

# Tropical Topics

An interpretive newsletter for the tourism industry



Bird body language

No. 65 March 2001

## Notes from the Editor

*Tropical Topics* no. 56 looked at bird calls and songs. This issue looks at visual signals. Whereas many mammals, reptiles and other animals use scent for communication, birds rely heavily on visual and audible signals. Although we cannot hear or see as much as birds (see page 7), on the whole this makes it a lot easier for us to understand, or at least, guess their intentions. Indeed, their animated antics invite us to try to understand their body language.

### Acknowledgements

Much of the information, and some of the illustrations, in this issue of *Tropical Topics* came from various issues of the *Interpretive Birding Bulletin*. Published six times a year, this 16-page bulletin is devoted to observations of bird behaviour. It is available on subscription — see Bookshelf on page 8 for details.

### Please note

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## Why the flashy males?

We humans flout the rules of nature. While it is generally human females who go for colours and ornamentation, in most other species, if there is a difference between the sexes, it is invariably the males which dress up.

This is particularly true in the case of birds\*. The most spectacular, such as the birds of paradise, peacocks and other pheasants, go to incredible lengths to impress the opposite sex with elaborate, colourful plumage and energetic displays. Male bowerbirds concentrate their efforts on producing wonderfully constructed and decorated courting platforms.

Why do they need to work so hard?

One reason is that most male birds cannot mate unless the female accepts them. The few with penises (3 percent of all birds, including emus, cassowaries and all waterfowl) can force their attentions but the vast majority of male birds must persuade the females to co-operate in the brief balancing act which constitutes mating in birds — and females demand high standards of courtship before they will participate.

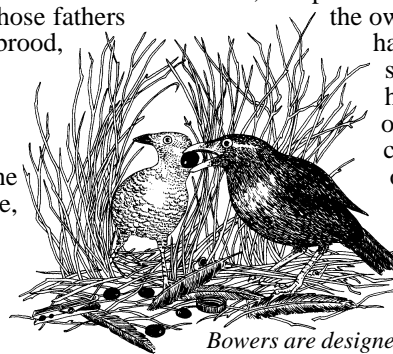
This is not just a case of female whimsy. A male is able to produce abundant sperm and mate many times, but a female has invested her energies in just a few eggs. She wants to make sure she chooses the best father for her precious offspring. She wants good genes and, from those fathers which help to raise the brood, a useful provider.

The female therefore judges the fitness of a male by traits such as the condition of his plumage, the standard of his

display, his song and/or his bower. The most proficient displays and the best bowers usually belong to the older and most experienced birds — proof that they are tough survivors with worthy genes. Good plumage is a clear indication of good health in a bird, which may therefore have an inherited, and inheritable, resistance to diseases. It also shows that the bird has access to good food sources — an important attribute in males which will be relied on to feed the young.

The desire of females for certain male attributes can lead, over evolutionary time, to those characteristics becoming increasingly exaggerated. If males with flashy plumage get to mate with more females, then it is to the advantage of a female to produce males with similarly flashy plumage so that her genes have the best chance of being perpetuated. Then each time the males with the longest tails, for example, are selected by the females, the gene for long tails is passed on and reinforced. As a result, some males, such as the lyrebird, have ended up with tails which must surely make them an easy target for predators. On the other hand, this provides further proof of

the owner's fitness. If he has managed to survive with this handicap then he is obviously a suitable candidate for passing on his genes. There are good reasons why female birds put their mates to the test.



Bowers are designed for courtship

\*For a notable exception see page 5.



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# Show-offs

Displays staged by birds can convey a number of messages. The same routine may be used for courtship or conflict, depending on the situation. It can be used as a greeting, to attract a mate, to reinforce a pair-bond, to bluff, to convey aggression or submission to rivals and/or proclaim ownership of a territory. Often it settles disputes without violence.

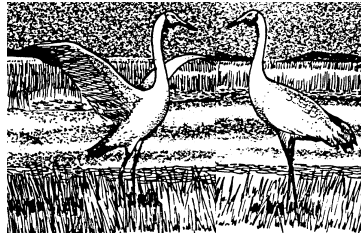


## Courting

Our Australian birds of paradise put on quite a show at mating time. The male riflebird stands on a display perch, flares out the iridescent blue-green triangular bib on his chest and fans out his wings, arching them in a circle around his head. If a female appears to show interest he gets very excited, dancing animatedly on his perch and beating his arched wings rhythmically and noisily. His head thrown back, his open mouth reveals a bright yellow interior, contrasting with his velvety black and iridescent plumage.

The kori bustard may not have such colourful plumage, but makes up for it in effort. Throwing back his head he droops his wings, erects his tail, fans out his neck feathers and, booming and roaring, sways from side to side. Like many of the greatest show-offs, he contributes nothing to child care.

Instead of relying entirely on plumage for display, male bowerbirds construct courtship areas. Some fairy-wrens say it with flowers — the male will pluck a petal and present it to the lady of his choice. The colour selected varies with species.



