

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):

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- 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;
- ORIIDAE (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.;
- DICAEDIDAE (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.
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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 Muscicapoida (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 Dicuridae and Corvidae (cf. Dicuridae–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, taxonomy 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 widespread, 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).

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Family ALAUDIDAE larks

A rather large and fairly diverse family of small to medium-small passerines, usually with rather drab brownish plumage. This predominantly Old World family comprises c. 90 species in 15–19 genera, distributed widely across Europe, Africa, s. and central Asia, including the Indian subcontinent, and e. and se. Asia, with only one species occurring naturally in Wallacea, New Guinea and Aust., and Horned Lark *Eremophila alpestris* the only representative occurring naturally in the Americas, across much of N. America, S to Mexico and montane regions of Colombia. Two species, in two genera, in HANZAB region: Singing (Horsfield's) Bushlark *Mirafra javanica*; and Skylark *Alauda arvensis*, which introduced successfully from Great Britain (and possibly also continental Europe) to se. Aust., including Lord Howe I., and NZ, including many offshore and subantarctic islands (and also to sw. Canada and Hawaiian Is) (Long 1981; Sibley & Monroe 1990; Monroe & Sibley 1993; Peters). Cracraft (1981) indicates that larks have uncertain affinities and places the Alaudidae, along with the Hirundinidae and Acanthisittidae, as families *incertae sedis* at the base of the oscine group of songbirds. Syringeal morphology, tarsal scaling and several osteological characteristics are distinctive in larks, but they show certain other morphological characteristics similar to those of Old World nine-primaried passeroids (oscines in superfamily Passeroidea including berrypeckers, sunbirds and spiderhunters, flowerpeckers, Old World sparrows and Old World finches) (DAB; see below for morphological characteristics). Analysis of egg-white proteins (Sibley 1970) reveals a relationship between larks and passeroid oscines. DNA–DNA hybridization analysis (Sibley & Ahlquist 1985, 1990) supports this, and indicates that larks are descendants of the earliest branch of the passeroid lineage of songbirds; the hybridization data indicates that larks are a sister family to all other passeroid families ($\Delta T_{50H} = 10.4$).

Species range in size from small (e.g. Black-crowned Sparrow-lark *Eremopterix nigriceps*: length c. 12 cm, weight c. 15 g) to medium-small (e.g. Greater Hoopoe-lark *Alaemon alaudipes*: length c. 20 cm, weight c. 48 g). In HANZAB region, Singing Bushlark smaller (length c. 14 cm, weight c. 22 g) than introduced Skylark (length c. 17 cm, weight c. 40 g). Shared characteristics of species in this family include (Stephan 1965; Ames 1971; Sibley & Ahlquist 1990; BWP; DAB): Wings rather short and rounded. Ten primaries; p10 usually vestigial (as in other passeroid species) except in *Mirafra*, which have very short (not vestigial) p10. Ten or eleven secondaries, innermost secondary vestigial. Tail varies from rather short (e.g. Singing Bushlark) to fairly long (e.g. Skylark, Greater Hoopoe-lark); 12 rectrices. Some species (e.g. Skylark, Thekla Lark *Galerida theklae*) have short erectile crests on crowns. Bill varies considerably in shape, from short and finch-like in Singing Bushlark, to short and slender in Skylark, or rather long, slender and strongly decurved in Greater Hoopoe-lark. Tarsus rather short in most species, but fairly long in a few species (e.g. Greater Hoopoe-lark); tarsus latiplantar (rounded on rear or plantar surface); scaling holospidean (scaled on both front and rear surfaces). Hindclaw (hallux) fairly straight or slightly curved; rather long in some species (e.g. Skylark) and rather short in others (e.g. Greater Hoopoe-lark). Syrinx lacks pessulus (bony or cartilaginous rod or plate lying in mid-sagittal plane of trachea at junction of internal tympaniform membranes; Ames 1971), which is unique among oscines (but occurs in many suboscine genera). Single fossa at head of humerus, typical of corvoid songbirds (cf. double fossae in passeroid songbirds). Cranial characteristics are as follows (from DAB): vomer has attenuated pair of horns at tips (similar to those found in *Petroica* robins); maxillo-palatine processes terete; ectethmoid plate thickened with honeyeater-like winging; zygomatic processes broadly ossified and dorsoventrally compressed; in some species (e.g. Skylark), and zygomatic and post-orbital processes fuse in bridge over temporal fossae.

Following summarized from BWP. Plumage of most species rather drab and shades of brown, typically with blackish mottling or streaking on dorsum and breast, and often with dark facial markings, such as moustachial or malar stripes. Extralimitally, some species have prominent markings of head, such as yellow and black head-patterns in Horned Lark. Some species have distinct markings to wing or tail, such as narrow white outer edges to tail and trailing edge to secondaries, which obvious in flight (e.g. Skylark). In most species, sexes identical in plumage, but some species (e.g. Horned Lark, Black Lark *Melanocorypha yeltoniensis*) are plumage-dimorphic. Nestlings have dense natal down and contrasting dark spots on tongue and mouth. Juveniles of most species superficially resemble adults but have prominent pale scalloping or barring to head and body. Most species undergo a complete post-juvenile (first pre-basic) moult to adult (first and subsequent basic) plumage when only a few months old. However, some species (e.g. sexually dimorphic Black-crowned Sparrow-lark) undergo a partial post-juvenile moult to an adult female-like first immature plumage; these then acquire adult plumage either in a complete first immature post-breeding (second pre-basic) moult when c. 1 year old or, in some, possibly earlier in a first immature pre-breeding (pre-alternate) moult when c. 6 months old. After attaining adult plumage, most undergo a single complete post-breeding (pre-basic) moult annually, with no change in appearance; occasional species (e.g. Short-toed Lark *Calandrella brachydactyla*) also undergo partial pre-breeding moult to adult breeding plumage each year. Primaries moult outward, starting at p1. Moult of tail and body start during early stages of, or just before start of, moult of primaries.

Predominantly birds of open habitats, mainly in arid and semi-arid regions of Old World. Palearctic species (including Skylark), usually inhabit dry open country, including grassy plains (e.g. White-winged Lark *Melanocorypha leucoptera*) and dry farmlands (e.g. Crested Lark *Galerida cristata*); most African species inhabit dry grasslands (e.g. Lakatoo Lark *M. cheniana*) or savanna, especially *Acacia* savanna (e.g. Collared Lark *M. collaris*), as well as thorn shrubland (e.g. Abyssinian Lark *M. alopecurus*) and sparsely vegetated deserts (e.g. Somali Long-billed Lark *M. somalica*); and Asian species mostly inhabit grasslands, farmlands and stony plains (e.g. Rufous-tailed Lark *Ammomanes phoenicurus*). In Aust. and NZ, commonly in native and exotic grasslands, including tussock grasslands, and modified open habitats, especially pasture and crops, but also found in coastal heathlands and dunes, on beaches and on mudflats; less commonly in other grassy areas, such as playing fields, golf courses and verges of roads, salt-marsh and other shrublands or heathland, and rarely in treed habitats, such as open grassy woodlands or timbered farming land (Ali & Ripley 1972; Heinzel *et al.* 1977; Mackworth-Præd & Grant 1980; Long 1981; Sibley & Monroe 1990; Maclean 1993; BWP; see species accounts).

Many members of the family are migratory, but some species are varying resident or sedentary, and some wholly long-distance migrants. In Palearctic, many species migratory or partly migratory; some species more migratory in N of their ranges (e.g. Shore Lark *Eremophila alpestris*, Skylark), while in Lesser Short-toed Lark *Calandrella rufescens*, pattern of movements changes from W to E, from resident to dispersive to migratory. Some resident species undertake some dispersive movements (e.g. Black Lark). Most African species considered resident, but several s. African species considered dispersive (e.g. Monotonous Lark *Mirafra passerina*), and Dusky Lark *Pinarocorys nigrans* is a partial migrant. In Asia, species range from resident (e.g. Sand Lark *Calandrella raytal*, Singing Bushlark) to migratory (e.g. Hume's Short-toed Lark *Calandrella acutirostris*). Movements in HANZAB region not well understood, but both species probably largely sedentary or resident over most of range; seasonal differences in reporting rates probably exaggerated by changes in conspicuousness. However, in Aust., some evidence of seasonal movement of Skylarks across Bass Str.; and in NZ, Skylark shows some regular seasonal movements, birds in SI appearing to move N in autumn within SI, some possibly moving from SI to NI. Extralimittally, populations of Skylarks range from being wholly migratory to undertaking local movements only. In Aust., Singing Bushlark may make dispersive movements in parts of range (de Schauensee 1984; Flint *et al.* 1984; Maclean 1993; Grimmett *et al.* 1999; Heather & Robertson 2000; Robson 2000; Griffioen & Clarke 2002; BWP).

Omnivorous, terrestrial. Eat mainly seeds (mostly from grasses) and invertebrates (mostly insects), the proportion of each varying among species; also take green vegetation and to a lesser extent small bulbs and fruit; and some species (e.g. Greater Hoopoe-lark) occasionally take small reptiles. More granivorous species ingest small stones to aid breakdown and digestion of seeds. Most food is taken from surface or just below surface of ground. Diet varies seasonally; generally, insects form larger part of diet in summer (or during breeding season), with seeds a greater proportion at other times. Forage mostly by gleaning and by probing. Bill-shape varies greatly, with corresponding variation in foraging methods or diet, e.g. short and stout for crushing seeds (e.g. Singing Bushlark), long and curved for digging and probing (e.g. Greater Hoopoe-lark); Thick-billed Lark *Rhamphocoris clothey* uses bill to clip green shoots, while others (e.g. Desert Lark *Ammomanes deserti*) often hammer at mammal droppings with bill. Some species, such as Black Lark, dig tunnels in snow to get to food. Search by walking or (in insectivorous species) by running over ground, often pausing to dig furiously (up to 5 cm below surface). Also capture prey by lunging, flutter-chasing, sally-pouncing and screening for flying insects in continuous flight. Some species engage in more specialized foraging behaviours, e.g. Karoo Lark *Calendulauda albescens* takes termites from burrows of Aardvarks *Orycteropus afer*, with which they associate; and Dupont's Lark *Chersophilus duponti* takes tarantulas *Lycosa* by inserting bill (and often neck) into burrows of spider while adopting leg-up, tail-up posture. Often shake prey vigorously before eating; some species (e.g. Crested and Thekla Larks, Greater Hoopoe-lark) use stone anvils to break open shells of snails. Some species congregate in flocks (see below). Often forage in mixed-species feeding flocks with other larks. Some species (e.g. Skylark and Bimaculated Lark *Melanocorypha bimaculata*) cause considerable damage to cereal and vegetable crops, digging up freshly sown grain; in NZ, Skylark has been considered most destructive avian pest after House Sparrow *Passer domesticus* (Keith *et al.* 1992; de Juana *et al.* 2004; BWP; see species accounts).

Social organization shows many common trends. Most species usually seen singly or in pairs during breeding season, but are gregarious outside it. Flock-sizes of gregarious species vary greatly, from those species that only form small groups, to those that sometimes congregate in many hundreds or thousands (e.g. Black Lark). Most species monogamous, but many change mates from one season to the next. Bigamy once reported in Woodlark *Lullula arborea* but no details given. Co-operative breeding has been recorded in Spike-heeled *Chersomanes albofasciata* and Gray's *Ammomanopsis grayi* Larks. In most species, only female incubates and broods and shades nestlings, but there are exceptions, e.g. in Singing Bushlark, both parents incubate. Both parents feed nestlings and fledgelings, and remove faecal sacs. Most species nest as solitary pairs, but some nest in loose colonies (e.g. Grey-backed Sparrow-larks *Eremopterix verticalis*). All species defend a territory during breeding season, and some species territorial throughout the year. Most appear to roost at night on ground. Social behaviour of the family also quite well known, with many species showing similar behaviours. Larks characteristically dust-bathe on a regular basis, though rarely

reported bathing in water. Most larks sing in flight, usually with rapidly flapping wings. During song-flights, males often hover, or move in circles or arcs. Some species perform spectacular aerobatic displays while advertising (e.g. Greater Hoopoe-lark). During aggressive encounters between rival males, opponents often face each other on the ground with wings spread, feathers of head and breast raised and plumage of body fluffed so as to appear larger. Often also chase intruders in flight. Sexual behaviour often appears similar to agonistic behaviour. Early stages of pair-formation often involves aerial chases. After pairing, sexual displays usually occur on the ground and often include postures with body held horizontal, wings lowered, tail fanned, and feathers of crest, breast and body raised. Lark vocalizations, and song in particular, are usually rather complex and often include a long stream of trills and warbles; often also incorporate mimicry into song. Several species also produce non-vocal sounds by clapping wings together (de Juana *et al.* 2004; BWP; see species accounts).

