

## WHITE'S THRUSH: SOME ASPECTS OF ITS ECOLOGY AND FEEDING BEHAVIOUR

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### INTRODUCTION

Little is known of the ecology of White's Thrush *Zoothera dauma* in Australia beyond its habitat preference of moist, well-vegetated gullies and its ground-litter foraging behaviour.

As part of a larger project conducted at Kuitpo State Forest, 40 km SE of Adelaide, this species was mist-netted and closely observed by the author between February 1981 and February 1982. The study area comprised 70 ha of dry sclerophyll woodland, pine plantation and mixed native and pine forest in a relatively high rainfall area (875 mm annual) of the Mount Lofty Ranges. This area represents the western limit of the bird's Australian distribution so the data below may not relate to all Australian populations (see Discussion and Ford, J. R., forthcoming in *Emu*).

### BEHAVIOUR

On 97 visits to the study area, White's Thrush was sighted only 29 times, despite systematic searching. Other competent observers recorded it on nine of 38 visits. This is consistent with its quiet and furtive nature whereby the bird will often run with a crouched posture, behind low cover, to the far side of a bush or tree trunk and stay motionless in the shadows to avoid detection. It then, generally, quickly runs away, often unnoticed. Alternatively, when disturbed, it may fly up onto a branch, sometimes several metres above ground, and stay motionless, relying on its camouflage for protection, or it may fly directly away from the observer only to circle, under cover of shrubbery, so that it lands, hidden, some distance to one side of or even in the opposite direction to its initial flight path.

The bird was contacted in all seasons but less commonly over summer. It was seldom seen alone or in a group of more than five.

### CALLS AND SONG

In the hand, the birds showed a remarkable variety of calls, from a harsh alarm call, through various mimicries, to a Blackbird *Turdus merula* like warble. This contrasted with normal field observations of a limited number of soft sounds, which were as follows:

- (a) A thin, Golden Whistler *Pachycephala pectoralis* — like, ascending whistle. This seemed to be the normal contact call.
- (b) A fast, high-pitched, disyllabic, cricket-like "chi-lit", often accompanied by a flicking of the wings from a perch. This was noted in cases where the observer caused normal contact between two or more birds to be broken.

- (c) A drawn out, fairywren *Malurus*-like, ascending "seeeee", noted in reply to (b).
- (d) Similar to (c), but monotonal. This was noted while immatures were being fed and is perhaps of a similar function as (c).
- (e) A soft warble, noted in the breeding season. Another observer, G. Webster, secured a recording of this lengthy and variable Blackbird-like song, to which one bird responded with vigorous activity.
- (f) A fairywren-like, variably pitched, quick and prolonged "see-see-see . . ." accompanied by an up-pointed head and tail and fluttering wings. This was noted as a display to a bird on the ground, ten metres away from a nest with young.

### MIST-NET DATA

Six birds were mist-netted, individually colour-banded and released unharmed. Several others escaped from the nets. In all cases at least one other individual was nearby or caught at the same time and place. One bird was caught at a height of five metres, in a net set just below the tree canopy. Six others were caught at shrub height (1-2 metres) and one at less than one metre. Resightings of marked birds were few, yet suggested that:

- the birds were resident in the study site for one autumn and winter at least.
- the 'familiar area' of individuals was at least ten hectares.
- the birds fed in small groups or pairs, although the pair composition was variable from day to day.

Five of the marked individuals were caught in one area within two days, but the birds comprised only a small fraction of subsequent sightings of the species in that (10 hectare) area.

### FORAGING

The following data and observations were gathered by following approximately 17 individuals closely (up to four metres) for a total of seven hours during May, August and September 1981 and September 1982, and from other general observations.

An alerted bird may sometimes resume feeding in as little as one minute, provided the observer moves quietly, slowly and in view of the bird. The diet was estimated at over 95% by volume, of earthworms (about five centimetres long) with occasional small litter invertebrates accounting for the remainder. (B. C. Gepp (pers. comm.) concurs

that in another relatively high rainfall area of the Mount Lofty Ranges, the diet is predominantly earthworms.) Mixed black and white fluid excrement was passed at least every five minutes.

