A METHOD OF ATTACHING RADIO TRANSMITTERS TO DESERT MONITORS, *VARANUS GRISEUS* IN ZARANIK PROTECTED AREA, NORTH SINAI, EGYPT

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Radiotelemetry has afforded a conclusive method for studying several aspects of ecology. Monitors have been equipped with transmitters by various methods; externally to the pelvic region (Green and King, 1978; Stanner and Mendelssohn, 1987), and on the tail (Weavers, 1993; Phillips, 1995; Thompson, 1992, 1994, 1995). Transmitters with attached antennae were implanted in the body cavity (Stebbins and Barwick, 1968; Weatherhead and Anderka 1984), with the aerial under the skin of the tail (Christian and Weavers, 1994), and under skin folds of the lateral side of abdominal wall (Thompson *et al,* 1999). Reinert and Cundall (1982) illustrated a technique in which the transmitter is deposited into the posterior coelomic cavity of snakes and the whip antenna is escalated through the body wall and is implanted subcutaneously. They claimed that their technique bypasses the problem of post-ingestion behaviour, as well as the perpetual complexity of regurgitation or defecation of the ingested transmitter elements. Wang and Adolph (1995) examined the effect of transmitter implantation surgery on behavioural thermoregulation in the western fence lizard, *Sceloporus occidentalis.* They found a small but potential effect on behavioural thermoregulation for the first two days after surgery. This effect was short-lived and vanished by the third day after surgery. In this study, temperature sensitive transmitters were embedded subcutaneously and their whips were externally attached. The same type of transmitters were previously implanted under skin in snakes and both the snakes and transmitters behaved normally (Ibrahim *et al.,* 1998).

Five healthy, *Varanus griseus* (snout to vent length 30.2- 36.0 cm; tail length 39.7-44.8 cm, and mass 295- 455 g) were captured in the Zaranik protected area in North Sinai, Egypt (31° 07 - 02 N, and 33° 25 - 52E) for studying their home range, movements and activity from 14 July 1997 to 30 June 1998.

SI-2T temperature sensitive transmitters with a whip antenna (24 cm standard nylon coated stainless steel wire) (Holohil Systems Ltd, Canada) were used. The transmitter is cylindrical, its body length is 35 mm, and the diameter of its base is 9 mm. It weights eight g and is operated by a lithium battery with a life of about 14 months at 20°C. Transmitter signals were detected with a RX-1000 portable radiotelemetry receiver with a three element – Yagi Antenna (Wildlife Materials Inc., USA).

Prior to implantation, monitors were placed in cloth bags, and cooled in the fridge at 3°C for 3-4 hours. This hypothermic anaesthesia rendered the monitor to be moderately motionless. Implantation was initiated by making a horizontal 10-15 mm incision in the skin, at the left aspect of abdomen wall, about one cm anterior to the left hind limb using a Bard scalpel (Becton Dickinson Acute Care, USA). A little connective tissues were found between the dermis and the muscular layer, therefore, no tissues were removed.

Another incision (about 10 mm) was made in the muscular layer immediately below the first incision. This incision was made about 3 mm deep, but not reaching the body cavity. Transmitter was inserted with the thumb in the incision starting with its base, then the whole body of the transmitter was interjected by rotating and pushing it with thumb and fore finger, thus enlarging the hole slightly, and leaving the long antenna outside of the body. When the transmitter was deposited in the muscular layer, the incision was closed by 3 to 4 sutures. Thus, the transmitter was held in place and kept off from moving. Five to six sutures were used to close the outer incision, sealing the skin and leaving no space around the antenna wire. Incision sites were cleaned with iodine solution and 70% ethyl alcohol. Sterile gloves, and sterilized surgical equipments were also used. The antenna was then, traversed over the left thigh, positioned along the mid-dorsal line of the tail, and taped there by a strong heat resistant (up to 80°C) plastic tape (Manco, Inc., USA0 to the tip of the antenna. Fixing antenna in both positions in the skin and on the tail resulted in creating untaped bridge-like part of the antenna. This position kept the antenna from moving and hence, kept the sutured hole from being enlarged.

Wounds healed within four to five days, and the monitors were released to the wild. Each monitor appeared to have normal behaviour and were monitored for one year. The monitors maintained a home range size up to 22.8 ha, but one male moved about 8 km in two months following its release, and crossed two marshes of high salinity; another increased its body mass by 480g during the year. High air temperature, rocky terrain, and lizard movements, resulted in some of the attachment tapes holding the antenna in lace coming loose a few weeks before the end of study (one year). These lizards were not recaptured to replace the tape because their movements and the transmitter signal appeared to be normal. At the end of the study, it was noted that the wounds were completely dry, and the antenna was firmly fixed. To get the transmitters out, monitors were cooled in the fridge again as before, and the same incisions were reopened. Incisions were sutured back again. and the monitors were released to the wild.