A number of birds which form long-term pair bonds, dance together throughout the year to reinforce those bonds. Cranes are famous throughout the world for their dances and our broilgas and sarus cranes are no exception. Dancing back and forth, the males and females shake their spread-out wings, bow deeply, and from time to time spring up to three metres into the air.

Male pelicans march around in groups behind a female, gaping open their impressive bills and swinging their heads from side to side as they threaten each other. Males and females both snap their bills open and shut to make the colourful pouch wobble and indulge in some high-stepping.

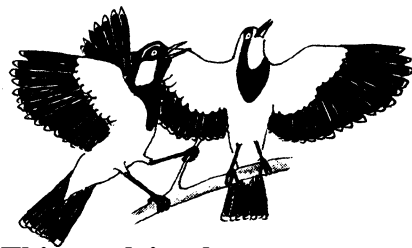
Birds of prey, such as ospreys and peregrine falcons court each other with spectacular aerial displays during which they swoop, plunge and tumble sometimes wheeling around with interlocked talons. Perhaps this allows them to assess each others' ability to catch prey for the young.

## Raising the white flag

To avoid being picked on, many birds will signal their unwillingness to fight. They may sleek down their plumage, withdraw their head and avert their bill — their main weapon. Some species have stylised signals. A dusky moorhen, defeated in the course of a confrontation, turns its back and flips up its tail to display the white feathers on either side. If two moorhens decide to settle a dispute peacefully they may both make use of this conciliatory gesture.



Purple swamp-hens flick their tails. Since juveniles do so more often, this is thought to signal their low status and thus defuse the tendency of more dominant birds to challenge them. On the other hand, tail-flicking may simply indicate excitement or act as a signal to a predator, letting it know that it has been spotted and shouldn't waste any more time stalking this particular victim.



## This patch is taken

Birds regularly advertise their territories with song but some reinforce this with displays. Duetting loudly together, magpie-larks open their wings, their black and white plumage making a striking display of ownership.

Kookaburras have stand-offs with neighbouring kookaburra groups at common boundaries. Individuals from each group may take it in turns to invade, and be chased from, the neighbours' patch. Laughing kookaburras ritualise this by flying to and fro across the boundary in unison, passing each other in mid air rather like trapeze artists.

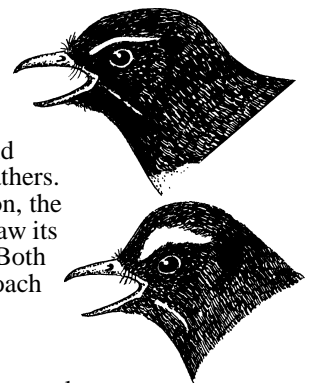
## Multi-purpose facial plumes

Feathers on heads and faces, can be erected by many birds to signal status, territorial threats, general aggression — or attraction.

A 'crestfallen' person is a dejected one. Similarly the height of a cockatoo's crest is probably a good indication of its level of excitement and alertness while a lowered crest may signal submission. Some birds without noticeable crests, such as satin and related flycatchers, can raise the feathers on their crowns during confrontations.



Willie wagtails use their eyebrows in territorial disputes. Diving at a rival, and chattering crossly, an aggressor expands and fluffs up the white feathers. To indicate submission, the loser is able to withdraw its eyebrow completely. Both male and female approach courtship with raised eyebrows.



Fluffing out feathers can make a bird seem a more daunting opponent. The male rufous whistler fluffs out his white throat feathers during territorial disputes. A number of honeyeaters signal with facial plumes. When some interfering researchers removed these plumes from New Holland honeyeaters (right), those individual birds 'lost face', their position in the group deteriorating.

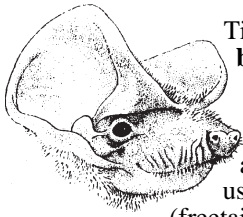


Lewin's honeyeaters are able to erect the crescent-shaped tufts of feathers on the sides of their heads. These tufts may indicate dominance, and allow less dominant birds to back away from conflict, over food sources, for example, without injury.



Great, spotted and western bowerbirds are fairly dull birds but the males have an unexpected attraction — a lilac bunch of feathers on the back of their necks which can be raised and flashed when females venture near their bowers. Confident male fairy wrens make the most of their striking blue plumage by flaring out the blue feather fans on their cheeks during courtship.

# Out and about



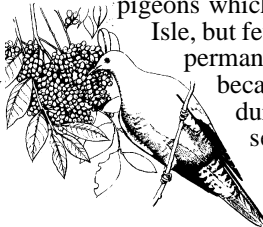
Tiny, furred **insectivorous bats** sometimes turn up in houses at this time of year clinging to washing or curtains or even crawling across the floor. These are usually northern mastiff (freetail) bats — not 'baby flying foxes' as many people assume. Flying foxes are much bigger, use their eyes to find their way around and feed on nectar and fruit. Insectivorous bats are very much smaller, navigate using sonar (echo-location) and feed on small insects like mosquitoes. Look into the evening sky as it is getting dark and you will see them flitting around.