Predominantly monogamous and solitary, and all territorial during breeding season (see above). Most species nest on ground, usually at base of grass tussock, small shrub or stone, and often in shallow depression or scrape; one species, the Greater Hoopoe-lark, typically nests above ground (30–60 cm) in bushes and tussocks. Nests vary from open cups to partly or fully domed structures; made mainly of dry grass. In most species, only female builds. Eggs varyingly oval; mostly shades of white to buff or pink, usually spotted or blotched (or both) with tones of brown and grey; some have underlying markings of grey, brownish grey or purple; markings sometimes concentrated round, or form zone or cap at, large end. Clutch-size highly variable, ranging from single egg in Sclater's Lark *Spizocorys sclateri* to 6–8 in Calandra *Melanocorypha calandra* and Black Larks, but fairly constant within some genera and, across the family, usually 2–5 in most species; also varies with environmental aridity, with smaller clutches recorded from drier localities. Eggs laid on successive days. Intra- and inter-specific nest-parasitism has been recorded, but incidence of parasitism is low ($\leq 1\%$ of all nests). In most species, only female incubates, but in some both adults incubate (e.g. sparrow-larks *Eremopterix*, Singing Bushlark); in most species, begins with laying of last or penultimate egg, but in some begins with first egg (e.g. Pink-billed Lark *Spizocorys conirostris*, Black-crowned Sparrow-lark). Incubation period 11–13 days in most species, but up to 14 days in Greater Hoopoe-lark and 15–16 days in Black Lark, or as little as eight days in some sparrow-larks breeding in arid areas. Usually only female broods and shades young. Both parents feed nestlings and remove faecal sacs. Young may depart nest at 7–8 days old, before capable of flight; or, if undisturbed, young may remain in nest for up to 12–14 days or longer. Both adults feed fledgelings, which are dependent on parents for almost 1 month after fledging. Nesting success is low, with most losses from predation. Most species are single- or double-brooded, but some (e.g. Crested, Thekla and Dune *Calendulauda erythrochlamys* Larks) rear up to four broods per season, and Skylark very occasionally produces five broods per season. Adults of several species perform distraction displays if disturbed at nest (Keith *et al.* 1992; de Juana *et al.* 2004; BWP; see species accounts).

Eight species, all in Africa, are globally threatened: two critically endangered (Archer's Lark *Heteromirafra archeri* in Somalia, and Raso Lark *Alauda razae* of C. Verde Is), two endangered (Ash's Lark *Mirafra ashi* of Somalia, Botha's Lark *Spizocorys fringillaris* of S. Africa) and four vulnerable (Degodi *Mirafra degodiensis* and Sidamo *Heteromirafra sidamoensis* Larks, both in Ethiopia, and Rudd's *Heteromirafra ruddi* and Red *Certhilauda burra* Larks, both of S. Africa); another four species are considered near-threatened. Many have restricted or patchy distribution in grasslands and other open habitats that are subject to grazing; other major threats include cropping, afforestation and predation by introduced mammalian predators (Stattersfield & Capper 2000).

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Alauda arvensis Skylark

COLOUR PLATE FACING PAGE 993

Alauda arvensis Linnaeus, 1758, *Syst. Nat.* ed. 10, 1: 165 — in Europae apricis = Sweden.

Genus from Latin *alauda*, a lark. According to Pliny this was the Gaulish name for the Crested Lark *Galerida cristata*. The specific name refers to the usual habitat, from Latin *arvensis*, of the field (from *arvum*, a field).

OTHER ENGLISH NAMES Common, English, Eurasian or Northern Skylark.

POLYTYPIC Introduced populations in Aust. (in SE, from Hunter R., NSW, S to Tas. and W to Eyre Pen., including Kangaroo I.), Lord Howe I., and NZ (NI, SI and Chatham Is, and vagrant to Kermadec, Antipodes, Snares, Auckland and Campbell Is) comprise nominate *arvensis* (s. England and n. Europe E to Urals, Russia), *scotica* Tschusi, 1903 (n. England, Scotland, Ireland) and a blend of both (DAAB). Extralimitally, nine or ten other subspecies, from s. Europe and n. Africa E across central and n. Asia to n. Siberia, Manchuria and Japan, wintering S to n. Africa, the Middle East, nw. India, n. China and Japan.

FIELD IDENTIFICATION Length 18 cm (16–19); wingspan 32 cm (28–36); weight 38 g. Medium-small, ground-dwelling songbird, with: small head and short, erectile crest; short, thickish, pointed bill; fairly long tail, with slight central notch at tip; and moderately long legs, with very long and fairly straight hindclaw (about two-thirds length of tarsus). Similar in size and shape to Australasian Pipit *Anthus novae-seelandiae* (slightly bigger than Pipit in Aust. populations, roughly same size in NZ); obviously larger than Singing Bushlark *Mirafra javanica*, with longer and less compact and dumpy appearance. When perched, note typically horizontal stance, with long but stout body and large wings, latter often covering most of underparts, and with tips of folded primaries extending well past (c. 3 cm) tips of tertials and about halfway

along tail; tertials long and pointed, often with worn and ragged tips; when crouching, legs often held at only slight angle, and close, to ground. In flight, wings appear long, broad and pointed, with tips of tertials extending noticeably past trailing edge of rest of wing; tail often spread, with tips characteristically flared outward; and tail and wings held flat with tips of wings quivering and slightly upswept. Mostly brown to sandy-brown, heavily streaked blackish, above, with pale supercilium and eye-ring and rather open-faced expression; conspicuous narrow off-white trailing edge to wings and white edges to tail; and pale-buff underbody with gorget of dark streaks across breast and some streaking along flanks. Sexes alike (female slightly smaller). No seasonal variation. Juvenile similar to adult but varying; much more spotted and scalloped

above and with unmarked chin and throat; best distinguished by teardrop-shaped spots (not streaks) to breast, broad and clear pale fringes to upperwing-coverts, and narrow pale fringes to outer primaries; also much smaller than adult when recently fledged. Immature indistinguishable from adult.

Adult Top of head and neck and sides of neck, light brown to brownish grey (tinged rufous, particularly on hindneck, in some), grading paler on hindneck and towards throat, and heavily streaked blackish-brown, streaks aligning to form six ragged crown-stripes (interspersed with brown); on some, centre of crown paler brown than rest of ground-colour, forming paler median crown-stripe; ground-colour of head and neck becomes paler, sandy brown, with wear. Lores, off-white (sometimes with diffuse dusky spot in front of eye), continuous with narrow, diffuse cream to buff supercilium that extends to rear edge of ear-coverts and usually joins strongly contrasting cream crescent (faintly streaked dark brown) curving round behind ear-coverts and meeting pale throat; crescent narrowest behind ear-coverts, where often broken. Diffuse, broad dull-white, cream or buff eye-ring merges with paler supercilium and, with pale lores, combines to give rather open-faced expression; bordered below by narrow broken blackish-brown line extending forward to gape and upward behind eye and along upper edge of ear-coverts. Ear-coverts, cream to buff, sometimes tinged rufous, and finely streaked blackish brown (more diffusely on anterior coverts). Chin and throat, cream to buff, sometimes faintly streaked brown on throat and progressively more heavily streaked blackish brown towards breast; pale sides of throat form indistinct cream to buff submoustachial stripe bordered by narrow dark-brown malar stripe. Upperbody, light brown or reddish brown (richer towards tail) with blackish-brown streaks, broad on mantle and scapulars and becoming narrower on back, rump and uppertail-coverts; in fresh plumage, upperbody also finely streaked cream (formed by fine edges to feathers); with wear, fine cream streaking lost, and upperbody appears pale sandy-brown, strongly streaked blackish. Uppertail appears largely dark grey-brown with paler brown centre, narrow paler brown edges to feathers, and conspicuous narrow white edges (formed by white edge to t5 and mostly white t6). Upperwing largely grey-brown, with: black centres, narrow buff edges and buff to off-white tips to median and greater secondary coverts, with dark centres more prominent on median coverts, and forming chain of pale-fringed blackish spots across shoulder, and pale tips of coverts forming pair of narrow pale wing-bars (which become more diffuse, and are eventually lost, with wear); conspicuous buff to pale-grey edges to blackish-centred tertials; and mostly blackish remiges and primary coverts with narrow buff outer edges grading to white on outer primaries. Pale edges of remiges combine to form pale sandy or brownish panel on folded wing, matching general tone of upperparts, and tips of blackish outer 2–3 primaries (forming noticeable primary-projection beyond tips of tertials on folded wing) have clear narrow pale fringes round tips when fresh; in flight, note obvious narrow whitish trailing edge to wing (along secondaries and inner primaries). Breast and flanks, light buff-brown, sometimes with faint rufous tinge, with gorget of heavy blackish streaks across breast, grading to finer dark streaking along flanks. Rest of underbody, off-white with cream tinge to undertail-coverts, which sometimes faintly flecked pale greyish-brown; thighs, light brown. When folded, undertail appears mostly white; when spread, appears dark brownish-grey with white edges. Underwing largely grey, with brownish tinge to coverts, and narrow pale trailing edge as upperwing. Bill, pinkish grey with dark-grey tip and top of upper mandible. Iris, dark brown. Orbital ring, dark grey. Legs and feet, yellow-brown to dull orange-brown. **Juvenile** Similar to adult but with heavily scalloped upperparts; also much smaller than adult at fledging. Differences from adult: Top of head and upperbody buff,

sometimes with rufous tinge, heavily scaled with blackish subterminal bars and cream to buff fringes; hindneck often more uniformly buff, with only faint scalloping, forming diffuse collar that, in some postures, merges with pale crescent behind ear-coverts; ear-coverts and supercilium also tend to be paler and more prominent than in adult. Uppertail similar to adult but with broad and sharply defined buff to off-white edges to t1–t4 bordered by distinct blackish submarginal marks and with buff barring or marbling to centres of feathers, and with white outer edges to tail as in adult (t5–t6 much as adult but with buff barring to t5); feathers of tail much narrower and more pointed than in adult. Upperwing darker brown than in adult (sometimes tinged rufous) with broader off-white to buff fringes and tips to coverts, tertials and outer primaries, bordered by distinct blackish submarginal markings, giving folded wing very scaly appearance; and broad but more sharply defined buff edges and tips to remiges. Underbody largely as adult but breast and flanks marked with broader teardrop-shaped dark-brown to blackish spots or streaks. Underwing slightly paler than in adult. Bare parts like adult but legs and feet pinker.

Similar species Very similar to **Australasian Pipit** but readily identified with reasonable views; see that text for details. Superficially similar to **Singing Bushlark**; while adults easily distinguished with good views, juveniles more difficult to separate. **ADULT** Skylarks differ from all ages of Bushlark by, when perched: (1) much larger size (about one-third larger than Bushlark) with proportionately smaller head compared with longer body, longer and larger wings that cover most of undercarriage when perched and that extend well past uppertail-coverts to halfway along tail (Bushlark much more compact, with proportionately large head, smaller and shorter wings that do not cover much of undercarriage when perched, and which extend only just past tips of uppertail-coverts to about one-third way along tail); (2) longer and finer bill (bill of Bushlark, short, deep and sparrow-like); (3) when erect, crest longer, pointed and more triangular and ragged in profile (Bushlark has neater short, rounded crest); (4) upperparts paler, sandy or greyish brown (sometimes with reddish tinge) with blackish streaks (where ranges overlap, Bushlark much darker, mostly blackish or heavily mottled blackish, and only narrowly streaked or mottled grey to brown); (5) folded wing mostly sandy-brown or grey-brown, with dark centres to secondary coverts most obvious on median coverts as chain of dark spots across anterior shoulder, and with buff fringing and edging to feathers, but lacking strong rufous coloration (folded wing of Bushlark varies: secondary coverts either with large dark centres to feathers and narrow pale fringes [and median coverts no more prominent than other coverts] and little rufous coloration visible on shoulder, or shoulder predominantly rufous with fewer dark centres to feathers, and always with rufous panel on remiges, contrasting strongly with dark upperbody); (6) breast and flanks patterned with long blackish streaks (in Bushlark, streaks on breast short, and flanks never streaked); (7) whitish lores, eye-ring and prominent supercilium, combining to give pale, open-faced appearance (Bushlark with darker lores and duller supercilium and eye-ring, forming duller facial area); (8) very different wing-shape when perched, with tips of tertials pointed (rounded in Bushlark), and much longer primary projection, extending 2–3 cm past tips of tertials and involving tips of three widely spaced tips (only 2–3 more closely bunched tips extending only slightly past tips of tertials in Bushlark); and (9) hindclaw straight or slightly curved and extremely long, two-thirds length of tarsus and one-quarter longer than length of hindtoe (without claw) (much shorter and strongly curved in Bushlark: roughly one-third length of tarsus and slightly shorter than length of hindtoe). **IN FLIGHT**, adult Skylark immediately distinguished by: (10) white trailing edge to wing (Bushlark has no pale trailing

edge); (11) rather uniform brown to sandy-brown upperparts (cf. mostly rufous upperwing contrasting noticeably with darker upperbody in Bushlark); and further distinguished by: (12) long, broad and pointed wings (shorter, broader and rounded in Bushlark) with tertials extending behind trailing edge of rest of wing (fall level with secondaries on Bushlark), and tail proportionately longer; and (13) underwing predominantly grey (in Bushlark, underwing largely pale rufous with diffuse greyish tips to remiges). Songs of the two also differ: while both often or usually sing in Song-flights, Song of Skylark loud and continuous, with no breaks and only occasional mimicry, while Song of Bushlark quieter, more repetitive, with shorter notes, and often includes mimicry. JUVENILE Skylark more difficult to distinguish from all ages of Bushlark; recently fledged Skylark very similar in size to same of Bushlark, though with slightly longer wings even at this age, with longer primary projection beyond tips of tertials (>2 cm or so, and slightly shorter than adult Skylark). Juvenile Skylark differs from Bushlark by some of the same characters as adult above: finer bill (point 2 above), strong rufous patches in wing (point 5), paler, more open-faced appearance (point 7), length of hindclaw (point 9), pale trailing edge to wing (point 10), rather uniformly brownish upperparts lacking contrasting rufous upperwing of Bushlark (point 11), and lack of rufous in underwing (point 13). Further differ by: ground-colour to upperparts very brown, emphasizing strongly scaled appearance, including better-defined blackish submarginal markings (in Bushlark, ground-colour much more blackish, with less strong scaling [though it is still strong, especially in juvenile Bushlark]; and submarginal markings merge more into darker background coloration); central rectrices, brown with strong blackish submarginal markings and dark-brown barring (central rectrices in Bushlark mostly dark brown or blackish without well-defined blackish submarginal markings and no barring); breast and flanks strongly marked with broad teardrop-shaped blackish spots, slightly longer than in Bushlark (in Bushlarks, upper breast patterned with shorter and narrower blackish streaks, which do not extend to flanks). Should not be confused with much larger songlarks *Cincloramphus*; see those texts for details.

