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. Aviculr.* 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 merula **Common Blackbird**

Turdus Merula Linnaeus, 1758, *Syst. Nat.* 10(1): 170 — in Europae sylvis = Sweden.

Generic and specific names taken directly from the Latin substantives (*turdus*, a thrush; *merula*, the Blackbird).

OTHER ENGLISH NAMES Blackbird, or English or European Blackbird; Merle.

POLYTYPIC Nominate *merula* introduced and established in se. mainland Aust., from New England Tableland and riverlands of Murray–Darling Rs, NSW, S and W to Yorke and lower Eyre Pens and Kangaroo I., SA; islands of Bass Str. and Tas.; Lord Howe and Norfolk Is; and NZ, and Kermadec, Chatham, Snares, Auckland, Campbell Is, with accidentals to Antipodes and Macquarie Is. Extralimitally, nominate indigenous to n., w. and central Europe, including British Isles, wintering in w. and s. Europe. Extralimitally, *c.* 15 other subspecies from the Azores, Madeira and Canary Is, n. Africa and se. Europe through Asia Minor and sw. and central Asia to central and e. China, all India and Sri Lanka.

FIELD IDENTIFICATION Length *c.* 25 cm; wingspan 34–38.5 cm; weight 90 (70–130) g. Familiar medium-sized and rather rotund thrush, mainly of urban and other settled areas, with: small rounded head; medium-length and straight bill with rather blunt tip; short, broad wings with rounded tips; moderately long and square-tipped tail; and fairly long and sturdy legs with long claws. In flight, appear small-headed, with broad, rounded wings and fairly long tail with moderately rounded tip when spread. Similar in size and shape to Song Thrush *Turdus philomelos* but slightly larger, bulkier and more heavily built, with a proportionately larger and more robust bill and sturdier legs; slightly smaller and less heavily built than Bassian Thrush *Zoothera lunulata*, with less robust bill and legs. Sexes differ in adults and immatures, but difficult to distinguish in juvenile plumage. Adult male entirely black with conspicuous orange-yellow bill and orbital ring. Adult female, dark to black-brown above, and dark-brown strongly mottled or streaked darker below, and with diffuse pale supercilium, pale-streaked ear-coverts and pale-grey and dark-streaked throat. No seasonal variation (other than slight differences with wear). Juvenile similar to adult female but with rufous streaking above, and paler underparts spotted and barred blackish. Immatures like respective adult sexes, but with some retained juvenile plumage of wing and tail. GEOGRAPHICAL VARIATION: All populations in HANZAB region believed to be nominate *merula* (described below). Little variation in these populations, but females from Mt Lofty Ras, SA, said to be duskier than females from elsewhere; and males in Gippsland, Vic., said to have orange bill and orbital ring. **Adult male** Entirely black, with glossy sheen in fresh plumage; with wear, appears duller, mat black, and remiges become brown-toned, contrasting with rest of plumage. Plumage often patchily white, varying from small patches of white to piebald or occasionally entirely white. Bill and orbital ring, orange-yellow, and highly conspicuous. Iris, dark brown. Legs and feet, dark brown to black. **Adult female** Head, neck and upperbody, dark brown to brownish black, with: faint and diffuse brownish-grey to dull-grey fore-supercilium and sometimes lores, fine off-white streaks to ear-coverts, and brownish-grey to buff-grey chin and throat, evenly streaked brown to rufous-brown. Uppertail uniformly dark brown. Upperwing duskier than rest of upperparts, with olive tone to remiges. Breast, belly and flanks, brown to rufous-brown, strongly mottled and streaked dark brown to brownish black, and with slightly paler brown edges to feathers of belly, forming paler streaks. Vent and undertail-coverts, and undertail, dark brown. Underwing, dark brown with rufous edges to coverts. Bill, yellow-brown, though yellow-orange in some. Orbital ring, dull yellow-brown. Iris, dark brown. Legs and feet, dark brown to black. **Juvenile** Similar to adult female but more rufous overall; differs by: (1) fine rufous streaks to top of head, hindneck and scapulars, and scattered rufous streaks and tips on rest of upperbody; (2) buff central streaks and broad tips to upperwing-coverts (streaks reduced on outer greater secondary and greater primary coverts, tips to median and greater secondary coverts often aligning to form diffuse pale bars across tips of coverts on folded wing; (3) buff chin and throat, speckled brownish black; (4) paler, rufous-brown underparts, heavily spotted brownish black on breast, grading to finer brownish-black spots on belly and vent, and to

brownish-black notches or bars on flanks, and with dense brownish-black barring on undertail-coverts; (5) rectrices, particularly central feathers, narrower and more pointed at tips; and (6) bill and orbital ring, grey or brown (not yellow-brown). Sexes not reliably distinguished, but juvenile males tend to be darker overall, with blacker remiges and rectrices. **Immature male** Varies greatly, from very similar to adult male to like adult female. Typically blackish brown to black above, duller and less uniform than adult male and lacking glossy sheen, but generally darker than adult female; wings usually obviously paler than rest of upperparts; and underbody paler than upperparts, brown, dark brownish or rufous-brown, usually with fairly distinct dull-brown streaking or mottling, and, in some birds, pale chin and throat with darker streaking like adult female. Best distinguished by retained juvenile plumage of wing and tail, and bare parts. Usually retain juvenile primaries and secondaries and varying number of tertials, alula, greater secondary coverts (usually outer coverts) and rectrices, and show moult-contrast between worn brownish juvenile plumage and new blackish adult male-like feathers, most conspicuous on greater secondary coverts and, in those that replace some rectrices, in tail; retained outer greater coverts also show buff streaks and tips; retained juvenile rectrices narrower and more pointed at tips than replaced, adult-like, rectrices. Bill: at first, wholly dark brownish-horn to blackish brown; gradually develop some yellow by winter–spring, and like adult male by first summer; rest of bare parts as adult male. **Immature female** Very like adult female and difficult to distinguish reliably in field, but breast and belly tend to be more strongly rufous, and flanks, vent and undertail-coverts tend to be slightly greyer, and some have hint of rufous supercilium. Retain juvenile plumage as in immature male, but show much less contrast between worn juvenile plumage and new adult-like dark-brown plumage of wing, tail and upperbody. However, if present, retained pale tips and streaks to outer greater secondary coverts readily distinguishing immature female.

Similar species Adult male unmistakable, with wholly black plumage and conspicuous yellow bill and orbital ring, diagnostic. Blackbird should not be confused with **Common Starling** *Sturnus vulgaris*, which often also forages on ground; at all ages, Blackbird readily distinguished from Starling by size, shape and behaviour: (1) Blackbird much larger (c. 50% bulkier than Starling) with much rounder head and fuller, more rounded underbody (Starling much more lightly built with more slender head and body and flatter forehead and crown); (2) much longer and broader tail with rounded or squarish tip, c. 75% of head–body-length and extending well past tips of folded wings (Starling has short, narrow tail with pointed tip when tightly closed with slight cleft, <50% of head–body-length and only extending short distance beyond tips of folded wings); (3) robust and rather blunt-tipped bill (Starling has finer, conical and pointed bill); (4) long, sturdy and dark-brown legs and feet (Starling has much shorter red-brown legs and feet); and (5) Blackbirds usually occur singly, in pairs or small family groups, whereas Starling highly gregarious, and often in large flocks, even on ground. All plumages of Starling very different: adults in fresh plumage instantly distinguished by heavy pale spotting or flecking on upperparts and underparts, with strong greenish gloss to mantle, scapulars and upperwing-coverts, and purple sheen to upper breast, and, in worn plumage, strongly buff to rufous spotted, scaled and margined upperparts and white spotted underbody. Juvenile Starling much plainer and browner than adults, and more similar to Blackbird, but readily distinguished by size and shape as described above, and conspicuous pale margins to feathers of wing. Slight risk of confusion between juvenile Blackbirds and **Song Thrush**, though other ages of Blackbird should not be mistaken; see that text for details. Also slight risk of confusion between female Blackbird and **Rufous Bristlebird** *Dasyornis broadbenti*; see that account for details (*HANZAB* 6). For distinction from **Bassian Thrush**, see that account.

Often observed singly or in pairs or sometimes in small family parties; and, at least in n. hemisphere and NZ, occasionally roost or forage in congregations of hundreds. Typically confiding in urban areas or where in contact with people, though can be more shy and wary away from human habitation. On ground or perch, stance varies but often rather upright, with head held high and tail held rather horizontal or raised slightly, and regularly flicked up or cocked, especially after alighting; wings often droop down (in fashion of *Petroica* robin) with lower edge of wings below level of belly and exposing upperbody. Often stay within, or close to, dense cover, though also spend much time foraging in open areas, such as lawns, in urban areas or round human habitation. Mainly forage on ground, probing for invertebrates, especially earthworms; dig and scratch vigorously through leaf-litter and in soil with bill and feet. Also forage in trees and shrubs for fruit, commonly in orchards and gardens. Alert and active on ground; move with rapid runs or hops in stop-start fashion while foraging. Flights tend to be short, rapid and low to the ground, often into dense dark cover; fly with bursts of fast, wavering wing-beats, often accelerating rapidly, though can glide over open habitats; also capable of fast, direct sustained flight. In flight, note well-rounded tips to wings and to long trailing tail, which often partly fanned and closed. Very vocal; Song rich and mellow, often delivered from elevated perch, and also utter various high-pitched alarm calls, including a panicky chatter while flying away.

HABITAT Most common in modified habitats, usually with dense cover of shrubs, especially in gardens and parks where shrubs occur with lawns. Also occur in farmland, especially in NZ, and orchards throughout range in HANZAB region. Often inhabit shrubby natural habitats, such as shrublands, including heathland, woodland and forest, including temperate rainforest. Sometimes occur in tussock grasslands adjacent to wooded habitats (see below). Occasionally recorded on tidal flats in NZ, and occasionally in mangroves. Occur from coasts up to elevations of 1500 m asl (NZRD; CSN 41). Extralimitally, inhabit diverse range of habitats where open space interspersed with cover of shrubs or trees (BWP).

Aust. Mostly inhabit modified habitats, especially parks and gardens in towns, suburbs and cities (e.g. Morgan 1914; McEvey 1965; Napier 1969; Paton 1976; Gibson 1977; Whatmough 1978; Harris 1980; Loyn 1985; Traill *et al.* 1996; Fulton 2002; Vic. Atlas), especially in older, well-established gardens, usually with combination of lawns and exotic shrubs and trees (Lamm 1963; Green 1984; Mason 1985; Kentish *et al.* 1995; ACT Atlas), e.g. in ACT, most common in old suburbs, 40+ years old, where gardens mostly comprise exotic plants and wide lawns, and least common in suburbs where native vegetation dominant and there are few or small lawns (Lenz 1990). Also occur on golf courses (Morris 1989; Ratkowsky 1993a,b). Often recorded in orchards and vineyards (Sutton 1928; Hobbs 1961; Ridpath & Moreau 1966; Fielding 1979; NSW Bird Rep. 1975), but seldom in other types of farmland, e.g. pasture (Bryant 1999). Recorded in plantations of pines, in all age structures, usually with dense understorey (Payne 1931; Pawsey 1966; Heron 1973; Gepp & Fife 1975; Stevens 1975; Friend 1982; Duckworth 2002), e.g. in Gippsland, Vic., recorded in pine plantations of all ages, but most often in 6-year-old plantations, with incomplete canopy, understorey of acacias and dense ground-cover of Blackberry and grasses (Traill 1985). Also occur on cleared land, often infested with weeds, especially Blackberry (Bedggood 1970; Mollison 1974; Ratkowsky & Ratkowsky 1977; Reilly 1978; Loyn 1980). Some inhabit various natural habitats, ranging from shrublands to forests, though usually with dense shrub-layer. Often

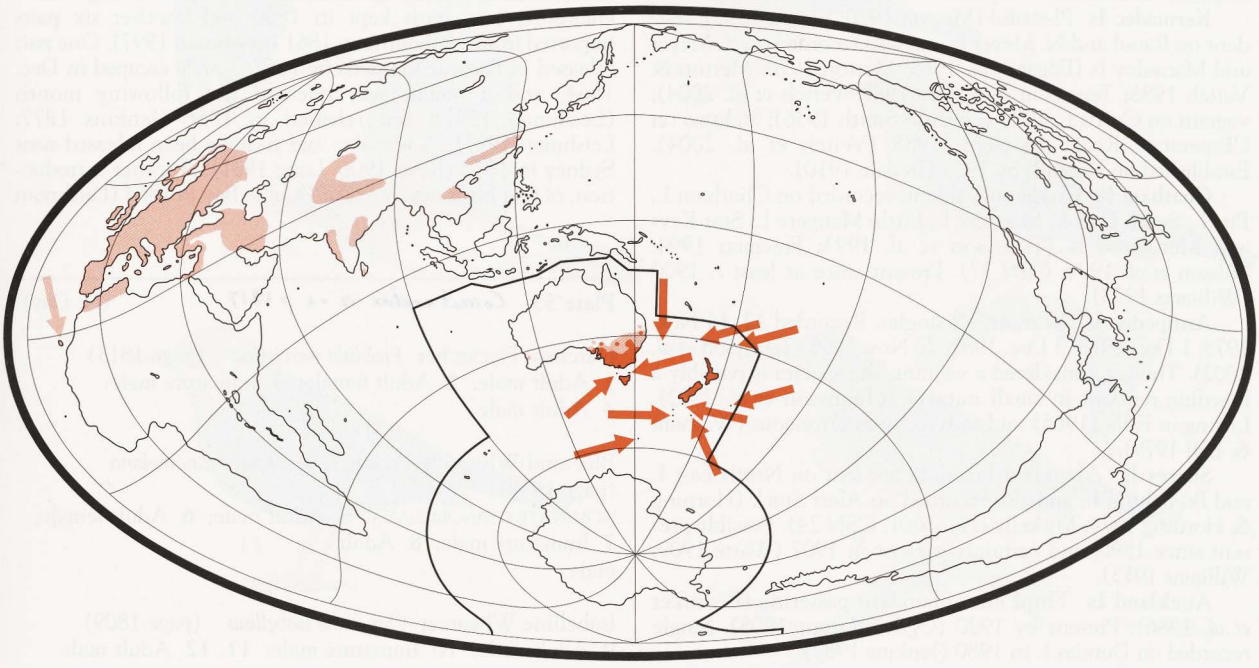
occur in shrublands, especially among dense shrubs in gullies and along watercourses (Cleland 1924; Clarke 1967; Green & McGarvie 1971; Bedggood 1973; ACT Atlas); and in coastal or near-coastal shrublands (where often referred to as 'scrub'), often dominated by tea-trees or paperbarks, sometimes also with banksias, acacias, casuarinas and boobialla *Myoporum* (Storr *et al.* 1952; Hyett & Gottsch 1963; Green 1969; Green & McGarvie 1971; Bedggood 1980; Horrocks & Brown 1993; Holdsworth 1998; Berry 2001); also, at margins of suburbs, occur in degraded remnant shrublands infested with woody weeds (Reilly 1981; Preston 1983). Sometimes occur in heathlands (Ridpath & Moreau 1966; Morris 1989); and very occasionally in saltbush shrublands (NSW Bird Rep. 1984) or saltmarsh, e.g. at Sellicks Beach, SA, inhabit degraded ephemeral wetland dominated by samphire *Salicornia*, Salt Club-rush *Bolboschoenus caldwellii* and saw-sedge *Gahnia*, with low shrubs including sea-heath *Frankenia*, Silky Wilsonia *Wilsonia humilis* and Creeping Brookweed *Samolus repens*, and bordered by African Boxthorn and Artichoke Thistle *Cynara cardunculus* (Ashton 2001). Very occasionally recorded in mallee shrublands or woodlands (Rix 1945; SA Bird Rep. 1968–69). Often occur in woodlands and forests, especially those dominated by eucalypts, usually with shrubby understorey, especially in dense vegetation along moist gullies (Ratkowsky & Ratkowsky 1977; Friend 1982; Traill *et al.* 1996; B.J. Kentish). Most often occur in wet sclerophyll forests (e.g. Ridpath & Moreau 1966; Ratkowsky & Ratkowsky 1977; Ratkowsky 1983; Loyn 1985; Thomas 1986; French 1990; B.J. Kentish), such as, in Toolangi SF, Vic., tall Mountain Ash forest with understorey of acacias and tall shrubs such as Blanket-leaf *Bedfordia arborescens*, Hazel Pomaderris *Pomaderris aspera* and Musk Daisy-bush *Olearia argophylla*, and dense shrub-layer, especially of Mountain Tea-tree *Leptospermum grandifolium* in gullies, and patches of Blackberry (Loyn 1985). Occur less often in dry sclerophyll woodland or forest (e.g. Ridpath & Moreau 1966; Gepp & Fife 1975; Ratkowsky & Ratkowsky 1977; Emison & Porter 1978; Smith & Robertson 1978; Ratkowsky 1983; Thomas 1986; Kennedy 2003), such as, in ACT, in remnant Yellow Box–Blakely's Red Gum woodland, often with other sparsely scattered eucalypts, and shrub-layer of acacia and Blackberry, with ground-cover of native grasses (Er *et al.* 1996, 1998; Er 1997; Er & Tidemann 2001). Near Aireys Inlet, Vic., recorded in coastal ironbark forest 3–4 years after severe bushfire, when regrowth had developed at all levels of vegetation, especially ground-cover (Reilly 1991, 2000). Also occasionally occur in woodlands and forests dominated by plants other than eucalypts, such as casuarinas, cypress-pines, acacias and banksias (Clarke 1967; Emison & Porter 1978; Duckworth 2002). Occasionally recorded in rainforests (Ridpath & Moreau 1966), e.g. in cool-temperate rainforests dominated by Myrtle Beech (Ridpath & Moreau 1966; Tas. Bird Rep. 2; B.J. Kentish), in warm-temperate rainforest dominated by Lilly Pilly (Bedggood 1980) or Yellow Sassafras and Coachwood *Ceratopetalum apetalum* (Fulton 2002), or at edge of subtropical rainforest (Morris *et al.* 1981). Sometimes occur in mangroves (P.W. Taylor 1987).

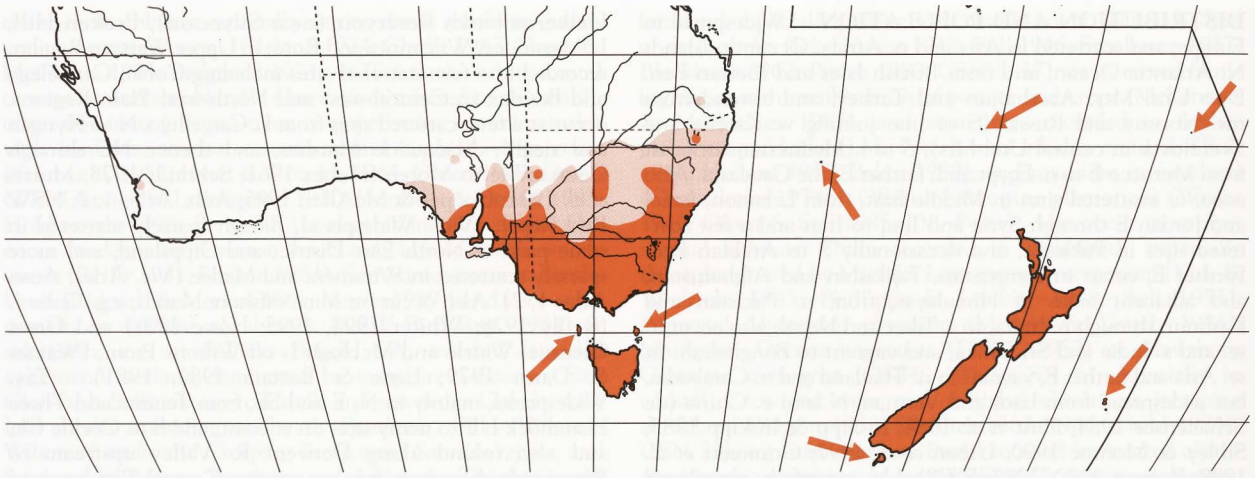
NZ Most often recorded in modified habitats, especially in gardens and parks with areas of open lawn interspersed with exotic trees and shrubs (Bull 1946, 1953; Phillipps 1948; Gurr 1954; East & Tasker 1967; Stidolph 1977; Lauder 1978; Guest & Guest 1987, 1993; Gill 1989; CSN 41), e.g. in Christchurch 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). In garden in Hamilton, NI, showed no significant correlation between abundance and proportion of native plants in garden (Day 1995). Sometimes also recorded on playing fields (CSN 34). Often occur in farmland, especially pasture with nearby cover, such as hedges or shelterbelts (Ick-Hewins 1917; Bull 1946; Stenhouse 1957; Blackburn 1967; Pierce 1980; CSN 5, 37), or in mixed farming areas, with combination of pasture and crops (McLennan & MacMillan 1985), and sometimes recorded in freshly ploughed paddocks (J.M. Peter); also inhabit orchards (Bull 1946; Hudson 1959; Baker 1980); and roadsides in farmland (Counsilman 1974b). Often inhabit pine plantations (Weeks 1949; Owen & Sell 1985; J.M. Peter). Also occur in various natural habitats. Often recorded in shrublands, especially those dominated by Manuka *Leptospermum scoparium* (Kirk & Wodzicki 1943; Phillipps & Lindsay 1948; Bull 1953), Popwood *Myoporum obscurum* (Merton & Veitch 1986), Matagouri *Discaria toumatou* (DNFC 1952) or Hawthorn *Crataegus monogyna* (DNFC 1952; CSN 6), especially in coastal or lowland areas, and at higher elevations, in alpine shrubland (Sibson 1958; Challies 1962, 1966; Child 1975b; CSN 23), e.g. near Arthurs Pass, recorded in stunted alpine shrubland comprising Mountain Flax *Phormium cookianum*, Turpentine Scrub *Dracophyllum longifolium*, Taramea *Aciphylla scott-thomsonii*, mountain daisies *Celmisia*, Great Mountain Buttercup *Ranunculus lyallii* and alpine cushion plants (J.M. Peter); absent from S. Alps in w. Otago, where there is no tall shrubland (Child 1978). Also common in forests dominated by beech, podocarps, hardwood or broadleaf trees, usually with dense shrubby understorey (Flux 1966; Wilkinson & Guest 1977; Innes *et al.* 1982; Gill 1983; Wilson *et al.* 1988; Fitzgerald *et al.* 1989), such as broadleaf forest at Heaphy Track, SI, dominated by Northern Rata *Metrosideros robusta* and Southern Rata *M. umbellata*, with some Mahoe *Melicytus ramiflorus* and Kamahi *Weinmannia racemosa* in canopy, shrub-layer of Quintinia *Quintinia acutifolia* and Kamahi, and emergent Rimu *Dacrydium cupressinum* (Dawson 1964); or lowland podocarp forest in Ohikanui R. Valley, in n. Westland, with canopy dominated by Matai *Prumnopitys taxifolia* and Kahikatea *Dacrycarpus dacrydioides*, with dense understorey of Horopito *Pseudowintera colorata* and Crown Fern *Blechnum discolor*, and ground-cover of grass and moss (Wilson *et al.* 1988). Often inhabit beech *Nothofagus* forests (Flux 1966; Wilkinson & Guest 1977; Dawson *et al.* 1978; Onley 1980, 1983), e.g. near Reefton, recorded in forest dominated by Silver Beech *N. menziesii* with a few podocarps, dense layer of fruit-bearing shrubs, and dense ground-cover of mosses and liverworts (Dawson *et al.* 1978); and in W. Paparoa Ra., mixed forest with emergent Rimu and Kahikatea above tall, closed canopy of Red Beech with dense understorey and ground-cover (Onley 1980). Also occur in regrowth in forests regenerating after logging (Onley 1983). Sometimes recorded in tussock grassland adjacent to forests and shrublands (Challies 1962, 1966), e.g. at St Arnaud, SI, observed in grassland with scattered clumps of Matagouri *Discaria toumatou* (Flux 1966). In coastal areas, sometimes occur on beaches or mudflats (Cunningham & Moors 1985; NZRD), e.g. occasionally occur on exposed mudflats and eelgrass *Zostera* beds round Tauranga, NI, at low tide (Hodgkins 1949), and at Moeraki, SI, seen foraging among beachcast seaweed and driftwood on sandy beach (J.M. Peter); also occasionally recorded in mangroves (Beauchamp & Parrish 1999).

Offshore islands On Lord Howe I., inhabit most lowland habitats, including gardens and all types of forest, especially those with dense understorey (Disney & Smithers 1972; McAllan *et al.* 2004). Occur in all habitats on Norfolk I., including gardens and orchards, riparian vegetation and dense forest (Schodde *et al.* 1983; Hermes 1985). Recorded in forests on Snares Is, dominated by Snares Tree-daisy *Olearia lyallii* and *Brachyglottis stewartiae*, with Kokomuka *Hebe elliptica* and ground-cover of ferns and mat-forming herbs (Blackburn 1968; Horning & Horning 1974; Freeman 1994; Miskelly *et al.* 2001).

DISTRIBUTION AND POPULATION Widespread in Europe, and scattered in Asia and n. Africa. Occur on islands N. Atlantic Ocean, and from British Isles and Iberian Pen. E to Ural Mts, Azerbaijan and Turkey, and extend from nw. Norway and Russia (S of line joining w. Karelia and Sverdlovsk in central Ural Mts), S to s. Mediterranean coast from Morocco E to n. Egypt and, farther E, the Caucasus. Also occur at scattered sites in Middle East, from Lebanon, Israel and Jordan E through Syria and Iraq to Iran and a few scattered sites in Pakistan, and occasionally S to Arabian Pen. Farther E, occur in Kyrgyzstan, Tajikistan and Afghanistan, and adjacent areas of Himalayas, from n. Pakistan and Kashmir, through n. India, to s. Tibet and Nepal; also occur in se. and s. India and Sri Lanka; and vagrant to Bangladesh. In se. Asia and farther E, vagrant in n. Thailand and n. Cambodia, but widespread from Laos and Vietnam N into e. China (de Schauensee 1984; Flint *et al.* 1984; Inskipp & Inskipp 1985; Sibley & Monroe 1990; Urban *et al.* 1997; Grimmett *et al.* 1999; Robson 2000, 2002; BWP). Unsuccessfully introduced to S Africa, USA (New York and Oregon) and St Helena in 19th century and Fiji in 1920s (Long 1981). In HANZAB region, successfully introduced to se. Aust. and NZ, but colonized many outlying islands unaided.