At this time of year the babies are beginning to fly, so it may be these inexperienced ones which blunder into our houses — or the wet weather may disorient them and cause them to lose essential body warmth. If you find one which seems uninjured, wrap it loosely in a tea-towel and hang this from a coat-hanger in a window or balcony where the bat will be able to take off when it is ready. Keep an eye on it, however, and if it is unable to fly off confidently take it to your local Wildlife Care Group. The office of the Far North Queensland Rescue Association is at Unit 4/ 114 Hoare St, Cairns; Ph: 4053 4467.

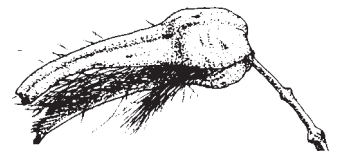


James Cook University student, Mary Gandini, with assistance from Marine Park volunteers and rangers as well as other JCU students and staff, have produced a **plant list for Low Isles**, off Port Douglas.

A year of collecting, identifying, pressing and photographing resulted in a list totalling 185 plants. This almost doubled the number previously recorded. Of the plants listed, 135 were native plants and 50 were exotic ones which had either been deliberately planted by lighthouse staff or were invasive weedy species. Numerous seedlings and saplings had germinated from the droppings of pied imperial-pigeons which nest on Woody Isle, but few of these make a permanent contribution because many die off during the dry season.

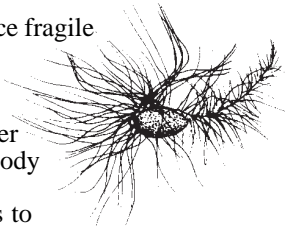


This list is available from the Port Douglas QPWS office, Ph: (07)40994709.



**Sassafras trees** (*Doryphora aromatica*) usually scatter their fruit in March. This tree is normally found in mature, densely-shaded rainforest but, unusually for deep rainforest trees, it relies on wind to scatter its seeds.

The trees produce fragile white flowers. Following pollination, the base of the flower grows into a woody container which eventually splits to release numerous plumed fruit. Each bearing a single seed, these are designed to blow on the wind. Clumps of these brown furry fruit can often be seen beneath a big sassafras tree.



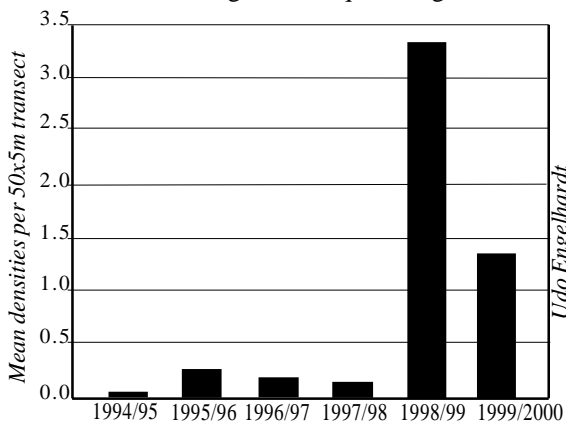
Some items, past their 'use-by date', have been removed from the web version of the newsletter.

A report on **crown-of-thorns starfish** has just been published. Detailed fine-scale surveys, conducted from 1999 to 2000, found large numbers of juvenile crown-of-thorns starfish on the 19 reefs surveyed in the Cairns and Central sections of the GBR.



Record numbers of juveniles (aged 1) were found in the 1998/99 season (see graph). These have now matured and have caused considerable damage by eating large areas of hard coral. The finding of more juveniles in large numbers in the 1999/2000 season is of concern, particularly as the sub-adults and juveniles on badly damaged reefs were found feeding on small recently settled new colonies. This could have a serious impact on the ability of reefs to recover.

The report's findings suggest that crown-of-thorns starfish outbreaks are becoming more frequent, high densities having been found on the same reefs within five years. Nine core reefs are to be resurveyed over the next three months.



Mean densities of juvenile COTS (aged 1) across all survey reefs over a six-year period.

The report, *Crown-of-thorns starfish (Acanthaster planci) in the central Great Barrier Reef region. Results of fine-scale surveys conducted in 1999-2000* by U. Engelhardt, et al., is published as Technical Report No. 32 by CRC Reef Research Centre. It is available from the CRC, c/- James Cook University, Townsville, QLD 4811; Ph (07) 4781 4976 and should be available soon from the Queensland Parks and Wildlife Service office at 10-12 McLeod St, Cairns, QLD 4870; Ph: (07) 40466600.

**Beach almond** (*Terminalia catappa*) trees are a common sight along tropical foreshores. Their branches grow horizontally with large, oval leaves which turn an autumnal red in the dry season. At this time of year, however, they produce large numbers of green fruits, tapered at each end. These are attractive to flying foxes as well as to rodents and sand crabs which eat them when they fall. Below the fleshy exterior is a fibrous layer within which is a brown almond-shaped seed. These seeds are edible and produce an oil when squeezed.

These fruits are frequently seen on the beach, often with the fibrous layer attached. They can remain afloat for two years or more.





# Colour codes and patterns

Colours and patterns are used to define the species of a bird, to convey messages regarding sexual identity, status, mood, territory and danger as well as to attract mates.

