TELESCOPIUM TELESCOPIUM L., FROM A FISH POND AND A MANGROVE AREA, SOUTH SULAWESI, INDONESIA

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ABSTRACT

Shell lengths, and wet and dry weights of soft bodies of *T. telescopium* were analyzed in 4 monthly samples at 2 stations (the edge of a mangrove, and a fish pond, respectively). The highest mean shell length (7.6 ± 0.9 cm) was measured in May at the edge of the mangrove. The corresponding mean wet and dry weights were 8.29 ± 3.38 g and 1.91 ± 0.81 g, respectively. Water temperature, salinity, pH, and dissolved oxygen were measured. Spearman coefficient correlation showed significance between shell length and wet weight of the soft body at both stations. All parameters were correlated in the fish pond, with the exception of shell length compared with wet weight and density; wet weight compared with density; dry weight compared with shell length, wet weight, and density. All environmental parameters were correlated in the fish pond, but not in the mangrove, where the pH was correlated with all parameters while dissolved oxygen only was correlated with salinity.

INTRODUCTION

Relationships between shell length and weight of the soft body reflect the effects of environmental factors on the growth rate of gastropods (Wilbur &Owen 1964; Wass 1967; Purchon 1968). The purpose of this work was to investigate these relationships for *T. telescopium* living in a fish pond located in a mangrove area.

MATERIALS AND METHODS

Telescopium telescopium, L. were collected monthly during April to July 1994 from the Pompengan region, Luwu regency, South Sulawesi. Snails were picked from 1 m^2 frame samples, the shells measured to the nearest 0.1 mm (vernier caliper). The soft body was extracted, weighed, dried to constant weight, weighed again to the nearest 0.01 g, and the mean values ± s.d. calculated for each month. Water temperature, salinity, pH and dissolved oxygen were measured in the field when sampling was done. Morphometric data and the environmental parameters were tested in a Spearman coefficient correlation analysis (Sokal & Rohlf 1981) using Microstat Rel. 4.1.13 programme for the calculation.

RESULTS

Density of snails

The highest density of 17 *T. telescopium* m^{-2} was found in the fish pond (Station B) in April 1994.

Mean shell length

The mean shell length of samples collected at two stations (A & B) are shown in Table 1. At Station A, the mean shell length was highest in May (range 5.4-9.3 cm; n = 10). At Station B, the mean shell length was highest in July (range 4.2-8.8 cm; n = 9).

Table 1. Mean shell length ± s.d. of *T. telescopium* on 4 occasions in 1994. Station A at the edge of the mangrove, and Station B in the fish pond.

Month	Shell-length (cm)	
	Station A	Station B
April	6.8 ± 0.8	6.5 ± 1.3
May	7.6 ± 0.9	6.9 ± 1.0
June	6.7 ± 0.8	7.0 ± 0.7
July	6.5 ± 1.1	7.1 ± 1.0

Mean wet weight of the soft body

The mean wet weight of samples collected at two stations (A & B) are shown in Table 2. At Station A, the mean wet weight of the soft body was highest in May (range 3.01-16.09 g; n = 10). At Station B, the mean wet weight was highest in July (range 1.92-7.48 g; n = 9).

Mean dry weight of the soft body

The mean dry weight of samples collected at two stations (A & B) are shown in Table 3. At Station A, the mean dry weight of the soft body was highest in May (range 0.74-3.80 g; n = 10). At Station B, the mean

wet weight was highest in July (range 0.35-1.10 g; n = 9).

Table 2. Mean wet weight (g) ± s.d. of the soft body of *T. telescopium* on 4 occasions in 1994. Station A at the edge of the mangrove, and Station B in the fish pond.

Month	Dry weight (g)	
	Station A	Station B
April	5.40 ± 1.99	4.02 ± 2.00
May	8.29 ± 3.38	4.70 ± 1.54
June	6.04 ± 1.94	4.86 ± 1.32
July	5.19 ± 2.30	5.18 ± 1.74

Table 3. The mean dry weight (g) ± s.d. of the soft body of *T. telescopium* on 4 occasions in 1994. Station A at the edge of the mangrove, and Station B in the fish pond.

Month	Dry weight (g)	
	Station A	Station B
April	0.72 ± 0.28	0.69 ± 0.36
May	1.91 ± 0.81	0.79 ± 0.31
June	0.93 ± 0.36	0.73 ± 0.23
July	1.11 ± 0.79	0.84 ± 0.32

Environmental parameters

Water temperature, salinity, pH and dissolved oxygen (DO), were measured when the monthly sampling was done (Table 4). At Station A, temperature, salinity and DO decreased during the study period. At Station B, the temperature, salinity, pH, and DO, were more stable. The highest temperature, salinity, pH, and DO were recorded in April.

Correlation analysis.

The correlations between shell length, wet and dry weights of soft body, and environmental condition are shown in Tables 5, 6, and 7.

Table 5 shows correlation between shell length and wet weight of *T. telescopium* at Stations A and B (the critical value of Spearman coefficient correlation is ± 0.92820 at the 5 % significance level). Table 6 shows correlation between oxygen and salinity, and the pH and all other parameters at Station A. Table 7 shows that all parameters were correlated at Station B, with the exception of shell length compared with wet weight and density; wet weight compared with density; dry weight compared with shell length, wet weight, and density. Tables 6 and 7 show that all environmental parameters were correlated at Station B, but not at Station A, where the pH was correlated with all parameters while dissolved oxygen only was correlated with salinity.