Usually seen singly or in twos in breeding season; more usually in small loose flocks in autumn–winter, when also occasionally in larger flocks of up to 80, sometimes more. Sometimes occur in mixed-species flocks. In breeding season, usually first noted by conspicuous Song-flights (see below), but more difficult to see in late summer and autumn–winter, when sing less and more cryptic generally. Mainly terrestrial; perch on ground, rocks or on low shrubs, but seldom on fences or overhead wires or trees. Walk with short, even steps, or more shuffling gait with legs flexed and body lowered nearer ground; sometimes creep mouse-like when feeding in short cover or during strong wind; also run freely, hopping over obstacles. When alarmed on ground, crouch and remain motionless; when flushed, explode with rapid, sometimes panicked, take-off. Normal take-off somewhat laboured. Flight over short distances fluttering, weaving and undulating; usually with loose hover above ground before landing, though can fly quickly into or drop into cover. Flight somewhat erratic, hesitant and undulating when flying longer distances, with bursts of loose, heavy flapping alternating with short glides, sometimes completely closing wings. Flight-silhouette alternates between cruciform when flapping and rather elliptical when wings closed, with heavy-chested appearance balanced by long tail. White trailing edge to wing and white edges to tail usually obvious with reasonable views of bird in flight. Perform conspicuous Song-flights for much of year, though more often in breeding season: ascend with strong, rapid wingbeats, followed by prolonged hovering, then rapid descent, either parachuting vertically with tail and wings spread, or in

a circling sweep, with sudden drop to ground at end. Begin singing as soon as airborne and continue singing on ascent and while hovering; descent usually silent, though may recommence singing before they land. Song rich, sweet, clear and melodious, but often shrill, trilling, sometimes including mimicry of other birds. While mostly sing in Song-flights, occasionally sing at night and, rarely, from low perch. Other calls include a liquid rippling *chirrup*. (Above based on information in subsequent account [as cited], BWP and Donald [2004].)

HABITAT Usually occur in open grassy areas, especially tussock grassland or open farmland (e.g. Taylor 1975; Hirth 1976; Pierce 1980; Ashton 1985, 2001; Horrocks & Brown 1993; Baverstock & McCarthy 2000; CSN 33), sometimes with sparsely scattered trees (Hore-Lacy 1964; Ridpath & Moreau 1966; Brouwer 1993; Possingham & Possingham 1997). Often occur in areas where grass considered 'rough', reflecting tussocky nature of moist pasture or the like; sometimes also occur where grass short, close-cropped or grazed (Child 1975; Gill 1989; Beauchamp 1998; CSN 36, 38). Also inhabit other grassy areas, such as playing fields, golf courses and verges of roads, and various types of wasteland (Bell 1983; CSN 41), such as saltmarsh or heathland (see below). Seldom recorded in woodland.

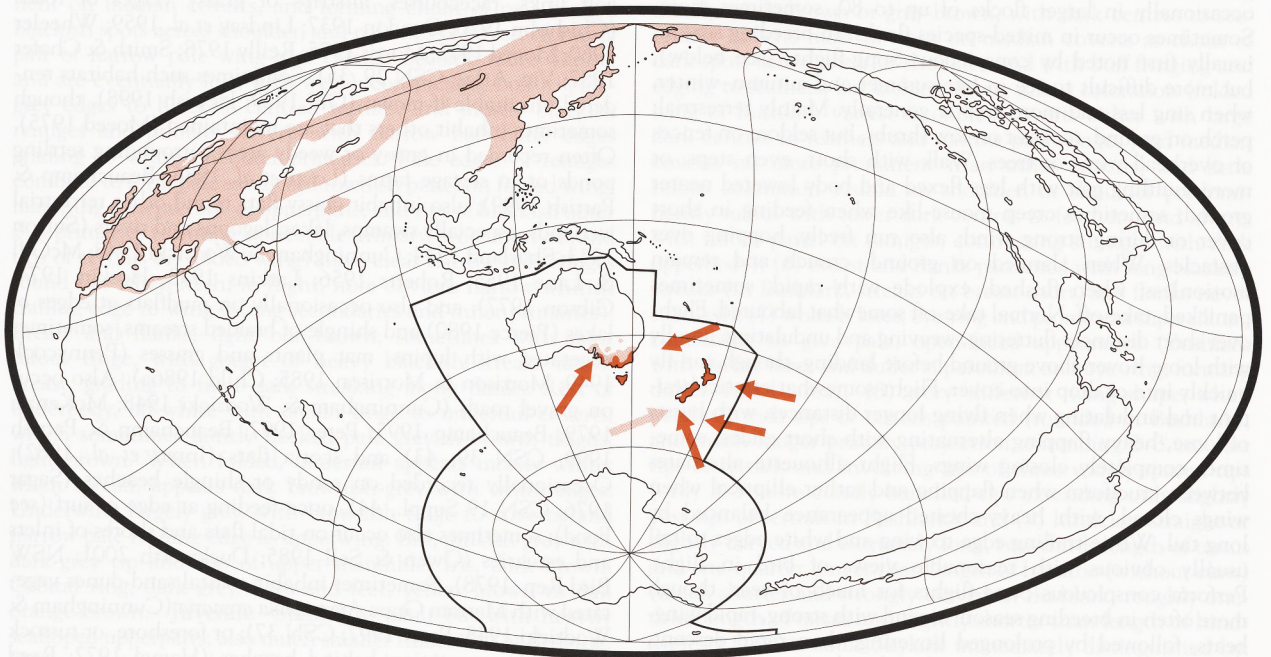
Often inhabit open tussock grassland (Hodgkins 1949; Crockett 1954; Dawson 1964; Thomas 1965; Challies 1966; Child 1975; BFNC 1976; Innes *et al.* 1982; Bryant 1999; CSN 28), on plains, valley flats or tops of hills (Penniket 1955; Challies 1962; Hamel 1972). Said to avoid undisturbed native grassland in Tas. (Green 1995; Aust. Atlas 1) but in NZ, inhabit grasslands of indigenous Red Tussock *Chionochloa rigida* (Dawson 1964; Challies 1966). Also often inhabit open farmland, especially pasture (Graham 1948; Dawson & Cresswell 1949; Sedgwick 1955; Blackburn 1967; Green 1969; Green & McGarvie 1971; Mollison 1974; McKenzie 1979; Loyn *et al.* 1986; Brouwer 1993; Beauchamp 1998; CSN 36, 37), and crops, stubble or ploughed paddocks (Mellor 1925; Althofer & Althofer 1936; Sharland 1944; Ridpath & Moreau 1966; Green 1969; Bedgwood 1972; Jackson 1976; Peter 1997; Hewish 2002; CSN 199 Suppl., 26). Also often occur in other artificial or modified grassy habitats, such as playing-fields, golf links, racecourses, airstrips or grassy verges of roads (Chisholm 1926; Conadon 1937; Lindsay *et al.* 1959; Wheeler 1960; Moeed 1975; Morris 1975; Reilly 1978; Smith & Chafer 1987; Vic. Atlas; CSN 29, 35). Sometimes such habitats rendered unsuitable if moored (Gill 1989; Hewish 1998), though sometimes inhabit others that are maintained (Moeed 1975). Often recorded in grassy or weedy areas surrounding settling ponds or in sewage farms (Loyn *et al.* 1986; Beauchamp & Parrish 1999); also inhabit grassy flats round other terrestrial wetlands, especially swamps, lakes, lagoons and rivers (Sutton 1933; Sharland 1944; Cunningham & Wodzicki 1948; McGill & Lane 1955; Roberts 1956; Larkins 1973; Hoskin 1974; Gibson 1977); and also occasionally on mudflats at edges of lakes (Pierce 1980) and shingle of braided streams, sometimes vegetated with lupinus, mat plants and grasses (Pennycook 1949; Morrison & Morrison 1985; Child 1986a). Also occur on gravel roads (Cunningham & Wodzicki 1948; McKenzie 1979; Beauchamp 1995; Peter 1997; Beauchamp & Parrish 1999; CSN 39, 43) and scoria flats (Innes *et al.* 1982). Occasionally recorded on sandy or shingle beaches (Sagar 1976; CSN 19 Suppl., 44), once feeding at edge of surf (see Food); sometimes also occur on tidal flats and shores of inlets and estuaries (Owen & Sell 1985; Duckworth 2001; NSW Bird Rep. 1978). Sometimes inhabit coastal sand-dunes vegetated with Marram Grass *Ammophila arenaria* (Cunningham & Wodzicki 1948; Peter 1997; CSN 37); or foreshore, or tussock or shrubby vegetation behind beaches (Hamel 1972; Reed

1975; CSN 22); or other low scrub (Innes *et al.* 1982). Also occur in areas of low shrubland, such as saltmarsh vegetated with Beaded Glasswort *Sarcocornia quinqueflora* (Watson 1955; Hyett & Gottsch 1963; Sagar 1976; Owen & Sell 1985; Loyn *et al.* 1986; Hewish *et al.* 1999; Hewish 2000; Ashton 2001; Peter 2004) or low heathland (Thomas 1965; Morris 1975; Horrocks & Brown 1993; Mitchell *et al.* 1996; Possingham & Possingham 1997; Duckworth 2002a; SA Bird Rep. 1968–69), or, at high elevations, in alpine or subalpine herbfields or moorland (Longmore 1973; Child 1975, 1986b; Innes *et al.* 1982; Tas. Bird Rep. 5); and occasionally in rank bracken (Phillipps & Lindsay 1948; CSN 33, 37). Occasionally occur in grassy areas with well-spaced taller plants, such as newly established plantations of pines (Loyn 1980; Friend 1982; Clout & Gaze 1984; Owen & Sell 1985; Duckworth 2002b; CSN 30) or vineyards (CSN 38). Sometimes also recorded in disturbed areas, where tree or shrub cover has been removed, e.g. recently cleared paddocks (Storr *et al.* 1952), shrubland regenerating after fire (Green 1969; Reilly 1991), selectively logged forest (Wilson *et al.* 1988), or clearings or fire-breaks (Weeks 1949). Seldom recorded in woodlands, e.g. eucalypt woodlands, mallee or mixed stringybark–banksia woodland (Er & Tidemann 1996; Possingham & Possingham 1997; Possingham *et al.* 2004). Very occasionally recorded flying over unsuitable habitats, such as forest (Vic. Bird Rep. 1986) or sea (Vic. Bird Rep. 1985).

DISTRIBUTION AND POPULATION Widespread in Eurasia and nw. Africa, from Morocco, Iberian Pen. and British Isles, E through Russia, to Kamchatka, Ussuriland, e. China, Korean Pen. and Japan, and from near Arctic Circle S to c. 30°N. Generally breed throughout range, though in some n. parts, only occur during breeding season, and in some s. parts, only non-breeding visitor (de Schauensee 1984; Flint *et al.* 1984; Keith *et al.* 1992; Grimmett *et al.* 1999; Lee *et al.* 2000; Orn. Soc. Japan 2000; Donald 2004; BWP). Introduced to C. Verde Is, Azores, Bermuda, San Juan I., Washington State, USA (though unsuccessfully introduced at various sites [see Campbell *et al.* 1997] and rare natural breeding migrant to w. Alaska, and natural vagrant to California)], s. Vancouver I. in w. Canada, Hawaii (though also recorded as natural

vagrant), Aust. and NZ (Long 1981; AOU 1983; Campbell *et al.* 1997; Donald 2004; BWP); also said to have been introduced to Uruguay (BWP).

