



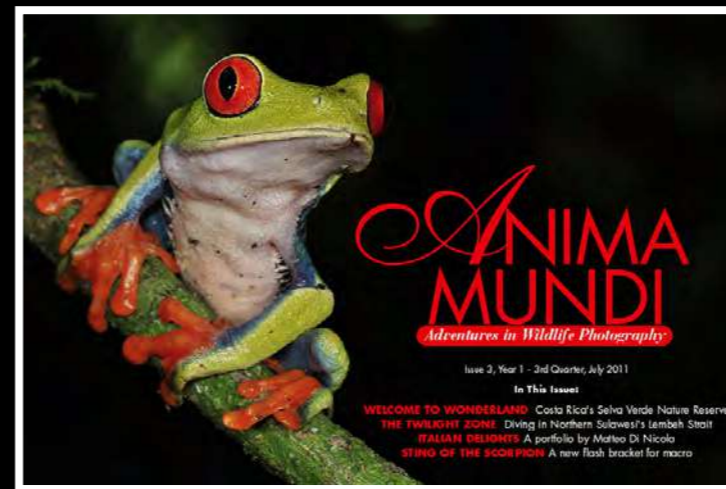
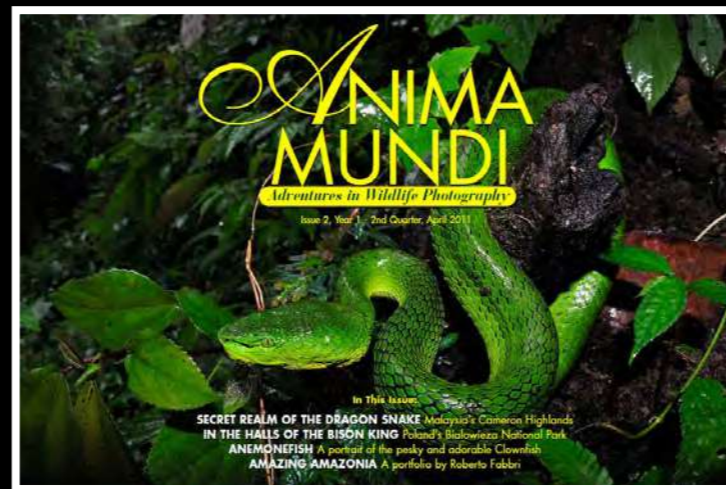
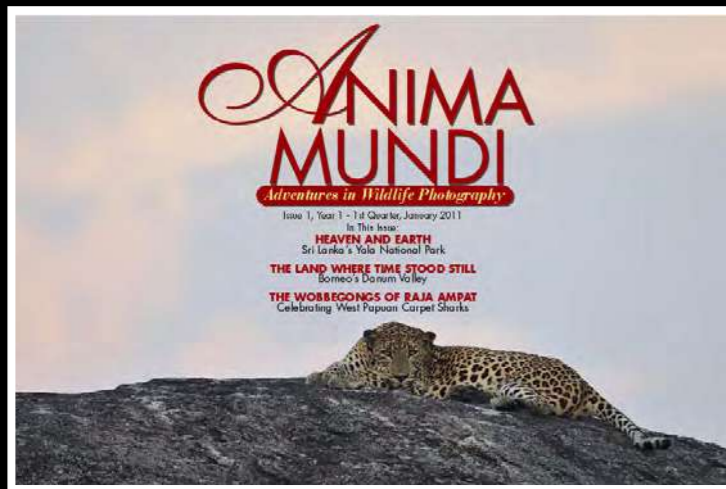
ANIMA MUNDI

Adventures in Wildlife Photography

Issue 26, Year 7 - April 2017

In This Issue:

- SCOOP Sri Lanka's endemic Rhino lizard
- PRIMATES PARADISE Assam's Gibbon Wildlife Sanctuary
- LORDS OF THE ATLANTIC Namibia's Brown fur seals
- LIFE IN THE DARK Dante Fenolio's latest book
- RAINFOREST JEWELS Dendrobatid frogs

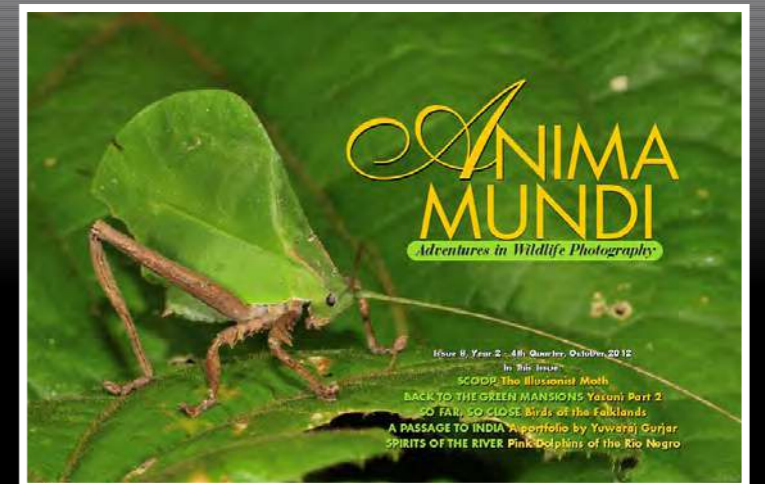
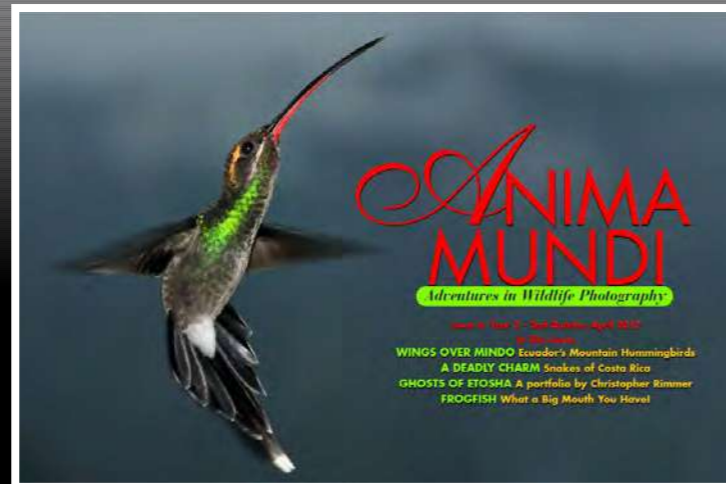


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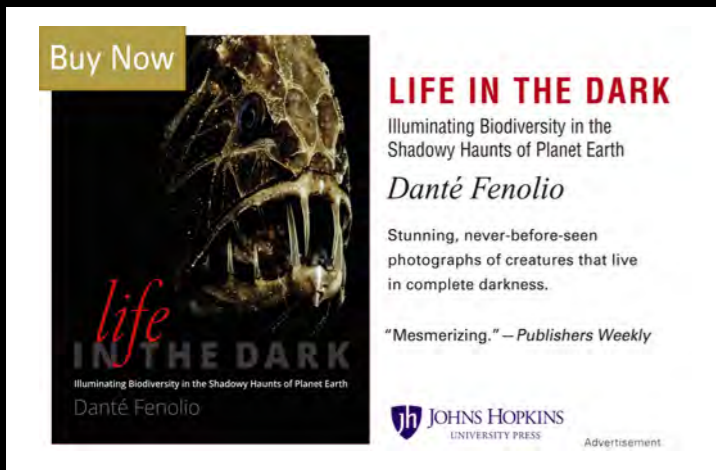
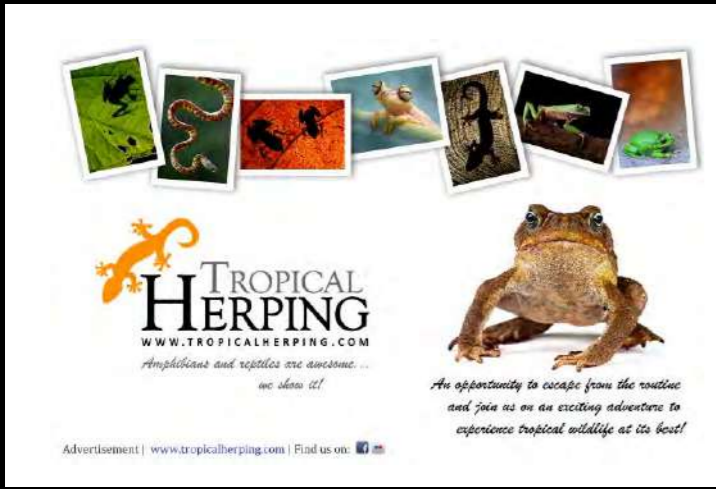
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Dear Andrea & Antonella,

I have just finished reading your latest edition of Anima Mundi and I was inspired to write and say how much I am enjoying your publication and following your adventures. My wife and dive/photo partner Cherie and I were so inspired by your feature on Yala National Park that we booked a Safari with Eco Team and we had a fantastic time. It was exactly as portrayed in your article and we also followed your recommendations for visiting the cultural triangle in Sri Lanka. As we were leading one of our dive tours on a live aboard exploring the Maldives last June, a private side trip to Sri Lanka was clearly not to be passed up due to your information. So, I guess it's good news for you both that others are reading and responding to your work. So, we just wanted to give you some feedback, say hello and wish you all the best with your future adventures. Keep up the great work.

