

An improved identification marking method for hedgehogs

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Introduction

Since 2014, we have been monitoring hedgehogs in The Regent's Park (London, UK) using repeated spotlighting field surveys on two consecutive Friday nights in early May and early September each year [1]. We needed a durable, individual identification marking system that was quick and safe to apply to hedgehogs in the field by 'citizen scientists' (trained volunteers). Of the marking methods previously used for hedgehogs we ruled-out using ear tags or PIT tags because both require skilled application to avoid potential animal welfare issues. Also detecting PIT tags requires a reading device. We chose to tag the spines with plastic sleeving because it is more durable than paint, is quick and easy to apply with minimal welfare implications. Although not permanent, the tags are durable and, although the spines are gradually moulted, they are known to remain in the pelage for 18 months or more [2]. Initially, we trialled colour-coded combinations of tags (10mm long plastic sleeves; red, white, blue or yellow), tagging five spines in each of up to six patches on the hedgehog's back (n=27 in May 2014, n=41 in September 2014). The tags themselves were robust but, after four months in the field, mis-identification of recaptured animals by field workers was common. Hedgehogs found dead and incomplete were hard or impossible to identify and incidental finds between surveys by grounds staff could not be identified without the code. Therefore, from May 2015 onwards we used a modification of Wroot's [3] method with pre-printed numbers on the tags. Here we report the results of a field-test of this marking method.

Method

We used yellow heat-shrink polyolefin plastic sleeving, 1.6mm internal diameter costing approximately £0.06 per tag (supplied uncut with a printed series of 200 numbers each duplicated 20 times: Printasleeve, Crewkerne, UK, March 2015). Tag numbers were prefixed by a hash (#) to ensure that they would not be read backwards or upside down. To ensure the durability of the numbers, before being cut into 10 mm lengths, the sleeving was secured on adhesive tape (numbers uppermost) and sprayed with acrylic resin fixative (Perfix Colourless Fixative, Daler-Rowney Ltd).

Six duplicate tags were glued to spines just behind the crown of the head, where they were easy to see in both active and rolled-up hedgehogs (Figures 1-3). When recaptured hedgehogs were found to have moulted tagged spines, spare duplicate tags were used to refresh the number of tags back up to six before re-releasing the animal.

Results

Seventy recapture events from a total of 34 individuals were recorded after three periods of eight months and two of four months, from May 2016 (animals marked in September 2015) to May 2018. Of the six tags per hedgehog at the start of each period, the mean number of tags remaining after eight months was 3.78 (SE = 0.24, n = 45), and 4.16 (SE = 0.31, n = 25) after four months (Table 1). Additionally, four individuals not seen for a year, plus one not seen for 16 months, were easily identified; each retained at least three tags. Mean tag loss rate was 4.63% per month (SE = 0.03, n = 45) during September-May periods and significantly higher at 7.67% per month (SE = 1.31, n = 25) during May-September periods (Welch's-t = 2.17, p = 0.038, 2-tailed). This may reflect a younger sample in the September-May period, but the mean monthly rate of tag loss in this period was not significantly higher for younger animals (under 700 g) at 5.73% per month, (SE = 0.93, n = 12) than the 4.23% per month (SE = 0.58, n = 33) for older animals; t = -1.35, p = 0.183 (2-tailed).

