van Eeden, 1969). At that stage *B. depressus* was considered to be part of the *B. truncatus* group. Electrophoresis of proteins from the eggs of *B. depressus* (Hamilton-Attwell, 1976), however, yielded a single-banded main fraction consistent with the diploid chromosome number (Brown, 1994) in contrast to the tetraploid chromosome number characteristic of *B. truncatus*. According to Brown (1994) the *Bulinus* species may be divided into groups that have their origins in the four species groups of Mandahl-Barth (1957), namely *B. africanus*, *B. truncatus*, *B. tropicus* and *B. forskalii*.

However, the groups discussed by Brown (1994) differ in the separation of a *B. reticulatus* group (Wright, 1971) and the fusion of Mandahl-Barth's groups for *B. truncatus* and *B. tropicus* into a single *B. truncatus/tropicus* complex (Brown, 1980; 1981). *Bulinus depressus* is regarded by Brown (1994) as part of this complex.

This report focuses on the geographical distribution and habitats of *B. depressus* as reflected by the 552 samples in the database of the National Freshwater Snail Collection of South Africa (NFSC). Details of each habitat, as well as mean altitude and mean annual air temperature and rainfall for each locality, were processed to determine chi-square and effect size values. An integrated decision tree that is a statistical model enabling the selection and ranking of those variables that can maximally discriminate between the frequency of occurrence of a given species under specific conditions as compared to all other species in the database was also constructed. The results indicated that altitude, temperature and type of water-body seemed to be some of the major factors determining the distribution of this species in South Africa. On account of the great variation among species of the genus *Bulinus* in respect of compatibility with schistosomes (Brown, 1994), the role of *B. depressus* as intermediate host of economically important helminth parasites in South Africa is briefly discussed.

Methods

Data pertaining to the habitats and geographical distribution of *B. depressus* were extracted from the database of the NFSC, which dates from 1956 up to the present. Only samples for which the collection sites could be pinpointed on the 1:250 000 topographical map series of South Africa, were included in the analy-

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