

Order GALLIFORMES

Morphologically similar, though apparently genetically divergent, group of small to large terrestrial birds (though some species arboreal or partly so). Colloquially often referred to as 'gamebirds', because some of the most familiar pheasants, partridges and grouse are important quarry for shooters, or 'gallinaceous birds', because the Domestic Fowl is a characteristic species. Distributed world-wide (except Antarctica).

Six (or seven) families, containing about 250 species in about 90 genera (or 283 species in 75 genera; Sibley & Ahlquist 1990). Only two families occur naturally in HANZAB region: Megapodiidae (megapodes, scrubfowls and brush-turkeys), with about 19 species in six genera, in A'asia, se. Asia, the Philippines and islands of sw. Pacific; and Phasianidae (pheasants, partridges, Old World and New World quail and allies) with about 160 species in 50 or so genera (189 in 46; Sibley & Ahlquist 1990) distributed in n. and s. America, Africa, Eurasia and Asia; only four species of *Coturnix* indigenous to Aust. and NZ, though many other species have been introduced. The other families are: Tetraonidae (grouse) with 17 species in about six genera, confined to n. hemisphere; Meleagrididae (turkeys) with two species in two genera, confined to North America, with one species introduced to Aust. and NZ; Numididae (guineafowl) with 6-7 species in four genera, confined to Africa, with one species introduced to Aust. and NZ (though no definitely feral populations extant); Cracidae (curassows, chachalacas and guans) with 36-50 species in 8-11 genera, confined to Neotropical region.

The families are said to be closely similar in egg-white protein, osteology, immunology and haemoglobins, though the Megapodiidae differ somewhat from other families. DNA comparisons, however, reveal substantial genetic diversity. On the basis of DNA comparisons, Sibley & Ahlquist (1990) placed both Cracidae and Megapodiidae in a separate Order (Craciformes); they also submerged Tetraonidae and Meleagridae within the Phasianidae, and kept New World quail in a separate family, Odontophoridae. The aberrant Hoatzin *Opisthocomus hoatzin* of South America, in the monotypic family Opisthocomidae, has been placed in the Galliformes on the strength of immunological data (Brush 1979) but study of egg-white proteins (Sibley & Ahlquist 1973) and DNA comparisons (Sibley & Ahlquist 1990) show it most closely allied to the Crotophagidae in the Cuculiformes. Here we do not consider Tetraonidae or Cracidae further. History of taxonomic classification of the Order reviewed by Johnsgard (1988) and Sibley & Ahlquist (1990).

Mostly stocky birds with small heads and short broad wings. Flight, generally fast and low but not sustained and no species are long-distance migrants except the European Quail *Coturnix coturnix*. Eleven primaries (including remicle), curved; 9-20 secondaries; eutaxic, except Megapodiidae; 8-32 rectrices. Bill, heavy at base with curved culmen, usually shorter than head. Nostrils often partly covered by operculum; holorhinal; nares, impervious. Two carotids, except in Megapodiidae. Brightly coloured bare skin, wattles or combs on head in many species. Legs, short, powerful with heavy toes; hind toe present and spurs on tarsus in some. Oil-gland, varies, usually feathered; naked or with short tuft in Megapodiidae; absent in some. Crop, large; gizzard, powerful; caecae, well developed. Syrinx rather simple; tracho-bronchial. Feathers with long aftershaft; down on apteria only.

Clutch-size usually large; 6-15; up to 34 in Malleefowl. Young of most families, downy when hatched; Megapodiidae probably hatch in juvenile plumage (for discussion, see introduction to that Family); precocial, nidifugous. Most species able to fly soon after hatching (3-15 days) but some megapodes can fly almost immediately, though usually only weakly; all can fly strongly before fully grown and before post-natal moult finished. Post-juvenile moult starts within 1 month of hatching and before post-natal moult finishes; complete, or nearly so, outer 2-3 outer primaries and primary coverts retained in most species. Adult post-breeding moult complete, primaries outwards or serially outwards; moult of tail varies between families. Partial pre-breeding moult in many species.

Many species of galliforms have been introduced throughout the world (Long 1981; Westerskov 1990). In Aust. and NZ, most introductions have failed to establish or maintain feral populations; these are treated separately and briefly under the heading 'Failed introductions' at the end. Species with established feral populations are treated in the normal way.

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Plate 28

Malleefowl
Leipoa ocellata (page 331)
1 Adult
2 Juvenile, at hatching
3 Immature
4 Adult

Orange-footed Scrubfowl
Megapodius reinwardt (page 323)
5 Adult
6 Juvenile, at hatching
7 Immature

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- Brush, A.H. 1979. *Biochem. Syst. Ecol.* 7: 155–65.
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Family PHASIANIDAE pheasants, partridges, quails, and allies

Small to large gamebirds; c. 140 species in c. 45 genera (189 in 46; Sibley & Ahlquist 1990), of which only four species of *Coturnix* indigenous in our region (one extinct); many species have been introduced to our region with five species in five genera, extant. New World (American) quail restricted to Americas; distribution of rest of Family centred in e. Himalayas and se. Asia; rather few species and genera spread W to Africa, N to central Asia and Europe, and S to Aust. and NZ, barely extending beyond the Greater Sunda Is. On the basis of DNA comparisons, Sibley & Ahlquist (1990) submerged the Tetraonidae and Meleagridae within the Phasianidae; they also placed the New World quail in a separate family, Odontophoridae. Morphologically similar to other families in Order, though usually lacking specializations found in other families, such as pectinate claws and feathered tarsi (Tetraonidae), bare heads, bony helmets and fleshy wattles (Numididae), bristles on breast and bare heads and fleshy wattles (Meleagrididae); less adapted to arboreal life than Cracidae. The family is absent only from polar regions, parts of South America and oceanic islands.

New World (American) quail (usually regarded as a sub-family Odontophorinae or put in a separate family Odontophoridae) are small to moderately sized, compact gamebirds; possibly originated in forests of Central America (Johnsgard 1988). About 30 species in nine or ten genera, of which two, *Colinus virginianus* and *Lophortyx californica*, have been introduced to our region, only the latter extant. Similar to partridges and Old World quail, differing in serrated tomium of lower mandible and lacking spurs. Sexes mostly alike in plumages or differing only slightly. Often with crest on head. Bill, short and stout, rather high. Nostrils, bare. Rectrices, 10–14; tail-moult, centrifugal. No species undertake long migrations though *Oreortyx* undertake seasonal altitudinal movements (Johnsgard 1988). Typically monogamous; gregarious when not breeding, in coveys or flocks.

Partridges (including francolins) and Old World quail are small to moderately sized (15–35 cm long), generally brownish birds with short tails. About 106 species in 20 genera distributed in se. Asia, through Himalayas and central Asia to w. Palaearctic and Africa; *Coturnix* extending to Aust. and NZ. Sexes generally similar but usually distinguishable by plumage. Few species have spurs. Rectrices, 8–22; moult of tail, centrifugal. Typically live in open grassy, semi-arid or agricultural land. Fly fast and low but not far, with burst of wing-beats at take-off and then alternate gliding and flapping. Free-striding gait; well adapted for running. Outside breeding season live in coveys or flocks.

Pheasants and their allies (tragopans, monals, peafowl, junglefowl) are generally larger than partridges and have long tails. About 50 species in 16 genera. Males are often brilliantly and spectacularly plumaged, differing strongly from the drab females. Males distinguished by spur. Rectrices, 14–32; moult of tail, centripetal. Usually live in wooded habit, roosting in trees. Walk with high-stepping stately gait and run easily with tails held high. Flight, strong but usually only for a few hundred metres; take off with loud wing-beats and in longer flights whirring of wings maintained; often with the ability to rise sharply upwards out of thick woods and scrub. Sedentary, living in loose groups rather than forming coveys; sexes separate outside the breeding season in some species. Many species are not monogamous (Johnsgard 1988).

Habitats vary from arid or semi-desert regions through tropical forests and temperate woodlands to high mountain tops. Particular species and genera are confined to, or prefer, tropical rainforest, woodlands, scrublands, edges of woodlands and forests, open plains, pasturelands and near-deserts. In general, sedentary; only *C. coturnix* of Europe and Africa subject to long migrations. Pheasants typically perch and roost in trees but forage on ground in open areas, where partridges both feed and roost; some pheasants feed in bushes or in the lower parts of trees. Most phasianids are omnivorous, eating roots, tubers, bulbs and other parts of plants such as seeds and fruit, as well as worms, snails, grubs and insects. Bill, feet and claws well adapted for digging and scratching.

Often gregarious but species of woodlands and forest less so than those of open country. In most species with little sexual differences in plumage, pair-bond monogamous, perhaps long-lasting. In strongly dimorphic species, harem polygamy or promiscuity prevalent. In monogamous species, males establish territories and defend them with help from mate. In polygynous species, males hold territories and display within them, in some species at traditional cleared sites or courting grounds. In all species, advertisement by male has a strong vocal accompaniment, sometimes with whirring of wings. Lateral circling display is widely, if not always, used in courtship but among polygamous species may often be replaced by frontal displays in which erection, spreading and shivering of wings, tail or tail-coverts is used. Courtship feeding by several methods is widespread. Voice, especially in large species, is loud, far-carrying and consists of simple crowing, howling, hooting, cackling or whistling. Some pheasants liable to call and whirr wings on hearing a loud noise. True bathing in water does not take place; instead, dusting in one way or another widespread. Birds pant to cool themselves. At rest, squat with head drawn into shoulders and tail drooped in species with long tails. Yawn; scratch head directly.

Breed seasonally. Nest on ground, in open, in shelter, or rocks and vegetation, or in dense cover. Usually female makes simple scrape, often lined with grass, leaves and debris collected from nearby by throwing material sideways. Eggs, oval; smooth, glossy; off-white to brown, immaculate or lightly spotted. Clutch-size, large (7–16) except in a few forest species that lay only 2–8 eggs. Usually single brooded but female may lay at two sites, one clutch for male and another for herself, in *Alectoris rufa*. Replacements laid after loss of eggs. Laying interval, 1–2 days. Incubation by female alone, except for

A. rufa as above, so far as is known. Incubation period, 17–28 days, beginning with last egg of clutch. Hatching synchronic; young, precocial, nidifugous, hatched in down; self-feeding or occasionally fed when first hatched, bill to bill, or shown food by female. Tended by female or by both parents. Injury-feigning and distraction displays may or may not be given. Young can generally fly when 7–12 days old but are not fully grown till 20–60 days old.

