PsittaScene

Magazine of the World Parrot Trust

Winter 2020

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World Parrot Trust

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ABOUT THE WPT

Capture for the live-bird trade, habitat loss and other factors put wild parrots at risk. Nearly 30% of all parrot species are considered by IUCN to be at risk of global extinction.

As an international leader in parrot conservation and welfare, the World Parrot Trust works with researchers, in-country organisations, communities and governments to encourage effective solutions that save parrots.

Since 1989 the WPT has grown to become a global force that moves quickly to address urgent issues and support long-term projects. Over that time WPT has led or aided conservation and welfare projects in 43 countries for more than 70 species of parrot.

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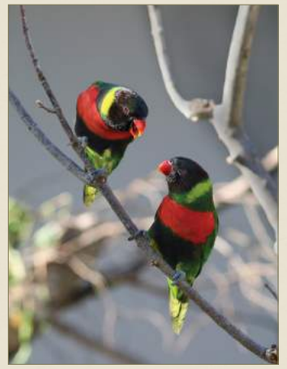
ON THE COVER

Photo © *Alison Hales*

Mitchell's Lorikeets *(Trichoglossus forsteni mitchellii)* at Paradise Park, UK home of the World Parrot Trust. Mitchell's Lorikeet is found on the islands of Bali and Lombok in mostly cultivated areas that have been nearly completely denuded of natural vegetation. Little is known of their wild ecology.

See the article: ***Gone for Good? Maybe not – Mitchell's Lorikeets found on Bali,*** Page 5.



A message from
Steve's desk

Over the past year we have witnessed great change in how we communicate, work and live. Diligence in our attention to personal safety and dedication to caring for others in our communities have increased our sense of sharing a common experience and for many, left us hoping for a better world.

On the cusp of a new year, one that's hopefully brighter for everyone, we offer our deep gratitude for your ongoing dedication and support. One of the things that keeps us going forward here at the Trust is the passion you share with us for these wonderful birds. It encourages and compels us to carry out the work of protecting some of the most endangered birds on Earth.

You'll see some of that work with our valued partners in this issue.

You'll learn how the smallest of insects can cause big problems for Lear's Macaws, why Mitchell's Lorikeet, the smallest subspecies of *Trichoglossus forsteni*, needs urgent protection, how parrots sense their infinitely complex surroundings, and more.

We hope you enjoy this issue. May you all have a bright and prosperous New Year.

Steve Milpacher
WPT Operations Director

Yellow-crested Cockatoo © Victor Sores

The Trichoglossus lorikeets are among the most flamboyant of all the parrots. These comical little rainbow-coloured birds dart in and out of the forest canopy chattering, feeding and mixing easily with other bird species.

It's little wonder they've become so popular with humankind; too popular, it seems — many of them are now seeing their numbers decline because of trapping for the wildlife trade.

GONE FOR GOOD?
Maybe not – Mitchell's Lorikeets found on Bali

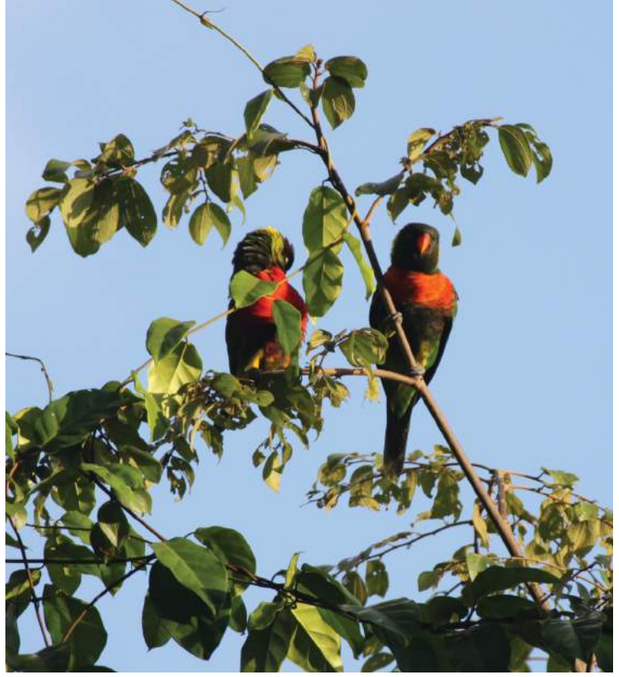
Based on a report by Oka Dwi Prihatmoko, Mochamad Saifudin, Husnaeni Nugroho and Waskito Kukuh Wibowo
First published in Birding ASIA

The Scarlet-breasted or Forsten's Lorikeet (*Trichoglossus forsteni*) has seen its population drop to less than 2000, prompting the International Union for Conservation of Nature (IUCN) to list it as globally Endangered.

Mitchell's Lorikeet, *Trichoglossus forsteni mitchellii*, has paid a particularly harsh price, having been trapped to near extinction on a number of its small home islands. They once occurred on Bali, Nusa Penida and Lombok, but surveys in 2015 pronounced them all but wiped out on Bali. They were reported as being common in Bali upland forests in the 1910s and 1920s, but in subsequent decades they were heavily trapped and exported to Europe. On Lombok, where it had not been seen for many years, an image was taken in 2011 of a single bird out of a flock of 5-6, and a flock of 18 individuals was found there on Mt. Rinjani, an active volcano, in September 2015. Total numbers of wild Mitchell's Lorikeet have been estimated at 30-40 individuals.

Mitchell's Lorikeet is a striking bird – it is the smallest of the four subspecies that comprise *T. forsteni*, with a blackish-brown head revealing olive-green streaks, a flash of yellow-green on the nape and a deep purple-black abdomen. There's no barring on the breast as in other *Trichoglossus* species, just vibrant scarlet. The ecology of these gregarious parrots is not well known, but it is assumed that they take nectar, fruit and probably insects, and recent sightings confirm they inhabit various forest canopies as their close cousins do.

A favourite tree to forage and roost in is the conifer *Dacrycarpus imbricatus*, and that is where WPT-Indonesia staff and locally-based colleagues found six of the birds foraging near Bedugul on Bali in October 2019. The team had landed there mid-year determined to find any remaining birds after a number of searches by others turned up empty. In May they spotted what they were certain were four *Trichoglossus* lorikeets after being led out by a local villager guide who claimed he had seen flocks of 10-16 individuals in a specific area.



