Higgins, P.J.; Peter, J.M. & Cowling, S.J. (editors) 2006. Handbook of Australian, New Zealand & Antarctic Birds. Volume 7, Boatbill to starlings; Part 7B, Dunnock to starlings. Melbourne, Oxford University Press. [Vol. 5, pages 51-55] Vol. 7B, pages 1802-1805, 1877-1891; plate 53 [captioned transposed with plate 52].

Order **PASSERIFORMES**

The largest and most diverse order of birds, commonly called passerines or perching birds, and comprising some 5712 species in 45 families (based on Sibley & Monroe 1990; Sibley & Ahlquist 1990), and well over half the world's known bird species. In the HANZAB region, Passeriformes represented by some 382 species in 39 families. Tiny to large: smallest passerine is Pygmy Tit *Psaltria exilis* of Java, with a total length *c.* 8 cm; largest is Greenland Raven *Corvus corax principalis*, with a total length *c.* 64 cm and weighing up to 1.7 kg. Superb Lyrebird *Menura novaehollandiae* of e. Aust. probably second largest in Order, with a total length (in adult male) of *c.* 103 cm, including tail of *c.* 70 cm, and weight up to *c.* 1.1 kg. Cosmopolitan except Antarctica and some oceanic islands; and occupying all terrestrial habitats.

Overall, Passeriformes are characterized by (based on Raikow 1982; Sibley & Ahlquist 1990; and DAB [=Schodde & Mason 1999]): Palate aegithongnathous (except Conopophagidae [gnateaters]). Intestinal caeca rudimentary. Single left carotid artery (except paired in *Pseudocalyptomena* and possibly other broadbills [Eurylaimidae]). Aftershaft reduced or absent. Neck short, with 14 cervical vertebrae in most, but 15 in Eurylaimidae (broadbills); atlas perforated; metasternum usually two-notched (rarely four-notched). Bicep slip absent. Expansor secundariorum often present (Berger 1956; Raikow 1982; *contra* Beddard 1898; Ridgeway 1901). Pelvic muscles AXY (AX in *Dicrurus* [drongos]). Ambiens absent. Iliofemoralis externus usually absent, but present in some groups as 'developmental anomaly' (Raikow 1982). Tensor propatagialis brevis tendon present. Hypocleideum present (except Menuridae [lyrebirds]). Wings eutaxic. Usually ten primaries, but p10 often reduced or absent; 11 primaries in Menuridae (lyrebirds), most Eurylaimidae (broadbills), most Furnariidae (ovenbirds), and some Passeri (oscines [see below]). Usually nine secondaries (ten in Menuridae [lyrebirds]). Usually 12 rectrices, but from six (*Stipiturus* [Maluridae]) to 16 (Menuridae). Lesser primary and secondary coverts usually reduced or absent (Zeidler 1966; Morlion 1985; Winkler & Jenni 1996), but a few well-developed lesser primary coverts are present in Superb Lyrebird (Morlion 1985). Uropygial preen glands naked. No basipterygoid process. Nasal glands minute. Foot anisodactyl. Hallux incumbent, large and directed backwards; toes 2, 3 and 4 directed forward; digital formula 2–3–4–5. Deep plantar tendons usually of type VII (lacking vinculum), but often type I in Eurylaimidae (broadbills). Spermatozoa bundled with coiled head and large acrosome.

The DNA–DNA hybridization studies of Sibley & Ahlquist (1985a, 1990) revealed much about the relationships within the Passeriformes and resulted in fundamental changes to the higher level taxonomy of passerines, not least to the taxonomy of the Australo-Papuan oscine passerines. Importantly, these studies showed that many elements of the Australo-Papuan avifauna (e.g. the A'asian wrens [Maluridae], robins [Petroicidae], babblers [Pomatostomidae], and so on), represent an endemic radiation of forms that bear an external resemblance to Eurasian families. Many of the findings of DNA–DNA hybridization studies regarding the Australo-Papuan oscines have since been broadly corroborated by studies using protein allozymes (e.g. Christidis 1991; Christidis & Schodde 1991) and microcomplement fixation (e.g. Baverstock *et al.* 1991, 1992), though there are also many points that remain uncertain and many familial relationships within the Passeriformes are unresolved (Christidis & Boles 1994). (For discussion of historical taxonomic arrangements preceding results of DNA–DNA hybridization studies, see BWP, and Sibley & Ahlquist [1985a,b, 1990]).

The Passeriformes divide into two main groups:

SUBORDER TYRANNI (SUBOSCINES): The distribution of the suboscines is centred in the American and Afro-asian Tropics, with a massive radiation in South America (Sibley & Ahlquist 1990; DAB). Suboscines characterized by mesomyodian syrinx, with or without a single pair of intrinsic syringeal muscles (van Tyne & Berger 1976; Campbell & Lack 1985; DAB). Suborder sometimes named Oligomyodi (e.g. Sibley & Ahlquist 1985a,b), Deutero-Oscines (e.g. Morony *et al.* 1975; Voous 1977), or Clamatores (Campbell & Lack 1985). Poorly represented in the HANZAB region: only TYRANNIDAE (tyrant-flycatchers), with two species, both accidental to South Georgia; ACANTHISITTIDAE (NZ wrens), with four species (one extinct) in three genera, endemic to NZ; and PITTIDAE (pittas), with four species in one genus in HANZAB region (three breeding, one accidental). Tyranni formerly included the Menuridae and Atrichornithidae (e.g. Wetmore 1960; Storer 1971), though subsequently shown that these two families should be included in Passeri (e.g. Sibley 1974; Sibley & Ahlquist 1985, 1990).

SUBORDER PASSERI (OSCINES OR SONGBIRDS): Cosmopolitan in distribution. Within the HANZAB region there are 36 families of Passeri. The Australo-Papuan Passeri can be subdivided into several supra-familial groups, but those recognized differ between authors (for further information, see Sibley & Ahlquist 1985, 1990; DAB). Oscines are characterized by acromyodian syrinx, with three or four pairs of intrinsic syringeal muscles (van Tyne & Berger 1976; Campbell & Lack 1985; Sibley& Ahlquist 1990; DAB).

Suborder Passeri comprises the major element of the Aust. and NZ passerine avifauna. The families recorded in the HANZAB region, and the representatives in the region, are (following Christidis & Boles [1994] for Aust., with additional species for wider region added as appropriate):

MENURIDAE (lyrebirds): two species in one genus; endemic to Aust.;
ATRICHORNITHIDAE (scrub-birds): two species in one genus; endemic to Aust.;
CLIMACTERIDAE (A'asian treecreepers): six species in two genera breeding in Aust.;
MALURIDAE (Australopapuan fairy-wrens, emu-wrens and grasswrens): 22 breeding species in three genera in Aust.;
MELIPHAGIDAE (honeyeaters and Aust. chats): 76 species in 26 genera in Aust. and NZ, all breeding;
PARDALOTIDAE (pardalotes, scrubwrens, thornbills and allies): 51 species (one extinct) in 15 genera in HANZAB region, all breeding;
PETROICIDAE (A'asian robins): 23 species in eight genera in HANZAB region, all breeding;
ORTHONYCHIDAE (logrunners): two breeding species in one genus in Aust.;
POMATOSTOMIDAE (A'asian babblers): four breeding species in single genus in Aust.;
CINCLOSOMATIDAE (whipbirds, wedgebills, quail-thrushes and jewel-babblers): eight breeding species in two genera in Aust.;
NEOSITTIDAE (sitellas): single species breeding in Aust.;
PACHYCEPHALIDAE (whistlers, shrike-thrushes and allies): 17 species in seven genera in HANZAB region, all breeding;
DICRURIDAE (monarchs, flycatchers, fantails and drongos): 19 species in seven genera in HANZAB region, all breeding;
CAMPEPHAGIDAE (cuckoo-shrikes, trillers and minivets): eight species (one extinct) in two genera in HANZAB region, all breeding;
ORIOLIDAE (Old World orioles and figbirds): three species in two genera in Aust., all breeding;
ARTAMIDAE (woodswallows, butcherbirds and currawongs): 14 species in four genera in HANZAB region, all breeding;
PARADISAEIDAE (birds of paradise): five breeding species in two genera in Aust.;
CORVIDAE (crows and jays): six breeding species in single genus in Aust. and NZ, including one introduced to NZ;
CORCORACIDAE (Aust. mudnesters): two species in two monospecific genera, endemic to Aust.;
CALLAEIDAE (NZ wattlebirds): three species (one extinct) in three monospecific genera, endemic to NZ;
LANIIDAE (shrikes): two species in HANZAB region, one accidental to Prince Edward Is, the other accidental to Christmas I.;
PTILONORHYNCHIDAE (bowerbirds): ten species in seven genera in Aust. (nine species) and NZ (one species), all breeding; Piopio of NZ probably extinct (Heather & Robertson 1997);
ALAUDIDAE (larks): two breeding species in HANZAB region (including one successfully introduced to Aust. and NZ);
MOTACILLIDAE (wagtails and pipits): eight species in two genera in HANZAB region, only two breeding (one on South Georgia), the rest non-breeding visitors or accidentals;
PRUNELLIDAE (accentors): one species successfully introduced to NZ;
PASSERIDAE (Old World sparrows and A'asian finches): 22 species in nine genera (including four successful introductions) in HANZAB region, all breeding;
FRINGILLIDAE (Old World finches): seven species in four genera in HANZAB region, all introduced except one naturally occurring vagrant to South Georgia;
EMBERIZIDAE (buntings, cardinals, tanagers and allies): two successfully introduced species, occurring NZ and Lord Howe I.;
NECTARINIIDAE (sunbirds and spiderhunters): single breeding species in Aust.;
DICAEIDAE (flowerpeckers): single breeding species in Aust.;
HIRUNDINIDAE (swallows and martins): eight species in four genera in HANZAB region, including four breeding species in Aust. and NZ, one non-breeding visitor and three accidentals;
PYCNONOTIDAE (bulbuls): one successfully introduced species in Aust.;
SYLVIIDAE (Old World warblers): 13 species in eight genera in HANZAB region, including ten breeding species (one extinct) in Aust. and NZ, and three accidental to region;
ZOSTEROPIDAE (white-eyes): seven species (one extinct) in single genus in HANZAB region, all breeding;
MUSCICAPIDAE (Old World flycatchers, thrushes and chats): eight species in six genera in HANZAB region, including five breeding species (two introduced), and four accidentals (including one on Prince Edward Is);
STURNIDAE (starlings and mynas): five species in four genera, four breeding in HANZAB region (including two species successfully introduced, and one species now extinct), and one accidental.

The Aust. oscines fall into two distinct clusters, each with at least three major supra-familial lineages (DAB): One cluster is the Passerida, comprising the Muscicapoidea (including true thrushes and allies), Sylvioidea (true warblers and babblers, and swallows, and others), and Passeroidea (including larks, pipits, sunbirds, flowerpeckers and all finches and their allies). The other cluster is the Corvida, which is centred on the Australo-Papuan region (though its origins are not certain) and which also comprises three main lineages: Menuroidea (lyrebirds, scrub-birds, treecreepers and bowerbirds), Meliphagoidea (A'asian wrens, pardalotes, acanthizid warblers, and honeyeaters), and Corvoidea (A'asian robins, logrunners, A'asian babblers, whipbirds and quail-thrushes, sitellas, whistlers, fantails and monarchs, birds of paradise, butcherbirds and woodswallows, cuckoo-shrikes, Old World orioles, crows and mudnesters).

Throughout this volume, arrangement of families follows that of Christidis & Boles (1994) except that the Meliphagidae precedes the Pardalotidae. This change was made to ensure the Meliphagidae were dealt with in a single volume, rather than split between volumes, and because the switch meant no change to the positioning of Meliphagidae relative to the Pardalotidae (including Acanthizidae), one another's closest relatives, and because there is little overriding evidence of the exact taxonomic positioning of all families within the Meliphagoidea; Sibley & Monroe (1990) also placed the Meliphagidae between the Maluridae and Pardalotidae. However, DAB points out that based on structure of humeral fossa, positioning of Meliphagidae between the Maluridae and Pardalotidae is not correct.

DAB, however, varies from the familial arrangement of Christidis & Boles (1994) in several ways. The main differences are: (1) recognition of Pardalotidae and Acanthizidae as separate families (combined in Pardalotidae in Christidis & Boles); (2) minor rearrangement of the sequence of the families Paradisaeidae–Artamidae–Campephagidae–Oriolidae between the Dicruridae and Corvidae (cf. Dicruridae–Campephagidae–Oriolidae–Artamidae–Paradisaeidae–Corvidae in Christidis & Boles); (3) and use of the more traditional muscicapoid (flycatcher) – sylvioid (warbler) – passeroid (finch) sequence of Sibley *et al.* (1988), Sibley & Ahlquist (1990) and Sibley & Monroe (1990) and much contemporary literature of n. hemisphere, with families in the sequence Muscicapidae–Sturnidae–Hirundinidae–Pycnonotidae–Zosteropidae–Sylviidae–Alaudidae–Dicaeidae–Nectariniidae–Passeridae–Motacillidae–Estrildidae–Fringillidae and noting recognition of the Estrildidae as a separate family (cf. the reversed sequence of Christidis & Boles, as given above, and which submerges the Estrildidae within the Passeridae). For discussion of the reasons for these changes, see DAB (and discussion under these families in future volumes of *HANZAB*).

Arrangement of genera and species within families also follows Christidis & Boles (1994), which was in turn largely based on Schodde (1975) unless there were specific reasons for change. Lastly, with few exceptions, which are discussed in individual species accounts, taxomony of subspecies follows DAB.

Passerines are extremely diverse in body form and plumage, and vary greatly in rates of maturation. Some attain adult plumage within months or weeks of fledging; others can take up to 9 years to attain adult plumage (e.g. Superb Lyrebird). Degree of sexual dimorphism also varies greatly: some monomorphic, others vary in either size, plumage or both. Common pattern of annual moult is a single complete post-breeding (pre-basic) moult, but some groups (e.g. Maluridae) or species (e.g. Banded Honeyeater *Certhionyx pectoralis*) also undergo a partial pre-breeding (pre-alternate) moult annually. Moult of primaries usually outward. Secondaries moult from innermost and outermost toward s5. Moult of tail usually centrifugal (outward from centre). Young altricial, nidicolous and dependent on adults for food; usually hatch with sparse to very sparse covering of down, mainly on dorsum; Menuridae (lyrebirds) have heavy natal down. Juvenile plumage usually duller than adult, and in many sexually dimorphic species, often similar to that of adult female.

There are few common features of food, feeding behaviour, social organization and behaviour, voice or breeding in such a large and diverse group of birds.

Volant; extinct Stephens Island Wren *Traversia lyalli* probably the only flightless passerine (Millener 1988). Movements vary greatly: some species long-distance migrants (e.g. Barn Swallow *Hirundo rustica*, Nightingale *Luscinia megarhynchos* and many Old World warblers, such as *Acrocephalus* and *Locustella*, breed in temperate Palaearctic and migrate to Africa or Indian subcontinent [BWP]; Acadian Flycatcher *Empidonax virescens* breeds North America and migrates to South America [Ridgely & Tudor 1994]), others sedentary in small territories (e.g. Cactus Wren *Campylorhynchus brunneicapillus* of sw. USA and Mexico [Ricklefs 1975; Ehrlich *et al.* 1988]). In HANZAB region, movements also vary widely: e.g. Yellow-faced Honeyeater *Lichenostomus chrysops* regular annual migrant in parts of e. Aust.; Rifleman *Acanthisitta chloris* of NZ sedentary in small territories. In Aust., movements often poorly known and unstudied; many species often said to be nomadic, with such claims often based on no or very poor knowledge of actual movements and based only on apparently irregular occurrence in an area (see General Introduction [Movements] for fuller discussion of this point).

Arboreal or terrestrial or both; some strictly arboreal (e.g. Hirundinidae), others strictly terrestrial (e.g. Menuridae, Pittidae); most combine both arboreal and terrestrial foraging to varying degrees, but usually with one predominating. Feed on almost all known food, from plant material to vertebrate animals, but most show some specialization for certain food, such as feeding on nectar (Nectariniidae), seeds (Passeridae), fruit (Zosteropidae), small vertebrates (Artamidae) and, commonly, insects (e.g. Maluridae, Pardalotidae, Petroicidae and others). Mostly feed by gleaning and probing, including probing flowers for nectar; and other substrates for invertebrates; also feed by sallying, including various sallying techniques (sally-hovering, sally-striking and sally-pouncing), each suited for one group of prey, particularly moving animals.

In passerines, parental care in both sexes is well developed. However, a few species are parasitic, e.g. cowbirds *Molothrus* (Campbell & Lack 1985). Young are dependent on parents for food. Young beg by gaping, typically exposing brightly coloured inside of mouth, often with contrasting pale or dark spots; in non-passerines, bright gape present only in hoopoes (Upupidae), mousebirds (Coliiformes) and cuckoos (Cuculiformes) (BWP). See Boles & Longmore (1985) for descriptions of colours and markings inside the mouths of some Aust. passerines.

Anting is a highly specialized behaviour: ants are held in the bill and applied to the plumage, usually to the underside of the wing-tip (direct or active anting, or ant-application), or ants are allowed access to the plumage (indirect or passive anting, or ant-exposure), or both, e.g. anting recorded in Regent Honeyeaters *Xanthomyza phrygia* in HANZAB region, with bird then seen eating ant. Thought to be unique to Passeriformes (e.g. Simmons 1966; Campbell & Lack 1985; BWP). Suggested this may be comfort behaviour related to maintenance of feathers, by perhaps reducing ectoparasite load, removing stale or excess lipids, or adding supplementary essential oils (Campbell & Lack 1985); some secretions of ants are antibiotic, inhibiting growth of both fungi and bacteria, and the secondary acquisition of these antibiotic secretions would be an important advantage of anting (Ehrlick et al. 1986).

Other behavioural characters include head-scratching indirectly (or over the wing) in most families, with the foot brought up above the lowered wing. Head oiled indirectly, as seen in most taxa, but passerines also oil head by head-scratching, in which bird oils the bill directly, then transfers the oil first to one foot by scratching the bill, and then to the head by scratching the head with foot. To oil the undersurface of the wings, use bill or bill and head together, extending one wing at a time sideways and forward, carpus uppermost, and often alternating rapidly from one wing to the other. The stretching of one wing as a comfort movement seems common to all birds, but in passerines it is often accompanied by sideways fanning of tail. After both wings are stretched, passerines often give a two-leg stretch as they straighten the tarsal joints and lift the body. Heat is dissipated by gaping and panting (not by gular-fluttering, so far as known) (Campbell & Lack 1985; BWP). Bathing widespread, mainly by standing in shallow water, but some groups jump into and out of water repeatedly, or flight- or plunge-bathe, while others bathe only or mainly in rain or among wet foliage; for further details of bathing, see Campbell & Lack (1985). Passerines do not flap wings in the manner of non-passerines to dry, but perform various shaking movements, as well as preening (Campbell & Lack 1985). Dusting confined to only a few groups, but sunning, both for gaining heat (sun-basking) and other purposes (sun-exposure), is widepread, and of two distinct types: (1) lateral posture, in which sunning bird squats or sits down, usually on ground, and leans to one side exposing the flank or the 'sun-wing', which has been lowered and partly unfolded, and the fanned tail, which has been brought round to the same side; and (2) spread-eagle posture, in which bird squats or lies flat with both wings open and tail fanned (details in Campbell & Lack 1985; Simmons 1986).

There is a high incidence of co-operative breeding in Aust. and NZ, and it is especially common and well-studied in the Maluridae but is more widely recorded, including within the Acanthisittidae, Meliphagidae, Petroicidae, Pomatostomidae and Corcoracidae (see Dow 1978, 1980; Brown 1987; Ford 1989; Rowley & Russell 1997).

In vocal abilities, species of Passeriformes are more accomplished than those of any other order, but songs may be simple or highly complex, and repertoires small or large. Mimicry of calls of other species is practised by many species; c. 15% of Australian passerine species have been reported to mimic (Marshall 1950). The Superb Lyrebird and the Tui *Prosthemadera novaeseelandiae* have been classed among the best seven of the world's songsters (Hartshorne 1973). Oscines, or songbirds, have specialized forebrain song nuclei, and, through auditory feedback, learn their songs from those of adults, in much the same way as human young learn their spoken language from adults. In contrast, the songs of suboscines are relatively simple (like the non-learned call-notes of songbirds), repertoires are small, geographical variation is minimal, and development of song appears to take place without any imitative or feedback process. Some oscine species use vocal learning to generate large song repertoires and may vary them geographically, even locally. Other oscine species forgo these possibilities and have song repertoires more like those of suboscines; how the learning process maintains stereotypy of song over the range of such species is a mystery (Kroodsma 1996).

Apart from the five families discussed hereunder, syringeal structure of passeriform species of our area is similar, there being four pairs of intrinsic muscles. Pittidae have no intrinsic muscles (Ames 1971); calls are mostly loud strong whistles (Pizzey 1980). Acanthisittidae also have no intrinsic muscles, but the presence of a well-developed drum (fusion of posterior tracheal elements) suggests they may have once been present; vocal repertoire is not great (Ames 1971). Menuridae and Atrichornithidae have similar syringeal structures, with three pairs of intrinsic muscles; songs are highly developed, and there can be much mimicry (Ames 1971). Climacteridae, with four pairs of intrinsic muscles, exhibit gross asymmetry of the extrinsic muscles, unusual directions of muscle fibre in the intrinsic muscles, and an exceptionally robust sternotracheal muscle (Ames 1987); calls are brisk, sharp and piping (Pizzey 1980).