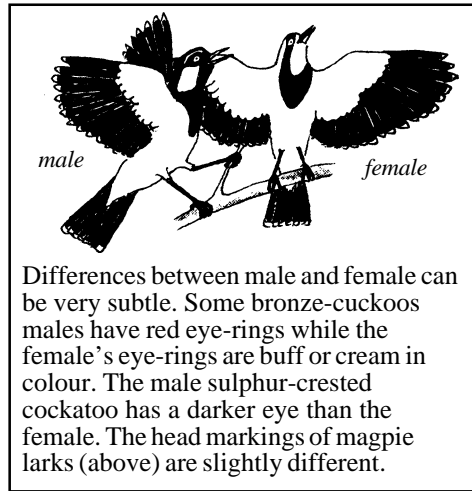
## Dressed to impress

The males which put most effort into producing visual attractions, such as the birds of paradise, lyrebirds and bowerbirds, are invariably promiscuous flirts. The males take no part in building nests, incubating eggs or caring for nestlings. They devote all their energies to being attractive and mating with as many females as possible — genetic flashiness is their only legacy to future generations.

However, this arrangement can only work where food is plentiful and close enough for the female to raise a brood on her own. This is a comparatively rare situation so in most cases both parents contribute to childcare. About ninety percent of birds

are considered monogamous, in that the pair stay together throughout the breeding season. At least that is the theory. In fact, DNA sampling has shown that it is not uncommon for the females of many species to mate with other males and that the eggs in one nest frequently have many different fathers. This may explain the tendency for many monogamous males to be flashier than the females — the flashiest are often chosen for these 'adulterous' affairs and get to father more youngsters than the less attractive males. Nonetheless, the duller males get to father at least some of the brood so are still willing to put in the hard work looking after them.

The males and females of many bird species appear identical\*. These birds rely primarily on songs and/or behaviour to reveal sexual identity and may indulge in quite elaborate displays (see page 2). Those birds which pair for life (and are normally relatively long-lived) are usually alike.



Differences between male and female can be very subtle. Some bronze-cuckoos males have red eye-rings while the female's eye-rings are buff or cream in colour. The male sulphur-crested cockatoo has a darker eye than the female. The head markings of magpie larks (above) are slightly different.

## Moody colours

The red comb of a comb-crested jacana changes colour according to the situation. When the bird is in relaxed or submissive mood the comb is a pale yellow. When it is excited or aggressive a rush of blood colours it a bright red. The change can be instant and is probably involuntary, conveying information about the bird's mood and motivation. Both male and female jacanas defend territories, so both have this feature, ready to signal defence capability, or willingness to mate.

The facial skin around the eyes of male figbirds is normally a dull red or buff but glows red when the bird is excited.



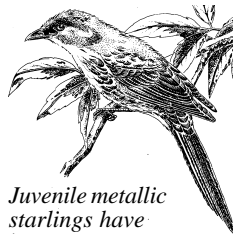
## Role reversal

We are so accustomed to males with the brighter plumage that uninformed birdwatchers are regularly confused by the male and female eclectus parrots, of Cape York. The male is mostly green while the female is a vivid red and bright blue. The reason is thought to be the shortage of suitable nesting hollows. Females, when they acquire a good hollow, become extremely territorial, spending long periods, even outside the nesting season, hanging about the entrance. It is thought that their bright colours help them to advertise to rival females that 'this spot is taken'.



## Sexual camouflage

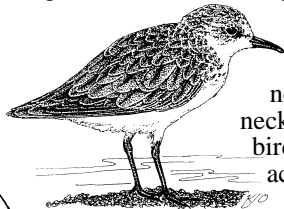
Juvenile males, of species in which there is a plumage difference between male and female birds, often resemble the females. Alternatively, juveniles have a uniform of their own. It is thought that this allows them to mature in peace without provoking the aggression of mature birds which might mistake them for rivals. Only when they are mature enough to actually become a threat, does their plumage change to reflect their changed status.



Juvenile metallic starlings have streaked breasts, unlike the glossy black of the adults.

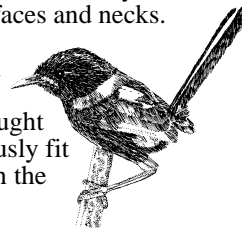
## Temporary costume changes

Some birds put on their courting plumage only at breeding time, thereby reducing the period during which their striking looks make them more vulnerable to danger. Some birds simply look brighter, in new feather suits. Others grow special feathers. Egrets of many species develop elaborate plumes on their necks, breasts and backs. Their eyes, beaks, facial skin, legs and feet may also change colour. These changes signal the readiness of the bird to breed.

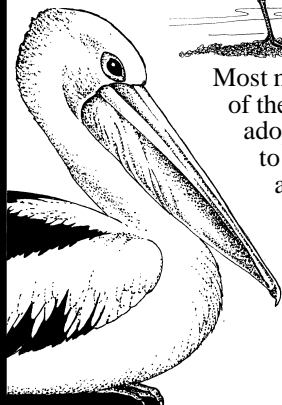


Many of the dull brown migratory waders which visit us during summer are transformed when they return to their northern hemisphere nesting grounds. We don't see the red neck for which the red-necked stint (left) is named, except in some birds departing in March and April which have already achieved a deep salmon colour on their faces and necks.

