

body, and wing-coverts new, and tail new except for growing t6. One, early October, Jordan, had score 46 (primary moult almost completed), and wing and tail new except for a few scattered feathers growing on body and growing t6. In *Halcyon* generally, secondaries moulted ascendantly and descendantly from s11-s12 (starting at same time as p1) and ascendantly from s1 (starting with p6-p7); s4 moulted last, growing with p10; tail moulted centrifugally, starting with t1 at loss of p2-p3 (Stresemann and Stresemann 1966). POST-JUVENILE. Partial; all head, body, and wing-coverts, no flight-feathers and apparently no tail-feathers. Starts soon after fledging, head and underparts first; completed October-November.

**Measurements.** Nominate *smyrnensis*. ADULT. Turkey, Lebanon, Israel, Jordan, and Iraq, all year; skins (BMNH, RMNH, ZFMK, ZMA, ZMM). Bill (F) to forehead, bill (N) to distal edge of nostril.

WING	♂ 128 (3.00; 15)	124-134	♀ 127 (1.95; 11)	124-131
TAIL	86.7 (3.87; 11)	82-93	86.6 (3.95; 7)	84-92
BILL (F)	64.1 (3.99; 11)	58.7-70.7	64.4 (3.04; 7)	60.3-69.4
BILL (N)	51.2 (3.41; 14)	47.3-56.9	52.1 (2.66; 9)	48.3-56.7
TARSUS	16.6 (0.48; 13)	15.9-17.2	17.0 (0.93; 8)	15.8-18.0

Sex differences not significant.

Sexes combined. Nominate *smyrnensis*: (1) Southern Turkey (Izmir to Amik Gölü); (2) Lebanon, Israel, and Jordan; (3) Iraq. *H. s. fusca*: (4) Nepal to central India; (5) Ceylon; (6) Malaya and Sumatra; (7) Fukien (south-east China).

	WING		BILL (N)	
(1)	130 (2.05; 9)	128-134	51.4 (1.76; 9)	48.9-54.6
(2)	128 (2.70; 16)	125-133	50.5 (3.25; 14)	47.3-56.9
(3)	126 (1.87; 24)	123-129	52.1 (2.01; 20)	49.3-56.9
(4)	122 (3.50; 6)	118-126	50.6 (3.94; 4)	46.8-55.1
(5)	114 (2.92; 21)	109-118	47.1 (2.41; 22)	44.7-51.9
(6)	120 (2.52; 9)	116-123	47.3 (2.57; 8)	44.2-51.5
(7)	127 (3.27; 5)	123-132	48.9 (3.63; 4)	44.9-53.4

JUVENILE. Wing and tail in Middle East birds both on average c. 3 shorter than adult; bill not full-grown until after post-juvenile moult.

**Weights.** Nominate *smyrnensis*. Iraq, February: ♀ 110; sex unknown, 92, 98, 104 (BMNH). Iran, ♂♂: February, 85; March, 88 (Paludan 1938; Diesselhorst 1962).

*H. s. fusca*. India: 3 ♂♂, 78-83; sex unknown, 79 (Ali and Ripley 1970). Malaya: ♂♂ 76, 78, 87 (ZMO). Nepal, ♂♂: 82, 83 (Diesselhorst 1968).

## *Halcyon leucocephala* Grey-headed Kingfisher

Du. Grijskoprijsvogel FR. Martin-chasseur à tête grise GE. Graukopfliest  
Ru. Сероголовый зимородок Sp. Martin pescador de cabeza gris Sw. Gråhuvad Kungsfiskare

*Alcedo leucocephala* P L. Stenius Müller, 1776

Polytypic. *H. l. acteon* (Lesson, 1831), Cape Verde Islands. Extralimital: nominate *leucocephala* (P L. Stenius Müller, 1776), northern Afrotropics from Sénégal to Ethiopia and northern Somalia, south to northern Zaïre and Lake Victoria; *semicaerulea* (Gmelin, 1788), south-west Arabia; *hyacinthina* Reichenow, 1900, coastal Kenya and north-east Tanzania, Pemba, and Zanzibar; *pallidiventris* Cabanis, 1880, southern Afrotropics north to southern Zaïre, Tanzania, and inland Kenya.