Aust. Introduced. Widespread in SE (Aust. Atlas 1, 2). **NSW** Mostly occur S of 33°S (though occasionally recorded farther N, from Myall Ls inland to Aberdeen, Muswellbrook and Howes Valley; Recher 1975; Aust. Atlas 1), from coastal and near-coastal areas, inland to line joining Parkes, Coleambally, Daysdale and Howlong; also recorded farther W along Murray R. downstream nearly to Barham (Morris *et al.* 1981; Disher 2000; Aust. Atlas 1, 2; NSW Bird Reps). Several recent records from much farther W and NW, at scattered sites from Pulletop NR W to Pooncarie (Aust. Atlas 2); two anomalous records on nw. slopes of Great Divide, at Merriwindi SF, near Baradine (Aust. Atlas 2), and historical record at Macquarie Marshes in 1948 (Morris *et al.* 1981). **Vic.** Widespread, though generally absent from E. Gippsland, Great Divide E of 145°E and Mallee; and more sparsely scattered N of Great Divide than farther S. Most records in S: E of Melbourne, mostly S of 37°S, and, farther W, on Volcanic Plain of Western District (Vic. Atlas). **Tas.** Widespread in E, mostly E of line from Recherché Bay, through Bronte Park, to La Trobe; also widespread in NW, S to line from round Ulverstone, through site N of Guildford, to mouth of Arthur R.; rarely recorded elsewhere on w. coast, e.g. Grenville, lower reaches of Henty R., Strahan and Macquarie Heads (Thomas 1979; White 1985; Moverley 1992; Aust. Atlas 1, 2). Also occur on islands off nw. coast, including Hunter I and Albatross I.; also on King I. and Furneaux Grp (Green 1969; Green & McGarvie 1971; Pinner & Bird 1974; Brothers & Davis 1985; Bryant & Holdsworth 1992; Bryant 1999; Aust. Atlas 1, 2; Tas. Bird Rep. 3). **SA** Widespread, but scattered, from Vic. border W to Sleaford Bay on s. Eyre Pen., though scarce in s. Mt Lofty Ras and Fleurieu Pen., and mainly S of 33°S (SAOA 1977; Paton *et al.* 1994; Stove 1994; Aust. Atlas 1, 2; SA Bird Rep. 1976), though a few records farther N from near Peterborough and Morchard, W to round Port Augusta (Aust. Atlas 1, 2); and reported from much farther N at Brindana Gorge in n. Flinders Ras (Hornsby 1997, 1998). Also occur on Kangaroo I. (Wheeler 1960; Lashmar 1988; Baxter 1989). **WA** 'Unconfirmed report ... at the Pilbara



goldfields' in 1908 (Gregory-Smith 1983) is incorrect (see Whitlock 1909).

NZ Introduced; widespread (NZ Atlas; NZCL). **NI** Widespread from North C. S to C. Palliser, mainly S to line joining Torere in Bay of Plenty, Turangi in s. Volcanic Plain, and Hawera in sw. Taranaki, and S of line from Napier to Wanganui; more sparsely scattered in intervening area, encompassing inland parts of East Coast, n. and inland Hawkes Bay, s. Volcanic Plain, n. Manawatu, inland Wanganui, and e. and s. Taranaki (NZ Atlas; CSN). Also occur on many offshore islands, e.g. Cavalli Is (Sibson 1953), Great Barrier I. (Bell & Brathwaite 1964; Reed 1972; Bell 1976), Cuvier I. (Blackburn 1967; Reed 1976), Great Mercury I. (Edgar 1962; Skegg 1963), Noises Is (Cunningham & Moors 1985), Mana I. (Beauchamp 1998) and Kapiti I. (Stidolph 1948; Wilkinson & Wilkinson 1952). Also occasionally recorded at sea, e.g. c. 72 km off C. Reinga (CSN 26), illustrating capacity to colonize islands. **SI** Widespread in most regions, though in Marlborough, scattered in area between Wairau R. and Inland Kaikoura Ra.; widespread throughout Canterbury and Otago except in Spenser Ra. and on e. slopes of Southern Alps, where generally scarce or absent; also widespread in Southland, except in Fiordland, where few records (e.g. Preservation Inlet and e. Dusky Sound). Widespread in coastal and near-coastal areas of Westland from lower reaches of Turnbull R. NE to Karamea, though generally absent from w. slopes of Southern Alps; and, though occasionally recorded in Paparoa Ra., generally scarce. Widespread in n. and e. Nelson (Child 1975; Onley 1980; NZ Atlas; CSN). Also recorded on various offshore islands, e.g. N. Brother I. (Gaston & Scofield 1995), Ruapuke I. (NZ Atlas), Stewart I. and associated islets (Blackburn 1965; NZ Atlas) and Centre I. (Cooper 1991). Occasionally seen at sea, e.g. >30 km off Banks Pen. (CSN 36) and c. 37 km off Nugget Pt (Petyt 1995).

Lord Howe I. Vagrant; three records (Hutton 1991; McAllan *et al.* 2004). First record, two birds, 3 Sept. 1963 (McKean & Hindwood 1965); five at airstrip, 16 June 1982; and five at same site, 26 July 1983 (McAllan *et al.* 2004).

Kermadec Is Vagrant. First record, two birds (specimen collected) on Raoul I., in June 1944 (Sorensen 1964), though said to have been recorded earlier (Veitch *et al.* 2004); two more seen 28 July 1944 (Sorensen 1964); single, 18 Nov. 1964 (Edgar *et al.* 1965); single, 9–19 Apr. 1973 (Merton & Veitch 1986; Veitch *et al.* 2004). Unconfirmed report of two, early Jan. 1967 (Merton 1970); and two, probably this species, on L'Esperance Rock, 14 Sept. 1988 (Tennyson & Taylor 1989; Veitch *et al.* 2004).

Chatham Is Common on Chatham, Pitt and Mangere Is and occasionally recorded on South-East (Rangitira) I. (Freeman 1994; Nilsson *et al.* 1994; CSN 29, 37, 42). First recorded before 1893 (Lindsay *et al.* 1959), though not known if introduced or established unassisted (see Introductions below).

Antipodes Is Vagrant; two records (both specimens) of singles, 7 Nov. 1995 and 18 Nov. 1995 (Tennyson *et al.* 2002).

Snares Is Vagrant; few published records. Three, 14 Feb. 1972, and seen again on 14 Apr. (Horning & Horning 1974); single, 23 Dec. 1974 (Horning 1976); single, 8 Feb. 1984; two, 27 and 31 Oct. 1986; two, Apr. 1999; and three, 7–13 Oct. 2000 (Miskelly *et al.* 2001).

Auckland I. Vagrant. Thought to have first arrived between 1890 and 1900 (Williams 1953); recorded in 1954 and 1966 (Taylor 1971); not recorded 1972–73 (Bell 1975); single, in Dec. 1976 (Bartle & Paulin 1986).

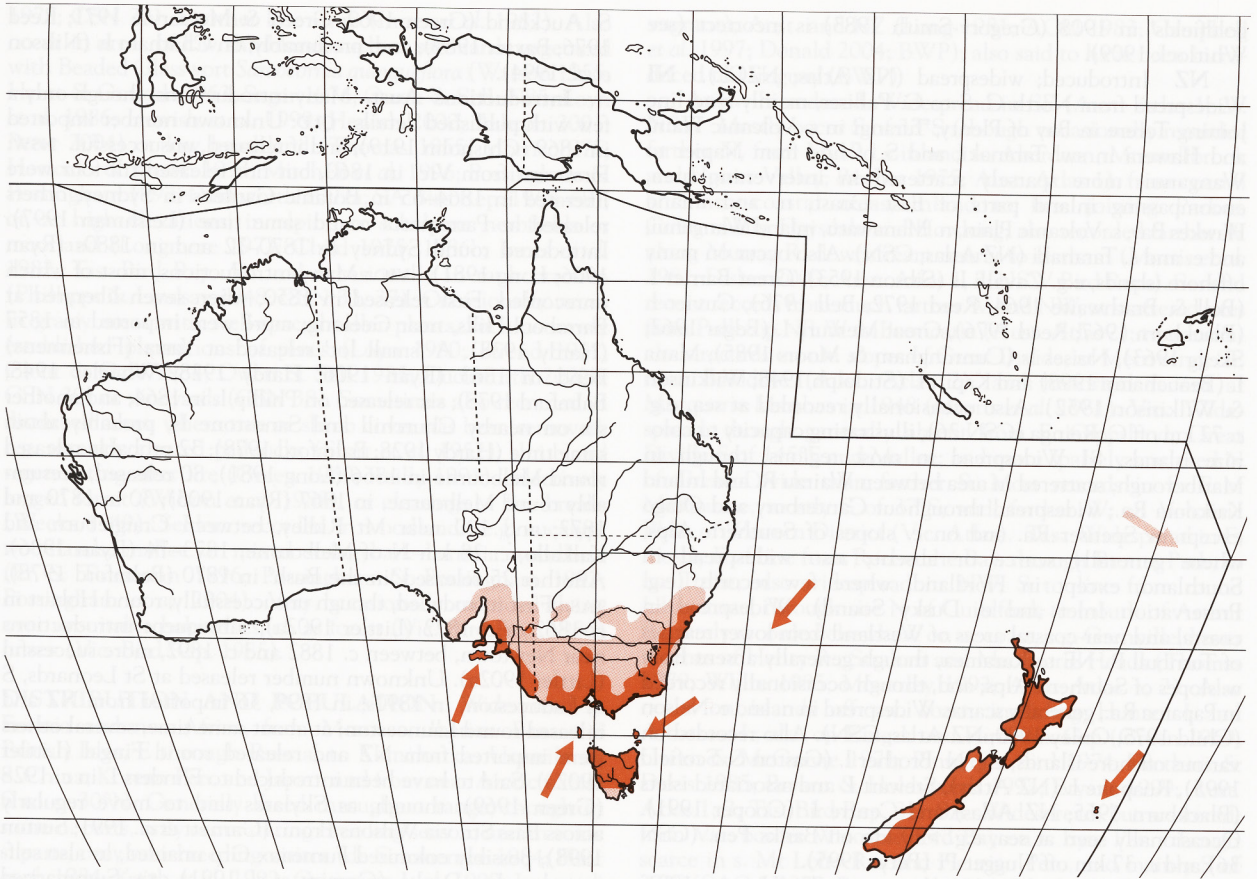
Campbell I. Specimen collected 28 Aug. 1968, though several unconfirmed reports since c. 1966 (Kinsky 1969).

Breeding Widespread. Probably throughout range in Aust. and NZ (Aust. Atlas 1, 2; CSN; NRS), including various offshore islands, such as Kangaroo I. in SA, King and Flinders Is in Bass Str., and Cuvier I., off Coromandel Pen.,

S. Auckland (Green 1969; Green & McGarvie 1971; Reed 1976; Baxter 1989), and, presumably, on Chatham Is (Nilsson *et al.* 1994).

Introductions Aust. Many introductions, though only a few with published details. **QLD:** Unknown number imported in 1869 (Chisholm 1991), and if released, unsuccessful. **NSW:** First sent from Vic. in 1860, but not released till four were liberated in 1864–65 in Botanic Gardens in Sydney; others released at Parramatta round same time (Leishman 1997). Introduced round Sydney in 1870–72 and in 1880s (Ryan 1906; Long 1981). **VIC.:** Many introductions, most of which unrecorded. First released in 1850, when seven liberated at Barrabool Hills, near Geelong; more were imported in 1857 (Hardy 1928). A 'small lot' released at Yarra (Fishermens) Bend in 1863 (Ryan 1906; Hardy 1928; Wheeler 1948; Balmford 1978); six released on Phillip I. in 1864, and another six on nearby Churchill and Sandstone Is, probably about same time (Hardy 1928; Balmford 1978); 32 probably released round Melbourne in 1866 (Long 1981); 80 released, presumably round Melbourne, in 1867 (Ryan 1906); 30 in 1870 and 1872; and 100 near Mt Ridley, between Craigieburn and Kalkallo, c. 28 km NN of Melbourne, 1873–74 (Ryan 1906). Another 25 released 'in the Bush' in 1870 (Balmford 1978). **TAS.:** First introduced, 1, though unsuccessfully, round Hobart in c. 1862 or c. 1872 (Littler 1902a); subsequent introductions near Newtown, between c. 1882 and c. 1892, more successful (Littler 1902a). Unknown number released at St Leonards, S of Launceston, in 1890s; in 1899, 36 imported from NZ and released round Launceston; at about same time, several others were imported from NZ and released round Fingal (Littler 1902a). Said to have been introduced to Flinders I. in c. 1928 (Green 1969), though, as Skylarks said to move regularly across Bass Str. via Wilsons Prom. (Garnett *et al.* 1991; Sutton 1998), possibly colonized Furneaux Grp unaided, as also self-introduced to Deal I. (Garnett *et al.* 1991). **SA:** Summarized from Sutton (1935). First imported from Britain in 1863 (or 1862; Condon 1951) but most died on passage. In 1879, 18 brought from Melbourne and released at 'the Park Lands' in Adelaide and Enfield, 44 imported from NZ and released at Dry Ck, another 18 or 20 of unknown origin released at Enfield, and another 664 purchased, of which 19 died, but fate of rest not known. In 1880, 147 birds, possibly from NZ, released at various sites round Adelaide; and in following year, 36 more released at Kapunda. **WA:** About 100 released at unknown site, presumably near Perth, in c. 1899 (Long 1988). **NZ** Summarized from Thomson (1922) unless stated. **NI:** In Auckland, ten released in 1867 and 52 in 1868; in Wellington, 52 in 1874 and 56 in 1875. **st:** In Nelson, 20 in 1864; in Canterbury, 13 in 1867 and 18 in 1871 (Thomson 1922), and unknown number in 1874 (Phillips 1947); in Otago, four in 1867, 35 in 1868 and 61 in 1869; in Southland, 70 released on Stewart I. in 1879, though died out within a few years. In addition, many private introductions thought to have occurred. Also said to have been introduced to Chatham Is in late 19th century (Oliver), though also said to have arrived unaided (Williams 1953). Unknown number from NZ were released in Hawaii in 1870 (Long 1981).