The bird almost always fed by probing energetically into the litter to about the depth of its bill, with a series of sudden probes in one particular spot.

The overall feeding success rate in 1981 was on average, one worm every four minutes, but observation continually disrupted feeding. In 1982, while feeding two nestlings one bird showed a success rate of two worms every minute. The author was unable to match this success rate by physically pulling up wads of litter, though many millipedes were found.

The birds hopped or ran several paces and then stayed momentarily stationary, before probing or moving on. This occurred every 2-5 seconds while feeding (usually every three seconds) and approximately one successful foraging attempt occurred every 2-10 positions.

A noise similar to a jet of air and somewhat louder (clearly audible at five metres and lasting less than 0.25 sec.) than the bird's footfalls was produced immediately after stopping and was in turn, followed by probing or more hopping. Coincident with this noise, was a distinct downward movement of the vent region ('vent-dipping'), very similar to the movements of defaecation. Legs and claws were noticed to be motionless at this time, as were the head and beak. The 'vent-dipping' did not occur between the closely separated probes at a single spot. Prior to moving to a new position (or prior to another 'vent-dipping' if the bird did not move) the body and tail were noted to show a slight tremor of usually five or six shivers. If foraging were more intensive, for example in the pursuit of a particular worm, one shiver would take place every  $\frac{1}{3}$  second; if slower, up to every second. Each shiver was accompanied by a very soft sound somewhat similar to an inhalational gasp. Only in one individual was the tremor absent or less obvious. When the bird was not feeding (*i.e.* when sitting on a nest, on the alert or perched) no such noises, dipping movements or shivers occurred. The head was held motionless and often cocked, rarely pointing to wherever the set of probes proved to be directed. This posture was quickly adopted before and after each unsuccessful single probe.

Up to eight live earthworms were held in the beak at one time when an adult was feeding younger birds. The bundle of worms may quickly be dropped, in order to probe for further food, and picked up soon afterwards and taken to either nestlings or free-flying young. Campbell (1900) noted similar behaviour.

Immature birds (still being fed by an adult) seemed to be less expert at foraging, in that their probing efforts were less rewarding, took longer to

complete, were attempted less often and were less vigorous. According to the immature's own success rate, it was fed more or less frequently by an adult.

Some small areas (e.g. less than one hectare) seemed to be much preferred by the White's Thrush for feeding. With the approach of summer, some of these feeding areas seemed to be abandoned in favour of moister areas (e.g. creeklines). Following a low intensity prescribed-burn, in which the larger soil invertebrates were mostly unaffected, several White's Thrush were seen feeding in areas where they had not previously been contacted.

The birds were not seen drinking despite lengthy and careful observation at the only known water sources.

### NESTING

Both parents were involved in rearing nestlings. At one nest (30 m in from the edge of a pine plantation; 8 m high, in the fork of a *Pinus radiata*; a platform of pine needles and mostly dry grass, lined outside with green moss and housing an unlined 10 cm diameter hemispherical cup) one parent sat in the nest with the two newly hatched young, leaving only for one half-hour every few hours to feed, while the other (identified by darker breast markings) fed itself and also brought back a beakful of worms to the nestlings regularly every 13 minutes. No regurgitation was noticed and waste material was removed from the nest or eaten. The nest was vacated within two weeks, possibly sooner.

### DISCUSSION

The surprisingly high population density (inferred from the low overall contact rate but low proportion of marked (resident) birds amongst resightings) illustrate that this bird is not so much "uncommon" as "uncommonly seen", at least in its preferred habitat.<sup>1</sup>

That this so-called 'ground bird' does fly well above ground at times, is confirmed by the height at which some birds were observed: the capture height of one bird in the non-breeding season and the eight metre high nest. The calls described differ somewhat from the descriptions in standard guides and emphasize that this species may have more variable calls (perhaps geographically so) than previously thought. The "darker breast markings" mentioned appear not to be a consistent sexual dimorphism (based on the examination of 12 sexed museum specimens).