Aust. Introduced. Widespread in SE. **Qld** Recent arrival. Aust. Atlas 2 accepted five records from Toowoomba, Jan. 2000–Jan. 2001, but records from Charleville and St George were not accepted (Aust. Atlas 2). No other published records. **NSW** Widespread but patchily distributed; range expanding, especially in N and W (see Change in range, populations, below). In NE, though mainly absent from Northern Rivers Region, recently recorded at Taloumbi and Grafton (NSW Bird Rep. 1998). Recorded at scattered sites in coastal strip, from Pt Plomer, near Crescent Head, S to Nadgee NR. More widespread on Great Divide, where occur from round Inverell and Bingara S to s. Kosciuszko NP, though occur at more scattered sites on w. slopes (Morris *et al.* 1981; Cooper & McAllan 1995; Gosper & Baker 1997; Aust. Atlas 1, 2; NSW Bird Reps). Recorded at scattered sites in all regions farther W, mainly in Riverina, where widespread, especially S of 35°S; in Lower Western Region, occur downstream along Murray R. at least to Wentworth, and recorded farther N round Pooncarie, Umberumburka Reservoir (near Silverton), Broken Hill, L. Menindee, Wilcannia and Roto; in Upper Western Region, recorded at a few scattered sites including Cobar, Canbelego and Bourke; in Central-west and North-west Plain Regions, occur at a few scattered sites from L. Cargelligo, N to Nyngan and nearby Macquarie Marshes, and thence NE through Coonamble to Moree (Hobbs 1961; Schmidt 1978; Morris *et al.* 1981; Cooper & McAllan 1995; Aust. Atlas 1, 2; NSW Bird Reps). **Vic.** Widespread, though sparsely scattered in some parts of North East District and Gippsland, and more sparsely scattered in Wimmera and Mallee (Vic. Atlas; Aust. Atlas 1, 2). Also occur on some offshore islands, e.g. Gabo I. (Reilly 1978; Whiter 1994, 1995; Howe 2001) and Great Glennie, Wattle and McHugh Is off Wilsons Prom. (Wainer & Dann 1979; Lane & Battam 1980, 1981). **Tas.** Widespread, mainly in N, E and SE, from Temma and Three Hummock I. E to many sites on e. coast, and S to Cockle Ck, and also inland along Derwent R. Valley upstream to Wayatinah; however, few records on Central Plateau, and recorded at a few scattered sites in S and SW, from Surprise Bay and Picton R., W to Towterer Beach (40 km NW of Melaleuca), including on Maatsuyker I. (Milledge 1972; Brothers 1979; White 1985; Aust. Atlas 1, 2; Tas. Bird Reps) (though none recorded on walk between Port Davey and C. Sorell in 1993; Schulz & Kristensen 1994), and in W, in area between Macquarie Harbour and Pieman R., and inland to Queenstown and Roseberry, though a few isolated records elsewhere (Thomas 1979; Aust. Atlas 1, 2). Also occur on various islands in Bass Str., from King I. E to Furneaux Grp, and N to Hogan Grp (Green 1969; Green & McGarvie 1971; Whinray 1970, 1971, 1972; Morton & Braithwaite 1976; Holdsworth 1998; Bryant 1999; Aust. Atlas 1, 2). **SA** Widespread in S, from Port Macdonnell in SE, N mainly to 32°S, from Wandaminga Stn W to Ceduna and Streaky Bay, but also recorded farther N in Flinders Ras, round Hawker, and also round Roxby Downs (Stove 1994; Read 1999; Aust. Atlas 1, 2; SA Bird Rep. 1982–99). **WA** Vagrant, all records of singles: Bunbury, Feb. 1979 (Johnstone & Storr 2004); Nannup, 18 Oct. 1984 (Johnstone & Storr 2004); Narrikup, 19 Nov. 1996 (Johnstone & Storr 2004); Kardinya, 28–29 Nov. 2000 (Johnstone & Storr 2004); Murdoch Univ., 6 Oct. 2002





(Anon. 2002) and Eyre Bird Observatory, 23–24 Oct. 2002 (Anon. 2003).

NZ Introduced. Widespread from C. Reinga and North C., S to Bluff and Papatowai in s. Southland (NZ Atlas; NZCL; CSN). Also occur on most offshore islands, from Three Kings Is S to Stewart I. and associated islets (Blackburn 1965b, 1968; Ramsay & Watt 1971; Wilson 1973; NZ Atlas; CSN).

Lord Howe I. Common breeding resident; colonized island in second half of 20th century (Hutton 1991; McAllan *et al.* 2004; NSW Bird Reps). First recorded in Dec. 1953, and well established in N by 1959 (McKean & Hindwood 1965); suggested that originated from NZ (McKean & Hindwood 1965).

Norfolk I. Breeding resident (Schodde *et al.* 1983; Hermes *et al.* 1986). First recorded in 1920 (Schodde *et al.* 1983; Hermes 1985; *contra* McKean & Hindwood 1965), but unclear whether introduced or colonized unaided (Williams 1953; Turner *et al.* 1968; Schodde *et al.* 1983; Hermes 1985). Also recorded on Philip I. (Hermes *et al.* 1986).

Macquarie I. Vagrant; ⩾10 records before 1987 (Anon. 1987), but details unpublished. Single, 31 Mar. 1960 (Warham 1969); recorded on six occasions in 1990 (Tas. Bird Rep. 20). Unconfirmed report in 1951 (Warham 1969).

Kermadec Is Plentiful (Merton 1970; Veitch 2003); resident on Raoul and N. Meyer Is and also recorded on S. Meyer and Macauley Is (Edgar *et al.* 1965; Merton 1970; Merton & Veitch 1986; Tennyson & Taylor 1989; Veitch *et al.* 2004); vagrant on Curtis I., 1929 (Guthrie-Smith 1936); and two on L'Esperance Rock, 14 Sept. 1988 (Veitch *et al.* 2004). Established on Raoul I. by 1908 (Iredale 1910).

Chatham Is Common resident; recorded on Chatham I., Pitt I., South East I., Mangere I., Little Mangere I., Star Keys and Murumuru Is (Tennyson *et al.* 1993; Freeman 1994; Nilsson *et al.* 1994; CSN 37). Present since at least c. 1900 (Williams 1953).

Antipodes Is Vagrant; all singles. Recorded 12–14 Nov. 1978; 1 Dec. 1978; 3 Dec. 1989; 20 Nov. 1995 (Tennyson *et al.* 2002). Though considered a vagrant, the species is possibly a breeding resident in small numbers (Tennyson *et al.* 2002). Listing in Falla (1965) said to have been erroneous (Warham & Bell 1979).

Snares Is Abundant breeding resident on North East I. and Broughton I., and also recorded on Alert Stack (Horning & Horning 1974; Miskelly *et al.* 2001; CSN 24). Possibly present since 1890, and certainly present in 1907 (Waite 1909; Williams 1953).

Auckland Is Third most abundant passerine (Penniket *et al.* 1986). Present by 1900 (Ogilvie-Grant 1905). Single recorded on Dundas I. in 1980 (Jenkins 1981).

Campbell I. Common breeding resident (Bailey & Sorensen 1962). Present in 1900 (Ogilvie-Grant 1905), though may have already been numerous by 1888 (Bailey & Sorensen 1962).

Breeding Aust. Widespread throughout core range; on mainland, recorded mainly S of 33° or 34°S in NSW and Vic., though occasionally recorded farther N, e.g. Coonabarabran, Gilgandra, Cobar and Broken Hill, and though records generally lacking from newly occupied areas, recorded at Inverell, NSW; in SA, recorded N to Wilmington and W to Port Lincoln. Widespread in Tas., including on islands in Bass Str. (Aust. Atlas 1, 2; NRS). **NZ** Widespread, including on offshore islands (CSN). **Outlying islands** Recorded on all those mentioned above, except Antipodes Is, where, though breeding not recorded, possibly occurs (Tennyson *et al.* 2002), and on Macquarie I. (Anon. 1987).

Introductions Aust. Though many introduced by various acclimatization societies, many others were probably released privately, and remain undocumented (Long 1981). QLD: Imported in 1869 (Chisholm 1919; Jenkins 1977), and presumably unsuccessfully released around then. NSW: Earliest releases took place round Sydney Botanic Gardens; housed in aviaries with the intention of allowing the birds to breed, then encouraging them to escape by removing roof of enclosure; four birds kept in 1860 and another six pairs imported from Melbourne in 1861 (Leishman 1997). One pair released in Botanic Gardens by 1862; a male escaped in Dec. 1864, and a female was released the following month (Leishman 1997); ten released in 1866 (Jenkins 1977; Leishman 1997). A few also said to have been released near Sydney in 1872 (Ryan 1906; Long 1981). Another introduction, of four birds, was made at Double Bay in 1864 (Leishman

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Plate 53 Correct caption is on p 1817 (N. Day)

Narcissus Flycatcher *Ficedula narcissina* (page 1813)
1 Adult male; **2** Adult female; **3** Immature male; **4** Adult male

Blue-and-White Flycatcher *Cyanoptila cyanomelana* (page 1817)
NOMINATE CYANOMELANA: **5** Adult male; **6** Adult female; **7** Immature male; **8** Adult male

Isabelline Wheatear *Oenanthe isabellina* (page 1809)
9 Adult male; **10** Immature male; **11, 12** Adult male

1997). Possibly introduced round Albury in mid-1920s (Chisholm 1926). Unknown number released by Mr Hirst of Ingleburn in *c.* 1940 (Hindwood 1947). VIC.: First imported into Melbourne in 1857, when 72 arrived; whether these birds were released is unrecorded (Hardy 1928; Balmford 1978); others were imported between then and in 1860 (Long 1981; Heathcote 1999). Some said to have been released before Dec. 1860, and well established round Melbourne by 1862 (Balmford 1978). First recorded introductions occurred in Melbourne Botanic Gardens (Ryan 1906; Hardy 1928), when six released in 1864; another 17 or 18 released there in 1866 (as well as six in Royal Park) and another 22 in 1872 (Ryan 1906; Jenkins 1977; Balmford 1978). Also imported into Geelong in 1859, possibly to be released near Winchelsea (Balmford 1978). Others released at Phillip I. and possibly other islands in Western Port in 1860 (Hardy 1928; Jenkins 1977; Balmford 1978); some possibly released in 1864 (Hardy 1928), and four released in 1866 (Jenkins 1977; Balmford 1978). Unknown number unsuccessfully released near Streatham in 1860s (Balmford 1978), and in 1876, unknown number released near Ballarat, though others possibly released there earlier (Balmford 1978). Twelve birds from NZ released at Gembrook in 1880 (Jenkins 1977); and said to have been introduced round Warrnambool in 1886 (J.K. Henry). Said to have been introduced round Beechworth in either late 19th or early 20th centuries (Cheney 1915). TAS.: Said to have been unsuccessfully introduced in *c.* 1830s (Lord 1933). Probably released round Launceston in *c.* 1916 (Dove 1919). In early 1930s, possibly 1933, 12 released from Hobart Zoo (Butler 1941; Sharland 1967; Green 1989); also said to have been released from a private collection by or at the request of the Governor (Butler 1941; Sharland 1967). Introduced to Flinders I. in *c.* 1930 (Green 1969). SA: First imported in 1862 (Anon. 1948) or 1863 (Sutton 1935; Condon 1951); in 1863, two sold for 68 shillings, but both birds were males (Sutton 1935). Batches later released round Adelaide, including Mt Lofty, Beaumont and Torrens Park: in 1878 or 1879, two or four released at Mt Lofty; and 1881 or 1882, 15 released at Beaumont and 30 at Torrens Park (Sutton 1935; Condon 1951; Long 1981). Claimed to have been introduced onto Kangaroo I. (Condon 1948a). WA: Two imported in 1977; after one died, other released in 1979 (Johnstone & Storr 2004). **NZ** Summarized from Thomson (1922). **NI** AUCKLAND: Eight released in 1865, *c.* 30 in 1867, 132 in 1868 and large number released in 1869. **SI** NELSON: In *c.* 1862, 26 released, though success unknown. CANTERBURY: Mr Potts said to have been instrumental in procuring the first pair from Melbourne for liberation on Banks Pen. (Dawson & Cresswell 1949). 'A number of songbirds' purchased by Canterbury Acclimatization Soc. in 1865, but unclear whether the group contained Blackbirds. Two years later, 46 Blackbirds released, another 152 in 1868, 62 in 1871 and unknown number in 1875. OTAGO: Two released in 1865, six in 1867, 39 in 1868, 21 in 1869 and 70 in 1871. SOUTHLAND: Unknown number released on Stewart I., 1879.

Change in range, populations Aust. Range continues to expand. Though examples of change in range detailed in Tarr (1950), these considered unreliable and misleading (Chisholm 1950). **Qld** Range recently expanded N from NSW; said to have been present round Toowoomba, on Darling Downs, since *c.* 1995 (N. Thompson). **NSW** Range has expanded rapidly, with odd birds turning up at sites well outside former range, but not established in intervening areas till much later. SYDNEY: Breeding recorded in Botanic Gardens soon after release (Leishman 1997), but introduction essentially unsuccessful, as considered to have become locally extinct by 1903 (Leishman 1997), though possibly persisted at that site till 1920s (Chisholm 1926). Apparently more successful after subsequent introduction in *c.* 1940, as range soon expanded and became established in various suburbs by 1950s (Morris *et al.* 1981; Hoskin 1991). Though range expanded well beyond Sydney, range within some suburbs expanded only slowly, e.g. first recorded at Lane Cove in 1963 (Lane 1964), and established at Penrith, Burwood and Croydon only since 1999 (NSW Bird Rep. 2001), having only became established at a few w. suburbs, such as Leichhardt, a few years earlier (NSW Bird Rep. 2001). N OF SYDNEY: First recorded at Dungog in Mid-North Coast Region in Sept 1959 (Hobbs & Kaveney 1962); Armidale in 1977 (Morris *et al.* 1981; NSW Bird Rep. 1977); and Inverell in 1994 (NSW Bird Rep. 1994). Comparison of records in Aust. Atlas 1, 2 indicates that between early 1980s and early 2000s, range has expanded N to include Moree, Inverell and Bingara (Aust. Atlas 1, 2). Despite this expansion, pockets free of Blackbirds remained within this range, e.g. in Hunter Region, many gaps in range were not occupied till 1990s: first recorded at Shortland in Sept. 1992 (NSW Bird Rep. 1992); and not recorded at Dooralong, NW of Wyong, till Aug. 2001 (NSW Bird Rep. 2001); farther N, in Mid-North Coast, not recorded at Barrington Tops till Nov. 1993 (Smith 1994), and in s. North-West Slope Region, not recorded at Currabubula, S of Tamworth, till Nov. 2000 (NSW Bird Rep. 2000). ILLAWARRA REGION: Well established on plateau in 1970s, where mostly confined to towns (Gibson 1977); first coastal record was at Nowra in 1979 (Chafer *et al.* 1999), but not recorded there again till Aug. 1988 (NSW Bird Rep. 1988); by mid-1990s, range had expanded to include coastal plain (Chafer *et al.* 1999; NSW Bird Rep. 1995), and well established by 1998 (NSW Bird Rep. 1998). SOUTH COAST: Occasionally recorded in early 1970s, mostly N of Batemans Bay and mostly away from coastal plain (Anon. 1978): in 1973–74, a few records, mainly centred on plateau round Braidwood, with very occasional coastal records at Tuross Head and Narooma (Anon. 1978); not recorded at Moruya till 1979 (Marchant 1992), but more widespread by 1986 (Whiter 1987), though still considered rare till 1994 (Whiter 1995); resident at various sites by 1995 (Whiter 1996), and now regularly recorded. MURRAY R. VALLEY: Recorded round Albury in mid-1920s (possibly introduced there) (Chisholm 1926). Rapid expansion of range recorded in 1950s, but not progressively downstream: first recorded at Barham in 1949 (Disher 2000); Rutherglen (Vic.) in 1950 (McEvey 1965), and common at Corowa, on the opposite bank, by 1957, but not recorded at Rand, *c.* 50 km farther N, at that time (Bourke 1957; see below); Deniliquin (on Edward R., a tributary of the Murray) in 1954, where one of the most common birds within 5 years (Hobbs 1961); and Dareton by 1957 (Hobbs 1961). By late 1950s, conspicuous along Murray R. (Bourke 1957; Hobbs 1961); first recorded at

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Plate 54 (N. Day)

Metallic Starling *Aplonis metallica* (page 1896)
NOMINATE *METALLICA*: **1** Adult; **2** Juvenile; **3** Immature; **4, 5** Adult

Common Starling *Sturnus vulgaris* (page 1906)
NOMINATE *VULGARIS*: **6** Adult male (fresh plumage); **7** Adult male (worn plumage); **8** Adult female; **9** Juvenile; **10** Immature; **11, 12** Adult male

Purple-backed Starling *Sturnus sturninus* (page 1934)
13 Adult male; **14** Adult female

Singing Starling *Aplonis cantoroides* (page 1903)
15 Adult; **16** Immature

Rand in Apr. 1960 (Bourke 1960); and generally common in Riverina by 1970s (NSW Bird Rep. 1975). ELSEWHERE W OF GREAT DIVIDE: In Lower Western Region, first recorded at Broken Hill in 1975 (NSW Bird Rep. 1975); Roto in Aug. 1988 (NSW Bird Rep. 1988); and Wilcannia in 1995 (NSW Bird Rep. 1995). In Upper Western Region, first recorded at Cobar and Bourke in 1976 (Schmidt 1978; NSW Bird Rep. 1976). In Central-West and North-west Plain Regions, first recorded at Nyngan in Aug. 1977 (NSW Bird Rep. 1977); and Narrabri in Sept. 1994 (NSW Bird Rep. 1994). **ACT** Said to have dispersed along major rivers (ACT Atlas). First recorded in Canberra in Aug. 1949 (Lamm *et al.* 1963; Calaby 2000), and common in suburban gardens by early 1960s and expanding range into less settled areas, e.g. Mt Tidbinbilla (Lamm *et al.* 1963), but still not recorded in Brindabella Ra. by mid-1960s (Lamm & Wilson 1965); by mid-1980s, most records at isolated locations in the ranges were of individuals, unlikely to represent breeding populations (ACT Atlas). **Vic.** Expansion of range said to have been aided by spread of Blackberries (Bedggood 1970; Vic. Atlas). MELBOURNE AND SURROUNDS: After initial releases in 1860s and early 1870s, population was slow to increase (Ryan 1906) and considered not to have been successful (Jenkins 1977); present round Box Hill, in e. suburbs, by early 1890s (Hall 1899), but generally remained confined to gardens in suburban areas by 1905 (Ryan 1906). Abundant at Montrose in Dandenong Ra. by early 1920s (Thomson 1923). Range said to be expanding quickly by late 1930s (Coleman 1939). NORTH-EAST: Recorded round Wangaratta before 1915, possibly having originated from those previously introduced at Beechworth (Cheney 1915). Present in upper reaches of King R. in late 1940s (Shanks 1949). GIPPSLAND: Range had expanded SE to include Wilsons Prom. by 1930 (Bryant 1930), and present much farther E at Marlo by 1935 (Bryant 1936). W AND NW OF MELBOURNE: Recorded at 'Turkeith', near Winchelsea, by 1911, and resident there by 1918 (Brown 1950a); and established in Colac since 1928 (D.M. Hodges). Reached Bendigo by 1912–13, with occasional records farther N at Yarraberb, *c.* 25 km N, in 1920s (Wilson 1928); recorded at Woomelang in 1948 (Tarr 1950), and near Mildura in 1957 (Hobbs 1961), though a few present in Sunraysia in late 1930s or early 1940s (E.R.E. Barlow). Range still expanding in semi-arid areas of Mallee and Wimmera Districts (Vic. Atlas). **Tas.** LAUNCESTON AND ELSEWHERE N OF 42°: After first record at Launceston in 1916 (Dove 1919), range expanded NW to include Devonport in 1932, where a few birds present for a few years, but population then increased suddenly in 1935 (Dove 1936). Regarded as a recent arrival at Cullenswood, near St Marys, *c.* 85 km ESE of Launceston, in 1935 (Legge 1935). ISLANDS IN BASS STR.: First recorded breeding on Flinders I. in 1932, *c.* 2 years after introduction there, and population soon increased rapidly; very common by 1952 (Green 1969). Present on Kent and Hogan Grps in 1938 (Mattingley 1938); probably originated from mainland (Garnett *et al.* 1991; *contra* Cooper 1974), as Blackbirds possibly regularly cross Bass Str. from Wilsons Prom. (Sutton 1998). HOBART AND SURROUNDS: By early 1940s, range expanded to include 'most of the settled parts of the state as well as in some forested country', at least within an area in radius of *c.* 100–115 km round Hobart, and population within that range had increased to pest proportions (Butler 1941; Sharland 1942). In late 1990s, range said to be still expanding in Coal Ck area, colonizing bushland from nearby settlements (Hooper 2001). SOUTH WEST: Recorded at Port Davey in 1937 or 1938, just a few years after release round Hobart; well established along sw. coast, between Recherché Bay and Bond Bay in Port Davey, by 1961 (Green & Mollison 1961), and considered fairly common by early 1980s (White 1985), though few records in Aust. Atlas 2 in late 1990s to early 2000s. Established on Maatsuyker I. by 1972 (Milledge 1972). **SA** ADELAIDE, MT LOFTY RAS, FLEURIEU PEN. AND KANGAROO I.: Considered a pest in cherry orchards within a few years of release; by mid-1880s, Blackbirds were 'getting pretty numerous' and 'multiplying to a very large extent' (Sutton 1935). Range had expanded S to include s. Fleurieu Pen. by early 1920s (Cleland 1924). First recorded on Kangaroo I. in 1938 (Lashmar 1988; *contra* Abbott 1974), though claimed that Blackbirds introduced to the island rather than colonized it unaided (Condon 1948a; see Introductions, above); subsequent authors state that arrived unaided (Abbott 1974; Baxter 1989). Early records in The Coorong may have been from s. expansion from Fleurieu Pen. or n. expansion from South East, with the two populations gradually becoming linked. Range continued to expand, radiating out from Adelaide: by 1950, occurred W to Kangaroo I., N to Mt Lofty Ras, E to Renmark and SE along coastal strip through The Coorong to Mt Gambier (Condon 1951). Between mid-1970s and mid-1980s, range said to have further expanded in n. Mt Lofty Ras (Paton *et al.* 1994); also since 1970s, populations within existing range have increased in some areas, e.g. Aldinga Scrub CP (Ashton 1996). SOUTH EAST: Birds occurring in SE possibly originated from Vic. (Condon 1969). Recorded at various sites from Port Macdonnell and Mt Gambier N to Policemans Pt by early 1940s (Condon 1942; Rix 1945; Francis 1946) and probably earlier; well established between Kingston SE and Port Macdonnell by 1951 (Storr *et al.* 1952). Apparently took longer to colonize areas farther inland, with first record at Frances in Oct. 1966 (SA Bird Rep. 1966–67); numbers round Naracoorte said to have increased before early 1970s (Attiwill 1972). Between mid-1970s and mid-1980s, range in South East said to have further expanded (Paton *et al.* 1994). E AND NE INTO MURRAY–MALLEE AND LOWER NORTH: First recorded at Yurgo, E of Murray Bridge, in 1919 (Anon. 1919); and present between Morgan and Renmark, along Murray R., since *c.* 1942 (Mack 1961), and well established by mid-1950s (Schodde & Glover 1955). Record at Manunda Stn, Lower North Region, in May 1970 said to have been the first N of Murray R. (SA Bird Rep. 1969–70), though recorded on Chowilla Stn, just N of Murray, the previous year (SA Bird Rep. 1968–69). Became established at Nor West Bend Stn, Murray–Mallee Region, in *c.* 1972 (SA Bird Rep. 1976). Between mid-1970s and mid-1980s, range in Murray–Mallee said to have expanded (Paton *et al.* 1994). N TO FLINDERS RAS AND BEYOND: First recorded in Flinders Ras at Telowie in Sept. 1964 (Glover 1969; SA Bird Rep. 1964). Comparison of Aust. Atlas 1, 2 shows that between early 1980s and early 2000s, range has expanded N to include Hawker, in s. Flinders Ras, and still farther N, occur at isolated site, round Roxby Downs, where first recorded in May 1998, and now regularly occur (Read 1999). W TO EYRE PEN. AND BEYOND: First recorded on Eyre Pen., at Flinders Pen., in Apr. 1967 (SA Bird Rep. 1966–67), and present round Port Lincoln by Oct. 1967 (SA Bird Rep. 1967–68). Comparison of Aust. Atlas 1, 2 shows that between early 1980s and early 2000s, range has expanded W to include w. Eyre Pen., with records W to Ceduna (Aust. Atlas 1, 2). **NZ** By early 1920s, one of the most common introduced species (Thomson 1922). NI: Said to have been thoroughly acclimatized in Auckland within 3 years of initial introduction, though by early 1920s, numbers round Whangarei and farther N were low or even absent (Thomson 1922). Reached Little Barrier I. by 1880s (Reischek 1886) and Hen and Chickens Grp by 1923 (Skegg 1964). Population around Rotorua said to have increased remarkably between late 1920s and late 1940s (Phillipps & Lindsay 1948); and population in Kaingaroa Forest said to have been plentiful and increasing in late 1940s (Ryder 1948; Weeks 1949). SI: In Canterbury, population had not increased as quickly as had been hoped by 1871 (6 years after first release), but within 10 years of introduction in Otago, population

was 'exceedingly numerous' (Thomson 1922). Range expanded to include Dusky Sound, where recorded in 1884 (Hall-Jones 1966). Population in s. Otago said to have been increasing in late 1940s (DNFC 1948). OUTLYING ISLANDS: After first record on Lord Howe I. in 1953 (see above), present in small numbers in n. half of island, and by 1962, present throughout most of island (McAllan *et al.* 2004). On Raoul I., Kermadec Grp, numbers recorded along transect in forest have maintained their abundance since 1967, while numbers along transects along roads have increased in that time (Veitch 2003).

Populations Population on Snares Is estimated at *c.* 220 pairs (Miskelly *et al.* 2001). RECORDED DENSITIES: **Aust.** Near Morwell, Vic., 0.04–0.29 birds/100 m, along 600-m transects (Traill 1985); 1.26 birds/ha (0.92; 0–6.37; n=522 surveys, 1989–98), Gardiners Creek, Bennettswood, e. suburban Melbourne (J.M. Peter); 0.83 birds/ha (1.24; 0–5.56; n=48 surveys), Darling Square, Melbourne (W.K. Steele); 5.9 birds/ha, Parkville, n. suburban Melbourne (Aust. Atlas 1, 2); 1.81 birds/ha, Ballarat Botanic Gardens, Vic. (B.J. Kentish); 0.06–0.21 birds/ha, near Moyston, Vic. (Kennedy 2003). **NZ NI** 0.51 birds/5-min count, Raetea, Northland, 1979 (Pierce *et al.* 1993); 0.76 birds/5-min count, same site, 1993 (Pierce *et al.* 1993); 0.15 birds/5-min count, Puketi, Northland, 1979 (Pierce *et al.* 1993); 0.08 birds/5-min count, same site, 1993 (Pierce *et al.* 1993); 0.24 birds/5-min count, Mataraua, Northland, 1979 (Pierce *et al.* 1993); 0.06 birds/5-min count, same site, 1993 (Pierce *et al.* 1993); 0.16 birds/5-min count, Russell, Northland, 1979 (Pierce *et al.* 1993); 0.16 birds/5-min count, same site, 1993 (Pierce *et al.* 1993); 0.22 birds/5-min count, Omahuta, Northland, 1979 (Pierce *et al.* 1993); 0.05 birds/5-min count, same site, 1993 (Pierce *et al.* 1993); 0.13 birds/5-min count, Waipoua, Northland, 1979 (Pierce *et al.* 1993); 0.07 birds/5-min count, same site, 1993 (Pierce *et al.* 1993); 0.2 birds/ha, Hen I. (Turbott 1940); 1.59 birds/5-min count, Auckland Domain (Gill 1989); 0.54 pairs/ha, Mangere (Bull 1946); 0.08 birds/5-min count (0.36; 333 counts), Kaitoke Wetland, Great Barrier I. (Anderson & Ogden 2003); 0.26–0.77 birds/5-min count, Red Mercury I. (Robertson *et al.* 1993); 0.15 pairs/ha, L. Rotoiti, SI (Flux 1966); *c.* 0.02–1.05 birds/10-min count (estimated from graph), W. Hutt Hills (Gibb 2000b); 0.67–1.38 birds/10-min count (annual means, 1981–92), in same area (Gibb 2000a); 0.27 birds/5-min count, Ohau Gorge, near Levin (Gill 1983); on 56 trips between Foxton and Palmerston, NI (32.5 km), recorded at 0.065 birds/km (2.77; 0–0.34; 56) (Gill 1977). **SI** 0.15–1.2 birds/5-min count (estimated from graph), Kennedys Bush Scenic Reserve, near Christchurch (Freeman 1999); 0.69 birds/5-min count, Fletcher Ck, near Reefton, W. Coast (Dawson *et al.* 1978); 0.51 birds/5-min count, Reefton Saddle, near Reefton (Dawson *et al.* 1978); 0.34 birds/5-min count, Te Wharau, near Reefton (Dawson *et al.* 1978); 0.43 birds/5-min count, Rahu Saddle, near Reefton (Dawson *et al.* 1978); 0.03 birds/5-min count, upper Ohikanui R. Valley (Wilson *et al.* 1988); 0.3–0.79 birds/5-min count, Little Wanganui R., near Karamea (Onley 1983); 0.5–2.6 birds/5-min count, W. Paparoas (Onley 1980); 0.022 birds/ha, Chatham I. (CSN 37); 1.02 birds/5-min count, Tuku NR, Chatham I. (West 1988); 0.64 birds/5-min count, South East I. (West 1988).