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- Sibley, C.G., & J.E. Ahlquist. 1973. *Phylogeny and Classification of Birds*. Yale Univ. Press, New Haven.

Coturnix ypsilophorus Bosc, 1792, *J. Hist. nat. Paris* 2: 297 and Pl. 39 — no locality; Tasmania *vide* Mathews.

Ypsilophora combines the Greek for the letter 'upsilon', the Greek letter 'u', and φορέειν, to bear or carry; referring to the Y- or V-shaped marks on the plumage.

OTHER ENGLISH NAMES Partridge, Sombre, Sordid, Northern, Greater Brown, Swamp, Tasmanian or Silver Quail, Swamp Partridge, Tasmanian Swamp Quail.

POLYTYPIC Nominate *ypsilophora*, Tas.; *australis* (Latham 1801), Aust. mainland; *raaltenii* (Müller, 1842), Lesser Sunda Is: Flores, Alor, Wetar, Dao, Doö, Roti, Timor, Kisar, Leti, Moa, Luang; *pallidior* (Hartert, 1897), Lesser Sunda Is of Sumba, Sawu; *saturator* (Hartert, 1930), lowlands of n. New Guinea; *dogwa* (Mayr & Rand 1935), lowlands of s. New Guinea; *plumbeus* (Salvadori, 1894), lowlands of e. New Guinea; *mafulu* (Mayr & Rand, 1935), s. slopes of se. New Guinea; *lamonti*, (Mayr & Gilliard, 1951), mid-mountain areas of Central Highlands; *monticola* (Mayr & Rand, 1935), alpine areas of se. New Guinea.

FIELD IDENTIFICATION Length 17–22 cm; wingspan 26–36; weight 90–120 g. Large plump rather uniformly dark quail, with slightly decurved bill; similar in size to Stubble Quail *Coturnix pectoralis* though wings broader and more rounded at tip. Dense wavy black barring on underparts; in flight, appear large and uniformly dark. Sexes differ; male has brown and, rarely, grey morphs (see Plumages, Moults for details); only brown morph considered below; female resembles brown-morph adult male. No recognizable seasonal variation. Juvenile separable.

Description Adult male Mainland Aust. Crown and nape, mid-brown to reddish brown with fine black markings, heaviest at sides, and bold narrow creamy median crown-stripe; indistinct thin creamy lateral crown-stripe in some. Forehead and sides of head, mid-brown through reddish brown to ashy grey, giving rather plain-faced appearance with diffuse dusky spot on ear-coverts and short dusky moustachial stripe; sides of neck, as sides of head but finely speckled black. Rest of upperparts and inner wing-coverts, mid-brown to reddish brown with fine wavy black barring, white shaft-streaks and varying ashy-grey streaking, sometimes forming broad silvery streaks or lines. Upper secondaries strongly barred and vermiculated brown or reddish brown, matching general tone of coverts; primaries and primary coverts, plainer dark grey-brown. Chin and throat, cream. Rest of underbody, rich buff to reddish brown with fine wavy black barring and inconspicuous thin white shaft-streaks. Underwing, pale ashy-grey. In flight, appear rather uniformly dark, with diffuse fine pale streaking on rich-brown to brighter reddish-brown upperparts; upperwing appears uniform in colour and pattern with rest of upperparts (no pale panel cf. button-quails). Bill, blue-grey tipped black. Iris, orange-red to brownish red. Legs and feet, orange-yellow. Tas. form slightly larger, with pale-yellow, not reddish, iris; no rufous males. **Adult female** Like adult male but

with larger, bolder black markings (blotches) on upperparts, producing coarser, more chequered pattern; crown-stripes more prominent; sides of head and neck, duller buffish and more clearly speckled black; underparts have coarser black barring; heavier black markings also make white streaking more prominent throughout. In flight, appear duller brown above than male, with black blotches obvious in close view, giving distinctly more patterned appearance. **Juvenile** When fully grown, like adult female but spotted rather than barred below (except on flanks), with much bolder and conspicuous white streaking on foreneck, breast, upper belly and flanks.

Similar species Only large quail with barred underbody; call diagnostic. In flight, distinguished from button-quails by rather uniformly dark appearance, uniformly dark upperparts without any trace of pale wing-panel, longer and more pointed wings. In flight, **Painted Button-quail** more patterned above: mostly rufous-brown with noticeably greyer rump and tail, and distinct paler panel on central inner wing-coverts. In flight, can also be confused with **Stubble Quail** (q.v.) and **King Quail** *Coturnix chinensis*; latter much smaller, darker and more uniform above, lacking conspicuous black blotching of female Brown, and diffuse silvery streaking of male Brown; much less noise of wings when flushed.

Singly, in pairs, or coveys of up to 30 (occasionally 100+) when not breeding; in dense rank vegetation of low-lying swampy ground, grassy woodlands, or agricultural land. More difficult to flush than Stubble Quail, preferring to squat rather than fly. When disturbed, move rapidly in spurts, bounces and bounds. When flushed, explode noisily from cover with whistling or metallic whirring of wings and quick call, individual birds often exploding in different directions; tend to rise almost vertically from cover to perhaps 1–2 m before setting off in horizontal or

gently sloping flight to ground; vertical take-off said to be characteristic but apparently depends much on habitat and can be matched by other quail; also have direct take-off and stay low, as in Stubble Quail. Fly strongly, gliding between bursts of whirring; slope down and plunge into cover, wings held high and clear of vegetation, cf. brake-and-drop method of Stubble Quail. Call a diagnostic loud ascending two-noted whistle, rising at end and uttered at frequent intervals; often heard early morning, late afternoon and at night. When flushed, give sharp chirp or quick, rather fluty, chatter (cf. Stubble Quail usually silent).

HABITAT Shrublands and grasslands of tropical and temperate Aust. and NZ.

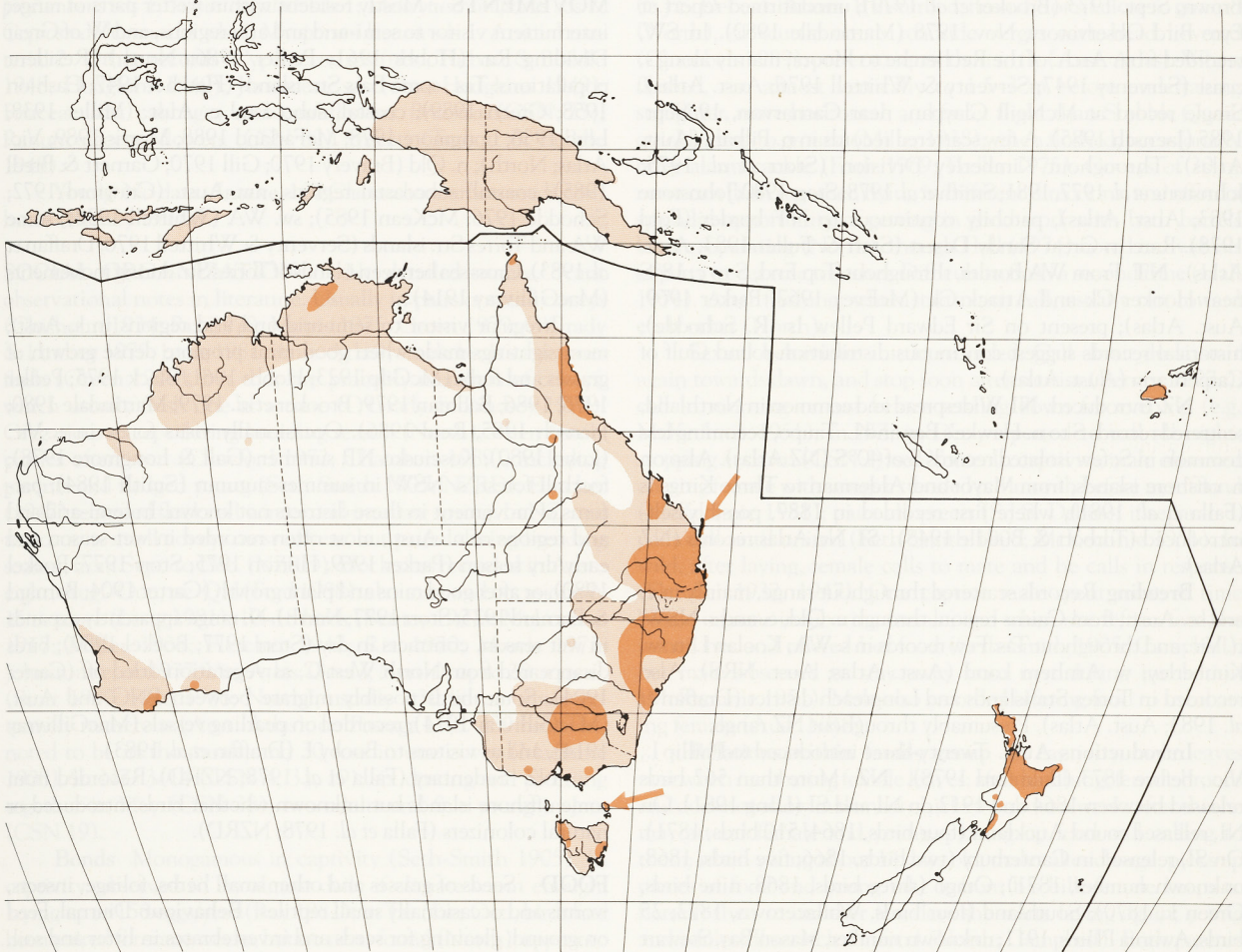
Aust. Mainly in well-watered districts, but far inland in wet years. Particularly in tall rank ground vegetation of grass, ferns, shrubs, herbs or mixture thereof, over damp or swampy ground: grassland, cereal crops or stubble, leafy crops, heath, bracken *Pteridium esculentum*, and stands of reeds, rushes or sedges fringing freshwater wetlands or on floodplains (Chisholm 1934; Miller 1938; Sedgwick 1964; Bravery 1970; Crawford 1972; Pedler 1975, 1986). Rank roadside vegetation may provide suitable habitat when adjacent paddocks cultivated or browsed short by livestock (L. Pedler). Move into ephemeral grasslands formed after flooding (Reid 1986). Trees may or may not be present, but canopy must be open enough to allow growth of undergrowth; occur in woodland, coastal scrub, orchards, even tall forest on mountain ridges (Crawford 1972; Fielding 1978; Longmore 1978; Boekel 1980; Smith 1984; Woodall & Geeves 1989); avoid dense forest,

but may use dense shrubby regrowth up to 7 years after clear-felling (Loyn 1980; Wilson 1981). In subtropical heath at Cooloola, Qld, benefit from frequent fires; most common ≤ 2.5 years after fire, when heath contains grassy areas with abundant seed (McFarland 1988). Occur on offshore islands, in s. Aust. especially in tussock-grass *Poa*, and on cays (Cashion 1958; Smith 1977; Abbott 1982).

