

Notes on breeding, plumage, locomotion and feeding in Little Grebes *Tachybaptus ruficollis*

Introduction

These notes on Little Grebes *Tachybaptus ruficollis* fall into two sections: the first a complete breeding record cycle, the second on observations of a hand-reared immature. Brown *et al.* (1982) stated "broods of two to three in East Africa [are] usually reduced to one or less by end of fledging period." Here, where five hatchlings were reduced to zero, such decline is documented. A fledged immature, once returned to its natal dam and able to fend for itself and despite habituation and artificial feeding, permitted proximity to within touching distance which allowed observations to be made on locomotion and feeding that would otherwise have been difficult.

Observations on breeding cycle

On 24 May 1998 a Little Grebe in immature plumage appeared on a small, roughly oval dam (1°23'S, 36°44'E, c. 1720m) with a maximum diameter of 50m in Nairobi's Langata suburb. Peripheral vegetation included patches of *Papyrus* sp., *Phragmites* sp., *Typha* sp. and *Nymphae* sp. On 26 May a second grebe in adult plumage arrived and within 24h the courtship trill as described in Brown *ibid.* was being uttered frequently by both birds who spent all observed time within 10m of one another.

On 31 May a second grebe in adult plumage appeared. The two adults were close to one another when first observed, both uttered the courtship trill several times an hour. Periodically they chased the bird in immature plumage, which spent more time skulking under overhanging *Phragmites* reeds than on open water. It disappeared on 3 June after three days of being harried by the adult birds.

By the same date, 3 June, the two adults were already building a floating nest of aquatic weeds within a bed of *Phragmites* and anchored to a stem of this plant, in water c. 70cm deep. By 10 June it contained five eggs which were routinely covered whenever an incubating bird left the nest as described by Broekhuysen (1973). Commencement of incubation was not recorded, but was apparent by 6 June, i.e. before the last egg was likely to have been laid. Material was added to the nest which grew throughout incubation as reported in Brown *et al.* (1982). When the fifth egg was laid, the bottom of the internal nest cup was only c. 5mm above water level. Before the first egg hatched this had increased to c. 4cm. No other nest or courtship platform as reported by Brown *et al.* (1982) was made.

The date the first egg hatched is not known, but all had hatched by 5 July, i.e. within 32 days after nest building began. Once hatched, the young stayed on or at the nest accompanied by an adult for the next 11 days until 16 July. An adult was either with them on the nest or not more than 1m from it throughout this period.

Among grebes in general, young are reported riding on adults' backs, e.g. Brown *et al.* (1982), del Hoyo *et al.* (1992) – Little Grebes among them. The term 'riding' tends to obscure the reality that, at least in *T. ruficollis*, 'brooding' is more appropriate. The young were brooded, not underneath an adult, but between folded wings and on the back covered by scapulars, tertials and central back feathers. Sometimes they were completely hidden beneath these feathers, at other times, heads protruded. At yet other times they sat openly, thus more 'riding' on an adult's back.

On 17 July the five chicks were following an adult on open water. Numbered one to five in order of descending size, the difference between them was obvious, re-

flecting asynchronous hatching, presumably because incubation began before the last egg(s) was laid (del Hoyo *et al.* 1992). Over the next week this gradation became more obvious with the smallest chick subjectively half the size of the largest. Periodically, but with declining frequency, the young returned to and climbed on to the nest with an adult. The two smallest chicks, no. 4 and no. 5, spent more time on the nest and occasionally stayed there when the others followed a foraging adult.

After this same week during which both parents fed the young, on 25 July one adult ceased to do so. For a day it stayed still almost hidden among *Papyrus* stems, seemingly ill, and then disappeared. From then on the remaining adult spent all observed time hunting and feeding the young which followed it closely, soliciting with cheeping calls. On 28 July, three days after the first adult vanished, chick no. 1 was repeatedly attacking other young. By 2 August it had effectively established a mobile 'territory' about its parent, not allowing any other young within 2 m or so of it, effectively monopolizing all food provided by the adult. After a further two days, the adult itself was enforcing the 'territory' around itself and attacked any of the young which approached it except chick no. 1.