Mortality In Aust., of 546 banded birds, mean annual mortality was 51.6% for females and 38.8% for males (B.J. Kentish).

THREATS AND HUMAN INTERACTIONS

Considered a pest in orchards, eating or damaging various fruits (see Food: Pest status). Sometimes shot by orchardists (Sutton 1928; Sharland 1942), with one shooting 30 in 2 months (Bull 1953), and, in early 1950s, fruit-growers at Waimate, SI, offered bounty of sixpence per dozen Blackbird heads or eggs, with a bonus for the person who collected the most (CSN 6); formerly protected in Tas., at least till 1920s (Lord 1920), but by 1930, a bounty was established, only to be withdrawn because the species was too widespread (Lord 1931), though apparently reinstated in 1940s with little effect (Butler 1941; Sharland 1942); still often shot or trapped in Tas. (Liddy 1970). Any Blackbirds recorded in WA are extirpated immediately by The Authorities (M. Massam). Sometimes also considered a nuisance in gardens, scattering mulch and digging up lawns and newly planted beds; and also blamed for spreading seeds of weeds (see Food: Pest status). Sometimes considered helpful in controlling insect pests (Kendall 1904; Campbell 1905; Coleman 1939; Robertson 1947). Benefited from the process of urbanization, and are highly adapted to urban areas (see Habitat). On Norfolk I., thought to have successfully competed and possibly hybridized with the endemic subspecies of Island Thrush *Turdus poliocephalus* (Smithers & Disney 1969; Schodde *et al.* 1983; Hermes 1985; Garnett & Crowley 2000); elsewhere, possibly also compete with Bassian Thrush (Garnett & Crowley 2000). Often killed by Cats, and occasionally by Dogs (Hall 1899; Moore 1949; Bull 1953, 1954, 1956; Kinsky 1957; Hobbs & Kaveney 1962; Liddy 1970; ABBBS 1977, 1979; Dowling *et al.* 1994; T. Peter); in NZ, eggs and young probably also preyed on by introduced species including Common Brushtail Possums *Trichosurus vulpecula* (Brown *et al.* 1993), mustelids (Tily 1946; McLennan & MacMillan 1985), rats (McKenzie 1945; Bull 1946; Tily 1946; CSN 1) and Little Owls *Athene noctua* (CSN 3). On Noises Is, Hauraki Gulf, and occasionally elsewhere, often killed in traps set for Brown Rats or other terrestrial mammals (Bull 1956; Cunningham & Moors 1985; ABBBS 1987). Often struck by vehicles on roads (Bull 1956; Kinsky 1957; Lepschi 1992); and sometimes collide with windows (Salter 1960; Liddy 1970; M.B. Peter); one collided with window then, stunned, fell into a tub of water in which it drowned (Moore 1949). Nests or eggs sometimes taken by children (Bull 1946). In NZ, Blackbirds have died after becoming entangled in hip-chain cotton used to measure distances (Brown & Miller 1997). Said to 'take advantage of the work of illegal worm-diggers' (Fleming 1976).

MOVEMENTS

Resident or sedentary in Aust. and NZ (see below), though some limited evidence for local movements, and possibly movement across Bass Str. (see below). Broad-scale analysis of bird atlas and count data from e. Aust. found strong evidence for no movement (Griffioen & Clarke 2002), though some local movements occur (see below). No evidence of regular long-distance movements, but ability to travel long distances indicated by occasional long-distance recoveries of banded birds (see Banding, below) and unassisted colonization of outlying islands (see Distribution and Population). Extralimitally, nominate *merula* part migratory, with n. populations moving S or W, augmenting resident populations in s. or w. Europe during winter (BWP).

Aust. Widely described as resident throughout range: in NSW (Morris 1989; Gregory-Smith 1991; Egan *et al.* 1997; Whiter & Andrew 1998; NSW Bird Reps); in ACT (Anon. 1974; Taylor 1984, 1987b; Er & Tidemann 1996); in VIC. (Payne 1931; Fleming 1976; Thomas & Gilmore 1976; Humphreys 1986); in TAS. (Fielding 1979); and in SA (Symon 1946; Clarke 1967; Ford & Paton 1976; Baxter 1980; Ashton 1985; Winslet & Winslet 1987). Banding data reflect resident status (see below). Also described as sedentary or present throughout year (probably sedentary of *HANZAB*) in Illawarra Region, NSW (Gibson 1977), Eurobodalla Shire, se. NSW (NSW Bird Rep. 1990), ACT (Taylor 1983, Taylor & Davey 1985; ACT Atlas), Rotamah I., e. Vic. (Howard & Crawford 1989), in Tas. (Harris 1980; Green 1989), Tantanoola, se. SA (SA Bird Rep. 1964) and Langhorne Ck,

SA (SA Bird Rep. 1964). **NZ** Described as resident in Auckland (Moncrieff 1929), on Noises Is (Cunningham & Moors 1985), Waikanae R. estuary, NI (Wodzicki 1946) and in Port Hills, Christchurch (Freeman 1999). Also described as present throughout year (probably sedentary of *HANZAB*) at Lower Hutt, NI (Bull 1953), Herbert, SI (Anderson 1947) and Ohikanui, Buller and Inangahua R. Valleys, SI (Wilson *et al.* 1988). **Outlying islands** On Norfolk I., considered resident (Schodde *et al.* 1983) or sedentary (Hermes 1985). Resident on Chatham Is (Nilsson *et al.* 1994).

A few reports of movements. In AUST., some possibly cross Bass Str., as regularly seen heading out to sea or flying in from sea at Wilsons Prom. (Sutton 1998), where flocking observed early one morning in mid-Apr. (Garnett *et al.* 1991). Also, colonized Deal I., and suggested that population may be supplemented from mainland (Garnett *et al.* 1991); and one struck lighthouse at Eddystone Pt, ne. Tas., before dawn, mid-Sept 1912 (Anon. 1913). Dispersal of young recorded after breeding season in ACT (ACT Atlas). Seasonal fluctuations in numbers at observation points in Vic. described as consistent with post-breeding dispersal of young birds (Thomas 1968). In NZ, undertake local post-breeding movements at Taranaki (Moncrieff 1929); and at Minginui, NI, part of population makes local movements between habitats, moving from hawthorn *Crataegus* shrublands into nearby forest, May–Sept. (CSN 5, 6). Said to occur seasonally at L. Rotoiti, SI, where recorded Apr.–Sept. (Moncrieff 1929). Recorded throughout year near Reefton, SI, though suggested that some undertake altitudinal movements, moving to high elevations in summer and to lowlands in winter (Dawson *et al.* 1978).

Banding Of 10,226 banded in Aust., 1953–June 2003, 1228 recoveries (12.0%), of 801 birds: 1221 (99.4%) <10 km from banding place; six (0.5%) 10–49 km; two (0.2%) >100 km (ABBBS). Of 170 banded near Launceston, Tas., 1960–63, 23 recoveries, 22 within 4 km of banding site, with one other *c.* 9 km away (Liddy 1970). In NZ, longest recorded movement by a banded bird 90 km, from Orongorongo Valley to Levin, NI (Heather & Robertson 2000). LONG-DISTANCE RECOVERIES: Juvenile female banded Canberra, 1 Jan. 1968, shot at Castlemaine, Vic., 28 Sept. 1968, 500 km WSW (Anon. 1969); Coorong NP to Athelstone, SA: 222 km, 331°, 18 days, Dec., J, M (ABBBS). LONGEVITY: Adult male banded at Beaumont, SA, 25 Nov. 1974, recaptured at St Georges, SA, 11 Apr. 1984, over 9 years 4 months after banding (ABBBS). Oldest Blackbird in NZ claimed to have survived for 15 years (Heather & Robertson 2000); unbanded bird at Okaihau, NI, said to have survived for *c.* 10 years 4 months (CSN 24); three others survived 8 years 1 month, 7 years 2 months and 7 years 1 month (Niethammer 1970).

FOOD Omnivorous; mainly take ground-dwelling invertebrates, especially earthworms, snails and insects; also seeds and fruit. **Behaviour** Mainly terrestrial, probing lawns, garden beds and leaf-litter for invertebrates; also glean much fruit from trees and shrubs, including commercial orchards, where often considered pests; very occasionally forage aerially (e.g. Bull 1946; McCann 1953; Hobbs 1961; East 1967; Baker 1980; Paton & Reid 1983; Powlesland 1983; Green 1984; Fitzgerald *et al.* 1989; French 1990; Smith 1994; see below). DETAILED STUDIES: In Aust., e. suburban Melbourne (Green 1984); and in NZ, on Noises Is, Hauraki Gulf, NI (Cunningham & Moors 1985); near Nelson, SI (Williams & Karl 1996); and at Port Hills, SI (Burrows 1994). FORAGING ASSOCIATIONS: Said to forage singly, in twos, in small flocks or very occasionally in large flocks (Long 1981). However, few published observations of size of foraging flocks in HANZAB region. In Melbourne, flock of 21 seen foraging together (Norris *et al.* 1995). In NZ, seen foraging in pairs (Daniel 1971; CSN 37), threes (CSN 44) and in group of six (CSN 37) or several together seen feeding on carrion (CSN 19 Suppl.); occasionally in larger numbers: 60 seen eating fruit of in single Matai tree (CSN 8), and near Invercargill *c.* 400 seen foraging on a lawn (Barlow 1983). Occasionally forage with other species. In Melbourne, seen foraging with Song Thrushes (J.M. Peter; G.D. Price) and Brown Thornbills *Acanthiza pusilla* (J.M. Peter). At Lunawanna, Bruny I., Tas., up to three juvenile Masked Lapwings *Vanellus miles* were observed following adult Blackbird across lawn, probing soil and gleaning from grass at sites where Blackbird had been foraging a few seconds earlier (J.M. Peter). In NZ, often forage with House Sparrows *Passer domesticus*, Song Thrushes, Common Starlings (Bull 1946; Graham 1948; Dawson & Cresswell 1949; Counsilman 1974b), Rock Doves *Columba livia*, and sometimes Silver *Larus novaehollandiae* and Kelp *L. dominicanus* Gulls; often with disputes between all species (Counsilman 1974b). Near Invercargill, *c.* 400 Blackbirds seen foraging with *c.* 600 Song Thrushes (Barlow 1983); and in same area, two seen foraging with 106 Song Thrushes, and six seen foraging with 60+ Song Thrushes and 14 Starlings (CSN 37); near Murchison, SI, seen foraging with 'hundreds' of Song Thrushes in winter (CSN 34). FORAGING HEIGHTS AND SITES: Mainly forage on ground (Ryan 1906; Michie 1948; East 1967; Lambert 1970; Gravatt 1971; Fleming 1976; Baker 1980; Falla *et al.* 1981; Powlesland 1983; Green 1984; Hutton 1991; Smith 1994; Day 1995; Er 1997; Heather & Robertson 2000; Pierre 2000; CSN 37), often in paddocks (including freshly ploughed paddocks), pasture, steppes or other open grassy areas (Bull 1946; McCann 1953; Sibson 1958; Edgar *et al.* 1965; J.M. Peter), often close to cover (Heather & Robertson 2000) including on lawns (Moncrieff 1929; Shanks 1953; East 1967; Daniel 1971; Paton 1977; Barlow 1983; Hermes 1985; Bennett 1988; Pizzey 1988; Bell 1996; Heather & Robertson 2000; Vic. Atlas; CSN 20; 34), and in gardens and shrubberies (Bull 1946, 1953; Graham 1948; Sharland 1958; Edgar *et al.* 1965; Paton 1977; Kennedy 1978; Loyn 1985; Green 1995; Bell 1996). Males said to forage in more open areas than females (B.J. Kentish). Mainly forage in leaf-litter (East 1967; Smith 1994; Bell 1996; Vic. Atlas), including under hedges and shrubs (McCann 1953; Hermes 1985), in peat on forest floor (Horning & Horning 1974) and from accumulated organic matter in guttering (B.J. Kentish). In NZ, also seen foraging on and beside roads (Counsilman 1974b), from edges of ponds (CSN 22, 42) and in a dried-up pond (Bell 1996); on shoreline (Cunningham & Moors 1985), on a sandy beach among beachcast seaweed and driftwood (J.M. Peter), mudflats (Hodgkins 1949), pumice flats (CSN 5) and on eelgrass *Zostera* beds (Hodgkins 1949). Often forage in trees or shrubs: in fruit trees in orchards (Bull 1946; Dawson & Cresswell 1949; Sharland 1958; McCann 1964; Green 1995; Vic. Atlas), including vineyards (Kendall 1904; Campbell 1905; Hudson 1959), Orange groves (Hobbs 1961; NSW Bird Reps) and Apple orchards (Dawson & Bull 1970; Baker 1980); in gullies choked with Blackberries (Loyn 1985); in a Houpara *Pseudopanax lessonii* tree (CSN 37); and in *Cotoneaster* shrub, *c.* 2 m above ground (G.D. Price). Sometimes forage at bird-tables (Tily 1946; Mollison 1961; East 1967; Green 1995). Also in NZ, young fed food items from household scrapheap (CSN 24), and once, ate fat from a sheepskin hanging over a branch (CSN 21). On Kermadec Is, seen foraging in damp soil scraped by Wedge-tailed Shearwaters *Puffinus pacificus* from their burrows the previous night (Merton & Veitch 1986); and on Snares Is, seen feeding on maggots from corpse of dead Sooty Shearwater *P. griseus* (Horning & Horning 1974). Several seen feeding together on dead Common Brushtail Possums and other carrion (CSN 19 Suppl.). Occasionally forage aerially (see below). Of 281 foraging observations in e. suburban Melbourne: 268 (95.4%) on ground, ten (3.6%) in exotic plants, one (0.3%) in eucalypts

and two (0.7%) in other native plants (Green 1984). Of 1129 foraging observations in Christchurch (figures estimated from graph): *c.* 75% on lawn; *c.* 16% in leaf-litter; *c.* 4% fruit on trees; *c.* 1% fruit on ground; *c.* 1% on bare soil and paths; and *c.* 2% artificial (probably feeding stations) (East 1967). FORAGING METHODS: Search by hopping and running on ground, in stop-start fashion, pausing with head cocked, listening for invertebrates, and then probing ground (East 1967; Pizzey 1988; Green 1995; Heather & Robertson 2000), or turning over and scattering leaf-litter or garden mulch, and scratching soil (McGilp 1926; Kennedy 1978; Green 1995; Heather & Robertson 2000). When searching in leaf-litter or loose soil, use co-ordinated movements of feet and bill: as bill comes down to flick or throw dead leaves or earth to one side, move one foot forward to level of head and scratch vigorously backward (East 1967). Sometimes stamp on lawn, apparently to bring worms to surface (CSN 19 Suppl.). Difficult to know whether worms located by ear or eye; extralimitally, suggested that able to see tips of worms protruding above ground, and also hear worms moving under ground (Snow 1958; Simms 1978). When prey located, probe for worms and grubs in lawns with sudden jab of bill, then pull them from ground (Frith 1969; Bennett 1988; Heather & Robertson 2000). Sometimes 'take advantage of illegal worm-diggers' (Fleming 1976) and, in NZ, follow rotary hoe (Michie 1948). For extralimital details on foraging strategies on ground, see Smith (1974a,b) and Clark (1983). Once seen to catch and eat three tadpoles from edge of pond (CSN 42). When foraging for fruit, glean (pluck) ripening fruit from trees and shrubs (Green 1995); berries of African Boxthorn plucked with bill and swallowed whole, with almost no manipulation by bill (Peter 2000). Extralimitally, sometimes catch insects in air (Snow 1958); in NZ, female once seen attacking butterfly in flight (Flux 1986). In NZ, female pursued a Copper Skink *Cyclodina aenea* for *c.* 4 m, and on catching it, repeatedly pecked, shook and tossed Skink into air for *c.* 18 min, before attempting to swallow it head-first (Bell 1996). Once, Blackbird took several caterpillars from vine, laying each one in turn on asphalt path; after collecting five caterpillars in this manner, bird flew off with all five and fed them to young (Kendall 1904). KLEPTOPARASITISM: Sometimes rob smaller birds of food, including scraps provided by people; also rob Song Thrushes (East 1967). Blackbirds often react to sight of smaller bird with food in its bill, or extracting it from ground: rush up, half running and half flying, sometimes from several metres away, and drive smaller bird away; attack often begins as soon as Blackbird sees victim pull worm, or other item, from ground. Extralimitally, sometimes rob Song Thrushes of snails after Thrush has extracted snail from shell (see Song Thrush: Food); Blackbird reacts to cessation of hammering by Song Thrush, indicating snail is in a state that can be dealt with by Blackbird, which said not to be able to open snails itself (Snow 1958, but see Handling of food below). SELECTION OF FOOD: Near Murray Bridge, SA, took ripe fruit only (Paton & Reid 1983). Extralimitally, apparently prefer red fruit to those of other colours (Snow 1958). HANDLING OF FOOD: Large fruit punctured with bill to get to inner pulp (Burrows 1994; Heather & Robertson 2000). Seen extracting snails from their shells (Coleman 1939; CSN 19 Suppl.; J.M. Peter). At Colac, w. Vic., played with a lizard for minute or so, then swallowed it whole (Brown 1950b); also see description of capture of lizard in Feeding methods (above). Near Brooklyn, NI, bashed a weta before eating it (CSN 43). Near Gisborne, NI, observed catching and dunking worms in honey set out at ground level for Silvereyes *Zosterops lateralis* (CSN 31). Extralimitally, sometimes wash food before eating it (Snow 1958). Often bunch up long worms for transportation, e.g. a 20-cm worm seen looped four times through bill (Coleman 1939). SEASONAL VARIATION: Said to eat much fruit in summer when earthworms less plentiful and ground drier and harder; also said to take many caterpillars and adult insects from above ground during late spring and summer (Frith 1969). In Melbourne, in June–July, appear to favour ripening seeds and fruit of *Pittosporum* over usual diet of worms; at end of July, seeds dry up and turn black, and are no longer eaten (Cooper 1959). In NZ, eat much Black Nightshade *Solanum nigrum* during winter and early spring (McCann 1953). At Kowhai Bush, SI, diet mainly comprises invertebrates during winter and spring (Powlesland 1983). On Snares Is, eat animal food throughout year, as no fruit trees present (Stead 1948). TIMES OF FORAGING: Forage throughout day (B.J. Kentish), though also said to be crepuscular (McCann 1953) and to forage in early morning (Counsilman 1974b). In NZ, forage on shoreline, mudflats and *Zostera* beds at low tide (Hodgkins 1949; Cunningham & Moors 1985). In Christchurch, regularly forage under artificial lights 3 h before dawn (CSN 45). PEST STATUS: Can cause damage to fruit in orchards and vineyards (e.g. Anon. 1905; Campbell 1905; Drummond 1906; Ryan 1906; Thomson 1922; Sutton 1928; Lord 1931, 1933; Butler 1941; Sharland 1942, 1967; Dawson & Cresswell 1949; Bull 1953; McCann 1953, 1964; Napier 1969; Dawson & Bull 1970; Fielding 1979; Baker 1980; Harris 1980; Green 1995; Heather & Robertson 2000; Spennemann & Allen 2000; Bomford & Sinclair 2002; Oliver) and in gardens (Bomford & Sinclair 2002), but also help control numbers of other pests, such as insects, snails and slugs (Campbell 1905; Robertson 1947; Baker 1980; Oliver). In Tas., described as 'obnoxious pest, especially in suburban gardens' (Green 1995), owing to habit of damaging crops, turning and scattering garden mulch, scratching newly planted ground and destroying unprotected seedlings in search of food (Morgan 1914; Fricke 1983; Green 1995; B.I.E. Peter). At Murray Bridge, SA, responsible for 4% of attacks on apricots in orchards, but 93% of those apricots (n=14) had already been pecked (Paton & Reid 1983). Very efficient at dispersing weeds, especially of plant pests, such as Blackberry and Black Nightshade, causing them to spread into native forests and crops (McCann 1953; Heather & Robertson 2000; Oliver). Not only frequent areas where many weeds originate, but move between urban and rural vegetation, often soon after feeding, ensuring seeds passed are dispersed widely (Burrows 1994; Timmins & Williams 1996; Williams & Karl 1996). In Vic., also a dispersal agent for native species such as Sweet Pittosporum and Cherry Ballart (Aust. Atlas 1) and, in some native forests in NZ, help disperse seeds of fleshy-fruited understorey plants (Heather & Robertson 2000). In NZ, said to displace native birds by eating their preferred native fruits (Oliver) but confirmation needed. IMMUNITY TO POISON: In NZ, eat much poisonous Black Nightshade, with birds either immune to the poison, or poison not present in sufficient quantities to harm them, though it does appear to cause significant looseness of bowels; Black Nightshade not fed to young (McCann 1953). ADAPTATIONS: Large gape allows ingestion of most fruits and berries whole (Burrows 1994). DRINKING: Observed drinking water (Tily 1946; Kennedy 1978; Green 1995), including from saucer (CSN 21). In NZ, adults observed drinking with bills filled with food (Tily 1946).

On NOISES IS, HAURAKI GULF, NI, NZ (stomach contents of 13 birds; Cunningham & Moors 1985): **Plants** (All fruit or seeds [not specified].) DICOTYLEDONS: Araliaceae: *Pseudopanax arboreum* 7.7% freq.; *P. lessonii* 92.4; Epacridaceae: *Leucopogon fasciculatus* 23.1; Myoporaceae: *Myoporum laetum* 7.7; Rubiaceae: *Coprosma macrocarpa* 7.7; Rutaceae: *Melicope ternata* 7.7; Tetragoniaceae: *Tetragonia trigyna* 7.7; Thymelaeaceae: *Pimelea prostrata* 7.7. **Animals** ANNELIDS 7.7. MOLLUSCS 38.5; Gastropods: Sigmurethra: Zonitidae: *Oxychillus cellerius* 7.7; Stylommatophora: Punctidae: *Laoma glabriuscula* 7.7; *L. poecilosticta* 15.4;

Systellomatophora: *Therasia* 7.7; Littorinidae: *Risellopsis varius* 7.7; Rissoidae: *Estea zosterophila* 7.7. CRUSTACEANS 23.1. SPIDERS 46.2. MYRIAPODS 15.4. INSECTS 100; Coleoptera 61.5; Dermaptera 7.7; Diptera 23.1; Hemiptera (mainly Cicadidae: *Amphisalta*) 38.5; Hymenoptera: ants (including Ponerinae: *Amblyopone australis* and Ponerinae: *Mesoponera castanea*) 46.2; Lepidoptera 7.7.

At PORT HILLS, CHRISTCHURCH (fruit eaten, by obs.; Burrows 1994): **Plants** MONOCOTYLEDONS: Agavaceae: *Cordyline australis*. DICOTYLEDONS: Araliaceae: *Schefflera digitata*; Caprifoliaceae: *Leycesteria formosa*; *Sambucus nigra*; Cornaceae: *Griselinia littoralis*; Elaeocarpaceae: *Aristotelia serrata*; Grossulariaceae: *Ribes sanguineum*; Onagraceae: *Fuchsia excorticata*; Rosaceae: *Rubus fruticosus*; Rubiaceae: *Coprosma lucida*; *C. robusta*; Violaceae: *Melicytus ramiflorus*.

In rainforest near NELSON, SI (faecal samples and observations at three sites: Eves, Feb. 1992–Feb. 1993; Marsden, Feb.–June 1993; and Faulkners, Dec. 1993–June 1994; Williams & Karl 1996) summarized in Table 1; in addition to items listed, also seen eating fruit of *Dacrycarpus dacrydioides*, *Solanum aviculare* and *Ligustrum sinense*.

Other records—Aust. Plants (Fruit unless stated.) Seeds[29,34,51]. MONOCOTYLEDONS: Grain[29,50]; Arecaceae: *Chamaerops humilis*[10]; Liliaceae: *Asparagus asparagoides*[32,38]. DICOTYLEDONS: Fruit[4,7,8,11,12,21,29,41,45,51]; Aquifoliaceae: *Ilex*[5]; Araliaceae: *Hedera helix*[20]; Asteraceae: *Chrysanthemoides monilifera*[38,39]; Grossulariaceae: *Ribes sativum*[43]; Loranthaceae: *Amyema pendulum*[35,37]; Moraceae: *Ficus*[8]; *F. carica*[35]; *Morus nigra*[35]; Oleaceae: *Olea europaea*[35]; Pittosporaceae: *Pittosporum undulatum* fru.[22,30,50], sds[22]; Rosaceae: *Cotoneaster*[22,51,52]; *Crataegus monogyna*[5,6,13,22,35]; *Eriobotrya japonica*[35]; *Fragaria virginia*[9]; *Prunus*[35,49]; *P. armeniaca*[33]; *P. cerasifera*[43]; *P. domestica*[9,44]; *P. laurocerasa*[44]; *P. persica*[9]; *Pyracantha*[36]; *P. angustifolia*[43]; *P. fortuneana*[43]; *Rubus fruticosus*[20,35,38]; Rubiaceae: *Coprosma quadrifida*[40,42]; Rutaceae: *Citrus sinensis*[25]; Santalaceae: *Exocarpos*[35]; *E. cupressiformis*[50]; Solanaceae: *Lycium ferocissimum*[20,48]; Verbenaceae: *Lantana camara*[39]; Vitaceae: *Vitis vinifera*[8,15,16,23,35,38,49]; Winteraceae: *Pseudowintera axillaris*[31]. **Animals** ANNELIDS: Oligochaetes: earthworms[21,29,34,38,45,46,51,52]. MOLLUSCS: Gastropods: snails[21,29,34]; Helicidae: *Helix aspersa*[2,51]; *Helicella neglecta*[24]; Limacidae: slugs[7]: *Limax maximus*[24]. SPIDERS[29,34,41]. DIPLOPODS[29]. INSECTS[2,28,29,34,41,45]: Blattodea[41]; Curculionidae[51]; Scarabaeidae[51]; Diptera larv.[29,51]: Stratiomyidae[51]; Tenebrionidae: *Tenebrio*[12]; Hymenoptera: Formicidae: ants[51]: *Camponotus*[26]; Lepidoptera larv.[1,2,51]; Agaristidae: *Phalaenoides glycinae* larv.[14]; Noctuidae[51]; Orthoptera: Acrididae: *Chortoicetes terminifera*[17,18]. AMPHIBIANS: Tadpole[50]. REPTILES: Lizards[19,47]; Scincidae[38]. **Other matter** Crumbs[27,45]; slice of lemon cake with icing, thrown by drunken observer[52]; scraps[45], including meat scraps[53].