Extended tracheae are found in the genus *Manucodia* (Paradisaeidae), the calls of which are deep, loud or far-carrying (Frith 1994). In the only species occurring in our area, the Trumpet Manucode M. *keraudrenii*, the trachea forms a flat coil between the skin and the pectoral muscles, sometimes extending over the abdominal muscles as well, and may be up to 828 mm in length, compared with body-length, from bill to pygostyle, of *c.* 150 mm (Ames 1971; Clench 1978).

REFERENCES

Ames, P.L. 1971. *Bull. Yale Peabody Mus. Nat. Hist.* 37: 1–194.

—— 1987. *Emu* 87: 192–5.

Baverstock, P.R., *et al.* 1991. *Aust. J. Zool.* 39: 417–25.

——, *et al.* 1992. *Aust. J. Zool.* 40: 173–9.

Beddard, F.E. 1898. *The Structure and Classification of Birds*. Longmans, Green & Co., London.

Berger, A.J. 1956. *Am. Midl. and Nat.* 55: 326–33.

Boles, W.E., & N.W. Longmore. 1985. *S. Aust. Orn.* 29: 213–19.

Brown, J.L. 1987. *Helping and Communal Breeding in Birds*. Princeton Univ. Press, Princeton, New Jersey.

Campbell, B., & E. Lack. (Eds) 1985. *A Dictionary of Birds*. T. & A.D. Poyser, Calton, England.

Christidis, L. 1991. *Chromosomes Today* 10 (1990): 279–94.

——, & W.E. Boles. 1994. *RAOU Monogr.* 2. Melbourne.

——, & R. Schodde. 1991. *Ibis* 133: 277–85.

Clench, M.H. 1978. *Condor* 80: 423–30.

Dow, D.D. 1978. *Int. Orn. Cong. Proc.* 17: 875–81.

—— 1980. *Emu* 80: 121–40.

Ehrlich, P.R., *et al.* 1986. *Auk* 103: 835.

——, *et al.* 1988. *The Birder's Handbook: A Field Guide to the Natural History of North American Birds*. Simon & Schuster, New York.

Farner, D.S., *et al.* (Eds) 1971. *Avian Biology. 1*. Academic Press, New York.

Ford, H.A. 1989. *Ecology of Birds*. Surrey Beatty, Sydney.

Frith, C.B. 1994. *Condor* 96: 552–5.

Hartshorne, C. 1973. *Born to Sing*. Indiana Univ. Press, Bloomington, Indiana.

Heather, B.D., & H.A. Robertson. 1997. *The Field Guide to the Birds of New Zealand*. OUP, Auckland.

Kroodsma, D.E. 1996. Pp 3–19 **In**: Kroodsma & Miller 1996.

——, & E.H. Miller. (Eds) 1996. *Ecology and Evolution of Acoustic Communication in Birds*. Comstock, Ithaca, New York.

Marshall, A.J. 1950. *Emu* 50: 5–16.

Millener, P.R. 1988. *J. R. Soc. NZ.* 18: 383–406.

Morlion, M.L. 1985. *Rec. Aust. Mus.* 37: 143–56.

Morony, J.J., *et al.* 1975. *Reference List of the Birds of the World*. Am. Mus. Nat. Hist., New York.

Pizzey, G. 1980. *A Field Guide to the Birds of Australia*. Collins, Sydney.

Raikow, R.J. 1982. *Auk* 99: 431–45.

Ricklefs, R.E. 1975. *Condor* 77: 34–45.

Ridgely, R.S., & G. Tudor. 1994. *The Birds of South America. 2. The Suboscine Passerines*. OUP, Oxford.

Ridgeway, R. 1901. *Bull. US Natn. Mus.* 50(1): 1–715.

Rowley, I., & E. Russell. 1997. *Fairy-wrens and Grasswrens*. OUP, Oxford.

Schodde, R. 1975. *Interim List of Australian Songbirds: Passerines*. RAOU, Melbourne.

——, & I.J. Mason. 1999. *The Directory of Australian Birds: Passerines*. CSIRO Publ., Melbourne.

Sibley, C.G. 1974. *Emu* 74: 65–79.

——, & J.E. Ahlquist. 1985a. *Emu* 85: 1–14.

——, —— 1985b. *Int. Orn. Congr. Proc.* 18: 83–121.

——, —— 1990. *Phylogeny and Classification of Birds: A Study in Molecular Evolution*. Yale Univ. Press, New Haven.

——, & B.L. Monroe. 1990. *The Distribution and Taxonomy of Birds of the World*. Yale Univ. Press, New Haven.

——, *et al.* 1988. *Auk* 105: 409–23.

Simmons, K.E.L. 1966. *J. Zool., Lond.* 149: 145–63.

—— 1986. *The Sunning Behaviour of Birds*. Bristol Orn. Club, Bristol.

Storer, R.W. 1971. Pp 1–18 **In**: Farner *et al.* 1971.

van Tyne, J., & A.J. Berger. 1976. *Fundamentals of Ornithology*. John Wiley & Sons, New York.

Voous, K.H. 1977. *Ibis* 119: 223–250, 376–406.

Wetmore, A. 1960. *Smithson. Misc. Collection* 139.

Winkler, R., & L. Jenni. 1996. *Auk* 113: 968–9.

Zeidler, K. 1966. *J. für Orn.* 107: 113–53.

Family **MUSCICAPIDAE**
Old World flycatchers, Old World thrushes and allies

A large and morphologically rather diverse family of fairly small to medium-sized passerines, usually with rather slender bodies, rather long legs and distinctive syrinx (see below). The family comprises c. 450 species in c. 69 genera, distributed through the Americas, Africa, Middle East, Eurasia, including the Indian subcontinent, Japan, Philippines, Indonesia, Australo-Papuan region and islands of the sw. and central Pacific Ocean (Ripley 1952; Sibley & Monroe 1990; Monroe & Sibley 1993; Peters). Early authors (Sharpe 1879; Hartert 1910) also placed Old World warblers, Old World babblers and some groups now known to be in the corvoid lineage of songbirds (e.g. monarch flycatchers) along with true thrushes and Old World flycatchers in the one family. This was followed by Mayr & Amadon (1951) and Peters. However, later studies on egg-white proteins (Sibley 1970), and syrinx structure (Ames 1975) and DNA–DNA hybridization data (Sibley & Ahlquist 1990) indicate that warblers and babblers are not closely related to true thrushes and Old World flycatchers. Some authors (Sharpe 1903; Keith *et al.* 1992; Coates *et al.* 1997; Urban *et al.* 1997; BWP) split Old World flycatchers from true thrushes in the families Muscicapidae and Turdidae respectively. Some works (Keith *et al.* 1992; Coates *et al.* 1997; BWP) further combine Old World chats and allies with true thrushes in the family Turdidae. However, in this study we follow more recent works based largely on DNA–DNA hybridization data and certain shared morphological characters (see below) in dividing Muscicapidae into the following two subfamilies:

TURDINAE (true thrushes): 165–180 species in 20–22 genera, distributed across range of family (Sibley & Monroe 1990; Clement & Hathway 2000; DAB).

MUSCICAPINAE (Old World flycatchers and allies): 270–273 species in 47–48 genera, distributed through Africa, Eurasia, Japan, Philippines and Indonesia and just into Australo-Papuan region, and with two species in N. America (Sibley & Monroe 1990; see above). Most recent works divide this subfamily into two tribes: Muscicapini (Old World flycatchers), comprising 115–117 species in 17–18 genera; and Saxicolini (Old World robins, chats, akalats, redstarts, forktails, cochoas, wheatears and allies), comprising 155–156 species in 30 genera.

Nine species acceptably recorded for HANZAB region: six species of Turdinae in three genera: *Turdus* (three species, two introduced), *Zoothera* (two species) and *Monticola* (single species, accidental); and three species of Muscicapinae, in three genera: *Ficedula* and *Cyanoptila* (both Muscicapini) and *Oenanthe* (Saxicolini), which are all rare vagrants. Another species, Mountain Wheatear *Oenanthe monticola* (Muscicapinae: Saxicolini), vagrant to Prince Edward Is (see species accounts). One other species currently not acceptably recorded for HANZAB region (at present): Sooty Flycatcher *Muscicapa sibirica* (Muscicapinae: Muscicapini) reported from WA, with single bird observed at Shay Gap, 15 Oct. 1983 (Johnstone & Storr 2005; not appraised by BARC).

In addition, a further three species unsuccessfully introduced to Aust. or NZ. (1) EUROPEAN ROBIN *Erithacus rubecula* (Turdinae): In Aust., 47 birds released in or near Melbourne in 1863, 1866 and 1870, and birds may have been imported as early as 1857, though not known to have been released then (McCance 1962; Jenkins 1977; Balmford 1978; Long 1981). In NZ, a single bird imported in 1862; nine released Auckland 1868–72; and birds were released in Christchurch in 1879, Wellington in 1883 and Otago in 1885–1900 (Thomson 1922; Long 1981). The species did not become established in Aust. or NZ. (2) COMMON NIGHTINGALE *Luscinia megarhynchos* (Muscicapinae): In Aust., four released in Melbourne in 1857. In NZ, three attempts to import birds 1871–79, but all but one bird died on passage to NZ, and single survivor released Christchurch in 1879 but died soon after; and four introduced some time before 1928 (Thomson 1922; Hardy 1928; Long 1981). The species did not become established in Aust. or NZ. (3) HERMIT THRUSH *Catharus guttata* (Turdinae): Possibly this species said to have been introduced to Vic. in the 1860s or 1870s, evidently without success (Long 1981), but no further details.

Size varies from rather small in most Old World flycatchers (e.g. Red-breasted Flycatcher *Ficedula parva*, total length 11–12 cm; Black-banded Flycatcher *Ficedula timorensis*, total length 11 cm) to medium-small (e.g. Isabelline Wheatear *Oenanthe isabellina*: total length 15–16.5 cm, weight 30 g) or medium (e.g. Common Blackbird *Turdus merula*: total length 23.5–29 cm, weight 90 g; Bassian Thrush *Zoothera lunulata cuneata*: total length 25–30 cm, weight 90–120 g). In HANZAB region, smallest is probably Narcissus Flycatcher *Ficedula narcissina* (total length 12.5–14 cm, weight 15 g) and largest is probably Common Blackbird or Bassian Thrush (as above). The family have the following morphological characteristics (largely summarized from Ripley 1952; Beecher 1953; Keith *et al.* 1992; Urban *et al.* 1997; Clement & Hathway 2000; BWP; DAB). Wings vary from rather short and rounded at tips (e.g. *Brachypteryx*, *Alethe*, some Old World flycatchers) to rather long and fairly pointed at tips (e.g. most *Zoothera* thrushes, most Old World flycatchers, wheatears). Ten primaries; outermost (p10) often short, sometimes very short (e.g. *Turdus*). Nine secondaries, including three tertials. Tail varies from rather short (e.g. *Brachypteryx*) to moderately long (most species) with tip rather square or slightly notched or rather long and rounded (e.g. *Cossypha*, *Copsychus*, *Cercotrichas*); usually 12 rectrices, but some species have 14 (some *Zoothera*) and some also said to have as few as ten (Keith *et al.* 1992). Legs and feet usually rather long and strong, but weaker and shorter in most Old World flycatchers. Bill varies from short, slender and dorsoventrally flattened with rather pointed tip (e.g. most Old World flycatchers) to stout with broader base (e.g. *Zoothera*, *Catharus*, *Cichlherminia*); bill notched near tip of upper tomium. Nostrils rounded or oval, non-operculate. Rictal bristles well developed in Old World flycatchers (Muscicapini), present and sometimes well developed in true thrushes (Turdinae) and very indistinct in Old World chats and allies (Saxicolini). Tarsal scaling varies from laminiplantar in Old World flycatchers (Muscicapini) to holothecal in true thrushes (Turdinae) and usually holothecal in chats and allies (Saxicolini). Claws vary from short in Old World flycatchers to longer, strong and well decurved in true thrushes. Tongue tapers to slender bifid reedy tip. Syrinx distinctive among passerines, with diagnostic muscle termed 'turdine thumb' (Ames 1975). Humeral fossae doubled, distinctly so in Turdinae, second fossa only weakly developed in Muscicapinae (Bock 1962). Process 'D' present on protuberantia metacarpalis of carpo-metacarpus. Ectethmoid foramen doubled. Lachrymal fused. True thrushes have crested tympanic wings at base of cranium, possibly to assist hearing. Jaw musculature and palate usually similar to that of Sylviidae.

The family have the following shared plumage characteristics (summarized from Keith *et al.* [1992], Urban *et al.* [1997], Clement & Hathway [2000], BWP, and DAB). Plumages vary greatly; true thrushes (Turdinae) usually have rather drab plumage with brown, grey, bluish-grey, russet or olive tones, and some species extensively black; many thrushes have distinct scalloping, mottling or spotting, particularly on underparts; Old World flycatchers (Muscicapini) vary from rather dull brown, russet or grey, to pied, to vivid blue, yellow or red; chats, wheatears and allies (Saxicolini) vary from pied to extensively russet, brown or grey, some species with vivid blue, red or yellow markings, such as throat-patches or breast-bands. Other markings include white frontal spots (e.g. on some *Ficedula*), white supercilia (e.g. some *Luscinia*, *Oenanthe*, *Zoothera*, *Cercotrichas*), dark malar or moustachial stripes (e.g. on some *Zoothera* and *Luscinia*), white eye-rings (e.g. *Cercotrichas*, some *Zoothera*), and white tips to tail or outer rectrices (e.g. *Cercotrichas*, some *Zoothera*). Sexes similar or identical in some species (e.g. most true thrushes), but obviously plumage-dimorphic in others (e.g. *Oenanthe*, some *Luscinia*). Bare parts usually black, dark grey or brownish, some species (e.g. some *Luscinia*, *Zoothera*) with paler flesh-coloured legs and feet. Juveniles usually duller than adult, often with yellowish gapes; in those species that show obvious plumage-dimorphism, juvenile usually rather similar to adult female; juveniles of many species (e.g. *Zoothera*, *Oenanthe*, many Old World flycatchers) heavily spotted, scalloped or mottled darker on underparts. Nestlings hatch with down; lack mouth markings. Following discussion of moult mostly from BWP, as moult in most African and Asian species poorly understood. Fledge in juvenile plumage and undergo a partial post-juvenile (first pre-basic) moult to adult-like first immature (first basic) plumage. Then acquire adult (definitive basic) plumage in complete first immature post-breeding (second pre-basic) moult, probably when *c.* 1 year old. Adults undergo one complete post-breeding (pre-basic) moult each year; in some species (e.g. Bluethroat *Luscinia svecica*), adults (or at least adult males) also undergo a partial pre-breeding (pre-alternate) moult annually, producing an adult breeding (alternate) plumage. Primaries moult outward, starting at p1. Moult of tail and body start during early stage of, or just before start of, moult of primaries.

As expected for such a large family, occupy a great diversity of habitats, from dense undergrowth in closed forest to sandy desert. Palaearctic species mainly in forests, woodlands, parklands, orchards and gardens, though species breeding at higher latitudes also commonly in forest and forest edges. SE. Asian and Melanesian breeding species commonly inhabit broadleaf evergreen forests, as well as forest clearings and edges and secondary growth (e.g. *Ficedula* flycatchers, Island Thrush *Turdus poliocephalus*). Some species use more open country, such as desert (e.g. White-crowned Black Wheatear *Oenanthe leucopyga*), open woodlands and savanna (e.g. Northern Wheatear *O. oenanthe*), tundra (e.g. Dusky Thrush *Turdus naumanni*), open moorland (e.g. Ring Ouzel *Turdus torquatus*), and other natural shrublands and heaths; while others commonly use coastal habitats, including mangroves, beaches and tidal flats. Some, such as the rock thrushes (e.g. Blue Rock Thrush *Monticola solitarius*), occur mainly in rocky areas such as gorges, cliffs and boulder-strewn hillsides. A few also well adapted to sparsely vegetated or barren artificial landscapes, such as quarries, cuttings (Ant Chat *Myrmecocichla aethiops*), industrial sites, railways and warehouses (Black Redstart *Phoenicurus ochruros*). Many species commonly in modified habitats, such as those combining lawns with cover of shrubs or trees, such as parks and gardens, or farming land, orchards and plantations. Habitat of some migratory species varies through year, e.g. Verditer Flycatcher *Eumyias thalassina* breeds in open broad-leaved evergreen forests and clearings, but found in wooded gardens and mangroves on migration. Occur from coasts and lowlands up to 5500 m asl in Eurasia and 4300 m asl in Africa (AOU 1983, 1998; de Schauensee 1984; Keith *et al.* 1992; Urban *et al.* 1997; Doughty *et al.* 1999; Robson 2000; BWP).

Palaearctic and Nearctic breeding species predominantly migratory, usually over long distances (e.g. Semi-collared Flycatcher *Ficedula semitorquata*, Mountain Bluebird *Sialia currcoides*); the few partial migrants tend to be migratory in N of their ranges and resident in more temperate regions (e.g. Common Blackbird, Song Thrush *Turdus philomelos*, European Robin); some also altitudinal migrants (e.g. Eversmann's Redstart *Phoenicurus erythronotus*). At lower latitudes, more sedentary across range, e.g. mainly resident in se. Asian, central American (e.g. solitaires *Myadestes*) and Afrotropical regions (e.g. akalats *Sheppardia*). Vagrant species to HANZAB region all migratory, and generally e. Palaearctic breeding species that appear to have overshot normal wintering range in se. Asia (AOU 1983, 1998; de Schauensee 1984; Keith *et al.* 1992; Urban *et al.* 1997; Robson 2000; BWP; see species accounts).

Mainly eat invertebrates, but some species also eat fruit and, in those species, fruit often forms a significant part of diet only at certain times of year, particularly in late summer to winter. True thrushes (Turdinae) mostly eat insects, spiders, snails and worms and berries, and some species occasionally observed to eat small vertebrates (frogs, snakes and lizards), and some occasionally eat seeds; one species, Black-breasted Fruit-hunter *Chlamydochaera jefferyi* wholly frugivorous. Old World flycatchers and allies (Muscicapinae) primarily insectivorous, but often also eat other invertebrates and some occasionally eat fruit; very occasionally recorded eating nectar or seeds. Thrushes predominantly forage on ground, gleaning from surface or probing, and will also often lunge after prey; many of the larger thrushes uncover food among leaf-litter on ground by sweeping with bill at same time as scratching with one foot. When foraging, some species often stop and listen with head cocked to one side (e.g. Bassian Thrush). Sometimes stamp foot on ground or flick out wings when searching for food on ground. Some species have been seen to glean parasites from large mammals such as camels and other livestock (e.g. Hooded Wheatear *Oenanthe monacha*). Some species beat snails against hard surface or anvil (e.g. Song Thrush and Redwing *Turdus iliacus*). Flycatchers typically arboreal and often catch insects during aerial sallies from branch or similar perch, but some species forage mostly from ground (Ali & Ripley 1973a,b; Smythies 1981; Campbell & Lack 1985; Keith *et al.* 1992; Urban *et al.* 1997; BWP; DAB; see species accounts).

Most often seen singly, in pairs, or in small family groups during the breeding season. Most usually rather solitary outside breeding season, though sometimes congregate on passage or at sources of food. Most species monogamous, but some occasionally polygynous (e.g. Fraser's Forest-Flycatcher *Fraseria ocreata*, European Pied Flycatcher *Ficedula hypoleuca*). Co-operative breeding, with helpers at nest, occasionally recorded in some species (e.g. Northern Wheatear, Mariqua Flycatcher *Melaenornis mariquensis*). Incubation usually by female only, but in some species sometimes also by male. Feeding of nestlings and fledgelings usually shared between sexes, and with helpers in co-operatively breeding species. Usually nest solitarily and most are strongly territorial in breeding season; some defend territories throughout year. Many species proclaim territory with loud or distinctive songs. Conspicuousness varies; many species cryptic and skulking, making observation difficult, but some rather confiding and perch in open. Scratch head indirectly. Usually bathe by standing in shallow water, and often sun themselves. Anting recorded in several species. Not known to dust-bathe. Most defend territories with vocal displays, but also perform threat displays when others intrude into territory or approach territorial boundaries. When performing threat displays, often hold wings out from body, or flash wings. Some cock tail when singing. Chasing and fighting also recorded. Sexual behaviour often includes chases (Skutch 1987; Keith *et al.* 1992; Urban *et al.* 1997; BWP; DAB).

All rather vocal. Most true thrushes (Turdinae) excellent songsters, but song less well developed in the Old World flycatchers (Muscicapinae). Territorial males pour out rich and complex melody from vantage perches; and some sing antiphonal duets with females (e.g. White-browed Robin-Chat *Cossypha heuglini*). Some also excellent mimics (e.g. shamas *Copsychus*, wheatears *Oenanthe*) (Hartshorne 1973; Smythies 1981; Skutch 1987; Keith *et al.* 1992; DAB).

