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3. FOOTPRINT TUNNELS

3.1 Making up the ink

The only equipment required to make up the ink is a 3-litre beaker and 300 g unenclosed (beam-type) balance. The actual amounts of the ingredients used are not critical, but their relative proportions should remain about the same. The ingredients are weighed into the beaker in this order: ferric nitrate (technical grade) 80 g; polyethylene glycol (PEG 300/400) 120 g; any unscented, non-foaming concentrated detergent 40 g; and water to a total of 270 g, or any multiple. The detergent is a viscous hygroscopic fluid which helps to retard evaporation. This mixture is stirred well, if necessary over gentle heat. The result is a thick, brown, very slightly caustic liquid which is ready to use and lasts indefinitely when bottled.

3.2 Preparing the recording papers

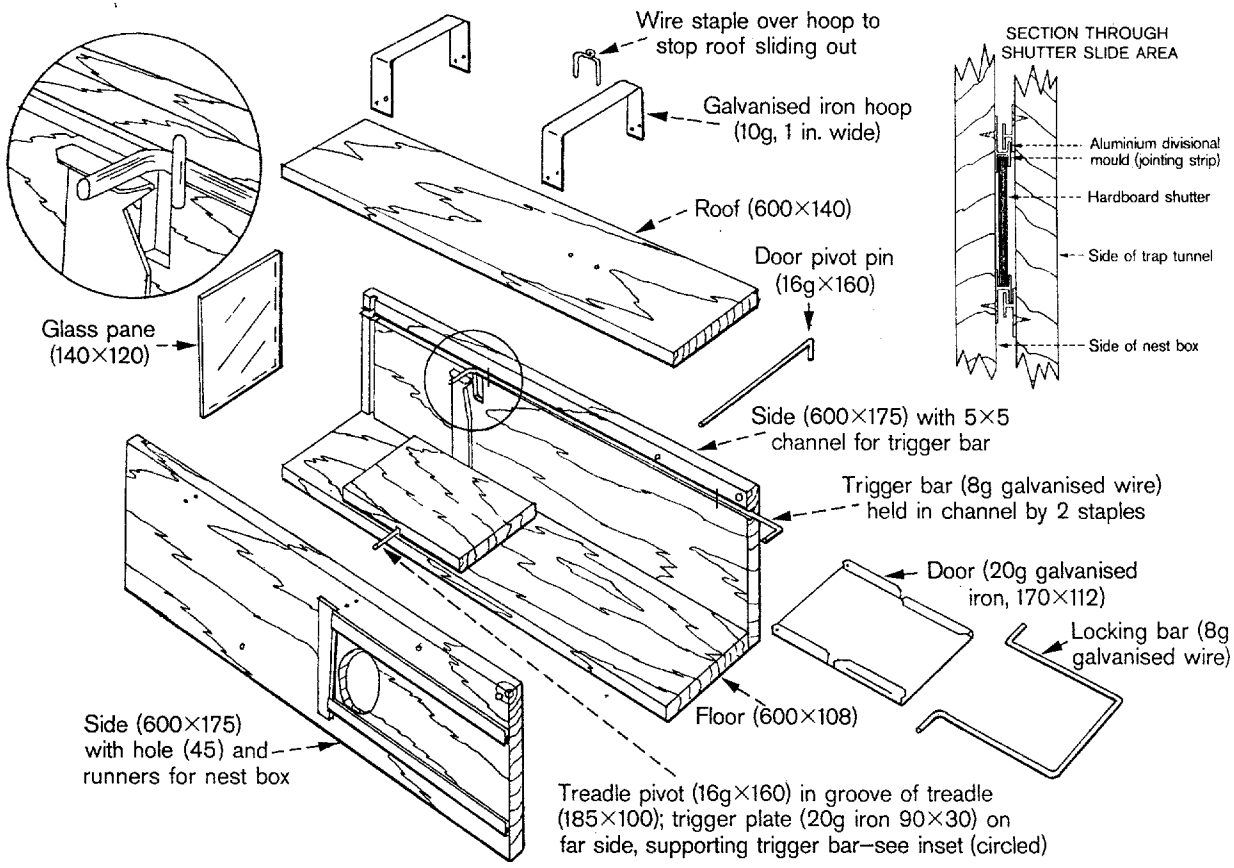
For the paper, a coarse grade of Kraft or brown wrapping paper is used, rough side up. (For finer prints, use glossy white paper, if the animals are not put off by it.) A solution of 5% tannic acid in 75% ethanol is sprayed over the paper evenly and finely (soaking is not necessary), to the equivalent of about 1.6 g tannic acid/m^2. It dries invisibly, in seconds. The best arrangement is a vacuum spray operated in a fume cupboard, but a hand-operated atomiser used in the open air will do. When dry, the sheets are cut to the size required for the tunnels (ours were 17 x 7 cm). Paper with no obvious rough side must be marked on the side which was sprayed, otherwise it may be mounted upside down. Two papers are required per tunnel, to record animals passing through in either direction.

