

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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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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Pavo cristatus Indian Peafowl

Pavo cristatus Linnaeus, 1758, *Syst. nat.* ed. 10, 1: 156 — 'India orientali, Zeylona' = India (Peters).

Pavo is Latin for peacock; *cristatus* Latin for crested.

OTHER ENGLISH NAMES Peafowl, Common Peafowl, Peahen (female), Peacock (male).

MONOTYPIC

FIELD IDENTIFICATION Length: male 200–225 cm, of which train 80–160, female c. 90 cm; wingspan: male 130–160 cm, female 80–130 cm; weight: male 4–6 kg, female 2.8–4 kg. Large, distinctive pheasant, familiar to everyone. Sexes differ in size and plumage: female smaller. Juveniles like adult female.

Description Adult male Head, glossy metallic blue with lores, broad stripe over and through eye and ear-coverts, black, bordered above and below by broad white stripes of bare skin, from base of bill to ear-coverts; fan-shaped crest of wire-like feathers with broad blue tips on crown. Nape and hindneck, metallic green; throat and sides of upper neck, black; rest of neck and mantle, deep glossy metallic blue with greenish tinge; scapulars, tertials, and lesser and median secondary coverts, cream with dark-brown barring; glossy green tinge on scapulars and tertials;

secondaries and greater secondary coverts, glossy blue-black to green-black; primaries and primary coverts, pale buff-brown. Back and rump, glossy bronze-green with darker green to black fringes giving scaly appearance; shorter upper tail-coverts, bronze-green with large circular brown patch enclosed at tip; longer upper tail-coverts, elongated to form train, glossy metallic green with large tricoloured ocelli that are deep blue centrally, surrounded by bronze and with green margins; shafts, white; tail, brown, covered by train when not displayed. Breast, deep glossy metallic blue with greenish tinge; belly, vent, and undertail, brown; under tail-coverts and feathers of thighs, pale buff, speckled brown. Underwing: primaries, pale buff-brown; secondaries and coverts, dark brown to coppery brown. Bill, grey to white. Iris, brown. Legs and feet, grey. **Adult female** Forehead, crown and lores, chest-

nut-brown; fan-shaped crest of wire-like feathers on crown, coppery brown tipped metallic green; supercilium, ear-coverts, throat and sides of upper neck, white with dark-brown spot on ear-coverts; rest of neck, metallic gold-green. Mantle, metallic coppery brown, green and dark blue; rest of upperbody and tail, dark brown, with narrow pale-grey scaling on back and scapulars, and pale-grey speckling on rump and upper tail-coverts; latter elongated (though much less so than male), reaching almost to tip of tail, not modified. Upperwing, mostly dark brown with some paler brown speckling and mottling. Breast, dark metallic green with off-white fringes giving scaled appearance; on lower breast, fringes broader giving off-white appearance; belly, off-white. Vent, under tail-coverts, and undertail, brown. Feathers of thighs, off-white. Underwing, mostly dark brown with some paler brown mottling and flecking. Bill, legs and feet, grey-brown. Iris, dark brown. **Juvenile** Not well described; similar to adult female; crest small.

Similar species None in HANZAB region.

In small flocks throughout year, often of a male and several females; family parties of female and chicks and parties of males also seen after breeding season. Familiar and common ornamental bird of parks and gardens. Shy and wary in natural range but become rather bold scavenger when accustomed to human settlement (e.g. Rottnest I.). Walk and run rapidly through thick undergrowth, males carrying their long trains horizontally, just off the ground; rarely fly, though sometimes do so when flushed or to cross open ground; take off with loud flapping of wings, flying rapidly and strongly with quick wing-beats interspersed with glides. Roost in trees and on low buildings, often in groups of up to 15–20; also in hedgerows, bush and scrub. Calls consist of very loud repeated crowing uttered when going to roost and before leaving roost in morning; also give repeated short gasping screams and brassy notes in alarm.