REFERENCES: [1] Kendall 1904; [2] Campbell 1905; Anon. [4] 1905, [5] 1940, [6] 1949; [7] Campbell 1905; [8] Ryan 1906; [9] Sutton 1928; [10] Tadgell 1936; Coleman [11] 1937, [12] 1939; [13] Cohn 1942; [14] Simmonds 1943; Fuller [15] 1942, [16] 1945; [17] Basse 1948; [18] Condon 1948b; [19] Brown 1950b; [20] Cleland 1952; [21] Sharland 1958; [22] Cooper 1959; [23] Hudson 1959; [24] Cotton 1960; [25] Hobbs 1961; [26] Bedggood 1965; [27] Crowe 1978b; [28] Kennedy 1978; [29] Long 1981; [30] Gleadow 1982; [31] Norton 1982; [32] Fricke 1983; [33] Paton & Reid 1983; [34] Hermes 1985; [35] Forde 1986; [36] Mulvaney 1986; [37] Reid 1986; [38] Pizzey 1988; [39] Morris 1989; [40] French 1990; [41] Hutton 1991; [42] French *et al.* 1992; Lepschi [43] 1993, [44] 1997; [45] Green 1995; [46] Kentish *et al.* 1995; [47] Kutt & Kemp 1997; [48] Peter 2000; [49] Bomford & Sinclair 2002; [50] Aust. Atlas 1; [51] FAB; [52] G.D. Price; [53] M.A. Weston.

Other records—NZ Plants (Fruit unless stated.) Seeds[24]. MONOCOTYLEDONS: Agavaceae: *Phormium tenax*[25]; Arecaceae: *Rhopalostylis sapida*[29]. DICOTYLEDONS: Fruit[2,7,9,10,18,19,22,23,24]; Agavaceae: *Cordyline australis*[39,40]; Apiaceae: *Daucus carota*[6]; Araliaceae: *Pseudopanax lessonii*[38]; Berberidaceae: *Berberis vulgaris*[8]; Cornaceae: *Corokia*[27]; Corynocaraceae: *Corynocarpus laevigatus*[1]; Ericaceae: *Arbutus undedo*[13]; Grossulariaceae: *Carpodetus serratus*[31]; Malpighiaceae: *Byrsonima lucida*[39]; Moraceae: *Ficus carica*[22]; *F. macrophylla*[39]; Oleaceae: *Olea dioica*[9]; Myrtaceae: *Feijoa* calyx[33]; Onagraceae: *Fuchsia*[40]; Piperaceae: *Macropiper excelsum*[22]; Podocarpaceae: *Dacrycarpus dacrydioides*[39]; *Podocarpus nivalis*[12]; *P. spicatus*[30,31]; Rosaceae: *Crataegus monogyna*[8,27,28]; *C. lavallei*[13]; *Eriobotrya japonica*[22]; *Malus sylvestris*[6,15,17,22]; *Prunus domestica*[22]; *Pyracantha*[22]; *Raphiolepis indica*[40]; *Rosa* buds[41]; *Rubus idaeus*[22]; Rubiaceae: *Coprosma*[8,41]; *C. repens*[42]; *C. robusta*[22]; Sapindaceae: *Alectryon excelsus*[22]; Solanaceae: *Solanum nigrum*[9]; Vitaceae: *Vitis vinifera*[22]. **Animals** ANNELIDS:

Table 1. Fruit in diet at three localities in NZ (* = estimated from mean values; after Williams & Karl 1996).

Fruit	EVES (n=108)		MARSDEN (n=106)		FAULKNERS (n=106)	
	% freq.	% dry wt	% freq.	% dry wt	% presence	% dry wt
Indigenous fruit						
Alectryon excelsus	–	–	18.2	57.8	–	–
Coprosma grandifolia	6.3	1.8	–	–	–	–
C. robusta	18.8	0.8	9.1	0.8	–	–
Coriaria arborea	–	–	18.2	2.9	–	–
Melicytus ramiflorus	12.5	–	27.3	17.4	–	–
Muehlenbeckia australis	18.8	0.6	–	–	–	–
Podocarpus hallii	25.0	23.3	18.2	6.6	–	–
Prumnopitys taxifolia	–	–	–	–	100	100
Pseudopanax arboreus	18.8	0.6	9.1	0.3	–	–
Schefflera digitata	12.5	2.8	–	–	–	–
Introduced fruit						
Berberis glaucocarpa	31.3	23.7	–	–	–	–
Crataegus monogyna	12.5	43.6	–	–	–	–
Leycesteria formosa	50.0	2.6	–	–	–	–
Passiflora mollissima	–	–	9.1	11.1*	–	–
Solanum nigrum	–	–	9.1	3.1	–	–
% presence of fruit	71.0		50.0		66.6	
No. of species/defecation	2.0±0.8		1.8±0.3		1.0	

Oligochaetes: earthworms[1,2,4,10,11,23,24,26,27,33,37]. MOLLUSCS: Gastropods: snails[24]; water snails[35]; Helicidae: *Helix aspersa*[2]; Pulmonata: *Wainuia urnula*[29]. CRUSTACEANS: Amphipods[23]; also see Birds, below. SPIDERS[23]. DIPLOPODS[23]. INSECTS[2,3,4,10,24]: Coleoptera[23]; Diptera[3]: Calliphoridae: *Calliphora huttoni* larv.[16]; Isoptera: Porcellionidae[3]; Lepidoptera: larv.[3,4,23], ads[3]. AMPHIBIANS: Tadpoles[21,41]. REPTILES: Scincidae[20,36]: *Cyclodina aenea*[21]. BIRDS: *Pachyptila vittata* regurgitant (mainly copepods)[20]; *Puffinus* (though not confirmed eating flesh and probably taking maggots from corpse)[14]. MAMMALS: Carrion[32]; Marsupials: *Trichosurus vulpecula*[32]. **Other matter** Breadcrumbs[5]; scraps[10,13]; fat[34].

REFERENCES: [1] Moncrieff 1929; [2] Bull 1946; [3] Tily 1946; [4] Robertson 1947; [5] Graham 1948; [6] Michie 1948; [7] Dawson & Cresswell 1949; [8] Hodgkins 1949; McCann [9] 1953, [10] 1964; [11] Shanks 1953; [12] Sibson 1958; [13] East 1967; [14] Warham 1967; [15] Dawson & Bull 1970; [16] Horning & Horning 1974; [17] Baker 1980; [18] Falla *et al.* 1981; [19] Fitzgerald *et al.* 1989; [20] Nilsson *et al.* 1994; [21] Bell 1996; [22] Gibb 2000a; [23] Heather & Robertson 2000; [24] Oliver; CSN [25] 2, [26] 3, [27] 4, [28] 5, [29] 6, [30] 8, [31] 9, [32] 19 Suppl., [33] 20, [34] 21, [35] 22, [36] 28, [37] 31, [38] 37, [39] 38, [40] 39, [41] 42, [42] 44.

Young Both sexes feed young, though also claimed only female feeds young (see Breeding). Feed nestlings at intervals of *c.* 45 min, interspersed with bouts of brooding by female lasting *c.* 15–20 min (Marples & Gurr 1943). In NZ, young once fed 40 times in 4 h (Robertson 1947). Larval and adult insects, captured above ground in late spring and summer, said to form large part of diet of young (Frith 1969). In NZ, young fed almost exclusively on soft-bodied insects and earthworms (McCann 1953); at one nest, female fed nestlings worms from a bunch in her bill (McKenzie 1945). When feeding worms to nestlings, sometimes chop them into small pieces before carrying them to nest (Moore 1949), or mangle them by repeatedly banging them against ground and shaking them. Extralimitally, sometimes drag mangled worm through soil of flowerbed before giving it to young, perhaps to remove slime, or maybe because grit is necessary in diet (Snow 1958).

No detailed studies on diet of young. **Plants** Myrtaceae: *Feijoa* fl.[10]. **Animals** ANNELIDS: Oligochaetes: earthworms[1,2,4,6,7,8]. MOLLUSCS: Gastropods: snails[2]. SPIDERS[8]. INSECTS[7]: Lepidoptera: *Theretra oldenlandiae*[2], larv.[3]. **Other matter** Fat[5]; food scraps[9].

REFERENCES: AUST.: Coleman [1] 1937, [2] 1939; [3] Simmonds 1943. NZ: [4] McKenzie 1945; [5] Tily 1946; [6] Moore 1949; McCann [7] 1953, [8] 1964; CSN [9] 22, [10] 31.

Intake In Melbourne, bird once ate 74 *Crataegus* berries continuously in very short time (Cooper 1959). Near Healesville, Vic., from eight faecal samples collected from adult birds: 75% contained fruit, with mean 22.3±17.4 seeds/faecal sample, and total of 67 seeds of *Coprosma quadrifolia* in three samples (French 1990). In orchard at Murray Bridge, SA, made 14.9 pecks/visit when feeding on apricots (Paton & Reid 1983). SIZE OF FOOD: Able to swallow whole native and exotic fruit up to 10 mm in diameter, digesting flesh and passing viable seeds in faeces (Burrows 1994; Heather & Robertson 2000); and once ate Fuchsia fruit 15 mm in diameter (CSN 39). Said to pass seeds in 4.5 min (Barnea *et al.* 1990). Seen to catch worm 20 cm long (Coleman 1939); caught and ate weta 3 cm long (CSN 43); and caught and ate Copper Skinks 5–6 cm long (snout–vent), weighing *c.* 4 g (Bell 1996).

SOCIAL ORGANIZATION

Well known extralimitally (see Greenwood & Harvey 1978; BWP). Less well known in HANZAB region, but some information from study of breeding and behaviour in SI, mainly at Dunedin, 1943–47 (Gurr 1954), on which account based unless stated. Usually seen singly or in pairs (e.g. Chisholm 1926; Gurr 1954; Lindsay *et al.* 1959; Gall & Longmore 1978; P.J. Higgins) and seen in pairs more often during breeding season than at other times of year (e.g. Thomas 1965; Brothers 1979); occasionally in small parties or flocks, such as one flock of 12 in Apr. (Gurr 1954; Gibson 1977; Garnett *et al.* 1991; see Food). Sometimes occur in larger parties, of up to 20–30, and occasionally loose flocks or congregations of hundreds reported foraging together; sometimes forage with other species such as House Sparrow, Song Thrush, Brown Thornbill and Common Starling (see Food). Territorial for much of year in HANZAB range (see below) with little evidence of gregarious behaviour shown by migratory populations extralimitally (BWP). However, roost communally in s. NZ (see below).

Bonds Claimed, without substantiating evidence, to be occasionally or habitually polygamous (Coleman 1939); no other account claims polygamy, and monogamous extralimitally (BWP). SEX-RATIO: Adult sex-ratio of some SI populations described as predominantly male, estimated at *c.* 2:1, based on trapping, shooting and observations made from car (Gurr 1954); in Ballarat Botanic Gardens, sex-ratio male-biased 1.23:1 (B.J. Kentish); and of 1091 Blackbirds banded in Vic., 1958–81, sex-ratio was 1:1.01 (B.J. Kentish). Winter study in Christchurch Botanic Gardens showed male-biased sex-ratio of 6:5, based on two independent studies, using counts and transects (East & Tasker 1967). Of records from Otira, SI, Oct., 80% were males, and suggested that tend to divide into parties of males and females (Moncrieff 1929), but probably biased due to sex differences in conspicuousness. TIMING OF BONDING: Pairs at Dunedin formed before mid-June (Gurr 1954). Young can breed at 9 months (Heather & Robertson 2000). **Parental care** Usually only female incubates and broods, and both parents feed nestlings (see Breeding). Near Melbourne, females twice observed to successfully raise broods of four nestlings in complete absence of male during brooding period (Coleman 1939). Often only male feeds fledgelings, while female begins another breeding attempt (see Breeding), consistent with behaviour reported from n. hemisphere (BWP).

Breeding dispersion Breeding density at Mangere, NI, based on assumption of two nests per pair during a breeding season, estimated at 0.75 pairs/ha (Bull 1946). In Nelson, SI, 19 active nests found in 72.8 ha (0.26 nests/ha) (Flux 1966). Territory of one pair studied over two seasons at Dunedin was 0.6–0.8 ha (Gurr 1954). TERRITORIES: Territorial; occupy discrete, non-overlapping territories (Gurr 1954; Kentish *et al.* 2001). Defend territories for most of year, e.g. from late Mar. to end Dec.; trespass by conspecifics apparently tolerated at other times. Pair studied at Dunedin used territory for all purposes except roosting. Females at Nelson defended territories by mid-May (Gurr 1954; see Social Behaviour).

Roosting Roost both within and outside territories; usually concealed. Males appear to keep rigidly to one roost-site, whether inside or outside territory, entering via regular route. Female more difficult to observe; roost more quietly, and possibly earlier than males. At Dunedin, *c.* 100 birds, of both sexes, roosted in *c.* 4 ha. One male left roost 35–48 min before sunrise (n=19 observations), and arrived 5–28 min after sunset (n=36) (Gurr 1954). Extralimitally, usually roost solitarily, or members of pair may roost close together, though in areas where suitable cover restricted, may roost communally (BWP).

SOCIAL BEHAVIOUR

Well known extralimitally (see BWP). Major study of breeding biology and behaviour from SI, mainly from pairs studied at Dunedin, 1943–47 (Gurr 1954). Territorial and sexual display conspicuous, though

pair-formation not observed (Gurr 1954). Tendency to flush noisily from nests when approached facilitates observation (Miskelly *et al.* 2001). **Communal display** During autumn, communal displays by up to seven males often observed; participants run around in circles or back and forth, keeping *c.* 1 m apart and posturing in a mild fashion. Communal displays last up to *c.* 30 min, ending for no apparent reason (Gurr 1954). BATHING: Male seen bathing in 1–2 cm of water in pool, dipping bill in water and splashing it all over itself; remained in pool for *c.* 1 min (Vellenga 1965).

Agonistic behaviour Territories defended by males and females against conspecifics, especially intruding males (Gurr 1954; Bright & Waas 2002). Males advertise by singing, often from song-post in centre of territory (Gurr 1954). Study of bill-colour and territorial behaviour found that simulated territory invasion by male models with brown bill received reduced response compared with that by models with yellow or orange bills (Bright & Waas 2002). Territorial behaviour most intense before nesting, diminishes during incubation and brooding, and absent during autumn moult, dispersal and break-up of family parties (Gurr 1954). Aggression between males described as typically mild, compared to often vicious fighting between females (Coleman 1939), though, after reports of fierce fighting between males at Karori, NI, nestlings in nearby nest were found to have been decapitated (Secker 1947a). Male at Lower Hutt, NI, observed displaying to his reflection in chrome rim of car headlight, for *c.* 2 min., after which female replaced him, behaving similarly, and continued to display and attack reflection intermittently for several weeks, till mid-Sept.; pecked at reflection with neck arched, wings fluttering and tail repeatedly fanned and cocked; on 21 Aug., displayed at car bumper for ⩾5 h; behaviour persisted in all weather, stopping only briefly to feed or rest, and female's tail and primaries became tattered (Daniel 1971). ESTABLISHMENT OF TERRITORIES: At Dunedin, territories established by fights between males (see Fighting below) which common by early Apr. Such fights either between two 'pioneers' to a new territory, or between an established owner and a newcomer attempting to annex part of territory. After establishment, territories mostly maintained by Threat Displays and Chases. One male viciously pecked a stuffed specimen placed on his territory in mid-Apr. (Gurr 1954). **Threat** THREAT DISPLAYS: Varied, but typical display is with head lowered, neck extended, wings drooping and feathers of rump erected. Male observed striding up and down cross-piece of telephone pole in centre of his territory, with back hunched, rump feathers raised and tail lowered, giving repeated Aggressive Tsee Calls, immediately before chasing another male off territory. Aggressive Tsee Calls mainly between males facing each other across territory boundary, occasionally given during chase-flights (Gurr 1954; see Voice). Before going to roost, repeatedly utter metallic Aggressive Call, which said to have infectious effect on all neighbouring birds; once one bird starts Call, flying restlessly about territory, it is taken up by all adjacent birds and increases in volume till all birds have roosted, usually within 10 min (Gurr 1954; see Voice). At Dunedin, two males patrolled territory boundary in manner described as 'sentry marching' (CSN 1). For extra detail on threat postures extralimitally, see BWP. TERRITORIAL CHASE: Ground chase described as always comprising running or mincing stride; as intensity of chase increases, beak may be opened, displaying yellow inside of mouth (Gurr 1954). Aerial chases common, and usually between two, or sometimes several, males (e.g. CSN 2, 20). Aerial chases between adjacent territory-holders, in which the pursuer extends chase into neighbour's territory and is then, in turn, chased, may result in 'shuttlecock' performance which may last for 1 h (Gurr 1954). Such behaviour described as formalized and unexcited (Lack & Light 1941). **Fighting** Males initially sit facing each other with wings drooped, backs arched and tails lowered and spread, eventually striking each other with bills and claws, and often make vertical flights of *c.* 1 m, still facing one another and with beaks within 5–10 cm of each other; such behaviour interspersed with periods of chasing (Gurr 1954). Males sometimes utter high-pitched clucking call during fights (Secker 1947b). **Submission** SUBMISSIVE DISPLAYS: Alarm Rattle often given by bird being pursued during territorial chase, described as expression of submission (Gurr 1954; see Voice). Extralimitally, submissive birds adopt Sleeked-upright Posture, Hunched Posture, or Tail-up Posture; see BWP for details. TRIUMPH CEREMONIES: Victor of territorial encounters often returns to a song-post and gives Flight Song (Gurr 1954; see Voice). USE OF PLANTS: Twigs and other plant material held in bill often used as part of agonistic and sexual display. Male seen to pick up twig in his beak and run at opponent (Gurr 1954). Males displaying at other males also observed using leaves and grass roots (Shanks 1953; CSN 5, 20). Of two males observed in agonistic interactions, May–Aug. at Cambridge, NI, one habitually used leaves. When using long nectarine leaves, usual method was to snip the leaf in half before holding it clamped firmly in bill, but would also fold it in half along central vein, and hold it in middle; during displays, in which the two birds would flutter up and down together, and chase each other, leaves became ragged and torn, and would usually be discarded for fresh ones. Same male also displayed to a female with beech leaves (Shanks 1953). Male carrying fully opened marigold flower, closely followed by female, observed flying into tree, where both disappeared from view; flower fell to ground shortly after (Mosey 1951). **Alarm** When potential predator detected, often give Warning Calls, especially used to warn young or when aerial predator detected (see Voice). Utter Alarm Calls when mildly unsettled, or more intense Alarm Rattle when flushed (Gurr 1954; see Voice). Alarm Rattle sometimes taken up by nearby birds, but in a less intense manner; also sometimes uttered during Chases (Gurr 1954). **Interspecific interactions** Song Thrush singing weak Territorial Song was chased out of Blackbird territory in mid-May, but in late Aug., sang in same territory for prolonged periods without attracting any notice. All other species apparently tolerated within territory at Dunedin, though not near nest (Gurr 1954). Aggressive behaviour elsewhere observed towards many other species, including Weka *Gallirallus australis* (CSN 24), Southern Boobook *Ninox novaeseelandiae* (Harvey 1994; CSN 29), Little Owl *Athene noctua* (Hornby School 1946), Long-tailed Cuckoo *Eudynamys taitensis* (Sagar 1977), Sacred Kingfisher *Todiramphus sancta* (CSN 4, 44), wattlebirds *Anthochaera* (Pizzey 1988), Tui *Prosthemadera novaeseelandiae* (CSN 2), Rufous Bristlebird (Peter 2005), Bassian Thrush (Pizzey 1988), Common Starling (CSN 9), and Common Myna *Acridotheres tristis* (Counsilman 1974b), often associated with nesting activities. In turn, attacked or chased by Tui (CSN 45), nesting Sacred Kingfishers (Hayes 1991), Rufous Bristlebird (P.N. Reilly), Grey Shrike-thrush *Colluricincla harmonica* (Cleland 1944), Regent Honeyeater *Xanthomyza phrygia* (Franklin & Robinson 1989), and Noisy *Manorina melanocephala* (Mellor 1924, 1926, 1927) and Bell M. *melanophrys* Miners (Tzaros 1992). Chased several times by Black-billed Gulls *Larus bulleri* till billful of worms was dropped (Middleditch 1949). Once, male seen trying to drive Cat away from its injured mate (Hobbs & Kaveney 1962).

Sexual behaviour Aerial chases between pairs often observed; male gave high-pitched clucking call after ending one pursuit, similar to call given during fights (Secker 1947b). COURTSHIP DISPLAY: Actual pair-formation not observed; following descriptions of displays are of established pairs. Courtship display by male shares characteristics with agonistic displays. In one example, described as unusually violent, male,

giving peculiar gurgling *tsee* call, displayed with tail fanned down, back arched, feathers of rump erected and head bowed below perch (= Advertising-display of BWP, which see for illustration of posture); display first given while facing female, then facing away, usually wiping bill on branch between displays, and chasing female from branch to branch. Back-arching and head-bowing described as so violent that male became vertical, presenting complete dorsal and ventral surfaces to female. Female passive throughout, giving occasional *tchook* call and flick of tail. Entire performance lasted *c.* 15 min. In one display followed by copulation, elements of display described as much milder, consisting of lowered tail and drooped wings. In displays on ground, male runs up and down in front of female, posturing; sometimes with beak held open, giving *tsee* call. Display before female usually broken off suddenly by one of pair beginning to feed or flying off (Gurr 1954). **Courtship feeding** Male fed female on nest at Hakatamarea, SI (Robertson 1947), and also reported elsewhere (Oliver; NRS), but not seen feeding female on or off the nest during major study (Gurr 1954) and in several other studies (Coleman 1939; Tily 1946; Bennett 1988); seldom reported extralimitally (BWP), and requires confirmation.

Relations within family group Male visits nest often during incubation and brooding, standing on edge of nest, looking at eggs or young, occasionally lightly covering eggs, or feeding young (see Breeding). Male usually feeds nestlings when female away from nest, but if brooding, female will move aside while male feeds young (see Breeding). Male usually departs silently as soon as female returns, occasionally giving Alarm Call. Several times, one male seen flying at female after a period away from nest, and chased her to nest with excited clucking; also seen chasing female off nest after long spell on nest (Gurr 1954). Female described as being responsible for enticing nestlings to fledge; female alights below nest with a billful of food just out of reach, calling quietly (Coleman 1939). See Breeding for details of parental care. Female recorded sheltering nestlings from rain (see Breeding); and, extralimitally, both parents recorded shading nestlings (BWP). See BWP for further details recorded extralimitally, such as begging behaviour of nestlings, and calling of female to encourage nestlings to beg. ANTI-PREDATOR STRATEGIES OF YOUNG: Late in nestling period, Alarm Calls from male cause active nestlings to crouch on floor of nest (Coleman 1939). PARENTAL ANTI-PREDATOR STRATEGIES: Throughout nestling period, one female with nest in suburban garden repeatedly attacked person who had inspected nest, but ignored other people; observer was struck on shoulder and head, and otherwise harassed throughout garden; after young fledged, person was ignored (Lauder 1978). Fledgelings at Hastings, NI, froze on lawn with Cat 3 m away, all with beaks pointing upward, while nearby parents gave Alarm Calls (CSN 24). Female sits tight on nest when approached by people (Gurr 1954), often pecking viciously at fingers or intruding objects, and flattens body and spreads tail on nest, or freezes on nest with beak held vertically. One female froze on edge of nest for *c.* 3 min. in presence of person, despite holding a mass of worms in her bill (Coleman 1939).

VOICE Well known extralimitally (see BWP, and references therein), but little published information for HANZAB region; sonagrams in Jurisevic & Sanderson (1994) and Kentish *et al.* (2001), and for extralimital populations in BWP. In w. Palaearctic, repertoire of adults consists of six songs, of which Territorial Song most characteristic, and eight calls, most of which have several different variants (BWP). Often first detected by vocalizations (Chambers *et al.* 1955; Williams 1960; Blackburn 1968; Lashmar 1988; Gibb 1996, 2000b; Freeman 1999), e.g. near Wellington, detected first by vocalizations on 67.9% of days recorded (Gibb 1996); most often detected by Song, and less often by calls (Gibb 2000b); for seasonal breakdown of proportions heard first versus seen, see Table 2. Territorial Song sometimes dominates dawn or evening chorus (CSN 6), and on Kermadec Is, said to dominate forest (Edgar *et al.* 1965). Often sing from prominent perch or song-post, e.g. top of tree or on exposed branch, power-pole or top of building (Dove 1936; Secker 1947a; Brathwaite 1956; Disney & Smithers 1972; Gill 1977; Heather & Robertson 2000; CSN 2, 3, 4, 41); soft Subsong given from cover beneath leafy shrub or hedge (Falla *et al.* 1981; Heather & Robertson 2000; CSN 24). Sometimes several neighbouring birds sing at same time (NSW Bird Rep. 1977; CSN 4, 9). Song often described as beautiful or delightful (Ryan 1906; Leach 1928; Coleman 1939; Harris 1980); also serene, mellow and melodious, loud and powerful (Kloot & McCulloch 1980; Pizzey 1980); 'perhaps one of the most appealing bird voices' (Coleman 1939). DUETS: Occasionally sing in duets: one sang musical phrase, then paused while second bird immediately repeated phrase; first bird then sang another phrase, and the second repeated it; second bird very occasionally repeated phrase incorrectly (about once in every six phrases); duet lasted for *c.* 1 min (Halafoff 1962). Sometimes also sing (though not in duets) with Bellbirds (Watters 1949) and Song Thrushes (CSN 4, 5). SEASONAL PATTERN: Strongly seasonal. Little data for *AUST.*: said to sing between late winter and summer (Kloot & McCulloch 1980); in w. Vic., start singing in late July or early Aug., singing earlier in wetter conditions, and continue till late Dec. (Brown 1950a); in SA, sing from May till at least Jan. (Cleland 1927, 1937; Sutton 1927, 1932; Eckert 1972); in NSW, sing till at least Jan. (NSW Bird Rep. 1981). Much more data for *NZ*: usually first heard singing between mid-June and late July, though sometimes not till Aug.; and continue till Dec. or Jan., sometimes Feb., and very occasionally till Mar. (Sibson 1949a,b; Gurr 1954; Warham 1967; Falla *et al.* 1981; Merton & Veitch 1986; Heather & Robertson 2000; CSN). First Song in Orongorongo Valley, near Wellington, occasionally in Aug. but mostly in Sept. (Gibb 1996), and at W. Hutt, also near Wellington, main Song period Aug.–Jan., though occasionally earlier, in July, and sometimes till Feb. (Gibb 2000a). In NZ, song-period starts later at higher elevations than at lower ones (Dawson *et al.* 1978; CSN 3), and at Minginui, song-period appears vastly different to elsewhere, and said to be 3 months later than at Clevedon (CSN 5, 6), often not starting till Sept. and sometimes not finishing till Mar. (CSN 5, 6, 8, 9). In NZ, Subsong observed from Mar. through rest of year, and possibly occurs throughout year (Gurr 1954). Utter calls throughout year (Gibb 2000a); for monthly breakdown of proportion of songs and calls given, see Table 3. DIURNAL PATTERN: Sing at any time during daylight hours (e.g. Sibson 1949a; Wagener 1966; Merton & Veitch 1986; Gibb 2000b; CSN 2, 6, 8), though much singing occurs round dawn and sunset, and associated twilight (Mellor 1926; Sutton 1927; Leach 1928; Disney & Smithers 1972; Imboden 1975; Pizzey 1980; Hutton 1991; Smith 1994; CSN), with one bird singing for 90 min after sunset on moonless night (CSN 45). Also sometimes sing at night, e.g. *c.* 04:30 (Crockett 1954; Ward 1969; CSN 4, 6) with one bird singing at 01:20, accompanied by several others, which clucked at same time (CSN 19 Suppl.), and another singing from 02:00 till dawn (CSN 48). At Netherby, SA, first heard calling mean 65.6 min before sunrise (13.15; 40–107 min; 35 days [29 July–1 Sept.]) (Sutton 1919). In dawn chorus near Te Teko, NI, first heard at 05:32, 50 min before sunrise (Taylor 1975); and at Moumouki, first heard at 04:15, 41 min before sunrise (CSN 21). Early in song-period, often sing only in evening (CSN 1, 6, 38, 41, 42), though sometimes given in morning at that time (Sutton 1927). Sometimes sing after rain, and also in cold but sunny weather (Rep. Bull. OSNZ 3; CSN 35, 36).