***Left*:** *Dacrycarpus imbricatus*, a species of conifer in the family *Podocarpaceae* found in Indonesia. A favourite of the lorikeets, it can grow up to 40 metres (130 ft) high. © *Giuseppe Mazza*

***Top*:** Two birds released on Nusa Penida (2011). © *WPT*

Top and right: A group of birds from the breeding program at Paradise Park in Cornwall, UK. Some of them may be repatriated to Indonesia in the future. *Photos © Alison Hales*

The birds they saw on that trip were very active in the upper canopy of the conifers squeaking and foraging. Their true identity, however, remained a mystery because the team couldn't see their plumages clearly.

Five months later the searchers returned to the same general area and again found four *Trichoglossus* lorikeets. They took many photographs but were still unable to identify the birds due to the fact that neither the neck collar nor the head colour could be seen. On a second foray that month the team, armed with better equipment, finally succeeded in obtaining the videos and stills they were looking for. Six birds, race *mitchellii*, were confirmed by WPT-Indonesia Program Manager Mehd Halaouate after he examined the pictures and footage.

The location where the group found the birds was close to that mentioned by the German naturalist and ornithologist Erwin Stresemann in 1913. The researchers felt it was possible that a small population of these lorikeets had managed to escape being trapped all this time, but they also acknowledged that there is a chance that a group of birds escaped captivity and have been living wild. In 2013 a single *mitchellii*, which observers concluded was an escaped bird, was seen together with a Marigold Lorikeet (*Trichoglossus capistratus*) on south Bali.

There has also been speculation that birds have appeared in Bali from the Gunung Rinjani area of Lombok but this was deemed unlikely given the small numbers that occur there and the fact that no lorikeets have been recorded crossing Lombok Strait to the forests on Bali's eastern coast.

Another observation that attests to Mitchell's Lorikeet's fragility in status: WPT staffer Dr. Oka Dwi Prihatmoko has visited bird markets and shops in Bali every 2-3 months beginning in 2016 and while he has found birds of the *forsteni* race (the nominate of the species, from Sumbawa) for sale he has not seen *mitchellii*. The total number of Scarlet-breasted Lorikeets across all subspecies may be as low as 1600, with *forsteni* having the largest population at around 1000 individuals.

Oka Dwi has visited Sumbawa a number of times between 2017 and 2019 and feels that the once-stable population is no longer secure there, with the lorikeets now having disappeared from some areas. In the last five years there has been a sharp increase in the cutting of mature trees in eastern Sumbawa in particular; there it's been to make way for corn plantings subsidised by local authorities.

These observations have spurred conservationists on to look for ways to shore up the remaining population. Back in April 2008, WPT supported the Friends of the National Park Foundation (FNPF), which released three birds onto Nusa Penida, a small island southeast of Bali. The aim was to find out how the lorikeets would fare in locating the island's resources. One bird disappeared in the first week, and the other two were seen intermittently in coconut plantations and secondary forest. In mid-2010 WPT Executive Director Jamie Gilardi joined the FNPF team on Nusa Penida to attend the release of two more birds (*see 'To Wing on a Prayer,' PsittaScene February 2011*), and as of early 2011 the FNPF team saw the five released birds together. Unfortunately, they haven't been reported since. Plans are afoot, however, once the pandemic has eased to develop a captive breeding and release program to include birds found in Indonesia, as well as from Britain and possibly the European Union, where a total of about 200 captive birds exist.

Paradise Park UK, home of the World Parrot Trust, has held and bred Mitchell's Lorikeet since 2011. Dozens of chicks have hatched since the program began; the Park has sent out a number of birds on breeding loan to other institutions, and will send offspring to Bali for the program in the future. The goal will be to re-establish the birds in habitat that is suitable for their needs. WPT aims to continue monitoring bird markets for new individuals, and planning is in progress for installing nest boxes on Bali to replace lost mature nest trees and supporting anti-trade enforcement. All Indonesian parrots, including the Scarlet-breasted Lorikeet and by extension Mitchell's, are now included in the country's list of protected species. The species has also been listed as globally Endangered by IUCN as of 2020 due to its ongoing rapid decline.

There are little ecological data (such as movements, feeding and breeding behaviour) on these birds, so new studies are needed to inform and drive conservation actions for them. This, and a concentrated effort to boost its dangerously low population through captive breeding and release, is of paramount importance for its continued survival in the wild.

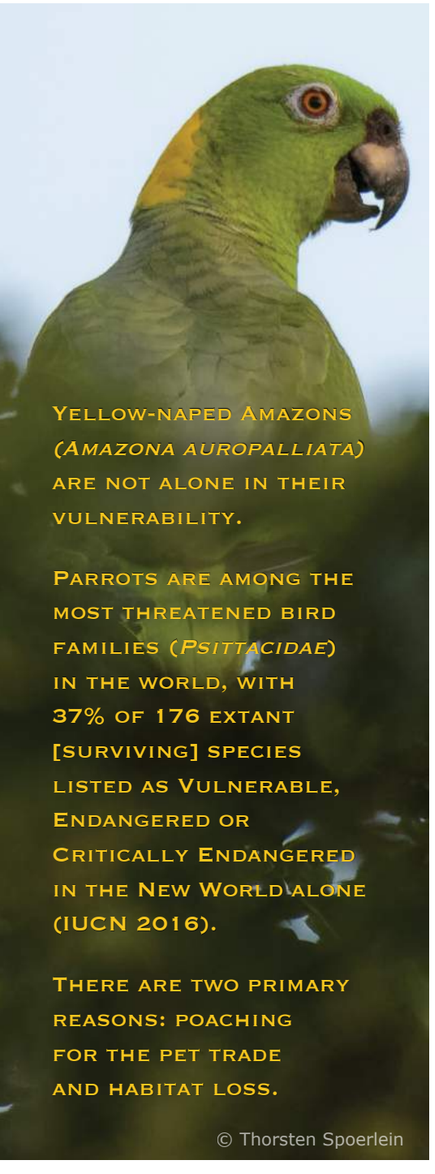
Our sincerest thanks to Blackpool Zoo, who provided funding for this project from donations collected at their lorikeet exhibit throughout 2019.