3.3 Preparing and setting out the tunnels

The papers are set in tunnels which have three basic components: a wooden base, and a tray and a cover made of lightweight aluminium or moulded plastic. The tray is easily removable, and divided into three compartments - a central one for a permanent ink pad (e.g., thin sponge or flannelette sheeting), and one on each side of it for the papers. The tunnels should be set in the same way as traps, but more attention must be paid to protecting their open ends from driving rain. Enough tunnels can be put out at once to make baiting them unnecessary, and besides, bait can lead to over-tracking.

3.4 Field routine

When inspecting, lift out the tray; slip out the papers and label them with date, tunnel number etc; renew the ink if necessary by painting ink into the pad evenly with a small brush or squeeze bottle; and set new papers in


Wire staple over hoop to stop roof sliding out
Galvanised iron hoop (10g, 1 in. wide)
Roof (600×140)
Door pivot pin (16g×160)
Glass pane (140×120)
Side (600×175) with 5×5 channel for trigger bar
Trigger bar (8g galvanised wire) held in channel by 2 staples
Door (20g galvanised iron, 170×112)
Locking bar (8g galvanised wire)
Floor (600×108)
Side (600×175) with hole (45) and runners for nest box
Treadle pivot (16g×160) in groove of treadle (185×100); trigger plate (20g iron 90×30) on far side, supporting trigger bar–see inset (circled)
SECTION THROUGH SHUTTER SLIDE AREA
Aluminium divisional mould (jointing strip)
Hardboard shutter
Side of trap tunnel
Side of nest box