Change in range, populations In many areas (e.g. Maroubra, NSW; Levevre Pen., SA; and Masterton, NI), local populations have declined after open areas were developed for housing (Stidolph 1977; Bell 1983; Winslet & Winslet 1987). **Aust. NSW–ACT:** Range has expanded slowly (Ryan 1906). Within a year of introduction in Sydney (in 1864–65), recorded breeding at Bondi; by 1867, 'seen in the fields near Liverpool in numbers'; and common in Moore and Centennial Parks, and had spread a little way S, by 1880 (Leishman 1997). First arrived round Wellington, w. Central Tableland, in 1933, and common there 2 years later (Althofer & Althofer 1936). Range thought to have expanded to



include ACT in mid- to late 1940s (Lamm & White 1950). Presently, said to be declining (NSW Bird Rep. 1990) but between 1977–81 and 1998–2001, range appears to have expanded into n. Riverina and se. Lower Western Regions, with greatly increased reporting rates (Barrett & Silcocks 2002; Aust. Atlas 1, 2). Said to have gone from Tuross, in SE, where formerly resident (Whiter 1991a). VIC.: After release at Fishermens Bend, near Melbourne, in 1863 (see Introductions), common in 1930s (Jones 1938). In n. Vic., first recorded near Appin S, 37.5 km S of Kerang, in Sept. 1963 (Disher 2000), and, N of Kerang, round e. L. Tutcheop, in Jan. 1978 (Disher 2000). TAS.: After release in 1880s, said to occur in 'fair numbers' in parts of suburban Hobart by early 20th century (Littler 1902a). Known to have colonized Deal I. in Bass Str. (Garnett *et al.* 1991). Population on King I. said to have increased greatly in c. 1960s (Green & McGarvie 1971), as did population on Flinders I. (Green 1969). Said to have been first recorded at Westbury in c. 1920, and range expanded W to round Devonport, where first recorded in 1925 (Dove 1926, 1929). SA: After introductions round Adelaide in 1879–81, numerous at Gilles Plain in 1917 (Anon. 1917) with population round Adelaide increasing in early 1920s (Anon. 1922). Populations in SE possibly originated from colonization by birds from Vic. (Condon 1962), and were 'exceedingly numerous' round Port MacDonnell in early 1940s (Condon 1942). Colonized Kangaroo I. in late 1950s with subsequent increase in population (Abbott 1975; Baxter 1989); elsewhere in SA, range apparently expanded in 1960s, from being centred on Adelaide (from Port Wakefield S to Sellicks Beach) with a few records at scattered sites in SE (Condon 1962) (though already said to have been widespread in SE; Storr *et al.* 1952), to being widespread and continuous from Murray–Mallee and South-East Regions W to Adelaide Plain by 1970s (Attiwill 1972; Cox 1973; SA Bird Rep. 1976). NZ Populations quickly

increased soon after release in most regions; considered established in Auckland by 1873, and spread throughout entire country by early 1920s (Thomson 1922). Stewart I. probably colonized after initial release failed. Round Port Whangarei, population said to have declined between 1979 and 1998 (Beauchamp & Parrish 1999); numbers in Hunua Ra. have declined greatly (McKenzie 1979); and, by late 1980s, said to have disappeared from round Clevedon (CSN 37), where previously breeding resident (CSN 6, 8).

Anomalies Unusually abundant in Illawarra Region in 1984 (NSW Bird Rep. 1984).

Populations RECORDED DENSITIES: AUST.: 1.23 birds/ha, Wilsons Prom., Vic. (Cooper 1974); 0.56–8.25 birds/ha, near Breamlea, Vic. (J.M. Peter); 0–0.26 birds/ha, Gatum, Vic. (Brouwer 1993); and 0.01 birds/ha, near Woodsdale, Tas. (Taylor *et al.* 1997). NZ: 0.10–0.15 birds/ha on Mana I. (Beauchamp 1998); and along transect of unknown length, up to 10 birds/km beside Parengarenga Harbour (Beauchamp 1995). In Kaitoke Wetland, Great Barrier I., 0.02 birds/5-min count (0.18; 333 counts) (Anderson & Ogden 2003). CHATHAM IS: 0.03 and 0.1 birds/ha (Freeman 1994; Beauchamp 1998; CSN 37).

THREATS AND HUMAN INTERACTIONS Adversely affected by urban development of 'wasteland' and other suitable habitat (see Distribution and Population: Change in range, populations; also see Habitat) or mowing of such areas (Gill 1989; Hewish 1998). Claimed to be a pest of germinating crops, pulling out sprouting seedlings (see Food: Pest status). Occasionally eat poisoned Wheat (Thomson 1922). Sometimes killed by vehicles on roads (Vestjens 1973) and very occasionally shot (Littler 1902b; Hanks 1957). Once, struck lighthouse (Le Souëf 2006). In NZ, contents of nests sometimes eaten by introduced Hedgehogs *Erinaceus europaeus*

(Bull 1939–40; McKenzie 1979); and sometimes killed by introduced Australian Magpie *Gymnorhina tibicen* (McKenzie 1979; Porter 1993).

MOVEMENTS Not well known in HANZAB region, with little published information. Very well known extraliminally, where populations range from being wholly migratory to undertaking local movements only (see Campbell *et al.* 1997; Donald 2004; BWP; and references therein). Probably mainly sedentary or resident in Aust. and NZ, and present throughout year in most parts of range, though appear to move locally after breeding in autumn–winter (see below). In Aust., no evidence of regular long-distance movement (Aust. Atlas 1), and analysis of bird atlas and count data from e. Aust. found suggestive evidence of no movements (Griffioen & Clarke 2002). However, some evidence of seasonal movement of birds across Bass Str. (Sutton 1998; see below). In NZ, no region completely vacated (see below), though some regular seasonal movements apparent (Heather & Robertson 2000), birds in SI appearing to move N in autumn within SI, and some possibly moving from SI to NI (see below). Reports of seasonal changes in abundance or occurrence (e.g. Bedgood 1972; Anon. 2001; Veerman 2002; Vic. Atlas) in many instances likely to reflect changes in conspicuousness (see Social Behaviour, Voice). **NATURE OF PASSAGE:** Readily makes long oceanic crossings, as evidenced by unassisted occurrence (and occasional establishment) on many outlying islands in HANZAB region, including Lord Howe, Kermadec (c. 885 km NNE of NZ), Chatham, Snares, Auckland and Campbell Is (see Distribution). Observed flying low over water, >30 km off Banks Pen. (CSN 36). Occasionally reported flying in flocks, e.g. 31 seen flying N over Bennettswood, e. suburban Melbourne, late Apr. 1992 (J.M. Peter); or flying over unsuitable habitat, e.g. occasionally flying N at Linton, Vic., in Apr.–Aug. (Thomas & Wheeler 1983). However, these provide no indication of movements. (See Social Organization for further discussion of flocks.)

Aust. Appear to be essentially resident or sedentary, with only real indication of movement possible partial migration across Bass Str. (see Vic. below). **NSW:** Present throughout year at various sites, e.g. E of Great Divide in Illawarra and S. Coast Regions (Whiter 1989, 1991b, 1994; Chafer *et al.* 1999), and in Central Tableland Region, round Orange (Heron 1973) and Bathurst (NSW Bird Rep. 1988); and described as resident at Bass Pt, near Kiama (Smith & Chafer 1987). Claim of apparent wintering at Dripstone (Althofer & Althofer 1936) but with no indication of movement. **ACT:** Resident or present throughout year (Frith 1969; Taylor 1984, 1987; Er & Tidemann 1996; ACT Atlas), but seldom recorded Feb.–Mar., when inconspicuous (Holland 1985; ACT Atlas). **VIC.:** Recorded throughout year, but reporting rates decline in late summer and early autumn (Vic. Atlas). In NE, regarded as common in Strathbogie Ra., Dec.–Mar., but seldom recorded Apr.–Nov. (Bedgood 1972); and movements implied by return to Wangaratta, 2 Sept. (Vic. Bird Rep. 1986). In Central District, resident or present throughout year at most sites (e.g. Watson 1955; Thomas & Wheeler 1983; Humphreys 1986; Brouwer 1993). Recorded throughout year at Wilsons Prom., with no evidence of movement from area (Cooper 1974, 1975), but also described as irregular visitor there (Garnett *et al.* 1991). However, also regularly recorded flying S or flying in from over sea at lighthouse (Sutton 1998). Three seen at sea, c. 11 km off C. Nelson, flying WNW, Aug. 1985 (Vic Bird Rep. 1985). **TAS.:** Claimed to be nomadic in autumn and winter (Green 1989, 1995). Described as a summer visitor to Hobart, but also present Feb.–June (Thomas 1972) with changes possibly a reflection of conspicuousness. Resident on Deal I. in Bass Str., which was colonized unaided (Garnett *et al.* 1991). **SA:** Resident at Sellicks Beach (Ashton 1985, 2001).

NZ Partly sedentary, as some birds remain on territories throughout year; others join locally mobile flocks in autumn–winter (Fallala *et al.* 1981; Heather & Robertson 2000; see below) and some may undertake longer seasonal movements, including n. migration from SI in autumn (Heather & Robertson 2000; see below), *contra* claim that no evidence of regular migration (Fallala *et al.* 1981). **NI:** Present throughout year at most sites (e.g. Moncrieff 1929; Kirk & Wodzicki 1943; Wodzicki 1946; Beauquenchamp & Parrish 1999), though local movements occasionally recorded (Moncrieff 1929), and sometimes seen flying lg between islands, or between islands and mainland (McKenzie *et al.* 1948; Skegg 1963). **SI:** Recorded throughout year at some sites, e.g. Herbert, N. Otago (Anderson 1947). Occasional seasonal movements recorded, with n. passage recorded at Farewell Spit in autumn (Heather & Robertson 2000) and also said to migrate from nesting sites at Nelson in autumn (CSN 1). At Christchurch, n. movements recorded in Apr., with birds passing at rates of 59 birds/h from dawn to b 10:00 on 5 Apr., and 36 birds/h on 19 Apr. (CSN 37). Once, e. struck lighthouse on Dog I. in Foveaux Str. (Le Souëf 1906).) Many vagrant records on NZ offshore islands (see Distribution).

Banding Of 83 banded in Aust., 1953–June 2003, three recoveries (3.6%) of three birds; all <10 km from banding site (ABBBS). **LONGEVITY:** Adult banded near Gunghalin, ACT, 14 June 1972, recaptured at banding place over 2 months after banding (ABBBS).