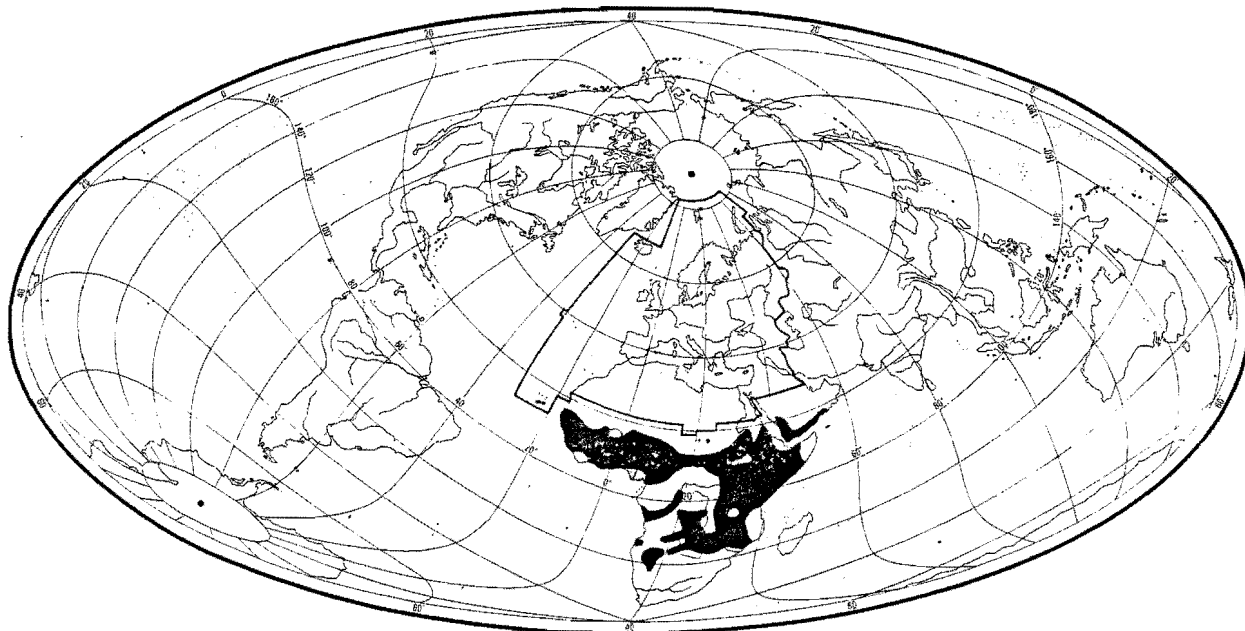
**Field characters.** 21-22 cm; wing-span 32-34 cm; bill 4 cm. About 20% smaller than White-breasted Kingfisher

**Structure.** Wing short and rather broad, tip rounded. 10 primaries: p8 longest, p9 4-7 shorter, p10 20-29, p7 0-1, p6 1-3, p5 8-11, p4 12-15, p1 20-25. Inner web of (p6-p7-p10) and outer web of p6-p9 slightly emarginated. Tail rather short and narrow, tip rounded; 12 feathers, t6 16-22 shorter than t1. Bill large and massive; base broad and wide, pentagonal in cross-section, tip laterally compressed; culmen and gonys with blunt ridge, both curving slightly to sharply pointed tip. Length of exposed culmen 8 mm less than length from tip to forehead. Nostrils small, rounded-triangular, bordered at rear by loreal feathering. Leg short and rather weak; tibia feathered, tarsus bare. Toes rather long, slender; outer toe c. 88% of middle, inner c. 58%, hind c. 56%. Claws short, sharp, strongly curved.

**Geographical variation.** Rather complex and mainly clinal; involves size, depth of chestnut and blue colouring, and extent of white on underparts. Nominate *smyrnensis* from Asia Minor to north-west India large and relatively pale; head, neck, upper mantle, and much of underparts deep chestnut; blue of lower mantle, scapulars, wing, and tail turquoise- or greenish-blue; blue of back to upper tail-coverts bright cerulean-blue. Isolated *saturation* from Andaman Islands also large; chestnut darker, almost blackish; blue of upperparts, wing, and tail deep violet-blue. *H. s. gularis* from Philippines differs from all others in completely chestnut underparts (except for cream-buff or pale cinnamon chin) and in restricted area of chestnut on lesser upper wing-coverts, these mainly black like median. Other populations all attributed to *fusca*, following Vaurie (1965), though far from uniform in size and colour, and 1-2 more races perhaps recognizable. Typical *fusca* from southern India and Ceylon small (see Measurements), chestnut very dark, almost blackish (except vent and under tail-coverts), and blue of body, tail, and wing turquoise or pale cerulean as in nominate *smyrnensis*; grades clinally into nominate *smyrnensis*, birds from Nepal to central peninsular India being intermediate in depth of chestnut and in size. Further east, from eastern India and Bangladesh through south-east Asia, depth of chestnut and size more or less intermediate between nominate *smyrnensis* and typical south Indian *fusca*, but blue of upperparts, tail, and wing bright dark blue or violet-blue, only slightly greenish in some lights on tertials and t1, not as pale turquoise- or greenish-blue as in both those races. Within south-east Asia, birds from south-east China largest and often with deep bill-base and markedly angled gonys; those from Malaya southward smallest and brightest blue.

Forms superspecies with Java Kingfisher *H. cyanoventris* from Java and Bali; sometimes considered conspecific (e.g. Dummerman 1929-30), but breeding ranges show recent overlap in western Java (Somadikarta 1973). CSR

PLATES 64 and 68  
[between pages 686 and 687]



blue and black back and wings, blue tail, and chestnut underbody. A bird of dry habitats. Sexes similar; no seasonal variation. Juvenile separable.