This method of attaching temperature-sensitive transmitters whip whip antenna may avoid problems associated with the placement of transmitters in the stomach, or in the coelomic cavity. The taping of the antenna along the mid-line of the dorsal surface of the tail seemed to function well for signal detection.

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IDENTIFYING INDIVIDUAL TORTOISES

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The Department of the Environment requires that captive-bred European tortoises *Testudo graeca/ibera, T. hermanni,* and *T. marginata* have micro-chips inserted when they reach a size of 100mm (4") flat shell length. They also require that the breeding stock be micro-chipped.

This raises two key questions:

(1) **do pet tortoises need to be individually identifiable?** [The raison d''etre is presumably to distinguish such legal tortoises from illegal (i.e. smuggled tortoises)]. The onus is on those who aver that this need does exist to demonstrate its **practical** usefulness. Unless there are to be random checks of privately-kept pet tortoises, there does not appear to be any justification for micro-chipping/individual recognition.

If it can be shown that they do need to be individually identifiable then the second question is: **how best can this be achieved *in practice?***

The present legislation in relation to micro-chipping would appear to be a typical 'red tape'-type requirement. It is unsatisfactory in that there is no way of knowing if the tortoises are chipped on reaching 100mm flat shell length. One must assume – in the absence of evidence to the contrary – evidence which the Department will have, as it issues the individual CITES paperwork and requires that on chipping the paperwork be returned to the Department for amendment – that only a small proportion of tortoises are ever micro-chipped. In other words the current law is being flouted. Laws which do not have the support of the community and which cannot be policed are unsatisfactory.

Reasons for people not carrying out the required micro-chipping are many and varied. They include: feeling chipping is cruel, having no competent vet with any knowledge of tortoises (let alone microchipping) within a reasonable distance [I write this as one with many MRCVS in the family], not wishing to make the outlay, [under the 1999 revision to the legislation the onus is on the purchaser to (a) buy the chip, (b) to pay the vet to insert it, and (c) under proposed new charges for CITES-related work, pay the Department to issue a new certificate]. Common sense dictates that many/most people will not bother.

Many animal species have been shown to have distinctive markings or patterns which are unique to each individual. Among reptiles and amphibians my own work with LAK Singh on tail 'finger-printing' in the gharial *(Gavialis gangeticus)* in the 1970's and last year's work on a population of over 500 natterjack toads *(Bufo calamita)* using dorsal stripe/throat markings (Bustard, in prepn.) are two examples in which all members of a population can be distinguished individually.

It has been suggested that for *T. graeca* and possibly for *T. hermanni* the pattern of dark markings on the pale background of the plastron (lower shell) is unique to each particular

tortoise and hence can be used to identify it (British Chelonia Group). This work has been based on adult tortoises. If this is correct, there is no need to micro-chip the adult breeding stock which can be plastral finger-printed with a copy of each photograph held by the DOE, if it so wishes *and is prepared to undertake this work at its own expense.* To charge the breeder for co-operation is unacceptable.

Recently the DOE has stated that a plastral photograph will be adequate for baby tortoises until they reach the mandatory 100mm shell length when micro-chipping has to take place. One wonders why, if a plastral photograph is satisfactory for the first few years of life, it is not deemed to be satisfactory thereafter. In particular one wonders why this is not acceptable for adults (see above) where the technique is less debatable.

I know of no scientific research on changes in the plastral 'finger print' with growth, so instigated work on *T. hermanni* hatchlings. In, any *hermanni* the black markings develop on new growth areas. This in itself does not invalidate the method as clear growth rings are laid down in testudinates and the finger print is concerned only with the area present at the time of hatching, if the method is to be used as a whole of life individual record. Due to the growth rings it is a straightforward matter to identify the original area of each scute. What still needs to be determined is whether the pattern, present at birth, remains unchanged on that area of scute throughout life. This is the focus of my current research, in which, commencing with hatchlings, individual tortoises are plastral photographed at six monthly intervals. If it can be demonstrated that this birth pattern remains throughout life then we have a simple yet effective, method of individual tortoise recognition and there would be no need for intrusive surgery.

If there is a legitimate need to identify individual tortoises in order to separate legal and smuggled animals, and if plastral 'finger-printing' is shown to be a reliable method, then the DOE can require that (a) all breeders deposit with them a photograph of the plastron of all their breeding stock, (b) supply a plastral photograph of each tortoise sold (both to the purchaser and to the DOE), and (c) that a copy of this photograph remains with the exemption certificate throughout the tortoise's life.

Incidentally, there can be no question of these photographs being used in conjunction with a smuggled tortoise in order to legalise it as they will not match. It has been suggested that chips may be recycled in this way.

These are purely personal views. Mike Hines has sent out a circular seeking opinions on these topics and he will be publishing the results of his survey in due course. Mike has seen this in advance of publication for the benefit of his survey. It is, of course, important, if the Society is to play its proper role, that the Society has a position on these matters and I will be raising this at Council.