Usually nest solitarily. Typically monogamous, but some polygamous or breed co-operatively. Use wide variety of nesting sites, including: branches of trees and shrubs; holes or crevices in trees, rocks or termite mounds; on ground or bare rock; and man-made structures such as nest-boxes, bridges, eaves of houses, or cavities in stone walls. Nest is cup-shaped and usually open, though White-starred Robin *Pogonocichla stellata* often builds dome structure over cup with side entrance to nest. Nests variously made of grass, twigs, leaves, vines, rootlets and other plant material, and in *Turdus*, often strengthened with mud; nests usually lined with softer material, including feathers, hair, wool and fine plant material such as down, but sometimes lined only with mud (e.g. Song Thrush). Built by female only in most species, but both sexes build in some (e.g. Spotted Flycatcher *Muscicapa striata*). Eggs usually oval or sub-elliptical; and smooth and glossy. Ground-colour varies greatly: often white, or various shades of cream, blue, grey, green, or olive, and either unmarked, or with spots or blotches of various shades of brown, reddish brown, grey and purple. Where known, eggs usually laid on successive days. Usual clutch-size 2–6, but smaller and larger clutches recorded occasionally. Incubation usually by female, but in some species sometimes also by male. Incubation period 12–17 days. Nestlings brooded by female only. Feeding of nestlings and fledgelings usually shared between sexes, and with helpers in co-operatively breeding species. Fledging period 12–17 days. Fledgelings typically dependent on parents for 2–3 weeks, but in some species are fed for up to 2 months after leaving nest (e.g. Yellow-footed Flycatcher *Muscicapa sethsmithi*). Many species rear two or more broods per season (Ali & Ripley 1973a,b; Campbell & Lack 1985; Keith *et al.* 1992; Urban *et al.* 1997; Clement & Hathway 2000; BWP).

A total of 41 species considered globally threatened: four are **EXTINCT**, all island species (Bonin Thrush *Zoothera terrestris*, Kama'o *Myadestes myadestinus*, 'Amaui M. *oahensis*, and Grand Cayman Thrush *Turdus ravidus*); five **CRITICALLY ENDANGERED**, three of which are island species and two in e. Africa (Amami Thrush *Zoothera major*, Oloma'o *Myadestes lanaiensis*, Puaiohi M. *palmeri*, Somali Thrush *Turdus ludoviciae*, and Taita Thrush *T. helleri*); ten **ENDANGERED**; and 22 considered **VULNERABLE**. A further 21 species are near threatened (Snetsinger *et al.* 1999; Wakelee & Fancy 1999; Stattersfield & Capper 2000; BirdLife International Species Factsheets, available at http://www.birdlife.org/datazone/species/index.html [accessed Sept. 2005]). Within the HANZAB region: endemic subspecies of Island Thrush *Turdus poliocephalus* extinct on Norfolk I. (nominate *poliocephalus*) and Lord Howe I. (subspecies *vinitinctus*), and Christmas I. subspecies *erythropleurus* critically endangered; and SA subspecies of Bassian Thrush *T.l. halmaturina* is considered near threatened (Garnett & Crowley 2000; see species accounts).

REFERENCES

Ali, S., & S.D. Ripley. 1973a. *Handbook of the Birds of India and Pakistan.* 8. OUP, Bombay.

——, —— 1973b. *Handbook of the Birds of India and Pakistan.* 9. OUP, Bombay.

Ames, P.L. 1975. *Bonn. Zool. Beitr.* 26: 107–34.

AOU. 1983. *Check-List of North American Birds.* Sixth edn. Am. Orn. Union, Washington, DC.

—— 1998. *Check-List of North American Birds.* Seventh edn. Am. Orn. Union, Washington, DC.

Balmford, R. 1978. *Aust. Bird Watcher* 7: 237–48, 262–5.

Beecher, W.J. 1953. *Auk* 70: 270–333.

Bock, W.J. 1962. *Auk* 79: 425–43.

Campbell, B., & E. Lack. (Eds) 1985. *A Dictionary of Birds.* Poyser, Calton, England.

Clement, P., & R. Hathway. 2000. *Thrushes.* Christopher Helm, London.

Coates, B.J., *et al.* 1997. *A Guide to the Birds of Wallacea.* Dove Publs. Alderley, Qld.

de Schauensee, R.M. 1984. *The Birds of China.* OUP, Oxford.

Doughty, C., *et al.* 1999. *Birds of the Solomons, Vanuatu and New Caledonia.* Christopher Helm, London.

Garnett, S.T., & G.M. Crowley. 2000. *The Action Plan for Australian Birds 2000.* Env. Aust., Canberra.

Griffioen, P.A., & M.F. Clarke. 2002. *Emu* 102: 99–125.

Hardy, A.D. 1928. *Emu* 27: 300–1.

Hartert, E. 1910. *Die Vögel der Paläarktischen Fauna.* R. Friedlander, Berlin.

Hartshorne, C. 1973. *Born to Sing.* Indiana Univ. Press, Bloomington, IN.

Jenkins, C.F.H. 1977. *The Noah's Ark Syndrome.* Gardens Board West. Aust., Perth.

Johnstone, R.E., & G.M. Storr. 2005. *Handbook of Western Australian Birds.* 2. West. Aust. Mus., Perth.

Keith, S., *et al.* (Eds) 1992. *The Birds of Africa.* 4. Academic Press, London.

Long, J.L. 1981. *Introduced Birds of the World.* Reed, Sydney.

Mayr, E., & D. Amadon. 1951. *Am. Mus. Novit.* 1496: 1–42.

McCance, N. 1962. *Aust. Avicult.* Aug. 1962: 105.

Monroe, B.L., Jr., & C.G. Sibley. 1993. *A World Checklist of Birds.* Yale Univ. Press, New Haven, CT.

Ripley, S.D. 1952. *Postilla* 13: 1–48.

Robson, C. 2000. *A Field Guide to the Birds of South-East Asia.* New Holland, London.

Sharpe, R.B. 1879. *Catalogue of the Birds in the British Museum.* 4. *Cichlomorphae (Part 1).* Br. Mus. Nat. Hist., London.

—— 1903. *A Hand-list of the Genera and Species of Birds.* 4. Br. Mus., London.

Sibley, C.G., 1970. *Bull. Yale Peabody Mus. Nat. Hist.* 32: 1–131.

——, & J.E. Ahlquist. 1990. *Phylogeny and Classification of Birds.* Yale Univ. Press, New Haven, CT.

——, & B.L. Monroe. Jr. 1990. *Distribution and Taxonomy of Birds of the World.* Yale Univ. Press, New Haven, CT.

Skutch, A.F. 1987. *Helpers at Birds' Nests.* Univ. Iowa Press, Iowa City, IA.

Smythies, B.E. 1981. *The Birds of Borneo.* Third edn. Sabah Soc. and Malayan Nat. Soc., Kuala Lumpur.

Snetsinger, T.J., *et al.* 1999. Puaiohi (*Myadestes palmeri*). *Birds of North America* 461. (Available online at <http://bna.birds.cornell.edu/BNA/account/Puaiohi>, accessed Sept. 2005.])

Thomson, G.M. 1922. *The Naturalisation of Animals and Plants in New Zealand.* Cambridge Univ. Press, Cambridge.

Urban, E.K., *et al.* (Eds) 1997. *The Birds of Africa.* 5. Academic Press, London.

Wakelee, K.M., & S.G. Fancy. 1999. 'Ōma'o (*Myadestes obscurus*), Kāma'o (*Myadestes myadestinus*), Oloma'o (*Myadestes lanaiensis*), and 'Āmaui (*Myadestes woahensis*). *Birds of North America* 460. (Available online at <http://bna.birds.cornell.edu/BNA/account/Omao> [accessed Sept. 2005].)

Turdus philomelos Song Thrush

COLOUR PLATE FACING PAGE ~~1817~~ 1848

Turdus philomelos Brehm, 1831, *Handb. Naturgesch. Vög. Deutschl.*: 382 — central Germany.

Specific name from Greek φιλο-, loving (φιλέω, to love) and μέλος, a song (cf. Greek φιλόμηλος, fond of apples). In Latin, Philomela was the nightingale (from Greek mythology where Philomela, a daughter of Pandion and sister to Procne, was metamorphosed into a nightingale after tricking the Thracian tyrant Tereus into eating the flesh of his own son).

OTHER ENGLISH NAMES Thrush, English or European Song Thrush or Thrush; Mavis or Throstle.

POLYTYPIC Subspecies *clarkei* Hartert, 1909, introduced and established around urban Melbourne and throughout NZ, and on Norfolk, Lord Howe, Kermadec, Chatham, Snares, Antipodes, Auckland, Campbell and Macquarie Is; otherwise, indigenous to British Isles and w. Europe, wintering in sw. Europe and nw. Africa. Extralimitally, nominate *philomelos* throughout all Europe except W, and E through Asia Minor to Caucasus and n. Iran, wintering in s. and w. Europe, n. Africa and sw. Asia; *hebridensis* W.E. Clarke, 1913, Outer Hebrides and Isle of Skye, wintering in British Isles; *nataliae* Buturlin, 1929, w. and central Siberia, wintering in ne. Africa and sw. Asia.

FIELD IDENTIFICATION Length 22 cm (21–23); wingspan 34.5 cm (32–36); weight 70 g. Medium-small thrush, with short, pointed bill, fairly square-tipped tail and long legs. Slightly but obviously smaller than Common Blackbird *Turdus merula* with more compact and less elongated build, and shorter tail and more upright stance. Sexes alike. No seasonal variation. Adults warm brown above with complex facial pattern of dark brown and buff; and largely cream to off-white below with bold blackish chevrons to breast, flanks and sides of belly. Juveniles like adults but with buff streaks on mantle and conspicuous buff tips to secondary coverts, which align to form pair of buff wing-bars on folded wing. Immature like adult, but retain some juvenile plumage of wing and tail, and show moult-contrast with fresh adult-like plumage. Subspecies *clarkei* described below. **Adult** Top of head, hindneck and sides of neck, grey-brown to rufous brown, some birds with indistinct streaks on forehead; and complex facial pattern of: greyish-cream fore-supercilium grading to diffuse streaked brown behind eye to above rear ear-coverts; dark-brown lores mottled cream; narrow off-white to cream eye-ring, obvious against darker sides of face; buff ear-coverts finely streaked and flecked grey-brown, forming darker brown crescent round rear edge of ear-coverts; rather indistinct dark-brown moustachial stripe, sometimes merging into ear-coverts; broad, cream to buff submoustachial stripe; and varyingly distinct blackish-brown malar streak. Chin and throat, off-white to cream, with fine, blackish-brown streaks across lower throat. Upperbody largely warm-brown to rufous-brown, though some birds lack warm tones, grey-brown; rump and uppertail-coverts, olive-brown. Uppertail, dark brown. Folded wing mostly brown, darker than upperbody and with fine cream crescent-shaped tips to median secondary coverts and narrow cream or buff fringes to tips of greater secondary coverts; pale fringes lost with wear. In flight, upperwing appears plain brown, lacking wing-bars. Breast and flanks, buff to cream, grading to off-white on belly, vent and undertail-coverts, with bold dark-brown to black chevrons on breast, flanks and sides of belly, appearing heavily spotted at distance; central belly, vent and undertail-coverts unmarked. Undertail, grey. Underwing, buff with broad dark-brown trailing edge, and contrasting with olive-brown inner flanks and axillaries. Bill, dark grey to black with yellowish cutting edge and base to lower mandible. Iris, blackish brown. Legs and feet, greyish pink. **Juvenile** Like adult, but differing by: narrow buff streaks to top of head and neck, grading to broad buff streaks on mantle and scapulars, then narrowing again on back; rump and uppertail-coverts, plain brown, washed buff; broad buff rosethorns at tips of secondary upperwing coverts (except greater coverts), broadest on median coverts; broad buff tips to greater secondary coverts; tips and rosethorns align to form two broad wing-bars across median and greater secondary coverts (faint at best in adult); and blackish spots on breast and flanks smaller than in adult. Tips of rectrices also more pointed than in adult. Bare parts as adult, except for prominent yellow gape. **Immature** Very like adult and only separated in close view by retained juvenile plumage of wing and tail. Retain most outer greater secondary coverts, which have broader buff tips, and sometimes retain a few outermost median secondary coverts, which show bold rosethorn-shaped tips; retained coverts also show moult-contrast with innermost coverts; and rectrices have slightly more pointed tips.

Similar species Even with poor views, readily distinguished from brown adult female and immature **Common Blackbird** by wholly pale-buff to white underbody boldly and conspicuously spotted blackish (these ages of Blackbird wholly dark brown to rufous-brown below, diffusely mottled and streaked darker brown). Slightly greater risk of confusion with juvenile Common Blackbird, which has paler underparts than adult Blackbird, marked with bold blackish spots, notches and barring. Song Thrush still readily distinguished by buff to whitish underbody clearly spotted with black, compared with pale-brown to pale rufous-brown underbody of juvenile Blackbird, with less distinct spots, notches and bars; with good views, Song Thrush also distinguished by pale flesh-coloured legs and feet (dark brown in Common Blackbird). Somewhat similar to and possibly briefly confused with larger **Bassian Thrush** *Zoothera lunulata*; see that species for differences.

Usually occur singly, in pairs, or in small family parties; occasionally forage in loose flocks of up to 100 or so or, exceptionally, in loose flocks of several hundred in winter. Often forage with Common Blackbirds, Common Starlings *Sturnus vulgaris* or other introduced birds, such as House Sparrow. Can be conspicuous and tame in urban areas or where in contact with people, but more usually shy and wary, especially in natural habitats away from human habitation; often remain in or close to dense, moist and often exotic vegetation, but also forage in open areas, such as on lawns. Flick wings and tail when alert. Forage in similar manner to Common Blackbird; mainly on ground, probing for and gleaning invertebrates, especially earthworms and snails; also forage in trees and shrubs for fruit. When foraging on ground, move in series of short runs and hops, interspersed with pauses with head cocked, before snatching invertebrates from ground. Snail shells often cracked open against an anvil of rock or wood. Flight low, direct and agile, with bursts of fast wing-beats but little undulation, as wings closed fully only very briefly; buff underwing-coverts often clearly visible, contrasting with dusky trailing edge and with pale underbody and olive-brown inner flanks and axillaries. Often dive rapidly into dense cover. During breeding season, males deliver musical and pleasant Song from elevated perches, usually at dawn and dusk; rapidly repeated alarm notes; sometimes mimic other birds.

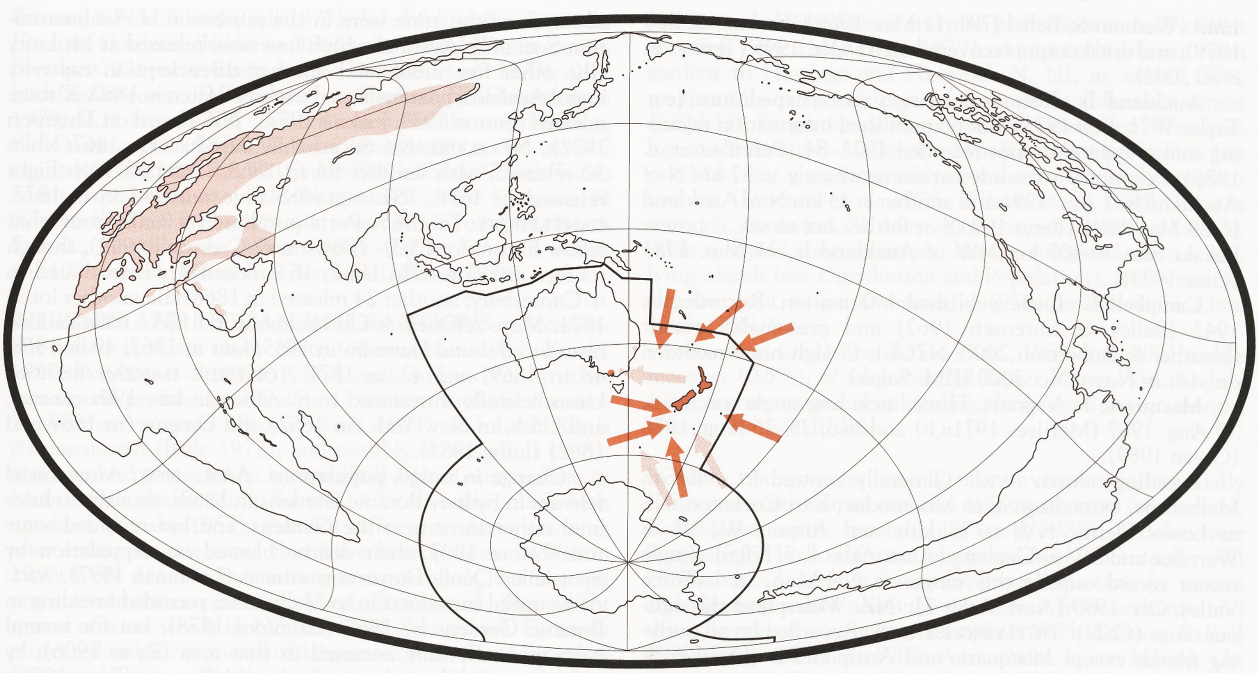
HABITAT In Aust. and NZ, commonly inhabit modified habitats, especially parks and gardens with mixture of shrubs, hedges or other dense vegetation and lawns; in NZ, also often occur in farmland. Also often recorded in natural habitats in NZ, including various forests, dominated by beech, podocarps, and hardwood and broadleaf species, dense shrubland and grassland with scattered thickets; seldom recorded in native habitats in Aust. (see below). Said to venture farther from cover than Common Blackbird (Stenhouse 1957). In NZ, occur from sea-level to 1500 m asl (Sibson 1958; NZRD); in Aust., from sea-level up to *c.* 300 m asl (Thomas & Gilmore 1976; Preston 1983; Loyn 1985).

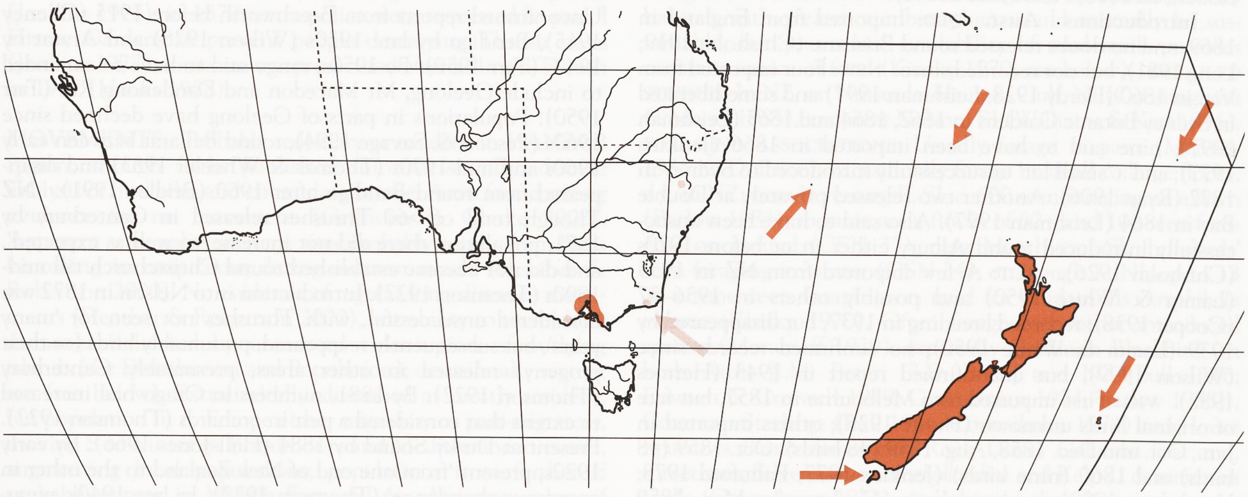
In both Aust. and NZ, often inhabit gardens in settled or built-up areas, especially areas with mixture of lawns or garden beds and denser vegetation, often of exotic plants (Roberts 1938; Bull 1946; Phillips 1948; Tarr 1950; McEvey 1955; Middleton 1969; BFNC 1976; Guest & Guest 1987, 1993; Gill 1989; Pescott & Savage 1994; Day 1995; Aust. Atlas 1; CSN 25, 30, 36, 39), e.g. in Christchurch Botanic Gardens, abundant in areas of exotic trees such as elms *Ulmus*, oaks *Quercus*, maples *Acer* and conifers, interspersed with various native trees, dense shrubberies and large lawns (East 1967). Particularly occur in older suburbs, e.g. 50+ years old, where gardens planted out with exotic shrubs and trees (Mason 1985). In garden in Hamilton, NI, showed no significant correlation between abundance and proportion of native plants in garden (Day 1995). Also sometimes recorded on playing fields and golf courses (CSN 32, 34). In NZ, also often inhabit other modified habitats, largely farmland, especially in pasture with nearby cover, such as hedges or shelter belts (Bull 1946; Ryder 1948; Stenhouse 1957; Edgar *et al.* 1965; Blackburn 1967; Freeman 1994; CSN 37), or with scattered remnant thickets of willow *Salix* and New Zealand Flax *Phormium tenax* (Pierce 1980); also commonly inhabit roadsides in farmland (J.M. Peter). Sometimes also occur in orchards (Dawson & Bull 1970; CSN 36; NZRD). Common in pine plantations, especially those of Monterey, Ponderosa *Pinus ponderosa* and Corsican *P. nigra* Pines (Moncrieff 1929; Gibb 1961; Kinsky 1970; Owen & Sell 1985), especially in clearings and near settlements (Weeks 1949).