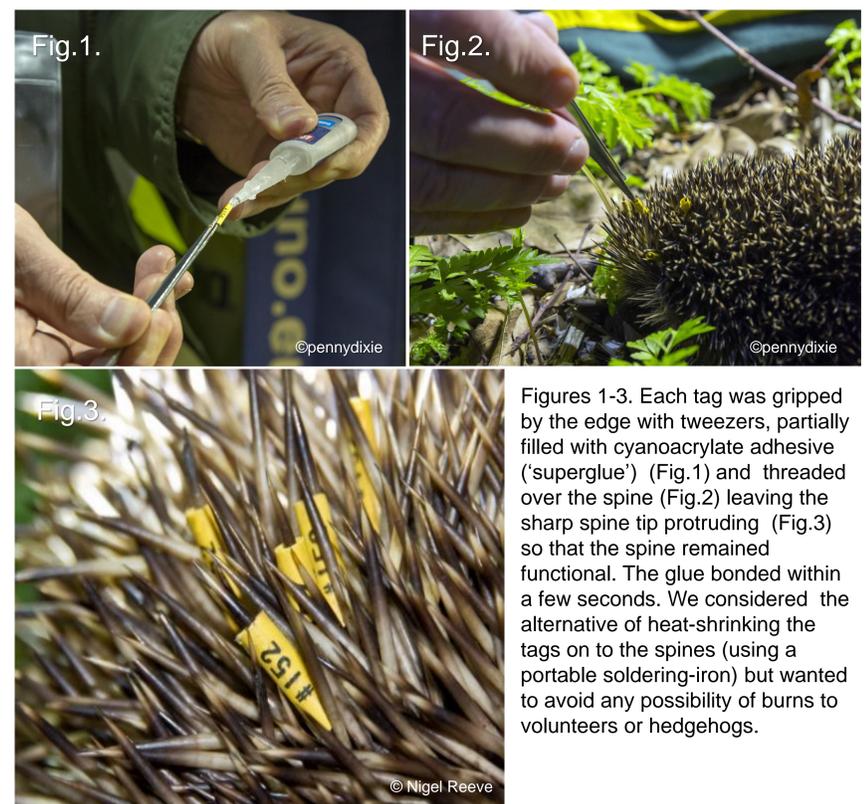
Conclusions

Our identification marking method is cheap, quick to apply, does not impair the function of the spines, has minimal welfare implications and can be easily read by anyone finding the animal. The tags can be placed in the same location on every hedgehog and are thus easy to find without being obtrusive. The choice of only six duplicate tags as a starting number was somewhat arbitrary but we considered both economy and the need to minimise handling time. Nevertheless, the tags are tough (Figure 4) and six seem to have been enough in this study to ensure that recaptured hedgehogs remained identifiable. Only one tag on a recapture allows correct identification (Figure 5). Spine replacement rate is individually variable and some may undergo a flush of moulting [2]. This may be why some animals retain relatively few tags. It is not possible to know whether some of the 12 unmarked individuals first captured as adults between September 2015 and May 2018 had been marked but had lost all their tags or simply had not been previously captured. A significantly slower rate of spine moulting during the September-May periods could perhaps result from slower metabolism during the hibernation period.

More tags could be used for studies with longer periods between recaptures. If reports of sightings from the public are needed a contact telephone number could also be printed on the other side of each tag, which could be lengthened to 15mm without compromising spine function

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Figures 1-3. Each tag was gripped by the edge with tweezers, partially filled with cyanoacrylate adhesive ('superglue') (Fig.1) and threaded over the spine (Fig.2) leaving the sharp spine tip protruding (Fig.3) so that the spine remained functional. The glue bonded within a few seconds. We considered the alternative of heat-shrinking the tags on to the spines (using a portable soldering-iron) but wanted to avoid any possibility of burns to volunteers or hedgehogs.

Table 1. The number of tags found on recaptured hedgehogs after three periods of eight months (n = 45) and two of four months (n = 25) from September 2015 to May 2018.

Time from marking to recapture	N° of hedgehogs recaptured with 1-6 tags						N	% tag loss	N° tags remaining	
	1 tag	2 tags	3 tags	4 tags	5 tags	6 tags			Mean	S.E.
8 months	4	9	5	8	13	6	45	37.04	3.78	0.24
4 months	1	5	1	6	6	6	25	30.67	4.16	0.32



Figure 4. A tag, still in good condition after eight months in the field.

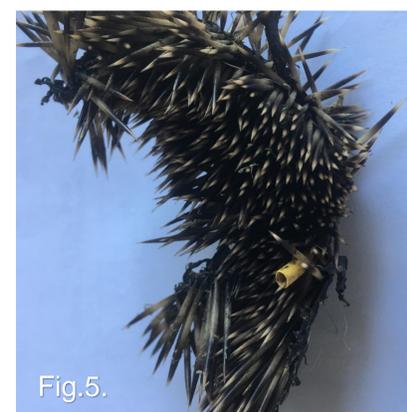


Figure 5. Only one tag on this fragment of spiny skin allowed identification of this individual. Our method was helpful in identifying road-killed, partially eaten or decomposed hedgehogs

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