NZ Habitats in NI and offshore islands similar to those in Aust.: grassland, including alpine tussock grassland to ≥ 1000 m asl, shrubland and swamp vegetation. Also regular in beds of rush and saltmarsh along seashores, perhaps more so than in Aust. (Hodgkins 1949; Falla *et al.* 1981; Ogle 1987).

Breed throughout range. Terrestrial; foraging, nesting and roosting on ground; occasionally perch on wheat stems to take seed from heads (Miller 1938). Usually keep to dense cover, but may land in open when flushed. Fly reluctantly when disturbed, rarely high or far, but capable of sustained flight during movements.

In Aust., may have declined in some areas, increased in others, depending on balance between benefits of clearing, establishment of pasture and crops, irrigation and logging, and detrimental effects of wetland drainage, clearing, burning and increased salinity (Miller 1938; Bravery 1970; Aust. Atlas). Backwaters of artificial wetlands rapidly colonized. Grazing by feral and domestic stock reduces height, density and seed production of ground vegetation, and probably detrimental; in Darwin area, NT, do not use sedge-swamps heavily grazed by buffalo (Crawford 1972). In NZ, probably most abundant in late 1800s, when partial clearing



produced mosaic of pasture, weeds and shrubby growth; since then, intensive cultivation or reversion to second-growth forest has reduced suitable habitat (Adams 1970).

DISTRIBUTION AND POPULATION Throughout Lesser Sundas, New Guinea and n., e., se. and sw. Aust. Introduced to NZ and Fiji.

Aust. Qld Scattered records from Gulf Country, w. C. York Pen. and Torres Str. islands. Mainly in E from Torres Str. to se. regions, and W to w. slopes of Great Dividing Ra. In N, rarely, inland to Mt Isa, Taldora Str and Glenora (Horton 1975; Ford 1988; Qld Bird Rep. 1983; Aust. Atlas); in central regions, inland to Longreach area (Aust. Atlas) and Mitchell in S (Qld Bird Reps 1985, 1986). **NSW** Mainly in E, to w. slopes of Great Dividing Ra., nw. Plains and Riverina; few records in far W. Most numerous in NE (Morris *et al.* 1981; Aust. Atlas; NSW Bird Rep. 1984). **Vic.** Widespread and locally common in suitable habitats (Vic. Atlas). **Tas.** Widespread and locally common in some areas; mainly in e. and coastal regions. Also Furneaux Grp (McGarvie & Templeton 1974; Thomas 1981; Tas. Bird Rep. 3). Rare or accidental on King I. (R.H. Green). **SA** Rare. Records generally in E: from Peake Ck in L. Eyre drainage basin, S to Naracoorte, and W to Eyre Pen. (Badman 1979; Aust. Atlas; SA Bird Reps 1970–71, 1975). Since 1974, 24 published records (Black 1975; Pedler 1975, 1976, 1986; Badman 1979; Reid 1986; SA Bird Reps 1975, 1977–81; Aust. Atlas); also two unpublished records: 1988 in Cantarra, The Coorong, and 1990 in Clare, n. SA (L. Pedler). **WA** Status on Nullarbor Plain not known: recorded near L. Brown, Sept. 1973 (Brooker *et al.* 1979); unconfirmed report at Eyre Bird Observatory, Nov. 1978 (Martindale 1980). In SW, recorded from Arch. of the Recherche to Moora, mainly along s. coast (Serventy 1947; Serventy & Whittell 1976; Aust. Atlas). Single record at McNeill Claypan, near Carnarvon, 19 Sept. 1985 (Jaensch 1985). A few scattered records in n. Pilbara (Aust. Atlas). Throughout Kimberley Division (Storr *et al.* 1975; Johnstone *et al.* 1977, 1981; Smith *et al.* 1978; Storr 1980; Johnstone 1983; Aust. Atlas), patchily continuous to NT border (Ford 1978). Rare in Great Sandy Desert (Start & Fuller 1983; Aust. Atlas). **NT** From WA border, throughout Top End, S to c. 18°S near Hooker Ck and Attack Ck (McEvey 1967; Parker 1969; Aust. Atlas); present on Sir Edward Pellew Is (R. Schodde); historical records suggest continuous distribution round Gulf of Carpentaria (Aust. Atlas).

NZ Introduced. **NI** Widespread and common in Northland, scattered records S to n. Hawke's Bay and L. Taupo, becoming less common in S; few isolated records S of 40°S (NZ Atlas). Also on n. offshore islands, from Mayor and Alderman to Three Kings Is (Falla *et al.* 1981), where first recorded in 1887, possibly self-introduced (Turbott & Buddle 1948). **SI** No Atlas records (NZ Atlas).

Breeding Records scattered throughout range, mainly in e. and se. Aust., from Cairns region, through e. Qld, e. and s. NSW, n. Vic. and throughout Tas. Few records in s. WA; Koolan I. in sw. Kimberley; w. Arnhem Land (Aust. Atlas; Aust. NRS). Also recorded in Torres Str. islands and Longreach district (Draffan *et al.* 1983; Aust. Atlas). Presumably throughout NZ range.

Introductions Aust. Twenty-three introduced to Phillip I., Vic., before 1873 (Balmford 1978). **NZ** More than 562 birds released between 1864 and 1912 on NI and SI (Long 1981). On NI, released round Auckland (four birds, 1864; 510 birds, 1871). On SI, released in Canterbury (two birds, 1866; five birds, 1868; unknown number, 1871); Otago (three birds, 1868; nine birds, Green I., 1870); Southland (four birds, Wallacetown, 1872; 25 birds, Awarua Plains, 1911; unknown number, Mason Bay, Stewart

I., 1912) (Long 1981). Also successfully introduced to Fiji (date unknown; Aust. CL; Long 1981); established on Viti Levu and Vanua Levu (Blackburn 1971).

Irruptions After favourable seasons, may irrupt into regions beyond normal range (Pedler 1986). In 1974–75, many records in e. SA, after good seasons in e. Aust. (Black 1975; Pedler 1975, 1976; Badman 1979; SA Bird Rep. 1975). Another possible influx into SA in 1984 in similar conditions (Pedler 1986; Reid 1986). Historical records suggest that numbers and range inland fluctuate, e.g. Western Deserts (Aust. Atlas), appearing only after rains (Carter 1904; Storr 1977). Opportunistic breeding may occur in suitable conditions (Pedler 1986). Miller (1940) suggested that increased numbers following good seasons resulted from increased breeding activity alone.

No measures of abundance. May have declined in se. Aust. this century and in NZ since late 1800s (when probably most abundant) because habitat modified (Adams 1970; Frith 1973; Ford & Howe 1980). Nests sometimes destroyed by farm machinery (Hyem 1936; Tas. Bird Rep. 15). May feed on roadsides (Black 1975; Pedler 1976; Longmore 1978; Ogle & Cheyne 1981; CSN 19, 34), where sometimes struck by vehicles (Whittell 1938). Occasionally feed on grain spilt along railway tracks (Lord 1956); may feed with poultry (Fletcher 1947; Green & Mollison 1961). Shot during open season in NSW, Qld and Tas. (Robinson & Brouwer 1989), but not as popular as Stubble Quail (Miller 1935, 1938; Lord 1956). Sometimes eaten by feral cats (Lord 1956; NSW Bird Rep. 1980; Tas. Bird Rep. 10).

MOVEMENTS Mostly resident within wetter parts of range; intermittent visitor to semi-arid and arid regions, and W of Great Dividing Ra. (Hobbs 1961; Pedler 1986; North). Resident populations: Tas., some Bass Str. islands (Fletcher 1947; Cashion 1958; Green 1989); coastal, subcoastal e. Aust. (Miller 1938; Lord 1956; Longmore 1978; McFarland 1988; Morris 1989; Vic. Atlas; North); n. Qld (Bravery 1970; Gill 1970; Garnett & Bredl 1985); coastal, subcoastal regions, nw. Aust. (Crawford 1972; Schodde 1976; McKean 1985); sw. WA (Whittell 1938); some WA and Torres Str. islands (Serventy & Whittell 1976; Draffan *et al.* 1983). Cross sea between islands of Torres Str. during movements (MacGillivray 1914).

Irregular visitor to semi-arid and arid regions in s. Aust.; most sightings made when good rains promote dense growth of grasses and forbs (McGilp 1923; Hobbs 1961; Black 1975; Pedler 1976, 1986; Badman 1979; Brooker *et al.* 1979; Martindale 1980; Jaensch 1985; Reid 1986). Occasionally visits forest in e. Vic. (Loyn 1980); Kosciusko NP, summer (Gall & Longmore 1978); foothill forest, s. NSW in summer–autumn (Smith 1984); patterns of movement in these districts not known. In semi-arid and arid regions of n. Aust., most often recorded in wet season and early dry season (Parker 1969; Horton 1975; Storr 1977; Boekel 1980), or after good rains and plant growth (Carter 1904; Barnard & Barnard 1925; Storr 1977; North). N. range apparently expands in wet season, contracts in dry (Storr 1977; Boekel 1980); birds disappeared from North West C. as vegetation dried off (Carter 1904). Some birds possibly migrate between PNG and Aust. (MacGillivray 1914); recorded on pearling vessels (MacGillivray 1914), and as visitors to Booby I. (Draffan *et al.* 1983).