In part one (Loved to Extinction, PsittaScene Autumn 2020), a group of biologists lands in Costa Rica to begin surveys on Yellow-naped Amazons. It doesn't go quite as planned – read more here in part two, "Moths and Machine Guns".

MOTHS AND MACHINE GUNS:

Monitoring Yellow-Naped Amazons in Central America

By Christine R. Dahlin, PhD



YELLOW-NAPED AMAZONS (*AMAZONA AUROPALLIATA*) ARE NOT ALONE IN THEIR VULNERABILITY.

PARROTS ARE AMONG THE MOST THREATENED BIRD FAMILIES (*PSITTACIDAE*) IN THE WORLD, WITH 37% OF 176 EXTANT [SURVIVING] SPECIES LISTED AS VULNERABLE, ENDANGERED OR CRITICALLY ENDANGERED IN THE NEW WORLD ALONE (IUCN 2016).

THERE ARE TWO PRIMARY REASONS: POACHING FOR THE PET TRADE AND HABITAT LOSS.

© Thorsten Spoerlein

We converged on the small town of Tivives, Costa Rica, excited to meet for the first time and begin our parrot adventure.

Booking lodging from across the world is not easy, however. We arrived at a house without window screens or proper cooking equipment, but with plenty of moths and scorpions. On our first night, a cooking accident resulted in 3rd degree oil burns, a trip to the nearest hospital and the temporary loss of one of our team members. More typical field mishaps included stranded vehicles. Less typical ones included my brief detention by the Nicaraguan military.

We had set out along the Costa Rican border with Nicaragua, but the noise from the border facilities was drowning out the parrots. Trying to stake out a quiet spot, I accidentally stepped into Nicaraguan territory. A soldier spotted me and, with his machine gun, convinced me to accompany him to a military outpost further into Nicaragua. My recording equipment led to the conclusion I might be a spy. My Spanish was not fluent enough to get me out of trouble. I did my best to smile through the scariest 12 hours of my life and convince the military I was a hapless biologist, not the world's most terrible spy. Meanwhile my team talked to the Costa Rican authorities. Eventually I was released unharmed. The soldiers were kind enough to provide juice and cookies, inquire about America and show off their pet squirrel.

DISHEARTENING DATA

Despite these setbacks and more, we persevered. Occasionally we found a roost seemingly overflowing with a raucous community of parrots settling in for a noisy nightcap. Most sites, however, seemed diminished compared to previous years. In some, the parrots were gone altogether.

The data were disheartening. Numbers from between 2005 and 2016, when we had the most reliable surveys, indicated a decrease in mean roost sizes of 54% in Costa Rica, and low roost numbers at the majority of sites in Nicaragua (Wright et al. 2019). Previous surveys in Nicaragua at different sites also found declines (Lezama-López 2009). The only exception to the disturbing trends in Nicaragua was the presence of sizeable roosts on the island of Ometepe, in the middle of Lake Nicaragua. In total, we observed only 1,682 birds across both countries. We are confident we counted the majority of roosts in both Nicaragua and Costa Rica.

> **"I did my best to smile through the scariest 12 hours of my life and convince the military I was a hapless biologist, not the world's most terrible spy."**

DIFFERENT PLACES, DIFFERENT SOLUTIONS

The problems that Yellow-naped Amazons are experiencing are not uniform across their range, so different solutions may be required in different places. In addition, a lack of knowledge on the status of the population across the parrot's range has presented a major stumbling block.

In Costa Rica, a considerable portion of land is protected in Áreas de Conservación. A much smaller proportion of land is publicly protected in Nicaragua. A few areas received limited protection as part of private reserves (Minsterio del Ambiente de Nicaragua 2013). Much of the possible range of the Yellow-naped Amazon in Nicaragua is heavily devoted to agriculture and no longer suitable for the parrot.

Collection of Yellow-naped Amazons for the pet trade is illegal in Costa Rica and the rest of Mesoamerica, but enforcement has not been adequate. Our team has provided professional testimony to assist with Costa Rican trials. Local poverty and limited law enforcement both contribute to continued illegal trade of Yellow-naped Amazons, though, as well as numerous other species (Castellón et al. 2008).

There is still an opportunity to conserve this species, but additional actions are necessary. One key step was taken by the International Union for Conservation of Nature in December 2017 when it upgraded the threat status of this species from Vulnerable (VU) to Endangered (EN). We are recommending that it be upgraded to Critically Endangered (CR) due to its rapidly declining numbers. Additional required conservation measures include greater enforcement of anti-poaching laws, public education efforts and habitat protection and restoration.

TAKING ACTION

We have recently formed the Mesoamerican Parrot Census Network, which is designed to link biologists into a collaborative network to gather and share population data on Yellow-naped Amazons. Thus far, we have linked 13 scientists through the site and our Facebook presence.

Researchers have also embarked on broadening our understanding of the parrots elsewhere in their range. Molly Dupin, a graduate student at New Mexico State University, has expanded surveys into Mexico, Guatemala and Honduras. Her data indicates that the only sizeable roosts that remain are in very limited regions of southern Mexico and in Honduras. Most of Guatemala, she found, is devoid of Yellow-naped Amazons.

These beautiful birds cannot fail to affect you once they have peered at you with their wild, magnetic, orange eyes, given their boisterous calls and flown off like a cocky green clown across the treetops. Like many other species, these parrots face numerous threats, which cannot be overcome without action from locals who share the landscape with them, and from people who have the means to assist. Unless we can convince local populations to reduce poaching and preserve their remaining habitat, a once common species that ranged across Central America may disappear.

Christine Renee Dahlin, PhD is an associate professor in the department of biology at the University of Pittsburgh at Johnstown.