While chick no. 1 spent all its time protecting the adult from its siblings and being fed, the others started foraging for themselves, making short dives (3–5 s) mostly along the dam edges in thin aquatic vegetation. By now the size range between them was even more accentuated. Size was not the only difference between the siblings. Plumage colouring was most advanced with the largest, and least developed on the smallest, with nestling neck stripes being still prominent. Plumage change in the young Little Grebe is thus not related to time alone, but presumably to nutritional condition as well.

On the 5 August chick no. 5 was recovered comatose from the nest. Warmed and force-fed, it recovered. A day later, it could catch small guppies *Poecilia reticulata* and *Haplochromis* sp. fry in a kitchen sink half filled with water. On 6 August chick no. 4 was picked up alive on dry land 100 m from the dam. On 7 August chicks no. 2 and no. 3 were found on another pond some 25 m from the natal dam which, in order to reach, they had moved either through a patch of *Euclea* woodland or through thick *Panicum repens* grass. When found, both were foraging vigorously, diving for periods of more than 5 s. Neither lasted 4 h, however. In shallow water in thick grass, one was killed by a dog and shortly afterwards the other was taken by a Great Sparrowhawk *Accipiter melanoleuca*.

On 8 August chick no. 1 disappeared, and on 9 August the single adult had gone. While the loss of a parent may have 'overloaded' the surviving parent, the disintegration of this clutch of five grebe nestlings is in keeping with Brown's *op. cit.* record of hatchlings' poor survival. This observation presents a case of this process, and that under duress, despite grebe's inability to walk easily on land and presumably through harassment by both a parent and the eldest sibling, three of the five chicks hatched had made substantial terrestrial expeditions away from their natal water.

Observations on plumage change and skin colour in juveniles

The two captives were held in a kitchen sink and fed *ad lib.* with meal worms *Tenebrio* larvae and guppies. Chick no. 5 only survived for seven days. Yet in that time when cold or resting after being fed, it tried to clamber on top of its sibling, rather than trying to burrow beneath it as expected of most young birds seeking to be brooded.

When taken into captivity at a month or slightly more after hatching, all that re-

mained of the hatchlings' russet red on crown, occiput, nape and top of neck for both birds was on the crown. This became more obvious when the birds were being fed and hungry. Specifically, feathers on either side of the crown parted to display an area of very short crown feathers through which the skin beneath could be seen and flushed deep crimson. Thus, though not bald as in the bigger *Podiceps* grebes (Brown *et al.* 1982), this short 'fuzz' does not conceal the skin colouring. At the same time as the crown skin flushed crimson, the bill also changed colour: approaching crimson at the base, but fading towards the tip. Yet under the stress of being caught and held, all trace of red or pink on both crown and bill vanished and the bill became a pale horn yellow.

Observations on locomotion

On 15 August chick no. 4 was transferred to a fish tank 4 m in diameter and *c.* 0.7 m average depth in which there were *c.* 250 tilapia *Oreochromis andersoni* fry and fingerlings. There it could be watched feeding itself in the clear water. It showed two different modes of propulsion. On the surface, the tarsi hung down vertically beneath the bird as do a duck's, and are moved in alternate swimming strokes as in walking or paddling. Submerged, this changed. The legs were rotated outward through 90° so that the tarsi stuck out sideways and horizontally from the body and were moved synchronously like a pair of oars; both are pulled forward with lobes feathered and stroked backwards simultaneously with lobes extended. The efficiency of these oar strokes is greatly enhanced by the medially flattened tarsi minimizing drag. The switch from surface to subsurface leg positions appears to be a reflex triggered by the head entering water. Even when the stationary bird puts its head into the water to look below the surface, when the water reaches the bird's ear orifices, the tarsi flick outward into subsurface 'oaring' mode. As the head is withdrawn the tarsi drop down into surface 'paddling' mode.

The hydrodynamic advantages of the two propulsion systems are self-evident. On the surface, where a grebe has wings to acquire aerial speed, simple paddling leg movements are adequate. Below the surface where it needs speed for pursuing prey, synchronous oaring is more efficient. Using a pair of oars alternately would, in addition to providing forward motion, expend energy wastefully in lateral thrust away from the stroking oar and induce a zigzag course, as anyone who has rowed a boat will appreciate. Stroking synchronously, the oars cancel their opposing lateral thrusts.