Most male fairy-wrens lose their bright plumage at the end of the breeding season, becoming duller, but safer. Some adopt breeding plumage earlier than others and are thought to be the ones which get the most mates, being obviously fit and healthy enough to be the first of the season with the necessary resources to grow the right clothes.



The bills and pouches of courting pelicans become dramatically more colourful. The pouch skin at the neck end becomes bright yellow and the front half bright pink to red with a dark blue stripe running along the length. The upper bill becomes partly blue. This colour fades by the time the pair has begun to incubate the eggs.



## Camouflage

The primary function of many birds' plumage is to camouflage them. Brightly coloured males often have partners with dull plumage, which conceals them well while sitting on the nest. Birds, such as waders, which feed in the open, and nocturnal birds are also often cryptically coloured. A frogmouth is almost impossible to see when standing with its beak pointed skywards, perfectly imitating a broken stump. Some patterns, such as eye stripes, may serve to break up the outline of a bird and conceal its eyes.

Despite its bright colours the double-eyed fig parrot can be incredibly difficult to find, even if it is calling loudly. Its bright green blends well with tropical foliage, while the red and blue patches can be mistaken for red leaves or flowers and glimpses of sky.



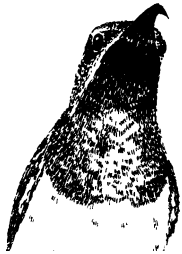
## Badges

Badges are used by many birds to advertise fitness and status. These plumage signals help to save energy and reduce potentially damaging conflict between birds competing over food, territory and mates, while helping the females to make an informed choice.

Male house sparrows (left) have black bibs which range in size. The larger the bib, the higher the status of the owner — and the more females willing to mate with him. Researchers, curious to know why all males do not grow large bibs, implanted some with testosterone. The bibs of these males grew larger and they sang and displayed more. However, tests showed that they also suffered very high levels of stress and were unlikely to survive for long. It seems that only the very fit birds are able to cope with the high testosterone levels needed to maintain the high status. Females are therefore choosing well when they pick the large bibbed males because this is a true indication that they are the fittest.

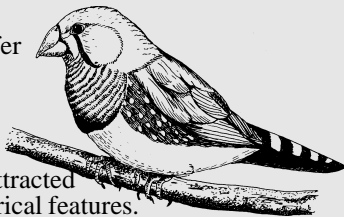
However, it seems that this fitness may depend on environment rather than genes. British scientists put nestlings which had been fathered by small bibbed sparrow males into nests of large bibbed males, and vice versa and discovered that their bib sizes eventually developed to resemble those of the foster, not the biological, fathers. It was suggested that parental care determined the size of the bib — if, for example, large-bibbed fathers were good at keeping the nests free from debilitating parasites and at providing good food.

An adolescent male yellow-bellied sunbird develops a black line on his breast, which eventually grows into the familiar metallic blue-black bib. This allows the females to know which are the mature males. Possibly the quality of the bib also conveys status. Sunbird males have a habit of roving around in noisy gangs but from time to time they all freeze silently with their beaks pointing skywards. Perhaps they are showing off the quality of their bibs.



## Fashion-conscious finches

Studies of zebra finches have shown that females prefer those males in which the barring pattern of the throat and breast is even. It seems that symmetry in this pattern indicates good genes and a healthy start in life. This preference may not be confined to birds. Researchers have discovered that humans are more attracted to members of the opposite sex with the most symmetrical features.



Curiously, female zebra finches are attracted to unnatural features. It appears that captive females are influenced by the colours of leg bands on prospective mates, preferring red ones. Interestingly, they were more attracted to symmetrical arrangements of the coloured bands than to asymmetrical combinations of the same colours.

In another experiment, researchers attached white, red and green feathered crests to both male and female zebra finches and long-tailed finches. The females of both species approved of the revamp and were strongly attracted to the males with white crests. Male long-tailed finches also preferred white crests on their females, but male zebra finches were more conservative, rejecting all females who had adopted the new crest fashion.

## Nestling signals

The interior of nestlings' mouths are often colourful. This probably acts as an incentive, and provides a target, for the feeding parent. Canary parents have been shown to give priority to those chicks whose mouths have flushed reddest. This is thought to happen when blood rushes from an empty stomach to the mouth, but cannot happen if the nestling's stomach is full. The reddest mouth is therefore the hungriest.

A study of 125 different finches found that the nestlings of each species had unique mouth markings. This may have evolved to prevent parasitic birds from laying their eggs in others' nests — which might be why many cuckoo nestlings quickly eject their hosts' eggs and offspring, before the parents have a chance to spot the difference. Some cuckoos have cleverly managed to imitate the mouth colour of the species they parasitise.



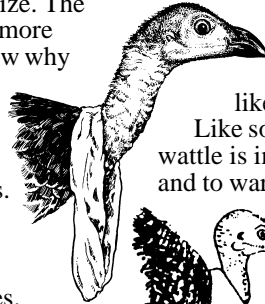
## Badges of convenience

Some birds can choose to display or hide their badges according to situation or season.