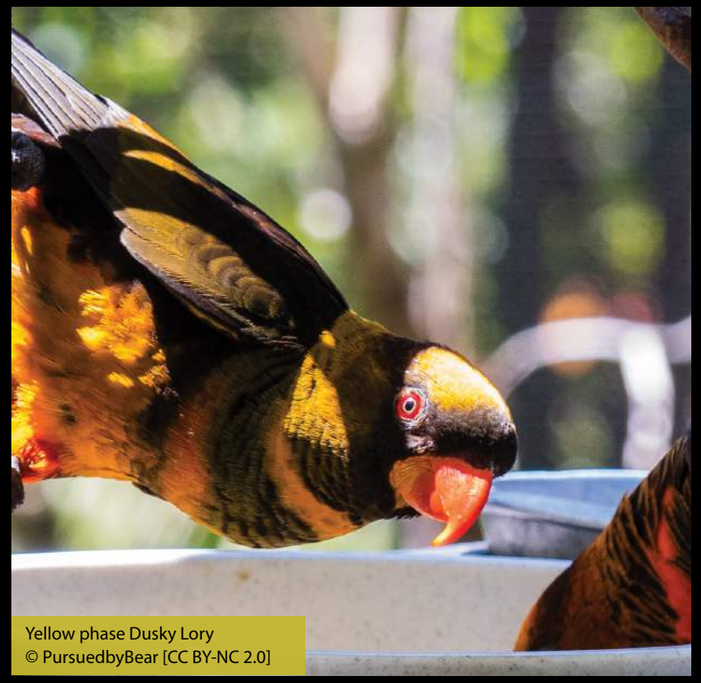
© Thorsten Spoerlein

Different Shades

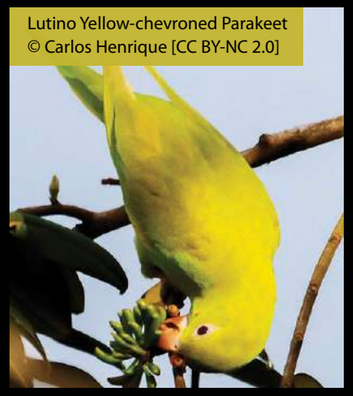
EXPLORING COLOUR MUTATIONS IN PARROTS

by Desi Milpacher

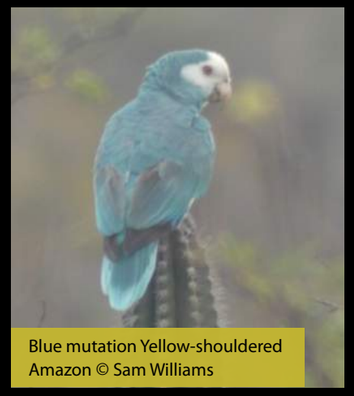
Parrots are known for a lot of interesting qualities, not the least of which is the variety of colours they come in – green is a main colour, along with red, orange and yellow. The pigments responsible for their bright red and yellow colours are called psittacofulvins ('parrot yellows'). Parrots have no green pigment; what you see is due to light reflecting off their feathers' tiny structures. The other factor that affects colour in parrots is melanin pigment, which affects how light or dark the feathers are.



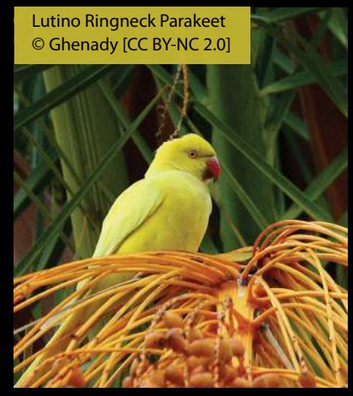
Yellow phase Dusky Lory
© PursuedbyBear [CC BY-NC 2.0]



Lutino Yellow-chevroned Parakeet
© Carlos Henrique [CC BY-NC 2.0]

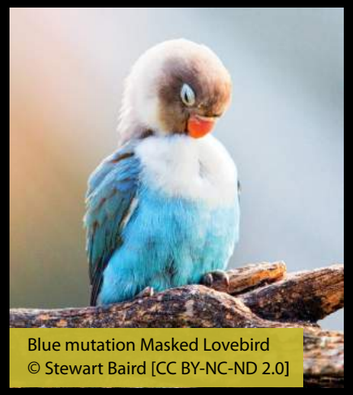


Blue mutation Yellow-shouldered Amazon © Sam Williams



Lutino Ringneck Parakeet
© Ghenady [CC BY-NC 2.0]

Examples of colour mutations in birds are: leucisism, melanism, blue, red, and lutino (also known as xanthism). An example: A blue mutation in a parrot is due to a lack of red and yellow psittacofulvins, and also a result of particles scattering light in feather structures.



Blue mutation Masked Lovebird
© Stewart Baird [CC BY-NC-ND 2.0]

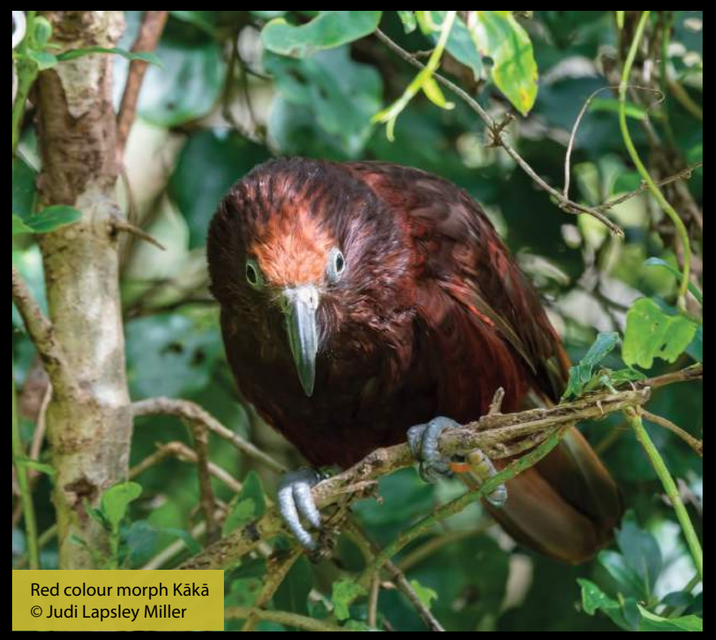
Leucistic Yellow-tailed Black Cockatoo
© David Cook [CC BY-NC 2.0]

Blue mutation Barred Parakeet
© Kathinetzwek [CC BY-SA 4.0]