SIMILAR SPECIES: Song resembles that of Bassian Thrush (Ford 1983; Holmes 1984) and of Island Thrush, differing from latter by being 'stronger' and phrases repeated less often (van Tets & van Tets 1967; Blackburn 1971; Holyoak 1979; Frith & Frith 1992). Trilling and warbling of Subsong similar to Song of Silvereye, but slightly louder (Cleland 1936; St Paul 1975). Warning Call, when given in presence of raptor, said to be indistinguishable from Seee Call of Common Chaffinch *Fringilla coelebs* (Serventy 1957); and Alarm Call said to be similar to that of Island Thrush (Blackburn 1971; Holyoak 1979). Communicative *zeet* similar to concluding part of Song of Yellowhammer *Emberiza citrinella* (Ward 1969). MIMICRY: In HANZAB region, occasionally include mild mimicry in Subsong (Marshall 1950; Chisholm 1965; Pizzey 1980), e.g. heard mimicking Cockatiel *Nymphicus hollandicus* and Grey Butcherbird *Cracticus torquatus* (Lane 1964; CSN 36). In Canberra, mimic call of Yellow-tailed Black-Cockatoo *Calyptorhynchus funereus* (which colonized the area 2 years previously) and ring-tone of mobile telephone (J.R.W. Reid); and in suburban Melbourne, mimicked Song of Olive-backed Oriole *Oriolus sagittatus* (J.M. Peter). INDIVIDUAL AND REGIONAL VARIATION: Comparison of Songs of birds from two sites in Vic. indicates much individual variation, and many Songs have site-specific characteristics, with phrase-sharing within local populations, based on timing within phrase which comprises the loudest elements, with greatest variation in notes in middle of phrase (Kentish *et al.* 2001, which see for further details). Song on Kermadec Is considered the same as that on mainland NZ, but Alarm Calls differ slightly (Merton & Veitch 1986), though not stated how the calls differed.

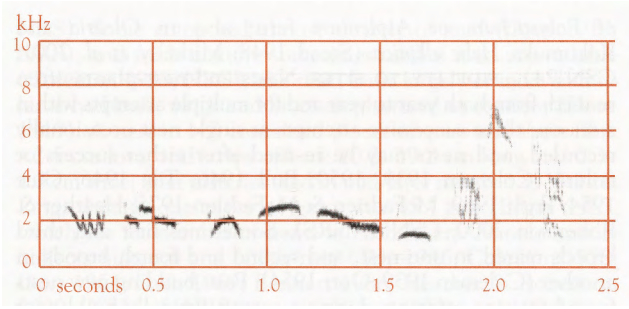
Adult TERRITORIAL SONG: Long, loud, musical, complex string of measured phrases, fluently run into each other and seldom repeated (lacking repetitive nature of Song of Song Thrush or Island Thrush) (Pizzey 1980; Falla *et al.* 1981; Hutton 1991; Heather & Robertson 2000; Kentish *et al.* 2001; CSN 4). Each phrase usually *c.* 2 s long, and phrases early in Song often louder and longer than later ones, possibly to gain attention, and less varied in order to be quickly recognized by congeners, with later ones more varied (Kentish *et al.* 2001); see sonagram **A**. Given constantly by male while female incubated (Turbott 1947). When singing resumes after break of several months, irregular or incomplete version of Song often uttered for a few days or weeks before full Song given (e.g. with only first or last phrase sung spasmodically) and described as brief or weak, sung in odd snatches or attempts, as though in practice; similarly, after main singing period ends, continue to give incomplete, 'fading and infrequent' song (Sibson 1953; Kinsky & Sibson 1959; Merton & Veitch 1986; CSN). Can sing while holding a billful of worms, and call while drinking (Tily 1946; CSN 23). Quiet singing from one or more birds sometimes heard (e.g. Secker 1952; CSN 4, 19 Suppl., 34, 41) and probably refers to either Male Subsong or Subdued Song (see below). MALE SUBSONG (= Whisper Song): Soft and continuous inward warbling, often given from beneath dense shrub (Gurr 1954; Falla *et al.* 1981; Heather & Robertson 2000; CSN 24); *sotto voce* (Cleland 1936). Consists of disjointed series of phrases of own song and calls, especially alarm calls, and mimicry of other species (Pizzey 1980; BWP; CSN 1). Audible only within a few metres (Gurr 1954). Used to practice full song rather than for communication (BWP). SUBDUED SONG: Quiet song, but louder than Subsong, consisting of all phrases of full song (CSN 4); hurried and jumbled, interspersed with soft versions of Alarm Rattle (BWP). FLIGHT SONG: Described as sounding like a strangled version of Territorial Song; given after winning territorial encounter (Gurr 1954). Three other songs described extralimitally: RAMBLING SONG OF MALE, COURTSHIP SONG OF MALE and COURTSHIP SONG OF FEMALE (BWP), which not described for HANZAB region. CONTACT CALL: Thin or high-pitched *tsee* (Kloot & McCulloch 1980; Pizzey 1980) or *zeeet* (Ward 1969). Sounds similar to one type of Aggressive Call (see below), but with slightly lower pitch and slightly rough or rolled *rr* quality due to pronounced frequency modulation (BWP). Whispered alarm call once given by foraging male that continued to feed (CSN 34) possibly contact call. WARNING CALL (TERRESTRIAL): Repeated *pook pook* or *kop kop*, used to alert young to presence of terrestrial predator (BWP); on hearing call, nestlings crouch on floor of nest (Coleman 1939). WARNING CALL (AERIAL): Anxious *tsoi* (Pizzey 1980) or high-pitched *seeeee* (Serventy 1957), given as warning of presence of aerial predator (BWP). Gradual in onset and cessation so as not to betray location (BWP). Probably this call given when New Zealand Falcon *Falco novaeseelandiae* flew overhead (Porter & Dawson 1968). ALARM CALL: In HANZAB region, rendered as anxious *tchook tchook* (Falla *et al.* 1981; Heather & Robertson 2000) or persistent ringing *tchink tchink* (Pizzey 1980; Hutton 1991; Heather & Robertson 2000). Initially given in mild alarm or protest, but subsequently given at accelerated rate and rising in pitch as bird becomes more excited, often leading into Alarm Rattle (BWP; see below). Alarm notes from calls uttered at two different intensities measured at: (a) peak frequency 5.8 kHz, minimum frequency 2.8 kHz, and duration 0.048 s; (b) peak frequency 6.3 kHz, minimum frequency 3.6 kHz, and duration 0.043 s (Jurisevic & Sanderson 1994). Staccato *chip chip chip* (Ward 1969; Kloot & McCulloch 1980), clucking given while another bird sang (CSN 19 Suppl.), and high-pitched clucking by male during fights, or once after sexual chase (Secker 1947b), all possibly describe *tchook* Alarm Call. ALARM RATTLE: Hysterical, shrill screaming chatter given when flushed or otherwise surprised suddenly (Witherby *et al.* 1938; Gurr 1954; BWP). In HANZAB region described as screeching chatter and angry screech (Williams 1960; Pizzey 1980; Falla *et al.* 1981); Alarm Rattle given by female when flushed from nest (McKenzie 1945; Miskelly *et al.* 2001). AGGRESSIVE CALLS: Three different types observed (BWP): (a) Repeated metallic *chink*, *pink* or *mik* given when mobbing predator or when going to or from roost; sometimes mistaken for Alarm Call (BWP); (b) thin, high-pitched *tsee* (Aggressive Tsee Call) (Gurr 1954) or *seee*, similar to Contact

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

	Heard first	Seen first
Spring	*c.* 67%	*c.* 33%
Summer	*c.* 70%	*c.* 30%
Autumn	69%	31%
Winter	64%	36%

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

	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.
Song	30	3	0	0	0	0	7	20	49	52	52	54
Call	70	97	100	100	100	100	93	80	51	48	48	46



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

Call but sounding slightly higher pitched (BWP); and (c) screaming or shrieking notes uttered during Pursuit-flights (BWP). In HANZAB region, utter Aggressive *Tsee* Call as threat signal in territorial disputes (Gurr 1954; see Social Behaviour: Agonistic behaviour); and utter repeated aggressive *chick* when going to roost (= Roosting Call) (Gurr 1954; CSN 1). Following calls probably also refer to Aggressive Call: piercing cries used to scold owls and Cats, sometimes for up to 2 h (Hornby School 1946; Shanks 1953; Falla *et al.* 1981; Heather & Robertson 2000; CSN 24, 31, 39); scolding at person near nest with young (Coleman 1939; Lauder 1978; J.M. Peter); intense calls given when confronting Long-tailed Cuckoo or stuffed European Cuckoo *Cuculus canorus* (Sagar 1977; Gill 1982; CSN 24); shrill distress calls given when Australian Magpie *Gymnorhina tibicen* at nest (Nevill 1976); and piercing screams given by female watching two fighting males (Rep. Bull. OSNZ 3). OTHER CALLS: Chuckling notes given when on ground (McGilp 1926; Tarr 1950; Pizzey 1980), rendered as *te-he-he* (Shanks 1953). Loud *tsup* given by males during fierce fighting (Secker 1947a). Undescribed 'great fuss and outcry' given by male when first egg of clutch was laid (Moore 1949). Male gave 'continuous cries of distress' when temporarily deserted by female (Lane 1980), though this unlikely to have been true Distress Call described for w. Palaearctic. Three other calls reported extralimitally: Distress Call, Courtship Call and Feeding Call (BWP).

Young In HANZAB region, nestlings give faint cheeping (Tily 1946), and nearly fledged nestlings piercing screeches when handled (CSN 24). Fledgelings call plaintively, and one, feeding near parents, made chirping attempt at Song (McKenzie 1945; CSN 30). For extralimital details, see BWP.

BREEDING Very well known in HANZAB region from detailed studies: at Mangere, NI, 1943 (Bull 1946); at St Arnaud, SI, Oct. 1962–Dec. 1965 (Flux 1966, submitted to NZ NRS); and Dunedin, 1943–44 season (Gurr 1954); at Otago Museum, Dunedin (Marples & Gurr 1943); elsewhere in NZ (McKenzie 1945; Tily 1946); and detailed observations of nests at Melbourne and Sorrento, Vic. (Coleman 1939); 1483 Aust. NRS records to Apr. 2004. Kentish *et al.* (1995) analysed 1284 NRS records up to 1987, and contains some additional analyses to those below. Bull (1946) and Flux (1966) included comparison of breeding biology with Song Thrushes. Also well known extralimitally (see BWP and references therein).

Season Aust. Eggs, Aug.–Feb., mainly Sept.–Dec.; of 1091 clutches: one (<0.1%) in mid-Aug., nine (0.8%) in late Aug., 47 (4.3%) in early Sept., 52 (4.8%) in mid-Sept., 105 (9.6%) in late Sept., 111 (10.2%) in early Oct., 131 (12.0%) in mid-Oct., 140 (12.8%) in late Oct., 107 (9.8%) in early Nov., 101 (9.3%) in mid-Nov., 101 (9.3%) in late Nov., 85 (7.8%) in early Dec., 39 (3.6%) in mid-Dec., 33 (3.0%) in late Dec., 18 (1.6%) in early Jan., seven (0.6%) in mid-Jan., two (0.2%) in late Jan. and two (0.2%) in early Feb. (NRS). QLD: No published records. NSW–ACT: Eggs, Aug.–Feb. (Morris *et al.* 1981; Hermes *et al.* 1986; NRS); of 106 clutches in NRS: two (1.9%) in Aug., 33 (31.1%) in Sept., 25 (23.6%) in Oct., 29 (27.4%) in Nov., 13 (12.3%) in Dec., three (2.8%) in Jan. and one (0.9%) in Feb. Nestlings, Aug.–Feb. (Bennett 1988; NSW Bird Rep. 2000; NRS). Unspecified breeding, including fledgelings, Aug.–Apr. (Frith 1969; Heron 1973; Anon. 1974; Hermes *et al.* 1986; I.M. Taylor 1987a; Taylor *et al.* 1987; NSW Bird Rep. 1973; NRS). VIC.: Eggs, Aug.–Jan.; of 846 clutches in NRS: eight (0.9%) in Aug., 135 (16.0%) in Sept., 328 (38.8%) in Oct., 232 (27.4%) in Nov., 129 (15.2%) in Dec. and 14 (1.7%) in Jan. Nestlings, Sept.–Feb. (Nevill 1976; NRS). Unspecified breeding, including fledgelings, Aug.–Apr. (Coleman 1939; Bedggood 1972, 1973; Nevill 1976; NRS). TAS.: Eggs, Sept.–Jan. (Dove 1919; Dodson 1976; NRS); of 52 clutches in NRS: 14 (26.9%) in Sept., 12 (23.1%) in Oct., 18 (34.6%) in Nov., six (11.5%) in Dec. and two (3.8%) in Jan. Nestlings, Sept.–Feb. (Thomas 1965; Milledge 1972; Dodson 1976; NRS). Unspecified breeding, including fledgelings, Sept.–Feb. (Dodson 1976; Tas. Bird Reps 1, 4; NRS). SA: Eggs, Sept.–Feb. (NRS); of 92 clutches in NRS: 23 (25.0%) in Sept., 19 (20.7%) in Oct., 31 (33.7%) in Nov., ten (10.9%) in Dec., eight (8.7%) in Jan. and one (1.1%) in Feb. Nestlings, Sept.–Jan. (SA Bird Rep. 1977–81; NRS). Unspecified breeding, including fledgelings, Sept.–Feb. (Ashton 1987; SA Bird Rep. 1977–81; NRS). **NZ** Eggs recorded June–Feb., but mostly late Aug. to late Dec. (McKenzie 1945; Tily 1946; Moore 1949; Blackburn 1965a; Falla *et al.* 1981; Heather & Robertson 2000; Oliver); from NZ NRS (n=429 clutches): recorded Aug.–Feb.; *c.* 2% in Aug., *c.* 21% Sept., *c.* 40% Oct., *c.* 24% Nov., *c.* 11% Dec., *c.* 2% Jan. and *c.* 1% Feb. (figures estimated from graph; Niethammer 1970). Unspecified breeding, including fledgelings, Nov.–Dec. (McKenzie 1945; Tily 1946). Breeding begins *c.* 1 month earlier in Auckland than at St Arnaud, SI (which at a higher altitude and latitude; Bull 1946; Flux 1966). NI: Eggs, June and Aug.–Dec. (Bull 1946; Turbott 1947; McKenzie 1950a,b; Chambers *et al.* 1955; McFadzien & McFadzien 1975; CSN 1, 3, 19, 19 Suppl., 34, 41); at Mangere, peak laying period early Sept. to late Oct. (Bull 1946). Nestlings, July and Sept.–Jan. (Secker 1947a; Sibson 1949a; McKenzie 1950a,b; McFadzien & McFadzien 1975; CSN 1, 3, 19 Suppl., 24, 34). Unspecified breeding, including fledgelings, June–Jan. (Sibson 1949a; McKenzie 1950b; Counsilman 1974b; McFadzien & McFadzien 1975; CSN). SI: Eggs, Aug.–Dec. (Marples & Gurr 1943; Robertson 1947; Gurr 1954; Flux 1966; Lauder 1978; CSN 1, 3, 5, 32); of 28 clutches at St Arnaud: two (7.1%) commenced 24–30 Sept, three (10.7%) 1–7 Oct., one (3.6%) 8–15 Oct., six (21.4%) 16–23 Oct., four (14.3%) 24–31 Oct., four (14.3%) 1–7 Nov., five (17.9%) 8–15 Nov., two (7.1%) 16–23 Nov. and one (3.6%) 24–30 Nov. (Flux 1966). Nestlings, Sept.–Jan. (Marples & Gurr 1943; Robertson 1947; Gurr 1954; Lauder 1978; CSN 1, 3, 5, 33). Unspecified breeding, including fledgelings, Aug.–Feb. (Marples & Gurr 1943; Robertson 1947; Lauder 1978; CSN 1, 2, 3, 32). **Offshore islands** LORD HOWE I.: Unspecified breeding usually Sept.–Jan., but recorded late Aug. to Mar. (Hutton 1991; McAllan *et al.* 2004). NORFOLK I.: Eggs, Aug., Dec. (Schodde *et al.* 1983; Hermes *et al.* 1986). Unspecified breeding, Oct.–Dec. (Smithers & Disney 1969; Hermes *et al.* 1986). KERMADEC IS: Eggs, Nov. and Dec.; nestlings in Nov. (Edgar *et al.* 1965; Merton & Veitch 1986). CHATHAM IS: Unspecified breeding Nov.–Jan. (Nilsson *et al.* 1994). SNARES IS: Eggs, Oct.–Feb. (Warham 1967; Miskelly *et al.* 2001).

Site Usually in vertical or horizontal fork, in middle or outer branch of shrub, tree or hedge; often in prickly plant (Moors 1983; Heather & Robertson 2000; Oliver; NRS). Conspicuousness can vary, some being well sheltered by foliage, and others quite exposed (Coleman 1937; McKenzie 1945; Falla *et al.* 1981; NRS). Often in vines and creepers

growing over shrubs or trees (NRS), or growing on fences, walls and other artificial structures (Morgan 1914; Marples & Gurr 1943; Moore 1949; Gurr 1954; NRS). Sometimes placed on ground, usually at base of a tree or shrub (Flux 1966; CSN 19 Suppl., 20, 34, 38, 41; NRS), though one clutch was laid directly onto bare soil in garden (CSN 19); and once, five eggs found beneath five separate stalks of rhubarb (CSN 41). Also on or in stumps or tree-hollows, on clump of pine cones in pine tree or among tree-roots (Bedggood 1972; McFadzien & McFadzien 1975; NRS) or among clumps of grass (Oliver; CSN 5). Odd nests recorded among flood debris or on wood piles (NRS). Often nest on ledges, posts and rafters, or in cleft of wall, in sheds or other buildings (McKenzie 1945; Hindwood 1947; Moore 1949; Wakefield 1954; Heather & Robertson 2000; CSN 3; NRS; K.F. Peter). Round human habitation, often nest in novel sites, including in hanging baskets, pot plants, tins, buckets and other containers; among coils of wire or fencing, including one hanging on wall of shed; in various cavities, such as beneath sheet of corrugated iron, in glove-box of abandoned car, and in rolled-up roller door; and very occasionally on light fittings (NRS). On Norfolk I., use various sites, including fruit trees round habitation, and vines in dense forest (Hermes *et al.* 1986). On Snares Is, mostly in clumps of ferns and forks of *Olearia*, though also in stumps, among branches or roots of uprooted trees (Stead 1948; Miskelly *et al.* 2001; CSN 24). **NEST-PLANT**: *AUST.*: Of 909 records of nest-plant from throughout range in NRS, 66 (7.3%) in tea-trees, 56 (6.2%) in Apple trees, 48 (5.3%) in Orange trees, 39 (4.3%) in paperbarks, 29 (3.2%) in *Prunus* (including Apricot, Peach and Plum), 27 (3.0%) in eucalypts, 26 (2.9%) in grevilleas (including Rosemary Grevillea *Grevillea rosmarinifolia*), 25 (2.8%) in ivy, 25 (2.8%) in rose bushes, 24 (2.6%) in acacias, 24 (2.6%) in *Pittosporum*, 23 (2.5%) in cypresses, 21 (2.3%) in pines, 18 (2.0%) in *Callistemon*, 17 (1.9%) in Blackberries and brambles *Rubus*, 16 (1.8%) in *Kennedia*, 14 (1.5%) in honeysuckle, 14 (1.5%) in privet *Ligustrum*, 13 (1.4%) in *Hakea*, 13 (1.4%) in jasmine, 13 (1.4%) in willows *Salix*, 12 (1.3%) in tree-ferns, 11 (1.2%) in *Photinia*, ten (1.1%) in banksias and ten (1.1%) in Lemon *Citrus limon* trees; the remaining nest-plants were mostly trees and shrubs, often either prickly or with dense foliage, or creepers and vines. Nest-plants recorded in literature include: paperbarks, citrus trees, Prickly Moses *Acacia verticillata*, Blackberries, Apple trees, *Bougainvillea*, African Boxthorn, *Cussonia thyrsiflora*, Japonica *Chaenomeles speciosus*, *Viburnum*, Scarlet Kunzea *Kunzea baxteri*, rose bush and *Wisteria* (Dove 1919; Lienau 1947; Coleman 1950; Watson 1955; Lowe 1959; Vestjens & Vestjens 1970; Bedggood 1972; Dodson 1976; Bennett 1988; Lashmar 1988; Leishman 1997). *NZ:* Nests recorded in *Aristotelia*, Boxthorn, *Buddleia*, *Camellia*, currant, *Cryptomeria*, *Elaeagnus*, elder, *Escallonia*, eucalypts, grape vines, hawthorn *Crataegus*, Holm Oak *Quercus ilex*, Japonica *Chaenomeles speciosus*, jasmine *Jasminum*, Kahikatea *Dacrycarpus dacrydioides*, Karamu *Coprosma lucida*, Macrocarpa *Cupressus macrocarpa*, Matagouri *Discaria toumatou*, Popwood *Myoporum obscurum*, *Olearia forsteri*, Pear, *Photinia*, pine *Pinus*, Pohutukawa *Metrosideros excelsa*, privet *Ligustrum*, spindle tree *Euonymus* and tree-fern (McKenzie 1945; Tily 1946; Secker 1947a,b; Sibson 1949a; Dawson 1950; Gurr 1954; Blackburn 1965a; Child 1975a; McFadzien & McFadzien 1975; Lauder 1978; McLennan & MacMillan 1985; Merton & Veitch 1986; CSN). Of 37 records of nest-plant at St Arnaud, SI: 18 (54.5%) in Matagouri, five (15.2%) in beech *Nothofagus*, four (12.1%) in *Coprosma*, four (12.1%) in Manuka *Leptospermum scoparium*, two (6.1%) in Broadleaf *Griselinia littoralis*, three in other species, and one on ground (Flux 1966). At Mangere, NI, many nests built in Gorse *Ulex europaeus* (Bull 1946); and round Temuka, SI, many nest in broom *Cytisus* (Pennycook 1949). *OUTLYING ISLANDS*: On Snares Is, nest mostly in clumps of *Polystichum* or *Asplenium* fern; also in *Olearia* and Kokomuka *Hebe elliptica* (Stead 1948; Miskelly *et al.* 2001; CSN 24). **FIDELITY TO SITES**: Nests and nest-plants often re-used, from both year to year and for multiple attempts within a season; three successive attempts at single nest occasionally recorded, and nests may be re-used after either success or failure (Coleman 1939, 1950; Bull 1946; Tily 1946; Gurr 1954; Frith 1969; McFadzien & McFadzien 1975; Heather & Robertson 2000; CSN 1; NRS). Sometimes first and third broods reared in one nest, and second and fourth broods in another (Coleman 1939; Gurr 1954). Pairs building new nests for subsequent attempts during a season typically build near previous nests (Tily 1946; Robertson 1947; Lauder 1978; CSN 2; NRS); once, pair built fifth nest in site that had been inspected and rejected earlier in season (Tily 1946). New nests occasionally built on top of previous nests (CSN 19 Suppl.; NRS). **ASSOCIATIONS**: Sometimes nest in same plant as Little Wattlebird *Anthochaera chrysoptera*, House Sparrow, European Goldfinch *Carduelis carduelis*, European Greenfinch *Carduelis chloris*, Silvereye, or Song Thrush (Child 1975a; McLennan & MacMillan 1985; NRS). Once, Blackbird nest was found entwined with nest of Song Thrush, forming a 'combination' nest (Pycroft 1931); and another 0.9 m from nest of Song Thrush (NRS). In one tree, one nest of Sparrow was 0.6 m above nest of Blackbird, and a second 1.2 m to the side and 0.6 m above; elsewhere, occupied nests of Blackbird and Sparrow were almost touching one another (Child 1975a; NRS). One nest was among mixed colony of Australian White Ibis *Threskiornis molucca*, Great Egrets *Ardea alba*, Nankeen Night Herons *Nyctocorax caledonicus* and Little Pied Cormorants *Phalacrocorax melanoleucos* (NRS). One nest 10 m from nest of Bell Miner (NRS). Sometimes nest within 2 m of other Blackbirds (Secker 1947a; Lowe 1959; NRS). Near Hamilton, NI, nests in hedges were mean 90 m apart (CSN 35). Compete with native birds for nest-sites (Roberts 1938; Coleman 1939; Bomford & Sinclair 2002). **SITE SELECTION**: Nest-site selected by female (Tily 1946; Frith 1969). **MEASUREMENTS** (m): *AUST.*: Height of nest, 1.8 (1.14; 0–15.0; 1346) (NRS); said to be mostly 1.2–3.0 (NRS). One nest found inside stump 0.75 in diameter (NRS). *NZ*: Height of nest, 1.4 (1.79; 0–6.1; 22) (Bull 1946; Tily 1946; Child 1975a; McFadzien & McFadzien 1975; Merton & Veitch 1986; CSN); 1.0–10.0 (Heather & Robertson 2000). One nest on clay bank, 2.1 above ground level (Robertson 1947). At St Arnaud, 2.3 (n=37), including one nest on ground (Flux 1966, which see for mean height in different nest-plants). On Snares Is, mostly within 1.5 m of ground, but some up to 6 m (Miskelly *et al.* 2001).