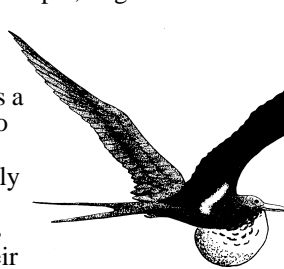
The bright yellow wattle of an Australian brush-turkey hangs down from its red throat like a dangling fleshy necklace.

Like so many decorations, the male's wattle is intended to both attract females and to warn off other males; its size is an indication of worthiness.

However, if a stronger male turns up, a bird is able to avoid provoking his rival and to back away from a potentially damaging conflict by suddenly retracting his wattle.



Male frigatebirds have a patch of naked red skin on their throats which is normally an inconspicuous shrivelled patch of skin. At breeding time, however, they blow it up with air to create a large scarlet balloon which attracts the females.



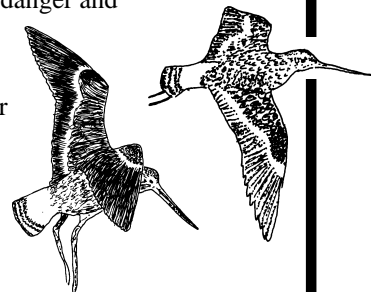
Dusky moorhens have a red 'shield' on the front of their faces, the size and brightness of which are influential in determining the outcome in stand-offs between rival birds (both male and female) disputing territorial boundaries.



## Alarm patterns

Wing markings can communicate danger, particularly in birds which do not use alarm calls. Researchers in Europe, trying to minimise crop damage from wood pigeons, experimented with different decoys and discovered that while those with open wings, but *without* wing bar markings, had little effect, decoys with exaggerated wing bars deterred many birds from landing. Presumably the sight of the wing bar, shown as the pigeon takes off, suggests to nearby pigeons that this is an unsafe place to be.

Flocking waders tend to have white 'flash marks' on their tails, wings and rumps which are visible as they take off. This may quickly signal danger and encourage all birds to fly off together, co-ordinating their flight as they wheel in close formation.



## Questions & Answers

**Q Do flatback turtles nest at certain stages of the moon?**

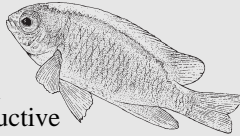
**A** No and, to a certain extent, yes. This is because the moon affects the tides and it is possible for a very low tide to prevent turtles from reaching the nesting beaches, by exposing reefs and other nearshore obstructions which form a barrier. However, if there is beach access they will nest, no matter what the moon or the tide is doing. Turtle nesting is often associated with the full moon because that is when people are most likely to see them — but this does not mean they are not nesting during the dark of the moon. In addition, it is not unusual for flatback turtles to nest during cooler daylight hours.

The flatback turtle breeds only in Australia. Like other sea turtles, it concentrates its nesting on a few mainland beaches and on cays and islands. The breeding season extends from October to January, a nesting female laying about 50 billiard-ball-sized eggs in a clutch and dropping them into a pit which she has excavated in the beach. The baby turtles emerge from the nest between December and March, with most hatching during February. Their carapaces (shells) are then about 5.5-6.5cm long.

**Q How exactly do fish change sex?**

**A** Over 350 fish species have some ability to change sex. These include many coral reef fishes such as wrasses, parrotfishes, damselfishes, groupers and some gobies as well as barramundi. Most change from female to male, some from male to female, some function as both male and female at the same time and others can switch back and forth.

In those fishes which change sex,



both male and female reproductive tissue may be present.

When a female becomes a male, the ovarian tissue shrinks, while the male sperm tissue spreads. The change may take a few weeks. In barramundi, following the first spawning season, eggs begin to develop in the male gonads as the fish changes from male to female. In other fishes, both male and female reproductive organs are present. The functioning section can be switched off and the inactive section switched on. This change is more rapid, taking just a few days, and allows the fish to switch back again.

In reef fishes, the trigger for the change seems to be controlled by social conditions, related to a change in the composition of the pair or group of fishes. The male, in a harem, is thought to keep his females feminine by bullying them at regular intervals. When he is removed the largest female then becomes a male. If the dominant female in a group of anemonefishes disappears, the male becomes a female and the largest immature juvenile becomes a male. In large groups a certain ratio of males to females is kept constant so if three males are removed, three females become males. In some pairs, a 'widowed' individual may be able to change sex to form a pair with the next unattached individual (s)he finds.

Most fishes fertilise their eggs externally. Normally the male either releases sperm over eggs laid in a nest, or both partners release eggs and sperm together in the water.

A good article on this is **Changing Sex** by Philip L. Munday in *Nature Australia Vol 26 No 11 Summer 2000-2001*

## Facts and stats

**Female European chaffinches have been painted with pink breast feathers, to look like the males. These birds usually became dominant over other females and even over some males.**

Male American red-winged blackbirds have been shown to lose their territory if the red patches on their wings are coloured black. However, their mates stood by them and were unaffected by such a superficial change!