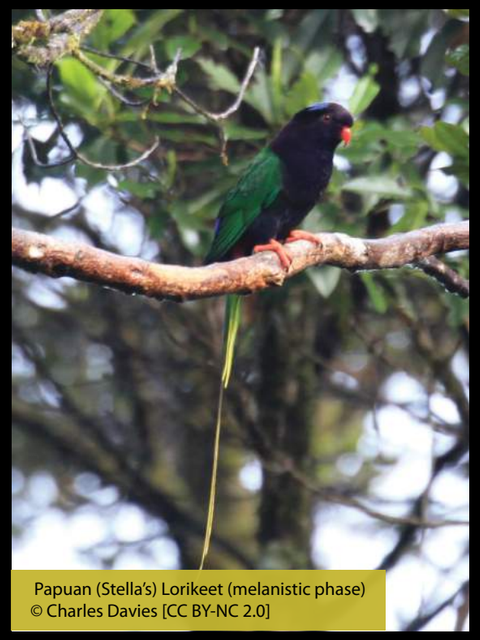
The majority of bright yellow and red non-parrot birds obtain their colours using carotenoid pigments that are gained from their plant and algae-based diets. Parrots are different; despite consuming and circulating these carotenoids in their bodies they don't deposit them in their feathers, but instead produce their own psittacofulvins. This was recently discovered by studying a mutation in captive Budgerigars (*Melopsittacus undulatus*), where scientists identified the gene responsible for yellow psittacofulvin production.

Sometimes changes occur in these colour-related genes: A mutation is defined as an alteration in a DNA sequence, an error in the copying of genes from one generation to the next. Mutations may or may not change an organism's observable characteristics, and play a part in both normal and abnormal biological processes.

Mutations occur in a number of parrot species including Budgerigars, Cockatiels (*Nymphicus hollandicus*), Kea (*Nestor notabilis*), Ringneck Parakeets (*Psittacula krameri*), and *Cyanoramphus* species.



Red colour morph Kākā
© Judi Lapsley Miller



Papuan (Stella's) Lorikeet (melanistic phase)
© Charles Davies [CC BY-NC 2.0]

The wild parrots
OF BIAK ISLAND

Article and Photos by Mehd Halaouate

The activities that wild parrots engage in have always been fascinating for me. I have been lucky to see and document the behavior of many parrot species in the wild, especially in Indonesia, Papua, Australia, New Caledonia and Fiji. Besides observing for enjoyment I always try to learn about the species' wild behaviour and ecology, which is key to understanding their conservation needs.

There's still a lot to learn about parrots!

Trapped Rosenberg's Lorikeet before release

Parrot life and increasing trade on Biak

I fell in love with Papua (formerly known as Irian Jaya) in New Guinea from my first trip in the summer of 2001. We had heard that there were political troubles in Papua as the independence movement there was very active. The Indonesian Embassy gave warnings not to travel to the region, but I was determined.

During the trip I had the chance to spend 10 days on Biak Island in Geelvink Bay, which is north of Papua and West Papua provinces. The mainly limestone island is situated in the centre of the bay and is 72.4 km long and 37 km wide. That was the first place I encountered the Biak or Rosenberg's Lorikeet *(Trichoglossus rosenbergii)*, which then was still considered a subspecies of the Rainbow Lorikeet *(Trichoglossus haematodus)*.

There are other parrot gems here, like the Biak Eclectus parrot *(Eclectus polychloros biaki)*, Biak Red-cheeked Parrot *(Geoffroyus geoffroyi mysoriensis)*, Biak Red-fronted Lorikeet *(Charmosyna rubronotata kordoana)*, and the Biak Black-capped Lory *(Lorius lory cyanauchen)*.

Biak Island also has a member of the tiniest parrot family in the world with the Geelvink Pygmy parrot (*Micropsitta geelvinkiana misoriensis*). It was a challenge to locate these tiny birds as they are no larger than 9 cm (3.5 inches). We quickly learned how to find them, as sometimes when they are close to you they get overlooked.

When they scurry up and down the trunks of trees feeding on lichens you can see vegetation bits falling; they also make a quiet *"tsits tsits tsits"* sound. Another way to find them is during the breeding season in termite mounds found in the forests. If the entrance to the termite mound is round it is a kingfisher's nest, but if it's oval then it is home to a pygmy-parrot.

When I'm travelling I get curious about what birds the locals are keeping as pets so I asked around; I was told about a small market in the middle of the city where some of the shops have a few birds for sale from time to time. I visited this market and found a few parrots such as Eclectus, Black-capped Lories and Black-winged Lories *(Eos cyanogenia)*. I even found non-native species such as Palm Cockatoos *(Probosciger aterrimus)* and the Yapen island subspecies of Black-capped Lory, *Lorius lory jobiensis*.

I again visited Biak island with some friends in 2016. One morning while we were heading to the forests from our hotel, we met an elderly lady carrying three Rosenberg's Lorikeets chained to 'L' stands, each with a cup made of bamboo where she put sweetened water for them.

We could clearly see that the birds were recently caught; the lady told us that her son caught them the day before. Without hesitation we decided to buy them from her to release them where we found wild ones. The birds were very alert and scared which are good signs that they were still ready for release back into the forests. Their wings were not damaged, and they looked in perfect health.

We checked a few locations and in one we found a few flowering trees with plenty of lory and lorikeet chatter. When we scanned these trees, we found a decent-sized flock of Black-winged Lories and a few Rosenberg's in a feeding frenzy. We enjoyed watching these birds moving energetically between the flowers. Without disturbing the birds too much we released the newly-caught ones. It was a treat to see them swiftly fly far away from us.

During my first visit to the island in 2001 I found that the Rosenberg's were common, with a few birds being sold in the city's market, but in 2016 there were none in captivity on the island and very few seen in the good bird watching spots that I usually take guests to. It is has become a rare species nowadays.

The Rosenberg's Lorikeet population has seen a major decrease in numbers due mostly to trapping to supply the pet trade. There is still hope for this parrot now that it has been designated as a full species, making it easier to put it on the Indonesian protected list but if the law is not enforced, we will end up losing the remaining wild population. Despite this, there are still fairly robust numbers to be found in the north of the island in Supiori. I have encountered more flocks here than anywhere on Biak and there are still good patches of forests in this region to support most of the wildlife on the island.