HABITAT Although released at many sites, extant feral populations largely restricted to coastal lowlands, some islands in s. and e. Aust., and NI, NZ. These sites have mediterranean climate: hot summers, wet winters, little frost (S.J. Cowling); where winters cooler (e.g. Tas., s. Vic., SI), most introduced populations have become extinct (see Distribution). On Rottnest I., mainly in *Acacia* scrub and woodlands of *Melaleuca lanceolata*, particularly woodlands near saltlakes where some birds roost; glades among *Templetonia retusa* scrub, which are also used as display-sites by males; also found in open country near settlements (Storr 1965; Saunders & de Rebeira 1985; P. de Rebeira). On Heron I., in low forest of *Pisonia grandis*, *Ficus opposita* and *Celtis paniculata*, which covers most of area (Kikkawa & Boles 1976); perhaps close to settlement; no details given. On King I., in farmland with small patches of remnant native vegetation (e.g. thickets of *Melaleuca*) or hedgerows (S.J. Cowling). Semi-domestic populations reported from open pasture country, sw. NSW (Hobbs 1961); and modified environment of willows, cut lucerne paddock, rocky hillside with African Boxthorn *Lycium ferocissimum*, eucalypts and reeds, se. SA (Beasley 1986). In NZ, inhabit thickets and bushland in river valleys or near streams; roost in trees, often near water. Habitat at one site, small forest remnants surrounded by pastoral land; patches of forest with Tawa *Beilschmiedia tawa*, Totara *Podocarpus totara*, Hinau *Elaeocarpus dentatus*, and various other native trees (Phillipps 1948). Recorded nesting on rocky hillside and in light cover next to scrub on farmland (Beasley 1986; S.J. Cowling).

On Rottnest I., tolerate human traffic and nest in gardens and close to busy thoroughfares (P. de Rebeira).

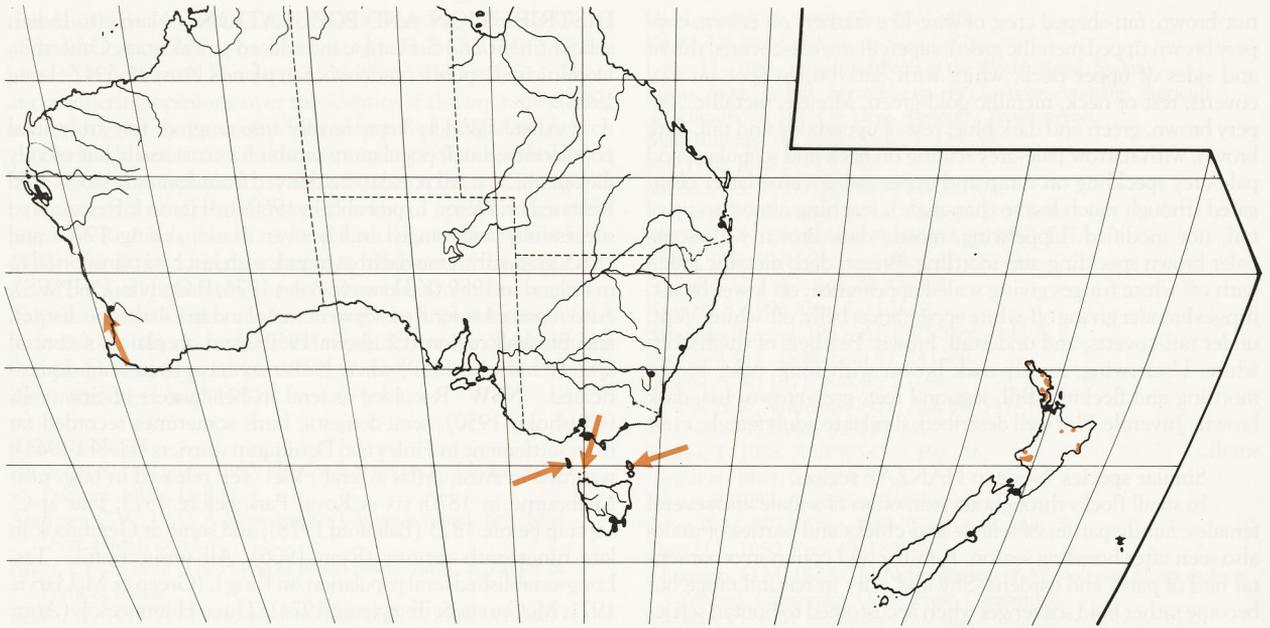
DISTRIBUTION AND POPULATION Native to Indian subcontinent and Sri Lanka; introduced to Pakistan, California, Dominican Republic, various ocean islands, Aust. and NZ (Long 1981).