NZ Sedentary (Falla *et al.* 1978; NZRD). Recorded from some offshore islands but unknown whether birds introduced or natural colonizers (Falla *et al.* 1978; NZRD).

FOOD Seeds of grasses and other small herbs, foliage, insects, worms and occasionally small reptiles. **Behaviour** Diurnal. Feed on ground, gleaning for seeds and invertebrates in litter and soil.

In Melbourne, take seeds and grasshoppers in spring and summer; clover leaves and soft green food in autumn (North).

Adult No detailed studies. **Aust.** (crops unless stated).

Plants Green leaf (1.25 cm) (Rounsevell 1978); vegetable matter (Berney 1907b); seeds (McLennan 1917; Lord 1956; obs., Cashion 1958; McEvey 1967; Hall 1974; North; Mathews); Poaceae: grass sds (Berney 1907a; Hill 1911; Barnard 1914; Lord 1956; Rounsevell 1978); *Triticum* sds (Fletcher 1947); *Dactyloctenium radulans* sds; *Digitaria* sds; *Oryza sativa* sds; *Panicum* sds; *Stipa* sds (Barker & Vestjens); *Paspalum dilatatum* sds; *Lolium* sds; *Digitaria sanguinalis* sds (Rose 1973); *Chionachne barbata* (Berney 1907a); *Alternanthera* sds (obs., Reid 1986); *Trifolium* lvs; *Rubus vulgaris* sds; Asteraceae: thistle sds (Berney 1907b); *Tagetes* (Rose 1973); *Arctotheca calendula* sds; Malvaceae: sds; *Acacia*; *Calandrinia calypttrata* (Barker & Vestjens). **Animals** *Deroceras reticulatum* (Rounsevell 1978); isopods (Rose 1973). Insects: *Locusta* (Hill 1911); *Gastrimargus musicus* (Rose 1973); Tettigoniidae (Rose 1973); Acrididae/Tettigoniidae (Berney 1907a; North); *Nysius vinitor* (Barker & Vestjens); Cicadellidae: Jassinae (Green 1966); Coleoptera (Berney 1907a): Chrysomelidae (Barker & Vestjens); Dynastinae: *Heteronychus arator* (Rose 1973); Diptera: larv.; Lepidoptera: ad., larv. (Barker & Vestjens); *Coleophora alcyonipennella* pupae (Green 1966). Reptiles: gecko (7.5 cm) (Hill 1911). Sand (McLennan 1917). Observations in captivity in Miller (1938).

NZ On **Three Kings Is** (seven stomachs; Turbott & Buddle 1955): Plants: *Carex testacea* sds, recorded in five stomachs; *C. virgata* sds 1; *C. lucida* sds 1; *Bromus mollis* sds 1; *Deyeuxia* sds 1; *Solanum nigrum* sds 3; *Dianella intermedium* sds 1; *Haloragis procumbens* sds 1; *Sicyos angulata* sds 1; *Melicytis ramiflorus* sds 2; *Coprosma rhamnoides* sds 1; *Myoporum laetum* sds 1. Animal material 2. **Other records** Cyperaceae sds (obs., Turbott & Buddle 1948; Hodgkins 1949); Juncaceae sds (obs., Hodgkins 1949); Poaceae sds; cabbages and cauliflowers *Brassica* (CSN 23); Ranunculaceae: flowers (CSN 32). Insects (Turbott & Buddle 1948).

Young No data. **Intake** 100 *Chionachne barbata* seeds with husks (Berney 1907a).

SOCIAL ORGANIZATION No detailed studies. Scant observational notes in literature. Usually in pairs or small coveys (Chisholm 1934; Rix 1970; Morris 1975; Green 1979; O'Grady & Lindsey 1979; Long 1981; Aust. Atlas); single birds sometimes flush (Green 1979), but they are probably members of coveys, which usually flush one at a time (O'Grady & Lindsey 1979). Gregarious except during breeding season (North), when family parties often seen (Crawford 1972; Chambers 1989), including parents and fledged young (Seth-Smith 1905; NZRD); Fletcher (1947) recorded flocks all winter and into late spring. In NZ, said to occur in small coveys most of year, but paired during breeding season, from Sept. to Dec. (NZRD). Flock sizes recorded in Aust.: eight, Aug.–Oct., ne. Qld (Ford 1988); about six and occasionally 15 or more (Long 1981); 10–18 birds (Berney 1907a; McLennan 1917; Miller 1938; Fletcher 1947; Rix 1970; Morris 1975; Johnstone *et al.* 1977; Vic. Atlas; Gould; North); up to 20 or more (Storr 1980; Reid 1986; North); usually <30 but at times extremely numerous (Aust. Atlas); on Passage I. (c. 200 ha), Tas., noted to be in thousands, and 30 rose in one covey (Maclaine 1908). In NZ: 3–14 (CSN 4, 31, 19); six dusting and preening together in May (CSN 38); two adults and five young in Jan. (CSN 19).

Bonds Monogamous in captivity (Seth-Smith 1905). In captivity, observed to lay almost daily if climate warm enough, laying up to 150 eggs/year (Ray 1982); in Tas., late Oct., birds had been paired for some weeks, but no nests found (North); appear to

separate into breeding pairs in Dec.; in pairs and appears to be breeding in Jan. (Mathews). **Parental care** Incubation by female only; male guards nest; both parents brood and rear chicks; fledged chicks usually stay with parents during autumn and winter (Seth-Smith 1905; McKechnie 1951; NZRD; Campbell). In captivity, when young hatch female mainly looks after them; some males help but others known to kill their young (Ray 1982); also see Relations within family group.

Breeding dispersion Flocks kept to own range all winter and into late spring (Fletcher 1947).

Roosting Pair roosted at night in nest before eggs laid; siblings, when 70 days old, still roosted in open in circular formation with tails pointing inwards (McKechnie 1951).

SOCIAL BEHAVIOUR No detailed studies; studied in captivity by Seth-Smith (1905), McKechnie (1951), Ray (1982), Pyle (1990) and S.J.S. Debus. Particularly active towards evening, when call more often (Cashion 1958). In captivity, easily desert eggs if disturbed (Ray 1982); will allow preening by King Quail (S.J.S. Debus). Small coveys dust-bathe together (Campbell; CSN 38).

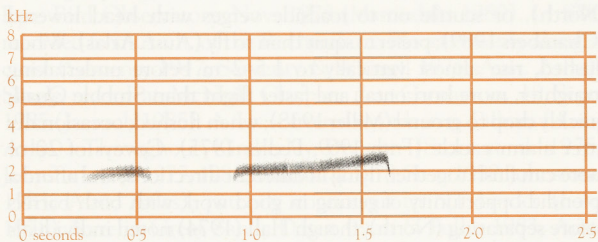
Agonistic behaviour In captivity, adults aggressive towards other adults of same sex (S.J.S. Debus); pair may become aggressive when nesting (Pyle 1990); male may kill female put into same enclosure (Ray 1982); males will quarrel among themselves (North). In captivity, when chasing conspecifics, use TURKEY DISPLAY similar to that of King Quail, raising feathers of body, drooping wings toward ground, and charging with head lowered (S.J.S. Debus). **Alarm** If disturbed, flush, lie or sit close to ground (North), or scuttle on to roadside verges with head lowered (Chambers 1989); prefer to squat than to fly (Aust. Atlas). When flushed, rise almost vertically to 1.5–2 m before undertaking straighter, more horizontal, and faster flight than Stubble Quail; quickly drop to ground (Miller 1938); when flushed, occasionally utter alarm cackle (Frith 1969; Pedler 1975). Coveys of 20 or more can flush together, flying in different directions, and afford a splendid opportunity of getting in good work with both barrels before separating (North), though Hall (1974) noted individuals of party never rose together. Difficult to flush a second time (Hall 1974). After flushing, when starting to call, usually run toward each other (North).

Sexual behaviour Little recorded. Call about dusk, start again towards dawn, and stop soon after sunrise (Berney 1907a); call in morning or just before settling down for evening (e.g. McKechnie 1951); in NZ, in Dec., reported to call all night, stopping at dawn (CSN 1); see Voice. In captivity, male observed chasing female with wings extended c. 1 month before nest found (McKechnie 1951); pairs allpreen (S.J.S. Debus); if separated, pairs call until united (Seth-Smith 1905; McKechnie 1951). In wild, after laying, female calls to mate and he calls in response (Fletcher 1932, 1947). One captive male spent most of time beside or near incubating female, and when she left to feed, he joined her and offered her food (Seth-Smith 1905; Campbell), but male observed to stay away from nest during incubation (McKechnie 1951). Male also recorded offering food to incubating female (Aust. NRS).

Relations within family group In captivity, male leaves nest when incubating female leaves; after hatching, female broods and does not allow male near chicks for about a week; after this he may attend female and young, picking up food and calling to them; when young about 14 days old, male takes charge, picks up pieces of food and young take it from his bill; female keeps to herself, then in another few days she starts laying again; young and adults all scratch for food (North; Campbell). Both parents

brood and help to feed young after hatching *contra* North and Campbell; feeding not bill to bill, but parent picks up food, calls chicks, then drops food; young wander much farther from parents than other quail; if disturbed, parents recall young with soft clucking (McKechnie 1951). **Parental anti-predator strategies** Parents remain near young even if disturbed (Pedler 1986). Adults reported to distract intruders (Aust. NRS), and female noted to charge with feathers raised (Campbell; North). Fledged chicks usually remain with parents during autumn and winter (NZRD).

VOICE Anecdotal information only; no detailed studies. Presence indicated by two-note whistle, rising in pitch, with first note shorter and softer. Calls more frequent and persistent towards evening (Hyem 1936; Cashion 1958); often heard in early morning and evening (Campbell & Barnard 1917; Lord 1956). Calling said to begin just before sunset, lapsing into silence towards midnight; starts again as daylight approaches, eases off near sunrise, and stops shortly after (Berney 1907a). Calls repeated a few times every 5–10 min for most of day on two days in each of Nov. and Jan. (Pedler 1975). Captive pair quieter during period when brooding and feeding chicks (McKechnie 1951). Calling bird may seem closer than it is (Pedler 1976). Two-note call not heard in shooting season when ordinary cry a sharp chirp (Mathews). Other calls include chattering, shrieks, clucking, churring and mewing. Sexual and individual differences not known. Calls of subspecies *ypsilophora* said to be deeper than *australis* (Lord 1956). **Non-vocal sounds** Loud whirr of wings when flushed (Bravery 1968; Pedler 1975).