One solution to keep this remaining population thriving in the wild is to set up a conservation program with the aim of raising awareness about the problems the species is facing. Most of us know from our experience watching lorikeets in Australia that the *Trichoglossus* family of birds is highly adaptable and does not rely entirely on undisturbed forests to survive. If there is no trapping these birds can live side by side with the locals. I have seen Deplanchi's Lorikeets *(Trichoglossus haematodus deplanchii)* in New Caledonia thriving in the cities, taking advantage of what the locals were growing. They relied on the few trees in the gardens and local park in the middle of the city. Another option is captive breeding programs; currently there are Rosenberg's Lorikeets in the European Union, so that may be a future possibility.

My visits to Biak Island have opened my eyes to the amazing variety of bird life and the threats they are facing there. It is my hope that we can both preserve and continue to enjoy this remarkable diversity.

Mehd Halaouate is WPT's Indonesia Program Manager. He also leads birdwatching groups on tours throughout Indonesia.

PARROT SENSES

How psittacines connect with their surroundings

by Graham Martin, BSc, PhD, DSc

In part one of this series, Professor Graham Martin talks about one of the most important senses for parrots – vision.

Parrots are clever, always doing something that fascinates us. They stand out from other bird families in many ways: manipulating objects, climbing about using their bill as a third limb, maintaining complex social relationships, and expressing strong preferences for people, places, and foods. They are always alert, always aware of all that is about them.

To express these fascinating behaviours needs not only dextrous limbs, specialised bills, and strong tongues, but also information; information about the world in which each parrot lives. Most of us take for granted the rich array of information that constantly flows into our brains from our senses, we assume that what we can see, hear, smell, and feel is comprehensive, and that it is available to every creature. But our senses are selective, feeding us vital information that allows us to execute our repertoires of human behaviours. The same is true of all animals; what they detect of the world about them is specialized and selective.

Comparative studies of senses show us very clearly that birds live in a different world to us,


© F. Lopes (CC BY 2.0)

framed by information that allows them to express their specialized behaviours; this is particularly true of parrots.

KEY SENSES

Two key senses stand out in parrots: **vision and touch**. Vision is such a multifaceted sense that it is probably true that vision is not exactly the same in any two species of birds; there are always subtle specialisations in every species. Parrots see the world in unique ways, shining light on some of their more notable behaviours.

Perhaps less obviously, the sense of touch is also highly specialized in parrots and is crucial for the conduct of the most intriguing parrot behaviours. While hearing and the sense of smell may not be so different to those of other birds, they are nevertheless important to parrots, and are certainly very different from our own.

And there are mysteries: can parrots detect the Earth's magnetic field and use this to guide both long and short distance travel?

A daisy photographed under visible light (left) and ultraviolet light (right). We cannot be sure how the daisy will look to a parrot, but they will certainly see more in it than we do. © David Kennard (CC-BY-SA 3.0)

VISION

Vision is a tricky sense to investigate. It is multifaceted, meaning that there are many ways of describing what can be seen. There is the breadth of the visible spectrum, the presence and subtlety of colour vision, the accuracy of spatial resolution at different light levels, and differences in the directions about the head where vision is most acute. In addition, there are differences in the field of view which determine how much of the world can be seen at any one moment.

VISUAL FIELDS

One rather peculiar thing about humans is that we have eyes on the front of our heads and that the two eyes see more or less the same view of the world. The consequence of this is that for us the world is always out in front and we seem to move into it, and it disappears behind us as we move forward. In birds, eyes are on the side of the head; they look in different directions and give a much more comprehensive view of the world at any moment. The result is that birds flow through their visual world, objects are seen in front, they flow past, and disappear slowly from view behind.

Another important consequence of birds' laterally placed eyes is that the direction of best resolution lies not in front (as in ourselves) but to the side. Furthermore, this means that there are two areas of high resolution to the left and right of the head, the direction of best resolution is not out in front as in ourselves. When we want "to look at something" we tend to face it squarely. For birds, however, examining something in detail involves looking laterally with one eye only; this is why we frequently see parrots turning their heads sideways to peer at something. In Senegal Parrots it has been possible to show that they have a narrow binocular field and that they can only just see what is at their bill tip. However, the eyes are positioned high on the sides of the head and this gives parrots very extensive visual fields. They have a blind area behind the head that is only 16 degrees wide with the consequence that only very small rotations of the head will reveal what is directly behind.

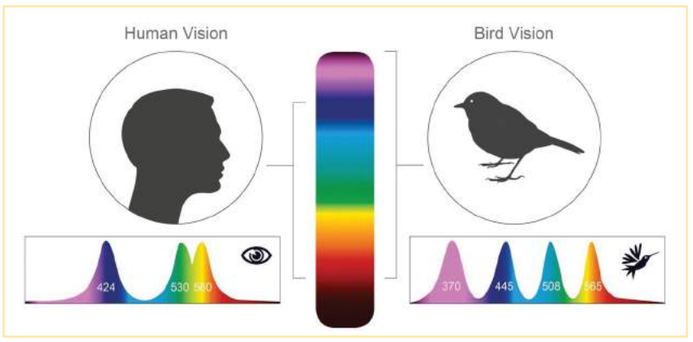
This means that parrots can detect what is going on around them all of the time; they even have binocular vision directly above the head, meaning there is no blind spot above. It seems likely that such an arrangement of the visual field is typical of most other parrots. It means that parrots can continually keep an eye on others in their social group, even when they are busy foraging or manipulating objects. It also allows them to be constantly on the lookout for predators.

While the directions of highest quality vision project laterally from each side of the head it has even been shown that Budgerigars have a region of enhanced visual resolution in each eye that projects backwards in their field of view. It seems impossible to creep up on these birds without them knowing that you are coming.

Parrots' ability to only just see the tip of their bill is quite different to the situation in many other birds. In many species their bill projects more-or-less centrally in the region of binocular vision. This is used to locate the bill with high accuracy and to time its arrival at a target with precision. This arrangement is the key for accurate pecking and lunging with the bill, and is also used for catching prey in the feet.

Clearly these are not the feeding techniques of parrots and their vision reflects this, being free of the need to peck or lunge they gain a near comprehensive view of the world about them. How parrots cope without seeing their bill tip involves something rather special: the sense of touch using a bill tip organ.