Nest, Materials Cup-shaped nest (Robertson 1947; Heather & Robertson 2000; Berry 2001; NRS), usually made of grass, bark, twigs, roots, leaves or moss, or a combination of these, cemented together with mud; and usually lined with fine grass, leaves or leaf-skeletons, but very occasionally with pine needles, rootlets, bark and moss, and very occasionally with hair, feathers, fur, string, straw or wool and, once, coconut fibre, and some lined with mud (Dove 1919; Coleman 1939; Marples & Gurr 1943; Robertson 1947; Gurr 1954; Edgar 1963; Frith 1969; Beruldsen 1980; Falla *et al.* 1981; Heather & Robertson 2000; Oliver; CSN 2; Tas. Bird Rep. 6; NRS). At St Arnaud, of 35 nests: 25 (71.4%) contained grass, 24 (68.6%) moss, 14 (40.0%) twigs, 13 (37.1%) roots, seven (20.0%) wool, five (14.3%) bark and one (2.9%) lichen. In NZ, leaves of Cabbage Tree *Cordyline australis* often used (Fitzgerald 1966). Some also contain sticks, needles of pines or casuarinas, pieces of plastic, paper, fern fronds, soft fabrics, such as nylon, and spider web (Robertson 1947; Gurr 1954; Edgar 1962, 1963; NRS); and single nests have been found with dry flowers, fishing line, a handkerchief, mulch, metal plant-tags, a piece of rope, and wire mesh (CSN 3;

NRS). Some composed almost entirely of mud (Dove 1919; NRS), and fresh manure sometimes used if mud unavailable (Coleman 1939; NRS); one nest, built largely of mud, said to have had bark, twigs and bracken plastered to exterior (Dove 1919). A nest in NZ contained pieces of grass and short fibre <2.5 cm long and strips of bark 10.2–29.2 cm long and 0.3–1.3 cm wide; finer material used in mid-layer mostly 3.8–15.2 cm long, though one piece of grass was 45.7 cm (Edgar 1963, which see for number of items in each layer). Female usually collects material and builds nest (Tily 1946; Coleman 1950; Gurr 1954; Frith 1969; Bennett 1988; Heather & Robertson 2000; CSN 1, 5; NRS), sometimes assisted by male (Coleman 1939; McKenzie 1945; Oliver; CSN 35; NRS); very occasionally, male does most of the building (Robertson 1947). Material usually collected from near nest-site, though once collected up to 165 m away (Tily 1946; Coleman 1950; NRS). Some material taken directly from plants: one female removed sprigs from Cherry Plum by tugging vigorously while gripping with feet, but when leaves came free, they were dropped (Coleman 1950); another bird tore strips of bark from a fallen eucalypt; one pair used pieces of tree-roots that had been exposed (NRS). Material also collected from ground, gutters and spouting, and wood piles (Tily 1946; Wakefield 1954; Flux 1966; NRS). Material is bunched in bill for transport (Coleman 1939). Brought to nest every 2–3 min (McKenzie 1945; Tily 1946); at one nest, six visits in 8 min (NRS). Frame made of grass built first, either built up from base or down from rim, to form a rough cup; interior then coated with mud and leaves, then compacted and shaped by rotating body and pressing with breast. Lining then added, and shaped in same manner (McKenzie 1945; Gurr 1954). At one nest, most material was collected before building began (NRS). Once, wall of house served as wall of nest (Tily 1946). Build throughout day (Bennett 1988); at one nest, began at 06:45 and ended at night (McKenzie 1945). Built in 2–13 days (McKenzie 1945, 1950b; Robertson 1947; Gurr 1954; Heather & Robertson 2000; CSN 1; NRS); typically in 7 days (Gurr 1954). Time spent building decreases as season progresses (Gurr 1954; Heather & Robertson 2000), and is quicker after a failed breeding attempt (Gurr 1954; NRS). Construction of nest said to remain the same regardless of building time, though nests with longer building times typically contain more lining (Gurr 1954); also claimed that quality of construction decreases as season continues (Tily 1946). Nest usually completed when eggs laid, but in one nest, lining added between laying of second and third eggs (NRS). Interval between completion of nest and laying of first egg 1.63 days (0.96; 1–4; 16) (NRS); also two records of intervals of 1 day after refurbishment of old nests (NRS); and up to 6 days, though first egg may be laid on day nest completed (Coleman 1939; McKenzie 1945, 1950b; Bull 1946; Tily 1946; Robertson 1947; Gurr 1954; CSN 1, 3). Old nests often repaired or relined (Coleman 1939, 1950; Bull 1946; Tily 1946; McFadzien & McFadzien 1975; CSN 1; NRS); some nests re-used with little or no additional material (Gurr 1954). Very occasionally take material from previous nest and use it to build new nest (NRS). Occasionally use nests of other species, especially Song Thrush (NRS). One pair built on nest of Spotted Turtle-Dove *Streptopelia chinensis* (NRS); and another modified nest of New Zealand Tomtit *Petroica macrocephala chathamensis*, the original lining remaining intact (Nilsson *et al.* 1994). Sometimes a second nest is started while young of previous nest still dependent (Tily 1946; Gurr 1954; NRS). When nest completed, claimed that birds do not approach it for 3–7 days, after which some fresh grass added (Coleman 1939). MEASUREMENTS: From NRS (* indicates that nests not round): external diameter 16.4 cm (2.51; 14.0–19.0; 3); external length* 17.0 (15.0–19.0; 2); external width* 11.5 (10.0–13.0; 2); external depth 18.3 (11.5; 8.5–33.0; 6); internal diameter 10.2 (0.76; 9.5–11.0; 3); internal length* 10 (n=1); internal width* 9.5 (n=1); and internal depth 6.8 (1.03; 5.5–8.0; 4). From literature, corresponding measurements were: –, 15.2 (n=2); 12.7 (n=2); 12.7 (n=1); 10.2 (n=1); 10.2 and 11.4; 8.9 and 9.5; and 6.4 and 7.0 (Dove 1919; Robertson 1947; Edgar 1963). On one nest, thickness of wall at rim 1–4 cm (NRS).

Eggs Elliptical ovate or long oval (Oliver); shape can vary within clutches (CSN 19 Suppl.). Described as blue, pale blue, greenish blue, bluish green, greenish, green, khaki or greenish brown, densely freckled and streaked all over with red, reddish, reddish brown, brown or grey (Robertson 1947; Frith 1969; Falla *et al.* 1981; Heather & Robertson 2000; Oliver; CSN 19 Suppl.; NRS). Colours, markings and size can vary within clutches (Bull 1946; Falla *et al.* 1981; CSN 19 Suppl., 41; NRS). Said to be almost indistinguishable from those of Bassian Thrush (Beruldsen 1980). Mean weight on first day of incubation 7.1 g (6.65–7.65; 8) (Marples & Gurr 1943). During 5 days before hatching, three eggs lost weight at rate of 0.1 g/day (0.38; 0–0.2; 15 days); an infertile egg of same clutch said to have lost weight at lower rate; the viable eggs weighed 5.5, 5.6 and 5.8 g on day of hatching (Marples & Gurr 1943; Gurr 1954). Another egg weighed 6.0 g just before hatching (NRS). MEASUREMENTS: In Aust., 28.4 (1.44; 23.5–33.2; 185) × 21.0 (0.67; 19.6–22.7) (NRS); 24 × 19 (Frith 1969). In NZ, 28.5 (1.05; 27.5–29.6; 3) × 20.9 (0.50; 20.4–21.4) (Oliver); 28 × 21, 6.5 g (Heather & Robertson 2000). Another clutch of four, *c.* 19.1 mm long (Robertson 1947).

Clutch-size Usually three (Nilsson *et al.* 1994); two to four (CSN 24); two to five (Falla *et al.* 1981); four, seldom five (Stead 1948); four or five (Beruldsen 1980; Oliver); usually two, but up to five (Frith 1969); two to six, but usually three or four (Heather & Robertson 2000). AUST.: From NRS: 3.5 (0.73; 377): C/2 × 24, C/3 × 156, C/4 × 173, C/5 × 23, C/7 × 1 (NRS). In NSW, 3.4 (0.67; 38): C/2 × 4, C/3 × 16, C/4 × 18. In Vic., 3.5 (0.70; 284): C/2 × 16, C/3 × 124, C/4 × 127, C/5 × 17. In Tas., 3.8 (0.71; 29): C/3 × 10, C/4 × 14, C/5 × 5. In SA, 3.5 (0.82; 25): C/2 × 4, C/3 × 6, C/4 × 14, C/5 × 1 (NRS). At Langwarrin, Vic., 3.3 (0.47; 11): C/3 × 8, C/4 × 3 (Berry 2001). At Melbourne, Vic., 16 nests had mean C/3, with one nest containing C/5 (Coleman 1939). During drought in Vic., 1938–39, clutch-sizes were reduced; many nests contained only two eggs, and few had more than four (Coleman 1939). Clutch-size in Aust. tended to be smaller than in Europe (Kentish *et al.* 1995). NZ: Mean clutch-size 3.44 (0.73; 1–5; 218) with no apparent latitudinal variation (Flux 1966; Niethammer 1970). On NI, 3.41 (0.70; 2–5; 122) (Niethammer 1970). At Mangere, NI, mean clutch-size 3.5 (0.65; 37): C/2 × 1, C/3 × 18, C/4 × 16, C/5 × 2. On SI, mean clutch-size 3.48 (0.78; 1–5; 96) (Niethammer 1970). At St Arnaud, SI, 3.5 (0.64; 28): C/2 × 2, C/3 × 10, C/4 × 16. On Snares Is, 3.2 (0.83; 62): C/1 × 1, C/2 × 11, C/3 × 27, C/4 × 21, C/5 × 2 (Miskelly *et al.* 2001). Largest clutches said to occur in middle of breeding season (Niethammer 1970). At Mangere, monthly clutch-sizes: Aug. 3.3 (0.58; 3): C/3 × 2, C/4 × 1; Sept. 3.4 (0.50; 14): C/3 × 9, C/4 × 5; Oct. 3.7 (0.82; 15): C/2 × 1, C/3 × 5, C/4 × 7, C/5 × 2; Nov. 3.6 (0.55; 5): C/3 × 2, C/4 × 3. At St Arnaud, monthly clutch-sizes: Sept. C/3 × 2; Oct. 3.5 (0.52; 13): C/3 × 7, C/4 × 6; Nov. 3.6 (0.79; 12): C/2 × 2, C/3 × 1, C/4 × 9. Mean clutch-size in NZ significantly smaller than in England, where clutch-size 3.9 (0.78; 1–6; 347) (Niethammer 1970).

Laying Eggs usually laid on consecutive days (Tily 1946; Robertson 1947; Dodson 1976; Heather & Robertson 2000; CSN 3; NRS), but sometimes interval >24 h; in one nest, third egg of clutch laid 4 days after second (Bull 1946); in another, interval ≥30 h (NRS); at third nest, clutch of six completed 8 days after first egg laid (CSN 1). Interval between loss and replacement usually short (Heather & Robertson

2000). Period between failure and first egg of new clutch typically 5–7 days or more (Bull 1946; Tily 1946; Lauder 1978; NRS), though construction of second nest may begin on same day as original nest fails, with new eggs laid after just 2–3 days (Dodson 1976; NRS). When nest deserted, period between laying of first egg in one nest and first egg in second nest sometimes 8 days (Gurr 1954); at Dunedin, nest deserted on day after clutch completed; pair built again and began laying within 4 days; second nest deserted 23 days after first egg laid, and female laid again within 3 days. Interval between success and next brood ranges from 4 days to 1–2 weeks, sometimes longer (McFadzien & McFadzien 1975; Dodson 1976; NRS); at one nest, female began building day after last young of previous brood fledged (Tily 1946). Up to six clutches may be laid in a season, though usually only two or three successful (Coleman 1939, 1950; Tily 1946; Frith 1969; Heather & Robertson 2000; SA Bird Rep. 1964; Tas. Bird Rep. 4; CSN 24; NRS). One nest contained five eggs of Blackbird and two of Common Myna; when next visited, contained two Blackbird nestlings (CSN 34).

Incubation Female usually incubates; male guards nest while female is away, and occasionally covers eggs lightly (McKenzie 1945; Tily 1946; Robertson 1947; Turbott 1947; Gurr 1954; Frith 1969; Bennett 1988; Heather & Robertson 2000; Oliver; NRS). START OF INCUBATION: Incubation often begins before clutch complete (Bull 1946; Heather & Robertson 2000), starting with second or third egg (Coleman 1939; Gurr 1954); or when clutch complete (Tily 1946; CSN 3). Time spent on nest by female increases as laying progresses. First two eggs incubated during morning only (and occasionally overnight), but female sits continuously once final egg is laid (McKenzie 1945; NRS). At one nest at Dunedin, proportion of daily active period (time between first leaving of nest in morning and last return in evening) spent on nest: 7% on first day of laying, 53% on second day, 75% on third day, and 87% on fourth and final day of laying. At another nest, clutch of four laid over 5 days; though laying of first egg was missed, active period on nest was 45% on second day of laying, 59% on third day, 76% on fourth day, and 82% on fifth and final day; time spent incubating influenced by length of daylight (Gurr 1954, which see for details). HATCHING: Eggs usually hatch over 1–2 days, and occasionally over 3 days or more (McKenzie 1945; Robertson 1947; Blackburn 1965a; Lauder 1978; CSN 1, 3, 5; NRS). Of 38 nests in NRS at which hatching period could be determined, 17 (44.7%) clutches hatched over 1 day, 18 (47.3%) over 2 days, one (2.6%) over 3 days, and two (5.3%) over ⩾3 days (NRS). Where observation times known, minimum hatching period was 14 h and maximum was 71 h 10 min (NRS). Eggs hatch at any time of day or night (NRS). In one clutch of three, first egg hatched at 14:00, second at 17:00, third later that night (Blackburn 1965a). BOUTS OF INCUBATION: During incubation at one nest, female sat for 14.5 min (1–45) periods, changing position every 3–10 min, and left nest to feed for stints of 7.5 min (2–14). Female at this nest usually used feet and body to turn the eggs, shuffling sideways, though bill sometimes used (McKenzie 1945). At another nest, at which behaviour was recorded 6–11 days after first egg laid, mean period spent on nest 30 min (10–40) with feeding bouts of 8 min (4–15), except first feeding bout of day. Periods of sitting and feeding alternated regularly, with bird leaving nest *c.* 24 times a day. On two of five mornings, first feeding bout was long (60 and 25 min), but others were normal. Over the 6 days, birds active for 58 hours; 80.8% (73.8–86.2) of this was spent on nest (Marples & Gurr 1943). At Dunedin, in 12-day incubation period, proportion of daily active period spent on nest was 88.0–92.0% at one nest, 86.0–92.0% at second nest, and 81.0–95.0% at third (Gurr 1954, which see for details of periods spent on nest and off it during various stages of incubation, at different times of day). Incubation periods tend to be longer during middle of day (Marples & Gurr 1943; McKenzie 1945; Gurr 1954). At one nest, female left nest between 12:00 and 13:00 each day, before returning 15:00–16:00 (Blackburn 1965a). FEEDING: Incubating female either leaves nest to feed (McKenzie 1945; Gurr 1954; Blackburn 1965a), or very occasionally fed on nest by male (see Social Behaviour: Sexual behaviour). At Dunedin, incubating birds fed mainly in morning and evening, with lull in middle of day (Gurr 1954). COVERING OF EGGS: At onset of rain, female may cover eggs for duration of the shower (Tily 1946), though in well-sheltered nests weather may not affect closeness of sitting (Gurr 1954). Eggs are covered more diligently at night, but incubating bird may ease itself off eggs occasionally (Gurr 1954). As hatching approaches, bird remains on nest, even when approached closely (Wakefield 1954). Sit less closely after first two or three eggs hatch, as female begins to feed nestlings (Coleman 1939). At Dunedin, birds tended to sit more tightly between fourth and ninth days of incubation (Gurr 1954). ABERRANT BEHAVIOUR: Once, old nest of Song Thrush that had blown onto ground was placed on fence, and two old eggs, one of House Sparrow and Starling, were placed in it; female Blackbird left her mate, with whom she had been building nest in nearby shrub, to incubate these eggs, but eventually returned to mate (Lane 1980). INCUBATION PERIOD: In Aust.: From completion of clutch, 12.7 days (0.69; 11–14; 40 eggs in 15 clutches); from laying to hatching, 13.8 days (1.10; 12–17; 31 eggs in 14 clutches) (NRS). Also given as: 13–14, occasionally 12 days (Coleman 1939); 14 days (Berry 2001); and 13–15 days (Frith 1969). In NZ: From completion of clutch, 13.5 days (0.63; 12–14; 16); from laying to hatching, 14.5 days (0.58; 14–15; 4) (Marples & Gurr 1943; McKenzie 1945; Robertson 1947; Blackburn 1965a; Lauder 1978; CSN 1). Also given as: 13–14 days (Gurr 1954; Blackburn 1965a; Falla *et al.* 1981; Heather & Robertson 2000); 12–14 days, usually 13 (Bull 1946); 13–16 days, usually 14 (Oliver). Infertile eggs may be incubated for several weeks; at one nest, a female sat for 18 days after clutch completed; at another, female sat on nest for 28 or 29 days after first egg laid (NRS); at third nest, clutch of five completed on 17 Oct.; after removal of three eggs by person on 31 Oct., female continued to sit on remaining eggs till 5 or 6 Nov., a period of 19–20 days (Dodson 1976). Eggshells removed by both sexes (NRS).

Young Altricial, nidicolous (NRS). Hatch blind and either naked or with some down on crown, wings and in broad line down centre of back (NRS). Slit in eye membrane appears 1–2 days after hatching (NRS); claws form, and down sprouts at 2–3 days; pin-feathers appear on wings, head and back from 4–7 days; eyes open fully by 6–7 days; feathers begin to erupt at 7–9 days; fully feathered by 9–12 days (NRS). **Growth** Newly hatched nestlings weigh 5.0–7.0 g, with culmen length 5.1–6.6 mm and tarsus length 6.4–7.9 mm; at 6–7 days, weight 24.0–59.0 g, culmen 9.7–14.6 mm, and tarsus 16.6–27.3 mm; at 13–14 days, weigh 63–68 g, culmen 13.2–15.6 mm, and tarsus 29.6–31.8 mm; at fledging, two young weighed 75.0 and 71.0 g; a few fledgelings lack tail (NRS). In brood of three, mean weights: day of hatching, 6.3 g (0.62; 5.8–7.0); 1 day old, 10.9 g (1.45; 10.0–12.6); 2 days, 15.6 g (1.37; 14.7–17.2); 3 days, 22.2 g (1.76; 20.9–24.2); 4 days, 25.5 g (5.90; 19.6–31.4); 5 days, 35.4 g (6.39; 28.3–40.7); 6 days, 43.8 g (4.72; 38.7–48.0); 7 days, 50.1 g (7.43; 41.8–56.2); 8 days, 59.7 g (8.57; 49.8–65.2); 9 days, 64.7 g (6.43; 57.6–70.1); 10 days, 72.6 g (3.92; 69.4–77.0); 11 days, 72.9 g (4.37; 69.4–77.8); 12 days, 71.1 g (4.12; 66.4–74.2); 13 days, 67.5 g (4.31; 64.4–70.5; 2). One left nest 12 days after hatching, other two after 13 days. Mean weight on day of fledging, 69.7 g (4.95; 64.4–74.2). Two reached maximum weight 10 days after hatching, other 11 days after; mean maximum weight, 75.4 g (3.43; 71.5–77.8) (Marples &

Gurr 1943; Gurr 1954). One nestling which hatched 2 days after siblings gained less weight than other two during early stages of incubation (Gurr 1954, which see for details of daily weight gain). Because incubation can start before clutch complete, and female sits less closely after hatching of first few eggs, one or two nestlings often smaller than siblings (Coleman 1939; Tily 1946; Moore 1949; CSN 1; NRS).

Parental care Young usually brooded by female (Coleman 1939; Marples & Gurr 1943; McKenzie 1945; Gurr 1954; NRS). Male usually guards nest, but occasionally covers nestlings while female away (Coleman 1939; Gurr 1954; NRS). During early stages of nestling period, female broods young after each feed (McKenzie 1945; Tily 1946). At one nest, female brooded young for 15–20 min at *c.* 45 min intervals (Marples & Gurr 1943). At another nest, for first 3 days after hatching, female sat for 8 min (1–21) after feeding young, and was off nest for 5 min (2–10). If young refused food, they were brooded by female, who retained food in bill, till ready to feed; if brood unable to eat all food given to them, female brooded them for 3–4 min, holding food in bill, before feeding them again. On fourth day after hatching, she stopped brooding after each feed. After tenth day, she stopped brooding overnight (McKenzie 1945). At one nest, female spread wings to protect nestlings from heavy rain (Lauder 1978). At another, 9 days after hatching, nestlings were made to face same direction as brooding female (McKenzie 1945). Usually fed by both parents (Coleman 1939; Fuller 1942; Robertson 1947; Gurr 1954; Frith 1969; McFadzien & McFadzien 1975; Lauder 1978; Bennett 1988; Oliver; Heather & Robertson 2000; NRS), though sometimes by female only (Coleman 1937, 1939; McKenzie 1945; Blackburn 1965a). Male mostly feeds nestlings while female is away, but also while she is brooding; when this occurs, female moves aside to allow young to be fed, and resumes brooding when male leaves (Tily 1946; Gurr 1954). Male may also feed brooding female (Robertson 1947). In nest at Dunedin, female fed nestlings immediately after hatching. On first day after hatching, nestlings fed 20 times (58.8%) by male and 14 (41.2%) by female; and on second day, 36 times (65.5%) by male and 19 (34.5%) by female (Gurr 1954). Older nestlings usually beg vigorously, and receive more food than younger, smaller siblings (Coleman 1939; B.J. Kentish). Very occasionally, male Blackbirds recorded feeding female Song Thrushes and their young (Anon. 1934; CSN 19). Faecal sacs eaten by adults, usually female (Coleman 1937; McKenzie 1945; Robertson 1947; NRS; CSN 1). At one nest, female removed and ate three faecal sacs per visit (Coleman 1937); at another, sacs were retrieved and eaten as they were produced after each feed (McKenzie 1945). Dead nestlings are removed from nest by either parent (Bennett 1988; CSN 4); infertile eggs also removed, but seldom, if ever, while young in nest (Coleman 1939). In one nest, infertile egg was broken by female (NRS).

Fledging to independence FLEDGING PERIOD: In Aust., from hatching to first day out of nest, including young disturbed from nest by observer: 13.5 days (1.07; 11–15; 17) (NRS); 14 days (n=2) (Berry 2001); and 12–15 days (Frith 1969). In NZ, 13.8 days (1.08; 12–15; 21) (McKenzie 1945; Robertson 1947; Gurr 1954; Lauder 1978; CSN 1, 20); 14–15 days (Bull 1946); 12–15 days (Falla *et al.* 1981); 13–15 days (Heather & Robertson 2000). Young enticed to fledge by female (see Social Behaviour: Relations within family group). Some broods all fledge on same day, or over 2 days (Marples & Gurr 1943; Robertson 1947; Lauder 1978; CSN 1; NRS). At one nest, three young fledged between 06:00 and 08:00; fourth left 08:15–09:50. At another nest, three young fledged between 14:30 and 17:30 (NRS). One nestling, removed from nest by observer and raised as a pet, became active and left artificial nest at same time as rest of rest of brood in original nest (Bull 1946). Newly fledged young generally capable of weak flight; at one nest, two fledgelings flew 5–10 m, and third could barely fly at all. At one nest, one young left nest, then returned (NRS). Fledgelings often fed by adult male, allowing female to begin another breeding attempt (McKenzie 1945; Tily 1946; Lauder 1978; NRS). Occasionally fed for several weeks after fledging (Lauder 1978; Heather & Robertson 2000); once fed for 25 days after leaving nest (McKenzie 1945).

Success For 139 nests where clutch-size, number hatched and fledging known: of 481 eggs, 223 (46.4%) hatched, and 64 (13.3%) fledged, equal to 0.46 fledgelings per nest; of these, 23 (16.5%) nests successfully fledged at least one young, and of the 23 successful nests, mean clutch-size, 3.48, and mean number of young fledged, 2.78. At 25 successful nests, where number of fledgelings not known, of 93 eggs, 88 (94.6%) hatched. For 72 nests where clutch-size and number hatched known, but outcome unknown: of 260 eggs, 235 (90.4%) hatched. Of 657 nests where outcome known, 220 (33.5%) successfully fledged at least one young, and 437 (66.5%) failed. At 141 nests where outcome unknown, young considered capable of leaving when last seen (NRS). From 12 nests in Canberra Botanic Gardens: of 35 eggs, 20 (57.1%) hatched, and seven (20.0%) fledged (Green & McWhirter 1973). At Langwarrin, Vic., of 15 nests, three (20.0%) successfully fledged at least one young, and 12 (80.0%) failed (Berry 2001). A pair in Hobart laid 14 eggs in a season, five (35.7%) of which fledged (Tas. Bird Rep. 4). Of 220 clutches in NZ, 73 (33.2%) successfully fledged at least one young; 43.0% of nestlings did not fledge (Niethammer 1970). During two seasons at Whangarei, NI, 13 nests produced six successful broods (CSN 20). At Mangere, of 201 eggs laid, 69 (34.3%) hatched and 61 (30.3%) young fledged. Of the 81 eggs in 24 clutches that survived long enough to hatch, 12 (14.8%) were infertile. Infertile eggs occurred throughout breeding season, but most often in early and late clutches. Observations were continued following season, after rat-trapping; 51 eggs recorded, and 46% of young fledged successfully. At St Arnaud, of 42 eggs, 18 (42.9%) hatched, and seven (16.7%) young fledged (Flux 1966). Of nine nests at Kowhai Bush, SI, where outcome known: four (44.4%) hatched, and two (22.2%) fledged young (Moors 1983). At 37 nests in Dunedin, of 138 eggs, 48 (34.8%) hatched, and 38 (27.5%) young fledged, equal to 1.03 fledgelings per nest (Gurr 1954). Also in Dunedin, one pair laid 43 or 44 eggs over two seasons; at least 21 hatched, and seven young fledged (Tily 1946). Also at Dunedin, of 88 nests, 41 (46.6%) produced at least one fledgeling, resulting in 98 fledgelings (Kikkawa 1966). CAUSES OF FAILURE: Nests usually fail due to desertion or predation (Coleman 1939; Marples & Gurr 1943; Tily 1946; Moore 1949; CSN 1, 5, 19 Suppl.; NRS), and human interference can result in nests being destroyed or abandoned (McKenzie 1945; Stead 1948; Sibson 1949b; McKenzie 1950b; CSN 1, 24, 38; NRS); nests abandoned due to human disturbance more often during incubation than during brooding (B.J. Kentish). Occasionally fail due to adverse weather (Edgar 1963; NRS), e.g. several young died during unseasonal snowstorm (Bull & Dawson 1969). At Langwarrin, Vic., of 12 failed nests, 11 (91.7%) were predated (Berry 2001). At Whangarei, NI, eggs disappeared from four nests and were pecked in two, and nestlings taken from another; another two failed nests had feathers scattered round them (CSN 20). At Mangere, most failures due to predation by rats; nests in gardens more often destroyed by rats than those in farmland. Twelve nests, all containing eggs, were deserted (including one close to ground, deserted after domestic duck built nest immediately below), three disappeared (probably removed by children), and one was damaged by wind (Bull 1946). At St Arnaud, of 17 failed nests: four deserted (23.5%), eggs broken in four (23.5%), eggs or chicks missing in four (23.5%), dead chicks in three (17.6%), one (5.9%) was

upturned and at one (5.9%) adult was killed at nest; no desertions attributed to human interference (Flux 1966). Of nine nests at Kowhai Bush, SI, five (55.6%) were predated (three with eggs, two with nestlings) and two were abandoned (22.2%) (Moors 1983). On Snares Is, many nests are upset by fern fronds growing up from underneath (Stead 1948). Nests occasionally deserted after aggressive clashes between rival pairs of Blackbirds (Tily 1946; Secker 1947a). PREDATORS: Eggs, nestlings and fledgelings eaten by Pied Currawong *Strepera graculina* (Vestjens & Vestjens 1970; Crowe 1978a; Metcalf 1992; Bayly & Blumstein 2001; NRS); at one nest with three nestlings, Currawong pulled one nestling from nest, flew to ground and pecked its eyes out, then repeated action with other two (Metcalf 1988). Eggs taken by Swamp Harrier *Circus approximans* (Baker-Gabb 1981) and Little Raven *Corvus mellori* (NRS); nestlings taken by Long-tailed Cuckoo, Laughing Kookaburra *Dacelo novaeguineae*, butcherbirds *Cracticus*, Australian Magpie and Bassian Thrush (Soper 1963; Tas. Bird Rep. 18; NRS). Fledgelings taken by New Zealand Falcon (Fitzgerald 1965) and ravens (NRS). Young also eaten by Little Owls (CSN 3). Common Starlings blamed for broken eggs and dead young at some nests (Tily 1946). Mammalian predators include Cats (which take nestlings, fledgelings and sitting females), rats and other rodents, and mustelids (including Stoats *Mustela erminea*) (McKenzie 1945; Bull 1946; Tily 1946; Moore 1949; McKenzie 1950b; Flux 1966; Lauder 1978; Moors 1983; McLennan & MacMillan 1985; CSN 1; NRS; J.B. Price). Once, a Common Brushtail Possum seen eating nestlings of either Blackbird or Song Thrush (Brown *et al.* 1993). Reptile faeces found in one nest from which nestlings disappeared (NRS). ECTOPARASITES: At one nest, nestling had tick and maggot (NRS). CUCKOOS: Parasitized by Pallid Cuckoo *Cuculus pallidus* (Ey 1944; Lienau 1947; McGilp 1956; Campbell). Long-tailed Cuckoo seen carrying egg (Soper 1963).

