

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.

REFERENCES

- Brush, A.H. 1979. *Biochem. Syst. Ecol.* 7: 155-65.
Johnsgard, P.A. 1988. *The Quails, Partridges, and Francolins of the World*. OUP, Oxford.
Long, J.L. 1981. *Introduced Birds of the World*. Reed, Sydney.
Sibley, C.G., & J.E. Ahlquist. 1973. *Auk* 90: 1-13.
—, — 1990. *Phylogeny and Classification of Birds*. Yale Univ. Press, New Haven.
Westerskov, K. 1990. *Proc. Perdix V: Gray Partridge and Ring-necked Pheasant Workshop*: 47-62.

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.

REFERENCES

- Johnsgard, P.A. 1988. *The Quails, Partridges and Francolins of the World*. OUP, Oxford.
- Sibley, C.G., & J.E. Ahlquist. 1973. *Phylogeny and Classification of Birds*. Yale Univ. Press, New Haven.

[*Coturnix novaezelandiae* New Zealand Quail]

Coturnix novaezelandiae Quoy and Gaimard, 1830, *Voy. Astrolabe, Zool.* 1: 242 —Baie Chouraki = Hauraki Gulf, North Island, New Zealand.

The species was named after the type-locality; it became extinct in New Zealand by about 1870.

MONOTYPIC

EXTINCT Length 22 cm; wingspan 35 cm. Typical *Coturnix* quail, closely related to Stubble *C. pectoralis* and Common *C. coturnix* Quails. Scarcity of accurate descriptions in literature and wrongly identified specimens have caused confusion in taxonomy since 1950s (see Plumages).

HABITAT No detailed information. Active ground-dweller once 'excessively abundant' in all open country, especially grass-covered downs of SI (Buller 1873, 1888); interpreted as lowland tussock grassland by Turbott (1967). On Long I., Queen Charlotte Sound (Fleming 1982) in dry grasses intermixed with low shrubby plants. Found in open fernlands on SI and flushed in numbers in cuts through fern c. 1840 (Fleming 1982). Recorded on several small and large islands.

DISTRIBUTION AND POPULATION NZ; extinct since c. 1870 (Olson 1977; NZCL). Occurred NI, SI, and Great Barrier I. (but not Three Kings Is. [Turbott 1967]). Information from Potts (1870, 1871, 1873), Buller (1873, 1905), Hutton & Drummond (1904), Oliver, and Fleming (1982). **NI** Bay of Islands 1772 (abundant); Hauraki Gulf, 1827 (specimen [type]); Whangaraei, 1860 (specimen); Mangawhai, 1866 (two specimens); Maketu, 1867 (seen); Taranaki, 1869 (some); undated records, Great Barrier Is, L. Colledge, Headwaters of Rakaia R.; no published reference of Europeans finding it common on NI but Maori reported it once common (about early 19th century) in Northland (Murimotu, Taupo, Tokoroa). **SI** Queen Charlotte Sound, 1773 (numbers seen); Nelson, 1840, 1848 (abundant); Stonyhurst, N. Canterbury, c. 1848 (abundant); Waikouaiti, Southland, 1851 (abundant); Ashburton R., 1857 (declining); Kaiapoi, Canterbury, 1860 (covey of nine shot); interior plains of Nelson Province, 1861 (abundant); Canterbury, c. 1861 (specimen); Blue Skin Bay, 1867 or 1868 (three specimens, these the last taken); undated records Christchurch and Selwyn, Canterbury (abundant); 'The Paddock', West Coast Road (specimens); Waitaki (eggs); Hokitiki, Westland (eggs). Later unconfirmed records from Okarito (1871, 1876); rumours persisted that last refuge between Wakitupi and Cosmos Peaks as late or later than 1896, but unlikely. Shot in large numbers on SI and had much wider range than published records indicate. In 1888, Buller wrote that it had not been recorded for at least 12 years but was occasionally found on SI till 1875. Disappeared earlier from settled country in E. Subfossils and in middens on both main islands, abundantly so in Northland, NI (NZCL).

Decline, noticed by late 1840s, rather sudden and unexplained (Potts 1871; see Buller 1873, 1888). Before European settlement, Maori hunted them with nets. Early authors attributed decline mainly to large-scale burning but also to dogs, cats, rats and grazing of sheep. Shooting and habitat degradation may have been important on SI but NI population was possibly in decline too early to be caused by impact of Europeans (Turbott 1967). Disease, suggested by later authors, is plausible because

extinction coincided with introduction of foreign birds. Decline was before introduction of stoats and weasels and evident before release of Brown Quail *Coturnix ypsilophora* (Turbott 1967).

MOVEMENTS Unknown.

FOOD Stomachs of individuals of one covey contained green blades of grass, a few bruised seeds and fragments of quartz (Buller 1873). Captive birds thrived on soaked bread, grains and insect larvae (Potts 1871).