Kevin & Cherie Deacon
Dive 2000
Sydney, Australia.
www.dive2000.com.au

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■ Stump-tailed
or Bear macaque
Macaca arctoides,
Hoollongapar Gibbon
Wildlife Sanctuary,
Assam, North-eastern
India - see page 11.



ANIMA MUNDI

Adventures in Wildlife Photography

It's our mission, baby

I am often asked why we work long hours to put together our online magazine since we do not make a profit out of it (yes, I know it is difficult to believe for some...but it is the absolute truth). I suppose we might answer that calling oneself an environmentalist, a conservationist, a nature lover and a staunch defender of wildlife anywhere in the world means that one has to somehow actually act about these matters - not just sitting passively in the aisles, but taking matters in one's hands and do something about it. I have been a professional journalist all my working life, so we do this - it's what we do best. We have no pretense of doing a unique job, but we try to do our bit to promote a conservationist set of mind in our readers, and to spread knowledge and ultimately love about nature and wildlife. Could we call it a mission? I don't know - if one truly and sincerely feels about the above, it only comes naturally to act on behalf of them - especially considering that we are living in times fraught with dangers and worries regarding wildlife and habitat conservation. We are proud and honored to have a great number of highly regarded professionals contributing to our magazine without asking anything in return - scientists, field researchers, travel journalists and wildlife photographers who realize that offering something freely in the name of conservation doesn't necessarily go against selling one's photos or writing for a fee. Both can

co-exist side by side (we freely provide our images to worthy causes like Arkive, but we also sell them through a commercial agency) - it's the purpose and meaning which are different. Sadly, there are also those - very few, but some of high repute - who do not share the above view, who will not offer their own work freely and who staunchly and often bluntly refuse to volunteer anything without being paid. What can I say? I can only deduce that they are not into this for a sincere love of the environment, but rather for the money itself - only to sell photos to magazines and to fill up their photographic workshops. Nothing wrong with it, mind you - but I do not believe that those unwilling to volunteer anything for a cause should deserve to be called and believed to be defenders of the



same. Professionals, yes - visionaries, no. Finally, let us remind you once more that our Parting Shot column is now open for publication to reader's photos. So if you would like to be featured in our coming Parting Shots and think you have clicked an interesting wildlife image worthy of publication, just send an email to editor@animamundimag.com and we'll gladly take a look at it!

In the meantime...

Have a good trip!
Andrea & Antonella Ferrari
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We appreciate your feedback
- constructive criticism, useful
suggestions and interesting
contributions are welcome.
Please drop us a line at
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Publishers
Andrea and Antonella Ferrari
editor@animamundimag.com

Editor-in-Chief
Andrea Ferrari
editor@animamundimag.com

Original Layout Design
Laura Genovese
Anna Bortolini

Videographer
Antonella Ferrari
anto@animamundimag.com

Video Editing
Leon Joubert & Claudia
Pellarini-Joubert
info@bittenbysharks.com

Technical Support
César Acuña Luzuriaga
scesarin@gmail.com

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LIFE IN THE DARK

A photographic tribute to
Dante Fenolio's latest book


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 *Dendrobatid frogs Oophaga pumilio are tiny, beautiful and poisonous- see page 97.*

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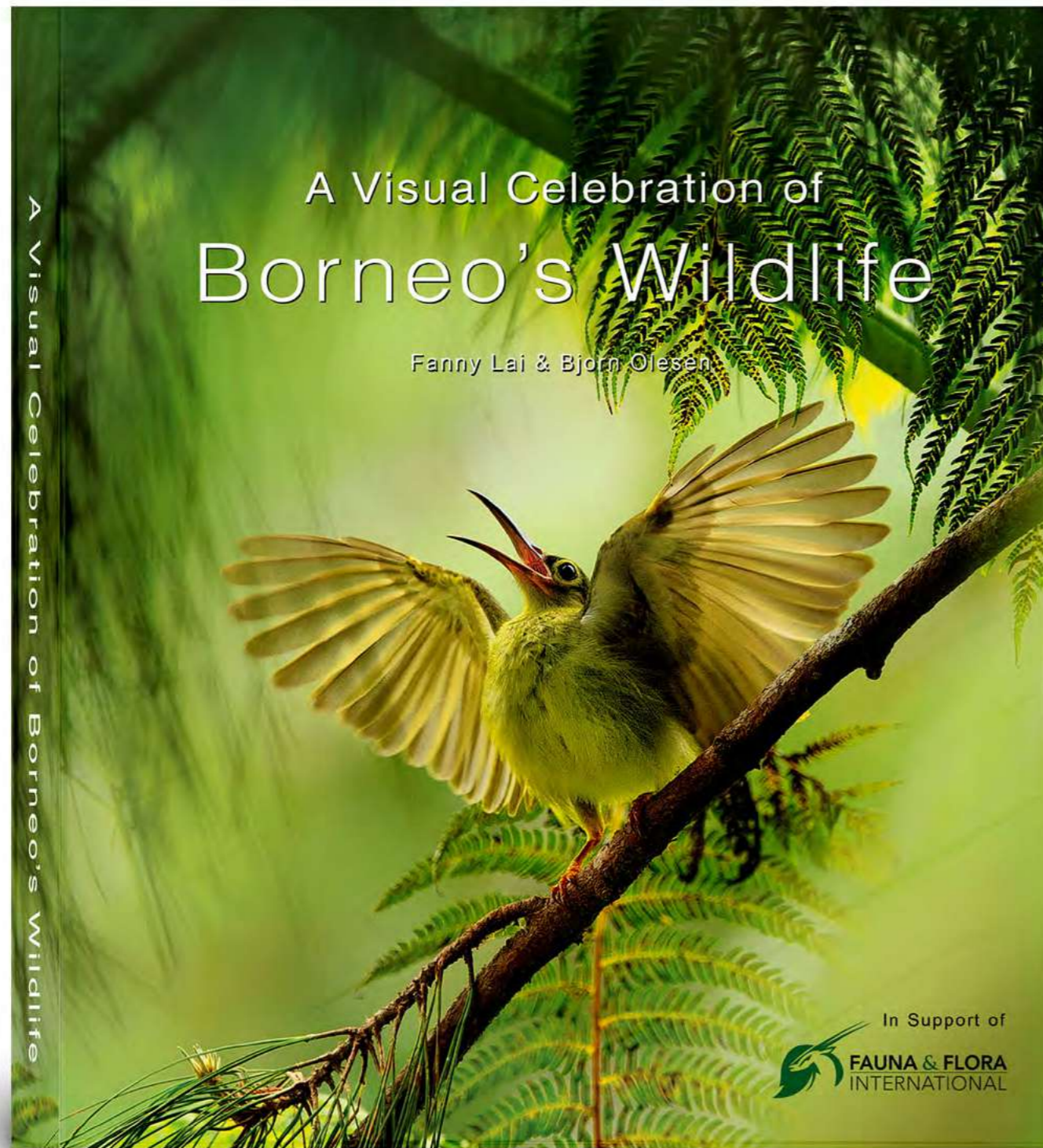
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The Rhino-horned lizard *Ceratophora stoddartii* is an endemic species with a very restricted distribution range from the cloud forest of Horton Plains National Park, in the Central Highlands of Sri Lanka.

SRI LANKAN ENDEMIC **THE RHINO LIZARD**

MEET A STUPENDOUSLY CRYPTIC, LARGE-SCALED, SLOW-MOVING REPTILE ADORNED WITH A MOVEABLE HORN AT THE TIP OF ITS NOSE



■ *Ceratophora stoddartii* is usually found among thick mosses, epiphytes and leaf litter.