Also inhabit natural habitats, especially in NZ, but seldom in Aust. In NZ, often inhabit shrubland, both near coasts and in subalpine areas, including those dominated by Manuka *Leptospermum scoparium*, *Olearia*, Ngaio *Myoporum laetum* or Matagouri *Discaria toumatou* (D'Ombrain 1936; Kirk & Wodzicki 1943; Anon. 1948; DNFC 1952; Challies 1966; Child 1975; Morrison 1979). Also occur in forests, such as those dominated by beech, podocarps, hardwood or broadleaf trees, or mixed forests, with a sparse to dense understorey of shrubs, small trees or vines, and varied density of ground-cover (Ryder 1948; Sibson 1958; Challies 1962, 1966; Dawson 1964; Onley 1980; Fitzgerald *et al.* 1989), especially round edges, such as where roads penetrate forest (Penniket 1955; Sibson 1958; McKenzie 1979; Wilson *et al.* 1988), and said to be scarce in large tracts of forest (NZRD). For example, near Reefton, common in forest dominated by Silver Beech *Nothofagus menziesii* with a few podocarps in canopy, with dense shrub-layer of fruit-bearing plants and dense ground-cover of mosses and liverworts; and in mixed podocarp–beech forest, with canopy dominated by Rimu *Dacrydium cupressinum* and Hard Beech *Nothofagus truncata* (Dawson *et al.* 1978); in n. Westland, often recorded in broadleaf forest with tall emergent Northern Rata *Metrosideros robusta* above dense canopy of Mahoe *Melicytus ramiflorus*, Pigeonwood *Hedycarya arborea*, Toro *Myrsine salicina* and Kamahi *Weinmannia racemosa*, with understorey including Supplejack *Ripogonum scandens* and Kiekie *Freycinetia banksii* (Wilson *et al.* 1988); and on Hen and Chickens Is, NI, in forest dominated by Kanuka *Kunzea ericoides* (Skegg 1964). Also occur in regrowth in forests regenerating after logging (Onley 1983). Sometimes occur in grasslands with thickets or scattered shrubs, e.g. at St Arnaud, SI, observed in grassland with scattered clumps of Matagouri *Discaria toumatou* (Flux 1966), or on Heaphy Track, SI, uncommon in alpine grassland of Red Tussock *Chionochloa rigida* with scattered shrubs (Dawson 1964). In coastal areas, sometimes inhabit mangroves (Beauchamp & Parrish 1999), and occasionally seen foraging in saltmarsh and on exposed tidal flats (Kinsky 1970; Nye 1971; Owen & Sell 1985; CSN 20). In AUST., only occasionally recorded in natural habitats, especially in remnant patches in built-up areas or at urban fringe, though little published information. Occasionally occur in wet sclerophyll forests, dominated by Mountain Ash, adjacent to gardens (Loyn 1985), moist woodland (Gregory-Smith 1983), dry sclerophyll woodland (French 1990), remnant patches of 'scrub' (Salter 1957) and remnant coastal heathland (Preston 1983). **Outlying islands** LORD HOWE I.: Mostly occur in lowland forests and nearby settled areas (Hutton 1991). NORFOLK I: Mainly inhabit modified habitats, including gardens, grasslands and pasture, usually with nearby thickets; sometimes also in plantations of introduced eucalypts; and dense native forest (Smithers & Disney 1969; Schodde *et al.* 1983; Hermes 1985). CHATHAM IS: Mainly occur in pasture with nearby cover, and occasionally in 'patches of bush', presumably shrubland, and forest; often near human habitation (Freeman 1994; CSN 37). SNARES IS: Inhabit forest dominated by Kanuka or *Brachyglottis stewartiae*, or shrubland or forest of Snares Tree-daisy *Olearia lyallii* (Anon. 1948; Skegg 1964; Warham 1967), e.g. in forest dominated by *Brachyglottis stewartiae* with Kokomuka *Hebe elliptica* and ground-cover of ferns and herbs (Miskelly *et al.* 2001).

DISTRIBUTION AND POPULATION Widespread throughout Europe, n. Africa and w. Asia. Occur from Morocco, Iberian Pen., British Isles and Scandinavia, E through most of Europe (except parts of Bulgaria, Turkey and Georgia), to L. Baikal in Siberia, and possibly w. Xinjiang Zizhiqu Province in w. China; and S to n. Africa, from Canary Is and Morocco, E through n. Algeria, Tunisia and n. Libya, to Egypt, where occur S along Nile R., and coast of Red Sea S through ne. Sudan and Eritrea to Djibouti, and also occur in Middle East; vagrants recorded in Pakistan and India, and in Africa, at oases in s. Algeria, s. Libya and s. Egypt, and, S of Sahara Desert, in Mauritania, Mali, Chad, Central African Republic and w. Sudan (Silsby 1980; de Schauensee 1984; Flint *et al.* 1984; Sibley & Monroe 1990; Urban *et al.* 1997; Grimmett *et al.* 1999; BWP). Successfully introduced into se. Aust. and NZ, and many outlying islands colonized from there. Unsuccessfully introduced to USA and S. Africa (Long 1981).

Aust. Introduced to various centres in se. Aust., from Brisbane S to Melbourne and W to Adelaide, but mostly unsuccessfully (see Introductions, below); extant only in Vic., though a few reports in NSW. **NSW** A few reports in 1960s and 1970s, all of unknown numbers and origin: recorded near Deniliquin, 1961–66; three records from round Lightning Ridge, 1967–69; and at Barham, 1961–66 (Aust. Atlas 1). Recent record of dead bird at L. Cathie, 13 Sept. 2001 (McAllan *et al.* 2004). **Vic.** Confined to S, mainly centred on Melbourne. Record at Marlo, in E. Gippsland, 31 May–28 Aug. 1997 and 5 Aug. 1998 (Eades 1997; Aust. Atlas 2); and very occasionally recorded in LaTrobe Valley, e.g. three records in





Aust. Atlas 2, at Moe and Narracan (Aust. Atlas 2); and historical reports from near Wilsons Prom. (Cooper 1974). Widespread in Central District, from line joining Drouin and Toolangi, W to Riddells Ck, Werribee, Geelong and Apollo Bay (though very occasional records farther NW at Ballarat and W at Colac [Pescott 1983; Thomas & Wheeler 1983]), and from Buxton and Riddells Ck S to line joining Apollo Bay, Aireys Inlet, Rosebud, Stony Pt, Tooradin and Drouin (Pescott & Savage 1994; Aust. Atlas 1, 2; Vic. Atlas). Formerly said to have been uncommon round Dartmouth Dam, in ne. Vic., before inundation (Thomas & Gilmore 1976); and formerly very occasionally reported round Bendigo (BFNC 1976; Bridley 1991).

NZ Widespread from C. Reinga and North C. on NI, S to Bluff and Papatowai on SI, and on many offshore islands, from Three Kings Grp S to Stewart I. (NZ Atlas; NZCL; CSN).

Lord Howe I. Widespread (Hutton 1991). First reported in 1928, when claimed to have built a nest (Sharland 1929; Hindwood 1940); not recorded again till 1951 (Hutton 1991), and first confirmed breeding recorded in 1955 (McKean & Hindwood 1965). Thought to have been colonized by birds from NZ (Williams 1953).

Norfolk I. Widespread (Schodde *et al.* 1983; Hermes 1985); also recorded on Philip and Nepean Is (Hermes *et al.* 1986). First recorded in 1913 (Hindwood 1940). Thought to have been colonized by birds from NZ (Williams 1953).

Kermadec Is Plentiful and widespread (Merton 1970; Veitch *et al.* 2004); mostly recorded on Raoul I., and very occasionally occur on Macauley and Curtis Is (Veitch *et al.* 2004); two (including single specimen) recorded on L'Esperance Rock, 14 Sept. 1988 (Veitch *et al.* 2004), and unconfirmed report from there in Sept. 1969 (Merton & Veitch 1986). Thought to have been colonized by birds from NZ (Williams 1953; Merton 1968). Established by 1907–08 (Iredale 1910; Sorensen 1964). One recorded at sea *c.* 580 km SW of Raoul I., 29 July 1967 (Jenkins 1967).

Chatham Is Recorded in small numbers on Chatham, Pitt, South East and Mangere Is (Freeman 1994; Nilsson *et al.* 1994). Present since at least early 1920s (Thomson 1922).

Snares Is Breeding resident (Miskelly *et al.* 2001). Present by 1900 (Ogilvie-Grant 1905). Recorded on North East I., Broughton I., Alert Stack and on Toru Isl. in W. Chain (Miskelly 1984; Miskelly *et al.* 2001).

Antipodes Is Vagrant. All singles, recorded on: 26 Feb.

1969 (Warham & Bell 1979); 11 Mar. 1969 (Warham & Bell 1979); and dried corpse recovered on 31 Oct. 1995 (Tennyson *et al.* 2002).

Auckland Is Recorded during various expeditions (e.g. Taylor 1971; Bell 1975), but no published information regarding status; apparently not recorded 1973–84 (Penniket *et al.* 1986). Occasionally recorded at sea nearby, e.g. *c.* 37 km N of Auckland Is, 2 Apr. 1991 and another *c.* 43 km N of Auckland Is, 29 Mar. 1991 (Petyt 1995); or farther out to sea, e.g. near Pukaki Rise, *c.* 400 km NW of Auckland Is, 31 Mar. 1983 (Gaze 1983).

Campbell I. Little published information. Recorded in 1942 (Bailey & Sorensen 1962) and presumably persist (Heather & Robertson 2000; NZCL), though none recorded on visit in Nov.–Dec. 2000 (P.M. Sagar).

Macquarie I. Vagrant. Three, including single specimen, 30 Aug. 1967 (Merilees 1971a,b) and two, 25–26 Aug. 1976 (Green 1989).

Breeding Aust. VIC.: Generally centred in suburban Melbourne, extending SE to Moorooduc, E to Cockatoo, NE to Lower Plenty, NW to Niddrie and Airport W., W to Werribee and SW to Geelong (Aust. Atlas 1, 2; NRS). Single recent record outside this range, at Narracan, in LaTrobe Valley, Oct. 1999 (Aust. Atlas 2). **NZ** Widespread throughout range (CSN). OUTLYING ISLANDS: Recorded on all outlying islands except Macquarie and Antipodes Is (Heather & Robertson 2000; NZCL; see above).

Introductions Aust. QLD: Imported from England in 1869, and no doubt released round Brisbane (Chisholm 1919; Long 1981), but not recorded since. NSW: Four imported from Vic. in 1860 (Hardy 1928; Leishman 1997) and some liberated in Sydney Botanic Gardens in 1862, 1864 and 1865 (Leishman 1997); nine said to have been imported in 1866 (Jenkins 1977); and a 'small lot' unsuccessfully introduced to Sydney in 1872 (Ryan 1906). Another two released privately at Double Bay in 1864 (Leishman 1997). Also said to have been unsuccessfully introduced round Albury either in or before 1920s (Chisholm 1926). ACT: A few imported from NZ in 1935 (Lamm & White 1950) and possibly others in 1936–37 (Cooper 1938); recorded breeding in 1937, but disappeared by 1939 (Lamm & White 1950); no confirmed records since (Wilson 1999), but unconfirmed report in 1943 (Hermes 1982). VIC.: First imported into Melbourne in 1857, but fate of original birds unknown (Hardy 1928); others imported in Jan., Oct. and Dec. 1858, Aug. 1859 (48 birds), Oct. 1859 (48 birds) and 1860 (nine birds) (Jenkins 1977; Balmford 1978; Heathcote 1999); and single in Geelong in Mar. 1859 (Balmford 1978). By 1860, 37 said to have been successfully established in Melbourne Botanic Gardens (Balmford 1978). 'A small lot' (i.e. 14) released in Melbourne Botanic Gardens and six at Yarra Bend in 1863 (Ryan 1906; Hardy 1928; Balmford 1978) (or 24 and six, respectively, in 1866; Jenkins 1977); four at Phillip I. in 1864 or 1866, and another four on Sandstone and Churchill Is in 1864 (Hardy 1928; Jenkins 1977; Balmford 1978); two at Royal Park in 1866 (Jenkins 1977; Balmford 1978); unknown number released near Streatham before 1869 (Balmford 1978); a further 28 released in Melbourne in 1872 (Ryan 1906); and unknown number released near Ballarat in 1879 (Barrett 1926; Thomas & Wheeler 1983). Also said to have been released at Gembrook in 1880 (Long 1981). TAS.: 'Half a dozen' said to have been released 'in the south', no doubt near Hobart, before mid-1930s (Dove 1936); presumably unsuccessful. SA: In 1863, several were purchased in England with a view to releasing them in SA, but most died *en route*; in late 1870s and early 1880s, several were 'set free in various localities on the plains and in the hills round Adelaide': in May 1879, three (of which one died) were purchased in Melbourne, and another purchased a month later, but unknown if released; however, at about that time, nine were in the possession of Acclimatization Soc. of S. Aust., of which four were released at Mt Lofty (the other five died), and another three kept in captivity round Adelaide, presumably to be released later; in 1880, 20 more released (Sutton 1935; Jenkins 1977). **NZ** (based on Thomson 1922): **NI** AUCKLAND: Successfully introduced in 1867, when 30 released, with another 95 in 1868. WELLINGTON: Eight released in 1878. **SI** NELSON: Five released in *c.* 1872. CANTERBURY: In 1865, Potts purchased a male from 'that fellow Fitton' for £5/5/- (Dawson & Cresswell 1949), though its fate unknown. In 1867, 36 successfully introduced in n. Canterbury; another 24 released in 1868; and another lot in 1871. More released at Christchurch in 1875. OTAGO: Two introduced round Dunedin in 1865, four in 1867, 49 in 1868, 48 in 1869, and 42 in 1871. OUTSIDE HANZAB REGION: Unsuccessfully introduced to S. Africa in late 19th century, and USA, in New York (in 1852) and Oregon (in 1889 and 1892) (Long 1981).

Change in range, populations Aust. NSW: After initial releases in Sydney Botanic Gardens in 1860s, thought to have bred either in or near the Gardens, and last recorded some time before 1903, their demise blamed on depredation by Spot-tailed Quolls *Dasyurus viverrimus* (Leishman 1997). VIC.: After initial introduction in Melbourne, recorded breeding in Botanic Gardens by 1860 (Balmford 1978), but for several years generally only occurred in that area (Ryan 1906); by 1906, recorded throughout suburban Melbourne (Ryan 1906). Unconfirmed reports from Beechworth before 1915 (Cheney 1915), Bendigo by late 1920s (Wilson 1928) and Ararat by 1940s (Tarr 1950). By 1950s, range said to have to expanded to include Geelong, Mt Macedon and Dandenong Ras (Tarr 1950). Populations in parts of Geelong have declined since 1960s (Pescott & Savage 1994), round Ballarat between early 1960s and mid-1970s (Thomas & Wheeler 1983) and disappeared from round Bendigo after 1960 (Bridley 1991). **NZ** Though total of >60 Thrushes released in Canterbury by 1871, population there did not increase 'so well as expected', and did not become established round Christchurch till mid-1890s (Thomson 1922). Introduction into Nelson in 1872 was considered unsuccessful, with Thrushes not seen for 'many years', but subsequently reappeared, presumably birds (or their progeny) released in other areas, presumably Canterbury (Thomson 1922). By 1881, numbers in Otago had increased to extent that considered a pest in orchards (Thomson 1922). Present at Dusky Sound by 1884 (Hall-Jones 1966). By early 1920s, present 'from one end of New Zealand to the other in enormous abundance' (Thomson 1922). In late 1940s, population in s. Otago said to have been increasing (DNFC 1948). Numbers round Rotorua said to have declined by a third between late 1940s and mid-1950s (CSN 6); and abundance round Masterton has declined since 1940s: recorded on total of 365 days, May 1942–Apr. 1943, but only on 174, May 1971–Apr. 1972 (Stidolph 1977).

Populations Total population on Lord Howe I. *c.* 50 pairs in 1959 (McKean & Hindwood 1965). Total population on Snares Is *c.* 20–30 pairs (Miskelly *et al.* 2001). RECORDED DENSITIES: **Aust.** 2.47 birds/ha, S. Melbourne, Vic. (Tarr 1950); 0.1–0.16 birds/ha, Geelong, Vic. (Pescott & Savage 1994). **NZ** 2.5–4.75 birds/ha, Kaingaroa Forest, NI (Gibb 1961); 0.03 birds/5-min count (0.2; 333 counts), Kaitoke Wetland, Great Barrier I. (Anderson & Ogden 2003); 0.10–0.31 birds/5-min count (n=1140 counts), Auckland (Gill 1989); 1.11 breeding pairs/ha, Mangere, NI (Bull 1946); 0.01 birds/5-min count, Red Mercury I. (Robertson *et al.* 1993); 0.62 breeding pairs/ha, L. Rotoiti, NI (Flux 1966); *c.* 0.02–0.35 birds/10-min count (estimated from graph), W. Hutt Hills, NI (Gibb 2000b); 0.29–0.59 birds/10-min count (annual mean, 1981–92), in same area (Gibb 2000a); 0–0.22 birds/km on 56 trips between Palmerston N and

Foxton, NI (32.5 km) (Gill 1977); 3.3–3.9 birds/ha, Dunedin Botanic Gardens (Kikkawa 1966); 0.75 birds/5-min count, Fletchers Ck, near Reefton, SI (Dawson *et al.* 1978); 0.17 birds/5-min count, Te Wharau, near Reefton, SI (Dawson *et al.* 1978); 0.11 birds/5-min count, Reefton Saddle, near Reefton, SI (Dawson *et al.* 1978); 0.1–1.6 birds/5-min count (n=117 counts), W. Paparoa Ra., SI (Onley 1980); 0.2–1.07 birds/5-min count (n=81 counts), Little Wanganui R., near Karamea, SI (Onley 1983); 0.06 birds/5-min count (n=50 counts), South East I., Chatham Is (West 1988); 0.6 birds/5-min count (n=100 counts), Tuku NR, Chatham I. (West 1988).

THREATS AND HUMAN INTERACTIONS Occasionally killed by Cats (Bull 1946; Cunningham 1952; Kinsky 1957; Dowling *et al.* 1994; R.H. Loyn), and in NZ, by other introduced predators, including Common Brushtail Possums *Trichosurus vulpecula* (Brown *et al.* 1993) and Little Owls *Athene noctua* (Rule 1977), and possibly Stoats (Bull 1946); and eggs and young taken by rats (Bull 1946; Cunningham & Moors 1985; see Breeding: Success). Occasionally collide with windows (Kinsky 1957). Possibly suffer secondary poisoning after eating invertebrates that have been poisoned (Wilson 1980; CSN 21). Considered a pest in orchards, but also eat many invertebrate pests (see Food: Pest status). Blamed for spread of some weeds in NZ (see Food: Pest status). Formerly protected in Vic.: a reward of 10 guineas was offered for information about vandals destroying nests in Carlton Gardens (Jenkins 1977); in 1879, extra police were requested to patrol Fitzroy Gardens to prevent people destroying Thrush nests (Jenkins 1977); someone was prosecuted after killing a Thrush in 1957 (Hanks 1958).

MOVEMENTS Probably sedentary or resident in HANZAB region, though little published information. Broad-scale analysis of bird atlas and count data from e. Aust. found strong evidence for no movement (Griffioen & Clarke 2002). Apparent seasonality at some sites probably results from birds becoming inconspicuous during autumn moult (Heather & Robertson 2000). No evidence of regular long-distance movements (Heather & Robertson 2000), but ability to travel long distances indicated by unassisted colonization of outlying islands (see Distribution and Population); occasionally seen at sea (see below). Extralimitally, described as mostly resident, but population in n. Europe either migratory or part-migratory, moving S to winter in Britain or round Mediterranean coasts, augmenting local populations; populations from farther E probably winter in Middle East and ne. Africa; number of birds that undertake migration determined by weather, with more moving if weather severe (BWP).

Aust. Described as resident in suburban Melbourne (Fleming 1976) and round Dartmouth Dam, ne. Vic. (Thomas & Gilmore 1976). Recorded throughout year in some parts of Geelong, Vic, but less often in autumn, possibly reflecting increase in conspicuousness at that time (Pescott & Savage 1994). **NZ** Described as resident in Auckland (Moncrieff 1929), round Waikanae R. estuary, NI (Wodzicki 1946), and Pembroke Wilderness Area, near Milford Sound, SI (Moncrieff 1929); and recorded throughout year (probably sedentary of *HANZAB*) at W. Hutt Hills, Wellington (Gibb 2000a) and round Herbert, n. Otago (Anderson 1947); 'no signs of migration' in Nelson, SI (Moncrieff 1929). **Outlying islands** Seen throughout year on Lord Howe I. (Aust. Atlas 2). Resident on Norfolk I. (Schodde *et al.* 1983; Hermes 1985). Resident or sedentary on Snares Is (Stead 1948; Miskelly *et al.* 2001).

Some evidence for movements or seasonal occurrence in NZ, though detection may be affected by inconspicuousness in post-breeding period. In Taranaki, said to undertake altitudinal movements to higher elevations after breeding season, and also move from shrublands and pine plantations to native forest at same time (Moncrieff 1929). Apparently absent from gardens in Hastings and Havelock N, NI, in winter 1988, reappearing in spring; present throughout following winter (CSN 37). Suggestion of altitudinal movement in n. Westland, e.g. in Ohikanui R. Valley, Paparoa Ra., recorded in Dec. but not Mar., but change possibly also due to seasonal conspicuousness (Dawson *et al.* 1978; Wilson *et al.* 1988). Present round C. Foulwind, SI, May–Aug. (Stuart-Sutherland 1922). Able to travel long distances, having colonized various outlying islands (see Distribution and Population), and occasionally seen out to sea (Abernethy 1956; Jenkins 1967; Gaze 1983; CSN 26).