**ADULT MALE.** Large vermilion bill. Head and breast pale grey (on some ♂♂, head stone-white), becoming white on throat and foreneck, and (unless plumage very worn) sharply divided from chestnut belly. Back mainly black. Rump and tail and most of wing deep blue, with black primaries and larger wing-coverts. In flight, blue centre to back exposed but wing does not show pattern as bold as *H. smyrnensis*. Legs coral-red. **ADULT FEMALE.** As ♂, but head often tinged brown, lacking clear grey-white tone. **JUVENILE.** Chestnut underbody paler (especially in centre) and less extensive than on adult; breast shows crescentic marks and is not sharply divided from belly. Bill all or partly black; legs pink-grey.

Unmistakable. Flight direct and fast, but action less rapid than that of Kingfisher *Alcedo atthis*, with spread of bigger wings more obvious. Hunts like shrike (Laniidae) by pouncing from perch.

Commonest calls a rapid chatter and (when breeding) a shrill twitter.

**Habitat.** In tropical Africa, including oceanic islands (Cape Verde Islands), in lowlands but also mountain plateaux up to c. 1600 m. Avoids mangroves and closed forest, although quickly colonizes clearings. Has widest habitat tolerance of its genus in West Africa, occurring on driest savanna and anywhere in open country with ground cover. Commonest garden kingfisher in Sierra Leone (G D Field). In rains, ranges furthest towards desert. Not particularly attracted to water, but found in swamps and in Nigeria often seen by tree-fringed margin of stream. Breeds in tunnels in sandy banks of river or

dried up streambed, or sides of irrigation ditch in cultivated fields, or in borrow-pit (Bannerman 1951). In Cape Verde Islands, numerous in dry ravines and in vineyards; generally in driest valley, sitting on branches of castor oil plant *Ricinus communis* or coral tree *Erythrina*. Common also in neighbourhood of dwellings, sitting on concrete wall of water tank in public garden, and diving breast first to bathe in a shady pool in heat of day (Bannerman and Bannerman 1968). In mainland Africa, shifts after dry season from forest clearings to savanna zone. In East Africa, frequents wooded areas, *Acacia* savanna, and dry semi-desert bush (Williams 1963). In Somalia, often lives far from water in dry open *Acacia* scrub, or perches in dead tree in middle of patch of dry cultivation, or along dry water-courses or marsh-edges, watching for insects. Near coast, favours gardens with groves of date palms and little irrigation channels, or edges of mangrove swamp (Archer and Godman 1961).

**Distribution and population.** In west Palearctic, breeds only in Cape Verde Islands on São Tiago, Brava, and Fogo. No information on numbers, but human persecution, formerly rare, said to have increased in recent years (Bannerman and Bannerman 1968; Naurois 1983b).

**Movements.** *H. l. acteon* of Cape Verde Islands resident. In Africa, populations on both sides of equator move seasonally into higher latitudes either before or after breeding.

In northern tropics, movements studied most closely in Nigeria, where birds make unusual 2-stage northward progression during first half of year (Skinner 1968; Elgood *et al.* 1973; Elgood 1982). Present southern Nigeria in dry season (November–February), then moving northwards

into central Nigeria (Guinea savanna zone) to breed March–May. Following this, moves further north to become non-breeding wet-season visitor (May–October) to Sudan savanna and Sahel zone and even further into Niger. Some presumed sub-adults stay there for ensuing dry season, but most birds return south in October–November; many (perhaps not all) overfly breeding range to reach southern Nigeria again by mid-November.

Elsewhere in Sahel zone (e.g. Mali, central Chad, Darfur), arrives and breeds during scanty summer rains, May–October (Lynes 1925*a*; Salvan 1968*b*; Lamarche 1980; Newby 1980). See also Britton (1980) for East Africa, including 2 Kenyan recoveries of birds ringed in Ethiopia. Population breeding southern Arabia absent December–March, and presumably migrates to Africa (Jennings 1981*a*) as there are a few records of birds at sea in Gulf of Aden and southern Red Sea in November and April–May (Moreau 1938; Bailey 1966*b*).

**Food.** On Cape Verde Islands: lizards (including geckos), one recorded *c.* 12 cm; mice; insects, including grasshoppers and locusts (Acrididae, e.g. *Catenops*) and beetles (Coleoptera). Small mouse struck against branch until dead, then held for 15 min before being swallowed head-first (Bannerman and Bannerman 1968). In Saudi Arabia, seen to catch fish by flying low over water and dipping bill in (King 1978). In Africa, mole-cricket (Gryllotalpidae), ants (Formicidae), and frogs also recorded (Mackworth-Praed and Grant 1970; McLachlan and Liversidge 1970).

DJB, BDSS

**Social pattern and behaviour.** Little information for west Palearctic (see Sharpe 1868–71, Bannerman and Bannerman 1968). Based largely on information for nominate *leucocephala*, East Africa, provided by H-U Reyer.