TEXT BY ANDREA FERRARI
PHOTOS BY ANDREA & ANTONELLA FERRARI

The montane forests shrouding the Central Highlands region of Sri Lanka host a fascinating, bewildering array of exceptionally beautiful *Agamidae* lizard species, often carrying extravagantly-shaped nasal appendages. Possibly the most striking of them all is the stunningly beautiful Rhino-horned lizard *Ceratophora stoddartii*, which with a degree of luck and some patient searching can be observed in several localities ranging from Nuwara Eliya to Hakgala, Pattipola, Ohiya, Horton Plains, Hewaheta, Dimbula, Agarapathana and Adam's

Peak. We had the opportunity of finding several different individuals belonging to this truly beautiful species while exploring the cloud forest of Horton Plains National Park together with our friends Mevan Piyasena and Sandaruwan Abayaratne. This is a slow moving reptile, often found among the thick mosses on the ground or on the lowest branches of the stunted trees and thick bushes growing in this cold, misty environment. Striking points of interest include the large, somewhat carelessly-looking arranged scutes, the elegant mottled coloration ranging

from moss green to a warm brown and of course the curious nasal appendage - a pointed "rhino horn" made of overlapping scales and - surprisingly - hinged at the base, which can be pointed at will at different angles; this last tract possibly pointing at its use by *Ceratophora stoddartii* as a means of communicating for territorial, courting or breeding purposes with other members of the species. Beautiful, gentle and easily caught, the Rhino lizard is sadly another of several unique Sri Lankan endemics endangered by the illegal traffic for the international reptile pet trade. ●



6
The beautifully mottled green or brown livery of the Rhino lizard helps it to blend well with its forest environment.





The nose horn of the ■ Rhino lizard is somewhat hinged at its base by a ligament, and can be moved at will by the animal - probably for intraspecific communication purposes.





Antonella observes an adult specimen of *Ceratophora stoddartii* basking along a road in the Horton Plains. This is a very gentle, slow-moving species.





The head of *Ceratophora stoddartii* is oval, and longer than wide. The rostral appendage is long, horn-like, about two thirds the length of the snout in males, but it is greatly reduced or even absent in females.



■ This unique species is sadly one of the countless endemic species of Sri Lanka being regularly and illegally captured by wildlife traffickers for the lucrative international reptile pet trade.

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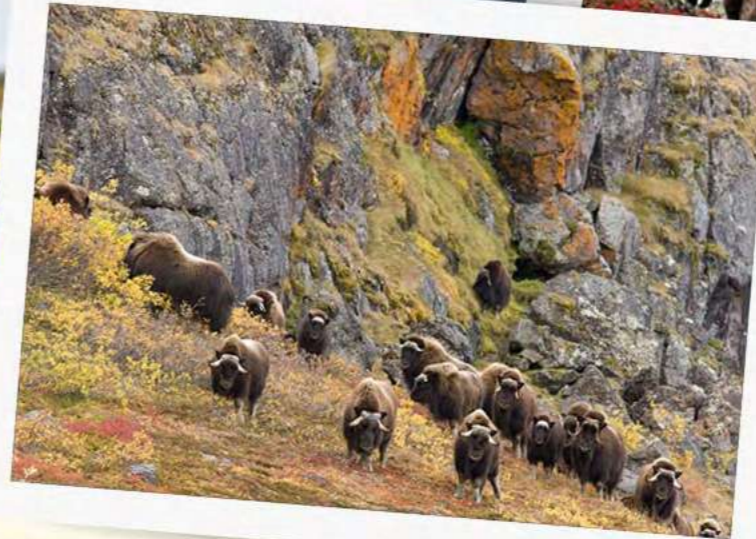
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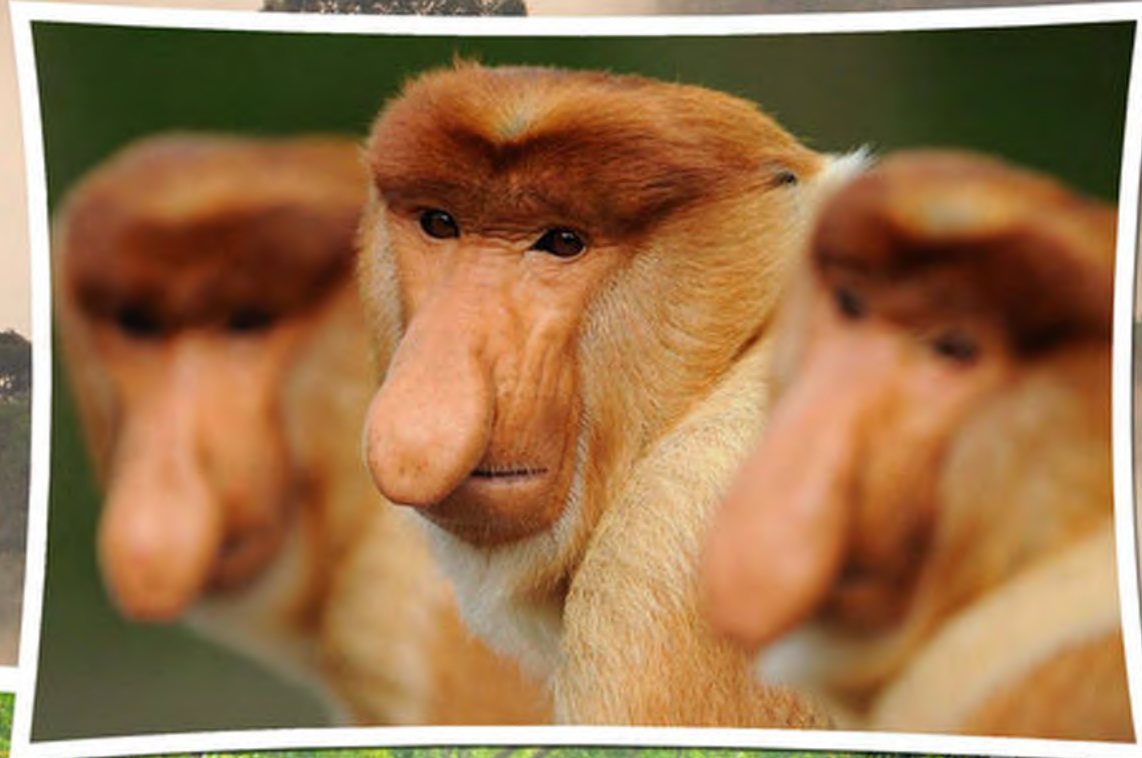
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THE HOOLLONGAPAR GIBBON SANCTUARY

PRIMATES PARADISE

Hidden among the sprawling tea estates in North-Eastern India, this remote and tiny patch of forest in Assam hides a veritable treasure of biodiversity

A close-up photograph of a young, light-colored macaque (Macaca arctoides) clinging to a tree branch. The monkey has large, dark eyes and is looking directly at the camera. It is surrounded by green leaves and branches, with some leaves showing signs of being eaten. The background is a soft-focus forest scene.

■ A baby Stump-tailed or Bear macaque *Macaca arctoides*, Hoollongapar Gibbon Wildlife Sanctuary (GWS), Assam, North-eastern India. On the opening spread, an adult male of the same species.



TEXT BY ANDREA FERRARI
PHOTOS BY ANDREA & ANTONELLA FERRARI

Travelling to remote, exotic and relatively unknown locales can be somewhat problematic and often disappointing for several reasons, but occasionally it presents us with the unexpected gem, a total mind-blowing surprise - and this was the case. Who would have ever thought that a ridiculously small stretch of forest - less than 21 square kilometers! - tucked in a corner of the far North-East of India and surrounded on every side by an endless ocean of tea gardens - yes, pleasant to the eye, but a cruel reminder of the atrocious tree-felling perpetrated in the past by the British -

could make such an overwhelming impression on us? And yet - thanks to the foresight of our Indian friend, naturalist and wildlife photographer Yuwaraj Gurjar, who insisted on taking us there - the virtually unknown Hoollongapar Gibbon Sanctuary has not only left an indelible mark on us, but has also provided a completely disproportioned amount of great moments and images in less than a week's stay. It may sound absurdly small - and it actually is - but it is the only Sanctuary in India with seven - yes, seven! - primate species, having quite possibly the highest primate

continued on page 15 ➤

Western hoolock gibbon
Hoolock hoolock,
adult male.

Capped langur ■
Presbytis pileatus.



biomass in India and one of the highest in the world. Not only it has a high density of the Hoolock gibbon, the only ape in India (roughly 100 individuals split in 26 families), but it is also one of the last strongholds of the endangered Stump-tailed macaque (230 individuals in 2 troops), of the threatened Assamese macaque (46 individuals in a single troop) and of the equally endangered Capped langur (160 individuals in 14 troops). The fact that it can only be explored on foot only adds to the excitement and to the apparently endless number of small species which can patiently searched for, found and photographed at ease: in its forest we have encountered and documented the fascinating Jumping Spider mimic Moth (see [our article here](#)), the mysterious Golden viper of Assam (see [our story here](#)) and the stunning Bird-poo Crab spider (see [here](#)), plus an overwhelming variety of Salticid Jumping spiders, many yet undescribed and a few of which can be seen gracing these pages. The Sanctuary trails are easily followed and very well maintained, but the presence of a rifle-armed warden is mandatory given the very real possibility of bumping into the irascible local elephants or even a leopard.