**Experimenters have used long-tailed whydahs (widow birds) in Africa to prove that females are influenced by plumage. They cut off half the lengths of the tails of some males and added the extra plumage to the tails of other males, and left some alone. The experiment showed that size does indeed matter to the female whydah, since they showed a definite preference for mating with the males with the artificially elongated tails.**

Experiments have shown that models of predatory shrikes were more likely to be mobbed by flycatchers if they had eye-stripes but that if the stripe was put in a different position, such as the breast, the mobbing decreased markedly. It is thought that eye-stripes on birds may help them to line up prey, using them as sight-lines. Certainly, it seems that they appear predominantly on birds which feed on living prey. It has been suggested that the eye-lines on herons may be angled to allow for the distortion effect of water.

**Ospreys have been observed using a particular flying pattern, along with special calls, to advertise to other ospreys that they have found a good source of schooling fish. Ravens and other birds have also been known to communicate, somehow, a source of food. Perhaps if all birds living nearby (which may be closely related) always share their finds, all stand to benefit in the long run.**

The shapes of the eyes and their position on the head vary according to the needs of the particular bird species. Most have eyes on the sides of the head so they can keep a sharp lookout for danger but hunting birds, such as owls and raptors, have eyes on the front of their faces. This allows the fields of vision from both eyes to overlap and gives these birds better depth perception. When they need to judge distances, birds often bob their heads, which gives them different, comparable views, in relation to the background.

**When walking, many birds, such as pigeons, appear to be nodding their heads backwards and forwards. Actually they are keeping their heads in one place for brief periods of time while their bodies catch up. This allows them to see better.**

## Tourist talk

ENGLISH	GERMAN	JAPANESE
display	Schaustellung	hyogen 表現
plumage	Federkleid	umou 羽毛
ultra-violet	ultraviolet	shigaisen 紫外線
polygamy	Mehrehe	ipputasai 一夫多妻
genes	Gene	idenshi 遺伝子
badge	Rangkennzeichen	shirushi 印
bib	Latz	yodare kake よだれ掛け
courtship	Balzen	kyuai 求愛
territory	Revier	nawabari 縄張り
crest	Schopf, Haube	kan u 冠羽

# Bird vision

Birds have very good eyesight — some birds of prey are able to see about two and a half times better than we can — and they have exceedingly quick responses. They also have excellent colour vision.

## Tricks of the light

The colours of feathers are created in a number of different ways. Some come from pigments. The most common is melanin, the pigment which darkens our skin in the sun. This creates the dark colours — black, brown and yellow-orange. Reds and oranges are created by carotenoid pigments, derived from food such as crustaceans (which obtain them from blue-green algae) but parrots create yellow, orange and red from another pigment, porphyrin. Red is a particularly 'expensive' colour to produce so if a male bird's red plumage is especially bright this indicates that he has access to good food sources and, perhaps, that he is genetically good at assimilating the red from his food.

Other colours are structural. Tiny air bubbles in the feather interfere with short wavelengths of light — UV and blue — and reflect them back to the eye. (Long wavelengths such as red and yellow are absorbed by the feather and made invisible.)

Light is made up of different wavelengths. A leaf looks green to us because the long wavelengths — the yellow, orange and red ones — are absorbed by the surface and the shorter green wavelength is reflected off to reach our eyes.

Chemical and structural sources of colour can be combined in feathers. Green is created by a combination of yellow pigment and blue, light-scattering, structures.

Iridescence is created structurally. Microscopic melanin particles, arranged on flattened filaments within the feather, split light, creating the same effect as an oil film on water. Reflected light waves interfere with each other producing a range of colours which may change, depending on the angle of view. These structural adaptations make these feathers unsuitable for flight so iridescence is found only on non-flight feathers.

## Bluff and distraction

Birds' displays are not always directed at others of the same species, or even at other birds. Some are intended for predators.

When predators come too close to a bird's eggs or young, it will often create a distraction by making itself conspicuous. Ground nesting birds are experts at the 'broken wing' routine. The red-capped plover (left), which nests in a vulnerable shoreline position, can often be seen putting on a very conspicuous show, dragging its wing, limping and flapping until it has drawn the predator to a safe distance whereupon it gives up the pretence and flies off.

Another distraction strategy is the 'rodent-run' used by fairy-wrens and willie-wagtails among others, where the parent bird drops to the ground below their nest, crouches down and scuttles along making an alarm call. Resembling a rat or mouse, it may be successful in engaging the attention of the predator.

If the broken wing routine fails, some birds will attempt to frighten off their enemies with intimidation. The bush curlew spreads its wings out wide and raises its head, presenting quite a daunting adversary.

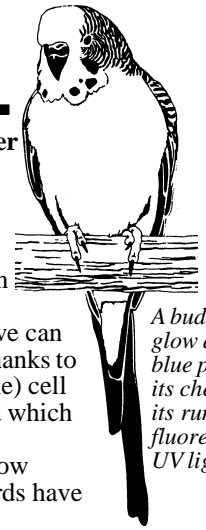
## Mobbing

Some birds mob predators very much bigger than themselves. The feisty willie wagtail is one of the most persistent of these, fearlessly attacking kookaburras, crows, cats and even peregrine falcons. Some years ago, when a peregrine falcon was in the habit of using the top of the Cairns Base Hospital as a perch, a particularly bold willie wagtail regularly flew all the way to the top of this five-storey building to harass the peregrine.