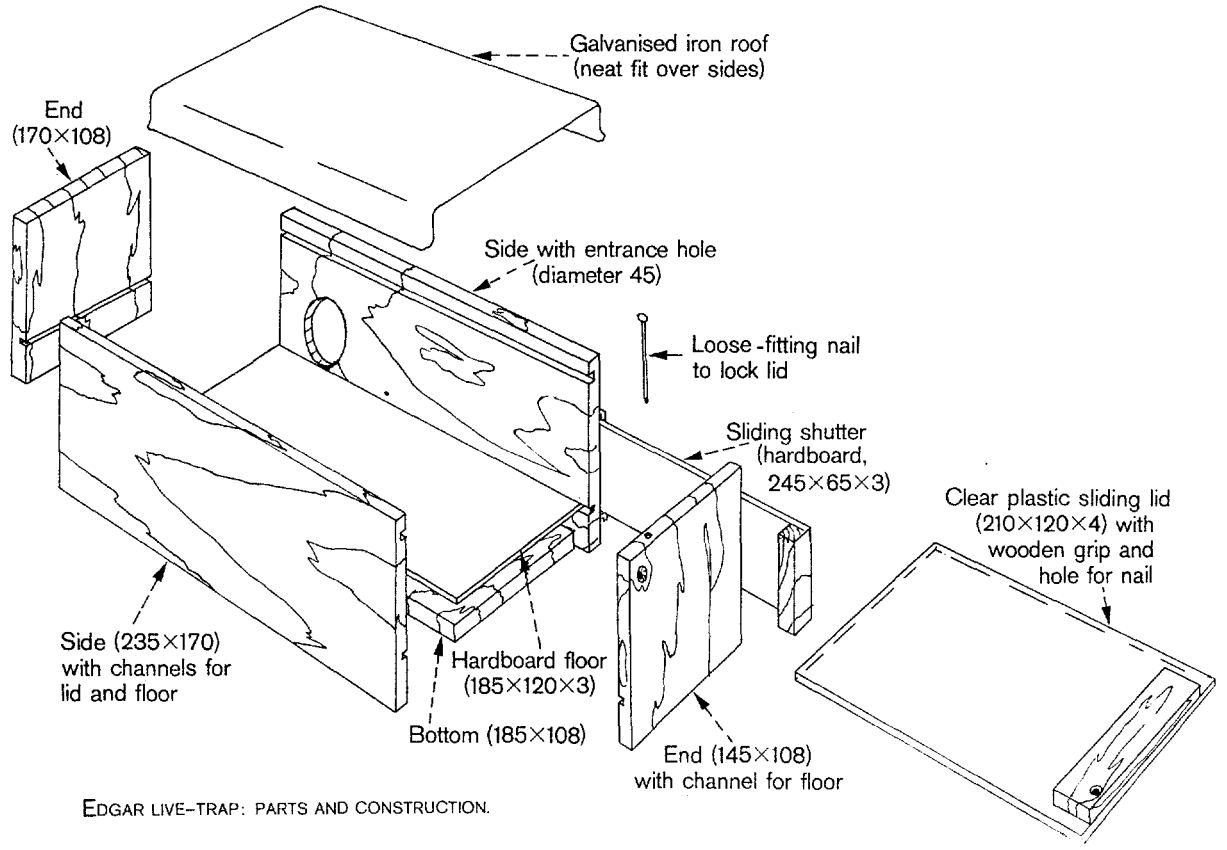


Fig. 5 Construction details for the Edgar live-trap. (R.L. Edgar)

place. The check takes only a minute or two, the tunnel site is not disturbed and the prints can be identified and analysed later. The prints are permanent and not spoiled by rain, so the papers are easy to handle in the field, but the ink tends to absorb water, and in extremely wet conditions it may become too dilute, blurring the prints and possibly running or spoiling the papers. It is essential to keep the papers and ink well separated; the moulded plastic trays isolate the three compartments with low bars.

The frequency of inspections must depend mostly on the population density of mice, even if other species are of greater interest. When numerous, mice track the paper quickly, and obscure other prints. Where mice are not abundant, tunnels may be left for a long as the ink remains damp - generally a fortnight, or up to a month in some circumstances.

4. LIVE-TRAPPING

Wire mesh traps are unsuitable for weasels and stoats, which really need the privacy and warmth provided by a dry nest in a solid-wall trap. Lightweight, collapsible aluminium box traps are available, but offer little insulation and in cold weather the mortality rate of small mammals in them is high. Wooden traps are heavy, but give good results for small, nervous mustelids.

The Whitlock or "see-saw" trap is common in Germany and has been used successfully with weasels in Britain (for description and illustration, see King 1973, 1989); the Edgar live-trap, developed in New Zealand, is better for stoats. By contrast, most ferrets tolerate wire mesh cage traps quite well, because they still retain the relatively docile nature of semi-domesticated animals.

4.1 The Edgar live-trap

The Edgar live-trap (Fig. 5) is essentially a wooden tunnel with a loose lid. A glass plate closes one end, and a metal drop-door the other. A hole in one side, which can be closed by a sliding shutter, leads to a large dark nestbox. The trap and nestbox need no great skill to make; precise fitting of the working parts is not necessary, and in fact should be avoided, because the wooden parts tend to swell and warp in the rain. The dimensions given are too small for ferrets but the same plan would work as well when scaled up for them.

The trigger bar holding the door open is released when the large wooden treadle on the floor is pressed forward. (The treadle can be counterweighted so that lightweight animals, such as mice and small birds, cannot set it off). When the trigger is released, the door drops under its own weight, and a locking bar swings down and holds it closed. This bar also makes a convenient carrying handle. The door can be opened and the trigger reset from the entrance, using one hand only, and without opening the top of the trap or disturbing the camouflage.

The moving parts are few, their working is not easily impaired by rust or rot, and they are internal, which reduces interference from possums. The treadle is easily removed for cleaning-out scats or food stuck underneath; by counter-weighting it to exclude mice, the trap is protected from gnawing and is not closed to mustelids. If the entire trap is dipped in linseed oil before use, damp and rot are at least retarded.

If the door is fitted with a switch that can be interrogated from a distance, the operator need not waste time, and trample the habitat, by having to get

within sight of every trap for each daily check. The mechanism must be fail-safe, i.e., produces a positive response only if the trap is still open.