1. Dispersion outside breeding season appears to vary regionally. After breeding, family parties of up to 6 seen, East Africa (Someren 1956). On Cape Verde Islands, formerly occurred in flocks of 8–10 'outside insect season' (see Sharpe 1868–71). Said to be strictly solitary, Somalia, outside breeding season (Archer and Godman 1961). At Lake Nakuru (Kenya), solitary, but at Lake Victoria (Kenya) in pairs (see Bonds, below). On migration, Nigeria, several birds per ha may occur (C H Fry). **BONDS.** Little information. Mating system probably basically monogamous. At Lake Victoria, pairs typically remain together throughout the year (H-U Reyer). Both ♂ and ♀ incubate and care for young (Sharpe 1868–71; Someren 1956; H-U Reyer). Although young remain with parents for a long time after fledging, more than a few weeks' dependence for food unlikely (H-U Reyer; see Relations within Family Group, below). While prolonged family bonds offer the potential for nest-helpers to occur, as in Pied Kingfisher *Ceryle rudis*, none yet reported for *H. leucocephala* (H-U Reyer). **BREEDING DISPERSION.** Defends breeding territory which serves for nesting and care of young at least up until fledging. During breeding season, Sierra Leone, pairs widely separated (Sharpe 1868–71). In Kenya, territories strung out, sometimes only 100 m apart along both sides of river, and extending 200–300 m back from it; territory size therefore *c.* 2–3 ha (H-U Reyer). In many places, mainland Africa, said to breed 'almost in colonies' (Mackworth-Praed and Grant 1970). In Ghana, birds

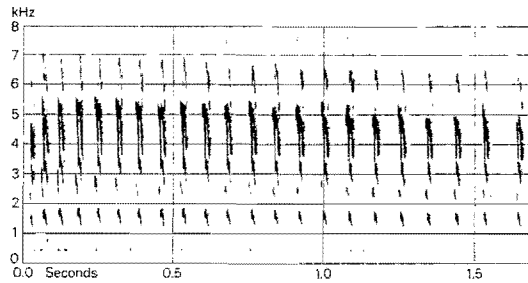
arriving from migration took over breeding territories vacated by departing Senegal Kingfishers *H. senegalensis* (Greig-Smith 1978*a*). In some areas (not in, e.g., Kenya), pairs typically continue to defend territories outside breeding season (H-U Reyer). **ROOSTING.** At night, said to assemble (numbers not given) at roost in dense woodland cover (see Sharpe 1868–71). By day, regular hunting perch also used for loafing (e.g. Sharpe 1868–71). During heat of day, often bathes (Alexander 1898; see also Ruwet 1964). Performs series of dives from perch; between dives returns to perch to shake and preen (Alexander 1898). After bathing and preening, sometimes rests to sunbathe on perch or on sandy river-bank, crouching on belly with bill half-open; tail fanned and wings outspread (H-U Reyer; see also Bannerman and Bannerman 1968). Wings spread horizontally and for much longer periods than in the different Wings-spread posture (P W Greig-Smith; see below).

2. On Cape Verde Islands, said to be very tame, flushing only on close approach with Contact-alarm call (see 1 in Voice); in alarm, ♂ erects crown feathers (Sharpe 1868–71). As in other *Halcyon*, commonly Head-bobs on perch, possibly expressing alarm or excitement (Chapin 1939; see also Greig-Smith 1978*a, b*). For timid behaviour at nest, however, see Parental Anti-predator Strategies, below. **FLOCK BEHAVIOUR.** No information. **ANTAGONISTIC BEHAVIOUR.** Markedly aggressive at start of breeding season when establishing and defending territories. Defence and advertisement of territory mainly (perhaps exclusively) by ♂. Advertising ♂ may sit upright on prominent perch, wings slightly lowered and tail held up at *c.* 45°, and give Advertising-call (see 2 in Voice). May also fly around territory, circling high in the air, giving Advertising-call; aerial advertisement (see Heterosexual Behaviour, below) often provokes confrontation with neighbours, leading to a chase. Rivals may perch close to each other and threaten by facing each other in an upright posture with open bills. Bird thus perched may spread its wings in vertical plane (Wings-spread posture) and splay tips to highlight bold black and white underwing markings (H-U Reyer, C H Fry). In Ghana, birds of various other species driven off by chasing, swooping attacks (P W Greig-Smith). **HETEROSEXUAL BEHAVIOUR.** Sequence of courtship and pair-formation not well known. Comprises aerial and ground behaviour, apparently same displays and vocalizations serving to attract mates and repel rivals (H-U Reyer). In Sierra Leone, aerial display involved a lot of calling (see 2 in Voice) in high semi-hovering flight, and circling round, followed by plunging dives to tree (G D Field). In Oman, birds performing display-flight circled close to ♀ giving Advertising-call; apparent Duetting-calls (see below) also heard, mostly from perched birds (Walker 1981*b*). On ground, courting birds of both sexes commonly adopt Wings-spread posture, more readily so than in antagonistic encounters (H-U Reyer). May display thus alone or facing mate 2–10 m away. Mate may reciprocate, calling, with whole body vibrating slightly, and sometimes pivoting body and wings through *c.* 90° without shifting stance on perch. At end of bout of such Duetting-calls (see 3, also 2, in Voice), folds wings abruptly. May extend them again equally rapidly, opening and closing them once or twice more without calling (C H Fry). Display between pair probably serves as Meeting-ceremony. When Duetting-calls delivered in antiphonal duet, may represent territorial display of established pair (H-U Reyer), as proposed for Striped Kingfisher *H. chelicuti* (Wickler 1976). When nest-chamber almost complete, ♂ starts courtship-feeding ♀, and may continue to do so well after egg-laying (H-U Reyer). ♂ seen to catch insects in flight to feed to ♀ on nest (Sharpe 1868–71). **RELATIONS WITHIN FAMILY GROUP.** Young in nest start begging on hearing either wing-beats of approaching parent, or Trilling-call (see 5 in Voice) of parent