Acknowledgements to Rupert Russell.

## UV — seeing another dimension

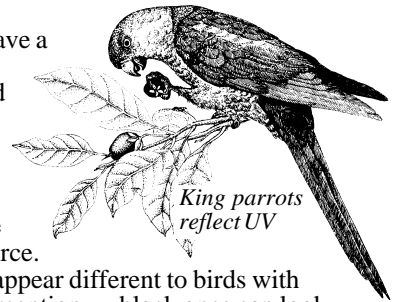
Among mammals, we are unusual in that we can see colour. Birds, however, can see even more than we can — ultra-violet (UV) light. This is thanks to an extra type of photoreceptor (cone) cell which is missing from our eyes and which is tuned to these particularly low wavelengths of light. Studies are now showing that many, if not most, birds have a UV component to their plumage.



A budgie's feet glow and the blue patches on its cheeks and its rump fluoresce with UV light.

This relatively recent discovery has added an unexpected dimension to our theories of how birds use and react to colour. For example, birds of some species, in which males and females appear identical to us, actually look quite different from each other when the UV component of their plumage is viewed. Experiments in which the UV-reflecting feathers were covered with sunblock showed that "females overwhelmingly preferred to associate with untreated males over treated males"\*; suggesting that this is yet another aspect of the competitive plumage-war between different males. Indeed, these feathers are most often found in the parts of the bird, around the head, front and rump, which are normally involved in visual display.

UV light perception may have a number of different functions. Birds which feed on flowers may use it in the same way as bees do, to perceive UV 'nectar guides' on the petals. Invisible to our eyes, these lead them to the nectar source.



King parrots reflect UV

Fruits with waxy coatings appear different to birds with UV perception — black ones can look blueish and white ones may glow. European kestrels are able to find an easy meal by following urine scent trails left by voles which, unbeknownst to these colour-blind mammals, glow brightly with UV-reflecting light, indicating 'dinner this way' to the raptor. On the other hand, some invertebrates which have evolved poisons and bad tastes to make themselves unpalatable, use UV, instead of, or along with, bright 'visible' colours, to advertise this feature.

Birds may also use UV light, and polarized light — also visible to them — to navigate. This allows them to locate the sun's position on a cloudy day.

As ever, we need to be cautious with our interpretation of animal behaviour. While signals transmitted and received in the UV wavelength may simply enhance other colour codes, it is always possible that we are judging bird behaviour without being able to see the whole picture.

\*Jim Davis. *Ultraviolet Vision in Birds: Hidden Perception*. Interpretive Birding Bulletin Vol. 2 No. 2 August/Sept. 1998.



# Bookshelf

## **Interpretive Birding Bulletin**

Dr. Wm. James Davis (editor)  
Available from PO Box 362, Toowong,  
QLD 4066

Subscription: \$30.00 for one year (6 issues)  
The editor is keenly interested in all aspects  
of bird behaviour and synthesises a great  
deal of information from numerous scientific  
papers into this readable and interesting  
publication.

## **The Life of Birds**

David Attenborough  
BBC (1998)

The book of the TV series, chapters 6 and  
7 are the most relevant to the topic of visual  
communication. The video, also available,  
is a good chance to watch the birds in action.

## **Bird Behaviour**

Robert Burton  
Granada (1985)

Interesting on vision/visual communication.

## **Reader's Digest Complete Book of Australian Birds**

Reader's Digest (1993)  
Much of relevance on bird behaviour.

## **Birds of Queensland's Wet Tropics and Great Barrier Reef**

Lloyd Nielsen  
Gerard Industries Proprietary Limited (1996)  
A useful field guide to local species, with an  
original and useful layout.

*Nature Australia Vol 24 No 11 Summer 1994*

## **Dressed to impress**

Mark A. Elgar & Michael J.L. Magrath  
This article looks at why females prefer well-  
endowed males.

*Nature Australia Vol 26 No 3 Summer 1998*

## **Sexy sparrows**

A report on the experiment on sparrow bibs  
and testosterone.

*Nature Australia Vol 26 No 9 Winter 2000*

## **Badges of fatherly pride**

A report of the cross-fostering of sparrow  
nestlings experiment.

*Nature Australia Vol 25 No 2 Winter 1997*

## **Signals of the flesh**

Natalie J. Demong and Stephen T. Emlen  
Jacanas and their fleshy, colour-changing  
'shields'.

*Wingspan Vol 10 No 2 June 2000*

## **That hollow feeling ...**

Sarah Legge and Rob Heinsohn  
An article on eclectus parrots.

*Geo Australasia Vol 21 No 1 March 1999*

## **Brolgas of the Dreamtime**

Graham Pizzey

*Nature Australia Vol 26 No 4 Autumn 1999*

## **A sight for UV eyes**

Blue tits and UV vision.

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