The hole between the tunnel and the nestbox can be closed with a sliding shutter, so the box can be removed from the trap with its contents secure. The nestbox, which also serves as an anaesthetising chamber, has a double bottom to keep out damp, a perspex lid through which the captive can be identified, and a metal cover to keep the box dark and dry. Use Dacron or cotton wool as nesting material. Between trapping sessions the traps can be locked open by pushing the trigger bar along its groove past the vertical recess, so that movements of the treadle cannot release the door.

Sites for live-traps should be arranged just as for Fenns (see section 5.3, below). A cover made of scrap plywood keeps off heavy rain and conceals the trap from human interference. The conventional bait used to be a dead white mouse, placed well inside, just in front of the glass plate, plus some strong smell smeared on the entrance, such as that of rabbit gut. This system can be very successful in live-trapping stoats; in Fiordland over the four days January 1- ,4 1980, 70 Edgar traps recorded 75 captures. Recent trials suggest that eggs may be a better bait (see section 5.7, below).

4.2 Identifying the catch

Check where the captive is before opening the lid of the trap.

Stoats and rats almost always take the dead mouse into the nestbox and stay there. They can be identified by briefly lifting the metal nestbox lid. Hedgehogs, small possums, cats and rabbits can enter the trap, but are too large to get into the nestbox. They can be released at once by sliding back the lid of the tunnel.

4.3 Anaesthetising live mustelids

Handling live-captured mustelids must be done with care, both to avoid frightening the captive and to save the operator's fingers. Ferrets are often quite docile (Fig. 6), but stoats must be anaesthetised with halothane or ether.

The door of the Edgar trap nestbox is so arranged that when the outside end of the sliding shutter is level with the front of the trap, the other end is clear of the hole. If the animal is in the nestbox, the shutter is pushed forward to close the nestbox entrance, and then the whole nestbox assembly can be removed, if convenient, by holding its top and bottom and sliding it forward.

A small hole in the side of the nestbox admits anaesthetic vapour, either bubbled through a glass jar or atomised through a plastic squeeze bottle. If