Banding Of 213 banded in Aust., 1953–June 2003, single recovery (0.5%), of adult banded Lower Plenty, Vic., 31 July 1966, and recaptured near banding place over 2 years 6 months after banding (ABBBS).

FOOD Omnivorous; mainly take invertebrates, especially snails and earthworms; but also take much fruit (see below). Considered snail specialist (Pizzey 1988). **Behaviour** Surprisingly little information from Aust., but fairly well known in NZ. Mainly forage on ground, probing for worms and gleaning snails; also take much fruit from orchards, and thus considered a pest (e.g. Campbell 1905; Dawson & Bull 1970; Fitzgerald *et al.* 1989; Aust. Atlas 1; see below). On Rough I., NZ, Thrushes live in mainly dry, sandy and gravelly habitat, with greater numbers than would normally be sustainable, but year-round availability of mud-snails provides constant source of food (Kinsky 1970; see below). DETAILED STUDIES: In NZ, on Noises Is, Hauraki Gulf, NI (Cunningham & Moors 1985), and near Nelson, SI (Williams & Karl 1996). FORAGING ASSOCIATIONS: Usually forage in pairs (McEvey 1955; G.D. Price); occasionally forage in small to large flocks, e.g. in NZ, near Invercargill, SI, *c.* 600 seen foraging on a lawn (Barlow 1983); in same area, flocks of 60+ and 106 seen foraging on ground (CSN 37); near Murchison, SI, 'hundreds' seen foraging in winter (CSN 34); on Rough I., NI, up to 13 at a time seen foraging on mud for mud-snails *Amphibola crenata* (Kinsky 1970). Often forage with other introduced species (Moncrieff 1929), especially Common Blackbird (in both Aust. [J.M. Peter; G.D. Price] and NZ [Bull 1946; Dawson & Creswell 1949; Counsilman 1974; Barlow 1983]), Common Starlings (Bull 1946; Counsilman 1974) and House Sparrows *Passer domesticus*, Rock Doves *Columba livia* and, sometimes, Silver *Larus novaehollandiae* and Kelp *L. dominicanus* Gulls (Counsilman 1974); and claimed that disputes between species common (Counsilman 1974). Near Invercargill, *c.* 600 Song Thrushes seen foraging on lawn with *c.* 400 Blackbirds (Barlow 1983); and 106 seen foraging with two Blackbirds, and 60+ seen foraging with six Blackbirds and 14 Common Starlings (CSN 37); near Murchison, 'hundreds' seen foraging with Blackbirds (CSN 34). FORAGING SITES AND HEIGHTS: Forage on ground, on bare soil, leaf-litter and on grass or other low vegetation (e.g. Hodgkins 1949; East 1967; Falla *et al.* 1981; Powlesland 1983; Hutton 1991; Heather & Robertson 2000; Vic. Atlas; CSN 37; see below), including lawns and sports ovals (Moncrieff 1929; McEvey 1955; East 1967; Barlow 1983; Heather & Robertson 2000; Vic. Atlas; CSN 47), in garden beds, between and beneath shrubs (Bull 1946; McEvey 1955; Nye 1971; Hutton 1991; Vic. Atlas), in paddocks and pasture (Bull 1946; Stenhouse 1957; CSN 34) and on floor of forests (Hutton 1991; Vic. Atlas). Also sometimes forage in trees and shrubs, mainly in orchards and other fruiting trees (Bull 1946; Dawson & Creswell 1949; Dawson & Bull 1970; CSN 1). In NZ, sometimes forage on shoreline (Nye 1975; CSN 6), on exposed tidal mudflats and saltmarsh (Kinsky 1970; Nye 1971; Owen & Sell 1985), in tussock areas (CSN 24), and from beneath surface of lake (CSN 20). In

Christchurch Botanic Gardens, of 426 observations of foraging (figures estimated from graph): *c*. 94% on lawn, *c*. 3% in leaf-litter, *c*. 2% fruit on trees and *c*. 1% fruit on ground (East 1967). Once pilfered fat from a dog's bowl (CSN 45) and on another occasion took chicken pellets from a hopper (CSN 47). FORAGING METHODS: When hunting worms, usually run a few paces or take a few hops, then stop with head cocked, as if listening, before moving a step or two to probe and pull worm from ground (Heather & Robertson 2000; Boles). Said not to turn leaves like Blackbirds; use only bill to search for food on ground and do not rummage vigorously in leaf-litter with co-ordinated sideways flick of bill and backward movements of feet, as does Blackbird (East 1967). However, extralimitally, use both sideways flick of tail and backward and sideways steps with feet (BWP). Small fruits eaten whole, but flesh of larger fruit pecked from ripe fruit in trees or on ground (Heather & Robertson 2000). Also seen reaching from ground to pick caterpillars from low-hanging leaves (Hodgkins 1949). On Little Barrier I., seen sipping nectar of Pohutukawa *Metrosideros excelsa* like a honeyeater (Sibson 1947). On Rough I., birds wait for low tide, then fly to freshly exposed mud and forage for mud-snails *Amphibola crenata*, which are carried back to shore and removed from shell, then eaten or carried back to be fed to young; seen foraging on mud up to 1 h after first seen there (Kinsky 1970; Nye 1971; see Handling of food, Use of tools, below). Once seen trying to work up trunk of tree to gather food but bird fell off often (CSN 29). HANDLING OF FOOD, USE OF TOOLS: Use anvils, such as stones or pieces of wood, to smash shells of gastropods (e.g. Hobbs 1971; Green 1972; Nye 1975; Falla *et al*. 1981; Hutton 1991; Gibb 2000a; CSN 20); some anvils surrounded by large number (e.g. 20+) of snail shells (Heather & Robertson 2000). Hold shell of snail by rim in bill and bang it against anvil till it breaks and animal comes free, bringing shell down using downward and sideways flick of head, not a vertical movement (Kinsky 1970; Nye 1971; Heather & Robertson 2000; Oliver; CSN 6, 20). Garden snails usually broken after 4–5 blows against stone anvil, but mud-snails have much thicker shell and require more thorough walloping against stone to break them open; once seen to bang mud-snail 40 times against rock and still not break shell (Nye 1971). Near Hamilton, NI, beat a weta (Orthoptera) on an asphalt driveway before eating it (CSN 47). SEASONAL VARIATION: At Dunedin Botanic Gardens, SI, feed mostly on earthworms and insects in summer and on fruits in autumn and winter (Kikkawa 1966); at Kowhai Bush, SI, diet mainly invertebrates in winter and spring (Powlesland 1983); on Rough I., NI, mud-snails available as food source throughout year (Kinsky 1970); on Snares Is, eat only animal food throughout year, as no fruit trees present (Stead 1948). SIZE OF FOOD: Near Hamilton, NI, ate weta with leg 3 cm long (CSN 47). PEST STATUS: Eat and damage fruit in orchards (Campbell 1905; Thomson 1922; Dawson & Bull 1970; Heather & Robertson 2000; Oliver; Aust. Atlas 1); conversely, destroy many snails, slugs and insect pests (Campbell 1905; Thomson 1922; Moncrieff 1929; Oliver); described as 'friend of the gardener' (Moncrieff 1929). Also efficient dispersal agent of weeds, spreading their seeds into native forests and crops (Thomson 1922; Williams & Karl 1996; Heather & Robertson 2000; Oliver), often moving between urban and rural habitats (Williams & Karl 1996); seeds pass through digestive system and are scattered far and wide, expanding range of noxious weeds, such as briars, inkweed, elderberries *Sambucus* and blackberries, as well as native fruit-bearing trees (Oliver). In Aust., said not to eat much cultivated fruit and, unlike Blackbird, not to be pest in this regard, but eat much fruit in NZ (Boles). DRINKING: In Otago, SI, once seen drinking milk from a Cat's saucer (CSN 4).

Detailed studies On NOISES IS, NI (contents of 13 stomachs; Cunningham & Moors 1985): **Plants** Araliaceae: *Pseudopanax lessonii* (not specified if fruit or seeds): 50% freq. **Animals** MOLLUSCS 75: Punctidae: *Laoma glabriuscula* 25. SPIDERS 25. INSECTS 100: Coleoptera 25; Diptera 75; Hemiptera 50; Hymenoptera 25; Lepidoptera 25.

At three sites near NELSON, SI (faecal samples and observations: at Eves, Feb. 1992–Feb. 1993; Marsden, Feb.–June 1993; and Faulkners, Dec. 1993–June 1994; Williams & Karl 1996): see Table 1.

Other records—Aust. Plants (Fruit.) Seeds[10]. MONOCOTYLEDONS: Arecaceae: *Chamaerops humilis*[2]. DICOTYLEDONS: Fruit[4,7,9,10]; Rosaceae: *Crataegus monogyna*[3]; Winteraceae: *Pseudowintera axillaris*[5]. **Animals** ANNELIDS: Oligochaetes: earthworms[4,7,11]. MOLLUSCS: Gastropods: snails[1,6,7,8,10]; Limacidae: slugs[1,4,6]. SPIDERS[7,10]. CHILOPODS: Centipedes[7]. INSECTS[1,4,6,7,10]: Coleoptera: beetles[4,7,10], larv.[4]; Lepidoptera: larv.[4], ads[7,10].

REFERENCES: [1] Campbell 1905; [2] Tadgell 1936; [3] Anon. 1940; [4] Long 1981; [5] Norton 1982; [6] Gregory-Smith 1983; [7] Hermes 1985; [8] Pizzey 1988; [9] French 1990; [10] Hutton 1991; [11] FAB.

Other records—NZ Plants (Fruit unless stated.) MONOCOTYLEDONS: Agavaceae: *Cordyline australis*[20]. DICOTYLEDONS: Fruit[10,14]; Araliaceae: *Pseudopanax*[6]; Labiatae: *Salvia*[16];

Table 1. Fruit in diet at three localities in NZ (after Williams & Karl 1996).

Fruit	EVES (n=5)		MARSDEN (n=5)		FAULKNERS (n=3)	
	% freq.	% dry wt	% freq.	% dry wt	% freq.	% dry wt
Indigenous fruit						
Coprosma robusta	–	–	50.0	91.0	–	–
Melicytus ramiflorus	–	–	50.0	8.0	–	–
Muehlenbeckia australis	–	–	20.0	0.6	–	–
Pittosporum tenuifolium	–	–	–	–	–	–
Podocarpus hallii	20.0	17.0	–	–	33.3	6.8
Prumnopitys taxifolia	–	–	–	–	33.3	43.5
Schefflera digitata	20.0	83.0	–	–	–	–
Introduced fruit						
Leycesteria formosa	–	–	20.0	0.1	–	–
Ligustrum sinense	–	–	–	–	33.3	49.7
Unidentified pulp	–	–	20.0	*	–	–
% freq. of fruit	14.0		60.0		100	
# species/defecation	1.0		2.3±0.4		1.0	

* = not determined

Myrsinaceae: *Myrsine australis*[6]; Myrtaceae: *Metrosideros excelsa* nectar[3]; Onagraceae: *Fuchsia excorticata*[6]; Polygonaceae: *Muehlenbeckia*[6]; Rosaceae: *Cotoneaster*[18]; *Crataegus monogyna*[18]; *Sorbus aucuparia*[6]; *Malus sylvestris* fru.[7]; Rubiaceae: *Coprosma australis*[19]; *C. baueri*[1]; *C. robusta*[21]; *Pyracantha*[18]; Violaceae: *Melicytus ramiflorus*[6]. **Animals** ANNELIDS: Oligochaetes: earthworms[2,13,14,15,16]; Lumbricidae: *Lumbricus rubellus*[6]; Hirudinea: leeches[16]. **MOLLUSCS**: Gastropods: snails[2,6,14,15]; Amphibola: *Amphibola crenata*[8,9,11,15,17]; Bulimulidae: *Placostylus*[15]; Helicidae: *Helix aspersa*[15]; Littorinidae: *Littorina littorea*[9]; Rhytididae: *Powelliphanta*[15]; Trochidae: *Melagraphia aethiops*[9]. **CRUSTACEANS**: Amphipods[6,15]; Isopods[6]. **SPIDERS**[15]. **DIPLOPODS**: Millipedes[15]. **INSECTS**[2,14,15]: Coleoptera: ads[6], larv.[6]; Dermaptera[6]; Diptera: ads[6], larv.[6]; Hemiptera: Pentatomidae: *Nezara viridula*[5]; Hymenoptera: Pompilidae ads[6]; Lepidoptera: ads[16], larv.[4,6]; Orthoptera: wetas[6,23]. **Other matter** Bread crusts[12]; fat[22]; mince meat[12]; chicken pellets[23].

REFERENCES: [1] Moncrieff 1929; [2] Bull 1946; [3] Sibson 1947; [4] Hodgkins 1949; [5] Abraham 1951; [6] Kikkawa 1966; [7] Dawson & Bull 1970; Nye [8] 1971, [9] 1975; [10] Falla *et al.* 1981; [11] Owen & Sell 1985; [12] Wood 1998; [13] Gibb 2000a; [14] Oliver; [15] Heather & Robertson 2000; CSN [16] 1, [17] 6, [18] 19 Suppl., [19] 20, [20] 38, [21] 42, [22] 45, [23] 47.

Young Both parents feed nestlings (see Breeding). At Papatowai, SI, well-grown fledgeling was fed by at least two adults four times in 30 s; young bird also pecked ground between feeds (J.M. Peter). At Dunedin Botanic Gardens, SI, nestlings fed mainly on earthworms (Kikkawa 1966). Young also recorded being fed fruit of *Coprosma* (CSN 19); and mud-snails (Kinsky 1970); one brood of fledgelings ate cherry plums *Prunus* (NRS). Once, at Nelson, SI, adult seen apparently teaching fledgeling how to extract snail from shell (Boyce 1972; for details, see Social Behaviour: Relations within family group).

SOCIAL ORGANIZATION Poorly known in HANZAB region, and no studies; better known extralimitally (see Clement & Hathway 2000; BWP and references therein). In HANZAB region, usually seen singly or in pairs (e.g. McEvey 1955; Boyce 1972; Beauchamp & Parrish 1999; CSN 19, 42, 45, 47; see Food); occasionally forage in small to large flocks of up to 100 or so and, exceptionally, in congregations of hundreds (see Food). Occasionally forage with other species, especially Common Blackbirds and other introduced passerines (see Food). Extralimitally, usually occur singly or in pairs during breeding season; and typically solitary or in small groups outside breeding season, but regularly form large, loosely co-ordinated flocks on passage (BWP).

Mating system **Bonds** Extralimitally, monogamous, but probably form new pair-bonds each year (BWP). No information from HANZAB region. **Parental care** In HANZAB region, usually only female incubates and broods (see Breeding), but at one nest, both parents observed sitting on nestlings at same time (NRS). In HANZAB region, both parents feed nestlings and fledgelings; and swallow excreta of nestlings (see Breeding: Young). Fledgelings remain with parents, and are occasionally fed for several weeks after leaving nest (see Breeding: Fledging to independence). Two newly fledged young from one nest were each attended by a single parent (NRS). Extralimitally, age of first breeding apparently 1 year (BWP).

Breeding dispersion Solitary, territorial (BWP; see below). In parkland in suburban Melbourne, in 1941, breeding density estimated at 0.74 pairs/ha (Bull 1946). At Mangere, NI, breeding density over 6-month period c. 1.11 pairs/ha in 40.5 ha study area, assuming three clutches/pair, including 0.77 pairs/ha in 38.8 ha of farmland and 8.64 pairs/ha in 1.6 ha of garden (Bull 1946). At St Arnaud, SI, 89 active nests found in 72.8 ha of grassland over 12-month period, density of 0.61 pairs/ha, assuming two clutches/pair (Flux 1966). For details of extralimital breeding dispersion, see BWP. **Territories** Established from Apr., and defended till Jan., after which birds become secretive and inconspicuous during autumn moult. Pairs often occupy same territory for several consecutive years (Heather & Robertson 2000). Extralimitally, territory boundaries not well defined, and often forage outside territory. Both sexes defend territory, but relative roles not known. In areas where part migratory, resident males and occasionally females occupy individual winter territories; those of males roughly equivalent in size and location to previous or subsequent breeding territories (BWP).

Roosting Little information in HANZAB region; at C. Foulwind, SI, small flocks of 12–20 very occasionally perched and crowded together on handrail of lighthouse, usually May–Aug. (Stuart-Sutherland 1922). Extralimitally, roost solitarily or in pairs, or in small groups if site suitable, occasionally with other *Turdus*. Roost among dense cover, especially shrubs (BWP).

SOCIAL BEHAVIOUR Poorly known in HANZAB region; single study of territorial behaviour in suburban Melbourne, May–Oct. 1953 (McEvey 1955); better known extralimitally (see Clement & Hathway 2000; BWP and references therein). In HANZAB region, often confiding in urban areas. Extralimitally, generally confiding and sometimes tame in urban areas or where in contact with people, but usually shy and wary in natural habitats away from human habitation (BWP). **Displays** Once, one bird seen to perform an aerial display, flitting up and down with legs lowered and bill pointed downward; bird landed and subsequently attempted copulation with a stump c. 100 mm long and roughly same diameter as a Thrush (CSN 23). Aerial behaviour does not match any displays described extralimitally (BWP). Maintenance behaviour similar to that of Common Blackbird and other thrushes *Turdus* (BWP).

Agonistic behaviour Territorial birds of both sexes usually aggressive towards intruders (BWP, which see for displays and postures). Males deliver territorial Song from elevated perches, with singing heard mainly Apr.–Dec. (see Voice). At Hawthorn, Vic., one territory apparently established in late June. Territorial boundaries were maintained by singing from song-posts, the height of which increased throughout July; mostly sang early in morning. When singing, usually adopt characteristic posture with head up and throat puffed and swelling, and wings drooping slightly during more vigorous Songs. Songs sometimes focused in single direction, and sometimes bird faced several different directions while singing. Song periods varied from a few minutes to 2.5 h of more or less consistent output. Territorial Song increased in vigour through July and early Aug., before subsiding and virtually ceasing in mid-Aug., when mate acquired. Singing recommenced in late Sept., 1 day after female partner disappeared (McEvey 1955). **Threat, Fighting** In territory at Hawthorn, Vic., threat display preceding combat consisted of bird perching opposite its opponent with head lowered and tail fanned slightly. Fighting observed once: two birds rose 0.9–1.5 m into air and faced one another, with wings fluttering and tails fanned, and apparently pecking at each other, then landed and faced one another alertly (McEvey 1955, which see for illustration). This was repeated two or three times before one left area. The encounter lasted 15 s, and no calls were heard. In a later observation, two birds made flitting passes at one another within metres of ground (McEvey 1955). Also recorded extralimitally (BWP). **Alarm** Utter Alarm Calls upon detecting potential predator (see Voice). At Rotorua, NI, Common Starlings destroyed one clutch despite 'clamorous' defence by adult Thrushes (Bull 1946).

Sexual behaviour Courtship Pair-formation takes place in territory after establishment of territory by male; not accompanied by a characteristic display (BWP). Once, at Hawthorn, Vic., one of two birds present perched on fence in semi-crouched posture, flapping wings rapidly; interpreted as courtship display (McEvey 1955). At Clevedon, NI, one bird picked up blade of dry grass and approached another in manner suggestive of courtship; the offer was ignored (CSN 21). **Courtship feeding** At one nest, male often fed female on nest during incubation (NRS); extralimitally, males usually pass some food to female, who eats some or occasionally all (BWP).

Relations within family groups Little information from HANZAB region; see BWP for extralimital details. Both sexes feed young and attend to nest-sanitation (see Breeding). Once at Nelson, SI, two seen performing behaviour which thought to be teaching young bird how to break snail-shell. Initially, the two stood facing each other *c.* 30 cm apart on lawn. Presumed parent held object in its bill (probably snail minus shell), then made 3–4 downward, sideways movements of head and bill, identical to those used to break snail shells, before dropping object onto ground and retreating 25–30 cm. Both stood and looked at object for short time, before young bird moved forward tentatively and paused with bill poised above object, before picking it up. After another short pause, young bird twice repeated head and bill movements of parent before dropping object and stepping back, but head and bill movements only weakly resembled those of adult. Parent then retrieved object and repeated performance, with the two repeating sequence of events several times over *c.* 5 min (Boyce 1972). **Anti-predator responses of young** No information from HANZAB region. Extralimitally, when disturbed, fledgelings usually remain silent, and sometimes adopt motionless posture with bill pointed upward; if scattered, utter croaking sound (BWP). **Parental anti-predator strategies** No information from HANZAB region. Extralimitally, use several strategies: When other birds approach nest, parents usually attack aggressively. When people approach nest, female usually settles deeper into nest, but leaves silently upon close approach; in suburban areas, however, parents often react to approach of people with intense threat behaviour, and occasionally attack (BWP, which see for further details).