Aust. Widely kept, usually free-ranging; few truly feral populations; small populations establish occasionally but usually die out quickly. All populations derived from domestic stock. **Qld** Released on Heron I., probably in 1960s by Heron I. Resort; bred successfully and ranged widely over island; during 1970s and 1980s gradually removed from island, with last bird transported to mainland in 1989 (Kikkawa & Boles 1976; P. Ogilvie; QNPWS). Also reported as feral on adjacent mainland in Gladstone district, and Blackall region (Chisholm 1950), and on plains of central Qld. (Chisholm 1950) where birds may have been semi-domesticated. **NSW** Recorded as feral in headwaters of Snowy R. (Chisholm 1950); semi-domestic birds sometimes recorded far from settlement in Finley and Deniliquin districts (Hobbs 1961); regarded in Aust. Atlas as feral. **Vic.** Ten released in bush near Melbourne in 1870; six at Royal Park before 1873; four at C. Liptrap before 1873 (Balmford 1978); and some at Gembrook in late nineteenth century (Ryan 1906). All unsuccessful. **Tas.** Long-established feral population on King I. (Green & McGarvie 1971; McGarvie & Templeton 1974), Three Hummock I. (Aust. Atlas), Sisters and Prime Seal Is (still present 1992; R. Sim), Furneaux Grp (Tarr 1950). Population on mainland at Chauncy Vale listed by Aust. Atlas as feral, but Green (1989) states that all Tas. mainland birds semi-domesticated. **SA** First released on Kangaroo I. before c. 1920; several subsequent introductions; all semi-domestic (Lashmar 1988; Condon 1969). Semi-domesticated birds breed round Monteith (Beasley 1986). **WA** Introduced to Rottnest I. in c. 1912 (Serventy 1948), from domestic stock (Storr & Johnstone 1988); up to 50 recorded there in early 1960s (Storr 1965) and mid-1980s (Saunders & de Rebeira 1985); apparently self-sustaining. Also released at Gingin and Pinjarra before 1912, with some surviving there (Jenkins 1959; Long 1981; Aust. Atlas); apparently once feral in Pilbara at Onslow (Chisholm 1950) but no recent evidence of survival (P. de Rebeira). Decline of mainland colonies in WA coincided with introduction of Foxes in early 1930s (Storr & Johnstone 1988).

NZ Privately introduced in many regions, but few details; escaped birds occasionally form feral populations, and some remain semi-domesticated. New occurrences are result of escapes (Westerskov 1990). **NI** Introduced Wellington 1843 (Long 1981); Waimarama, Hawke's Bay c. 1862 (Oliver); Mahia Pen. late nineteenth century (Phillipps 1948). Scattered records in Northland, round Kaipara, Miranda, Rotorua, Opotiki, near Gisborne, Mahia Pen., Wanganui district, and near New Plymouth (Fleming 1947; Phillipps 1948; Oliver; NZ Atlas). Formerly common at Wairoaiti and Tutira, near Napier, but possibly now extinct (CSN 4; Oliver). **SI** Unsuccessfully introduced to Canterbury, 1854 (nine birds), and Otago in 1867 (two birds; Long 1981). Single NZ Atlas record in nw. Nelson (NZ Atlas), and recent record on Nile R., West Coast, 1988–89 (CSN 37).

Populations apparently stable or declining (e.g. Mahia Pen.; Rottnest I.) by shooting for food or sport, and trapping (Phillipps 1948; Storr 1965; Green & McGarvie 1971; K. E. Westerskov). On King I. have increased in recent years, especially in NW where plenty of reserves and bushland; unprotected, but rarely shot (R.H. Green). On Rottnest I., reduction in numbers of feral cats and supplementary feeding by tourists probably account for small increase in numbers (P. de Rebeira).

MOVEMENTS Sedentary; small groups present in same area throughout year (Phillipps 1948; Long 1981; Beasley 1986; S.J.



Cowling). Individuals sometimes move considerable distances: Rottnest I., one male moved 2 km from banding site within 2 days; 3 months later had moved c. 6 km to new site, and later, another 1 km or so (Saunders & de Rebeira 1985). No long-distance movements recorded.

FOOD Seeds, fruits, flowerbuds, shoots, invertebrates and small vertebrates. **Behaviour** Active mostly in early morning and late afternoon (NZRD). Feed on ground. Glean shoots and berries, scratch litter for invertebrates, pry and peck with bill (Beebe 1922). On Rottnest I., take bread thrown out or left by visitors and forage in vegetable gardens (Saunders & de Rebeira 1985).