PLUMAGES Prepared by J.S. Matthew. Hatch naked or with sparse down on crown, upperwing and upperparts (NRS). Fledge in juvenile plumage. Undergo a partial post-juvenile (first pre-basic) moult to first immature (first basic) plumage, which varies individually in appearance from superficially similar to adult male (in males) to adult female-like (in females and some males). Acquire adult plumage in complete first immature post-breeding (second pre-basic) moult, when *c.* 1 year old. Thereafter, a complete post-breeding (pre-basic) moult each cycle produces successive adult non-breeding (basic) plumages with no known change in appearance. Sexes differ in adults. About 16 subspecies recognized (Clement & Hathway 2000; BWP); nominate *merula* introduced to HANZAB region (DAB).

Detailed descriptions of plumage of nominate given in Clement & Hathway (2000), BWP and Field Identification (q.v.). Variation in coloration and markings of plumage in adult females discussed in BWP (for n. hemisphere) and by Gurr (1954) for NZ populations. Gurr (1954) found much variation in ground-colour and markings of throat and breast in adult females from Southland and round Dunedin, SI. Leucism common in n. hemisphere, mostly in males, which vary from having a few white feathers of wing or tail, to extensive areas of whitish-cream on head, wings or tail, or even birds with entirely white plumage (Clement & Hathway 2000). Leucistic birds also recorded in HANZAB region: of 228 birds from SI, NZ, six had white feathering, varying from two feathers on head, to six or seven underwing-coverts or several on breast (Gurr 1954).

BARE PARTS Descriptions of bare parts given in Clement & Hathway (2000), BWP and Field Identification (q.v.). Gurr (1954) found following variation in bill colour on SI: (1) In 'second winter' and older males (all termed adult here) from Southland, bill varied from scarlet-orange (67%) to orange (33%); (2) round Dunedin, bill of adult males varied from scarlet-orange (7%) to orange (73%) or neutral orange (20%); (3) in 'first winter' males (termed first immature here), bill initially black, becoming orange by late Aug.; (4) of 18 first immature males from Mar.–May, six with bill entirely black, eight with bill mostly black, three with bill black on distal half and orange on basal half, and one (in May) with bill mostly orange; of 30 first immature males from June–Aug., five with bill mostly black, five with bill half black and half orange, 16 with bill mostly orange, and four with bill entirely orange; of 22 first immature males from Sept.–Dec., two (from Sept.–Oct.) with bill mostly orange, and rest with bill entirely orange; these observations indicate bill becomes more orange with age within first year of life. Svensson & Grant (1999) indicated that bill of adult male darkens slightly in winter, but no other details given and this not mentioned in other references cited here.

MOULTS Based on examination of skins of 21 adults and 12 first immatures from se. Aust. (NSW and Vic.) and NI of NZ (MV, NMNZ), and other information as cited. For detailed information on moults in n. hemisphere, see Snow (1969), Svensson (1992), Jenni & Winkler (1994) and BWP. **Adult post-breeding** (Third and subsequent pre-basic). Complete. In Britain, moult of primaries starts *c.* 15 days after end of breeding; individual duration of moult of primaries, 66–87 days (BWP) or *c.* 85 days (Snow 1969). Some birds suspend moult of primaries (Jenni & Winkler 1994). In skins from HANZAB region (se. Aust. and NZ combined), active moult of primaries recorded from one (of one) in Jan. (PMS 8; from NI of NZ); five of seven from Mar.–July have all primaries new; two in June and all 15 from Aug.–Dec. have all primaries worn, though only slightly in June. Rogers *et al.* (1986) recorded complete post-breeding moult in Vic. from Dec. to Mar. Niethammer (1971) recorded complete moult in NZ in late Jan. and Feb. On SI, moult starts in early Jan. and most birds finished by mid-Apr. (Gurr 1954). Little information on moult of tail; one bird from Vic. in Mar. had finished moult of primaries but had not yet finished moult of tail, this bird with t1–t3 and t6 new, and t4 and t5 nearly fully grown. Timing of moult of body apparently much as primaries; one bird starting moult of primaries (PMS 8) had just started moult of head and body. **Adult pre-breeding** (First and subsequent pre-alternate). Not known if this moult occurs. Jenni & Winkler (1994) suggested pre-breeding moult may occur in a few birds and involve some feathers of body; they used limited data in Gurr (1954) as basis for this hypothesis. Gurr (1954) noted a small number of 'first year' (presumably first immature) birds with active moult on breast, throat, rump and tail-coverts in Aug.–early Oct.; and also noted that none of 34 'second year' males (termed adult here) from 24 July–12 Oct. showed active moult of any feather-tract. **Post-juvenile** (First pre-basic). Partial; in n. hemisphere involves all feathers of head and body, all marginal and median wing-coverts, and varying number of greater secondary coverts (on average seven coverts), tertials (0–3 replaced), rectrices (0–4) and feathers of alula (Svensson 1992; Jenni & Winkler 1994; BWP). In central Europe, a few birds replace one or more secondaries, most often s6; secondaries usually replaced asymmetrically (Jenni & Winkler 1994). In n. hemisphere, starts 4–6 weeks after fledging and takes *c.* 3 months to finish (BWP). Little known about extent and timing of post-juvenile moult in Aust. Examination of skins (MV) of first immatures (which have finished post-juvenile moult) from Vic. indicates moult finished by about May and extent of moult similar to that in n. hemisphere; usually retain 2–5 juvenile greater secondary coverts but some birds replace all greater secondary coverts.

Some birds (3 of 12 first immatures examined here) replace one or two secondaries, e.g. one in May had secondary moult of $O^3N^1O^2$, while another in June had replaced s5 and s6 on right wing only. Six first immatures examined here replaced one or more tertials, e.g. one bird had replaced s7 on left wing but retained all other juvenile tertials. Some birds (1 of 12 from Aust. examined here) replace all rectrices, but others retain all juvenile rectrices (10 of 12); one bird had replaced all rectrices except t1 on right side of tail. In NZ, moult occurs in autumn and extent apparently similar to Aust.; includes all feathers of body; in males, replaced feathers of body are not jet-black (as in adult male) but have varying amount of grey or brown markings, especially feathers of throat and breast, some birds with plumage similar to adult female (Gurr 1954). Gurr (1954) also stated that proximal (inner) greater secondary coverts often replaced (mean 8.2 coverts [1.64; 29]); occasional birds replace one inner greater primary covert; 60% of first immatures examined had replaced 1–4 inner secondaries, usually symmetrically, but in some birds moult asymmetrical. **First immature post-breeding** (Second pre-basic). Little known. Apparently acquire adult plumage in this moult (BWP). Timing and extent probably similar to adult post-breeding. One first immature collected in Vic. in Nov. had very worn retained juvenile remiges and was starting moult of body and tail (with t1 about one-third grown).

MEASUREMENTS NOMINATE *MERULA*: (1–2) NSW and Vic., skins, sexed by plumage and labels (MV): (1) Adults; (2) First immatures. (3–6) Live birds, sexed by plumage (Rogers *et al.* 1986): (3–4) Vic.: (3) Adults; (4) First immatures; (5–6) Tas.: (5) Adults; (6) First immatures. (7) NI, adults, skins, sexed by plumage and labels (NMNZ). (8) SI, live adults, sexed by plumage (Gurr 1954). (9–12) Skins (Niethammer 1971): (9–12) NZ: (9) Adults; (10) First immatures; (11) Ages combined; (12) England (adults and first immatures combined). (13) Kermadec Is, live birds, ages not specified (Merton & Veitch 1986). (14) Little Barrier I., NZ, live birds, ages not specified (Gill & Veitch 1990). (15–16) S. England, skins, collected boreal summer (BWP): (15) Adults; (16) First immatures. Bill N1 measured from bill tip to basal corner of nostril.

		MALES	FEMALES	
WING	(1)	128.5 (2.07; 126–132; 8)	121.5 (5.20; 118–129)	**
	(2)	124.3 (3.08; 118–129; 12)	122	
	(3)	131.1 (3.16; 25)	126.5 (3.67; 24)	**
	(4)	128.8 (3.63; 23)	124.2 (2.37; 19)	**
	(5)	129.5 (3.21; 124–136; 12)	122.1 (1.79; 120–125; 8)	**
	(6)	126.5 (2.72; 123–130; 7)	122.9 (2.50; 119.5–126; 6)	*
	(7)	126.7 (3.27; 121–132; 17)	–	
	(8)	130.5 (7.60; 117–144; 75)	118.5 (6.05; 104–133; 53)	**
	(9)	130.4 (125–140; 40)	–	
	(10)	127.9 (124–131; 13)	–	
	(11)	129.7 (3.05; 124–140; 55)	125.4 (2.54; 121–131; 39)	**
	(12)	128.0 (3.43; 123–137; 29)	124.0 (2.88; 118–128; 36)	**
	(13)	125.2 (3.1; 120–130; 11)	121.2 (3.1; 116.5–129; 27)	**
	(14)	127.0 (3.65; 123–131; 4)	–	
	(15)	129.0 (1.56; 127–132; 10)	123.3 (1.89; 121–127; 10)	**
	(16)	125.3 (1.42; 124–128; 10)	120.7 (3.16; 116–126; 9)	**
TAIL	(1)	106.3 (2.43; 103–110; 8)	99.8 (6.13; 92–107; 4)	*
	(2)	104.6 (4.44; 96–111; 12)	97	
	(3)	109.9 (4.70; 10)	104.7 (4.63; 6)	*
	(4)	104.3 (4.37; 6)	100	
	(5)	107.6 (3.59; 102–115; 12)	100.9 (3.13; 96.5–106; 7)	**
	(6)	104.6 (1.37; 102–106; 7)	100.7 (2.34; 98–105; 6)	**
	(7)	109.2 (5.50; 102–121; 17)	–	
	(8)	103.5 (5.35; 95–122; 73)	104.5 (5.02; 94–115; 51)	ns
	(11)	106.9 (3.34; 100–117; 55)	102.7 (92–111; 41)	
	(12)	105.4 (3.97; 98–113; 28)	101.7 (96–109; 35)	
	(13)	109, 111	102.8 (3.82; 97–107; 6)	
	(14)	107.2 (3.1; 101–113; 11)	101.9 (4.2; 91–109; 27)	**
	(15)	108.8 (2.53; 105–112; 10)	106.0 (3.13; 101–112; 10)	**
BILL S	(1)	26.6 (1.45; 24.9–29.3; 8)	25.7 (1.64; 23.7–27.2; 4)	ns
	(2)	26.9 (0.92; 25.3–28.6; 12)	23.5	
	(7)	25.9 (1.54; 23.1–27.9; 17)	–	
	(8)	27.0 (1.18; 24.5–29.5; 63)	26.0 (1.87; 21–31; 39)	**
BILL F	(13)	22.1 (1.1; 20.5–24.0; 12)	21.7 (1.1; 19.2–23.5; 27)	ns
BILL N	(11)	15.9 (1.28; 14–18; 50)	15.6 (0.86; 14–17; 42)	ns
	(12)	15.1 (0.95; 14–17; 30)	15.5 (0.84; 14–17; 36)	*
BILL N1	(15)	17.3 (0.67; 16–18; 10)	17.1 (0.74; 16–18; 10)	ns
THL	(3)	53.3 (1.12; 24)	53.0 (0.98; 21)	ns
	(4)	53.4 (0.88; 22)	52.7 (0.92; 16)	*
	(5)	53.0 (1.17; 51.0–55.3; 12)	52.9 (0.97; 51.6–54.2; 8)	ns
	(6)	52.2 (1.45; 49.3–54.0; 7)	52.3 (1.18; 50.5–53.9; 6)	ns
TARSUS	(1)	33.3 (1.30; 30.4–34.7; 8)	32.9 (1.13; 32.1–34.6; 4)	ns
	(2)	32.1 (1.74; 28.1–34.4; 12)	30.5	
	(7)	32.4 (0.92; 31.1–34.4; 17)	–	
	(8)	31.8 (2.37; 26.5–37.0; 75)	30.5 (1.62; 27–34; 50)	**
	(13)	33.7 (1.5; 30.0–35.5; 12)	33.7 (1.1; 31.4–35.0; 27)	ns
	(14)	34.1 (1.87; 32.3–36.0; 4)	32.9 (1.32; 30.9–34.5; 6)	**
	(15)	34.2 (1.30; 32–36; 9)	33.2 (0.92; 32–34; 10)	*

In se. Aust., skins of adult males have longer Wing ($P<0.01$) than first immature males. In Vic., live adult males have slightly longer Wing ($P<0.05$) than first immature males; likewise, live adult males in Tas. have longer Wing ($P<0.01$) than first immature males (data from Rogers *et al.* 1986).

WEIGHTS NOMINATE *MERULA*: (1–2) NSW and Vic., from museum labels (MV): (1) Adults; (2) First immatures. (3–6) Live birds, sexed by plumage (Rogers *et al.* 1986): (3–4) Vic.: (3) Adults; (4) First immatures; (5–6) Tas.: (5) Adults; (6) First immatures. (7) NI, NZ, adults, from museum labels (NMNZ). (8) NZ, ages combined (Niethammer 1971). (9) SI, NZ, live birds, adults and first immatures combined (Gurr 1954).

		MALES	FEMALES	
(1)		84.0, 93.7, 96.0	95.8, 98.0	
(2)		94.1 (14.08; 80.5–120.0; 8)	93.0	
(3)		(84–95; 16)	(80–96; 17)	
(4)		(82–94; 20)	(81–91; 17)	
(5)		94.2 (6.20; 85–106; 12)	89.8 (5.73; 79.4–96.5; 8)	ns
(6)		95.5 (9.03; 82.6–112; 7)	91.9 (7.10; 85.0–104; 6)	ns
(7)		92.8 (15.23; 75–127.5; 9)	–	
(8)		90.5 (78–105; 11)	89.5 (80.5–110.5; 9)	
(9)	(JAN.)	93.5 (87.5–103.5; 18)	89.8 (87.5–106.1; 9)	
	(FEB.)	91.1 (76.2–101.1; 7)	88.8 (80.0–96.0; 8)	
	(MAR.)	102.0 (93.0–106.0; 8)	92.7, 104.9, 107.2	
	(APR.)	88.5, 88.8, 92.1	86.6	
	(MAY)	99.0 (82.8–109.2; 11)	94.7 (84.4–100.6; 9)	
	(JUNE)	98.7 (84.4–105.4; 9)	94.8 (90.4–100.3; 4)	
	(JULY)	103.1 (87.1–128.0; 30)	101.4 (85.3–123.8; 17)	
	(AUG.)	85.0 (72.2–108.0; 35)	89.9 (72.9–107.0; 27)	
	(SEPT.)	84.5 (73.8–102.0; 11)	81.3, 84.8	
	(OCT.)	83.0 (69.9–94.2; 29)	89.1 (75.0–105.7; 21)	
	(NOV.)	83.2 (74.3–89.8; 8)	87.4 (74.7–105.0; 12)	
	(DEC.)	91.3 (75.2–104.6; 15)	89.8 (77.2–101.0; 16)	

NOMINATE *MERULA*: (10–14) S. England, adults (BWP): (10) Jan.–Feb.; (11) Mar.–Apr.; (12) May–June; (13) Sept.–Oct.; (14) Nov.–Dec.

	MALES	FEMALES
(10)	105.9 (81–148; 198)	108.2 (87–135; 100)
(11)	96.4 (82–125; 256)	99.8 (83–129; 100)
(12)	94.6 (80–122; 193)	97.1 (81–128; 50)
(13)	102.6 (80–124; 229)	97.7 (85–129; 100)
(14)	113.8 (86–149; 422)	106.8 (82–129; 100)

STRUCTURE See BWP for details.

AGEING Juvenile superficially similar to adult female but distinguished by plumage and bare parts (see Field Identification). First immatures more difficult to distinguish

from adult females: first immature female very similar to adult female; first immature males vary individually, with some superficially similar to adult females, others similar to adult male. Published information (Rogers *et al.* 1986; Svensson 1992; Jenni & Winkler 1994; Clement & Hathway 2000; BWP) and examination of 13 skins (MV; this study) indicates following criteria useful for separating all first immatures from all adults: (1) first immatures usually show moult-contrast within greater secondary upperwing-coverts, and sometimes also tertials or alula, or both; most skins examined (this study) retain outer 2–5 juvenile greater secondary coverts, which are shorter, dark brown and often have pale spots at tips, and contrast with longer, blackish inner adult-like coverts which replaced in post-juvenile moult; some birds show obvious contrast between black adult-like tertials or feathers of alula, and paler, dark brown, retained juvenile tertials or feathers of alula; (2) those first immatures not showing moult-contrast in greater secondary coverts, tertials or alula (probably <5% of birds), recognized by retained juvenile greater primary upperwing-coverts and remiges which paler, dark brown, and contrast with replaced greater secondary coverts, alula and tertials (though contrast not so obvious in first immature females); (3) first immature males have paler plumage, particularly chin and throat, compared with adult males, but some birds resemble adult females in colour of head and body; (4) bill extensively blackish or dark grey at first (late summer and autumn in HANZAB region), becoming adult-like by late winter and spring. See photos in Jenni & Winkler (1994) for ageing birds in the hand.

SEXING Adults differ in plumage (see Field Identification) and size, with males averaging larger than females (see Measurements). Juveniles do not differ obviously in plumage; in nominate *merula* from n. hemisphere, juvenile males said to be darker and less rufous-coloured, with blacker remiges and rectrices than juvenile females (BWP); juvenile males said to have blackish centre of upper throat whereas juvenile females are mottled paler (Svensson 1992). First immatures also difficult to sex, and there is much individual variation in colour and markings of plumage in skins of both sexes examined here. Svensson (1992) also states that plumage coloration varies considerably in first immatures, particularly in females; in autumn, first immature males have brownish-black upperparts, never olive-tinged as in first immature females. Rogers *et al.* (1986) state that first immature females have entirely brown upper mandible (cf. black in first immature males); presumably this refers to birds in austral late summer to autumn. Moult-contrast between retained juvenile feathers of wing less in first immature females than in first immature males (females never having black wing-coverts, tertials or alula as in males); this characteristic possibly most important for sexing first immatures, even as late as spring or early summer.

GEOGRAPHICAL VARIATION In Eurasia, geographical variation apparently clinal, but 15–16 subspecies recognized by several authors (Clement & Hathway 2000; Peters; BWP). Variation in Europe considered to be slight and largely clinal, with gradual steps in size, coloration of populations and degree of sex-dimorphism; nominate *merula* (from Europe and British Isles except se. Europe) having deeper black plumage (males) or tinged brown (females) compared with subspecies *aterrimus* from se. Europe, extending from Hungary, s. Greece, Romania, the Balkans, Turkey, most Aegean Is, Ukraine and Caucasus, which have duller black plumage (males) or greyer-plumaged females (Svensson 1992; Clement & Hathway 2000; BWP). Across rest of Eurasia, adults show slight variation in size and plumage-coloration, overall, size smaller towards S of range, but birds from higher altitudes usually have longer wings than those from lower elevation; largest birds are from mountain regions of central Asia (subspecies *maximus* and *intermedius*) and south-central China (*mandarinus*), and smallest birds are from lowlands of nw. Africa (*mauritanicus*), Azores (*azorensis*) and Canary Is (*cabrerae*); intergradation occurs where ranges of subspecies meet (Clement & Hathway 2000; BWP). Some populations in s. Asia, namely subspecies *simillus*, *nigropileus*, *spencei*, *bourdilloni* and *kinninsii* from Indian subcontinent, have very different plumage compared with other Eurasian populations, and are possibly a separate species (Grimett *et al.* 1999; BWP). Introduced populations in Aust. and NZ considered to be nominate *merula* (Niethammer 1971; DAB). Little known about geographical variation within Aust.; adult males from e. Gippsland, Vic., said to have darker orange bills and orbital rings than those elsewhere; adult females in Mt Lofty Ras, SA, said to have duskier plumage than those in Vic. and NSW (DAB). Adult female captured at Toolangi, e. Vic., had reddish bill and orbital ring (R.H. Loyn). No difference in measurements between adult males from Aust. and NZ (this study).

REFERENCES

ABBBS. 1977. *Corella* 1: 20–3.
—— 1979. *Corella* 3: 34–6.
—— 1987. *Corella* 11: 68–71.
Abbott, I. 1974. *Emu* 74: 124–34.
Anderson, S. 1947. *NZ Bird Notes* 2: 80.
Anderson, S.H., & J. Ogden. 2003. *Notornis* 50: 201–9.
Anon. 1905. *Emu* 5: 91–2.
—— 1913. *Emu* 12: 207.
—— 1919. *S. Aust. Orn.* 4: 65–8.
—— 1934. *Victorian Nat.* 51: 178.
—— 1940. *Wild Life* 2(7): 37.
—— 1948. *S. Aust. Orn.* 19: 10.
—— 1949. *Victorian Nat.* 65: 207.
—— 1969. *Aust. Bird Bander* 7: 15–17.
—— 1974. *Canberra Bird Notes* 2(12): 2–24.
—— 1978. *Corella* 2 (Suppl.): 97–163.
—— 1987. *Macquarie Island Nature Reserve Visitor's Handbook.* Tas. Natl Pks Wildl. Serv., Hobart.
—— 2002. *West. Aust. Bird Notes* 104: 3–4.
—— 2003. *West. Aust. Bird Notes* 106: 3–4.
Ashton, C.B. 1985. *S. Aust. Orn.* 29: 169–79.
—— 1987. *Aust. Bird Watcher* 12: 73–82.
—— 1996. *S. Aust. Orn.* 32: 93–8.
—— 2001. *S. Aust. Orn.* 33: 145–55.
Attiwill, A.R. 1972. *S. Aust. Orn.* 26: 59–64.
Bailey, A.M., & J.H. Sorensen. 1962. *Proc. Denver Mus. Nat. Hist.* 10.
Baker, R.T. 1980. *Notornis* 27: 331–4.
Baker-Gabb, D.J. 1981. *Notornis* 28: 241–54.
Balmford, R. 1978. *Aust. Bird Watcher* 7: 237–48.
Barlow, M. 1983. *Notornis* 30: 232.
Barnea, A., *et al.* 1990. *Oikos* 57: 222–8.
Basse, F. 1948. *S. Aust. Orn.* 19: 8.
Baxter, C.I. 1980. *S. Aust. Orn.* 28: 90–8.
—— 1989. *An Annotated List of the Birds of Kangaroo Island.* S. Aust. Natl Pks Wildl. Serv., Kingscote, Kangaroo I., SA.
Bayly, K.L., & D.T. Blumstein. 2001. *Emu* 101: 199–204.
Beauchamp, A.J., & G.R. Parrish. 1999. *Notornis* 46: 470–83.
Bedggood, G.W. 1965. *Bird Obs.* 405: 6.
—— 1970. *Aust. Bird Watcher* 3: 252–65.
—— 1972. *Aust. Bird Watcher* 4: 116–28.
—— 1973. *Aust. Bird Watcher* 5: 12–22.
—— 1980. *Aust. Bird Watcher* 8: 147–62.
Bell, B.D. 1996. *Notornis* 43: 213–17.
Bennett, C. 1988. *Canberra Bird Notes* 13(4): 133–4.
Berry, L. 2001. *Emu* 101: 191–7.
Beruldsen, G.R. 1980. *A Field Guide to Nests and Eggs of Australian Birds.* Rigby, Sydney.
Blackburn, A. 1965a. *Notornis* 12: 53.
—— 1965b. *Notornis* 12: 191–207.
—— 1967. *Notornis* 14: 3–8.
—— 1968. *Notornis* 15: 51–65.
—— 1971. *Notornis* 18: 147–74.
Bomford, M., & R. Sinclair. 2002. *Emu* 102: 29–45.
Bourke, P.A. 1957. *Emu* 57: 263–4.