Underwater when hunting, the grebe's plumage appears compressed and the wings kept tightly folded, changing the bird's rotund surface appearance into an altogether sleeker and slimmer outline. Relative to the bird's surface outline, the legs extended sideways appear longer. Pursuing fish underwater, the grebe was agile and fast, easily outpacing and out manoeuvring tilapia up to 5 cm long.

On 25 August, >50 days after hatching, grebe no. 4 was returned to its natal dam, now in its full immature plumage as described in Brown *et al.* (1982). However, up to this point it had not been seen trying to fly. It remained on the dam until December 1998 before disappearing. In the four months that it was present, its habituation to humans was reinforced by regular offerings of meal worms. It would approach people who came to the dam and usually stay in close proximity to them, even when not being fed.

Approaches to visitors by the reintroduced chick were sometimes made by paddle-swimming gently on the surface. At other times it approached using the typical Little Grebe skittering flight over the water surface. Yet, if hungry, it dived and 'oared'

its way to them just below the surface where its progress was visible. Subjectively, this subsurface oaring was far faster than its aerial skittering flight.

When at rest, the grebe raised its tarsi above water level, tucking them beneath the long, dense flank feathers that normally cover the folded wing. Consequently, all unfeathered parts of the bird were insulated from contact with water which presumably enhanced heat retention.

With tarsi drawn up out of the water, the bird's rounded underside presents little resistance to wind pressure. The slightest breeze moved the grebe, often rotating gently across the water surface. To resist such drifting, it often rested against, or sometimes on, lily leaves *Nymphaeae* or other aquatic vegetation.

Observations on feeding

The grebe disabled small prey with a mandible pinch before consuming it. When presented with a simultaneous choice of aquatic life from a scoop net, small insects, dragonfly larvae, small fishes and small crustaceans *Procambarus clarkii* of <3 cm in length were all taken. Despite having taken guppies when in the kitchen sink, they and tilapia fry were selected less readily than small insects and crustaceans when the bird could select. To measure ingestion underwater, 20 meal worms were dropped into water and sank to a depth of c. 0.4 m where they could be seen and the grebe had to dive to get them. The most it collected and swallowed underwater without surfacing was seven meal worms, seized while sinking or off the bottom.

No prey > c. 2 cm long was seen ingested under water. However fishes of c. 5 cm and *Rana* tadpoles > 8 cm were very occasionally caught, brought to the surface, held in the bill by either their head or tail, and killed by repeated head flicks. The whiplash violence of this movement was sufficient to break up a soft-bodied tadpole. To test how large an item the grebe could swallow, it was fed strips of raw fish, the biggest, which it ingested with some difficulty, being 12 cm x 1 cm x 1 cm. For the most part, however, it took much smaller prey.

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Disarray in avian taxonomy and nomenclature: dilemmas facing authors, checklist compilers and museum curators

At present, more than 1400 species have been recorded in East Africa (Kenya, Tanzania and Uganda) with well over 1000 from each of them.

Britton (1980) listed 1293 species for East Africa, and since that milestone document, our knowledge of the East African avifauna has come a long way, starting with the DNA-DNA hybridization work of Sibley *et al.* (1988) that advocated some significant changes to our earlier understanding of avian taxonomy. A few years later saw the publication of several world checklists by Howard & Moore, Clements, HBW/Birdlife International and the International Ornithological Committee (IOC), and, depending on who one chooses to follow, the East African, Kenya, Tanzania and Uganda bird lists can vary considerably. Authors, compilers of checklists, local bird report editors, and others, not to mention museum curators of birds, are all affected enormously: in which order should they arrange birds and which names to use for them.