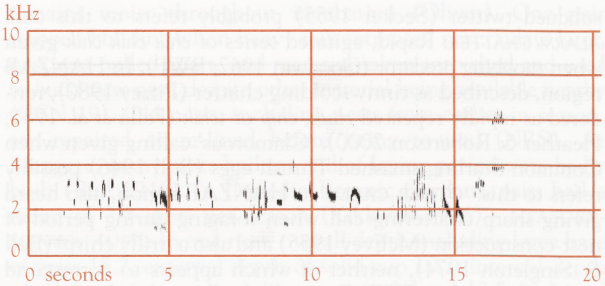
VOICE Well known extralimitally (see BWP, and references therein), but little published information from HANZAB region; sonagrams in BWP. In w. Palaearctic, repertoire of adults consists of four types of Male Song (including Territorial Song), and ten calls (BWP; see below). However, most reports in HANZAB region do not distinguish between types of Song, and all described under Male Song below, though most probably referring to Territorial Song. Male Song most commonly reported vocalization in HANZAB region (see below). Said that calls seldom heard (Gibb 1996, 2000a), but often utter Tsip Call (R.H. Loyn). Usually sing from prominent perch (Falla *et al.* 1981; Hutton 1991; Peter 1993; Gibb 2000a), such as top of tree (either bare or with foliage), telephone pole, overhead wires or chimney (McEvey 1955; Salter 1957; CSN 19 Suppl.), adopting characteristic posture (see Social Behaviour). Height of song-post said to increase as singing season progresses and said to vary from *c.* 1.5 m to *c.* 9 m high (McEvey 1955). Subsong usually given from shelter of foliage, perched in or beneath dense shrub (McEvey 1955, 1956; Rep. Bull. OSNZ 3). Often quiet (Hermes 1985), but also often first detected by voice, with presence commonly indicated by Male Song (Redhead 1969; Fullagar *et al.* 1974; Dawson *et al.* 1978; Cunningham & Moors 1985; Merton & Veitch 1986; Gibb 1996, 2000a,b; Miskelly *et al.* 2001); for seasonal breakdown of proportions heard first versus seen first, see Table 2. When singing, do not face any particular direction; in e. Melbourne, faced in all directions, though faced E and S slightly more often than W or N (McEvey 1955). Most singing birds stopped when stalked by an observer with tape-recorder (Ward 1969). SEASONAL PATTERN: Strongly seasonal, but little data for Aust. In Aust., usually sing late June to Nov., and sometimes later in summer and autumn (Kloot & McCulloch 1980; Pizzey 1980; R.H. Loyn); in e. Melbourne, sang between May and early Jan., though full Territorial Song only given June–Nov., with incomplete Song (see below) given in May and from late Nov. to early Jan.; singing sometimes stopped during breeding in Aug.–Sept., but resumed at full strength after nest failed and mate lost (McEvey 1955, 1956). Much more data from NZ. Combining sources from various locations, singing period covers all months, but with core generally winter–spring. Usually first heard singing in Apr. or occasionally Mar., though first Songs usually only irregular or incomplete; first Songs also reported as late as July–Aug. at some locations. Full Territorial Song usually does not start till first half of May, especially in first week, though occasionally earlier, in mid- to late Apr. or very occasionally in Mar., but sometimes not started till June. Singing (usually in the form of incomplete Song) finishes between late Dec. and mid-Feb., though very occasionally continues till late Feb. (Moncrieff 1929; Cunningham & Wodzicki 1948; Hodgkins 1949; Sibson 1949, 1958; Williams 1960; Andrew 1967; Warham 1967; Falla *et al.* 1981; Cunningham & Moors 1985; Merton & Veitch 1986; Gill 1989; Gibb 1996, 2000a,b; Heather & Robertson 2000; CSN). Singing said to start later at higher elevations (Dawson *et al.* 1978). Occasionally singing fades or stops abruptly in middle of singing season, e.g. at Mairangi Bay, stopped singing on 21 June (CSN 6), and at Minginui, Song 'faded somewhat' in June before starting again with renewed vigour in late July (CSN 8). At Clevedon, Territorial Song began on 27 Mar. and continued daily till 8 Apr., when reduced to incomplete Song (CSN 19 Suppl.). For monthly breakdown of proportion of Songs and calls given near Wellington, see Table 3. On Lord Howe I., sing in spring–summer (Hutton 1991). DIURNAL PATTERN: Territorial Song given throughout day (Moncrieff 1928; McEvey 1955; Salter 1957; Edgar *et al.* 1965; Merton & Veitch 1986; Gibb 2000b; CSN), though most often sing in early morning and evening (Tiley 1951; Sibson 1953; McEvey 1955; Merton & Veitch 1986; Hutton 1991; Gibb 2000b). Also sometimes sing outside daylight hours (Lindsay *et al.* 1959), e.g. 03:00–04:10 (Merton & Veitch 1986; CSN 1, 30, 36) or well after sunset, e.g. for 1 h after dark (Hodgkins 1949), or till 23:00 (CSN 5, 34). In list of species participating in dawn chorus near Te Teko, NI, on 27 Oct., Song Thrush was first heard 48 min before sunrise (Taylor 1975). In e. Melbourne, Subsong only heard during day, mostly late morning and early afternoon (McEvey 1955). Diurnal pattern possibly affected by season: at Dunedin, SI, apparently sing throughout day in Aug.–Oct.; by mid-Oct., amount of singing during day begins to decline, and from mid-Nov., singing mostly confined to morning and evening; when singing resumes in early Mar., again mostly confined to mornings and evenings, but singing in middle of day by mid-Mar. (CSN 1). Singing appears not to be affected by weather (McEvey 1955): sing in sultry or cold, clear, frosty, misty, overcast or rainy, windy or calm conditions (McEvey 1955; Kloot & McCulloch 1980; Rep. Bull. OSNZ 2, 3; CSN 37). SIMILAR SOUNDS: Territorial Song said to be sweeter than that of Common Blackbird (Kloot & McCulloch 1980); distinguished from that of Common Blackbird by habit of repeating notes and short phrases (R.H. Loyn). Extralimitally, Male Song said to be more penetrating and less rich than that of Blackbird (BWP). Calls said to sound like some notes of song of New Zealand Robin *Petroica australis* (Moncrieff 1932); and Alarm Call said to be similar to that of Chestnut-crowned Babbler

Table 2. Seasonal proportions (%) of Thrushes first detected audibly or visually in Orongorongo Valley, near Wellington, 1988–91; figures estimated from graph (Gibb 1996).

	Heard first	Seen first
Spring	c. 92%	c. 8%
Summer	c. 88%	c. 12%
Autumn	100%	0%
Winter	100%	0%

Pomatostomus ruficeps (Goodwin 1967) or Australasian Pipit *Anthus novaeseelandiae* (Secker 1955); or like that of Common Blackbird but slower and more metallic (R.H. Loyn). Occasionally include sounds in Song that are assumed to be mimicry but are, in fact, own sounds (McEvey 1956); thus, though sometimes said to mimic Shining Bronze-Cuckoo *Chrysococcyx lucidus* (see Mimicry below), part may merely sound similar rather than being an imitation (CSN 34). MIMICRY: Often incorporate mimicry of other birds into Territorial Song (e.g. Marshall 1950; McEvey 1956; Pizzey 1980; Heather & Robertson 2000; CSN); standard of mimicry said to range from excellent (Hutton 1991), exceedingly skilful (Kloot & McCulloch 1980) and able (McEvey 1956) to mild (Chisholm 1965) and amateurish (McEvey 1956). In Aust., heard mimicking calls of Masked Lapwing *Vanellus miles*, Galah *Eolophus roseicapillus*, Eastern Rosella *Platycercus eximius*, Superb Fairy-wren *Malurus cyaneus*, White-browed Scrubwren *Sericornis frontalis*, Noisy Miner *Manorina melanophrys*, Yellow-faced *Lichenostomus chrysops*, White-plumed *L. penicillatus* and New Holland *Phylidonyris novaehollandiae* Honeyeaters, Rufous Whistler *Pachycephala rufiventris*, Magpie-lark *Grallina cyanoleuca*, Willie Wagtail *Rhipidura leucophrys*, Black-faced Cuckoo-shrike *Coracina novaehollandiae*, Red-whiskered Bulbul *Pycnonotus jocosus*, Common Blackbird, Common Starling and Common Myna *Acridotheres tristis* (McEvey 1955, 1956; Salter 1957; Lee 1964; Peter 1993). In NZ, heard mimicking Red-legged Partridge *Alectoris rufa*, Purple Swamphen *Porphyrio porphyrio*, Whimbrel *Numenius phaeopus*, Black-winged Stilt *Himantopus himantopus*, Masked Lapwing, Silver Gull, Shining Bronze-Cuckoo (upward notes of first part of call only, without descending note; see note above), Long-tailed Cuckoo *Eudynamys taitensis*, Eastern Rosella and Southern Boobook *Ninox novaeseelandiae* (Falla *et al.* 1981; CSN 6, 30, 31, 34, 35, 41). All mimicry incorporated into Territorial Song, and not heard in Subsong (McEvey 1955). In Vic., mimicry heard in Oct.–Nov. (McEvey 1955, 1956; Salter 1957) or late winter and spring (Peter 1993); in NZ, mimicry heard May–Oct. (CSN). NON-VOCAL SOUNDS: Sometimes detected by repetitive cracking sounds of breaking open shells of snails on stone anvils (Hutton 1991; see Food).

Adult MALE SONG: Extralimitally, four types of Male Song recognized: Territorial Song, Battle-song, Alarmed-song and Courtship-song. Reports in HANZAB region do not distinguish between these types of Song, and most descriptions below probably of Territorial Song. However, Subsong (or Whisper Song) probably equivalent of Alarmed-song or Courtship-song, or both. *SONG* (sonagram **A**) is a melodious series of simple phrases, often repeated and punctuated with pauses of varying duration, though some non-repetitive phrases sometimes also included (Peter 1993); also described as clear phrases repeated 2–4 times between pauses, forming fragmented Song (Pizzey 1980); energetic, varied string of clear-cut musical phrases, repeated between brief pauses, rendered as *chitty-choo chitty choo, oo-eee oo-eee*… (Heather & Robertson 2000); voluble and rich, characterized by constantly repeated phrases (Hutton 1991); and four-note Song repeated several times (CSN 6). Also described as powerful, explosive, vociferous and strong (McEvey 1955; Ward 1969; CSN 9, 30), and melodious, sweet, rich, spirited and gay (McEvey 1955; Pizzey 1980; Hermes 1985; Hutton 1991) and 'a fine careless rapture' (Falla *et al.* 1981). In e. Melbourne, six or seven phrases were given before first repeated (McEvey 1955). Mimicry often incorporated into Song (see Mimicry above). Bouts of singing may last for a few minutes (McEvey 1955), in longer bursts of 40–60 min (Hodgkins 1949; Salter 1957; CSN 6), or much longer, e.g. more or less all day long (Edgar *et al.* 1965), or up to 2.5–3 h more or less continuously (McEvey 1955; CSN 36). Song said to carry for at least 275 m or so (McEvey 1955). When singing resumes after break of several weeks, or after main singing season is ending, often uttered as incomplete Song, described variously as tentative, hesitating, half-hearted, faded, weak and occasional, brief or slackened (McEvey 1955, 1956; CSN), snippets or faint snatches of Song (Sibson 1949) or simply as 'a mere travesty' (CSN 6), comprising two or three notes of Song (CSN 1, 5); given for a few days or weeks before full Territorial Song given, or for a few weeks after Territorial Song concludes. *SUBSONG* (or Whisper Song): In HANZAB region, generally described as soft or faint, sweet and varied song (McEvey 1955, 1956; CSN 26, 34, 37). 'Low throat notes' (Rep. Bull. OSNZ 2) possibly refer to this. Suggested to lead into full Territorial Song or given as an 'expression of contentment' when territorial advertising is at low level (McEvey 1955). Given by either paired or unpaired birds in response to a rival bird, induced by Territorial Song (BWP). CONTACT CALLS: *TSIP CALL*: Short, thin *tsip*, usually given when flushed or in flight; often used to warn off conspecifics, indicating 'not a good idea to approach me any closer' (BWP). Most common call. In HANZAB region, given when in flight (Pizzey 1980; Falla *et al.* 1981; Cunningham & Moors 1985; Heather & Robertson 2000), when chasing conspecific (Rep. Bull. OSNZ 3) and when male and female foraging together (McEvey 1955). ALARM CALLS: *SIIH ALARM CALL*: Thin *siih* given when raptor passes by (BWP); presumably this call was given when New Zealand Falcon *Falco novaeseelandiae* flew overhead (Porter & Dawson 1968). *LOW-INTENSITY ALARM CALL*: Subdued *djuk* or *dukduk* given in mild alarm (Falla *et al.* 1981; Heather & Robertson 2000; BWP); harsh



A L.B. McPherson; Christchurch, SI, Dec. 1984; P107

Table 3. Monthly proportion (%) of vocalizations of Thrushes near Wellington, 1981–92; figures estimated from graph (Gibb 2000a).

	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.
Song	95	83	31	62	96	100	100	100	98	100	97	100
Call	5	17	69	38	4	0	0	0	2	0	3	0

subdued twitter (Secker 1955) probably refers to this call. ALARM CHATTER: Rapid, agitated series of *chik chik chik* given when mobbing predator (Goodwin 1967; BWP). In HANZAB region, described as tinny scolding chatter (Pizzey 1980), rendered as rapidly repeated *chuk*, *chip* or *tchik* (Falla *et al.* 1981; Heather & Robertson 2000). 'Clamorous' calling given when Common Starling smashed Thrush eggs (Bull 1946) possibly refers to this. OTHER CALLS: In HANZAB region, also heard giving sharp chattering call when foraging during period of nest-construction (McEvey 1955) and also a 'trilly chirp' (Bell & Singleton 1974), neither of which appears to correspond with calls listed in BWP. Four other calls reported extralimitally: Zili Contact Call, Far-Carrying Seep Migration Call, Distress Call and Quiet Jup Jup Call (BWP).

Young No information from HANZAB region. Extralimitally, small nestlings give *chip* call, while older ones give hoarse, rapidly repeated sibilant *tschiptschiptschip*; fledgelings give querulous *treeep* in contact and croaking sounds as anti-predator response (BWP).

BREEDING Poorly known in Aust. and islands in HANZAB region; 70 records in NRS to Aug. 2004 (all from Vic.). Better known in NZ, with detailed studies at Mangere, NI, in 1943 (Bull 1946), at St Arnaud, SI, over 1963–65 breeding seasons (Flux 1966), and in Dunedin Botanic Gardens, Sept. 1958–Feb. 1961 (Kikkawa 1966); all three studies contained comparison of breeding biology with Common Blackbird.

Season In Aust. and NZ, most clutches Aug. or Sept. to Dec. **Aust.** Eggs Sept.–Feb., but most Sept.–Dec. (NRS). VIC.: Eggs, mid-Sept. to early Feb. (McEvey 1955; NRS). Of 54 clutches in NRS: seven (13.0%) in Sept., 24 (44.4%) in Oct., 13 (24.1%) in Nov., seven (13.0%) in Dec., two (3.7%) in Jan. and one (1.9%) in Feb. Nestlings, Aug.–Jan. (Coleman 1950; Aust. Atlas 1; NRS). Unspecified breeding, including fledgelings, Aug.–Feb. (Aust. Atlas 1, 2; Vic. Atlas; NRS).

NZ Eggs, May–Feb., mostly early Aug. to late Dec. (Falla *et al.* 1981; Heather & Robertson 2000; Oliver; see below). Laying began c. 1 month earlier at Mangere, NI, than at St Arnaud, SI, though peaked in late Sept. at both sites (Flux 1966). NI: Eggs, June–Feb. (Moncrieff 1929; Sibson 1947; McKenzie 1950; Challies 1966; CSN). Nestlings, June–Aug., Oct., and Dec.–Feb. (Turbott 1947; Sibson 1949; McKenzie 1950; CSN). Unspecified breeding, including fledgelings, July–Feb. (Turbott 1947; Cunningham & Wodzicki 1948; McKenzie 1950; CSN 1, 4, 5, 19 Suppl.). At Mangere, eggs, 26 June–12 Dec. (n=134 clutches). In 1943, no laying recorded between 4 July and 10 Aug., but rate increased steadily thereafter, peaking in late Sept., then declining slowly, with a series of diminished peaks 3–4 weeks apart, before finishing on 12 Dec.; in 1944, laying peaked mid-Aug. (Bull 1946). SI: Eggs, Aug.–Jan. (Marples & Gurr 1943; Flux 1966; Kikkawa 1966; CSN 1, 5, 32), though one clutch, based on hatching date of nestlings, must have been laid in late May (McKenzie 1950). At St Arnaud, of 121 clutches: 36 (29.8%) in Sept., 45 (37.2%) in Oct., 33 (27.3%) in Nov. and seven (5.8%) in Dec. (Flux 1966). In Dunedin Botanic Gardens, of 88 clutches: 14 (15.9%) in Sept., 30 (34.1%) in Oct., 19 (21.6%) in Nov., 24 (27.3%) in Dec. and one (1.1%) in Jan. Nestlings, July and Sept.–Jan. (DNFC 1949; Kikkawa 1966; CSN 1, 5, 6). Unspecified breeding, including fledgelings, in June and Oct.–Feb. (Kikkawa 1966; CSN 1, 21, 32, 33). In Dunedin Botanic Gardens, breeding apparently affected by rainfall; in 1959, increased breeding activity associated with high rainfall, whereas nest-building delayed during drought (Kikkawa 1966, which see for details of laying by Song Thrushes and Common Blackbirds with respect to monthly rainfall).

Offshore islands LORD HOWE I.: Unspecified breeding Oct. and Dec.–Jan. (McKean & Hindwood 1965; Aust. Atlas 2). NORFOLK I.: Eggs, early Dec. (Schodde *et al.* 1983). Nestlings, 13 Sept.–21 Oct. (Hermes *et al.* 1986). Unspecified breeding, including fledgelings, in late spring and early Dec. to Jan. (Schodde *et al.* 1983; Aust. Atlas 2); 13 Sept.–21 Oct. (Hermes *et al.* 1986). KERMADEC IS: Eggs and nestlings, Nov. (Merton & Veitch 1986). Unspecified breeding, including fledgelings, Sept. and Dec. (Sorensen 1964; Merton & Veitch 1986). SNARES IS: Eggs, 25 Oct.–9 Dec.; fledgelings, 2 Dec.–12 Feb. (Miskelly *et al.* 2001).

Site Usually in horizontal or vertical fork in outer branch or centre of tree, shrub or hedge (McEvey 1955; Kikkawa 1966; Schodde *et al.* 1983; Heather & Robertson 2000; Oliver; Vic. Atlas; CSN 24; NRS); and exotic plants said to be favoured (Vic. Atlas; NRS); sometimes in crown of fern (Sibson 1947; CSN 24), or in vines and creepers (CSN 5, 19, 39); seldom on ground (Flux 1966). Also recorded on a palm frond (Oliver), on branch fallen against tree-trunk, and on stump (NRS). Placed at any height in nest-plant, from top to among lower branches (Kikkawa 1966; NRS). Said that often conspicuous (Falla *et al.* 1981), but usually well concealed by foliage from above (Flux 1966; Vic. Atlas; NRS). Very occasionally use artificial structures: one was on beam beneath bridge (CSN 19 Suppl.). **Aust.** Of 43 records of nest-plant in NRS: six (14.0%) in Apple *Malus sylvestris*, five (11.6%) in *Melaleuca*, four in tea-trees (9.3%), three (7.0%) in acacias, three (7.0%) in *Camellia*, three (7.0%) in *Cotoneaster*, two (4.7%) in *Callistemon*, two (4.7%) in *Coprosma*, two (4.7%) in *Hibiscus*, two (4.7%) in *Magnolia*, two (4.7%) in *Viburnum*, and one (2.3%) in Lilly Pilly, one (2.3%) in Norfolk Island Pine, one (2.3%) in *Euonymus*, one (2.3%) in Azores Jasmine *Jasminum azoricum*, one (2.3%) in Pink Heart *Medicosma cunninghamii*, one (2.3%) in Red-leaf Photinia *Photinia glabra*, one (2.3%) in *Pomaderris*, one (2.3%) in *Prunus* and one (2.3%) in *Ulex*. Also recorded nesting in Lemon tree *Citrus limon* (McEvey 1955). **NZ** Placed in various native and introduced plants; said to favour Mahoe *Melicytus ramiflorus* as nest-plant (Kikkawa 1960). At St Arnaud, of 152 nests: 98 (64.5%) in Matagouri, 24 (15.8%) in *Coprosma*, 17 (11.2%) in beech *Nothofagus*, five (3.3%) in Manuka *Leptospermum scoparium*, one (0.7%) in Broadleaf *Griselinia littoralis*, and seven (4.6%) in other plants. In Dunedin Botanic Gardens, significantly more nests in *Melicytus* than in other species, such as Kanuka *Kunzea ericoides* or Mapou *Myrsine australis*. In Nelson, SI, of 16 nests: three (18.8%) in Round-leaved Coprosma *Coprosma rotundifolia*, three (18.8%) in Rohutu *Lophomyrtus obcordata*, three (18.8%) in Horopito *Pseudowintera colorata*, two (12.5%) in Rohuto *Neomyrtus pedunculata*, and one (6.2%) in *Coprosma*, one (6.2%) in Weeping Mapou *Myrsine divaricata*, one (6.2%) in Silver Beech *Nothofagus menziesii*, one (6.2%) in Horopito with entangled *Rubus* growing through and one (6.2%) in Horopito with lignum growing through (Kikkawa 1966). On Stewart I., of six nests, three in Broadleaf, one in *Neomyrtus*, one in *Coprosma* and one in *Rubus* (Kikkawa 1960). In Fiordland, SI, of eight nests, three in Weeping Mapou, two in Rohuto, one in Broadleaf, one in Kaikomako *Pennantia corymbosa* and one in Mountain Toatoa *Phyllocladus alpinus* (Kikkawa 1966). At Tauranga, NI, many in shelter belts round orchards, especially in banksias (CSN 36). Additional nest-plants recorded in literature include broom, casuarinas, *Escallonia*, Gorse *Ulex europaeus*, Monterey Cypress *Cupressus macrocarpa*, Matipo *Myrsine chathamica*, Mountain Beech *Nothofagus solandri*, oak *Quercus*, daisy-bush *Olearia* and *Photinia* (Cunningham 1941–42; Pennycook 1949; McKenzie 1950; Challies 1966; CSN 1, 19 Suppl., 24, 34). Occasionally nest in palms, such as Nikau Palm *Rhopalostylis sapida* (Oliver), or ferns, such as Silver Fern *Cyathea dealbata* (Sibson 1947); or vines and creepers, including climbing roses *Rosa* (CSN 5, 19), jasmine *Jasminum* (CSN 19) and Kiwi Fruit *Actinidia chinensis* (CSN 39); one nest was in clump of *Astelia* on Kanuka (Sibson

1949). **Outlying islands** On Norfolk I., nests in Broad-leaved Meryta *Meryta latifolia*, staghorn fern *Platycerium* and garden plants (Hermes *et al.* 1986), and recorded nesting in a plantation of eucalypts, and a small unidentified evergreen shrub (Smithers & Disney 1969). FIDELITY TO SITE: Old nests or nest-sites sometimes re-used, either in successive seasons or for subsequent attempts within a season (Anon. 1906; Heather & Robertson 2000; NRS). At Mangere, some nests used twice in one season despite failure of first attempt. At St Arnaud, three nests built on top of nests used in previous year; only one nest was used twice in a single season. One pair used same nest for three successive clutches (CSN 24). ASSOCIATIONS: Once, nest was found entwined with nest of Common Blackbird, forming a 'combination' nest (Pycroft 1931); and another 0.9 m from nest of Blackbird (NRS). Another nest was located 2.3 m from that of Golden Whistler *Pachycephala pectoralis* (NRS). MEASUREMENTS (m): *AUST.*: Height of nest, 2.3 (0.93; 0.9–5.0; 59) (NRS). *NZ*: Usually nest close to ground (Falla *et al.* 1981; Oliver). Height of nest, 2.2 (n=155), including three nests (1.9%) on ground (Flux 1966, which see for details of mean height in each plant species); 1.0–5.0 (Heather & Robertson 2000). In Dunedin Botanic Gardens, 0.9–8.4, but most 1.5–6.1; 15.5% of nests were below 50% of height of nest-plant (estimated from graph; see Kikkawa 1966). Elsewhere, 0.76 (Cunningham 1941–42); and 5.5 (McKenzie 1950). In Dunedin Botanic Gardens, favoured nest-trees 4.7–6.1 m tall, and shrubs ≥3.0 m. Combined data for Song Thrush and Common Blackbird given in Powlesland (1983). *NORFOLK I.*: One nest 0.46 m, another 6.1 m (Smithers & Disney 1969).