—— 1960. *Bird Obs.* 342: 4.
Brathwaite, D.H. 1956. *Notornis* 6: 217.
Bright, A., & J. Waas. 2002. *Anim. Behav.* 64: 207–13.
Brothers, N.P. 1979. *Emu* 79: 89–91.
Brown, A.G. 1950a. *Emu* 50: 105–13.
—— 1950b. *Emu* 50: 231.
Brown, K., & C. Miller. 1997. *Notornis* 44: 109–10.
——, *et al.* 1993. *Notornis* 40: 169–77.
Bryant, C.E. 1930. *Emu* 29: 297–301.
—— 1936. *Emu* 35: 219–29.
Bryant, S.L. 1999. *Tas. Bird Rep.* 27: 13–16.
Bull, P.C. 1946. *Emu* 46: 198–208.
—— 1953. *Notornis* 5: 149–56.
—— 1954. *Notornis* 6: 14–18.
—— 1956. *Notornis* 7: 9–13.
——, & D.G. Dawson. 1969. *Notornis* 16: 172–9.
Burrows, C.J. 1994. *NZ J. Bot.* 32: 169–81.
Butler, A.L. 1941. *Emu* 40: 395–6.
Calaby, J. 2000. *Canberra Bird Notes* 25(1): 1–22.
Campbell, A.G. 1905. *Emu* 5: 68–72.
Chafer, C.J., *et al.* 1999. *A Handbook of Birds Found in the Illawarra, Shoalhaven and Adjacent Tablelands.* Illawarra Bird Obs. Club, Wollongong, NSW.
Challies, C.N. 1962. *Notornis* 10: 118–27.
—— 1966. *Notornis* 13: 18–26.
Chambers, B.S., *et al.* 1955. *Notornis* 6: 152–7.
Cheney, G.M. 1915. *Emu* 14: 199–213.
Child, P. 1975a. *Notornis* 22: 121.
—— 1975b. *Notornis* 22: 143–50.
—— 1978. *Notornis* 25: 71–83.
Chilton, C. (Ed.) 1909. *The Subantarctic Islands of New Zealand.* Phil. Inst. Cant., Christchurch.
Chisholm, A.H. 1919. *Emu* 19: 60–2.
—— 1950. *Emu* 50: 97–100.
—— 1965. *Emu* 65: 57–64.
Chisholm, E.C. 1926. *Emu* 25: 276–9.
Clark, G.A. 1983. *Wilson Bull.* 95: 155–7.
Clarke, G. 1967. *S. Aust. Orn.* 24: 119–34.
Cleland, J.B. 1924. *S. Aust. Orn.* 7: 172–84.
—— 1927. *S. Aust. Orn.* 9: 148.
—— 1936. *S. Aust. Orn.* 13: 239.
—— 1937. *S. Aust. Orn.* 14: 71–2.
—— 1944. *S. Aust. Orn.* 17: 44.
—— 1952. *S. Aust. Orn.* 20: 72–7.
Clement, P., & R. Hathway. 2000. *Thrushes.* Christopher Helm, London.
Cohn, M. 1942. *Emu* 42: 122.
Coleman, E. 1937. *Emu* 37: 68–9.
—— 1939. *Emu* 38: 515–21.
—— 1950. *Victorian Nat.* 66: 217.
Condon, H.T. 1942. *S. Aust. Orn.* 16: 14, 23.
—— 1948a. *S. Aust. Orn.* 18: 78.
—— 1948b. *S. Aust. Orn.* 19: 8.
—— 1951. *S. Aust. Orn.* 20: 26–68.
Condon, H.T. 1969. *A Handlist of the Birds of South Australia.* S. Aust. Orn. Assoc., Adelaide.
Cooper, R.M., & I.A.W. McAllan. 1995. *The Birds of Western New South Wales: A Preliminary Atlas.* NSW Bird Atlassers, Albury, NSW.
Cooper, R.P. 1959. *Emu* 59: 60–1.
—— 1974. *Aust. Bird Watcher* 5: 205–33.
Cotton, B.C. 1960. *S. Aust. Orn.* 23: 44–7.
Counsilman, J.J. 1974. *Notornis* 21: 318–33.
Crockett, D.E. 1954. *Notornis* 6: 40–2.
Crowe, I.F. 1978a. *Canberra Bird Notes* 4(3): 12.
—— 1978b. *Canberra Bird Notes* 4(4): 23.
Cunningham, D.M., & P.J. Moors. 1985. *Notornis* 32: 221–43.
Daniel, M.J. 1971. *Notornis* 18: 50–1.
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.
—— 1950. *Notornis* 4: 27–31.
Day, T.D. 1995. *Notornis* 42: 175–86.
de Schauensee, R.M. 1984. *The Birds of China.* OUP, Oxford.
Disher, P. 2000. *Birds of the Barham District.* Barham Land Care Grp, Barham, and Bird Obs. Club Aust., Melbourne.
Disney, H.J. de S., & C.N. Smithers. 1972. *Aust. Zool.* 17: 1–11.
DNFC (Dunedin Nat. Field Club). 1948. *NZ Bird Notes* 3: 12.
—— 1952. *Notornis* 4: 32–3.
Dodson, G.S. 1976. *Tasm. Nat.* 46: 7.
Dove, H.S. 1919. *Emu* 19: 70.
—— 1936. *Emu* 35: 299–300.
Dowling, B., *et al.* 1994. *Tech. Ser. Arthur Rylah Inst. Env. Res.* 134.
Drummond, J. 1906. *Trans. NZ Inst.* 39: 227–52.
Duckworth, P. 2002. *Tas. Bird Rep.* 29: 15.
East, R. 1967. Unpubl. BSc(Hons) thesis, Canterbury Univ., Christchurch.
——, & R. Tasker. 1967. *Notornis* 14: 210.
Eckert, H.J. 1972. *S. Aust. Orn.* 26: 42–7.
Edgar, A.T. 1962. *Notornis* 10: 1–15.
—— 1963. *Notornis* 10: 414–15.
——, *et al.* 1965. *Notornis* 12: 3–43.
Egan, K.H., *et al.* 1997. *Corella* 21: 1–16.
Emison, W.B., & J.W. Porter. 1978. *Emu* 78: 126–36.
Er, K.B.H. 1997. *Corella* 21: 101–11.
——, & C.R. Tidemann. 1996. *Corella* 20: 117–28.
——, —— 2001. *Canberra Bird Notes* 26(2): 33–42.
——, *et al.* 1996. *Corella* 20: 117–28.
——, *et al.* 1998. *Aust. Bird Watcher* 17: 370–82.
Ey, A.E. 1944. *S. Aust. Orn.* 27: 32–7.
Falla, R.A. 1965. *Proc. Ecol. Soc. NZ* 12: 63–8.
——, *et al.* 1981. *The New Guide to the Birds of New Zealand.* Revised edn. Collins, Auckland.
Fielding, P. 1979. *Tasm. Nat.* 57: 1–11.
Fitzgerald, B.M. 1965. *Notornis* 12: 181–4.
——, *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.
—— 1986. *Weta* 9: 28–9.
Ford, H.A., & D.C. Paton. 1976. *S. Aust. Orn.* 27: 88–95.
——, —— (Eds) 1986. *The Dynamic Partnership: Birds and Plants in Southern Australia.* D.J. Woolman, Adelaide.
Ford, J.R. 1983. *Emu* 83: 141–51.
Forde, N. 1986. Pp 42–58 **In**: Ford & Paton 1986.
Francis, L.S. 1946. *S. Aust. Orn.* 17: 86–7.
Franklin, D.C., & J.L. Robinson. 1989. *Aust. Bird Watcher* 13: 129–32.
Freeman, A.N.D. 1994. *Notornis* 41 (Suppl.): 127–41.
—— 1999. *Notornis* 46: 388–404.
French, K. 1990. *Emu* 90: 185–9.
——, *et al.* 1992. *Aust. J. Ecol.* 17: 35–42.
Fricke, R. 1983. *Bird Obs.* 612–13: 10.
Friend, G.R. 1982. *Emu* 82: 80–91.
Frith, C.B., & D.W. Frith. 1992. *Aust. Bird Watcher* 14: 262–76.
Frith, H.J. (Ed.) 1969. *Birds in the Australian High Country.* Reed, Sydney.
Fuller, O. 1942. *S. Aust. Orn.* 16: 44.
—— 1945. *S. Aust. Orn.* 17: 55.
Fulton, G.R. 2002. *Corella* 26: 1–12.
Gall, B.C., & N.W. Longmore. 1978. *Emu* 78: 189–96.
Garnett, S.T., & G.M. Crowley. 2000. *The Action Plan for Australian Birds.* Env. Aust., Canberra.
——, *et al.* 1991. *Corella* 15: 1–7.
Gepp, B.C., & A.J. Fife. 1975. *S. Aust. Orn.* 27: 12–17.
Gibb, J.A. 1996. *Notornis* 43: 7–13.
—— 2000a. *Notornis* 47: 13–35.
—— 2000b. *Notornis* 47: 184–91.
Gibson, J.D. 1977. *Aust. Birds* 11: 41–74.
Gill, B.J. 1977. *Notornis* 24: 75–81.
—— 1982. *Notornis* 29: 215–27.
—— 1983. *Notornis* 30: 337–9.
—— 1989. *Notornis* 36: 81–7.
——, & C.R. Veitch. 1990. *Notornis* 37: 141–5.
Gleadow, R.M. 1982. *Aust. J. Bot.* 30: 185–98.
Glover, B. 1969. *S. Aust. Orn.* 25: 58.
Gosper, C.R., & J. Baker. 1997. *Aust. Bird Watcher* 17: 111–25.
Graham, D.H. 1948. *NZ Bird Notes* 2: 178–80.
Gravatt, D.J. 1971. *Emu* 71: 65–72.
Green, C., & A. McWhirter. 1973. *Canberra Bird Notes* 2(6): 10.
Green, R.H. 1969. *Rec. Queen Vict. Mus.* 34: 1–32.
—— 1989. *Birds of Tasmania.* Potoroo Publs, Launceston, Tas.

—— 1995. *The Fauna of Tasmania: Birds*. Potoroo Publs, Launceston, Tas.
——, & A.M. McGarvie. 1971. *Rec. Queen Vict. Mus.* 40: 1–42.
——, & B.C. Mollison. 1961. *Emu* 61: 223–36.
Green, R.J. 1984. *Aust. Wildl. Res.* 11: 181–90.
Greenwood, P.J., & P.H. Harvey. 1978. *Anim. Behav.* 26: 1222–36.
Gregory-Smith, R. 1991. *Canberra Bird Notes* 16(4): 65–74.
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.
Gurr, L. 1954. *Ibis* 96: 225–61.
Guthrie-Smith, H. 1936. *Sorrows and Joys of a New Zealand Naturalist*. Whitcombe & Tombs, Wellington.
Halafoff, K.C. 1962. *Emu* 62: 62.
Hall, R. 1899. *Victorian Nat.* 15: 156–9.
Hall-Jones, J. 1966. *Notornis* 13: 90–3.
Hardy, A.D. 1928. *Emu* 27: 300–1.
Harris, J.G.K. 1980. *Tasm. Nat.* 60: 1–6.
Harvey, R. 1994. *Canberra Bird Notes* 19(2): 23–4.
Hayes, L.M. 1991. *Notornis* 38: 73–9.
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. 1985. *Birds of Norfolk Island*. Wonderland Publs, Norfolk Island.
——, *et al.* 1986. *Notornis* 33: 141–9.
Heron, S.J. 1973. *Emu* 73: 1–8.
Hindwood, K.A. 1947. *Emu* 47: 63–4.
Hobbs, J.N. 1961. *Emu* 61: 21–55.
——, & M. Kaveney. 1962. *Emu* 61: 295–300.
Hodgkins, M. 1949. *NZ Bird Notes* 3: 116–25.
Holdsworth, M.C. 1998. *Tas. Bird Rep.* 26: 29–37.
Holmes, G. 1984. *Aust. Bird Watcher* 10: 164–6.
Holyoak, D.T. 1979. *Emu* 79: 7–18.
Hooper, J. 2001. *Tas. Bird Rep.* 28: 5–13.
Hornby School. 1946. *NZ Bird Notes* 2: 10.
Horning, D.S, & C.J. Horning. 1974. *Notornis* 21: 13–24.
Horrocks, G.F.B., & G.W. Brown. 1993. *Aust. Bird Watcher* 15: 24–34.
Hoskin, E.S. 1991. *The Birds of Sydney*. Surrey Beatty, Sydney.
Howard, T., & I. Crawford. 1989. *RAOU Rep.* 63: 10–28.
Howe, S. 2001. *Sea Swallow* 50: 53–6.
Hudson, F.P. 1959. *Notornis* 8: 166.
Humphreys, J.S. 1986. *Aust. Bird Watcher* 11: 153–66.
Hutton, I. 1991. *Birds of Lord Howe Island: Past and Present*. Author, Coffs Harbour, NSW.
Hyett, J., & M.D. Gottsch. 1963. *Aust. Bird Watcher* 2: 51–5.
Ick-Hewins, T.J. 1917. *Emu* 16: 192–93.
Imboden, C. 1975. *Notornis* 22: 221–30.
Innes, J.G., *et al.* 1982. *Notornis* 29: 93–9.
Inskipp, C., & T. Inskipp. 1985. *A Guide to the Birds of Nepal*. Croom Helm, London.
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. 1981. *Notornis* 28: 139–40.
Jenni, L., & R. Winkler. 1994. *Moult and Ageing of European Passerines*. Academic Press, London.
Johnstone, R.E., & G.M. Storr. 2004. *Handbook of Western Australian Birds. 2*. West. Aust. Mus., Perth.
Jurisevic, M., & K.J. Sanderson. 1994. *Emu* 94: 69–77.
Kendall, H. 1904. *Emu* 3: 233.
Kennedy, P.M. 1978. *Canberra Bird Notes* 4(1): 9.
Kennedy, S.J. 2003. *Corella* 27: 33–44.
Kentish, B.J., *et al.* 1995. *Emu* 95: 233–44.
——, *et al.* 2001. *Emu* 101: 335–40.
Kikkawa, J. 1966. *Trans. R. Soc. NZ* 7: 215–77.
Kinsky, F.C. 1957. *Notornis* 7: 123–35.
——, & R.B. Sibson. 1959. *Notornis* 8: 132–8.
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.
Kutt, A.S., & J.E. Kemp. 1997. *Sunbird* 27: 26–8.
Lack, D., & W. Light. 1941. *Br. Birds* 35: 47–53.
Lambert, R.E. 1970. *Notornis* 17: 62–5.
Lamm, D.W. 1963. *Emu* 63: 57–65.
——, & S.J. Wilson. 1965. *Emu* 65: 183–205.
——, *et al.* 1963. *Emu* 63: 57–65.
Lane, M. 1980. *Notornis* 27: 128.
Lane, S.G. 1964. *Emu* 64: 47.
——, & H. Battam. 1980. *Corella* 4: 37–8.
——, —— 1981. *Corella* 5: 91–4.
Lashmar, A.C.F. 1988. *S. Aust. Orn.* 30: 154–5.
Lauder, C.S. 1978. *Notornis* 25: 90–1.
Leach, H.A.C. 1928. *Emu* 28: 83–99.
Legge, R.W. 1935. *Emu* 35: 179–81.
Leishman, A.J. 1997. *Aust. Birds* 31: 1–11.
Lenz, M. 1990. *Emu* 90: 145–53.
Lepschi, B.J. 1992. *Corella* 16: 75–7.
—— 1993. *Emu* 93: 195–9.
—— 1997. *Emu* 97: 84–7.
Liddy, J. 1970. *Aust. Bird Bander* 8: 57–8.
Lienau, C.H.A. 1947. *S. Aust. Orn.* 18: 47.
Lindsay, C.J., *et al.* 1959. *Notornis* 8: 99–106.
Long, J.L. 1981. *Introduced Birds of the World*. Reed, Sydney.
Lord, C.E. 1920. *Emu* 20: 39–40.
—— 1931. *Emu* 30: 201–3.
—— 1933. *Emu* 32: 211–20.
Lowe, V.T. 1959. *Aust. Bird Watcher* 1: 23–5.
Loyn, R.H. 1980. *Emu* 80: 145–56.
—— 1985. *Emu* 85: 213–30.
Mack, D.B. 1961. *S. Aust. Orn.* 23: 69–79.
Marchant, S. 1992. *Occ. Publ. Eurobodalla Nat. Hist. Soc.* 1.
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.
Mattingley, A.H.E. 1938. *Emu* 38: 7–11.
McAllan, I.A.W., *et al.* 2004. *Aust. Field Orn.* 21 (Suppl.).
McCann, C. 1953. *Notornis* 5: 198–9.
—— 1964. *Notornis* 11: 36–45.
McEvey, A. 1965. *Emu* 65: 1–56.
McFadzien, J., & M. McFadzien. 1975. *Notornis* 22: 250–1.
McGilp, J.N. 1926. *S. Aust. Orn.* 8: 279–80.
—— 1956. *S. Aust. Orn.* 22: 9–12.
McKean, J.L., & K.A. Hindwood. 1965. *Emu* 64: 79–97.
McKenzie, H.R. 1945. *NZ Bird Notes* 1: 110–12.
—— 1950a. *NZ Bird Notes* 3: 229–30.
—— 1950b. *NZ Bird Notes* 3: 239–40.
McLennan, J.A., & B.W.H. MacMillan. 1985. *Notornis* 32: 95–100.
Mellor, J.W. 1924. *S. Aust. Orn.* 7: 234–5.
—— 1926. *S. Aust. Orn.* 8: 162–3.
—— 1927. *S. Aust. Orn.* 9: 75–7.
Merton, D.V. 1968. *Notornis* 16: 221–4.
—— 1970. *Notornis* 17: 147–99.
——, & C.R. Veitch. 1986. *Notornis* 33: 209–18.
Metcalf, R.A. 1988. *Canberra Bird Notes* 13(2): 32–3.
—— 1992. *Canberra Bird Notes* 17(3): 76.
Michie, R.H. 1948. *NZ Bird Notes* 2: 196–7.
Middleditch, J. 1949. *NZ Bird Notes* 3: 130.
Milledge, D. 1972. *Emu* 72: 167–70.
Miskelly, C.M., *et al.* 2001. *Notornis* 48: 1–40.
Mollison, B.C. 1961. *Emu* 61: 58–60.
—— 1974. *Tasm. Nat.* 39: 6–7.
Moncrieff, P. 1929. *Emu* 28: 215–25.
Moore, J.A. 1949. *NZ Bird Notes* 3: 136.
Moors, P.J. 1983. *Ibis* 125: 137–54.
Morgan, A.M. 1914. *S. Aust. Orn.* 1(3): 13–14.
Morris, A.K. 1989. *Aust. Birds* 23: 7–21.
——, *et al.* 1981. *Handlist of Birds in New South Wales*. NSW Field Orn. Club, Sydney.
Morton, S.R., & R.W. Braithwaite. 1976. *Aust. Bird Watcher* 6: 139–42.
Mosey, H. 1951. *Emu* 50: 285.
Mulvaney, M. 1986. *Canberra Bird Notes* 11(3): 94–9.
Napier, J.R. 1969. *Aust. Bird Watcher* 3: 179–92.
Nevill, J. 1976. *Aust. Bird Watcher* 6: 229.
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.
Norris, M., *et al.* 1995. *Local Birds of Bayside*. Bayside City Council, Melbourne.
Norton, S.A. 1982. *Notornis* 29: 91–2.
Ogilvie-Grant, W.R. 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.
Paton, D.C. 1977. *S. Aust. Orn.* 27: 185.
——, & N.C.H. Reid. 1983. *Agricult. Rec.* 10(15): 8–11.
——, *et al.* 1994. *S. Aust. Orn.* 31: 151–93.
Paton, P.A. 1976. *S. Aust. Orn.* 27: 131–4.
Pawsey, C.K. 1966. *S. Aust. Orn.* 24: 93–5.
Payne, H.W. 1931. *Emu* 30: 228–32.
Penniket, A., *et al.* 1986. *Preliminary Reports of Expeditions to the Auckland Islands Nature Reserve 1973–1984*. Dept Lands Surv., Wellington.
Pennycook, C. 1949. *NZ Bird Notes* 3: 135–6.
Peter, J.M. 2000. *Victorian Nat.* 117: 63–6.
—— 2005. *Aust. Field Orn.* 22: 147–51.
Phillipps, W.J. 1948. *NZ Bird Notes* 3: 17.
——, & C.J. Lindsay. 1948. *NZ Bird Notes* 3: 43–50.
Pierce, R.J. 1980. *Notornis* 27: 21–44.
——, *et al.* 1993. *Notornis* 40: 285–93.
Pierre, J.P. 2000. *Notornis* 47: 7–12.
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* 9: 132–5.
Pycroft, A.T. 1931. *Emu* 30: 168.
Ramsay, G.W., & J.C. Watt. 1971. *Notornis* 18: 287–90.
Ratkowsky, A.V. 1983. *Tas. Bird Rep.* 12: 18–21.
—— 1993a. *Tasm. Nat.* 113: 7–8.
—— 1993b. *Tas. Bird Rep.* 22: 15–22.
——, & D.A. Ratkowsky. 1977. *Emu* 77: 19–22.
Read, J.L. 1999. *Aust. Bird Watcher* 18: 59–76.
Reid, N.C.H. 1986. Pp 64–84 **In**: Ford & Paton 1986.
Reilly, P.N. 1978. *Corella* 2: 73–5.
—— 1981. *Aust. Bird Watcher* 9: 132–5.
—— 1991. *Corella* 15: 134–42.
—— 2000. *Emu* 100: 240–5.
Reischek, A. 1886. *Trans. NZ Inst.* 19: 181–4.
Ridpath, M.G., & R.E. Moreau. 1966. *Ibis* 108: 348–93.
Rix, C.E. 1945. *S. Aust. Orn.* 17: 56–71.
Roberts, N.L. 1938. *Emu* 37: 186–96.
Robertson, B. 1947. *NZ Bird Notes* 2: 127.
Robertson, H.A., *et al.* 1993. *Notornis* 40: 253–62.
Robson, C. 2000. *A Field Guide to the Birds of South-East Asia*. New Holland, London.
—— 2002. *A Field Guide to the Birds of Thailand*. New Holland, London.
Rogers, K.G., *et al.* 1986. *Banders Aid*. A. Rogers, St Andrews, Vic.
Ryan, C.S. 1906. *Emu* 5: 110–19.
Ryder, H.R. 1948. *NZ Bird Notes* 3: 20–2.
Sagar, P.M. 1977. *Notornis* 24: 205–10.
Salter, B.E. 1960. *Aust. Bird Watcher* 1: 105–7.
Schmidt, B.L. 1978. *Aust. Birds* 12: 61–86.
Schodde, R., & B. Glover. 1955. *S. Aust. Orn.* 21: 65–72.
——, *et al.* 1983. *Spec. Publ. Aust. Natl Pks Wildl. Serv.*, Canberra.
Schulz, M., & K. Kristensen. 1994. *Aust. Bird Watcher* 15: 265–72.
Secker, H.L. 1947a. *NZ Bird Notes* 2: 132.
—— 1947b. *NZ Bird Notes* 2: 132.
—— 1952. *Notornis* 5: 24–5.
Serventy, V. 1957. *Emu* 57: 82–93.
Shanks, D. 1949. *Emu* 49: 132–41.
Shanks, R. 1953. *Notornis* 5: 202–3.
Sharland, M.S.R. 1942. *Emu* 41: 205–7.
—— 1958. *Tasmanian Birds*. Third edn. Angus & Robertson, Sydney.
—— 1967. *Bird Obs.* 423: 7–8.
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. 1949a. *NZ Bird Notes* 3: 151–5.
—— 1949b. *NZ Bird Notes* 3: 183–8.
—— 1953. *Notornis* 5: 110–14.
—— 1958. *Notornis* 7: 213–19.
Simms, E. 1978. *British Thrushes*. Collins, Glasgow.
Simmonds, H.W. 1943. *S. Aust. Orn.* 16: 46.
Skegg, P.D.G. 1964. *Notornis* 11: 159–76.
Smith, A.J., & B.I. Robertson. 1978. *Emu* 78: 169–78.
Smith, J. 1974a. *Behaviour* 48: 276–302.
—— 1974b. *Behaviour* 49: 1–61.
Smith, J.M.B. 1994. *Aust. Bird Watcher* 15: 273–5.
Smithers, C.N., & H.J. de S. Disney. 1969. *Aust. Zool.* 15: 127–40.
Snow, D.W. 1958. *A Study of Blackbirds*. Allen & Unwin, Glasgow.
—— 1969. *Bird Study* 16: 115–29.
Soper, M.F. 1963. *New Zealand Bird Portraits*. Whitcombe & Tombs, Auckland.
Spennemann, D.H.R., & L.R. Allen. 2000. *Emu* 100: 264–73.
St Paul, R. 1975. *Notornis* 22: 273–82.
Stead, E.F. 1948. *NZ Bird Notes* 3: 70–80.
Stenhouse, D. 1957. *Notornis* 7: 114.
Stevens, J.H. 1975. *Aust. Bird Watcher* 6: 77–9.
Stidolph, R.H.D. 1977. *Notornis* 24: 196–7.
Storr, G.M., *et al.* 1952. *S. Aust. Orn.* 20: 70–1.
Stove, K. (Ed.) 1994. *S. Aust. Orn.* 31: 195–265.
Sutton, J. 1919. *S. Aust. Orn.* 4: 96–9.
—— 1927. *S. Aust. Orn.* 9: 145–9.
—— 1928. *S. Aust. Orn.* 9: 215–18.
—— 1932. *S. Aust. Orn.* 11: 203.
—— 1935. *S. Aust. Orn.* 13: 92–103.
Sutton, P. 1998. *Tas. Bird Rep.* 26: 24–8.
Svensson, L. 1992. *Identification Guide to European Passerines*. Author, Stockholm.
——, & P.J. Grant. 1999. *Bird Guide*. HarperCollins, London.
Symon, O. 1946. *S. Aust. Orn.* 18: 24–5.
Tadgell, A.J. 1936. *Victorian Nat.* 53: 74–5.
Tarr, H.E. 1950. *Emu* 49: 189–98.
Taylor, I.M. 1983. *Canberra Bird Notes* 8(1): 5–52.
—— 1984. *Canberra Bird Notes* 9(3): 50–139.
—— 1987a. *Canberra Bird Notes* 12(1): 8–13.
—— 1987b. *Canberra Bird Notes* 12(4): 110–31.
——, & C. Davey. 1985. *Canberra Bird Notes* 10(2): 26–85.
——, *et al.* 1987. *Canberra Bird Notes* 12(2): 30–83.
Taylor, M.J. 1975. *Notornis* 22: 350.
Taylor, P.W. 1987. *S. Aust. Orn.* 30: 62–73.
Tennyson, A., & G. Taylor. 1989. *OSNZ News* 50: 5.
——, *et al.* 1993. *Tane* 34: 171–9.
——, *et al.* 2002. *Notornis* 49: 241–5.
Thomas, D.G. 1965. *Emu* 64: 220–8.
—— 1968. *Emu* 68: 42–84.
—— 1979. *Tasmanian Bird Atlas*. Univ. Tas., Hobart.
—— 1986. *Tas. Bird Rep.* 15: 11–16.
Thomas, D.J., & A.M. Gilmore. 1976. *Aust. Wildl. Res.* 3: 189–208.
Thomson, D.F.F. 1923. *Emu* 23: 59–60.
Thomson, G.M. 1922. *The Naturalisation of Animals and Plants in New Zealand*. Cambridge Univ. Press, Cambridge.
Tily, I. 1946. *NZ Bird Notes* 1: 117–20.
Timmins, S.M., & P.A. Williams. 1996. *NZ J. Ecol.* 15: 153–62.
Traill, B.J. 1985. *Aust. Bird Watcher* 11: 74–9.
——, *et al.* 1996. *Aust. Bird Watcher* 16: 309–26.
Turbott, E.G. 1940. *Emu* 40: 158–61.
—— 1947. *NZ Bird Notes* 2: 93–108.
Turner, J.S., *et al.* 1968. *Spec. Publ. Aust. Conserv. Found.* 1.
Tzaros, C.L. 1992. *Aust. Bird Watcher* 14: 258–9.
Urban, E.K., *et al.* 1997. *The Birds of Africa. 5*. Academic Press, London.
van Tets, G.F., & P.A. van Tets. 1967. *Emu* 66: 309–17.
Veitch, C.R. 2003. *Notornis* 50: 116–17.
——, *et al.* 2004. *Notornis* 51: 61–90.
Vellenga, R.E. 1965. *Aust. Bird Watcher* 2: 144–6.
Vestjens, W., & C. Vestjens. 1970. *Canberra Bird Notes* 1(9): 10–13.
Wagener, L.J. 1966. *Notornis* 13: 150–6.
Wainer, J., & P. Dann. 1979. *Aust. Bird Watcher* 8: 47–50.
Waite, E.R. 1909. Pp. 242–600 **In**: Chilton 1909.
Wakefield, N.A. 1954. *Victorian Nat.* 70: 190.
Ward, W.V. 1969. *Notornis* 16: 163–71.
Warham, J. 1967. *Notornis* 14: 122–39.
—— 1969. *Notornis* 16: 190–7.
——, & B.D. Bell. 1979. *Notornis* 26: 121–69.
Watson, I.M. 1955. *Emu* 55: 224–48.
Watters, W.A. 1949. *NZ Bird Notes* 3: 157–9.
Weeks, M.F. 1949. *NZ Bird Notes* 3: 83–4.
West, J.A. 1988. *Notornis* 35: 159–61.
Whatmough, R.J. 1978. *S. Aust. Orn.* 28: 1–15.
Whinray, J.S. 1970. *Tasm. Nat.* 23: 1–2.
—— 1971. *Tasm. Nat.* 24: 2–3.
—— 1972. *Tasm. Nat.* 30: 4–6.
White, G. 1985. *Birds and Other Vertebrates of South West Tasmania*. Author, Sydney.

Whiter, J. (Ed.) 1987. *Ann. Rep. Eurobodalla Natural Hist. Soc.* 1: 3–20.
—— (Ed.) 1994. *Nature in Eurobodalla* 8: 5–47.
—— (Ed.) 1995. *Nature in Eurobodalla* 9: 5–50.
—— (Ed.) 1996. *Nature in Eurobodalla* 10: 5–47.
——, & E. Andrew. (Eds) 1998. *Nature in Eurobodalla* 12: 5–54.
Wilkinson, G.B., & R. Guest. 1977. *Notornis* 24: 161–6.
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, G.J. 1973. *Notornis* 20: 318–23.
Wilson, P.R., *et al.* 1988. *Notornis* 35: 217–43.
Winslet, J., & B. Winslet. 1987. *S. Aust. Orn.* 30: 103–10.
Witherby, H.F., *et al.* 1938. *The Handbook of British Birds. 2.* Witherby, London.
Wodzicki, K.A. 1946. *Emu* 46: 3–43.

Sponsors: JG Clarke, A West

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