FOOD Well known e. extraliminally (see Campbell *et al.* 1997; Donald 2004; BWP; and references therein) but little published information from HANZAB region. Mainly eat insects and seeds, including grain; occasionally also foliage and fruit. **Behaviour** Terrestrial. Forage on ground in open habitats, such as mudflats and d pasture; occasionally take food from standing plants (Campbell 1905; Miller 1938; Pierce 1980; Owen & Sell 1985; Loyn *et al.* 1986; Beauchamp 1998; see Habitat). Agricultural pest, particularly in NZ (see below). **DETAILED STUDIES:** At Huiarua Stn, NI, Dec. 1973–Apr. 1976 (Garrick 1981); and a at Christchurch International Airport, Mar. 1968–Feb. 1969 (Moeed 1975). **FORAGING ASSOCIATIONS:** Sometimes congregate in small to large flocks at food during winter (Heather & Robertson 2000; also see Social Organization); 52 seen feeding in paddock (CSN 38) and 65+ seen foraging together (CSN 36). On Chatham I., forage in groups of 2–12; and observed foraging with Australasian Pipit (Beauchamp 1998). **FORAGING HEIGHTS AND SITES:** Forage almost entirely on ground (Campbell 1905; Loyn *et al.* 1986; Er *et al.* 1998; Heather & Robertson 2000), including bare ground of exposed mudflats (Pierce 1980; Owen & Sell 1985); also often foraged on G Glasswort *Salicornia australis* at Waimea Inlet, SI (Owen & Sell 1985; see Habitats). In open pasture on Chatham I., foraged mainly in heavily grazed areas or near seeding *Bromus* on drier slopes (Beauchamp 1998). In Canterbury, SI, foraged for adult grass grubs *Costelytra zealandica* beneath pasture vegetation and surface litter (East & Pottinger 1975). On one fed at edge of water on beach (CSN 31). **FORAGING METHODS:** Fly between foraging sites in two or groups, selecting sites where other Skylarks already feeding (Beauchamp 1998). One loose flock flew between two sites several times during 4 40-min observation (CSN 36). Seeds gleaned mainly from ground, and seldom from standing plants (Loyn *et al.* 1986). Strip leaves from or pull up seedlings (Heather & Robertson 2000; Oliver). On Chatham Is, groups move little when foraging, walking mean 1.06 m/min (2.41; 5); in open pasture, spent 91.1% of time foraging (n=846 obs. over 7 h, 10:00–17:00), including: 57.1% feeding (bill movements on ground or against objects), 17.4% walking, 15.4% standing and searching (looking for food), 1.2% dashing after prey and 0.001% hopping (Beauchamp 1998). **FOOD**

SELECTION: At Mentone, Vic., fed on vegetable matter, though potential insect prey abundant (French 1914). **SEASONAL VARIATION:** At Huiarua Stn, only significant seasonal variation in frequency of occurrence was for Coleoptera, which present in 85% of gizzards in Oct.–Dec. and 22% in Apr.–June; seeds appeared more prevalent (and conversely, invertebrates less common) in diet in Jan.–June than in other months (see Garrick 1981 for further details). **INTERSPECIFIC COMPARISONS:** For comparison of diet and foraging behaviour with Australasian Pipit, see that account for details. Also see Moeed (1975) and Beauchamp (1998) for some other comparisons of diet and foraging behaviour. **PEST STATUS:** Cause little damage in Aust. (Long 1981), though sometimes damage germinating crops of Canola *Brassica napus* and poppies *Papaver somniferum* (Bomford & Sinclair 2002; Aust. Atlas 1), and, at least formerly, attacked vegetables in market gardens and seed-beds (French 1914). Damage more serious in NZ, where only House Sparrow *Passer domesticus* considered more harmful to agriculture (Thomson 1922; Long 1981, Heather & Robertson 2000; Oliver): eat sown grain and damage germinating or seedling vegetables and cereals, stripping leaves and pulling seedlings from ground (Anon. 1910; Thomson 1922; Bull 1966; Heather & Robertson 2000; Oliver). Also damage experimental crops of fodder and sugar beet (NZRD). In 1934, said to have pulled up 5000 young Tobacco plants (Oliver). Damage to crops may be partly offset by benefit of consumption of insects (Oliver), though impact on agriculture in NZ said to be declining (NZRD).

Detailed studies At HUIARUA STN, NI (frequency occurrence of food items in 64 gizzards; totals for plant families and arthropod orders, and insect larvae and pupae, include all items within those categories; Garrick 1981): **Plants** (All seeds.) Unident. seeds 7.8% freq. **MONOCOTYLEDONS:** Cyperaceae 23.4; *Carex* 23.4; Poaceae 73.4: *Anthoxanthum odoratum* 68.8; *Cynosurus cristatus* 3.1; *Lolium* 1.6; *Poa* 1.6. **DICOTYLEDONS:** Amaranthaceae 4.7: *Amaranthus retroflexus* 4.7 Asteraceae 25.0: *Cirsium arvense* 1.6; *C. vulgare* 18.8; *Hypochoeris glabra* 1.6; *Taraxacum officinale* 6.3; Brassicaceae 1.6: *Sinapis nigra* 1.6; Caryophyllaceae 12.5: *Stellaria media* 12.5; Fabaceae 15.6: *Trifolium repens* 3.1; *T. pratense* 12.5; Plantaginaceae 10.9: *Plantago* 4.7; *P. lanceolata* 6.3; Polygonaceae 20.3: *Polygonum aviculare* 18.8; *Rumex acetosella* 6.3; Ranunculaceae 10.9: *Ranunculus repens* 10.9; Solanaceae 10.9; Thymelaeaceae 4.7: *Pimelia* 4.7. **Animals** Unident. invertebrates 28.1. **MOLLUSCS:** Gastropods: Endodontidae: *Paralaoma pumila* 1.6. **SPIDERS** 12.5: Araneae: Dictynidae 1.6; Lycosidae 1.6. **INSECTS:** Larv. 21.9, pupae 17.2; Coleoptera: ads 65.6, unident. larv. 3.1; Carabidae: Cicadellinae ads 1.6; Chrysomelidae ads 1.6; Coccinellidae ads 1.6; Curculionidae ads 26.6; Scarabaeidae: *Aphodiina granarius* ads 6.3; *Pyronota* ads 4.7; Diptera: ads 25.0, unident. larv. 6.3, pupae 1.6; Nematocera: unident. ads 9.4; Tipulidae: ads 10.9, larv. 3.1; Brachycera: Cyclorrhapha ads 4.7; Hemiptera: ads 7.8; Aphididae ads 1.6; Lygaeidae: *Cymus novaeseelandiae* ads 1.6; Hymenoptera: ads 14.1; Apocrita: unident. ads 7.8; Formicidae: ads 6.3; Lepidoptera: ads 3.1, unident. larv. 3.1; Coleophoridae: *Coleophora* pupae 15.6; Noctuidae: larv. 1.6; Orthoptera: ads 1.6; Gryllidae: *Pteronemobius bigelowi* ads 1.6.

At CHRISTCHURCH INTERNATIONAL AIRPORT (912 items in nine gizzards; Moeed 1975): **Plants** (All seeds.) **MONOCOTYLEDONS:** Poaceae: *Anthoxanthum odoratum* 3.7% no.; *Poa* 14.8; *Stipa* 3.1. **DICOTYLEDONS:** Caryophyllaceae: *Stellaria media* 50.5; Chenopodiaceae: *Chenopodium album* 1.1; Fabaceae: *Trifolium* 0.3; Geraniaceae: *Erodium* 4.8; Oxalidaceae: *Oxalis* 3.9; Polygonaceae: *Polygonum* 1.3. **SPIDERS:** Araneida: Lycosidae 0.3. **INSECTS** (Ads unless stated): Coleoptera: Carabidae 7.9; Curculionidae 4.5; Elateridae 0.1; Scarabaeidae: *Costelytra zealandica* 0.8; Diptera 0.3; Hemiptera: Cicadidae: *Rhodopsalta* 0.2; Lygaeidae: *Nysius* 0.3;

Lepidoptera: Coleophoridae: *Coleophora* larv. 1.0; Pyralidae: *Crambus* ads 0.5, larv. 0.2; Orthoptera: Acrididae: *Phaulacridium marginale* 0.1.

Other records **Plants** Seeds, including grains^{9,10,11,13}; fruit¹³. **MONOCOTYLEDONS:** Cyperaceae sds¹¹; Poaceae: sds^{8,11}, cereal seedlings³; *Eleusine indica* sds⁸; *Festuca* sds¹⁶; *Triticum aestivum* lvs¹¹, seedlings^{3,11,13}. **DICOTYLEDONS:** Asteraceae: *Lactuca sativa* seedlings¹; Brassicaceae: *Brassica napus*¹²; *B. oleracea* lvs¹, seedlings^{1,3,11,13}; *B. rapa* seedlings^{1,3,13}; *Raphanus sativus* lvs¹; Chenopodiaceae: *Beta vulgaris* seedlings¹⁵; Cucurbitaceae: *Cucurbita* seedlings⁵; Epacridaceae: lvs⁶; Fabaceae: *Pisum sativum* seedlings^{5,11}; *Trifolium* sds^{6,11}; Papaveraceae: *Papaver somniferum* seedlings¹⁴; Solanaceae: *Lycopersicon esculentum* lvs¹¹, seedlings¹¹; *Nicotiana tabacum* seedlings^{13,15}. **Animals** **SPIDERS**¹¹. **INSECTS**^{2,4,13}: Coleoptera: larv.¹¹, ads¹¹; Curculionidae: ads⁸; Elateridae: ads⁸; Scarabaeidae: *Costelytra zealandica* ads⁷; Diptera: larv.¹¹, ads¹¹; Hemiptera: ads¹¹; Pentatomidae: ads⁸; Hymenoptera: Formicidae: ads^{6,16}; Lepidoptera: larv.¹¹; Orthoptera: Acrididae: ads⁶. **Other matter** Gravel¹; grit⁶.

REFERENCES: ¹ French 1914; ² Hilgendorf 1918; ³ Thomson 1922; ⁴ Miller 1938; ⁵ Bull 1966; ⁶ Green & McGarvie 1971; ⁷ East & Pottinger 1975; ⁸ van Tets *et al.* 1977; ⁹ Pierce 1980; ¹⁰ Loyn *et al.* 1986; ¹¹ Heather & Robertson 2000; ¹² Bomford & Sinclair 2002; ¹³ Oliver; ¹⁴ Aust. Atlas 1; ¹⁵ NZRD; ¹⁶ FAB.

Young In NZ, young fed worms and insects, by both parents (Heather & Robertson 2000; Oliver).

Intake At Huiarua Stn, invertebrates contributed little to volume of gizzard contents: in 40 of 64 gizzards (62.5%), invertebrates comprised ≤10% of volume; and only 16 (25%) had volume of invertebrates greater than or equal to volume of seeds. Conversely, at Christchurch International Airport, volume of invertebrate matter in gizzards was greater than that of seeds, owing to larger size of invertebrate items, though seeds were the dominant item numerically (Moeed 1975; see Detailed studies above).

SOCIAL ORGANIZATION Well known extralimally (see Campbell *et al.* 1997; Donald 2004; BWP; and references therein) but little published information from HANZAB region. During breeding season, usually seen singly or in twos, occasionally in small loose flocks; in autumn–winter non-breeding period, while seen singly or in twos, more usually in small flocks of up to 15 birds, particularly at sources of food (Fletcher 1932; Kirk & Wodzicki 1943; Wodzicki 1946; Cunningham & Wodzicki 1948; Secker 1960; Skegg 1963; Cooper 1974, 1975; Falla *et al.* 1981; Green 1989, 1995; Beauchamp 1998; CSN 38, 39; Tas Bird Rep. 29; see Food) with occasional records of larger flocks of up to 80 (e.g. Vic. Bird Reps 1982, 1985; CSN 36, 38; see Food), and once, c. 500 reported at Carrum, Vic., in June 1987 (Vic. Bird Rep. 1987). Flocks disperse at start of breeding season (Fletcher 1932). Occasionally associate with other species, e.g. in large mixed-species flock of 500–600 birds, including House Sparrows, Common Starlings *Sturnus vulgaris*, Common Mynas *Acridotheres tristis* and Silvereyes *Zosterops lateralis* (CSN 36); and seen foraging with Australasian Pipit (see Food).

Bonds Members of pair said to breed together year after year (Heather & Robertson 2000). Extralimally: monogamous (though two records of bigamy) with pair-bond maintained through year in non-migratory populations; in migratory populations, pair-bond often (c. 50% of pairs surviving into consecutive seasons) maintained for second year, and bonds known to be maintained for up to four seasons, with strong correlation between fidelity to territories and breeding success. Can first breed when 1 year old (Campbell *et al.* 1997; Donald 2004; BWP). **Parental care** Nestlings and fledgelings fed and

attended by both parents, though more by female; nestlings brooded by female, or by both parents; male may take over care of fledgelings if female re-nests; young tended by parents till c. 30 days old (BWP; and see Breeding).

Breeding dispersion Breed solitarily; no records of colonial nesting (NRS). Pairs described as strongly territorial in breeding season, with some pairs remaining on territory all year (Heather & Robertson 2000). Extralimitally: solitary and territorial, with territory defended by both sexes, though more by male; boundaries of territories often marked by topographical features, and boundaries tend to be constant, some over many years; average size of territories, 0.5 ha (Campbell *et al.* 1997; Donald 2004; BWP).

Roosting Roost on ground (Chisholm 1926); once, c. 100 seen roosting on beach, spread along 3 km (CSN 44). Extralimitally, roost nocturnally and always on ground; normally roost solitarily but winter flocks sometimes roost communally; female normally roosts on nest at night during breeding season (Donald 2004; BWP).