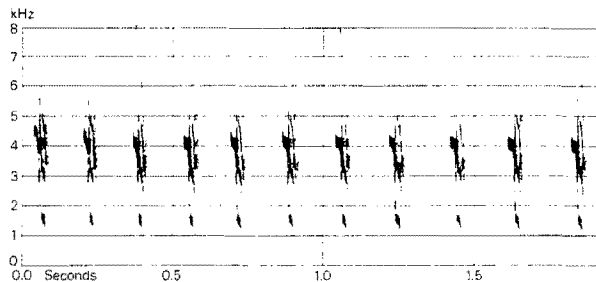
perched with food near tunnel entrance. Chick in nest-chamber sitting directly at end of nest-tunnel often pecks and bites siblings until they fall silent. Chick thus positioned is usual recipient of food (see also Kingfisher *Alcedo atthis*). Parent enters nest-chamber to feed small young, then turns and leaves tunnel head-first. From *c.* 2 weeks, 1 chick meets parent half-way along tunnel to snatch food, parent then retreating tail-first; chick thus fed returns to nest-chamber where some jostling occurs for most favourable position—that directly facing nest-tunnel (H-U Reyer). From *c.* 1–2 days before fledging, young make progressively longer sorties to tunnel entrance; initially look around briefly before retreating, but gradually remain longer, making wing-stretching movements. Fledging partly forced by siblings pushing from behind. Birds hand-reared in captivity caught live grasshoppers (Acrididae) at 2 weeks, and continued begging until *c.* 4 weeks old. Young chased away by parents at *c.* 3½–4 months. One 2½-month-old juvenile seen with parents who had 2nd clutch (H-U Reyer). ANTI-PREDATOR RESPONSES OF YOUNG. No information. PARENTAL ANTI-PREDATOR STRATEGIES. Timid and retiring at nest, sitting bird readily flushing from hard-set eggs well before close approach of man (Lynes 1925a; Broughton-Leigh 1932; Jourdain and Shuel 1935; Vincent 1946a). H-UR, EKD

**Voice.** Freely used during breeding season. Most information for nominate *leucocephala*; nothing known about possible differences between races. Motivation and function of different calls poorly understood. Following account compiled from recordings, sonagrams, classification, and notes provided by H-U Reyer.

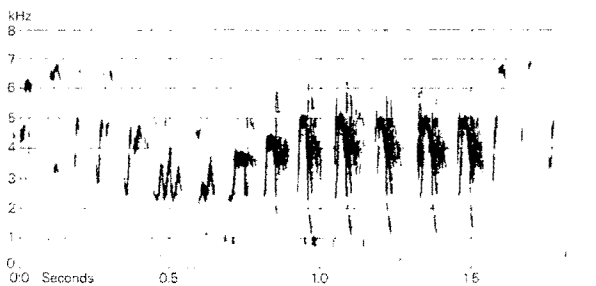
**CALLS OF ADULTS.** (1) Contact-alarm call. Very rapid, reeling 't-t-t-t-t-t...' with harsh, strident quality (E K Dunn: Fig I). May contain up to 150 't-' units. May give single call or more often a series with *c.* 4–20 s between calls. Birds may call alone or alternate with mate. Typically given when disturbed or excited, e.g. by observer suddenly appearing from hide, by juvenile leaving nest, or when chased by birds of other species. (2) Advertising-call. Rapid (6 per s), staccato 'chi-chi-chi-chi-chi...' (E K Dunn: Fig II). Call contains *c.* 10–40 'chi-' sounds, each separated by *c.* 120 ms. Probably serves both to attract ♀♀ and rebuff ♂♂. Mostly heard at start of breeding season, when it occurs in long bouts with *c.* 1 s between calls. Given mainly, perhaps exclusively, by ♂, both in flight and from perch (see Social Pattern and Behaviour). Neighbouring ♂♂ respond with same call, either overlapping or alternating with 1st ♂. Advertising-call elicits call 3 (see below) in ♀♀, whereupon advertising ♂ may also switch to call 3. (3) Duetting-call. Similar to call 2, serving closely related function. Given by both sexes, either unaccompanied or in antiphonal duet. Recording (Fig III) of unaccompanied bird begins with rapid warble, followed by 3–15 'chee'-like units, delivered in rapid series. Often given in Meeting-ceremony; also directed (in antiphonal duet) by pair at neighbouring pairs, then probably serving as joint territorial display of established pair. (4) Hunting-call. A brief, high-pitched, rapid trill, with fluting quality—'titititit' or 'trrrrt' (E K Dunn). Given often, but not always, as bird pounces on prey, and also while returning to perch. (5) Trilling call. Rather faint call (not des-



I H-U Reyer Kenya May 1976



II H-U Reyer Kenya May 1976



III H-U Reyer Kenya May 1976

cribed) sometimes given by food-carrying bird, e.g. just before entering nest. Function not clear, but possibly a contact-call as ♂ Striped Kingfisher *H. chelicuti* gives similar call just before courtship-feeding (H-U Reyer).