Table 4. Water temperature, salinity, pH and dissolved oxygen measured on 4 occasions in 1994. Station A at the edge of the mangrove, and Station B in the fish pond.

	Station A				Station B			
	April	May	June	July	April	May	June	July
Water temp (°C)	31.2	29.4	27.3	27.6	28.8	28.2	28.4	28.7
Salinity (ppt)	14.9	13.8	10.6	10.7	1.2	1.3	1.3	1.8
pH	7.6	7.5	7.5	7.4	6.8	6.4	6.5	6.6
DO (ppm)	15.7	15.6	12.1	12.3	8.9	8.2	8.4	8.6

Table 5. Correlation between shell length (SL), meat wet weight (WW), and meat dry weight (DW) of *T. telescopium*. A = Station A, at the edge of the mangrove; B = Station B, in the fish pond.

	SL-A	WW-A	DW-A	SL-B	WW-B	DW-B
SL-A	1.00					
WW-A	.96	1.00				
DW-A	.86	.91	1.00			
SL-B	-.14	.11	.32	1.00		
WW-B	-.20	.01	.30	.98	1.00	
DW-B	.06	.15	.55	.71	.82	1.00

Table 6. *T. telescopium* at Station A. Correlation between shell length (SL), wet (WW) and dry weights (DW) of soft body, density per unit area (P), and environmental parameters: T = water temperature (°C), S = salinity (ppt), pH , O = dissolved oxygen (ppm).

	SL	WW	DW	P	T	S	pH	O
SL	1.00							
WW	.96	1.00						
DW	.86	.91	1.00					
P	.65	54	.19	1.00				
T	.34	.10	-.10	.74	1.00			
S	-.72	-.54	-.29	-.92	-.89	1.00		
pH	99.99	99.99	99.99	99.99	99.99	99.99	1.00	
O	.71	.50	.33	.82	.91	-.98	99.99	1.00

Table 7. *T. telescopium* at Station B. Correlation between shell length (SL), wet (WW) and dry weights (DW) of soft body, density per unit area (P), and environmental parameters: T = water temperature (oC), S = salinity (ppt), pH , O = dissolved oxygen (ppm).

	SL	WW	DW	P	T	S	pH	O
SL	1.00							
WW	.98	1.00						
DW	.71	.82	1.00					
P	-.93	-.95	-.66	1.00				
T	99.99	99.99	99.99	99.99	1.00			
S	99.99	99.99	99.99	99.99	99.99	1.00		
pH	99.99	99.99	99.99	99.99	99.99	99.99	1.00	
O	99.99	99.99	99.99	99.99	99.99	99.99	99.99	1.00

DISCUSSION

According to Dharma (1988), the shell length of *T. telescopium* is 8-12 cm. We measured a maximum length of 9.3 cm in this study. The mean shell length tended to increase over time at Station B, while it tended to decrease at Station A (no significant differences within or between stations, *cf.* Table 1). However, a decreasing mean shell length could be a result of recruitment, migration, predation or selective collection of the larger size by fishermen. At present we are unable to distinguish between the various possible factors. The density per m^2 decreased over time at both stations.

The average dry weight, relative to the wet weight of the soft body, was higher at Station A, than at Station B. At a given shell length the snails also had a heavier soft body at Station A compared to Station B. We suggest that this reflects better food conditions at the edge of the mangrove compared to the fish pond. According to Boyd (1979), the pH should be 6-8 for good growth. We measured pH within this range at both stations, so the present correlation between size and pH, probably only reflects a more marine environment at Station A. As it should be expected, the shell length and the wet weight of the soft body were closely correlated at both stations. We are unable to explain why the wet and dry weights showed poor correlation. There was considerable variation in the amount of water of the soft body of snails collected at Station A, but less so at station B. However, on an average the soft body of *T. telescopium* contained 2.4 % more water at station B compared to Station A.

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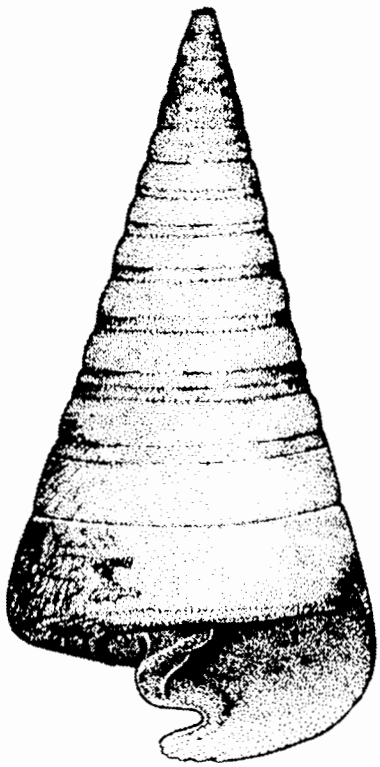

Telescopium telescopium L., 1758. PMBC 8223.
Drawing by Patairat Singdam