



Imping of Feathers

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Introduction

Imping is derived from the Middle English *impe*, scion, sprig, offspring, and from the Old English *impa*, young shoot, and from *impian*, to implant or to graft (American Heritage Dictionary).

Imping is the process of repairing a broken feather using part of another feather, to allow rapid return to full flight ability without having to wait for natural moult of the broken feather. This benefits affected rehabilitation birds because they can be released back to the wild much earlier (e.g., natural moult in wedge-tailed eagles (*Aquila audax*) takes up to two years to replace all feathers). Plucking broken feathers is not ideal - it may result in damage to the feather follicle, and a feather growing from a damaged follicle may be deformed. The bird would also have to be kept captive a further six weeks or more until the new feather grows completely.

Imping should be done at the end of rehabilitation, a few days before release is planned. If done earlier, there is risk of the bird damaging the newly repaired feathers on cage materials whilst still captive.

Materials

Donor feathers – from ideally the same species, same age/same size feather (younger birds have longer flight feathers than mature birds), same sex (different weight of genders e.g. raptors), the same shape (i.e., exactly same feather from same wing or side of tail), same colour (same colour stage/age of bird).

Sharp cutting instrument, which will not splinter feather shafts when cutting. Heavy duty dog nail clippers (not guilotine type) and hot knives work well. Do not use scissors.

Lightweight but strong small implants (“imping needles”) to put inside the shafts of the two pieces of feather to join. Bamboo is excellent – light weight and strong for weight. Try bamboo chopsticks or skewers. For large birds, e.g., eagles, pieces of aluminium knitting needles can work well. Very fine metal needles for very small diameter feather shafts.

Sharp knife for whittling and shaping bamboo imping needles to fit in feather shafts - or rasps, files and wet and dry sandpaper to shape metal implants. Need snug fit - but not so tight that there is no room for glue between the imping needle and wall of the feather shaft, nor so tight that the feather shaft splits as the imping needle is inserted. Too loose a fit means the feather parts will not be held securely.

Small implements (e.g., drill bits, short piece of wire), to ream out all loose keratin debris from inside the feather shafts. The glue needs to adhere directly to the walls of the shafts, not to material which will loosen later.

Suitable fast setting glue - 5 minute araldite is good, not instant setting (not superglue). A few minutes setting time allows final adjustment of the orientation of the feather pieces before the glue sets firmly.

Small strips of paper to put under the join when glueing, to stop glue getting onto surrounding feathers.

Anaesthesia and supportive care (warmth/fluids) during anaesthesia - essential if imping any more than just one feather. Reduces stress and keeps the bird still for the procedure; it is much faster to imp feathers with the bird not struggling. The bird must be clinically fit enough for prolonged anaesthesia if multiple feathers are being imped. It is important to have donor feathers trimmed and prepared with unglued imping needles whittled/shaped

and fitted before the bird is anaesthetized, to minimize time under anaesthetic. Final fitting and shaping is done once the bird is anaesthetized.

Replacement Feather Selection and Storage

Source undamaged donor feathers from dead birds, or collect feathers as they are moulted from captive birds. For wings, only primary flight feathers are impeded. The other feathers routinely impeded are the tail feathers.

Donor feathers need to be labeled and identifiable as to bird and the location they came from eg 6th primary flight, left wing, female juvenile kestrel. It can be convenient to store a frozen whole wing or tail of feathers, or individual feathers in envelopes or plastic packets. To avoid storing whole birds in freezers, the wings and tail can be removed and be kept with feathers in situ and in order. Feathers can also be removed and stored in natural sequence, with tape connecting the bases of the feather shafts - or stored individually. When removing donor feathers, pluck or cut as close as possible to the skin so the projecting feather shaft is left long (allows for trimming of length later).

Prevent moth attack of the stored feathers, if they are not being stored in a freezer.

Selection and Assessment of Birds for Feather Repair

The bird should be fit enough for prolonged anaesthesia. Sometimes, when there are multiple broken feathers, it is helpful to anaesthetise the bird more than once - a first brief anaesthetic to assess exactly which feathers need imping, wake the bird, source and prepare the donor feathers needed, then do the actual feather repair under a second anaesthetic at a later time or another day. If many feathers need repair, it may be best to do so under several anaesthetics (repairing all the primary flight feathers on one wing on a large eagle can take > 1hour for experienced people). Beware blood feathers!

Check the feathers are broken no closer than 1cm from the skin. The imping needle should project at least 1cm into the feather shaft either side of the glued join (or a general rule of 5 times diameter of the imping needle either side - e.g., at least 2cm+ either side of join for large eagle feathers). If the recipient feather is broken off too close to the skin, the feather stump will not be repairable.

Procedure

❖ Have all materials ready before anaesthetising the bird, to minimize anaesthetic time. Anaesthetise the bird and position it in dorsal recumbency (sometimes is easier to change to ventral recumbency when imping tail feathers). Monitor and use supportive care for the anaes-

thetic (warmth/fluids).