A R. Buckingham; captive, Melbourne, Vic., Sept. 1980; P35

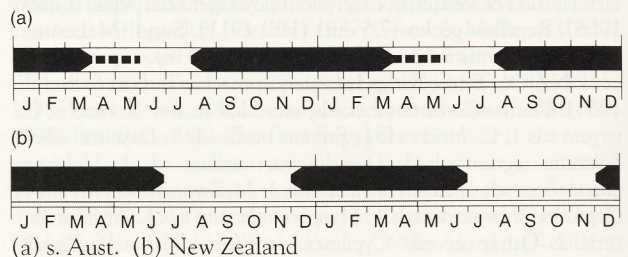
Adult **TWO-NOTE WHISTLE:** rising in pitch, first note shorter and softer; whistled *f-weep*, *tu-eeeeee* or *gop-war bee-quick*, *bee-quick* (White 1922; Pedler 1975; Mathews); see sonagram A. Sometimes loud and sharp, often rather plaintive (White 1922). After laying, female whistles to locate mate (Fletcher 1932, 1947). In captivity, if pair separated, call until reunited (Seth-Smith 1905; McKechnie 1951). **CHIRP:** sharp *chirp* usual cry during shooting season (Mathews); squeaky chirping calls in flight when flushed (Pedler 1975); call likened to cheep of young Domestic Fowl when flushed (Hall 1974). **CHATTER:** quick, rather fluty chattering when flushed (Pizzey 1980). **SHRIEK:** given when flushed (Fletcher 1939). **CLUCKING:** in agitation when disturbed with young (Pedler 1986); in captivity, adults cluck to recall wandering chicks (McKechnie 1951). **CHURRING:** strong churring given by female with young during distraction display (Bravery 1968). **MEWING:** a 'peculiar note' from captive bird first mistaken for mewing of kitten (Mathews).

Young In captivity, young first noted calling strongly when nearly full grown; usually called just before settling down for night or before moving off in morning (McKechnie 1951).

BREEDING Not well known; no major studies. Information from standard references, and from captivity; 36 records in Aust.

NRS up to Nov. 1991. May arrive in an area after rains, breeding in large numbers, and raise several broods in a season when conditions suitable (Miller 1938; North).

Season Aug. to Jan. in s. Aust., but may raise up to four broods in a season, with eggs and young common from Mar. to May (North; Aust. NRS); 2–4 months later in n. Aust. **Aust.** NT: eggs, Jan., Feb. (Le Souëf 1903; Crawford 1972), female with developed egg in May (Barnard 1914); young, early Mar. to late June (Crawford 1972; Aust. NRS). Qld: in N, Oct.–July (Campbell & Barnard 1917; Bravery 1963; Gill 1970; Aust. NRS; Aust. Atlas); breed in all months (Lavery *et al.* 1968); in S: Aug. to late Apr. (Aust. NRS; Aust. Atlas). NSW: begins early Aug.; may raise numerous broods in a season with second or third broods hatching Mar.–May (Hyem 1936; North; Aust. Atlas; Aust. NRS). Vic.: Sept. to late Apr. (Mattingley 1902; Miller 1938; McCulloch 1973; Aust. NRS). Tas.: mid-Nov. to mid-Feb., but young also in mid-Mar. and early May (Cashion 1958; North; Aust. NRS; Aust. Atlas). SA: young, early Dec. (Pedler 1986; Aust. NRS). WA: eggs, early Aug. to mid-Sept.; young, mid-Aug. to early Nov. (Carter 1904; Aust. NRS). **NZ** Eggs and young recorded Dec.–June (Ogle 1987; CSN 3, 20, 22, 23, 33).



(a) s. Aust. (b) New Zealand

Site On ground; in dense grass, rushes, thick ferns, lignum or at edge of dense shrubs, sheltered by tussock of grass or low shrub, in rank grassland in eucalypt woodland 2 months after being burnt, in area of bracken, c. 1 m tall, and wattle disturbed by plough (Bravery 1963; O'Grady & Lindsey 1979; North; Aust. NRS; QNPWS); in maize crops, lucerne paddock (North), garden (Aust. NRS); on e. slope of steep hill (Bedgood 1970), heath on dunes on edge of buttongrass swamp (Aust. NRS); two nests 140–180 m from watercourse, lake (Aust. NRS), up to 32 km from water in nw. Vic. (North). One nest was occupied by Cane Toad *Bufo marinus*, which had thrown out some eggs (QNPWS).

Nest, Materials Shallow depression scraped in ground, c. 10 cm in diameter and 2.5 cm deep; lined with grass, leaves, occasionally rootlets, roughly formed in circle (White 1922; Bedgood 1970; O'Grady & Lindsey 1979; Aust. NRS; North); grass blades bent over and slightly woven to form top and side of nest (White 1922); eggs in one nest rested on dry powdery dust (Bedgood 1970).

Eggs Swollen oval, pointed at smaller end, sometimes flattened at larger; close-grained, slightly lustrous; pale bluish or greyish-white to yellowish-white or greenish-yellow ground-colour, finely and thickly freckled brown, pale brown or olive-green, some unmarked (Le Souëf 1903; North; Campbell). One clutch in NZ, white with mid-brown freckles (Ogle 1987). **MEASUREMENTS:** NT: 28.8 (0.81; 27.4–29.5; 5) x 22.7 (0.63; 21.8–23.4) (Le Souëf 1903); n. Qld: 30.1 (0.43; 29.5–30.5; 15) x 24.1 (0.53; 24–24.8) (QNPWS); n. NSW: 27.8 (0.92; 27.4–29.7; 7) x 22.8 (0.48; 22.1–23.6) (North); Tas.: 33.1 (0.68; 31.8–33.8; 17) x 25.1 (0.45; 24.4–25.9) (North).

Clutch-size Usually 7–11 (Campbell), 9–12 (North), up to 14 (Serventy & Whittell 1976); claims of 18 eggs in clutch (e.g.

Gould) probably laid by two females (North). Few precise determinations; from Aust. NRS: 7.9 (5–11; 7): C/5 x 1, C/7 x 3, C/9 x 2, C/11 x 1. One nest at Moora, s. WA, contained seven eggs of Brown Quail and four of Stubble Quail (Serventy & Whittell 1976).

Laying In captivity, eggs laid at 1–2 day intervals; sometimes 2 days at start of laying, 1 day thereafter (Seth-Smith 1905; McKechnie 1951; Aust. NRS); in captivity, last four eggs of C/5 laid between 08:00 and 09:00 (McKechnie 1951). Lay up to four times in a season (Miller 1938); in captivity, start laying again 17–18 days after previous brood hatched (North); will re-nest c. 30 days after loss of clutch (Aust. NRS).

Incubation By female only, starting when clutch complete (Aust. NRS). Female covers eggs by spreading long feathers on sides of breast at right angles to body (Campbell). Male feeds female on nest (Aust. NRS). **INCUBATION PERIOD:** maximum 22 days (Aust. NRS), 21 days (Serventy & Whittell 1976); in captivity, 21 days (Seth-Smith 1905; McKechnie 1951). In captivity, clutch of five hatched between 12:00 and 16:00 (McKechnie 1951); male joined female on nest on day of hatching (Seth-Smith 1905).

Young Precocial, nidifugous. Hatch in golden-brown down, paler stripes on head and neck; possibly a sex difference in depth of colour (Seth-Smith 1905; McKechnie 1951). Both parents accompany, and female broods, small young; female feeds chicks, male passes food to young via female (Aust. NRS). In captivity: male tends chicks after 7 days, takes charge of young at 14 days (Campbell; North); McKechnie (1951) says both sexes feed and brood young, parents pick up food item, call young, then drop it for young to feed. **Growth, Development** Able to fly at 10 days (Serventy & Whittell 1976); in captivity, at 17 days (McKechnie 1951), c. 4 weeks (North). **Parental care, Role of sexes** Adults try to distract intruders from newly hatched young, decoying swooping Australian Magpie *Gymnorhina tibicen* as young scurry away (Aust. NRS); female ran round a tussock, falling at times, dragging wing and uttering strong agitated notes, and when approached closely, crept like a mouse into a dense grass-tussock (Bravery 1968).

Fledging to maturity Adult size at 6 weeks; attain adult plumage at 3 months (North), c. 100 days (McKechnie 1951).

Success Eggs may be washed out of nests during heavy rain (Campbell); eggs trampled (Aust. NRS); nests disturbed and eggs broken during harvesting of crops, such as hay-making (Hyem 1936; Aust. NRS); nests destroyed by fire (North).

PLUMAGES Prepared by D.J. James. Two subspecies recognized in Aust.: nominate *ypsilophora* of Tas. and subspecies *australis* of mainland Aust.; both said to have been introduced to NZ but see Geographical Variation. Cryptically plumaged and polychromatic, varying much; plumage characters such as tone of colour, darkness and patterning vary continuously due to age, sex, geographical and individual influences; few individuals are exactly alike in plumage though this is not immediately obvious because patterning is complex. Subspecies *australis* has rufous and brown variants (which intergrade completely and are treated together as 'brown morph') and possibly a blue-grey morph in males; females less varied than males, mostly brown. Nominate *ypsilophora* slightly larger, less varied, but difficult to separate on plumage. Adults possibly have breeding and non-breeding (alternate and basic) plumages, but no recognizable differences between these are known. First immatures (first basic and probably first alternate) separable only in hand (see Ageing).