SOCIAL ORGANIZATION AND BEHAVIOUR Unknown. Buller (1873, 1888) shot covey of nine at Kaiapoi, SI, which he said were adult male, adult female and seven young of the year; a skin (AV1666; CM), probably one of these, is in post-juvenile moult, estimated age 45 days after hatching (based on Crome *et al.* 1981). Like related quail, bickerings between male and female occurred in captivity (Potts 1871).

VOICE Only record, an insect-like low purring and *twit-twit-twit-twee-twit*, repeated several times in quick succession, most often in moist or wet weather; in stormy weather, silent, sheltering in tussocks (Potts 1871).

BREEDING No accurate information. Probably bred in simple pairs (cf. Buller 1873, 1888; Potts 1871). Nest a few blades of grass lining a depression on ground (Potts 1870). Buller (1873) described five varying eggs: two, regular oval, 33 x 25 mm, yellowish brown to buff with darker brown blotches; two, slightly larger, broader, dull cream speckled blackish brown; one smaller, more rounded, more glossy, yellowish white covered with small smudgy brown spots. More simply described as buffy white splashed brown (Potts 1871) or buff splashed greenish brown (Hutton & Drummond 1904). Pointed, ovoid, brownish white with dark-brown blotches and paler underlying ones: 29.4 x 23.8, 28.5 x 23.0, 33.2 x 23.5 (Oliver). Eggs from w. SI may have been larger than those from e. coast; clutch-size, 10–12; incubation period 21 days; young seen as late as Apr. (Potts 1870, 1871).

PLUMAGES Prepared by D.J. James. Specimens, rare (Buller 1888, 1905; James, in press). Descriptions probably of birds from SI; fading of specimens likely reduces accuracy of descriptions. Sexes, very different. First immatures probably differ consistently in plumage from adults but insufficient material available for confident assessment; can be aged on moult of wing (see Ageing). No direct evidence of alternating breeding and non-breeding (alternate and basic) plumages but these probably occurred. At 4 months, young not easily distinguished from adults by plumage or size (Potts 1871), implying that post-juvenile moult finished about this time.

Adult male Dark crown with white median crown-stripe; face and throat, orange-rufous; upperparts, blotched and finely

barred black and brown, overlaid with bold white streaks; breast, mostly blackish heavily mottled white and orange-rufous. **Head and neck** Top of head like Stubble Quail (q.v.). Supercilium, lores, ear-coverts and throat, bright orange-rufous, obviously brighter than on Stubble and without faint contrast between throat and face. Dark-brown (121) moustachial streak from gape to under rear of eye narrowly separated from conspicuous dark-brown (121) vertical crescent under ear; together these form pattern unlike Stubble but similar to Common Quail. Side of neck and base of foreneck, orange-rufous heavily speckled dark brown (121) with thin white shaft-streaks at tips of feathers.

Upperparts Superficially similar to Stubble but quite different in fine detail. Feathers of mantle and scapulars, mostly rich brown (c121C), with numerous fine wavy black-brown (119) bars, large black-brown (119) blotches and bold white tapering shaft-streaks, narrowly bordered black-brown (119). In at least some, lower anterior scapulars, black-brown (119) with narrow pale-brown (223D) fringe forming broad dark band on shoulder. Feathers of back, rump and upper tail-coverts, mostly black-brown (119) with narrow brown (121B) barring and tip, and white to pale-brown (223D) shaft-streaks. **Underparts** Vary, probably with age and location. Breast mostly black-brown (119) with orange-rufous bases and edges and white tips to feathers; appearing irregularly blotched and unlikely to show solid breast-patch like Stubble. Feathers at side of breast intergrade with those of upperparts. Belly, white with black-brown blotches or broad irregular V-shaped bars. Posterior flanks, rich brown (121C) with cream shaft-streak (much thinner than on Stubble), dark-brown (121) blotching or irregular stripe down each web, and narrow dark-brown (21) fringe at tip. Under tail-coverts, pale brown (c223D), irregularly marked brown (121C) and dark brown (21).

Tail Rectrices, dark brown (121) with numerous narrow cream (92) chevrons, the apices of which extend along shaft. **Upperwing** Primaries, greater primary coverts and alula, dark brown (121) to brown (28); secondaries, same with irregular narrow pale-brown (223D) barring along outer edges. Secondary coverts, olive-brown (olive 28) finely barred black-brown (119) with narrow white shaft-streaks. Tertials vary but distinctive; black-brown (119) to dark brown (c121) with cream shaft-streaks and brownish-grey (c79) to light-brown (223D) mottling or barring around edges. **Underwing** Remiges and greater coverts, brownish grey (c79), latter with thin white fringes. Median and lesser coverts, whitish with thin inconspicuous dark-brown (121) subterminal fringes.