Adult On Heron I.: Black Noddy *Anous minutus* eggs, chicks (P. Ogilvie). On Rottnest I.: seeds, insects, and reptiles, including skinks and small snakes (Saunders & de Rebeira 1985). **Extralimitally** India: seeds, groundnuts, grains and cereals, young shoots of crops, flowerbuds, berries and drupes (incl. *Carissa*, *Lantana*, *Zizyphus*, *Ficus*); molluscs; oligochaete worms; chilopods; scorpions; insects: isopteran, grasshoppers, beetles, caterpillars; amphibians; reptiles: skinks, small snakes (Beebe 1922; Ali & Ripley 1980).

Breeding Females feed and drink twice a day during incubation period. Wild birds accept chicken pellets (Beasley 1986).

SOCIAL ORGANIZATION Very little known in Aust. and NZ. Found in small groups throughout year (S.J. Cowling); family of four (Beasley 1986); female with 2–3 young (Storr 1965); seven young (Storr 1965); up to three females and young in loose association (P. de Rebeira); on King I., flock of 12 and also single birds reported (McGarvie & Templeton 1974); on Mahia Pen., NZ, small flock including five males (CSN 21).

Bonds Polygamous. On Rottnest I., courting males heard late Aug. to early Dec. (Storr 1965). **Parental care** Only female incubates and cares for young (Storr 1965; Saunders & de Rebeira 1985; NZRD; Aust. NRS; S.J. Cowling). **Breeding dispersion** Female nests solitary. On Rottnest I., males display from definite stations (Storr 1965). **Roosting** Male rests in trees at night, with or without his females (Oliver); on King I. in hedgerows, bush and scrub (S.J. Cowling); on Rottnest I., in tea-trees (Storr 1965); on low buildings, often in groups of up to 15–20 (P. de Rebeira).

In NZ, in trees, often near water (NZRD). Young recorded being taken to tree to roost (Aust. NRS).

SOCIAL BEHAVIOUR Very little known in Aust. or NZ. On Rottnest I., rather bold and accustomed to people; females observed dust-bathing (P. de Rebeira).

Agonistic behaviour Male uses spectacular fanned train to threaten other species (as well as in Courtship); one male defended food against Silver Gull *Larus novaehollandiae* by turning so that fanned train placed towards Gull, which backed off (Saunders & de Rebeira 1985). Young male, without train, recorded displaying to Purple Swamphens *Porphyrio porphyrio*, which completely ignored him (Beasley 1986). **Sexual behaviour** Spectacular Courtship display where male uses train to attract female: male raises long sweeping train and stands with it fanned and erect; then, with wings drooped and quivering, shivers violently as he struts and prances in front of female; more drably plumaged female appears unimpressed and mostly appears to ignore him (NZRD). On Rottnest I., individual males display and call from definite stations and are conspicuous (Storr 1965). **Relations within family group** Female found sitting on eggs did not flush from nest till intruder tried to handle her (Storr 1965). On Rottnest I. (P. de Rebeira), female broods small chicks; female and young roost together until young become independent some time in first year; young may maintain loose association with female parent and other young after independence. Parents and chicks wary and keep to cover. Adult female and her two young, just over 1 year old, seemed to stay together (Beasley 1986).

VOICE Numerous calls, still poorly described (Johnsgard 1986); Johnsingh & Murali (1980) list 11 possibly distinct calls. Most distinctive call is loud, far-carrying trumpeting or screaming of male; guttural clucking notes also uttered (Johnsgard 1986). In HANZAB area, no studies or recordings available of calls of established feral populations; some information from Rottnest I., WA (P. de Rebeira): loud trumpeting or screaming *pe-hawn*, *pe-hawn* or *ki hai*, *ki hai*, *ki hai*; on taking flight, utter loud popping *kok*, *kok*, *kok*; during concentrated feeding activity, both sexes utter sharp nasal single note, hoot, that of female more highly pitched and less resonant; contact call, a low clicking grunt. On

Rottnest I., males trumpet and display from late Aug. to early Dec., individuals doing so from definite stations (Storr 1965). At Monteith, SA, in Nov., clicking of feathers by male associated with displays, and, in Dec., calling by male (Beasley 1986). On Flinders I., Tas., males trumpeted and displayed during first half of Dec. (T. Howard). Chicks give whistling *cheep* (P. de Rebeira).