Nest, Materials Tightly woven cup-shaped nest, usually made of grass, twigs, dead leaves, roots or moss, and occasionally lichen, wool, bark or bracken; very occasionally, external walls covered with moss; lined with mud or rotten wood pulp, or both, and once lined with grass stems (Sibson 1947; McEvey 1955; Fitzgerald 1966; Flux 1966; Kikkawa 1966; Heather & Robertson 2000; Oliver; CSN 19, 19 Suppl.; NRS). Saliva is mixed with wood pulp to form 'plaster' (Sibson 1947; Falla *et al.* 1981; Heather & Robertson 2000; Oliver). Claimed that wood pulp and saliva, which may contain some grass, often mistaken for mud, and that mud seldom used (Oliver). Elsewhere, claimed that pulp used if mud unavailable (Falla *et al.* 1981). One nest said to have been lined with mud and horse manure (McEvey 1955); another with rotting wood and newspaper (Cunningham 1941–42); and a third with cigarette filters (CSN 31). Some nests unlined (Bull 1946; CSN 39). At St Arnaud, of 136 nests: 128 (94.1%) contained grass, 61 (44.9%) lichen *Usnea*, 39 (28.7%) twigs, 35 (25.7%) moss, 30 (22.1%) wool, seven (5.1%) roots, three (2.2%) bracken and one (0.7%) contained bark. In NRS, three nests contained string, and single nests incorporated clover *Trifolium*, plastic, cotton and cigarette filters. One pair used sprigs of Lavender Cotton *Santolina pinnata* in outer structure (Coleman 1950). At one nest, fine roots visible on rim of cup, and in some cases spiralled over rim, binding nest-materials together (McEvey 1955). Nest-cup placed on foundation of loosely tangled grass and roots (McEvey 1955). BUILDING: Built by female (Heather & Robertson 2000); once reported that both birds built (NRS). At one nest, material collected 5.5 m from nest, and at another nest, material taken from old nest of Eurasian Tree Sparrow *Passer montanus* (NRS). Build in both morning and afternoon, and bird shapes nest with body (NRS). Built in 1–2 weeks (Heather & Robertson 2000), and at Mangere, built in 7–13 days (Bull 1946), but one completed in <3 days (NRS). Birds quickly replace nests that fail (Heather & Robertson 2000). Laying often delayed till up to 7 days after nest completed (Bull 1946; Heather & Robertson 2000). Eggs sometimes laid before lining dry (Bull 1946), but also claimed that lining remains moist throughout incubation (Oliver). One pair stopped building when heavy rain saturated nest; 5 days later, nest was pulled apart, and material taken into shed and used to build new nest, despite other material being available nearby (CSN 19). Old nests, including nests from earlier in season, are repaired or re-lined before being re-used (NRS). At Mangere, many nests built at end of laying period were badly built (Bull 1946). In Dunedin Botanic Gardens, pairs had a mean of 2.5 nests per season (Kikkawa 1966). MEASUREMENTS: *AUST.*: In one nest, overall depth including loose base of grass 15.2, external depth of solid cup 10.2, internal depth of solid cup 6.4, external diameter of solid cup 12.7–13.3, and internal diameter of solid cup 9.5–10.2; lined to within 1.9 cm of rim, and lining was 0.64 cm thick in bottom of cup (McEvey 1955). *NZ*: One nest had rim 12 mm wide (CSN 31).

Eggs Oval; bluish green, greenish blue or pale blue, with scattered small spots of black or dark purplish-brown, mostly at large end (McEvey 1955; Dow 1972; Heather & Robertson 2000; Oliver). MEASUREMENTS: None in Aust. *NZ*: 27.2 (24.0–30.5; 165) × 20.4 (18.6–22.3) (Flux 1966); 27.0 × 20.5 (Heather & Robertson 2000); 28.0 × 21.0 (Oliver). One abnormal egg found was no larger than that of a sparrow *Passer* (Bull 1946). One other clutch contained very small eggs that lacked yolks (CSN 5).

Clutch-size Usually 3–4, though 1–6 (Stead 1948; Falla *et al.* 1981; Heather & Robertson 2000; Oliver; CSN 1, 5, 24; NRS; see below). Extralimitally, usually 3–5, though 2–6 (BWP). AUST.: 3.8 (0.94; 23): C/1 × 1, C/2 × 1, C/3 × 3, C/4 × 14, C/5 × 4 (NRS). NZ: 3.9 (0.54; 2–6; 569) with no significant difference between NI and SI (Niethammer 1970). One nest contained 11 eggs, which apparently laid by one bird (CSN 1), probably resulting from additional eggs being laid in nest with infertile eggs. *NI*: 3.9 (0.49; 2–5; 148) (Niethammer 1970). At Mangere, 3.9 (0.51; 83): C/3 × 15, C/4 × 61, C/5 × 7; large clutches more common during peak laying period, but number declined as season progressed: in Sept. 4.1 (0.47; 3–5; 31 clutches); in Oct. 4.0 (0.45; 3–5; 26); in Nov. 3.7 (0.47; 3–4; 11); in Dec. (n=4), all C/3 (Bull 1946). At Gisborne in one season, one pair laid three successive clutches of four, three and two eggs in same nest (CSN 24). At Whangarei, one nest with C/4 was deserted, but later another three eggs laid in same nest, giving apparent clutch of seven (CSN 19). *SI*: 3.8 (0.58; 2–5; 141) (Niethammer 1970). At St Arnaud, 3.8 (0.62; 112): C/2 × 6, C/3 × 14, C/4 × 84, C/5 × 8; clutch-size decreased over season, from mean of 4.0 (0.44; 3–5; 32) in Sept. to 3.7 (0.52; 3–4; 6) in Dec. (Flux 1966, which see for monthly breakdown). In Dunedin Botanic Gardens, 3.6 (0.80; 88): C/1 × 1, C/2 × 7, C/3 × 25, C/4 × 48, C/5 × 7; clutch-size increased from 3.36 (n=14) in Sept. to 3.87 (n=30) in Oct., then decreased to 3.53 (n=19) in Nov. and 3.50 (n=24) in Dec., with single C/3 in Jan. (Kikkawa 1966, which see for monthly breakdown). SNARES IS: 3.7 (0.49; 7): C/3 × 2, C/4 × 5 (Miskelly *et al.* 2001).

Laying Usually lay on consecutive days (Marples & Gurr 1943; Bull 1946; Heather & Robertson 2000; CSN 4; NRS), but at one nest, fifth egg laid 2 days after fourth (NRS), and at another, fourth egg laid ≥4 days after third (Bull 1946). At Mangere, interval between clutch laid after failure of previous clutch varied from 7–24 days. At one nest, repairs began on one nest 12–16 days after previous brood fledged, and egg found in nest 3 days later. At another, two eggs were found 38–40 days after young probably fledged (NRS). In Aust., breed two or three times a season (Anon. 1906); in NZ, nest 2–5 times a season, and rear two or three broods (Heather & Robertson 2000; Oliver).

Incubation Usually by female (Heather & Robertson 2000; NRS). At one nest, male said to have relieved incubating female for short periods (NRS), but possibly refers to male standing in nest without settling on eggs, as described extralimitally (see BWP). Usually begins when clutch complete (Bull 1946; Heather & Robertson 2000; NRS), though in one nest, bird sat on nest all day after third of five eggs laid (NRS), and in another two nests, fourth egg hatched 2 days after rest, suggesting incubation began before clutches complete (Bull 1946). Clutches usually hatch over 1–2 days (CSN 6, 9; NRS). Time spent on nest increases as laying progresses. At one nest, bird sat at night after laying first and third eggs, but apparently not after second; on day fourth egg laid, attended nest irregularly, sitting for total 7.5 h, and remained on nest overnight (Marples & Gurr 1943). Incubation consisted of alternating periods of feeding and sitting; first left nest at 04:45 (04:23–05:08; 9) and last arrived at nest 18:25 (17:45–19:00; 8) (Marples & Gurr 1943). At one nest, male often fed female on nest during incubation (NRS). One bird incubated with 2.5 cm of snow on back (Flux 1966). Infertile eggs remain in nest after others hatch (Coleman 1937; NRS). INCUBATION PERIOD: *AUST.*: From completion of clutch to hatching, 13.3 days (0.76; 12–14; 7); from laying to hatching, 15.3 days (0.82; 14–16; 6) (NRS). *NZ*: 12–13 days (n=6) (Bull 1946); 12–13 days (Heather & Robertson 2000); 13–14 days (Falla *et al.* 1981). Extralimitally, 13.4 (BWP).

Young Nidicolous. Hatch blind. Pin-feathers appear and eyes begin to open at 5–6 days; eyes open and pins established by 6–8 days; and well feathered by 13 days (McKenzie 1950; NRS). In one nest, all three nestlings different sizes (NRS). PARENTAL CARE: Both parents feed nestlings (Coleman 1937; Heather & Robertson 2000; NRS). At one nest, adults often fed two nestlings on a single visit, and sometimes both adults were at nest together, feeding young and attending to hygiene (Coleman 1937). Usually only female broods, but at one nest, both parents brooded nestlings at same time (NRS). Claimed that during cold weather, adults brood young almost constantly, so that nestlings receive less food and develop more slowly than usual (McKenzie 1950). Adults eat faecal sacs, either by taking them directly from cloaca of nestlings, or after waiting for them to be voided into nest. In >100 observations at three nests in one season, all faecal sacs were collected directly from cloaca and eaten (Coleman 1937). Dead nestlings are apparently always removed (Coleman 1937). Twice, a male Common Blackbird fed nestling Thrushes (CSN 19).

Fledging to independence FLEDGING PERIOD: *AUST.*: From hatching to day first recorded out of nest, including young disturbed from nest by observer: 13.9 days (1.13; 12–15; 8) (NRS). *NZ*: 12–13 days (Heather & Robertson 2000); 13–14 days (Falla *et al.* 1981); 13–15 days (Bull 1946). Extralimitally, 13.2 days (BWP). At one nest, brood prematurely fledged when nest examined, but returned to nest later that day (McKenzie 1950). At another, young left nest when startled by wattlebirds *Anthochaera* (NRS). Recently fledged young capable of weak flight (CSN 1). Both parents feed fledgelings, at least occasionally, for several weeks (Heather & Robertson 2000; NRS).

Success AUST.: For 12 nests where clutch-size, number hatched and fledging known: of 44 eggs, 22 (50.0%) hatched, and eight (18.2%) fledged, equal to 0.67 fledgelings per nest; of these 12 nests, two (16.7%) fledged at least one young, and had mean clutch-size of 4.00, and mean number of young fledged, 4.00. At another nest, C/4 all hatched, and unknown number of young fledged. For three nests where clutch-size and number hatched known, but fledging outcome unknown: of 13 eggs, all hatched; of 36 nests where only outcome known, ten (27.8%) successfully fledged at least one young, and 26 (72.2%) failed (NRS). NZ: At Mangere, in 1943, of c. 474 eggs, 172 (36.3%) hatched and 105 (22.2%) fledged; in 1944, of 81 eggs, 45% fledged. At St Arnaud, of 319 eggs, 45 (14.1%) hatched and 21 (6.6%) fledged (Flux 1966, which see for other measures of success). In Dunedin Botanic Gardens, of 133 nests, 52 (39.1%) were successful, fledging 153 young, equal to 1.15 fledgelings per nest; and 81 (60.9%) failed. There was a slight but insignificant tendency for nests with low height-ratios (<50% of height of nest-plant) to have higher success. At Whangarei, NI, five of 18 nests (27.8%) observed over two seasons were successful (CSN 20). In Nelson, SI, of ten active nests, two (20.0%) were successful and eight (80.0%) failed (Kikkawa 1966). CAUSES OF FAILURE: Predation and desertion of nests are the major causes of failure in HANZAB region (Bull 1946; Flux 1966; NRS). Most nests fail when eggs deserted; nestlings seldom deserted. Nests often fail due to predation of eggs or young by mice, rats, or Common Brushtail Possum (Coleman 1950; Kikkawa 1966; Brown *et al.* 1993; CSN 4), Long-tailed Cuckoo (Fulton 1904; Dow 1972), and possibly Southern Boobook and Common Myna (McKenzie 1950); one clutch disappeared after Common Blackbird was seen at nest (NRS). At Dunedin, predation accounted for about half of all nest losses (Kikkawa 1966). Also deserted, dislodged or destroyed by adverse weather (McKenzie 1950; NRS), e.g. in s. Canterbury, many young, including nestlings, killed in severe snowstorm (Bull & Dawson 1969). Some nests dislodged by children (McKenzie 1950). Eggs or nestlings disappeared from several nests; occasionally nestlings found dead in nest (NRS). At Mangere, in 1943, 30.6% of 134 nests failed due to predation by rats; parents were injured at two other nests, and two more may have been destroyed by Common Starlings; in previous season, Starling seen smashing Thrush eggs. A further 18.7% of nests failed due to desertion (including three in which nestlings deserted), attributed to interference by observer, injury to parents or change in surroundings caused by stock; eggs occasionally deserted before incubation, mostly towards end of breeding season. Another eight nests (6.0%) were destroyed by wind; six (4.5%) by hedge-trimming; three (2.2%) disappeared completely, probably taken by children; and cause of failure of 18 (13.4%) unknown. Of 191 eggs, 18 (9.4%) that survived long enough to hatch were infertile (Bull 1946). At St Arnaud, of 96 failed nests, eggs deserted in 49 (51.0%), of which eight probably due to snow, and three due to spikes of Matagouri penetrating lining of nest; eggs broken in 21 (21.9%), possibly by Common Brushtail Possums; adult killed at nest in 11 (11.5%), probably by Stoats *Mustela erminea*, and one seen dragging whole nest with one egg into its den; six (6.3%) nests were upturned, possibly by Common Brushtail Possums; eggs or nestlings disappeared from five (5.2%); and nestlings dead in four (4.2%); none resulted from human interference. In Dunedin Botanic Gardens, of 81 unsuccessful nests: 48 (59.2%) failed due to predation of eggs, 21 (25.9%) desertion of eggs, eight (9.9%) predation of nestlings (probably by Common Starlings and Cats), two (2.5%) desertion of nestlings and two (2.5%) from other factors, including one case in which nest collapsed under weight of nestlings. Desertion more frequent late in breeding season, probably caused by drought and human disturbance, and reduction of clutches or broods in successful nests apparently caused by adverse weather. At Whangarei, NI, of 13 failed nests: nestlings disappeared from five (38.5%); eggs taken from three (23.1%); eggs pecked in two (15.4%); nestlings found dead in two (15.4%); and one (7.7%) was deserted following reduction of clutch; in three nests, eggs or young possibly taken by Possums (CSN 20). CUCKOOS: Parasitized by Shining Bronze-Cuckoo and Long-tailed Cuckoo (Smith 1931; Stead 1936).

PLUMAGES Prepared by J.S. Matthew. Following summarized from BWP. Not known if nestling naked at hatching; develop down at unknown age. Fledge in juvenile plumage. Shortly after fledging, undergo partial post-juvenile (first pre-basic) moult to adult-like first immature (first basic) plumage. Acquire adult plumage in complete first immature post-breeding (second pre-basic) moult, probably when c. 1 year old. Thereafter, a complete post-breeding (pre-basic) moult produces successive adult plumages with no change in appearance. Sexes alike. Four subspecies generally recognized; populations in HANZAB region probably subspecies *clarkei* from England (DAB). For detailed descriptions of Plumages and Bare Parts of *clarkei*, see BWP, and for general summary, see Field Identification.

MOULTS Following based on Jenni & Winkler (1994) and BWP, examination of skins of 15 adults and one juvenile (MV, NMNZ), and other information as cited. **Adult post-breeding** (Third and subsequent pre-basic). Complete; primaries outward. In Britain, starts at p1, from late June to mid-Aug., and finishes mid-Aug. to mid-Oct.; individual duration of moult of primaries *c.* 50 days (BWP). In Europe, suspended moult of primaries known to occur, and possibly related to second breeding attempts within season (Jenni & Winkler 1994). From Aust. skins, active conventional moult of primaries recorded from one bird (PMS 41), but date of collection not given; four of six collected June–July have all primaries new, the other two all primaries slightly worn; one in Aug. has all primaries slightly worn and two collected Oct.–Nov. have all primaries worn. From NZ skins: one in Apr. with all primaries new; all four from June–July with all primaries slightly worn; and two in Aug. with all primaries worn. Niethammer (1971) recorded advanced moult in NZ birds on 31 Jan., with inner 3–5 primaries new. No information on moult of body or tail. These limited data suggest moult in HANZAB region occurs in summer and possibly finishes in early to mid-autumn. **Post-juvenile** (First pre-basic). Almost no information from HANZAB region. In n. hemisphere, partial, involving all feathers of head and body, all marginal coverts, all or most median wing-coverts, varying number of inner greater secondary coverts of upperwing, and sometimes one or more feathers of tertials or one or more feathers of alula; rarely, replace a few rectrices (Jenni & Winkler 1994; BWP). Starts shortly after fledging; in n. hemisphere, finishes July–Oct. (BWP) with extent of moult decreasing as autumn migratory season proceeds (Jenni & Winkler 1994). One juvenile from Aust. in early Feb. had not yet started post-juvenile moult. **First immature post-breeding** (Second pre-basic). No information. Timing and extent probably much as adult post-breeding.

MEASUREMENTS SUBSPECIES *CLARKEI*: (1–2) Vic., skins (MV): (1) Adults; (2) Juveniles. (3) NZ, adults, skins (NMNZ). (4) NZ, adults, skins (Niethammer 1971). (5–6) S. England, skins (BWP): (5) Adults; (6) First immatures. (7) Orongorongo Valley, NI, NZ, live adults (Robertson *et al.* 1983).

		MALES	FEMALES	
WING	(1)	116.4 (2.19; 113–119; 5)	114.5 (2.08; 112–117; 4)	ns
	(2)	113	–	
	(3)	115.0 (3.54; 111–120; 9)	–	
	(4)	115.9 (3.36; 110.5–121; 11)	112.8 (1.60; 111–116; 12)	**
	(5)	115.7 (1.34; 114–118; 10)	114.1 (2.73; 111–119; 10)	ns
	(6)	114.0 (2.26; 111–118; 10)	112.6 (2.37; 109–116; 10)	ns
	(7)	114.1 (2.75; 109–119; 34)	–	
TAIL	(1)	85.6 (1.52; 84–88; 5)	80.5 (3.42; 77–85; 4)	*
	(2)	82	–	
	(3)	80.2 (3.19; 75–85; 9)	–	
	(4)	82.0 (4.19; 74–90; 11)	80.5 (2.33; 78–84; 11)	ns
	(5)	85.2 (3.26; 78–89; 10)	83.5 (2.55; 81–87; 10)	ns
BILL S	(1)	22.3 (0.44; 21.6–22.7; 5)	21.6 (1.02; 20.1–22.3; 4)	ns
	(2)	20.6	–	
	(3)	22.1 (1.04; 19.8–23.5; 9)	–	
TARSUS	(1)	30.7 (1.20; 29.4–31.5; 5)	30.8 (1.56; 28.9–32.4; 4)	ns
	(2)	28.3	–	
	(3)	31.0 (0.78; 30.1–32.1; 9)	–	
	(5)	32.1 (0.86; 31–33; 10)	32.3 (1.16; 31–34; 10)	ns

SUBSPECIES *CLARKEI*: (6) Kermadec Is, live, ages not given (Merton & Veitch 1986).