Subspecies *australis* **Brown morph** Males vary continuously in ground-colour from light brown to rufous-brown; females

less varied, usually light brown to brown. **Adult Male Head and neck** Crown and nape may appear almost uniform blackish or dark brown but more often heavily scaled light brown; feathers, black-brown (119) to dark brown (121) with varying light-brown (123A, 27 or 28) or, in more rufous individuals, light rufous-brown (139) bases and fringes; fringes and bases may be very wide, especially in most rufous individuals, restricting dark colour to spot at tip of each feather; sometimes shafts are cream (92), producing very fine streaking over top of head. Most central feathers of crown have cream (92) shaft-streaks aligning to produce moderate to faint central crown-stripe. Feathers towards centre of crown often have broader, greyer margins than those at side, producing effect of paler central area round crown-stripe. Some have line of thin white streaks alongside of crown. Hindneck, generally similar but with slightly broader fringes and bases. Ear-coverts and lores, light grey-brown (119C–119D) in browner individuals; pink-brown (c219D) in more rufous birds, with very fine, hardly noticeable, dark-brown (119A) speckling. Small stiff feathers directly over ear form grey-brown (c119B) spot. Throat and foreneck, cream (92), buff (121D) or light brown (c223D), richest in most rufous birds; though throat always paler than ear-coverts and lores, these contrast little and together give plain-faced appearance. Very slight ruff of short, stiff and rounded feathers (in about three rows) encircling base of foreneck, with ground-colour as throat and faint dark-brown (121) subterminal crescents. Side of neck, light grey-brown (119D) with heavy dark-brown (119A) speckling giving contrast with face. **Upperparts** Generally rather cryptic, light brownish-grey (pale 80) with black-brown (119) and brown (121C) to rufous-brown (c340) blotches and bars and fine whitish streaks; fine detail of feathers varies considerably. Feathers have concealed light-grey (85) plumulaceous bases. Feathers of mantle and scapulars have light brownish-grey (c80) centre, varying in width from narrow stripe to two-thirds of feather (slightly broader on scapulars); edges of webs, rich brown (121C) to rufous-brown (c340) with irregular black-brown (119) bars; shafts or shaft-streaks, white, usually very thin; because barring of adjacent feathers does not align, impression is of fine blotching rather than barring; tips of feathers, often free of barring in more rufous birds; greyish centres can align giving impression of faint plain stripes or streaks down upperparts, but mostly impart washed-out appearance. Feathers of back, rich brown (121C) to rufous-brown (c340) barred black-brown (119) with light brownish-grey (c80) confined to tip (so not forming stripes) and slightly broader white shaft-streaks than scapulars; may have dark-brown (119A) area near base; generally covered by scapulars when at rest. Upper tail-coverts, dark brown (119A) near base with light brownish-grey (c80) centre (becoming broader on feathers towards tail), light-brown (c223D) to light rufous-brown (c139) outer half of webs, which are finely barred black-brown (119), and fine whitish shaft-streak. Rump, intermediate between back and upper tail-coverts, grading from one to the other. **Underparts** Both ground-colour and prominence of chevrons (crescents) vary independently. Breast, buff (c124–121D) to orange-rufous or light rufous-brown (139), each feather with three fairly narrow dark-brown (119A) chevrons; chevrons, fairly open (widely splayed), almost crescents, narrowly separated by inconspicuous whitish shafts; streaking not prominent on breast. Feathers at side of breast tend to have stronger rufous tinge (in both brown and rufous birds), light brownish-grey (c80) tips and thin white shaft-streaks, intergrading with upperparts. Belly, similar but with slightly paler ground and slightly broader chevrons. Posterior flanks (including feathers covering thighs), have similar ground-colour to belly and up to four broader (quite bold) dark-brown (119A) chevrons. Anterior flanks have light

brownish-grey (c80) centres and up to five chevrons, which tend to be broken, blotchy. Under tail-coverts and vent, buff (c124) with about three narrow dark-brown (119A) chevrons appearing much as bars on each feather; vent, fairly plumulaceous. **Tail** Rectrices, dark brown (119A) with buff (124) bars, which may be regular or irregular; completely covered above and below by tail-coverts. **Upperwing** Does not show much contrast with upperparts. Primaries and alula, dull brown (28), outer webs mottled (marbled) light brown (c39) to light orange-rufous; shaft, dark brown (223); outer web of p10, only faintly mottled. Greater primary coverts, dull brown (c28) with thin buff (124) or light-brown (223D) shaft or shaft-streak and sometimes narrow buff (124) outer edge; extreme cases may be indistinguishable from juvenile. Secondaries, dull brown (c28) with much light-brown (223C) marbling on outer webs and a few faint irregular buff (123D) bars distally on inner webs; narrow buff (121) fringe at tips. Tertiaries, dull brown (28) with irregular light-brown (223D) bars or blotches, which outlined in dark brown (119A); broad cream fringe at tips. Greater secondary coverts, grey-brown (c91) with light-brown (223D) to orange-rufous and black-brown (119) blotches along edges; shaft, cream (92). Lesser and median coverts, similar to greater coverts but less distinctly marked. **Underwing** Remiges and greater coverts, pale grey (c86) with translucent pale-brown mottling at tips. Median primary coverts, off-white. Lesser primary coverts, light grey-brown (119C) with off-white edges. Median and lesser secondary coverts, off-white with dull-brown (28) blotches at tips. Rufous birds may have rufous tinge to mottling on coverts.

Adult female Similar to male but rufous birds rare and not so extreme; best distinguished from male by large, square, black-brown blotches and bolder white streaks on upperparts, bold barring on flanks and stronger dark speckling on sides of head. **Head and neck** Crown and nape, mostly black-brown (119) with thin brown (121B) fringes; some have broad fringes but top of head usually more uniformly dark than that of male; central feathers have broad cream (92) shaft-streaks aligning as bold stripe; centre of crown does not tend to be paler grey (cf. some males); some have line of thin white streaks along side of crown. Hindneck, brown (121B) with broad white to cream (92) shaft-streaks narrowly bordered black-brown (119). Ear-coverts and lores, cream (92) to pale grey-brown (119D) heavily speckled dark brown (119A) (lack plain face of male); small stiff feathers over ear form brown (28) spot. Foreneck and side of neck, like ear-coverts but with larger speckles. Chin and throat, cream (92) without speckling, so contrasting with ear-coverts (cf. male). **Upperparts** Feathers have light-grey (85) plumulaceous bases. Appearance is of square blackish blotches on brown ground (chequered pattern) overlaid with fine white streaks; blotches vary somewhat in size. Mantle and scapulars, grey-brown (91) to rich brown (121C), with subterminal black-brown (119) blotch on inner webs, sometimes across both webs, prominent white shaft-streaks (resembling Stubble Quail) and some irregular black-brown (119) flecks or bars on both webs; broad rich-brown (121C) bar (regardless of ground-colour) from inner edge almost to shaft divides subterminal blotch. Feathers of back, black-brown (119) with grey-brown (91) to rich-brown (121C) tips, white shaft-streaks and thin rich-brown (121C) bars across middle. Rump and upper tail-coverts have irregular and smaller black-brown (119) subterminal blotch on grey-brown (91) to brown (232B) ground, which is flecked black-brown (119); and white shaft-streak narrowly bordered black-brown (119). **Underparts** Ground-colour, typically pale brown (223D) but may be cream (92) to light brown (26). Chevrons like male but usually broader, more widely separated at shaft. Whitish shaft-streaks,

slightly more prominent than male's but still not obvious. Feathers at side of breast have black-brown (119) subterminal band and broader white shaft-streaks, intergrading in pattern with feathers of upperparts. Flanks, very boldly barred black-brown (119) to dark brown (119A). **Tail** Rectrices, light brown (223D) with white to cream (92) shafts, irregularly barred or flecked dark brown (121). **Upperwing** Tertiaries, like upperparts, grey-brown (91) to rich brown (121C) with black-brown (119) subterminal blotches and bold whitish shaft-streaks. Secondary coverts, like upperparts but duller: lesser and medians, grey-brown (91) to rich brown (121C) with cream (92) shaft-streaks and sometimes small black-brown (119) blotches near tips; greater coverts, similar but with larger blotches mainly on inner web. Rest, as male. **Underwing** As male.

Downy young Little material examined so nature of variation unknown. Top of head, buff (124) with broad dark-brown (121) central and lateral crown-stripes and hindcollar. Side of head, buff (124). Chin and throat, cream (92). Upperparts, dark brown (121) irregularly, finely streaked rich brown (121C). Underparts, dull brown (28) with cream (92) bases showing and giving mottled look. Probably some birds lighter than this. Dark birds at least differ from other *Coturnix* in lack of distinct dorsal striping.

Juvenile Attained with post-natal moult beginning in first few days; post-juvenile moult begins c. Week 4, before post-natal moult finished and juvenile plumage complete. At first, smaller than adult with down retained on head; with growth, resemble adult females but with spotted, not scalloped, breast. Not enough material examined to determine range of variation; available skins suggest all females have buff ground on underparts, and some males may have faint greyish or rufous tinges fore-shadowing adult colouring; requires further study. **Head and neck** Last contour-feathers acquired. Crown and nape, black-brown (119) with thin brown (223B) fringes and white central and lateral crown-stripes like adult female; spot over ear less conspicuous. Hindneck, as upperparts. Side of neck, ear-coverts and lores, buff (124) speckled brown (119B). Throat, cream (92). Foreneck, cream (92) speckled light brown (26). **Upperparts** Similar to duller adult females; feathers, grey-brown (91) with black-brown (119) or dark-brown (121) subterminal bar or subterminal spots on each web; usually lack rich-brown colours; cream (92) shaft-streaks, usually more tapering (wedge-shaped) resembling Stubble Quail. **Underparts** Ground-colour of breast and belly, buff (124), sometimes with faint orange, rufous or greyish tinge and profusely streaked cream (92); each feather has broad cream shaft-streak and 2–3 dark-brown (121) to brown (119B) spots on each web, giving densely spotted appearance. Flanks and thighs, buff (124) with irregular narrow dark-brown (121) to brown (119B) barring (cf. bold barring of adult female). Vent and under tail-coverts, soft, loosely knit, buff (124) flecked brown (119B). **Tail** Rectrices, dark-brown (119A), uniform in centre, mottled brown (223B) near edges with broad cream (92) shaft-streaks and edges. **Upperwing** Inner seven primaries, dull brown (28) with broad sharp buff (124) edge to outer web that wraps round tip; p6 and p7, pointed at tip (square on adult); outer three primaries, as adult. Greater primary coverts, dull brown (28) with broad buff (124) edges and shaft-streak, both broadest at tip. Secondaries and tertiaries, dull brown (28) mottled buff (124) along outer web. Inner greater secondary coverts, dark brown (121) with broad cream (92) centre and edges. Outer greater, median and lesser secondary coverts, buff (124) with dark-brown (121) subterminal blotches on each web and cream (92) shaft-streak. **Underwing** Similar to adults.