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The striking ■
Curved spiny spider
Gasteracantha arcuata
can be occasionally
spotted in the
undergrowth.

■ The Sanctuary's thick and stunningly beautiful evergreen forest can only be explored on foot.



A LITTLE BIT OF HISTORY

The Hoollongapar Gibbon Sanctuary, formerly known as the Gibbon Wildlife Sanctuary or Hollongapar Reserve Forest, is an isolated protected area of evergreen forest located in Assam, North-eastern India, which has miraculously survived the ravages of deforestation brought on by the British occupiers during the time of the Raj, the Colonial rule. As they were fond of doing in many other occupied territories, the British had no qualms whatsoever in exterminating enormous numbers of wild animals and chopping down endless expanses of pristine, untouched forest to transform undisturbed primeval habitats into tea plantations (also known as tea gardens or tea estates). Luckily - as in this case - a few patches here and there survived

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Northern pig-tailed macaque
Macaca leonina.



Left, a dominant male Stump-tailed or Bear macaque *Macaca arctoides*; right, two views of the endemic and rarely observed Red-headed trogon *Harpactes erythrocephalus*.





Western hoolock ■
gibbon Hoolock hoolock,
adult female with baby.

the axe first and the chainsaw later. The Hoollongapar Gibbon Sanctuary derives from a patch of forest once part of the Hollongapar Reserve Forest in the civil district of Jorhat. Set aside as a "Reserve Forest" on 27 August 1881, it was named after its dominant tree species, the Hollong *Dipterocarpus macrocarpus*. At the time, it was considered an "integral part" of the foothill forests of the Patkai mountain range. The Sanctuary was officially constituted and renamed in 1997. Although its absurdly tiny area is currently completely surrounded by tea gardens and a few small villages, it used to connect to a large forest tract that ran to the state of Nagaland. The protected area started with 206 ha (0.80 sq mi) and then shrank in 1896 as sections were de-reserved. As tea gardens began to emerge between 1880 and 1920, and villages were established during the 1960s to

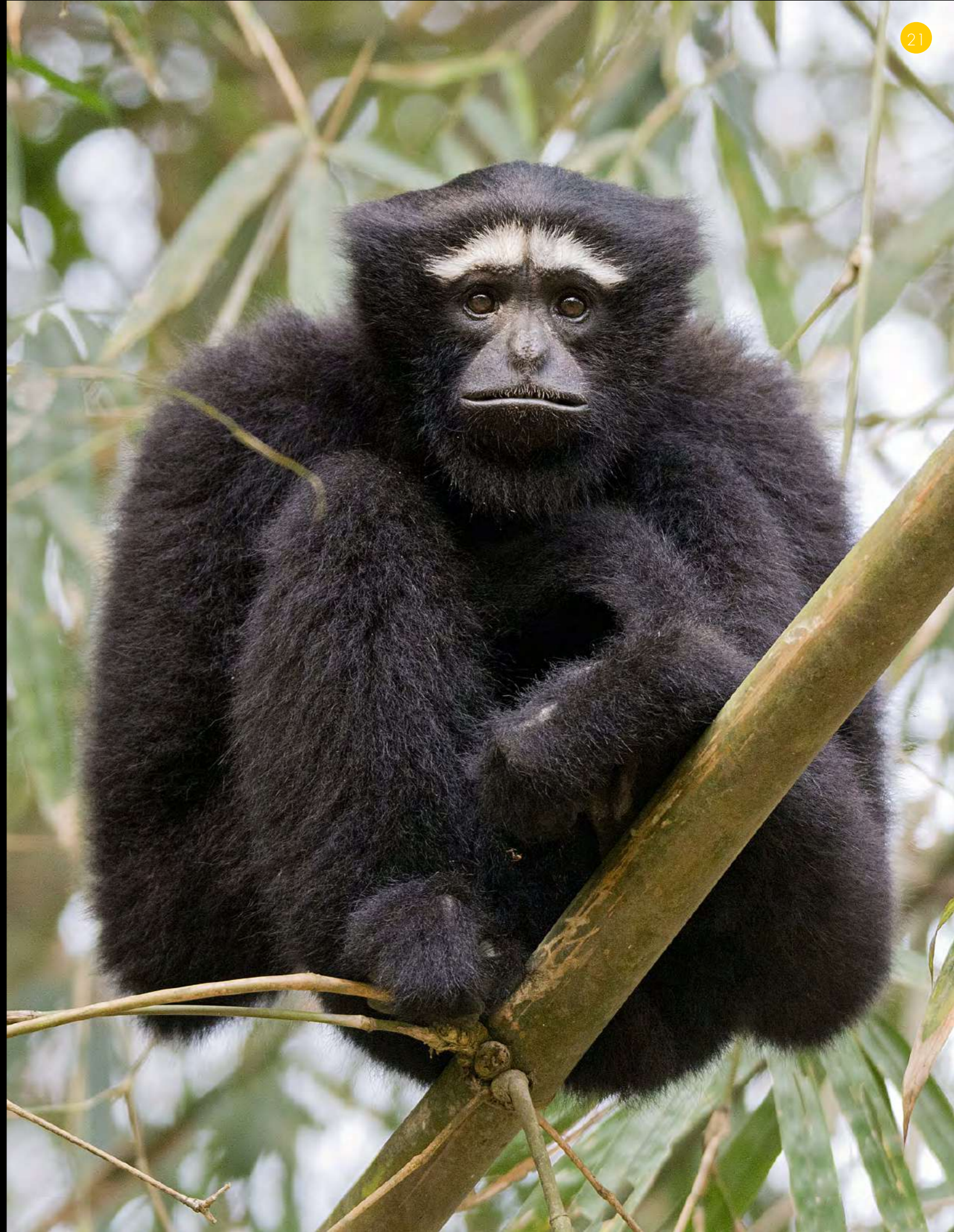
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Monkey-faced
Lynx Spider
Hamataliwa sp.,
family Oxyopidae.



■ Left, Capped langur *Presbytis pileatus* feeding on leaves; right, male Western hoolock gibbon *Hoolock hoolock*.





Stump-tailed █
or Bear macaque
Macaca arctoides.



Far left, a yet undescribed golden morph of the Northern tree pit-viper *Trimeresurus (Cryptelytrops) septentrionalis*; left, male Western hoolock gibbon *Hoolock hoolock*.

rehabilitate people from Majuli and adjoining areas who had lost their lands to floods, the forest became fragmented and the reserve became isolated from the foothills. In 1924, artificial regeneration was introduced in a long-sighted attempt to develop a well-stocked, even-aged forest. These plantations - along with the natural vegetation - subsequently created a forest stocked with a rich variety of flora and fauna. During the 1900s, forest areas were added to the reserve, eventually totaling 2,098.62 ha (8.1 sq mi) by 1997. However, the Sanctuary remains currently (and dangerously) fragmented into five distinct segments. On 30 July 1997, the sanctuary was finally constituted under the civil district of Jorhat and named the Gibbon Wildlife Sanctuary after the only apes found in India: the hoolock gibbons *Hoolock sp.* It is the only Sanctuary in India named after a gibbon due to its distinction for containing the densest gibbon populations in Assam. On 25 May 2004, the Assam Government renamed it as the Hoollongapar Gibbon Sanctuary. The Sanctuary officially now extends to the Dissoi Valley Reserve Forest, Dissoi Reserve Forest, and Tiru Hill Reserve Forest, which are used as dispersal areas for Indian elephants *Elephas maximus indicus* and other species. However, three extensive tea gardens that belong

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Baby Stump-tailed
or Bear macaque
Macaca arctoides.



Stump-tailed █
or Bear macaque
Macaca arctoides.



■ Top left,
 Jumping spider,
 Viciria sp.;
 top right,
 unidentified
 Jumping spider;
 bottom right,
 Jumping spider,
 possibly
 Pancorius sp.;
 bottom left,
 Jumping spider
 Hyllus
 keratodes.

Tiger day moth *Dysphania*
cf. *militaris* trapped by Giant
orb weaver *Nephila pilipes*.