BREEDING Very few and only casual mentions of feral birds breeding in Aust. On Rottnest I., WA (Storr 1965; P. de Rebeira): eggs laid Oct.–Dec.; female found sitting on eggs on 21 Nov.; nest a shallow scrape under low shrubs; one female nested in flower-box beside entrance to Rottnest I. Administration Office; eggs laid on litter below dense clump of *Acanthocarpus preissi* without scrape or lining; clutch-size, 3–5; in mid-Nov., female on two eggs, on five eggs 5 days later; only female incubates; incubation period: 27–30 days; two, three and seven chicks with female on 17 Jan. and 21 Mar. in different years. At Monteith on Murray R., SA, three eggs in scrape on protruding flat rock on rocky hillside, c. 0.8 x 1.6 m across, in Nov.; after that in Dec., Mar. and Sept. at first three and then two chicks seen with parents, which suggests several months of association in family party (Beasley 1986). In Griffith district, central NSW, clutch of six eggs laid between 23 Sept. and 4 Oct., perhaps irregularly; on ground without scrape in thick cover in garden (and so perhaps not true feral birds); only female recorded incubating; six young hatched between 28 Oct. and 1 Nov. (Aust. NRS). **NZ** Female recorded incubating clutch of six eggs, late Nov. 1953, Wanganui area; nest on ground in dense tall weeds and grass cover, in scrub-covered gully in rolling farmlands (K. E. Westerskov).

Information on captive breeding in Allen (1964) and Sharma (1972); outline of breeding in wild in natural range in Baker (1928) and Ali & Ripley (1980).

PLUMAGES Prepared by D.J. James. Few specimens available and little information in literature. Great sexual dimorphism: males gaudy metallic blues and greens with spectacular train; females, duller and browner. In both sexes appearance of metallic colours varies according to incident light.

Adult male Attained with first immature post-breeding moult at end of second year, though train not fully grown until at least end of fourth or fifth year. **Head and neck** Forehead and crown, metallic blue (c270) with concealed black bases to feathers. Feathers of nape and hindneck, very short, metallic green (c62) with concealed dark-brown (121) bases. Throat, top of neck at side, and ear-coverts, black-brown (119); feathers, short. Rest of neck, mostly metallic blues (c270, c67) with some metallic-green (c62) feathers. Fanned crest of 24 or 25 highly modified feathers in two longitudinal rows on crown; feathers 50–55 mm long, the rachis with only short barbs and no barbules for basal four-fifths, the tips, pennaceous, metallic blue (c270) and metallic green (c62). **Upperparts** Feathers have concealed brown (28) bases that extend in V along shafts, and aftershafts. Mantle appears mostly dark metallic-blue; feathers, reflective green (c62) towards base, metallic blue (67) in middle and darker metallic-blue (c270) distally, with thin glossy-black tip. Feathers of rump and back, metallic green (c62) towards base, metallic golden-green in middle and metallic coppery-brown distally, with thin dull-black fringe; some have concealed cream (92) bar at base. Scapulars, barred dark brown (219–223) and cream (92) to off-white; subscapulars, similar but barring less regular. **Train** Upper tail-coverts, modified, forming long spectacular shimmering green train that can be lifted and fanned in semicircle up to 2 m diameter; train consists of up to 200–220 plumes (Sharma 1974; Ali & Ripley 1980), and fringed with fish-tail structures and with