So where does this leave those of us who have for so long been accustomed to certain traditional and often conservative beliefs – for the order and also for the names – when compiling country checklists? In East Africa, the starting point was certainly Britton (1980) whose order of families followed that of Wetmore (1960), while genera were arranged alphabetically within subfamilies, and species alphabetically within genera. Nomenclature largely followed White (1960, 1961, 1962a, 1962b, 1963, 1965) for the Afrotropical species and Vaurie (1959, 1965) for Palearctic migrants. Later in Kenya, the East Africa Natural History Society bird checklists of 1996 and 2009 adopted a number of then recently suggested changes in the volumes of *The Birds of Africa* and in Dickinson (2003), but at the same time maintained a cautious approach to new species-splits and the arrangement of genera. More recently, in Zimmerman *et al.* (1996), the sequence of families followed was largely that of Voous (1977, 1985), while the taxonomic treatment largely paralleled that of the published volumes of *The Birds of Africa* series (Brown *et al.* 1982, *et seq.*).

In the meantime, and particularly during the last decade (2007–2017), we have witnessed nothing short of a revolution in avian classification, taxonomy and nomenclature, coupled with a ‘tidal wave’ of taxonomic recommendations. Depending on who one decides to follow, be it the ‘Howard & Moore’ 4th edition by Dickinson & Remsen (2013) and Dickinson & Christidis (2014), ‘HBW/Birdlife International’ by del Hoyo & Collar (2014, 2016), the International Ornithological Committee by Gill & Donsker (2017), or ‘Clements’ by Cornell University Press (2016), we find world checklists at variance with one another in terms of families, genera, species and subspecies adopted, simply because each ‘authority/author’ uses different criteria for what constitutes a species, how it is classified and what names it is given, both scientific and English. Currently Howard & Moore Vol 4 recognize some 10135 species worldwide, Clements 10514, the IOC around 10650 and HBW/Birdlife International almost 11000 species. The only semblance of common ground being the order and sequence of avian families, that started with the ground-breaking unfolding of the great Tree of Life by Hackett *et al.* (2008), later so succinctly expanded upon by Cracraft (2013, 2014), Jarvis *et al.* (2014) and Prum *et al.* (2015) and which has now largely been accepted worldwide, including by our own East African Taxonomic Committee.

Meanwhile, as Garnett & Christidis (2017) have pointed out, rules for taxonomy

have many consequences, one major issue being the use of either the Phylogenetic Species Concept (PSC) or the Biological Species Concept (BSC) when determining what constitutes a species. While most taxonomists dealing with mammals use the PSC, the majority of avian taxonomists favour the more conservative BSC. However, taxonomists in general are not accountable to anyone other than their academic peers, and as a result species are created or dismissed arbitrarily according to the individual taxonomists' adherence to one of many definitions. As a result, there is no global oversight of any taxonomic recommendations, leaving researchers, checklist compilers, authors of bird books and the bird-watching community at large free to split or lump species at will.

An important aspect of this rather chaotic situation is that many taxonomic recommendations impact on regional conservation programmes, but sometimes in a 'good' way. Depending on which 'Species Concept' is used, one species or subspecies can seem to be more threatened than another, and so receive a larger slice of conservation funding. Similarly, the splitting or lumping of species protected by national laws can influence investment and ultimately national land-use policies (Garnett & Christidis 2017).

So how can we here in East Africa review and later revise our regional and national bird checklists in a way to bring as broad an agreement as possible among our three national checklist committees and compilers? In my revision (Turner & Turner *in prep*) of Britton (1980), all alternate names, scientific and English, currently in use by the three major players (H&M 4, HBW/Birdlife International and the IOC) are listed; also, any variance in the taxonomy and classification adopted in those published world checklists is noted. At the same time, however, we must always keep reminding ourselves that species cannot be defined solely on phylogenetic evidence alone: and while it is sensible to note such results, there is a need for a caveat that although such results may *suggest* certain relationships, they may not necessarily *prove* them.

The East African Taxonomic Committee, under the guidance of Nigel Hunter, is well into its deliberations. When complete, it is hoped that there will be some broad agreement with a classification, taxonomy and nomenclature recommended for all species and subspecies occurring in the East African region.

Finally, it is hoped that in time, a single, internationally respected scientific body will be given the task of overseeing all avian taxonomic recommendations so that most of the current turmoil may be resolved. Arguments for the publication of a single World Checklist at five, ten or twenty year intervals have already been aired. Certainly, some stability is urgently needed in order to stabilize the current taxonomic 'free for all' existing today.

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