SOCIAL BEHAVIOUR Poorly known in HANZAB region, but well known extralimitally (see Campbell *et al.* 1997; Donald 2004; BWP; and references therein). Mostly silent in late summer and autumn, when less conspicuous than in breeding season (see Voice for details). Timid; when approached, usually fly away at great height (Green 1981). However, extralimitally, normally crouch or freeze (or both) when approached by person, often flushing explosively on closer approach to within a few metres (BWP; see Field Identification for further details of behaviour on flushing; also see Alarm below). **Flock behaviour** When flock takes flight, it rises as a unit, swiftly wheeling high in sky before returning to ground to feed or moving to another area (Green 1995). **Displays** Song of male usually given during conspicuous Song-flights (see below), less often from ground, or while perched on post or rock (see Voice). **SONG-FLIGHTS:** Occur regularly, more so during breeding season. In HANZAB region, sing loudly while hovering continuously, sometimes for several minutes, up to 20 m above ground. Soar and descend on fluttering wings; descend from Song-flight silently, either vertically, parachuting with wings and tail spread, or in circling sweep. Song-flights and Song appear to function in territorial advertising (Frith 1969; Green 1995; Peter 1997; Oliver) and in male advertising in courtship (BWP). Further to above, extralimitally, recorded hovering up to 150 m above ground; usually take off silently and always ascend into wind; Song-flights with much singing in ascent associated with period of pair-formation and territorial disputes. Duration of Song-flights changes over season, with mean ranging from 1.3 to 3.4 Song-flights/min at different stages of season; most are brief, with few >5 min and 20 min exceptional, though records of 57 and 68 min (Campbell *et al.* 1997; BWP [which see for detailed descriptions of extralimital populations]). **Maintenance behaviour** Dust-bathe on unmade roads (Moncrieff 1929). One bird sheltered from 35.5 °C heat beneath low shrub (Watson 1955).

Agonistic behaviour Song-flights and Song have territorial function (see above; also see Voice). **Chases, Fights** Aerial chases and fights occasionally recorded (Beauchamp 1998). Dispute observed at Kaikoura, SI: one bird was hovering high in air in Song-flight when another bird appeared c. 50 m away; singing bird flew within c. 1 m of ground straight at intruder, chasing it, before they grappled with feet locked together, both birds tumbling round on and just above ground for c. 30 s. When they separated, one stayed on ground for some time while the other, thought to be attacker, returned to original area, where it also rested on ground for c. 2 min before again performing Song-flight (J.M. Peter). **Alarm** Extralimitally, in response to bird of prey, crouch and freeze, as in

response to person (see above), then walk slowly to cover while watching threat; in flight will drop to cover (BWP).

Sexual behaviour Song-flights and Song probably also function in male advertising (see above). No other information for HANZAB region.

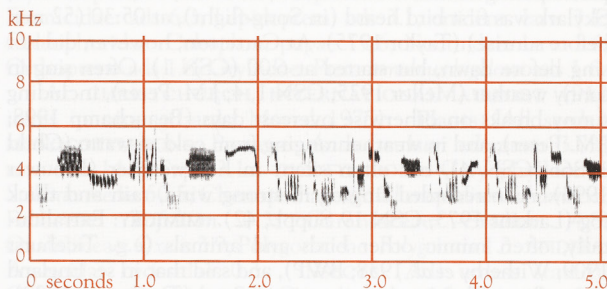
Relations within family group Little information for HANZAB region. Nestlings and fledgelings fed by both parents (see Breeding). Parents perform distraction displays when disturbed at nest, feigning broken wing, or making a creeping run with wings twisted downward (NRS).

VOICE Well known extralimitally (see Campbell *et al.* 1997; Donald 2004; BWP; and references therein), but little published information for HANZAB region; sonagrams in BWP and Campbell *et al.* (1997). In w. Palearctic, repertoire of adults consists of male and female Song and seven calls (BWP). Song is most often reported vocalization in HANZAB region (see below); Song-flights of male familiar and conspicuous, yet while birds clearly audible, often difficult to see (Dove 1929; Kinsky 1969); sometimes several birds sing at same time (Green 1969), e.g. near Torquay, Vic., up to five or six in Song-flight over same or adjoining paddocks (J.M. Peter), but elsewhere up to 14 noted (SA Bird Rep. 1963). Song described as delightful, beautiful and charming (Wolstenholme 1926; Sutton 1933; Chisholm 1950). **SEASONAL PATTERN:** Sing throughout much of the year, but often silent in late summer and early autumn (Wheeler 1948; Hodgkins 1949; Holland 1985; Brouwer 1993; Wood 1998) or autumn–winter (Green 1995). In s. Aust., usually stop singing between Dec.–Jan. and late Mar. to early Apr. (e.g. Watson 1955; SA Bird Reps 1966–67, 1967–68); in 64 surveys at Gatum, w. Vic., heard singing in all months except Feb. (Brouwer 1993). Seasonality less clear-cut in NZ; said to sing mainly Aug.–Jan. and seldom mid-Feb. to mid-Apr. (Heather & Robertson 2000) with many records of first Song in Apr. (Cunningham & Wodzicki 1948; CSN 5, 30, 41, 47), though elsewhere, first Song usually noted in July (e.g. CSN 1, 26, 49). At Carterton, last heard on 12 Feb., resumed at unknown time, then stopped again in early May, resuming on 29 June (CSN 1); and at Clevedon, quiet 6 Mar.–11 Apr. and 2–21 July (CSN 8). This pattern of singing leads to Skylarks being conspicuous in spring and summer (e.g. Moncrieff 1929; Vic. Atlas), and, conversely, when quiet and cryptic in autumn, reporting rates are lower, and often considered absent (e.g. Miller 1993; COG 1998, 1999, 2000, 2001; Vic. Atlas; ACT Atlas). **DIURNAL PATTERN:** Sing at any time of day (Green 1969), from sunrise till after sunset (Oliver), though some reports emphasize mornings (e.g. Littler 1902b; CSN 4, 5). Sometimes also sing at night, in bright moonlight (Whitlock 1909; CSN 1), when a sliver of moon had just risen (Littler 1902a), or without a trace of light in the sky (Hodgkins 1949). At L. Onoke, NI, at least five heard singing before 03:00 on 30 Dec. (CSN 1); at Burnham, SI, heard at 03:27 on 14 Dec. and 03:30 on 17 Dec. (CSN 1); and heard singing at 04:30 in Tas. (Littler 1902a). In list of species participating in dawn chorus near Te Teko, NI, on 27 Oct., Skylark was first bird heard (in Song-flight), at 05:30 (52 min before sunrise) (Taylor 1975). At Carterton, however, did not sing before dawn, but started at 6:00 (CSN 1). Often sing in sunny weather (Mellor 1925; CSN 1, 4; J.M. Peter), including sunny breaks on otherwise overcast days (Beauchamp 1998; J.M. Peter); and in weather ranging from cold to warm (Child 1986b; CSN 4), but often silent in hot weather (Brouwer 1993). Also recorded singing in strong wind, rain and thick fog (Larkins 1973; CSN 19 Suppl., 42). **MIMICRY:** Extralimitally, often mimic other birds and animals (e.g. Ticehurst 1909; Witherby *et al.* 1938; BWP), and said that in se. England most Songs begin with an imitation (Ticehurst 1909). Mimicry noted much less often in HANZAB region (Chisholm 1965) but heard imitating screeching Galah

Eolophus roseicapillus, and tinkling contact call of Blue-winged Parrot *Neophema chrysostoma* during Song-flight; mimicry of Masked Lapwing *Vanellus miles* also heard (Peter 1997). In NZ, heard imitating Flight Call *pink* of Double-banded Plover *Charadrius bicinctus* at conclusion of repeated quiet chirrups while on ground (CSN 5, 31).

Adult SONG OF MALE: Sustained, clear, beautiful song of runs, trills and repeated throbbing phrases (Pizzey 1980); a loud and melodious sequence of repeated trilling and warbling, interspersed with occasional chirrups (Peter 1997); a vigorous torrent of varying trills and runs (Heather & Robertson 2000); and prolonged trilling (CSN 32). Sonagram A shows an excerpt from a Song. Bouts of Song often prolonged (CSN 32), lasting for up to 5 min (Dove 1929; Peter 1997; Heather & Robertson 2000), though also said not to be given for long at a time (Oliver). On 3-h visit to one site, sang continuously (Sutton 1933). Mostly given in flight (Mellor 1925; Chisholm 1926; Green 1969; Reed 1975; Taylor 1975; Peter 1997; Beauchamp 1998; SA Bird Rep. 1963; CSN 4, 5; BWP), and very occasionally from low perch, such as post, or ground (Frith 1969; Redhead 1969; Heather & Robertson 2000; Oliver; CSN 19 Suppl.; BWP). Descent from Song-flight silent (Frith 1969; Oliver), though, extraliminally, either continue to sing while gliding down to land or more typically suddenly stop singing 10–20 m above ground then suddenly drop to ground. However, after long Song-flight descent usually silent (BWP). Intensity of Song can vary (Watson 1955); when singing resumed after break of several weeks, often uttered as tentative, partial or incomplete Song for a few days before full Song given (CSN). Given in territorial advertising and possibly functions in male advertising (see Social Behaviour). Song-flights sometimes interspersed with bouts of foraging on ground (Mellor 1925). Once gave loud bursts of Song in flights other than Song-flight (CSN 4). Said to have once burst into Song while being chased by a New Zealand Falcon *Falco novaeseelandiae* (Jackson 1976). **SONG OF FEMALE:** Extraliminally, monotonous and fragmented Song, quieter than male (BWP). Not noted in HANZAB region. **FLIGHT CALL:** Mellow, liquid chirrup; given often, especially in flight (Frith 1969; Pizzey 1980; Heather & Robertson 2000; J.M. Peter) and occasionally at intervals between phrases of Song (Peter 1997). At Torquay, Vic., single birds flying overhead heard chirrupping at intervals of 2–10 s (J.M. Peter). At Muriwai Lagoon, NI, one bird was heard giving quiet repeated chirrups that ended with mimicry; called from ground (CSN 31). Most common call extraliminally (BWP). **OTHER CALLS:** Six other calls reported extraliminally: Advertising-display Call, Threat Call, Contact Call, Feeding Call, Flight Call, Disturbance Call and Fright Call (BWP).

Young No information from HANZAB region. Extraliminally, nestlings give hoarse *ch ch ch* when gaping, and older nestlings give *iuu iuu* when begging; young removed from nest utter quiet piping sounds (BWP).



A R. Buckingham; Werribee, Vic., Aug. 1980; P48

BREEDING Not well known in HANZAB region, with little published information; very well known extraliminally (see Campbell *et al.* 1997; Donald 2004; BWP; and references therein); 45 records in Aust. NRS to Feb. 2004.

Season Aust. Clutches recorded Aug.–Jan. (Frith 1969; NRS; see below); of 41 clutches in NRS: one (2.4%) in Aug., two (4.9%) in Sept., two (4.9%) in Oct., 13 (31.7%) in Nov., 13 (31.7%) in Dec. and ten (24.4%) in Jan. NSW–ACT: Eggs recorded Sept.–Dec. (Morris *et al.* 1981; COG 1990). Nestlings, Sept.–Nov. (Veerman *et al.* 1988; NRS [n=1]). Otherwise, fledgelings and unspecified breeding recorded Oct.–Jan. (Smith & Chafer 1987; Veerman *et al.* 1988; Aust. Atlas 2; NSW Bird Rep. 1988). VIC.: Eggs, Sept.–Jan. (Wheeler 1946, 1948; Brown 1950; Watson 1955; Aust. Atlas 1; NRS); of 23 clutches in NRS: one (4.3%) in Sept., one (4.3%) in Oct., nine (39.1%) in Nov., three (13.0%) in Dec. and nine (39.1%) in Jan. Nestlings, Nov.–Jan. (Wheeler 1946, 1948; Aust. Atlas 1; NRS [n=7]). Otherwise, fledgelings and unspecified breeding recorded Oct.–Jan. (Aust. Atlas 1, 2). TAS.: Eggs recorded Sept.–Jan. (Aust. Atlas 1; NRS); of 17 clutches in NRS: one (5.9%) in Sept., one (5.9%) in Oct., four (23.5%) in Nov., ten (58.8%) in Dec. and one (5.9%) in Jan. Nestlings, Dec. (Aust. Atlas 1; NRS [n=1]). Otherwise, fledgelings and unspecified breeding recorded Oct.–Nov. and Jan.–Feb. (Fletcher 1932; Aust. Atlas 1, 2). SA: Eggs recorded late Aug. and late Dec. (Aust. Atlas 1 [n=1]; NRS [n=1]). Nestlings, Sept.–Oct. and Dec. (Aust. Atlas 1; NRS [n=2]). Otherwise, fledgelings and unspecified breeding recorded Aug.–Oct. and Dec.–Jan. (Aust. Atlas 1, 2). NZ Clutches recorded Sept.–Jan. (Falla *et al.* 1981; Heather & Robertson 2000; see below). Unspecified breeding (almost certainly including records of fledgelings), Oct.–Jan. (Oliver). NI: Eggs recorded early Nov. to late Jan. (Bull 1939–40; Edgar 1971; CSN 1, 6, 34). Nestlings, early Nov. to late Jan. (Bull 1939–40; CSN 1). SI: Eggs, mid–Nov. to mid–Jan. (Tily 1947; CSN 1, 5). Nestlings, early Jan. (Tily 1947).