Adult female Top of head, upperparts, tail and wings, like male; face, pale buff with dark-brown markings; underparts, cream to buff with heavy dark-brown scalloping. **Head and neck** Supercilium, lores and ear-coverts, buff (124) heavily speckled dark brown (121). Broader dark-brown (121) malar streak continuous or almost so with crescent under eye. Throat, cream (92), generally immaculate. **Underparts** Breast, buff (124) to light brown (c223D) with bold, though narrow, dark-brown submarginal crescent on each feather, giving heavily scalloped appearance; crescents broadest at centre of feathers where bisected by short white shaft-streak at tips. Feathers at side of breast intergrade with upperparts. Belly, whitish with dark-brown (121) submarginal crescents, narrower and less regular than those on breast; appear heavily scalloped, not plain as in belly of Stubble Quail. Posterior flanks and under tail-coverts, as male.

Downy young Undescribed; faded mount (CM) not verified as this species.

Juvenile No specimens examined. Buller (1873) states: crown, fulvous varied dark brown; ear-spots, black; throat and foreneck, buffy white; upperparts, yellowish brown with blackish markings and bold lanceolate shaft-streaks; underparts, pale buff

with two elongate, converging blackish streaks at tip of each feather.

BARE PARTS **Adult** Sexes, similar. Bill, black, paler at tip; iris, bright hazel-brown, light hazel, hazel-brown; legs, dull flesh, flesh-brown (Potts 1871; Buller 1873; Hutton & Drummond 1904). **Juvenile** Bill and legs, light brown (Buller 1873).

MOULTS Little data. Eight skins without dates (CM, MV) indicate similarity with other *Coturnix* quail.

MEASUREMENTS Skins and mounts from NZ (CM, MV), mostly without reliable dates and locations: (1) adults; (2) first immatures.

	MALES	FEMALES
WING	(1) 122, 118 (2) 109, 111, 117	119 111
TAIL	(1) 45, 47 (2) 45, 46	42, 43 39
BILL F	(1) 13.4, 11.5 (2) 13.8, 12.6, 12.1	12.0
TARSUS	(1) 23.1, 23.3 (2) 23.5, 24.7, 25.2	28.8, 23.6 24.7
TOE	(1) 20.3, 23.3 (2) 22.2, 23.5	21.6 23.0

Female probably larger than male on average (Buller 1873, 1888).

WEIGHTS Male, c. 220; female, c. 200 (Potts 1871).

STRUCTURE Similar to Stubble Quail but larger and plumper. Wing, broad, rounded, shorter for size of body than that of Stubble; said to be a weak flyer (Potts 1871). Pterylosis, similar. Bill, slightly longer, comparatively wider and deeper. Tarsus and toes, longer, thicker; scalation, similar. Possibly slightly larger webs between inner, middle and outer toes.

RECOGNITION Specimens, rare; several specimens of other species have mistakenly been identified as New Zealand Quail. Best distinctions from Stubble Quail are patterns of face and breast, continuous patterning from breast to belly, and patterns of flanks and tertials. Members of Common Quail complex have distinct buff barring or mottling along outer webs of primaries and a gorget of spots across upper breast grading into an unmarked cream belly. Brown Quail has comparatively very fine chevrons on feathers of underparts, barred flanks and mottled edges to primaries; fine detail of feathers very different.

GEOGRAPHICAL VARIATION None known. Specimens show considerable variation not accounted for by age and sex. Buller (1873, 1888) described a single male from NI as darker than all SI birds with breast almost entirely brownish black with few touches of 'fulvous upper', brighter rufous throat and face, bolder white streaks on upperparts, and 'fulvous' belly.

REFERENCES

Buller, W.L. 1873. *History of the Birds of New Zealand*. Van Voorst, Lond.
 — 1888. *History of the Birds of New Zealand*. 2. Author, Lond.
 — 1905. *Supplement*. 2. Author, Lond.
 Crome, F.H.J., et al. 1981. *Aust. Wildl. Res.* 8: 163–79.

404 Phasianidae

Fleming, C.A. 1982. *George Edward Lodge—The Unpublished New Zealand Bird Paintings*. Nova Pacifica, Wellington.

Hutton, G.W., & J. Drummond. 1904. *Animals of New Zealand*. Whitcombe & Tombs, Christchurch.

James, D.J. In press. *Notornis*.

Olson, S.L. 1977. *Emu* 77: 132–5.

Potts, T.H. 1870. *Trans. NZ Inst.* 2: 40–80.

— 1871. *Trans. NZ Inst.* 3: 59–109.

— 1873. *Trans. NZ Inst.* 5: 171–505.

Turbott, E.G. 1967. *Buller's Birds of New Zealand*. Whitcombe & Tombs, Christchurch.