nearly 200 ocelli. Four types of coverts (Sharma 1974; cf. Manning 1987): (1) ocellus-bearing feathers; most numerous; 25–150 cm long; shafts, thick, whitish; webs, disintegrated, shaggy, with barbs widely spaced and not interlocked, brown (28) heavily speckled metallic green (c62); single pennaceous ocellus at tip, which, when fully developed (40–50 mm diameter, generally on longer feathers and generally on older males), has broad blue-black (173) inverted U in centre, surrounded by blue-green (green 68) circle (broadest basally), metallic golden-brown circle (broadest distally), and narrow even green (c63) ring; smaller ocelli lack blue-black centre; distal to ocelli, barbs are loose, forming metallic green (c62) fringe, 10–30 mm long. (2) Small coverts (uppermost); intergrade with feathers of rump anteriorly; gradually increase in length, gaining rudimentary ocelli and intergrading with ocellus-bearing plumes posteriorly. (3) Feathers bearing fish-tails are longest coverts (c. 60 plumes, 150–180 cm long) and their tips form distal fringe to entire train; shafts and webs, as ocellus-bearing feathers, but barbs, brown (28) glossed with metallic gold and copper; terminal fish-tail or quarter-moon structure, up to 18 cm wide, dark-brown (121) with metallic green, coppery or golden sheen more prominent towards centre. (4) Lyre-shaped feathers (c. 10 feathers, 20–65 cm) form sides of train; asymmetrical, curved slightly inwards at tip with disintegrated inner web and basal outer web, and semi-pennaceous (denser, loosely interlocking barbs) distal outer web; shaft and disintegrated parts of web, as ocellus-bearing feathers; semi-pennaceous parts, dark-brown (121), heavily speckled and glossed metallic green (c62); four longer plumes (up to 140 cm long) bear small oblique ocelli. Further details in Sharma (1974). **Underparts** Breast, as mantle. Belly, brown (28); feathers, coarse, loose. Under tail-coverts, downy, woolly, long, off-white with brown (28) tips. Flanks, fairly woolly dark-brown (219), with scattered metallic green (c62) pennaceous feathers. Thighs, white, some feathers lightly speckled brown (28). **Uppertail** Dull brown (28–119B); rectrices mottled light grey-brown (119D) along edges. **Undertail** Rectrices, light grey-brown (119C) with cream (92) shafts. **Upperwing** Primaries and alula, light buff-brown (c123A); greater primary coverts, similar but more metallic, coppery. Secondaries and greater secondary coverts, blackish (119), outer web with faint green (c62) and metallic blue (c270) reflections. Lesser and median coverts, buff-brown (c39) with narrow close dark-brown (121) bars. Tertiaries, as subscapulars. **Underwing** Primaries, as upperwing. Greater primary coverts, coppery brown (c123A) speckled dark brown (219). Secondaries, dark brown (219). Greater secondary coverts, dark brown (219) speckled coppery brown (c123A). Median coverts, dark brown (219). Lesser and marginal coverts, coppery brown (c123).

Adult female **Head and neck** Lores, forehead and crown, dark brown (22) with slight dark metallic-green reflections at tips. Supercilium, throat, and ear-coverts, white, with dark-brown (22) spot over ear. Neck, metallic green (c160) with gold and blue tints. Crest, as male but coppery with metallic-green (c160) tips. **Upperparts** Feathers have concealed brown (28) base and aftershaft. Mantle, mixture of dull-metallic coppery brown (c123A), blue-black (c173) and dark green (c262); lower feathers have dark-brown (121) tips speckled off-white. Back and scapulars, dark brown (119A) with thin light grey-brown (119D) fringes to feathers. Rump, dark brown (119A) with some faint light grey-brown (119D) speckling on feathers. Upper tail-coverts, not modified, dark brown (119A), heavily speckled and vermiculated light grey-brown (119D). **Underparts** Feathers of breast have concealed dark-brown (219) base and aftershaft; upper breast, metallic dark-green (c162A) with off-white fringes to feathers; feathers of lower breast, less metallic with broader fringes and

partly exposed dark-brown (219) bases. Belly, mostly off-white with brown (28) mottling in centre of feathers. Vent, coarse, semi-plumulaceous, brown (28). Under tail-coverts, woolly, plumulaceous, brown (28), flecked with off-white. Flanks, mostly woolly, light grey-brown (c27), mottled paler, duller grey-brown (119D). Thighs, off-white, mottled light grey-brown (c27). **Tail** Rectrices, dark brown (219) with a little faint cream (92) mottling at tips. **Upperwing** Primaries, greater primary coverts and alula, rich brown (121C) speckled dark brown (119A). Secondaries, greater and median secondary coverts, and tertials, dark brown (121) mottled light grey-brown (119D) along outer edges of feathers. Lesser secondary coverts, brown (28) lightly flecked light brown (239). **Underwing** Mostly dark brown (121); primaries, flecked with brown (223B); lesser coverts, mottled brown (28) and light brown (239).

Downy young Top of head, mottled light brown (239) with faint brown (28) flecks. Hindneck same but with slightly paler bases to down. Supercilium, side of face and neck, throat and foreneck, pale buff (124) to cream (54); broken by thin dark-brown (121) line round eye extending back to nape. Mantle, buff (124). Back, almost uniform rufous-brown to brown (33), faintly flecked darker. Underparts, pale buff (124) to cream (54) tinged yellowish especially on breast.