A Budgerigar fluoresces under ultraviolet light, adding extra information that a parrot can detect using its sensitivity to UV light. © The Natural History Museum via Alamy



Comparison of human vs bird photoreceptors © Klaus Schmitt (CC BY-SA 4.0)

VISUAL ACUITY

What about other aspects of parrots' vision, especially acuity, colour, and the visible spectrum? The ability to resolve detail (acuity) in a scene varies markedly across animal species, with the highest acuity occurring in the larger eagles. Acuity in parrots does not match this; it is rather close to the average of most birds species. Detailed information is available only for Bourke's Parrots and Budgerigars, and this shows that their ability to see detail is about one third that of an average adult human and probably about 15 times lower than that of an eagle. But eagle vision is primarily used for detecting larger objects at greater distances when hunting, a visual task that parrots are unlikely to be interested in. Parrots are primarily interested in relatively large objects that are nearby and so their acuity matches the task very well.

COLOUR VISION AND ULTRAVIOLET

There is every reason to believe that parrots do have sophisticated colour vision. The impressive, coloured plumage patterns of many parrots certainly suggest this. Detailed studies of the photoreceptors in the retinas of parrot eyes show that they have four types of photoreceptors that underly colour vision. They give parrots a broad visible spectrum but importantly they underpin the ability to discern small differences within the spectrum.

Definitive colour vision tests have not been done in parrots. Such tests take a long time and involve a lot of training plus careful control of test stimuli, but information about their retinas suggest strongly that parrots can make very fine discriminations of colour. However, parrots are probably not exceptional among birds in their fine colour discrimination, but they are certainly better than mammals, including ourselves, at discriminating colour.

Parrots can see differences between colours that we cannot. Human colour vision is based upon a system employing three types of photoreceptors, whereas parrots have four types. These four types allow vision across a broader part of the spectrum. The visible spectrum of parrots shows a strong parallel with those of the songbirds (passerines). Parrots and passerines are considered sister taxa, that is they are more closely related to each other than they are to other birds. Both parrots and passerines are exceptional among birds (apart from gulls and ostriches) for having a class of photoreceptor in their retinas which gives vision in the ultraviolet (UV) part of the spectrum. This means that parrots can gain information from UV patterns in plumage, foliage, and fruits that we are unaware of.

In some parrot species there are plumage patterns that show up in the UV part of the spectrum, patterns that our eyes cannot detect. However, these patterns can convey important information about species, sex or even health. This means that there are aspects of the world that are secret to parrots and which we cannot readily detect.

Next time: Explore more parrot senses!

ABOUT THE AUTHOR:

Professor Graham Martin, BSc, PhD, DSc of The University of Birmingham, UK is an Ornithologist with an international reputation built upon his research into the sensory worlds of birds. In recent years he has used his expertise to focus on problems concerned with the functions vision, especially binocular vision, in foraging behaviour, and in understanding why some bird species are particularly vulnerable to collisions with human artefacts such as wind turbines, power lines and fishing nets. His son is Dr. Rowan Martin, WPT-Africa Programme Director.

DOUBLE WHAMMY CONSERVATION PROBLEM FOR THE ENDANGERED LEAR'S MACAW:

Urgent action to remove invasive Africanized honey bees in nesting areas

For more than a decade, our research group has been working with the last remaining Lear's Macaw population. From the initial study, started in 2008 with the Lear's Macaw Breeding Biology project, we uncovered unprecedented information on the species' biology and ecology, leading to many new questions. Over the years we have gathered more information that has informed conservation strategies for the species.

The Lear's Macaw *(Anodorhynchus leari)* is a globally endangered species and one of the most range-restricted and threatened parrots of the world, endemic to the Caatinga dry-forest in Bahia State, northeastern Brazil, an exclusively Brazilian Biome. The species was thought to be extinct in the wild until a small group of macaws (ca. 200 individuals) was located in 1978 in the Raso da Catarina ecoregion, having already experienced an acute population decline.

The Lear's Macaws are under serious threat, endangered by several *anthropogenic* (human-caused) disturbances such as habitat loss (caused mostly by deforestation and overgrazing), capture for illegal international trade and hunting, and also the absence of reserves to protect the licuri palm *(Syagrus coronata)*, whose fruits are the main food source of the species.

Specialising in nesting in natural cavities in sandstone cliffs, these amazing birds also face another conservation problem: nesting-cavity competition with invasive Africanized honey bees *(Apis cff. melifera)*, that build hives in the same cavities used by the macaws – the aggressive behavior of Africanized honey bees allows them to usurp macaws' nesting cavities, preventing them from nesting in the proximity, or even killing parrots using the same (or nearby) cavities. This makes them a serious menace to the wild Lear's population.

There is circumstantial evidence that Africanized honey bees compete with several parrot species for tree-nesting cavities and also artificial nest boxes placed to increase nest-site availability. Interestingly, there is a possibility that the bees also take over natural and artificial cavities abandoned by parrots. In addition, several bird species, including at least one parrot, associate with more aggressive nesting species (including wasps) to gain protection against predators.

Africanized Bee © Smithsonian Institution Archives

The Africanized honey bee is a hybrid of the African honey bee *(Apis mellifera scutellata)* and the European honey bee (*Apis mellifera mellifera*). The result of this cross is an aggressive insect that has quickly spread to become one of the most successful invasive animals in the world. These bees reproduce rapidly and use a wider range of sites to build their hives compared to other bees; their spread across the world has brought them into conflict with humans and animals alike. African honey bees were first introduced into Brazil in 1956, and after accidentally hybridising with the naturalised European honey bee easily spread into other parts of the Americas.

The World Parrot Trust (WPT) is supporting bee eradication work with Lear's Macaws, as well as efforts on the island of Bonaire with Yellow-shouldered Amazons. Parrot recovery projects elsewhere also take special precautions to prevent bee infestations.

During our monitoring of the macaws in the 2010 breeding season, we observed the occurrence of Africanized honey bee hives in Lear's nesting cliffs, and from local residents we learned that macaws bred previously in cavities that are currently occupied by the bees. Such reports, along with the knowledge that limited nest-site availability may constrain reproductive success and breeding populations in cavity-nesting birds, lead us to hypothesize that the Africanized honey bees could be associated with the Lear's Macaws population decline to local extinctions during the 1980s.