Site On ground, at least sometimes bare ground; usually beneath or at base of tussock of grass and rushes; often in a shallow depression, such as a hoofprint (Wheeler 1946; Watson 1955; Frith 1969; Reed 1975; St Paul 1975; Falla *et al.* 1981; Heather & Robertson 2000; Oliver; Aust. Atlas 1; NRS). Some nests well sheltered (NRS); one at Sorrento, Vic., faced into offshore winds (Reed 1975). Often near water (Wheeler 1948; CSN 5; Aust. Atlas 1; NRS), e.g. at Port Whangarei, NI, nests placed on bund between sediment ponds (Beauchamp & Parrish 1999). Very occasionally placed just above high-tide mark (NRS). At Fernhill, NI, six nests in a vineyard (CSN 38). **MEASUREMENTS:** Height of nests: 0 m (n=32) (NRS) or on ground (i.e. 0 m) (Chisholm 1926; Frith 1969; Falla *et al.* 1981; Heather & Robertson 2000; Oliver); one was ‘almost at ground level’ (NRS) but no further details. Height of vegetation above nest: 0.29 m (0.12; 0.2–0.5; 7) (NRS).

Nest, Materials Cup-shaped nest, variously described as shallow, deep and very deep; made of grass or, rarely, similar material, such as rootlets or medic burrs (Falla *et al.* 1981; Heather & Robertson 2000; Oliver; Aust. Atlas 1; CSN 1; NRS); either lined with fine grass or unlined (Oliver; NRS). Built by female (Heather & Robertson 2000). Extraliminally, female selects site (Campbell *et al.* 1997). Nest said to be similar to that of Australasian Pipit (Beruldsen 1980). **MEASUREMENTS:** One had diameter of 5–6 cm (Aust. Atlas 1).

Eggs Extraliminally, subelliptical; smooth and rather glossy (Campbell *et al.* 1997; BWP). In HANZAB region, ground-colour greyish white, creamy buff, pale green, pale brown, greenish grey and dark grey; extensively spotted, speckled and blotched brown, grey and olive, especially at large end (Frith 1969; Beruldsen 1980; Falla *et al.* 1981; Heather & Robertson 2000; Oliver; Aust. Atlas 1; NRS).

Said to be similar to eggs of Australasian Pipit, though markings larger and less numerous (Beruldsen 1980). **MEASUREMENTS:** In Aust., mean 24×17 (no N) (Frith 1969). In NZ, a clutch of three: 22.6×16.2 , 23×16.4 , 23.4×16.4 (Oliver). Extraliminally (nominate *arvensis*), 23.4 (20.5 – 26.5 ; 300) \times 16.8 (15.3 – 18.5); and weight 3.35 g (BWP).

Clutch-size Two to five, usually three or four, in both Aust. (Brown 1950; NRS) and NZ (Edgar 1971; Heather & Robertson 2000; Oliver; CSN 1, 5, 6, 34). Extraliminally, clutches of up to seven claimed (Falla *et al.* 1981; BWP). Clutch-size in NZ often smaller than in Britain (Niethammer 1970). In Aust., mean 3.25 (0.71 ; 8); $C/2 \times 1$, $C/3 \times 4$, $C/4 \times 3$ (also $C/5 \times 2$ not confirmed as complete) (NRS). In w. Palaearctic, mean clutch-size tends to increase from W (3.69) to E (3.97); and in England, clutch-size increases over season; no difference in clutch-size with age (BWP).

Laying Extraliminally, usually laid between 05:00 and 08:00, on consecutive days (Campbell *et al.* 1997). One egg in Aust. laid 07:00–08:00 (NRS). In NZ, sometimes lay 2–3 clutches in a season (Falla *et al.* 1981; Heather & Robertson 2000).

Incubation By female only (Heather & Robertson 2000; BWP); begins with last egg (BWP) or penultimate egg (Campbell *et al.* 1997). Claim that eggs possibly removed if nest disturbed (Stidolph 1923) unproven and confirmation needed. **INCUBATION PERIOD:** c. 11 days (Frith 1969; Falla *et al.* 1981; Heather & Robertson 2000). Extraliminally, 11 days, sometimes 12 days for early nests (Campbell *et al.* 1997; BWP).

Young Altricial, nidicolous. Nestlings have covering of down, and feathers in pin by c. 4 days old; feathering develops within 11 days of hatching (Aust. Atlas 1; NRS). For markings of mouths, see Boles & Longmore (1985). Hatching synchronous, usually all within 8 h. Both adults remove eggshells (Campbell *et al.* 1997; BWP). Attended and fed by both parents (see Food: Young); extraliminally, at first, both parents swallow faecal sacs, later carry them away (BWP). Extraliminally, young not normally brooded after Day 5 except in rain (BWP).

Fledging to independence **FLEDGING PERIOD:** 9–10 days (Frith 1969; Heather & Robertson 2000). Extraliminally said to be 7–11, usually 8–9, days but can first leave nest at 6 days and return; after first leaving nest to meet parent returning with food, always return to nest, gradually moving farther and staying out longer over ensuing days. Adults continue to feed and attend fledgelings, male taking increasing role to independence (Campbell *et al.* 1997; BWP). Unable to fly till c. 20 days old (Heather & Robertson 2000), which probably equates to 20 days to fledging of Falla *et al.* (1981). Extraliminally, independent at c. 25 days old, first attacked by male at c. 28 days, and separate from parents at 30–32 days old; though young may associate with parents for as little as 5–6 days after fledging (BWP).

Success In Aust., where clutch-size and outcome known, of eight eggs, in two nests, none hatched; where clutch-size and hatching success known, of 16 eggs, in five nests, eight (50.0%) hatched; for five nests where outcome known, all failed; at two nests, young capable of leaving when last seen (NRS). At Mangere, NI, of 12 nests where outcome known, six (50%) successfully fledged at least one young. Of nests that failed (all at egg-stage): one deserted, one trampled by a cow, eggs smashed in one, one destroyed, one flooded and eggs in one eaten by a Hedgehog (Bull 1939–40). In NZ, eggs also taken by Swamp Harriers *Circus approximans* (Baker-Gabb 1981), and young by New Zealand Falcons (Fitzgerald 1965). Nests on ground vulnerable to predation by Cats and Foxes (Chisholm 1926). In Brisbane Ras, Vic., dead young often found on roadsides (Conole 1981). Nests sometimes deserted (Bull 1939–40; Wheeler 1948; Edgar 1971; NRS). Extraliminally, success significantly higher for clutches of four than clutches of three; and predation main cause of failure (BWP).

PLUMAGES Prepared by J.S. Matthew. Following summarized from BWP. Nestlings have fairly dense covering of down, but underparts mostly naked (BWP). Fledge in juvenile plumage. Undergo a complete post-juvenile (first pre-basic) moult to adult (first basic) plumage, starting 2–4 weeks after fledging. Thereafter, a complete post-breeding (pre-basic) moult each cycle produces successive adult plumages with no change in appearance. Sexes alike. At least ten subspecies recognized (Peters; BWP). Nominate *arvensis* (and probably subspecies *scotica*) introduced to Aust., Lord Howe I. and NZ (Balmford 1978; Long 1981; DAB); see Geographical Variation for discussion on origin of populations in HANZAB region. For details of Plumages, Bare Parts and Structure see Campbell *et al.* (1997) and BWP, and for general description and identification, see Field Identification. For details of markings of mouths of nestlings, see Boles & Longmore (1985).

MOULTS Well known in n. hemisphere (see BWP). Following information for HANZAB region based on examination of skins of 20 adults and one juvenile from se. Aust. and NZ (MV, NMNZ). **Adult post-breeding** (Second and subsequent pre-basic). Complete. Primaries moult outward, starting at p1 (BWP). Few data for HANZAB region. Active moult of primaries recorded Mar. (1 of 1 [Aust.]; PMS 33). All four collected Apr.–June (Aust.) have new primaries; six collected July–Oct. (Aust.) and ten collected Aug.–Dec. (NZ) have all primaries worn and no moult of body. This limited data suggests that moult occurs from about mid-summer to early autumn. Extraliminally, moult begins after end of breeding (Campbell *et al.* 1997); for further details of sequence of replacement of feathers and timing in n. hemisphere, see BWP. Moult of tail finishes when PMS c. 35 (BWP). **Post-juvenile** (First pre-basic) Complete. Extraliminally, begins 2–4 weeks after fledging and finishes when c. 3 months old (Campbell *et al.* 1997); for further details of sequence of replacement of feathers and timing in n. hemisphere, see BWP. Moult of body rapid by time PMS 20–35, and almost finished when PMS c. 35. In Aust., one collected from Vic. in mid-Feb. had active moult of primaries (PMS 24), tertials and body, but had not yet started moult of tail.

MEASUREMENTS **NOMINATE ARVENSIS (AND POSSIBLY SUBSPECIES SCOTICA):** (1) Vic. and Tas., adult, skins (MV). (2–3) NZ, skins: (2) Adults (NMNZ); (3) Adults, including some from sample 2 (Niethammer 1971).

	MALES	FEMALES	
WING	(1) 110.5 (1.64; 108–113; 6) (2) 107.6 (2.46; 103–111; 11) (3) 109.6 (1.95; 106–112; 14)	102.0 (1.83; 100–104; 4) – 99.1 (95–102; 8)	**
TAIL	(1) 73.0 (5.39; 65–80; 5) (2) 68.9 (1.81; 66–72; 11) (3) 68.5 (2.22; 64–71; 16)	– 63.8 (1.71; 62–66; 4) 61.0 (59–63; 8)	**
BILL S	(1) 15.3 (0.99; 14.2–16.9; 6) (2) 15.5 (0.77; 13.8–16.4; 11)	14.6 (0.72; 13.7–15.4; 4) –	ns
TARSUS	(1) 25.5 (1.55; 22.5–26.8; 6) (2) 24.7 (0.84; 23.4–26.3; 11)	23.8 (1.00; 22.9–25.0; 4) –	*

For extralimital data, see Campbell *et al.* (1997), BWP.

WEIGHTS **NOMINATE ARVENSIS (AND POSSIBLY SUBSPECIES SCOTICA):** (1) Vic., adults, from museum labels (MV). (2–3) NZ, from museum data: (2) Adult males (NMNZ); (3) Adults, including some from sample 2 (Niethammer 1971).

	MALES	FEMALES
(1)	40, 45, 45	34.3, 39
(2)	35.9 (5.91; 23.5–42.7; 12)	–
(3)	40.8 (37.5–46.5; 9)	38.9 (34–51.5; 5)

For extralimital data, see BWP.

STRUCTURE See BWP for details. Juveniles have slightly more rounded tip to wing, with p10 comparatively longer and p3–p6 slightly shorter than in adult.

GEOGRAPHICAL VARIATION Geographical variation in populations from n. hemisphere discussed in BWP. Svensson (1992) considers plumage differences of birds from n. British Isles (subspecies *scotica*) too slight to warrant subspecific separation; he combines them with nominate *arvensis*, but we follow BWP in accepting the subspecies. Taxonomic status of populations in HANZAB region (se. Aust., NZ and Lord Howe I.) not fully resolved. Following largely summarized from DAB. Populations from Aust. and NZ assumed to be nominate *arvensis*, as they were introduced mostly from England. However, source of populations also includes Ireland (subspecies *scotica*) and possibly Germany (Balmford 1978; Long 1981). Within Aust. there is slight variation in tone of plumage: birds from Tas. described as having whiter underparts and greyer-brown upperparts than warmer-brown birds from mainland Aust. and King I.; with Tas. birds said to resemble nominate from central and n. Europe, and birds from mainland Aust. and King I. said to resemble nominate from se. England. Plumage tone of subspecies *scotica* approaches that of populations on mainland Aust. Variation in mainland Aust. populations may therefore be result of different origins of parental stocks (and intergradation between these) or genetic drift from original parental stocks (DAB). Examination of nine skins from Vic. (MV; this study) suggests that at least some variation in tone of plumage may be result of wear; birds with most heavily worn plumage have paler and greyer upperparts than those in least worn plumage. Niethammer (1971) found little difference in plumage or size between adults from NZ and England. However, his data indicates adult males from NZ have shorter Wing ($P < 0.01$) than adult males from Scotland.

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Volume 7 (Part A), Plate 30

Singing Bushlark *Mirafra javanica* (page 1021)

SUBSPECIES WOODWARDII: 1 Adult; 2 Juvenile; 3 Adult

SUBSPECIES HALLI: 4, 5 Adult

SUBSPECIES FORRESTI: 6 Adult

SUBSPECIES SODERBERGI: 7 Adult

SUBSPECIES MELVILLENSIS: 8 Adult

SUBSPECIES ATHERTONENSIS: 9 Adult

SUBSPECIES RUFESCENS: 10 Adult

SUBSPECIES HORSFIELDII: 11 Adult (worn plumage); 12 Adult (fresh plumage); 13 Juvenile; 14, 15 Adult

SUBSPECIES SECUNDA: 16 Adult

Skylark *Alauda arvensis* (page 1039)

17 Adult; 18 Juvenile; 19, 20 Adult