**CALLS OF YOUNG.** Food-call changes in structure and volume from hatching up until *c.* 4 weeks after fledging, when begging ceases. At *c.* 2 weeks, a hoarse, throaty 'schri-schri-schri-schri...' given in long bouts (E K Dunn); increases in volume when parent approaches nest, or when young jostling for position, and then can be clearly heard outside nest. At *c.* 3 weeks (shortly before fledging), young acquire call similar to call 1 of adult, and which later develops into it. Call 3 of adult first heard in juvenile at *c.* 4 months, when family breaks up (H-U Reyer).

H-UR, EKD

**Breeding. SEASON.** Cape Verde Islands: mid-July to mid-December and February–April (Naurois 1983b). In East Africa, clearly associated with rainy season (H-U Reyer); see also Movements. **SITE.** Hole in cliff, or bank, of river, road cutting, or pit; 15 cm to *c.* 20 m above ground, but usually in upper part of cliff or bank (H-U Reyer). **Nest:** tunnel with chamber at end. Usually 40–100 cm long, 5–

6 cm in diameter, with chamber 15 cm across (Serle 1939; H-U Reyer). Building: tunnel excavated by both adults. EGGS. See Plate 98. Almost spherical, smooth and glossy; white.  $24 \times 22$  mm ( $22-25 \times 20-22$ ),  $n=14$  (Nigeria) (Serle 1939). Clutch: 3-4(-5). 2 broods recorded (Bannerman 1953). INCUBATION. About 18 days (H-U Reyer). By both parents. YOUNG. Altricial and nidicolous. Fed by both parents. FLEDGING TO MATURITY. Fledging period c. 25 days (H-U Reyer). Probably become independent at  $3\frac{1}{2}$ -4 months (H-U Reyer). Age of first breeding not known. BREEDING SUCCESS. No information.

**Plumages (*H. l. acteon*).** ADULT MALE. Forehead, crown, and ear-coverts pale buff-grey, remainder of head, hindneck, sides of neck, and upper mantle pale cream-grey or greyish-white. Lower mantle, scapulars, and upper wing-coverts deep black; some contrastingly white bases of scapulars sometimes visible; occasionally, rufous-cinnamon border where whitish upper mantle meets black. Back, rump, and upper tail-coverts glossy bright dark blue; tail slightly paler, more cerulean-blue, fresh feathers narrowly edged dusky grey (broader on inner webs of t2-t5), t1 laterally slightly tinged greenish-blue; tail dull black below. Chin to chest and centre of breast white or with slight buff or cream wash, remainder of underparts bright rufous-chestnut. Bases of primaries pale cerulean-blue on outer web, white on inner; 50-55 mm of tip black on p9, gradually less on inner primaries, until 10-15 mm on p1; tip subterminally bordered by dark blue or violet-blue. Secondaries and tertiaries dark glossy blue, contrasting strongly with deep black upper wing-coverts; narrow tip and broader border along inner web of secondaries dull black, blue deepest along shaft, often slightly violet-blue. Greater and median upper primary coverts turquoise-blue with tips darkening to dark blue; lesser primary coverts cinnamon. Bastard wing dark blue, feather-tips and shafts dusky. Small coverts along leading edge of wing chestnut, grading to pale cinnamon and white at carpal joint. Under wing-coverts and axillaries rufous-chestnut; greater under primary coverts white with black tips. White of primary-bases forms triangular patch on undersurface of wing, white extending 10-15 mm beyond black tips of greater under wing-coverts on p10, c. 40 mm on p1. In fresh plumage, feathers of crown, hindneck, and cheeks show faint dusky terminal fringes (narrower than those of juvenile); in worn plumage, head and crown in others, or with white forehead grading to grey hindcrown; often shows dusky shaft-streaks when crown worn. Chestnut of underparts bleached to orange-cinnamon when worn. ADULT FEMALE. Like ♂, but forehead and crown slightly darker pale grey-buff, less whitish, giving brown-grey appearance when plumage worn rather than almost white as in some ♂♂; back to tail slightly paler blue, less bright dark blue; secondaries cerulean-blue or turquoise-blue rather than dark blue; chestnut of underparts sometimes less deep; white of chest sometimes extends slightly further down. NESTLING. Naked at hatching, becoming spiny later on as in Kingfisher *Alcedo atthis*; no information on timing. JUVENILE. Like adult ♀, but tips of feathers of crown with fine buff and dull black bars, appearing mottled; cream-buff hindneck with grey subterminal bars; black of mantle, scapulars, and upper wing-coverts duller and more greyish, less velvety black; much dark grey of feather-bases showing on back and rump, dark blue feather-tips relatively narrow. White of chin, throat, and chest tinged buff; cheeks, chest, and upper breast with distinct but narrow black fringes on feather-tips, appearing scaled, often