■ Stump-tailed
or Bear macaque
Macaca arctoides.

to the estates of Dissoi, Kothalguri and Hoolonguri span the distance between the Hoollongapar Gibbon Sanctuary and the nearest forests in Nagaland, the Dissoi Valley Reserve Forest, effectively sealing off the Sanctuary from any other protected area nearby.

AN EXTRAORDINARY BIODIVERSITY

Despite its ridiculously small size and virtually complete isolation, the Sanctuary boasts an extraordinary biodiversity and is home to the only ape in India, the Western hoolock gibbon *Hoolock hoolock*, as well as the only nocturnal primate found in the northeast Indian states, the Bengal slow loris *Nycticebus bengalensis* (which is the only primate species present here which we missed). Other primates include the Stump-tailed macaque *Macaca arctoides*, the Northern Pig-tailed macaque *Macaca leonina*, the Eastern Assamese macaque *Macaca assamensis assamensis*, the Rhesus macaque *Macaca mulatta* and the Capped langur *Presbytis pileatus*. Also found at the Sanctuary are Indian elephants, tigers *Panthera tigris* (not residents but rather the occasional stray), leopards *Panthera pardus*, jungle cats *Felis chaus*, wild boar *Sus scrofa*, three types of civet, four types of squirrel, and several other types of mammal. At least 219 species of bird and several species of snakes - including Banded Krait, Indian cobra, Tree Pit viper and Python - are known to live in the Park. Since the Sanctuary can

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Top left, unidentified Jumping spider;
top right, Jumping spider Portia fimbriata;
bottom right, Jumping spider Thiania bhamoensis, male;
bottom left, unidentified Jumping spider.



only be visited on foot, the cats are however very wary and very seldom encountered - while elephants can actually pose a risk.

A BEAUTIFUL TROPICAL EVERGREEN FOREST

Most of the vegetation within Hoollongapar Gibbon Sanctuary is evergreen in character and is composed of several canopy layers. The upper canopy consists mostly of *Dipterocarpus macrocarpus* rising 12 to 30 m (39 to 98 ft) and having straight trunks. Other species found in the top canopy include Sam *Artocarpus chaplasha*, Amari *Amoora wallichii*, Sopas *Mcheliai* spp., Bhelu *Tetramelis nudiflora*, Udal *Sterculia villosa* and Hingori *Castanopsis* spp.. Nahar *Mesua ferrea* dominates the middle canopy with its spreading crown, casting fairly heavy shade over a wide area. Other species that make up the middle canopy include Bandordima *Dysoxylum procerum*,

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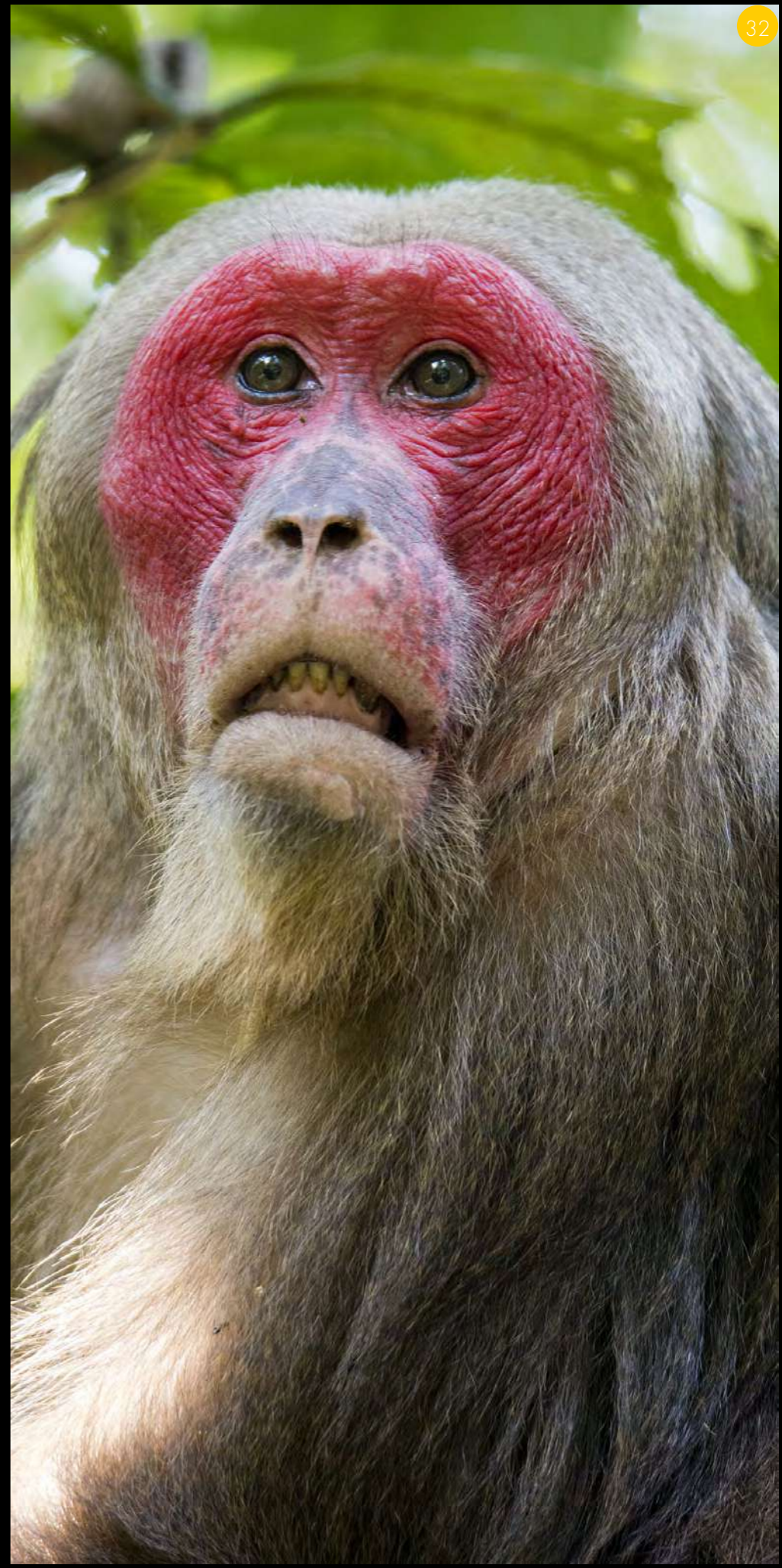
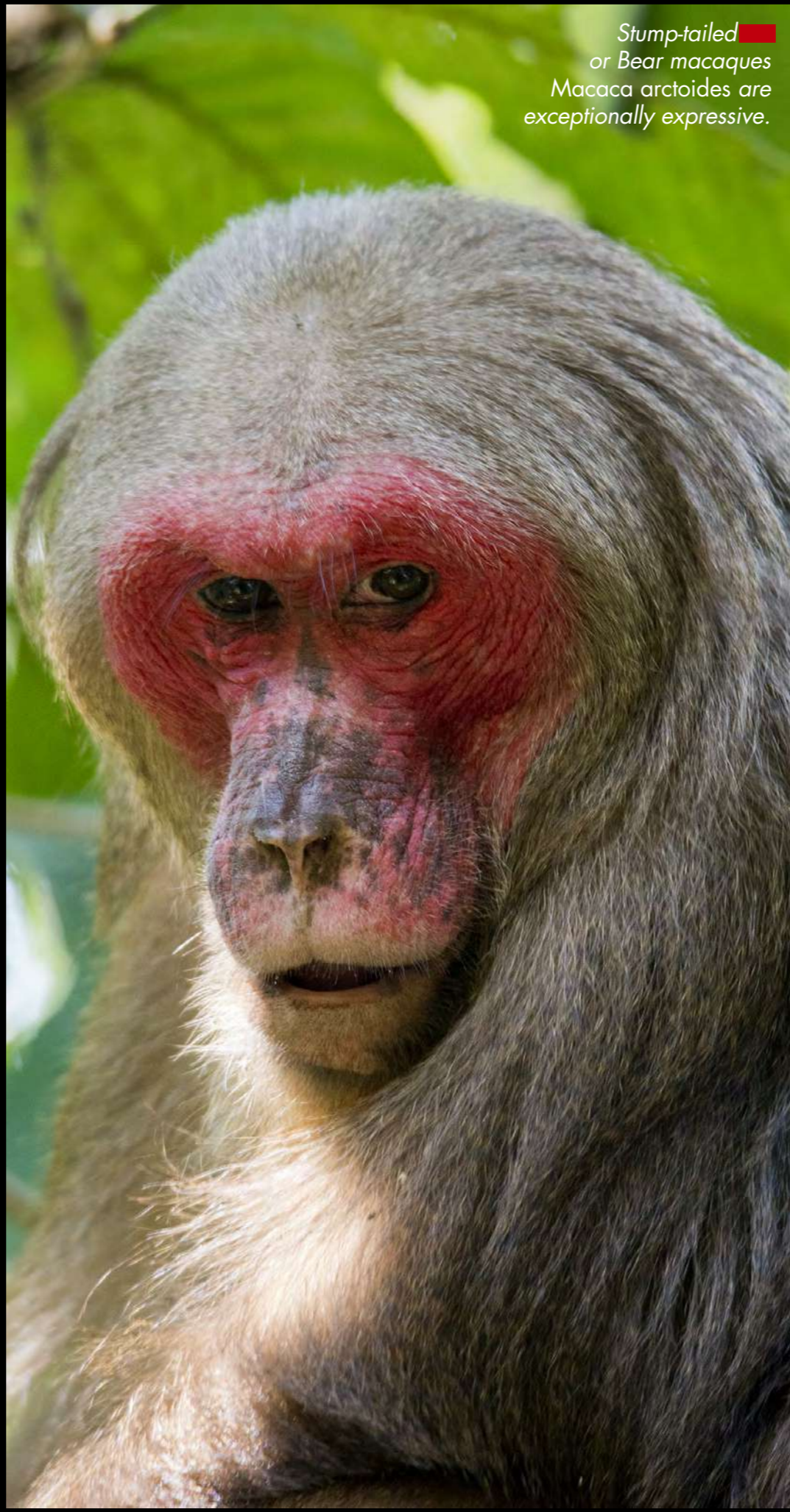