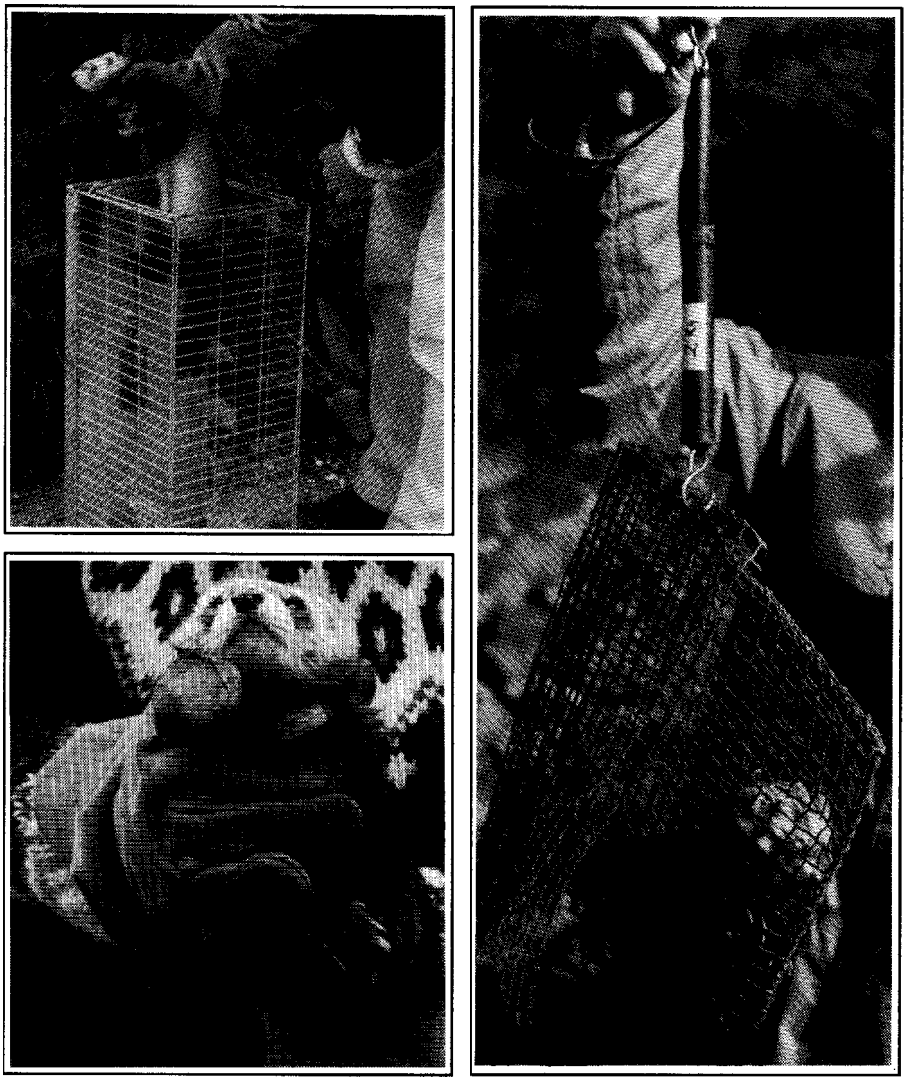


Fig.6 Feral ferrets have thicker fur, more fat and calmer temperaments than stoats or weasels, so they do not get chilled and frantic in commercially made wiremesh traps, and they can be handled without anaesthetic. *Top*: **Removing a captured ferret from a trap requires only a heavy leather glove and a firm grip.** ***Bottom***: **A ferret equipped with a radio collar.** *Right:* **Weighing a conscious ferret held in a sleeve made of plastic netting (unconscious stoats or weasels can be weighed directly by equipping the end of the springbalance with a crocodile clip). (C.M. Kina)**

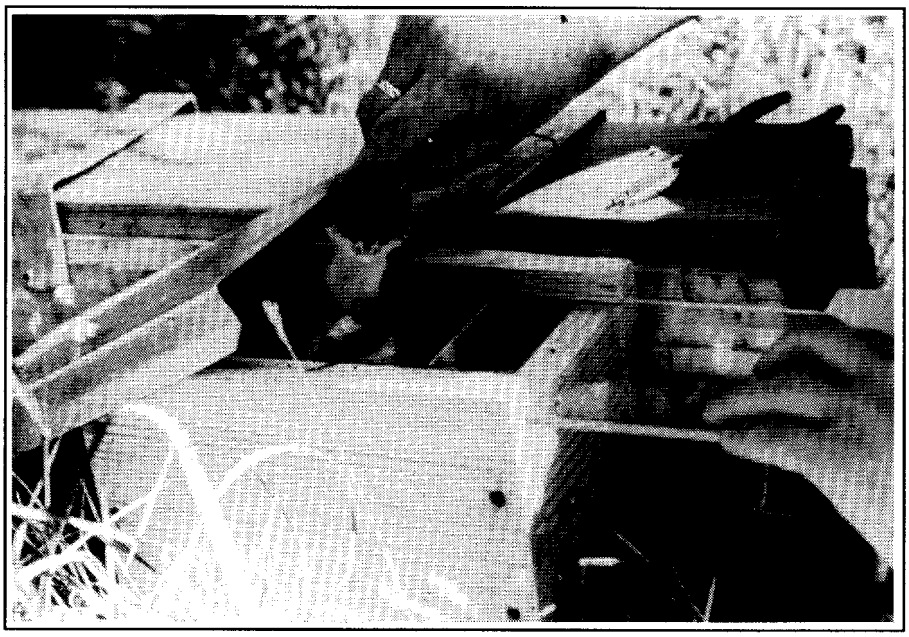


Fig. 7 Lifting an anaesthetised stoat out of the nestbox of an Edgar live-trap (A. Harris)

using ether, keep the box lid down during the early stages of anaesthetisation; when the sound of shuffling has subsided, open the metal lid and watch the process through the perspex top. There are differences between animals, and between different days for the same animal, so it is important to watch. A stoat usually first closes its eyes, sneezing and shaking its head; then as it begins to lose co-ordination, it breathes faster; finally, it completely collapses and its breathing slows down again. It is seldom unconscious for more than 2-3 minutes, and is usually fully alert again within 5 or 10 minutes. Two light doses are better than one heavy one, because overdoses are easily fatal. When it is unconscious, slide open the perspex lid and lift the stoat out by the scruff of the neck (Fig. 7).

If using halothane, which acts faster, watch the animal all the time, as a stoat can be overdosed on halothane in less than a minute. The advantage of halothane is that the animal recovers more quickly and without apparent effect (i.e., without a groggy stage). Either way, if a second dose is needed, return the stoat to the box before it has recovered much from the effects of the first.

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