Blue-grey morph Adult male Distinctive, extremely

varied, with normal pattern but varying blue-grey wash; rare in HANZAB area, represented in collections by at least two skins from se. Aust. (MV, QM) and two from near Auckland, NZ (MV); common in New Guinea (Rand & Gilliard 1967). Whether in Aust. and NZ these birds represent a morph or have escaped from aviaries is not known. **Head and neck** Crown and nape, similar to brown morph. Hindneck, brown (c28) with varying blue-grey (c87) centres to feathers. Forehead, lores, ear-coverts, sides and front of neck, blue-grey (c87); browner birds have broad pale orange-rufous edges to feathers on side of neck. Chin and throat, usually light grey-brown (119C). **Upperparts** Generally similar to brown morph but centres of feathers, blue-grey (c87), often broad and conspicuous. **Underparts** Generally washed light blue-grey (pale 87) all over; some have orange-rufous to light-brown (223D) edges or fringes, or dark-brown (119A) chevrons (like brown morph) on feathers, or both. **Tail** Rectrices vary but often uniform dark grey-brown (129). **Upperwing** Primaries and secondaries, as brown morph. Tertiaries vary, like brown morph or with blue-grey (87) centres. Coverts, as brown morph but slightly greyer in centre of feathers, though not blue-grey. **Underwing** Similar to brown morph but lacks brown mottling on coverts.

Nominate *ypsilophora*. No morphs and no extremely rufous birds. Most differ from subspecies *australis* in plumage, with typically broader, heavier chevrons on underparts and (on females) larger black blotches (grain size of pattern, larger). However, some are close to *australis* and no single diagnostic plumage features known; safely separable only by measurements of largest birds, and colour of iris.

Adult male Upperparts, vary more than in *australis*, underparts, less so; superficially appear less varied than mainland brown morph because variation in cryptic pattern of upperparts less obvious than in simpler pattern of underparts. **Head and neck** Crown, nape and hindneck, black-brown (119) with thin to broad, brown (223B) margins, which can be broader on feathers toward centre of crown, giving impression of pale central area but not so developed as in some *australis*. Lores and ear-coverts, light grey-brown (119D) to light brownish-grey (brown 85), faintly speckled dark brown (119A); brown (28) spot over ear. Side of neck, similar but slightly more heavily speckled. Throat, cream (92) to buff (121D), sometimes washed pale grey (86); foreneck, similar but slightly darker with thin dark-brown (121) chevron near tip of each feather. Like *australis*, plain-faced appearance, ear-coverts not contrasting with throat. **Upperparts** Feathers have plumulaceous grey (84) bases. Generally darker and with richer browns than *australis* but not consistently so. Feathers of mantle and scapulars have fine white shaft-streaks and brown (121C) to rufous-brown (37) inner webs that are boldly barred black-brown (119), subterminal bar often enlarged to form blotch approaching pattern of palest females; outer web, brownish grey (79) near shaft, brown (121C) to rufous-brown (37) on outer half and finely barred black-brown (119); greyest birds have broader greyish-brown (79) centres to feathers but most appear less grey than *australis* males; lowest scapulars, rufous-brown (c38) boldly barred black-brown (119), usually with brownish-grey (79) centres and white shaft-streaks. Back, brown (121C) to rufous-brown (37), boldly barred black-brown (119) on both webs with fine white shaft-streaks; some birds have fairly narrow brownish-grey (79) centres to feathers. Towards tail, bars finer, greyish centres slightly broader, and fine black-brown (119) flecking increases over whole of feather. Some have quite conspicuous white shaft-streaks on most of upperparts. **Underparts** Much as mainland brown morph though ground-colour not as varied: greyest birds, buff (121D) with faint greyish wash in centre of feathers; most rufous birds,

light rufous-brown (139) on breast, light brown (123B) on belly. Chevrons tend to be broader and more regular, appearing much more dense and invariably heavily scalloped except on central belly (about one more chevron per feather, i.e. four on feathers of breast, five on flanks); some birds from mainland also like this. **Tail** As brown-morph *australis*. **Upperwing** Primaries, secondaries, greater primary coverts and alula as for *australis* but mottling along edges of primaries, richer rufous-brown (37). Greater secondary coverts have grey-brown (c91) centres, rufous-brown (37) edges blotched with black-brown (119), and fine white shaft-streaks. Median and lesser coverts, grey-brown (c91) with irregular light-brown (26–223D) fringes. **Underwing** As *australis*.

Adult female No morphs; variation mostly confined to upperparts. **Head and neck** As *australis* but often with heavier speckling on sides of neck. **Upperparts** Generally similar to female *australis* in chequered pattern, but in fine detail, individuals vary substantially: mantle and scapulars of some, mostly black-brown (119) with white shaft-streak and light-brown (c39) tip and bars on basal half; others, rufous-brown (c37) with white shaft-streak and black-brown subterminal blotch on inner web, latter divided by golden-brown (123B) bar from inner edge almost to shaft. **Underparts** Like nominate male but on average with slightly heavier scalloping (chevrons) on breast and belly and bold barring on flanks like female *australis*. Back and rump, black-brown (119) with rufous-brown (37) to golden-brown (123B) tip and bars. Upper tail-coverts tend to be rich brown (121C), not patterned on outer web, barred black-brown (119) on inner web. **Tail** As nominate male. **Upperwing** Remiges and greater primary coverts, as nominate male. Secondary coverts, similar to female *australis*.

Downy young No specimens examined. Probably similar to subspecies *australis*; females possibly paler than males (McKechnie 1951).

Juvenile **Head and neck** Similar to adult female. Ear-coverts and side of neck, buff (124), each feather with black-brown (119) spot at tip of each web that gives more spotted, not obscurely speckled, appearance. Throat, buff (124), with obscure dark-brown (119A) spots at tip of each web. **Upperparts** Insufficient material examined to determine properly how much they differ from female, but appear to do so only by slightly smaller subterminal blotches on outer or both webs and bolder more tapering cream (92) shaft-streaks. **Underparts** Similar to juvenile *australis*. On central breast, spots can amalgamate into irregular streaks down webs. **Upperwing** Similar to juvenile *australis*.

Aberrant plumages Pied and white mutations in aviculture (Ray 1982).

BARE PARTS Based mostly on museum labels; also on photos (Wade 1975; Trounson & Trounson 1989; Moon 1992; Aust. RD; NZRD; unpubl.). **Adult, First immature** Sexes similar. Bill, black on upper mandible with grey or blue-grey base and sometimes tomiium; grey on lower mandible with blue-grey to white base. Mouth, off-white to pale pink or pale purplish-pink (Hall 1974). Iris, yellow, yellow-orange or orange in nominate *ypsilophora*; red, red-brown, brown-orange, brown or dark brown in subspecies *australis*; become more red with age during first year; Hall (1974) suggested possible seasonal change, iris becoming deeper red during breeding. Orbital ring, narrow, grey or greyish. Legs, orange-yellow, bright, pale, or dull yellow, greenish yellow, or brownish yellow. Claws, grey-brown to brown. **Downy young** No data. **Juvenile** Nominate *ypsilophora*: iris, hazel; legs, cream (McKechnie 1951). Subspecies *australis*: iris, dark-brown; legs, pale straw (Hall 1974).

MOULTS Based on c. 130 skins (ANWC, AWMM, HLW, MV, NMNZ, QVM, TMAG). Sequences of moults and plumages similar to Stubble Quail, though occurrence of pre-breeding (pre-alternate) moults unconfirmed; however, at least two skins in body-moult when primaries not active. **Adult post-breeding** (Definitive pre-basic). Complete or nearly so. Primaries, outwards; one or two active at once. Outer 1–3 primaries often retained, and then moult apparently arrested, resuming from p1 next pre-basic. Eight skins showed evidence of two simultaneous waves in primaries. Secondaries, inwards; centres, unknown. Timing varies greatly; generally later and more varying farther N and probably depends on local conditions; peak of primary-moult, Jan.–Apr. in Tas. and NZ; Feb.–July in se. Aust.; Feb.–Oct. in n. and ne. Aust. **Post-natal** Complete. Timing depends on date of hatching. Primaries, simultaneous; inners ahead of outers; pins appear soon after hatching; rate of moult has not been studied in detail but probably similar to Stubble Quail. Fly at c. 10 days (Seth-Smith 1905); first body-feathers on breast and rump; feathers of head, last (S.J.S. Debus). **Post-juvenile** (First pre-basic). Partial; outer three, sometimes four, rarely five, juvenile primaries and usually all juvenile greater primary coverts, retained; rarely some inner primary coverts replaced. Primaries, outwards. Timing depends on date of hatching. Begins before post-natal moult complete while juvenile p9 and p10 still growing.

MEASUREMENTS Skins (ANWC, AWMM, HLW, MV, NMNZ, QVM, TMAG). Sexing based on labels and plumage of upperparts; birds included only if both criteria agree. All samples combine adults and first immatures. Tail, approximate.

Subspecies *australis*: (1) se. Aust. (Vic., NSW, se. Qld), N to c. 25°S; (2) ne. Qld, N of c. 20°S; (3) n. and nw. Aust., N of c. 20°S; (4) sw. WA.