Adult male ■
Western hoolock gibbon
Hoolock hoolock.



Stump-tailed
or Bear macaque
Macaca arctoides
during a grooming session.


Stump-tailed
or Bear macaques
Macaca arctoides are
exceptionally expressive.





■ Adult female Capped langur *Presbytis pileatus* with baby.



Left,  *Aphaena aurantia*
lantern bug, family
Fulgoridae; right,
Caterpillar of Blue
Tiger Moth
Dysphania percota,
with parasitic wasp
eggs.



Dhuna *Conarium resiniferum*,
 Bhomora *Terminalia belerica*, Ful
 Gomari *Gmelina* sp., Bonbogri
Pterospermum lanceafolium, Morhal
Vatica lanceafolia, Selleng *Sapium
 baccatum*, Sassi *Aqualari agolacha*,
 and Otenga *Dillenia indica*. A variety
 of thick evergreen shrubs and herbs
 make up the lower canopy and ground
 layers. The most common are Dolu
 bamboo *Teinosstachyum dullooa*,
 Bojal bamboo *Pseudostachyum
 polymorphum*, Jengu *Calamus erectus*,
 Jati bet *Calamus* spp., Houka bet
Calamus spp., Tora *Alpinia allughas*,
 Kaupat *Phrynium imbricatum*, and
 Sorat *Laportea crenulata*. The
 Hoollongapar Gibbon Sanctuary is
 scientifically classified as "Assam
 plains alluvial semi-evergreen forests"
 with some wet evergreen forest
 patches. It receives 249 cm (98 in) of
 rainfall on average per year. Situated
 at an altitude between 100 and 120 m
 (330 and 390 ft), the topography

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An adult female
 Western hoolock
 gibbon Hoolock
 hoolock swinging
 on tree tops.





Top left, unidentified Jumping spider; top right, Jumping spider Phintella cf. vittata, male. Bottom right, Jumping spider Hyllus sp; bottom left, unidentified Jumping spider.

Jumping spider
Hyllus cf giganteus,
family Salticidae,
possibly a new
undescribed species.



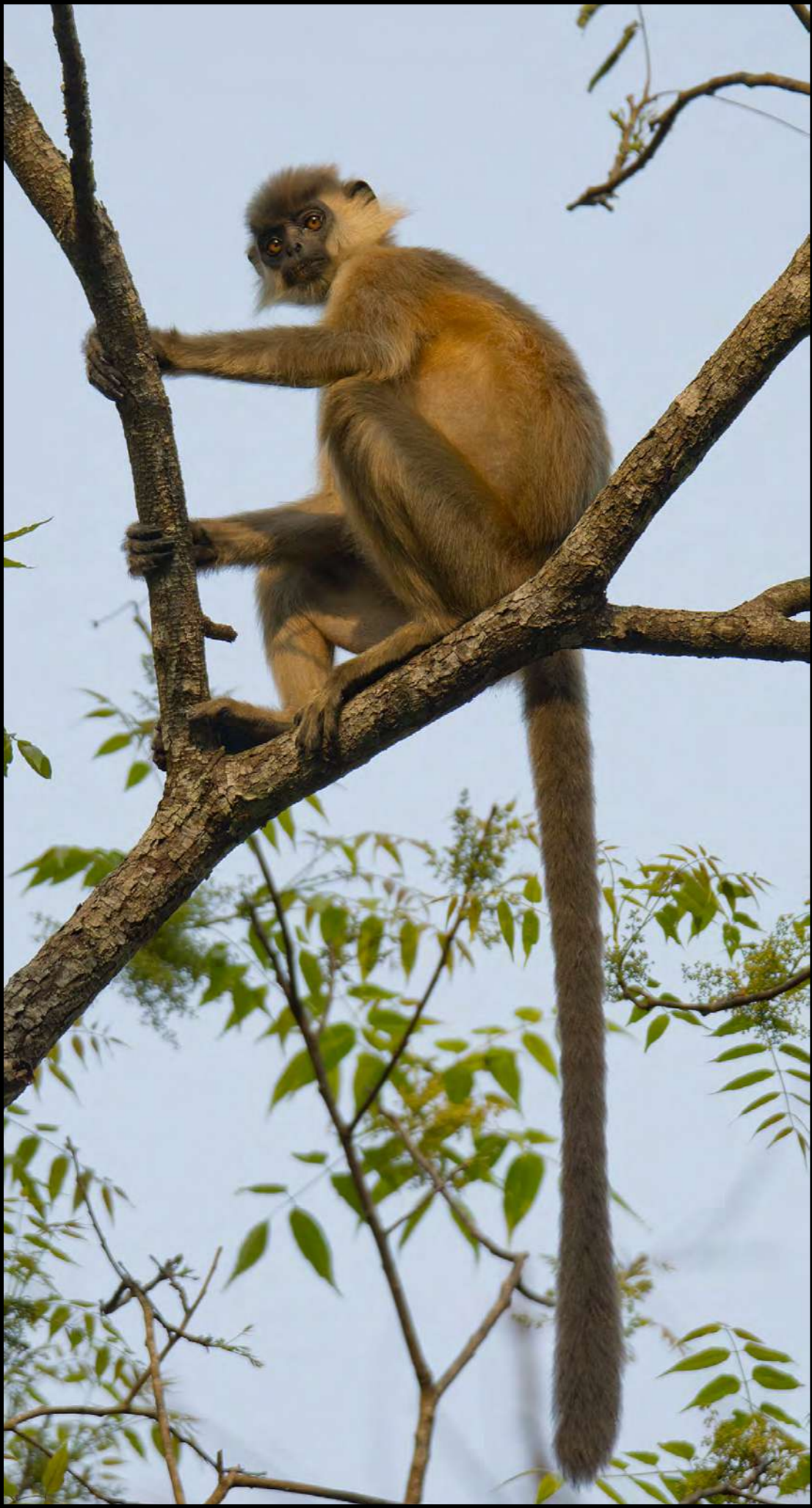
gently slopes downward from southeast to northwest. Furthermore, the Bhogdoi River creates a waterlogged region dominated by semi-hydrophytic plants along the border of the sanctuary, helping to create three distinct habitat zones or micro-ecosystems in the Park: the up-slope zone, the down-slope zone, and the flood-prone zone.

PARADISE THREATENED

The habitat is threatened by illegal logging, encroachment of human settlements, and habitat fragmentation. The extreme isolation of the Sanctuary created by the numerous surrounding tea estates creates a geographic barrier for migrating animals. The growing populations of tea garden workers also threatens the habitat, since many people rely on the forest for

continued on page 40 ➤

Capped langur
Presbytis pileatus
favor the upper canopy
and are seldom
seen close.





■ Western hoolock gibbon *Hoolock hoolock*, adult male.



