A USEFUL METHOD TO MONITOR THE BODY TEMPERATURE OF FRESHWATER TURTLES

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INTRODUCTION

Freshwater turtles, as ectotherm animals, depend on environmental temperatures for thermoregulation activity (Huey, 1982). Turtle body temperature (T_b) is a result of interaction between abiotic factors (e.g. environmental temperature, solar radiation) and the ability to use behavioural and physiological processes to control temperature fluctuations. Traditionally, several field methods have been implemented to study the spatial and temporary patterns and social interaction between the individuals (e.g. Buhlmann, 1995; Rowe & Moll, 1991). However, little is known about the importance of thermoregulation activity in the turtles behaviour (Dall'Antonia et al., 2001). As the use of internal transmitters involves a surgical procedure of the individuals and limits its distance of localization, in our study, we develop a method to monitor the variation of T_b in free-ranging individualsusing external shell temperature radio transmitters which record the temperature of the shell (T_s).

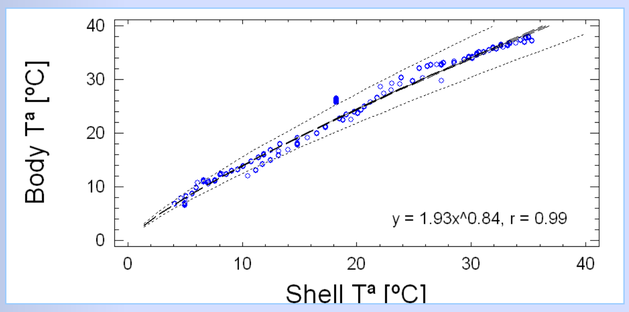
MATERIAL AND METHODS

Three individuals of *Trachemys scripta scripta* were obtained from the Centre de Recuperació d'Amfibis i Rèptils de Catalunya (CRARC) and used in a controlled temperature experiment. The individuals were kept in a container where the water temperature was controlled and varied (range: 4.1-35.3 ºC). The relationship between and T_s was estimated using internal temperature-sensitive radio transmitters (SOPT-2070; Wildlife Materials, Inc. Fig 1) to T_b and a digital thermometer (HD 9215; to nearest 0.1 ºC) to T_s. These temperatures were recorded in each water temperature that was maintained constant during 15 min. T_b and T_s were fitted using a regression model T_b.

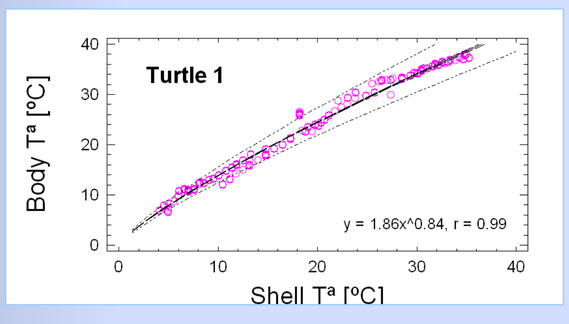
Fig. 1. Detail of the implantation of the internal transmitter.

Fig. 2. Regression model. Variation of body and shell temperature. a) the three turtles, b) turtle 1, c) turtle 2 and d) turtle 3.

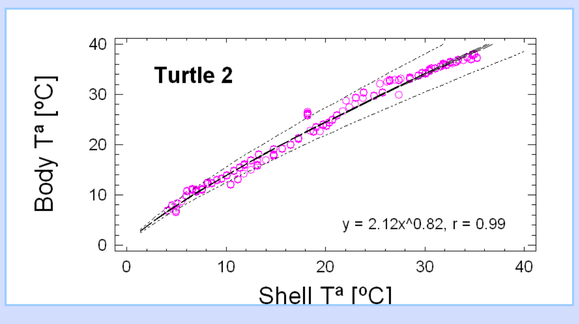
a)



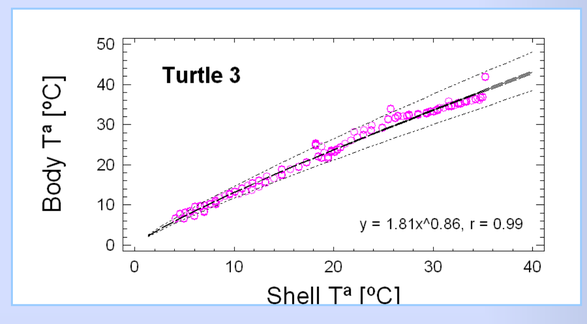
b)



c)



d)



RESULTS AND DISCUSSION

T_b and T_s had a positive correlation. The multiplicative regression model showed the best fit between T_b and T_s of the global temperatures recorded from the three turtles (slope: 1.93 +/- 0.003, p<0.0001; intercept 0.84+/- 0.009, p<0.0001; R^2=98.77 %; Fig 2a). Separately, turtle 1 (slope: 1.86 +/- 0.0029, p<0.0001; intercept 0.84 +/- 0.0085, P<0.0001; R^2=99.06 %; Fig. 2b), turtle 2 (slope: 2.12 +/- 0.003, p<0.0001; intercept 0.82 +/- 0.009, P<0.0001; R^2=98.65 %; Fig.2c) and turtle 3 (slope: 1.81 +/- 0.003, p<0.0001; intercept 0.86 +/- 0.0098, P<0.0001; R^2=98.77 %; Fig. 2d) showed similar results. With this experiment, we provide an easy and useful method to study Tb variation using external transmitters without a surgical procedure of the individuals.

At the present time, external shell temperature radio transmitters (TW31-THERM; Biotrack, Ltd.), stuck dorsally on the turtles' shell, are being used in eight individuals of *Emys orbicularis* in a small lake of western Catalonia (Estany d'Ivars i Visalana / Lleida province) (Fig. 3) in order to study the spatial and temporal habitat distribution and thermoregulation behaviour of this reintroduced species (Fig. 4).

Fig. 3

Fig. 4

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