some fine grey specks, streaks, or spots subterminally; chestnut of remainder of underparts paler, more yellow-cinnamon, partly washed white, especially on mid-belly. Wing as in adult ♀, but black of primary-tips duller and more extensive; blue of primaries paler, more greenish; white of bases of inner webs of primaries extends to just across shaft on outer webs; inner webs and tips of secondaries with broader dark grey borders; small coverts along leading edge of wing yellow-buff. Sexes similar, but back to tail of ♂ more often dark blue, of ♀ greenish-blue. See also Bare Parts. In worn plumage, forehead and crown heavily streaked dusky; much off-white or dull grey visible among greyish-black of mantle, scapulars, and upper wing-coverts; cinnamon of underparts strongly bleached, more cream or white of feather-bases visible. FIRST ADULT. Like adult, but flight-feathers still juvenile; juvenile character of these often difficult to see, especially when worn. Fresh cheeks and chest occasionally with dark crescents, as in juvenile.

**Bare parts.** ADULT. Iris warm sepia or dark hazel-brown. Bill brilliant scarlet or vermilion. Leg and foot coral-red or crimson-red. NESTLING. Skin flesh-colour. Iris brownish-grey. Bill black, tip of bill and corner of mouth dull orange-yellow. Leg and foot dusky brown, rear of tarsus and sole yellow. (Chapin 1939.) JUVENILE. Iris sepia. Bill black at fledging; gradually becomes more red, at base first; red with dusky tip during last stages of post-juvenile body moult, fully red when body moult completed. Leg and foot pinkish-grey with dusky edges to scutes; soles and rear of tarsus pale flesh-white; gradually brighter pinkish-red and orange-red during post-juvenile body moult. (BMNH, RMNH.)

**Moult.** (1) *H. l. acteon* (Cape Verde Islands). ADULT POST-BREEDING. Complete, primaries descendant. Starts with loss of p1, followed by scattered feathers of forehead and crown and some feathers of belly and flanks from primary moult score 15-25; much of head and underparts and part of mantle, scapulars, back, rump, and upper wing-coverts new at score 30-35, all new at c. 45. Tail started at score 20-30, completed with primaries (score 50); sequence approximately 1-2-5-3-4. Secondaries replaced during last stages of primary moult. Timing in relation to breeding season difficult to establish due to prolonged breeding. Probably starts with p1 late October to early January, completing April-June. In late November and early December, scores 0, 13, 14, and 22 recorded, but also 31 and 35; in mid-January, 14, 17, and 20; in mid-February, 16, in mid-April, 49; in May and June, moult completed (score 50). 3 birds, December-February, suspended primary moult with scores 25, 25, and 30; these perhaps started moult after fledging of 1st brood, suspending when 2nd raised. POST-JUVENILE. Partial: head, body, and most wing-coverts, not flight-feathers and apparently not tail. Crown and nape first, followed by underparts and mantle; vent, tail-coverts, and part of wing-coverts last. 2 groups of juveniles discernible, probably corresponding with young of 1st and 2nd broods. In 1st group, juvenile plumage fresh October-November; moult started November-December; head, neck, and underparts, and scattered feathers of upperparts and wing-coverts new January-February; all new except tail, flight-feathers, and a few scattered feathers on vent and wing March-April. In 2nd group, juvenile plumage fresh January-February and moult c. 3 months later than in 1st group.

(2) N nominate *leucocephala*. In Nigeria, where breeding February-May (late in dry season), adults and juveniles have complete moult May-November (in wet season). Onset of primary moult variable, adult starting mainly late May to late June,

juvenile early June to early August, but early-starting birds moult slower than late ones and moult in all birds completed with p10 within a short period late October and early November. In birds starting May, complete replacement takes up to 176 days and on average 1.7 primaries grow simultaneously; in those starting July–August, as little as 92 days needed and average of 2.3 primaries grow simultaneously. Only occasionally is moult suspended and a few outer primaries then retained until next moulting season. Secondaries moult ascendantly from s1 to s4 (s1 lost when p5–p6 growing) and descendantly from s12 to s5 (starting when p2 full-grown); moult of both series completed at about same time as p10 in adult, but s2–s4 completed later than p10 in juvenile (juvenile otherwise similar to adult from October). (Jones 1980.)

**Measurements.** *H. l. acteon*. Cape Verde Islands, November–June; skins (BMNH, RMNH, ZMA). Bill (F) is to forehead, bill (N) to nostril, both in adult only.

WING AD	♂ 105 (1.84; 14)	102–109	♀ 103 (2.16; 13)	99–106
JUV	103 (2.99; 4)	100–106	103 (4.16; 5)	97–106
TAIL AD	65.2 (2.58; 14)	62–70	63.4 (2.60; 10)	60–67
JUV	62.1 (1.65; 4)	60–64	62.0 (2.27; 4)	59–64
BILL (F)	47.2 (1.85; 14)	45–51	46.9 (2.71; 13)	44–52
BILL (N)	37.7 (1.57; 14)	36–41	37.7 (2.46; 13)	35–42
TARSUS	14.9 (0.40; 15)	14.3–15.5	15.2 (0.63; 10)	14.3–15.8

Sex differences significant for adult wing. Juvenile wing and tail not significantly shorter than adult.