■ Left, exploring the Sanctuary's thick bamboo forest; right, Oriental garden lizard, Eastern garden lizard or Changeable lizard *Calotes versicolor*.

firewood, traditional medicine and food, with large quantities of leaves and grass being collected from the forests to feed cattle. During the rainy season, herbicides and pesticides from the tea gardens wash through the Sanctuary. The tea gardens are also used by elephants as a migration route to Nagaland, making them vulnerable to frequent poaching. Railway lines further divide the Park, stranding a single group of gibbons in the smaller fragment. Illegal logging and the encroachment by local people employed by the tea gardens have - here and there - also visibly degraded the habitat quality. Despite these problems - which could be solved relatively easy, but which risk to have tragic consequences if left ignored in the long term - the Hoollongapar Gibbon Wildlife Sanctuary is a travel destination the motivated wildlife photographer and nature lover cannot absolutely afford to miss. ●



■ Giant mygalomorph spider, family Nemesiidae, *Damarchilus* sp., possibly *D. rufus*, facing a hoverfly.






Left, Black giant squirrel or Malayan giant squirrel *Ratufa bicolor*. Right, White-rumped Shama *Copsychus malabaricus*.

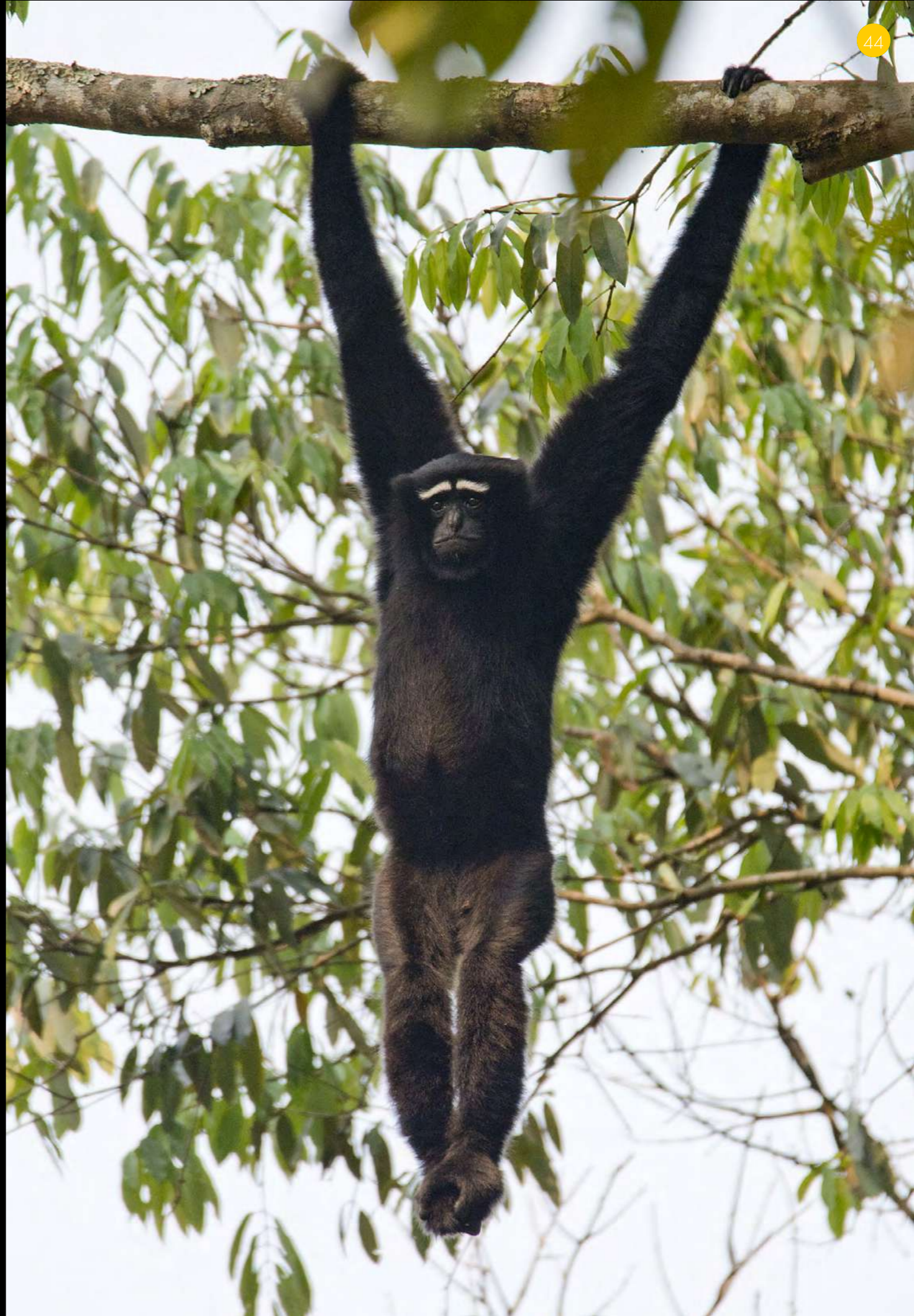


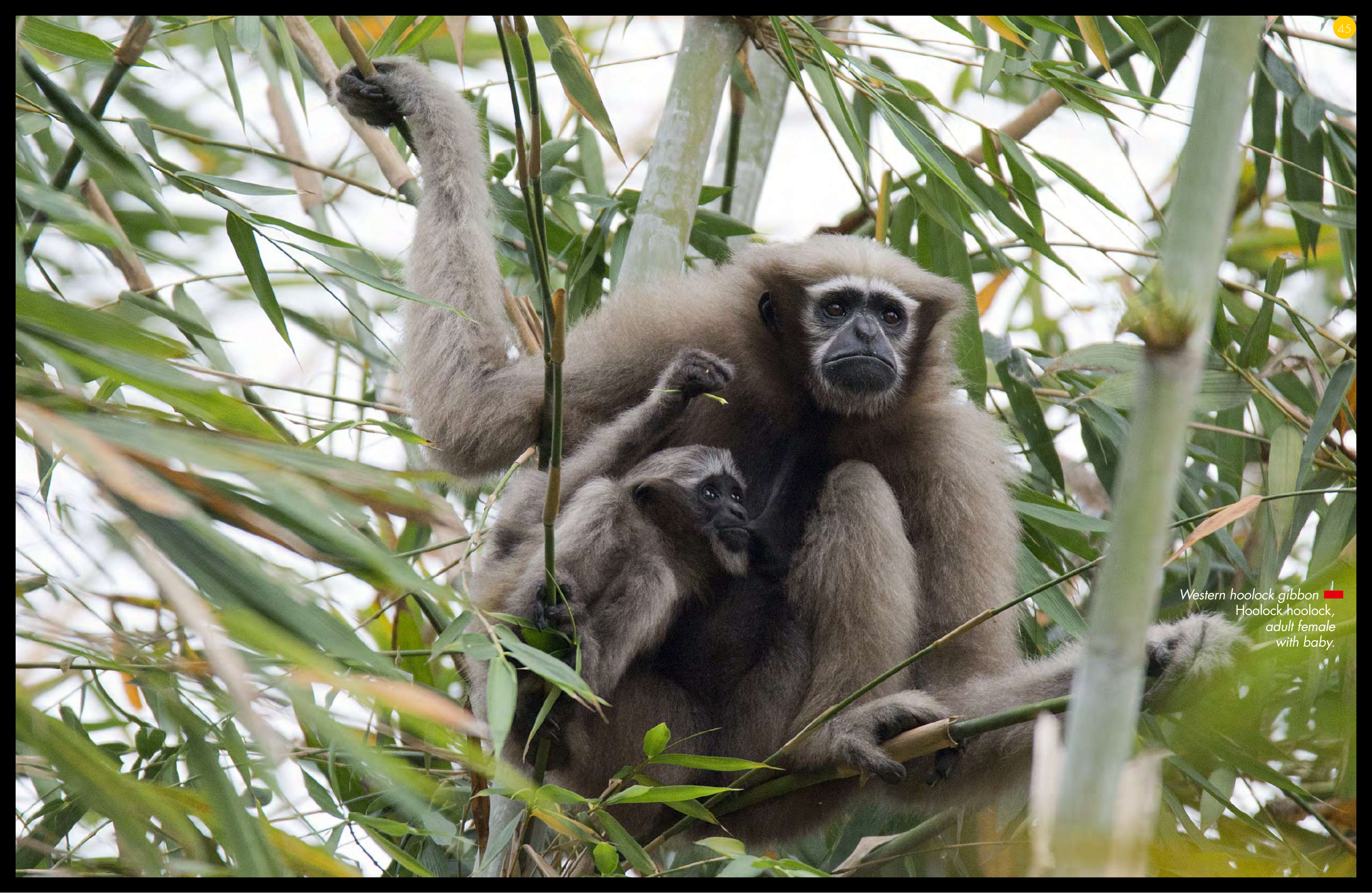


Blue whistling thrush 
Myophonus caeruleus.