We thus started a new study, the first of its kind, in 2016 with the support of WPT and collaborating with Caroline Efstathion and Robert French Horsburgh, two US-based entomologists, to investigate the extent of Africanized honey bee occurrence in the macaw's breeding cliffs, and the potential nest site competition between bees and macaws.

We predicted that limited nest-site availability due to Africanized honey bee infestation might limit the macaws' population growth, particularly in the historical areas of Barreiras and Baixa do Chico – areas undergoing recent occupation by the macaws after local extinctions and that are believed to be among the macaw breeding areas most infested. Setting-up sugar water feeding stations to attract the bees complemented direct observations. This allowed us to note their 'bee-lining' (flight path) after they had gorged on sugar water; we were able to follow them back to their nest cavity, thus helping us to identify less obvious hive locations.

Our results show high infestation of the macaw nesting cliffs by Africanized honey bees, especially in historical sites where hives outnumbered macaw nests by about 10 times.

© Cris Prates

After this discovery we carried out beehive removal experiments, testing their effectiveness on the macaws' *nest recruitment* (the ability to access and successfully use cavities for nesting). We treated hives with *permethrin* (a chemical that resembles that found naturally in *Chrysanthemum sp.* flowers), because it has been shown to be highly effective in deterring Africanized honey bees from taking over nest boxes placed to help parrot species breed in areas where nesting trees have been lost to deforestation. It is a chemical that is safe for birds, has low toxicity to other vertebrates, and does not last long in the environment.

The experimental treatment of Africanized honey bee hives was associated with an increase in recruitment of new breeding macaw pairs by 71.4%. We concluded that the elimination of beehives from cavities previously occupied by the bees increased nest-site availability and favored recruitment of macaw nesting pairs within two years post-treatment. An intensive and ongoing eradication program is recommended to enhance macaw breeding and habitat restoration, facilitating its expansion into historical areas.

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Upper left: Honey gatherers drive sticks into the sandstone wall to create ladders to reach beehive combs. Once there, many realise they can reach Lear's nests to capture chicks.
Upper centre, L+R: Team members rappel down cliff walls to remove invasive bee combs from cavity entrances so macaws can start breeding. A Lear's pair rests at a cavity entrance.
Upper right: Bee combs built by Africanised honey bees can obstruct cavity entrances.
Bottom right: Once the beehives are removed, team members can safely reach the nests to conduct research.
Bottom centre: Beekeeping gear and smokers kept the aggressive bees at bay.

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In addition to support from the World Parrot Trust, our work at Raso da Catarina ecoregion was also supported by The Parrot Fund, American Federation of Aviculture, HARI Conservation Network and CAPES (Brazilian Federal Agency for the support and Evaluation of Graduate Education). Safety support for rappelling in hive removal treatment was provided by Explore Trees, UK. Logistical support was provided by Fundação Biodiversitas (Canudos Biological Station), Ornithological Section of Museu de Zoologia da Universidade de São Paulo, Instituto Arara Azul and Doñana ICTS-RBD. We have also received help from local people and from several fieldwork volunteers, to whom we extend our sincerest thanks.

News

Confiscated parrots fly free again over eastern Congo's forests


© Lwiro

On November 18th, 39 Grey Parrots *(Psittacus erithacus)* were released by Vice Governor of Sud Kivu Province Marc Malago and Director and Site Manager of Kahuzi-Biéga National Park De-Dieu Byaombein in Sud Kivu in the Democratic Republic of Congo (DRC). A first of its kind in the region, this project marks an important step towards permanently ending the wildlife trade for this at-risk species, threatened by decades of unsustainable trade.

Read more of their story:
facebook.com/WPTAfrica

Read the press release:
tinyurl.com/y56tzq5v


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What does Polly Say? A Parrot Vocal Survey

Do you know a parrot that mimics speech or human-associated sounds? If so, researchers at the Universities of Northern Colorado and Pittsburgh-Johnstown could use your help! Parrots have amazing abilities to learn new vocalizations, and those that live with humans provide a unique opportunity to study what birds can learn. Take their survey to contribute to research on parrot vocal learning.

Take the survey:
tinyurl.com/vocsur

New research tracks the mysterious movements of Kākā


© Kate Macbeth (CC BY-SA 4.0)

Crown research institute Manaaki Whenua - Landcare Research has partnered with the Department of Conservation on a new research project using solar-powered GPS tags to track the movement of Kākā (*Nestor meridionalis)* on Waikato ranges in New Zealand. The distinctive parrot's numbers have seriously declined since the 1980s in some areas but are slowly recovering. Researchers say the project will help to answer questions about the Kākā's movements, most of which remain a mystery.

Read more:
tinyurl.com/kakagps

BOOK REVIEW: Hazel's Horrible Adventure

Story of a young, naïve macaw delights and instructs

Hazel, a young Scarlet Macaw, finds herself in trouble shortly after fledging and flying away from her parents. The story moves along briskly from there, with twists, turns and lessons learned along the way. This will appeal to the pre-teen set, a good age to impart the serious message that accompanies the tale. Part of the book's sale proceeds will benefit WPT's conservation programs.

Get your copy on Amazon:
tinyurl.com/hazelsha

Kiwa Centre Parrots and the COVID-19 pandemic

The parrots living at the Kiwa Centre in the UK need your help. It can cost upwards of £1,000 per month for food and enrichment supplies to meet the needs of the more than 200 rescued parrots residing there. To help get them through the challenges the COVID-19 pandemic has created, the Kiwa Centre staff created an Amazon Wish List where people can donate items directly to the birds.

View the wish list on Amazon:
tinyurl.com/kiwalist

Read the story of the Kiwa Centre:
tinyurl.com/kiwacovid

2021 Parrot Wall Calendars

Enjoy a year's worth of your favourite birds as depicted by some of the world's best wildlife artists with our Artist Edition calendar. Or fall in love with candid images of parrots in the wild with the Photography Edition. Proceeds help to protect these and other beautiful birds from the wildlife trade and habitat destruction.

Start shopping:
parrots.org/shop

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PARROTS IN THE WILD:

Red-winged Parrot

(Aprosmictus erythropterus)

A Red-winged Parrot forages in its native Australia. These striking birds are found in a wide variety of subtropical and semi-arid woodland and scrub, feeding on seeds, fruits (including native mistletoe) and insects.