

Quantitative Detection of *Schistosoma* spp. in Lake Malawi via Collection of the Intermediate Hosts *Bulinus globosus* and *B. nyassanus*

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INTRODUCTION

Research on urinary and gastrointestinal schistosomiasis in Lake Malawi has become more robust since the 1980s when cases were being documented in travelers to the lake. More recent studies have looked at the large prevalence in school-aged children. The current methods for the detection of *Schistosoma* spp. in the lake have been shown to underestimate the quantity of infectious cercariae in Lake Malawi and do not reflect the prevalence studies done in the past.^[1]

METHODS

Current methods require the intermediate snail hosts *Bulinus globosus* and *B. nyassanus* to be dredged from the lake floor (Table 1), incubated at ambient temperature overnight in lake water, and placed into the direct sunlight for 1 hour. A skilled technician must view the water under a dissecting microscope to confirm the presence or absence of cercariae shedding.

Two methods were used to collect material off the lake floor in order to expedite snail collection. Two scoops and two dredges (Table 1) were collected every 20m eastwardly in the Lake Malawi National Park and every 1000m in Chembe Village. Once collected the material was sieved using a 10mm sieve (Figure 1).

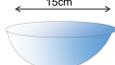
Method	Surface Area	Volume
Scoop 	180cm ²	880cm ³
Dredge 	12,500cm ²	62,500cm ³

TABLE 1. Comparison of two methods used for collecting snails.