	MALES	FEMALES	
WING	(1) 98.3 (3.00; 93–105; 16) (2) 93.0 (3.12; 89–97; 8) (3) 93.0 (3.70; 88–98; 9) (4) 91, 102	100.3 (4.83; 91–106; 17) 95.4 (2.12; 40–45; 7) 93.6 (3.04; 87–97; 13) 101, 103, 103	ns ns ns
8TH P	(1) 68.2 (2.48; 64–74; 13) (3) 65.0 (4.47; 59–70; 5)	68.3 (3.65; 62–74; 15) 62.8 (3.04; 59–67; 6)	ns ns
TAIL	(1) 42.1 (4.79; 36–52; 14) (2) 39.7 (3.42; 59–70; 5) (3) 38.0 (3.42; 34–45; 8)	43.0 (3.98; 34–48; 15) 42.1 (2.12; 40–45; 7) 38.7 (2.41; 34–43; 11)	ns ns ns
BILL F	(1) 13.2 (0.75; 12.0–14.2; 15) (2) 13.0 (0.59; 12.0–13.7; 8) (3) 13.0 (0.68; 12.0–14.4; 9) (4) 13.0, 13.0	13.2 (0.46; 12.4–14.2; 17) 13.0 (0.76; 11.5–13.8; 7) 13.2 (0.57; 12.0–14.0; 13) 12.6, 13.1, 14.0	ns ns ns ns
TARSUS	(1) 22.6 (1.22; 19.9–23.9; 16) (2) 22.1 (0.66; 21.0–22.6; 7) (3) 22.1 (1.14; 19.6–23.4; 9) (4) 20.2, 22.2	22.6 (0.88; 21.2–24.0; 15) 22.4 (0.87; 21.0–32.7; 7) 21.2 (1.00; 19.6–22.5; 13) 22.7, 22.9, 24.7	ns ns ns ns
TOE	(1) 20.5 (1.21; 19.0–23.6; 14) (2) 19.9 (1.17; 18.9–21.9; 6) (3) 19.3 (0.89; 17.9–20.5; 9) (4) 19.1, 20.0	20.5 (0.67; 19.2–21.6; 13) 20.5 (1.28; 18.1–21.3; 6) 19.3 (1.02; 17.5–21.0; 13) 19.9, 20.4	ns ns ns ns

Nominate *ypsilophora*: (5) Tas.

	MALES	FEMALES	
WING	(5) 106.1 (3.04; 103–112; 15)	107.0 (4.06; 102–115; 9)	ns
8TH P	(5) 71.5 (2.38; 68–76; 14)	71.3 (2.71; 67–75; 10)	ns
TAIL	(5) 45.5 (2.88; 42–51; 17)	47.0 (2.16; 44–49; 4)	ns
BILL F	(5) 13.9 (1.05; 11.7–15.6; 18)	14.5 (0.74; 13.4–16.2; 10)	ns
TARSUS	(5) 23.6 (1.18; 21.3–26; 18)	25.0 (0.82; 23.5–26.3; 10)	*
TOE	(5) 21.5 (0.97; 19.5–23.0; 18)	21.5 (1.01; 20.0–23.4; 10)	ns

Subspecies undetermined: (6) NZ.

	MALES	FEMALES	
WING	(6) 99.4 (3.73; 89–105; 25)	92.6 (3.54; 93–104; 16)	ns
8TH P	(6) 66.4 (3.26; 57–72; 16)	66.8 (2.28; 63–69; 9)	ns
TAIL	(6) 44.3 (2.41; 40–50; 22)	43.5 (3.48; 37–50; 15)	ns
BILL F	(6) 12.9 (0.63; 11.2–13.9; 26)	12.8 (0.66; 11.4–13.5; 16)	ns
TARSUS	(6) 22.5 (1.43; 19.5–24.8; 25)	23.2 (1.13; 21.6–25.2; 17)	ns
TOE	(6) 20.0 (0.92; 18.5–21.9; 21)	20.2 (1.01; 18.5–21.8; 13)	ns

Literature contradictory on sexual dimorphism in size; these samples, though small, indicate little difference. Significant differences ($P < 0.05$) in: length of wing for males, and length of wing, bill and tarsus for females, between se. Aust. (*australis*) and Tas. (*ypsilophora*); length of wing for males between se. Aust. and ne. Qld; length of wing for males, and all but length of bill for females between se. Aust. and n. and nw. Aust.; length of wing, tail, tarsus and toe for males, and length of bill and toe for females between ne. Qld and Tas. and n. and nw. Aust. and Tas.; and all measurements, except tail-length, between NZ and Tas.; all other differences not significant. See Geographical Variation for discussion.

WEIGHTS All samples combine adults and first immatures; sexing based on labels and plumage of upperparts; birds included only if both criteria agree (from museum labels: ANWC, AWMM, HLW, MV, NMNZ, QVM, TMAG). For details of samples and sexing see Measurements.

Subspecies *australis*: (1) se. Aust. (Vic., NSW, se. Qld), N to c. 25°S; (2) ne. Qld, N of c. 20°S; (3) n. and nw. Aust., N of c. 20°S; (4) sw. WA.

	MALES	FEMALES	
(1)	98 (11.8; 80–123; 13)	103 (15.4; 85–140; 12)	ns
(2)	82 (5.7; 75–89; 4)	92, 96	
(3)	86 (2.39; 83–88; 5)	86 (10.5; 69–97; 6)	ns

Nominate *ypsilophora*: (5) Tas.

	MALES	FEMALES	
(5)	119 (14.1; 103–140; 7)	112 (10.6; 95–125; 9)	ns

Subspecies undetermined: (6) NZ.

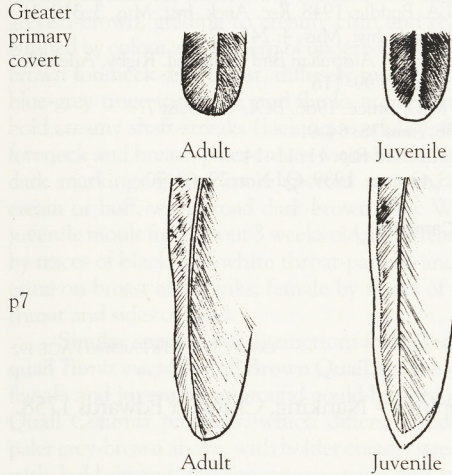
	MALES	FEMALES	
(6)	104 (5.4; 95–108; 5)	95, 105, 117	

Significant differences: males, between se. Aust. and Tas. and between se. Aust. and n. and nw. Aust.; males, between ne. Qld and Tas; males and females, between n. and nw. Aust. and Tas.

STRUCTURE Large plump quail; in Tas., slightly larger than Stubble Quail; in s. mainland, similar in size to Stubble Quail; in N, smaller than Stubble Quail. Wing, short, broad; broader and with blunter tip than Stubble Quail. Marked step in trailing-edge between long outer primaries and shorter inner ones, which, with

long bulging secondaries, form S-curved trailing-edge; this character may be useful for field identification. Eleven primaries; p7–p10, roughly equal; can be longest, equal longest or up to 3 mm shorter than longest; p6 2–10 shorter, p5 7–14, p4 12–22, p3 17–27, p2 20–31, p1 29–38, p11 extremely minute. P8–p10, weakly emarginated on outer web. One row of marginal, one of lesser and one of greater primary coverts; four feathers on alula. Fourteen secondaries including four tertials; longest tertial falls between p3 and p6 on closed wing. Tail, short, covered by tail-coverts; usually ten rectrices, weakly developed with thin shafts and difficult to distinguish from coverts. Bill, similar to that of Stubble Quail but slightly longer and narrower and much deeper. Nostril, covered dorsally by large oval operculum. Tarsus and toes, unfeathered, slightly more slender than that of Stubble Quail; scales, enlarged, scutellate on front of tarsus and top of toes, small, reticulate elsewhere. Very small webs between inner, middle and outer toes. Outer toe 71–79% of middle, inner 64–75%, hind 26–30%.

AGEING First immatures differ from adults only in retained outer 2–4 juvenile primaries and all juvenile greater primary coverts. Juvenile p8–p10 identical to adult but p7 (rarely retained), distinctive, with broad, sharp buff edge to outer web that wraps round pointed (not square) tip. Comparative wear of primaries alone not diagnostic because adults often suspend moult at outer primaries, but first immatures should always have outer few slightly more worn than rest. Juvenile greater primary coverts have broad buff (124) edges, and shaft-streaks that flare slightly at tip; adults generally have thin shaft-streak and lack pale edges except at very tip; however, overlap occurs (see below).



GEOGRAPHICAL VARIATION Numerous subspecies described; taxonomy in need of review. Peters recognized four subspecies from mainland Aust. (*australis*, in se. Aust.; *queenslandica* in n. Qld; *cervina* in n. and nw. Aust.; *sordida* in sw. Aust.) and one (nominate) from Tas. Aust. CL considered *australis* of mainland and *ypsilophora* of Tas. as separate species, with three subspecies on mainland (not *sordida*). Given their similarities, they are treated here as one subspecies. Nominate *ypsilophora* and *australis*-group allopatric in Tas. and Aust. respectively.

In Tas., nominate *ypsilophora* shows no geographical variation. In subspecies *australis* of mainland Aust., no clear relation between geography and colour or pattern; ratio of rufous birds higher in n. and arid regions; and birds from n. and ne. Aust. smaller, perhaps justifying recognition of single n. subspecies (*cervina*).

In NZ, *ypsilophora* and *australis* said to have been introduced during 1860s and 1870s, and *australis* again in 1911 and 1912 (Long 1981); Brown Quail were widespread and common in NI by mid-1870s and occurred on Three King Is as early as 1887, which led to suggestions that they were native or self-introduced (Buller 1873; Turbott & Buddle 1948; Long 1981). Oliver listed only three records of *ypsilophora* up to 1930. Of all specimens from NZ examined (50 adult and first immature skins; AWMM, CM, MV, NMNZ) only two were possibly within range of overlap between *ypsilophora* and *australis*; colour of iris from labels match *australis*.

Extralimitally, two subspecies recognized in Lesser Sunda Is, and six subspecies recognized in New Guinea; introduced to Fiji. In New Guinea, three subspecies in lowlands, two in mid-mountain grasslands and one alpine, all connected by intermediates (Rand & Gilliard 1967); females differ only slightly in plumage and subspecies diagnosis based mostly on size and plumage of males (see Rand & Gilliard 1967; Greenway 1973; Coates 1985; White & Bruce 1986, references therein). Suggested migration through Torres Str., which has not been confirmed, could have repercussions for taxonomy.

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Volume 2, Plate 32

Brown Quail *Coturnix ypsilophora* (page 404)

1 Adult male, subspecies *australis*, brown morph; 2 Adult male, subspecies *australis*, brown morph, rufous bird; 3 Adult female, subspecies *australis*, brown morph; 4 Adult female, nominate *ypsilophora*; 5 Downy young; 6 Juvenile; 7, 8 Adult

Stubble Quail *Coturnix pectoralis* (page 390)

9 Adult male; 10 Adult female; 11 Downy young; 12 Juvenile; 13 Immature male; 14, 15 Adult