		UNSEXED
WING	(6)	111.3 (3.4; 104–119; 12)
TAIL	(6)	81.0 (5.0; 72–89; 11)
BILL F	(6)	18.6 (0.8; 17.0–20.0; 11)
TARSUS	(6)	32.2 (1.4; 30.2–35.0; 12)

SUBSPECIES *CLARKEI*: Vic., live unsexed: Wing (118–125; 3); THL 47.2, 49.2 (Rogers *et al.* 1986).

WEIGHTS SUBSPECIES *CLARKEI*: (1) Vic., adults, from museum labels (MV). (2) NZ, adults, from museum labels (NMNZ). (3) NZ, adults (Niethammer 1971). (4) Orongorongo Valley, NI, NZ, live adults (Robertson *et al.* 1983).

	MALES	FEMALES
(1)	62	60, 65
(2)	68.8 (9.02; 59.6–83; 9)	–
(3)	72.2 (63–78; 15)	60, 65, 70
(4)	68.2 (5.05; 58–85; 109)	–

SUBSPECIES *CLARKEI*: Vic., live unsexed: 62.1, 63.0 (Rogers *et al.* 1986). England, unsexed: Jan.–Feb., 84.8 (69–101; 26); Mar.–Apr., 77.8 (68–96; 52); May–June, 74.0 (65–83; 46); Sept.–Oct., 74.4 (61–94; 38); Nov.–Dec., 88.2 (75–107; 29) (BWP).

STRUCTURE See BWP.

AGEING Juvenile distinguished by plumage (BWP; see Field Identification). First immature very similar to adult and distinguishable, especially in autumn–winter, by retained juvenile plumage: (1) Usually show moult-contrast within greater secondary coverts of upperwing, with moult-step between inner 1–5 adult-like coverts (which replaced in post-juvenile moult) and rest of coverts which retained juvenile; retained juvenile coverts have pale rosethorn-shaped tips and shaft-streaks while new adult-like coverts are fresher, with more uniformly shaped tips and lack pale shaft-streaks. However, outer 3–4 juvenile coverts not as obviously different in pattern from adult coverts. (2) Most, if not all, birds retain all juvenile rectrices, which narrower and more pointed at tips than those of adult (Svensson 1992; Jenni & Winkler 1994).

SEXING Sexes alike in plumage and probably in size, though adult males tend to be slightly larger than adult females. Birds with obvious brood-patches are female (Svensson 1992).

GEOGRAPHICAL VARIATION Three or four subspecies recognized in n. hemisphere; nominate *philomelos* breeding in most of Europe, except W; *clarkei* breeding in most of Britain, Ireland and central-w. Europe; *hebridensis* from Outer Hebrides and Isle of Skye; and possibly *nataliae* breeding in central Siberia, though latter subspecies not considered valid by some authors; *clarkei* and nominate *philomelos* thought to intergrade across a narrow zone from w. Germany, se. Netherlands, e. Belgium and ne. and central France (BWP). See Meinertzhagen (1947), McGowen *et al.* (2004) and BWP for plumage differences between subspecies. Populations introduced to HANZAB region thought to be subspecies *clarkei* (Niethammer 1971; DAB), but some Aust. birds may be derived from nominate or possibly intergradients between nominate and *clarkei* (see DAB for discussion).

REFERENCES

Abernethy, F. 1956. *Notornis* 7: 62.
Abraham, H.C. 1951. *Notornis* 4: 69.

Anderson, S. 1947. *NZ Bird Notes* 2: 80.
Anderson, S.H., & J. Ogden. 2003. *Notornis* 50: 201–9.
Andrew, I.G. 1967. *Notornis* 14: 167–81.
Anon. 1906. *Emu* 5: 110–19.
—— 1940. *Wild Life* 2(7): 37.
—— 1948. *NZ Bird Notes* 2: 181–4.
Bailey, A.M., & J.H. Sorensen. 1962. *Proc. Denver Mus. Nat. Hist.* 10.
Balmford, R. 1978. *Aust. Bird Watcher* 7: 237–48.
Barlow, M. 1983. *Notornis* 30: 232.
Barrett, C.L. 1926. *Victorian Nat.* 43: 190–1.
Beauchamp, A.J., & G.R. Parrish. 1999. *Notornis* 46: 470–83.
Bell, B.D. 1975. Pp 136–42 **In**: Yaldwin 1975.
Bell, R., & L. Singleton. 1974. *Notornis* 21: 268–9.
BFNC (Bendigo Field Nats Club). 1976. *Aust. Bird Watcher* 6: 186–208.
Blackburn, A. 1967. *Notornis* 14: 3–8.
Boyce, F.H. 1972. *Notornis* 19: 188.
Bridley, A. (Ed.) 1991. *Birds of the Bendigo District*. Bendigo Field Nats Club, Bendigo, Vic.
Brown, K., *et al.* 1993. *Notornis* 40: 169–77.
Bull, P.C. 1946. *Emu* 46: 198–208.
——, & D.G. Dawson. 1969. *Notornis* 16: 172–9.
Campbell, A.G. 1905. *Emu* 5: 68–72.
Challies, C.N. 1962. *Notornis* 10: 118–27.
—— 1966. *Notornis* 13: 18–26.
Cheney, G.M. 1915. *Emu* 14: 199–213.
Child, P. 1975. *Notornis* 22: 143–50.
Chisholm, A.H. 1919. *Emu* 19: 60–2.
—— 1965. *Emu* 65: 57–64.
Chisholm, E.C. 1926. *Emu* 25: 276–9.
Clement, P., & R. Hathway. 2000. *Thrushes*. Christopher Helm, London.
Coleman, E. 1937. *Emu* 37: 68–9.
—— 1950. *Victorian Nat.* 66: 217.
Cooper, R.P. 1938. *Emu* 37: 260–1.
—— 1974. *Aust. Bird Watcher* 5: 205–33.
Counsilman, J.J. 1974. *Notornis* 21: 318–33.
Cunningham, D.M., & P.J. Moors. 1985. *Notornis* 32: 221–43.
—— 1941–42. *Bull. Orn. Soc. NZ* 1: 64–5.
—— 1952. *Notornis* 5: 20–3.
——, & K.A. Wodzicki. 1948. *Emu* 47: 177–98.
D'Ombrain, A.F. 1936. *Emu* 36: 16–20.
Dawson, D.G. 1964. *Notornis* 11: 127–9.
——, & P.C. Bull. 1970. *NZ J. Agric. Res.* 13: 362–71.
——, *et al.* 1978. *Notornis* 25: 257–78.
Dawson, E., & I.D.R. Cresswell. 1949. *NZ Bird Notes* 3: 141–6.
Day, T.D. 1995. *Notornis* 42: 175–86.
de Schauensee, R.M. 1984. *The Birds of China*. OUP, Oxford.
DNFC (Dunedin Nat. Field Club). 1948. *NZ Bird Notes* 3: 12.
—— 1949. *NZ Bird Notes* 3: 85–7.
—— 1952. *Notornis* 4: 32–3.
Dove, H.S. 1936. *Emu* 35: 299–300.
Dow, D.D. 1972. *Emu* 72: 179–80.
Dowling, B., *et al.* 1994. *Tech. Rep. Ser. Arthur Rylah Inst. Env. Res.* 134.
Eades, D.W. 1997. *Wingspan* 7(4): 33.
East, R. 1967. Unpubl. BSc(Hons) thesis, Canterbury Univ., Christchurch.
Edgar, A.T., *et al.* 1965. *Notornis* 12: 3–43.
Falla, R.A., *et al.* 1981. *The New Guide to the Birds of New Zealand*. Revised edn. Collins, London.
Fitzgerald, B.M., *et al.* 1989. *Notornis* 36: 311–21.
Fitzgerald, M.E. 1966. *Notornis* 13: 222.
Fleming, A.M. 1976. *Aust. Bird Watcher* 6: 151–60.
Flint, V.E., *et al.* 1984. *A Field Guide to Birds of the USSR*. Princeton Univ. Press, Princeton, NJ.
Flux, J.E.C. 1966. *Notornis* 13: 142–9.
Freeman, A.N.D. 1994. *Notornis* 41 (Suppl.): 127–41.
French, K. 1990. *Emu* 90: 185–9.
Fullagar, P.J., *et al.* 1974. Pp 55–72 **In**: Recher & Clarke 1974.
Fulton, R. 1904. *Trans. NZ Inst.* 36: 113–48.
Gaze, P.D. 1983. *Notornis* 30: 216.
Gibb, J.A. 1961. *Proc. NZ Ecol. Soc.* 8: 129–38.
—— 1996. *Notornis* 43: 7–13.
—— 2000a. *Notornis* 47: 13–35.
—— 2000b. *Notornis* 47: 184–91.
Gill, B.J. 1977. *Notornis* 24: 75–81.
—— 1989. *Notornis* 36: 81–7.
Goodwin, D. 1967. *Emu* 66: 237–51.
Green, C. 1972. *Emu* 72: 185–6.
Green, R.H. 1989. *Birds of Tasmania*. Potoroo Publs, Launceston, Tas.
Gregory-Smith, R. 1983. *Canberra Bird Notes* 8(3): 70–89.
Griffioen, P.A., & M.F. Clarke. 2002. *Emu* 102: 99–125.
Grimmett, R., *et al.* 1999. *A Guide to the Birds of India, Pakistan, Nepal, Bangladesh, Bhutan, Sri Lanka and the Maldives*. Princeton Univ. Press, Princeton, NJ.
Guest, R., & G. Guest. 1987. *Notornis* 34: 59–64.
——, —— 1993. *Notornis* 40: 137–41.
Hall-Jones, J. 1966. *Notornis* 13: 90–3.
Hanks, E.S. 1958. *Emu* 58: 52–3.
Hardy, A.D. 1928. *Emu* 27: 300–1.
Heathcote, J. 1999. *Bird Obs.* 796: 14.
Heather, B.D., & H.A. Robertson. 2000. *The Field Guide to the Birds of New Zealand*. Viking, Auckland.
Hermes, N. 1982. *Canberra Bird Notes* 7(4): 87–90.
—— 1985. *Birds of Norfolk Island*. Wonderland Publs, Norfolk Island.
——, *et al.* 1986. *Notornis* 33: 141–9.
Hindwood, K.A. 1940. *Emu* 40: 1–86.
Hobbs, J.N. 1971. *Emu* 71: 84–5.
Hodgkins, M. 1949. *NZ Bird Notes* 3: 116–25.
Hutton, I. 1991. *Birds of Lord Howe Island. Past and Present*. Author, Coffs Harbour, NSW.
Iredale, T. 1910. *Emu* 10: 2–16.
Jenkins, C.F.H. 1977. *The Noah's Ark Syndrome*. Zool. Gardens Board West. Aust., Perth.
Jenkins, J.A.F. 1967. *Notornis* 14: 153.
Jenni, L., & R. Winkler. 1994. *Moult and Ageing of European Passerines*. Academic Press, London.
Kikkawa, J. 1960. *Rec. Dom. Mus. Wellington* 3: 307–20.
—— 1966. *Trans. R. Soc. NZ* 7: 215–77.
Kinsky, F.C. 1957. *Notornis* 7: 123–35.
—— 1970. *Notornis* 17: 77.
Kirk, A.A., & K.A. Wodzicki. 1943. *NZ Bird Notes* 1(2): 3–8.
Kloot, T., & E.M. McCulloch. 1980. *Birds of Australian Gardens*. Rigby, Adelaide.
Lamm, D.W., & D. White. 1950. *Emu* 49: 199–204.
Lee, R.D. 1964. *Victorian Nat.* 80: 369.
Leishman, A.J. 1997. *Aust. Birds* 31: 1–11.
Lindsay, C.J., *et al.* 1959. *Notornis* 8: 99–106.
Long, J.L. 1981. *Introduced Birds of the World*. Reed, Sydney.
Loyn, R.H. 1985. *Emu* 85: 213–30.
Marples, B.J., & L. Gurr. 1943. *Emu* 43: 67–71.
Marshall, A.J. 1950. *Emu* 50: 5–16.
Mason, P. 1985. *Corella* 9: 14–21.
McAllan, I.A.W., *et al.* 2004. *Aust. Field Orn.* 21 (Suppl.).
McEvey, A. 1955. *Emu* 55: 135–47.
—— 1956. *Emu* 56: 196–8.
McGowen, R., *et al.* 2004. *Birding World* 17: 71–5.
McKean, J.L., & K.A. Hindwood. 1965. *Emu* 64: 79–97.
McKenzie, H.R. 1950. *Notornis* 3: 239–40.
—— 1979. *Notornis* 26: 105–19.
Meinertzhagen, R. 1947. *Bull. Br. Orn. Club* 68: 18–33.
Merilees, W. 1971a. *Notornis* 18: 55–7.
—— 1971b. *Notornis* 18: 87–90.
Merton, D.V. 1968. *Notornis* 15: 3–22.
—— 1970. *Notornis* 17: 147–99.
——, & C.R. Veitch. 1986. *Notornis* 33: 209–18.
Middleton, A.L.A. 1969. *Emu* 69: 44–6.
Miskelly, C.M. 1984. *Notornis* 31: 209–23.
——, *et al.* 2001. *Notornis* 48: 1–40.
Moncrieff, P. 1928. *Emu* 28: 100–10.
—— 1929. *Emu* 28: 215–25.
—— 1932. *Emu* 32: 52–8.
Morrison, K. 1979. *Notornis* 26: 317.
Niethammer, G. 1970. *Notornis* 17: 214–22.
—— 1971. *J. Orn., Lpz.* 112: 202–26.
Nilsson, R.J., *et al.* 1994. *Notornis* 41 (Suppl.): 109–25.
Norton, S.A. 1982. *Notornis* 29: 91–2.
Nye, P.A. 1971. *Notornis* 18: 211–14.
—— 1975. *Notornis* 22: 248–9.
Ogilvie-Grant, W. 1905. *Ibis* (8)5: 543–602.
Onley, D.J. 1980. *Notornis* 27: 335–62.
—— 1983. *Notornis* 30: 187–97.
Owen, K.L., & M.G. Sell. 1985. *Notornis* 32: 271–309.

Penniket, A., *et al.* 1986. *Preliminary Reports of Expeditions to the Auckland Islands Nature Reserve 1973–1984*. Dept Lands Surv., Wellington.
Penniket, J.G. 1955. *Notornis* 6: 171–5.
Pennycook, C. 1949. *Notornis* 3: 135–6.
Pescott, T. 1983. *Birds of Geelong*. Neptune, Geelong, Vic.
——, & I. Savage. 1994. *Geelong Nat.* 31: 1–9.
Peter, J.M. 1993. *Aust. Bird Watcher* 15: 92–3.
Petyt, C. 1995. *Notornis* 42: 99–115.
Phillips, W.J. 1948. *NZ Bird Notes* 3: 17.
Pierce, R.J. 1980. *Notornis* 27: 21–44.
Pizzey, G. 1980. *A Field Guide to the Birds of Australia*. Collins, Sydney.
—— 1988. *A Garden of Birds*. Viking O'Neil, Melbourne.
Porter, R.E.R., & D.G. Dawson. 1968. *Notornis* 15: 237.
Powlesland, R.G. 1983. *Notornis* 30: 265–82.
Preston, I. 1983. *Aust. Bird Watcher* 10: 132–35.
Pycroft, A.T. 1931. *Emu* 30: 168.
Recher, H.F., & S.S. Clark. (Eds) 1974. *Environmental Survey of Lord Howe Island*. Aust. Mus., Sydney.
Redhead, R.E. 1969. *Notornis* 16: 263–84.
Roberts, N.L. 1938. *Emu* 37: 186–96.
Robertson, H.A., *et al.* 1983. *NZ J. Zool.* 10: 87–98.
Robertson, H.R., *et al.* 1993. *Notornis* 40: 253–62.
Rogers, K.G., *et al.* 1986. *Banders Aid*. A. Rogers, St Andrews, Vic.
Rule, M. 1977. *Notornis* 24: 40.
Ryan, C.S. 1906. *Emu* 5: 110–19.
Ryder, H.R. 1948. *NZ Bird Notes* 3: 20–2.
Salter, B.E. 1957. *Emu* 57: 67–8.
Schodde, R., *et al.* 1983. *Spec. Publ. Aust. Natl Pks Wildl. Serv.* 8.
Secker, H.L. 1955. *Emu* 55: 104–7.
Sharland, M.S.R. 1929. *Emu* 29: 5–11.
Sibley, C.G., & B.L. Monroe, Jr. 1990. *Distribution and Taxonomy of Birds of the World*. Yale Univ. Press, New Haven, CT.
Sibson, R.B. 1947. *NZ Bird Notes* 2: 134–44.
—— 1949. *NZ Bird Notes* 3: 151–5.
—— 1953. *Notornis* 5: 110–14.
—— 1958. *Notornis* 7: 213–19.
Silsby, J. 1980. *Inland Birds of Saudi Arabia*. Immel Publs, London.
Skegg, P.D.G. 1964. *Notornis* 11: 159–76.
Smith, W.W. 1931. *Emu* 30: 217–18.
Smithers, C.N., & H.J. de S. Disney. 1969. *Aust. Zool.* 15: 127–40.
Sorensen, J.H. 1964. *Notornis* 11: 69–81.
Stead, E.F. 1936. *Trans. Proc. R. Soc. NZ* 66: 182–4.
—— 1948. *NZ Bird Notes* 3: 70–80.
Stenhouse, D. 1957. *Notornis* 7: 114.
Stidolph, R.H.D. 1977. *Notornis* 24: 196–7.
Stuart-Sutherland, R. 1922. *Emu* 22: 54–9.
Sutton, J. 1935. *S. Aust. Orn.* 13: 92–103.
Svensson, L. 1992. *Identification Guide to European Passerines*. Stockholm.
Tadgell, A.J. 1936. *Victorian Nat.* 53: 74–5.
Tarr, H.E. 1950. *Emu* 49: 189–98.
Taylor, M.J. 1975. *Notornis* 22: 350.
Taylor, R.H. 1971. *NZ J. Bot.* 9: 225–68.
Tennyson, A., *et al.* 2002. *Notornis* 49: 241–5.
Thomas, D.J., & A.M. Gilmore. 1976. *Aust. Wildl. Res.* 3: 189–208.
Thomas, R., & J. Wheeler. 1983. *Birds of the Ballarat Region*. Author (Thomas), Linton, Vic.
Thomson, G.M. 1922. *The Naturalisation of Animals and Plants in New Zealand*. Cambridge Univ. Press, Cambridge.
Tiley, I. 1951. *Notornis* 4: 149–50.
Turbott, E.G. 1947. *NZ Bird Notes* 2: 93–108.
Urban, E.K., *et al.* 1997. *The Birds of Africa*. 5. Academic Press, London.
Veitch, C.R., *et al.* 2004. *Notornis* 51: 61–90.
Ward, W.V. 1969. *Notornis* 16: 163–71.
Warham, J. 1967. *Notornis* 14: 122–39.
——, & B.D. Bell. 1979. *Notornis* 26: 121–69.
Weeks, M.F. 1949. *NZ Bird Notes* 3: 83–4.
West, J.A. 1988. *Notornis* 35: 159–61.
Williams, G.R. 1953. *Ibis* 95: 676–92.
—— 1960. *Notornis* 8: 185–8.
Williams, P.A., & B.J. Karl. 1996. *NZ J. Ecol.* 20: 127–45.
Wilson, A.H.R. 1928. *Emu* 28: 121–8.
Wilson, P.R. 1980. *NZ J. Ecol.* 3: 117–24.
——, *et al.* 1988. *Notornis* 35: 217–43.
Wilson, S. 1999. *Birds of the ACT. Two Centuries of Change*. Canberra Orn. Grp, Canberra.
Wodzicki, K.A. 1946. *Emu* 46: 3–43.
Wood, J. 1998. *Notornis* 45: 126–8.
Yaldwin, J.C. (Ed.) 1975. *Preliminary Results of the Auckland Islands Expedition 1972–1973*. Dept Lands Surv., Wellington.

Sponsors: Lady Southey AM, A Ozols; In memory of J Bowman

Volume 7 (Part B), Plate 53 [transposed plate caption corrected from original]

Common Blackbird *Turdus merula* (page 1844)
NOMINATE *MERULA:* **1** Adult male; **2** Adult female; **3** Juvenile; **4** Immature male (dark variant); **5** Immature male (pale variant); **6** Adult female

Island Thrush *Turdus poliocephalus* (page 1870)
SUBSPECIES *ERYTHROPLEURUS:* **7** Adult; **8** Juvenile; **9** Immature; **10** Adult
NOMINATE *POLIOCEPHALUS:* **11** Adult

Song Thrush *Turdus philomelos* (page 1877)
12 Adult; **13** Juvenile; **14** Immature; **15** Adult