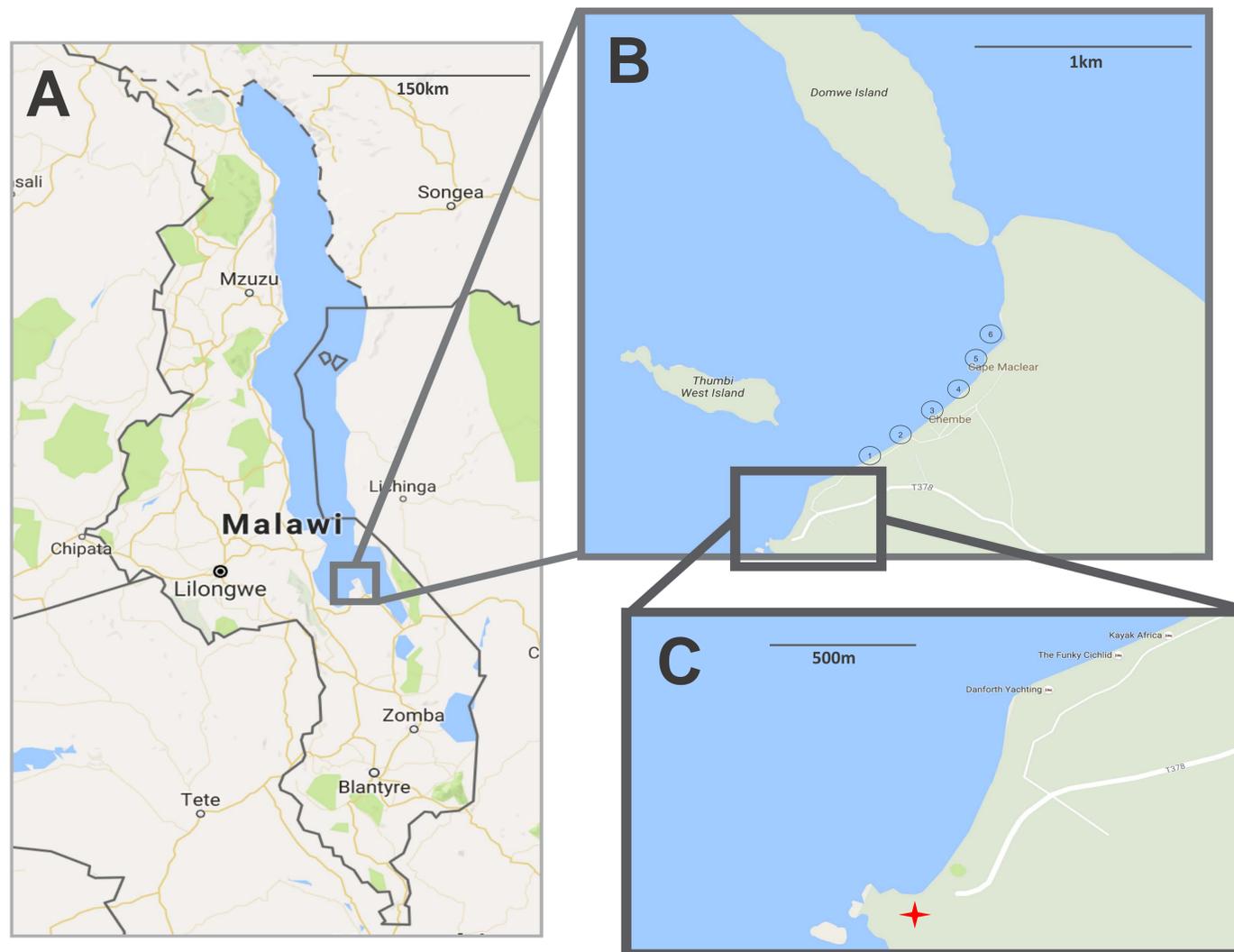


FIGURE 1. Maps of Malawi, Africa where snail samples were collected. Collections started at the west-most point on the beach labeled with a red star. **A.** Map of Malawi, Africa with Lake Malawi to the right of the country. **B.** Higher powered image of Nankumba peninsula containing Lake Malawi National Park and Chembe village. Sampling Sites 1-6 are labeled and were spaced approximately 1000m apart. **C.** Higher power Image of Lake Malawi National Park and Otter's Point, where snails were collected every 20m. The first sample site (represented as 0m in Figure 2) is marked with a red star.

RESULTS

Bulinus globosus and *B. nyassanus* were collected and distribution data was recorded (see Figure 2). The number of snails found was increased in the national park where there is more fine sand. This supports previous research performed at the same location.^[2]

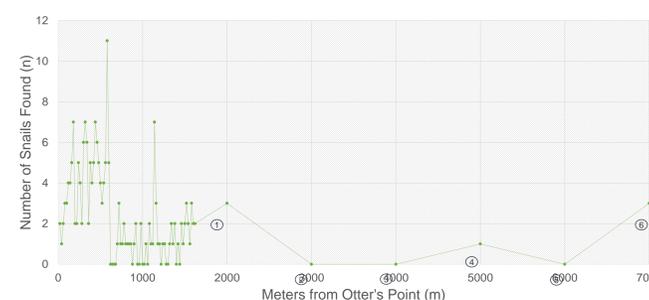


FIGURE 2. Distribution of snails collected.

Using the snail capture method, n=199 snails were found only 3 of which were schistosome positive using the inclusion criteria stated in the Materials and Methods. The snails that were found to be positive were dredged from the lake 460m, 740m, and 1,120m from Otter's Point. These positive samples clustered toward the eastern beach.

DISCUSSION

Though it may underestimate diseased snails, the snail-collection method may be useful in determining the relative distribution of snail hosts and will be useful in determining sampling sites for future research. Snails and water samples were collected concurrently. Eventually, these water samples can be used to create a molecular based assay to detect cercariae, thus eliminating the need for this laborious method. Long-term water sampling will reveal any fluctuations in cercariae load; accordingly, this novel method will be vital to evaluate any program aimed at eliminating this disease from the lake.

ACKNOWLEDGMENTS

Dr. Elaine Kohler Summer Academy of Global Health Research, Medical College of Wisconsin Office of Global Health, University of Wisconsin Milwaukee School of Freshwater Sciences, Bilharzia Eradication Team, Malawi Department of Fisheries, and the Malawi National Parks Department.

CITATIONS

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2. Townsend T, McKaye K. Using Nature to Reduce Human Infection Risks: A system for controlling schistosomiasis intermediate host snails in Lake Malawi (Unpublished Manuscript). *Jparasitology*. 2011.