The data suggest that at least some birds were year-round residents and so the species was presumably harder to detect in summer due to behaviour, range contraction or shift to denser vegetation. Sibility of some summer dispersal cannot be discounted. The small groups of birds (2-5) may be family groups.

The diet of predominantly earthworms would provide much moisture to these birds and minimize their need to drink. It is also a suitable high calorie source (Welty 1955) for an animal such as White's Thrush with a high body temperature (probably *c* 43°C, see Rodbard 1950) and high metabolic rate. In common with many avian 'carnivores' this species probably has a short gut and a fast gut-passage time, as suggested by the frequent feeding. The bird's hooked beak is admirably suited to extracting worms from beneath the litter. Although the birds' movement between and within feeding grounds may be explained by intolerance to repeated observations, it is more probably due to the changing availability of earthworms. The record of birds feeding in 'new' areas after the fire, suggests that altered food availability caused the birds to move to new feeding grounds. The apparent range contraction to moister areas over summer is also consistent with this hypothesis. Plasticity of preferred feeding sites indicates a larger rather than a smaller 'familiar range' for individuals.

The depth of probing suggests that visual cues are not especially important. Rather, the motionless posture with cocked head, (which is quickly resumed between unsuccessful probes) suggests that hearing is used to detect earthworm movements through the litter (compare this with the noisy litter-scattering behaviour of the Blackbird). Vibrations are probably also sensed, through the feet.

The louder of the two noises described (that accompanied by a downward movement of the vent) may well be a 'scare tactic' to induce earthworms to contract reflexly (or other prey to move away) and so betray their presence to the Thrush through noise or litter movement and vibration. That these louder noises were made only during foraging, were antecedent to the probing and were more frequent with more intensive foraging, suggests that they were indeed somehow used to detect prey.

If the source of the louder noise is assumed to be from the quick passage of air through the vent, then the softer, antecedent noises (each accompanied by a body shiver) might be explained as aerophagia — the gulping of air. Air swallowing would naturally occur more frequently when air was passed more frequently. Such a system would be possible for a bird with a short gut, and desirable for one that needs

to maintain good sensitivity to vibration and noise at the instant after producing a 'scaring' noise. Vocalization or foot pattering may reduce these senses.<sup>2</sup>

The immature birds' need to 'learn' how to forage effectively and the author's low success rate at finding worms in the litter together highlight the foraging expertise of the adults. In another earthworm predator, the Blackbird, often found in similar sites to the White's Thrush, the author has been unable to detect similar foraging techniques. Being more general in diet, habitat and behaviour, the Blackbird is probably less specialized to earthworm predation. If White's Thrush is indeed a specialized earthworm predator in other parts of its range, perhaps its preferred habitat might be restated as 'anywhere with suitable cover and nesting sites, provided earthworms are readily available to it'. Earthworm availability might also control the variable nesting times reported for this species.

Such specialized foraging techniques as described above, may well be unique to White's Thrush. In any case, the techniques themselves, the ecology of the species in other regions and the foraging techniques of other species warrant closer scrutiny.

#### NOTES

- 1 White's Thrush is known to occur commonly in 7-15 year old pine plantations with complete canopy cover and in older plantations containing remnant native vegetation in Second Valley, Kuitpo, Mount Crawford and all the plantations in the South-East of South Australia. (B. C. Gepp, pers. comm.)
- 2 Cooper (1959) said that he had noted many individual White's Thrush vibrating their bodies for several seconds while foraging. He interpreted this to mean that a Thrush's vibrations disturbed the leaf litter and the earthworms therein for which latter the bird listened with a cocked head. Presumably, these vibrations could have accompanied bursts of air from the vent as described in the present paper. Cooper (*op. cit.*) also noted, as had Hobbs (1954a), that the birds turn over leaves in their searches for earthworms. Lastly, Hobbs (1954b) and Wall (1982) noted the species' use of "foot pattering": a bird stands on one leg and patters on the ground rapidly with the "foot" of the other leg, this also being a technique to disturb earthworms. — Ed.

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