Juvenile No specimens available and not well described elsewhere; somewhat similar to adult female. Delacour (1951) writes: 'Crest small; head pale buff; upperparts light brown barred and freckled with brownish black; underparts creamy white, brownish on breast.' Emerging juvenile primaries on downy young, brown (c121C) finely speckled dark brown (121); secondaries and greater coverts, brown (121c) with dark-brown (121) blotches and subterminal band and pale-buff (121D) tip.

Aberrant plumages Several variations occur in domesticated birds; because feral birds derived from long line of domestic stock these might occasionally occur in wild. Pure white Peafowl are common: legs and bill, white; iris, brown; apparently simple autosomal recessive, but heterozygotes can have some white mottling on primaries (Delacour 1951). Pied Peafowl have white patches among normal plumage. Black-winged Peafowl males have blackish scapulars, secondary coverts and tertials with metallic hues; females paler, more rufous; downy young whitish (Delacour 1951).

BARE PARTS Based on photos (Campbell 1974; Wade 1975; Trounson & Trounson 1989; Aust. RD; NZRD; unpubl.). **Adult male** Bill, greyish to ivory-white, generally palest on culmen. Stripes of bare skin from base of upper mandible over, and behind eye, and from base of lower mandible under, curving up and broadening behind, eye, white. Iris, dark brown to brown. Feet, grey; tarsus, banded light grey and grey. **Adult female** Iris, dark brown. Bill and feet, grey-brown (Delacour 1951). **Downy young** Bill and legs, pale pinkish or pink-brown. Iris, dark brown. Orbital ring, brown.

MOULTS Poorly known. On Rottneest I., male and female moulting primaries and secondaries in Apr.–May; body-moult evident in Mar. (P. de Rebeira). In India, moult of train described by Sharma (1974): shed over 5 weeks, after breeding; cocks preen their trains of loose plumes. For growth rates of plumes, see Sharma (1974), Manning (1987). Otherwise, apparently not studied.

MEASUREMENTS (1) NZ, skins and mounts (AWMM). (2) From Delacour (1951), methods unknown.

	MALES	FEMALES
WING	(1) 442, 445, 460 (2) 440–500	413 400–420
TAIL	(1) 530, 490, 513 (2) 400–450	365 325–375
BILL F	(1) 48.2, 42.2, 45.0 (2) 40–44	43.9 37–40
TARSUS	(1) 123, 123, 122 (2) 140–155	107 120–130
TOE	(1) 68.0; 66.5, 67.3	67.0
SPUR	(1) 16.8, 11.3, 14.3	0

Domestic (and possibly feral) stock, shorter in tarsus than wild stock (Delacour 1951).

WEIGHTS No detailed information. Male 4.1–5.1 kg; female 2.7–4.1 kg (Ali & Ripley 1980).

STRUCTURE Wing, broad, rounded. Eleven primaries; wing formula, approximate: p6 or p7 longest; p10 100–110 mm shorter, p9 40–60, p8 10–20, p5 1–12, p4 7–20, p3 20–30, p2 40–50, p1 55–65, p11 minute. Twelve secondaries including three tertials; longest tertials fall just short of secondaries on folded wing; secondaries fall just short of longest primaries. Tail, long (longer in males) and broad; rectrices broad with strong shafts; male uses tail to support train during display; two males had 19 rectrices, one female, 16. Bill, moderately long, rather heavy. Tarsus, heavy, fairly long (more so in male); male has large spur on back of tarsus; female may also have spur, but smaller than those of adult males (P. de Rebeira; D.J. James); scales, scutellate on front and outside of tarsus and top of toes, reticulate elsewhere. Outer toe 66–72% of middle, inner 59–70%, hind 30–38%. Claws, short, strong, slightly decurved.

SEXING, AGEING First-year males (following post-juvenile moult) acquire varying amount of adult-like feathering; head, neck, mantle, back and breast, mostly like adult but with scattered to numerous brownish and buff-brown juvenile-like feathers intermingled; belly and vent, juvenile or female-like; train, short, barred (Delacour 1951). Second-year males, like adult males but train short with few or no ocelli. Length of train increases with age in males; rapidly up to fourth year, then more gradually, probably for a couple of years (Manning 1987). Details for ageing females not described; at least first-year birds probably separable. Development of spur for sexing juveniles needs study. Chicks develop crest after c. 1 month old (P. de Rebeira).

GEOGRAPHICAL VARIATION No subspecies (Peters). Hybridize with Green Peafowl *Pavo muticus* in captivity (Delacour 1951).

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