**Weights.** No information for *acteon*. Afrotropical races (similar in size to *acteon* except for slightly shorter bill). Nigeria: adult 40.4 (2.7; 8) 36–44, juvenile 38.5 (2.0; 12) 35–42 (Fry 1970). Ghana: 44 (Greig-Smith and Davidson 1977). Zaïre: ♂♂ 41, 42, 44; ♀ 41 (Verheyen 1953). Kenya: ♂♂ 34, 42, 43, 45; ♀♀ 37, 40 (Britton 1970; Colston 1971). Tanzania: 2 ♂♂ and 2 ♀♀, 41–52 (Meise 1937). Zambia: 42, 45 (Britton and Dowsett 1969). Botswana: 47 (Jackson 1969).

**Structure.** Wing rather short and broad, tip rounded. 10 primaries: p8 longest, p9 1–3 shorter, p10 12–18, p7 0–1, p6 1–3, p5 7–9, p4 9–14, p1 17–22. Inner web of p8–p10 and outer web of p7–p9 slightly emarginated. Tail rather short, slightly

rounded; 10 feathers, t5 5–9 shorter than t1. Bill as in White-breasted Kingfisher *H. smyrnensis*, but much smaller and less massive. Tarsus short and slender; toes rather short and slender. Middle toe with claw 21.6 (20–23); outer toe with claw c. 87% of middle, inner c. 56%, hind c. 53%. Remainder of structure as in *H. smyrnensis*.

**Geographical variation.** Mainly in colour, slight in size. 2 widely distributed races in Afrotropics, rather different in colour—nominate *leucocephala* in belt south of Sahara and *pallidiventris* in southern third of Africa; 3–4 more local races in Arabia and East Africa combine characters of these 2 in varying degrees. Size of all races similar to *acteon*, but bill shorter: e.g. in nominate *leucocephala*, wing 104 (14) 100–108, tail 65 (14) 60–69, bill to forehead 43.2 (13) 40–46, bill to nostril 34.0 (13) 31–37. Colour of West African nominate *leucocephala* as in *acteon*, but head, neck, upper mantle, and breast slightly darker buffish-grey, whitish only on indistinct supercilium and on throat, often with rufous band at border of black lower mantle, occasionally also across back of head; blue of back to tail and on wing paler greenish-blue or turquoise-green. *H. l. semicaerulea* from southwest Arabia similar to nominate *leucocephala*, but blue darker cobalt-blue; Ethiopian birds intermediate between *semicaerulea* and nominate *leucocephala* or nearer latter. *H. l. pallidiventris* from southern Africa differs from previous races by uniform medium grey head, neck, upper mantle, and breast with distinct white supercilium; belly to tail-coverts, flanks, and under wing-coverts tawny-cinnamon instead of rufous-chestnut; blue of upperparts and wing more violet or purple-blue than in other races. *H. l. hyacinthina* of coastal East Africa and perhaps south into Moçambique combines colour of head and underparts of nominate *leucocephala* with purple-blue flight-feathers and back to tail of *pallidiventris*. On other hand, birds breeding inland East Africa (west to eastern Zaïre) combine grey head and neck of *pallidiventris*, paler blue of nominate *leucocephala*, and variable depth of chestnut on underparts; these either included in *pallidiventris* (Mackworth-Praed and Grant 1952), included in nominate *leucocephala* (Britton 1980), or separated as *centralis* Neumann, 1905.

Considered by Fry (1980) to form superspecies with Black-capped Kingfisher *H. pileata* of eastern and southern Asia. CSR

## Subfamily ALCEDININAE small kingfishers

Very small to medium-sized kingfishers, mainly frequenting watersides. 23 species in 4 genera: (1) *Alcedo* (9 species; Eurasia, Africa); (2) *Myioceyx* (single species—African Dwarf Kingfisher *M. lecontei*); (3) *Ispidina* (pygmy kingfishers, 2 species; Afrotropics); (4) *Ceyx* (far-eastern dwarf kingfishers, 11 species; southern Asia, Australasia). Represented in west Palearctic by 1 species of *Alcedo*, breeding. Fry (1980) recognized 22 species in 3 genera (*Ceyx*, *Corythornis*, *Alcedo*).

For general features, moults, etc., see Alcedinidae. P10 never shorter than p5. Tails very short (less than half wing

length). Bills strongly compressed laterally, culmens narrow, not depressed at base. Skulls narrow. Lower end of tibio-tarsus bare for a short distance, tarso-metatarsus short, but always clearly longer than inner toe without claw. Middle and outer toes long; inner short, vestigial, or absent.

Sexes alike in colour of upperparts; in 2 species, some differences in underparts; bill colour differences in *Alcedo*. Primaries and tail without white markings. Plumage always with strong blues or violaceous, crown spotted or barred with blue. Bills black and/or reddish.