❖ Cut the damaged feather shaft with a clean transverse cut, to leave at least 1cm protruding from skin. Ideally cut the damaged feather just at the base of the feather vane for maximum length of exposed shaft. Place a small wedge of paper under the cut end, to protect the surrounding feathers from glue spills later.

❖ Select the appropriate donor feather and bamboo or imping needle. Measure the donor feather against the adjacent feathers (or the equivalent feather on the other wing), to determine the length required for the donor portion. Cut the donor feather shaft transversely, but not too short, because trimming may be required once fitted to the bird's feather stump.

❖ Final measure and trim of the donor feather against the feather stump. Adjust/trim so the diameter of the cut end of the donor shaft will match that of the feather stump, and when attached to the feather stump it will give the correct feather length. Clean out the inside of the donor shaft and feather stump with a reaming tool/piece of wire/drill bit, to remove loose keratin.

❖ Insert one end of the imping needle into the donor shaft first, to check the fit. Whittle and trim the ends of the imping needle so it will fit snugly into the shafts of both pieces of feather. (If fitting imping needles into donor feathers beforehand, do NOT glue the imping needle into place until the final fitting on the bird - once glued, you won't be able to trim the donor feather later to fit the feather stump).

❖ Mix the glue. Glue half the imping needle into the donor feather shaft first, then insert and glue the other part of the imping needle and donor feather onto the feather stump. Before the glue sets, rotate the feather shaft to align the feather properly with the plane of the other feather vanes. (A tip - align the midline grooves on the underside of the feather shafts). When all feathers are glued satisfactorily, clean up and allow further time under anaesthesia for the glue to dry before the bird is aroused from the anaesthetic.

❖ The day after imping feathers, release the bird into a suitably sized aviary to flight test the repair. If the repair is weak, the feathers will come apart in the first few days. If the impeded feathers remain intact during this time, the bird can then be released to the wild.

References/Further Reading

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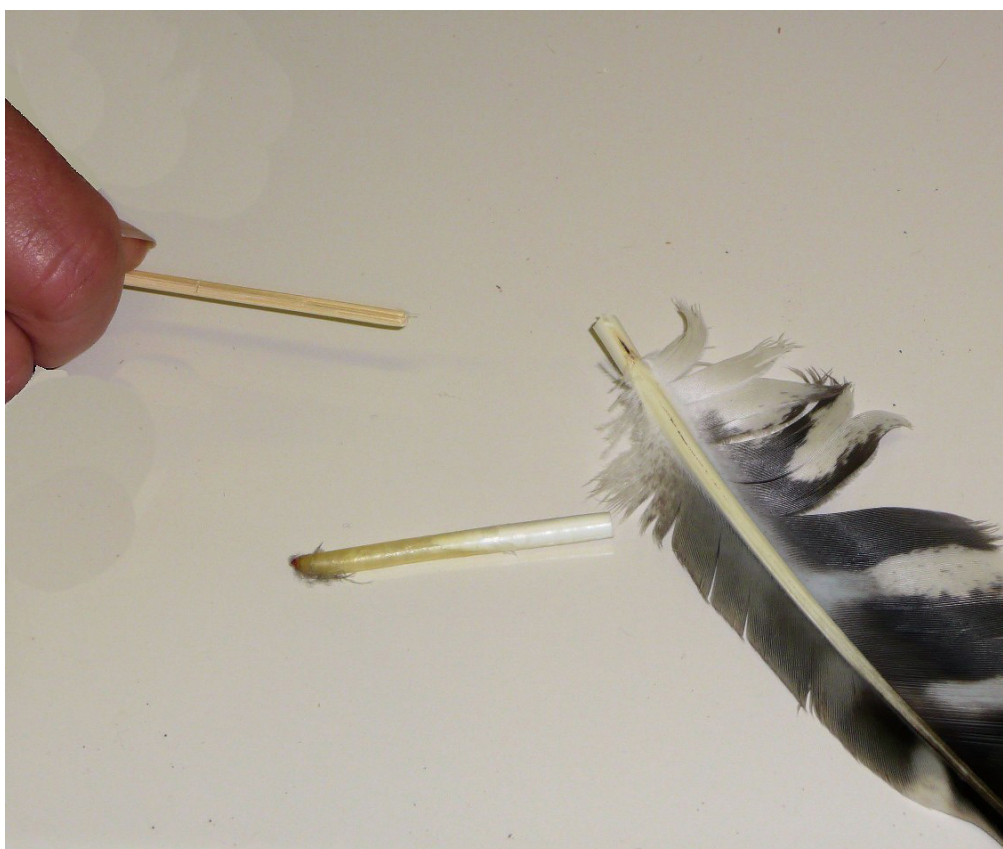


Figure 1. Cut feather and bamboo imping needle



Figure 2. Putting the feather pieces together



Figure 3. Equipment needed: replacement feathers, bamboo imping needles, nail clippers to cut feathers, sharp knife to whittle bamboo needles to fit, drill bits to clean inside feather shafts, 5 minute epoxy glue.