■ Left, exploring the Sanctuary's forest with an armed Park warden; right, adult male Western hoolock gibbon Hoolock hoolock hanging from a branch in a typically relaxed pose.



A photograph of a Western hoolock gibbon (Hoolock hoolock) sitting in a bamboo forest. The adult female is the central focus, with a small baby clinging to her chest. The gibbon has greyish-brown fur and a dark face. It is holding a bamboo branch with its right hand. The background is filled with green bamboo leaves and branches.

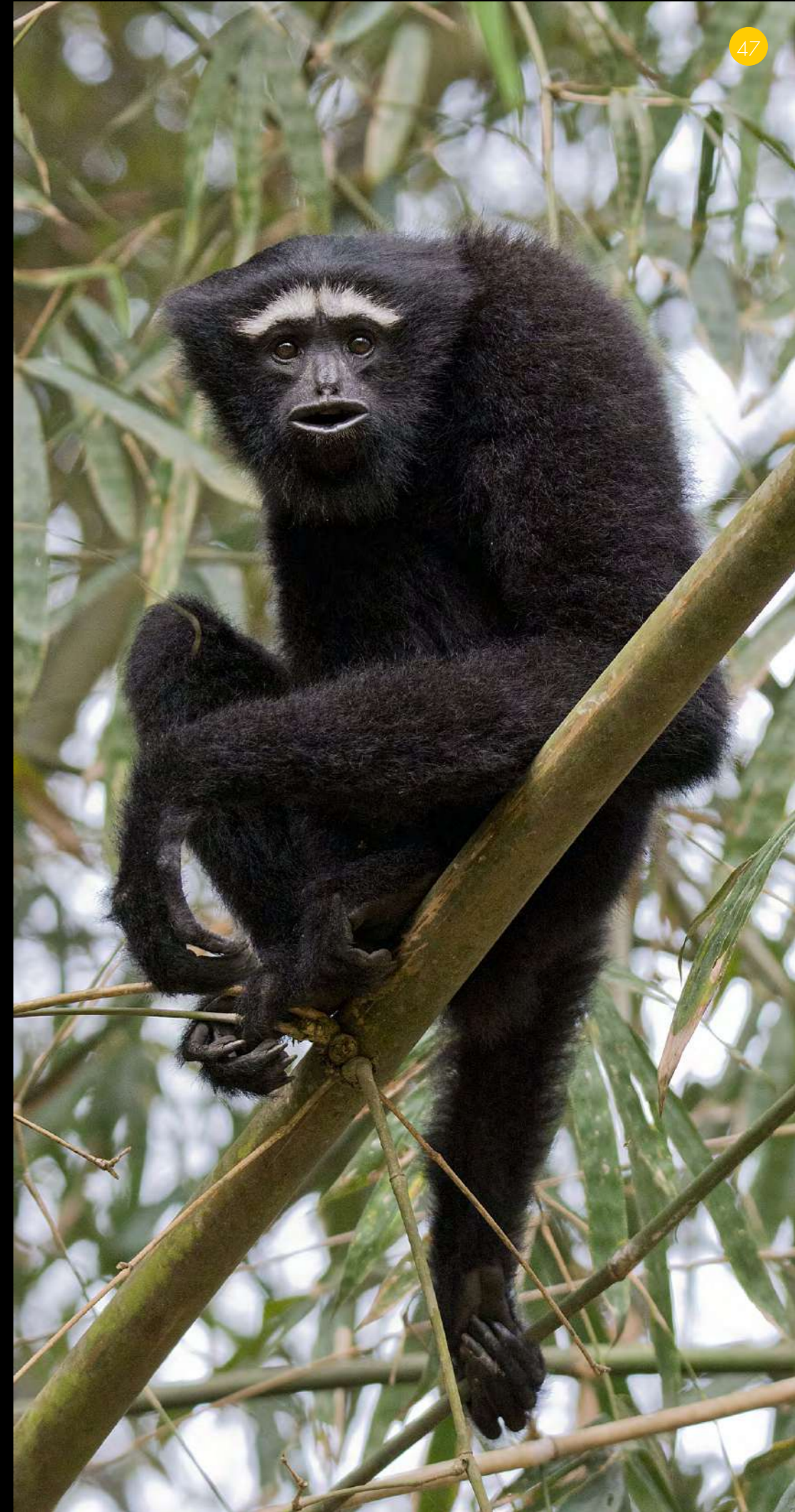
Western hoolock gibbon
Hoolock hoolock,
adult female
with baby.



■ *Western hoolock gibbon*
Hoolock hoolock, adult
female swinging among the
tree tops.



■ Left, a baby Stump-tailed or Bear macaque *Macaca arctoides* strikes an irreverent pose; right, adult male Western hoolock gibbon Hoolock hoolock.

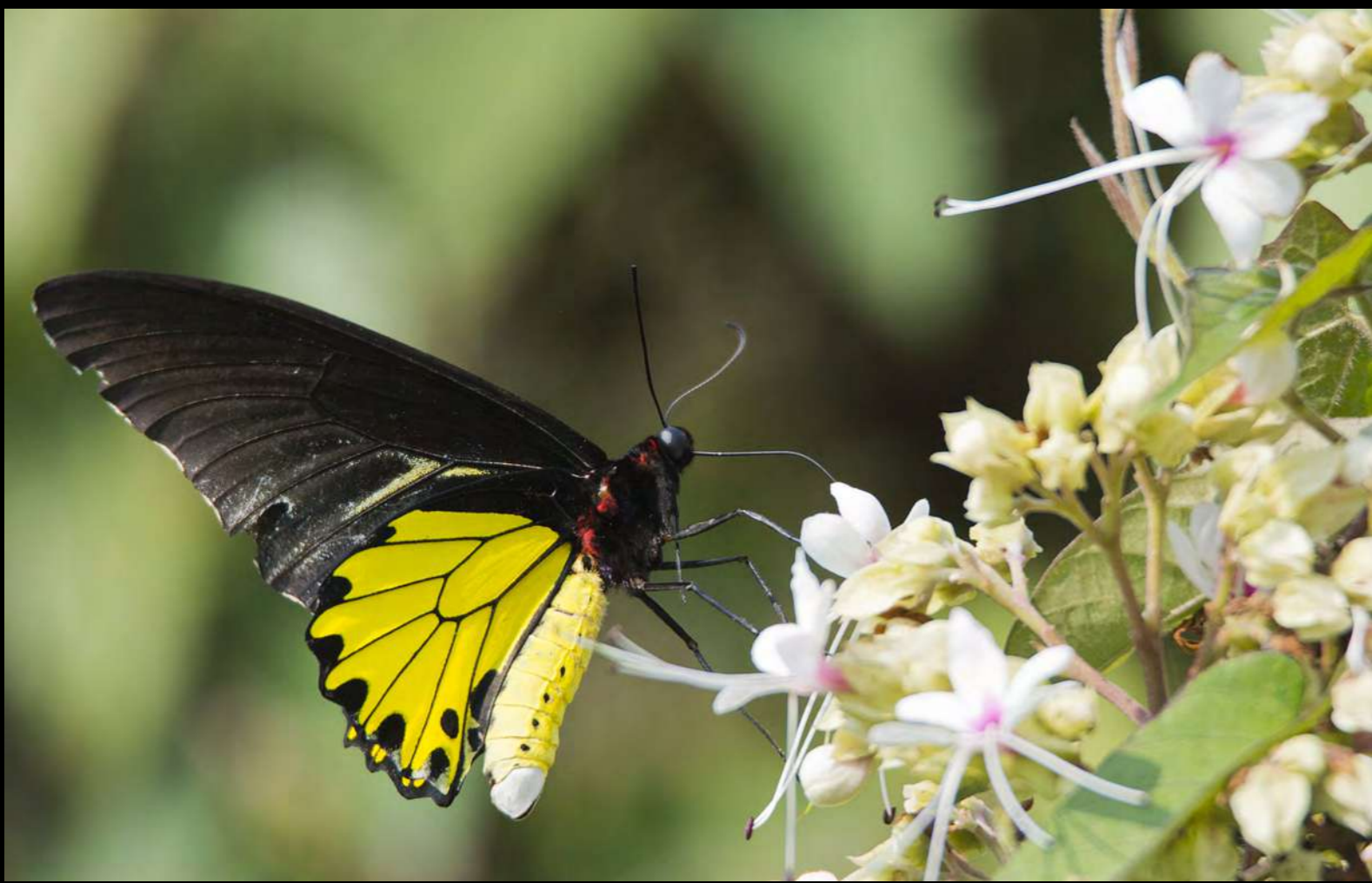




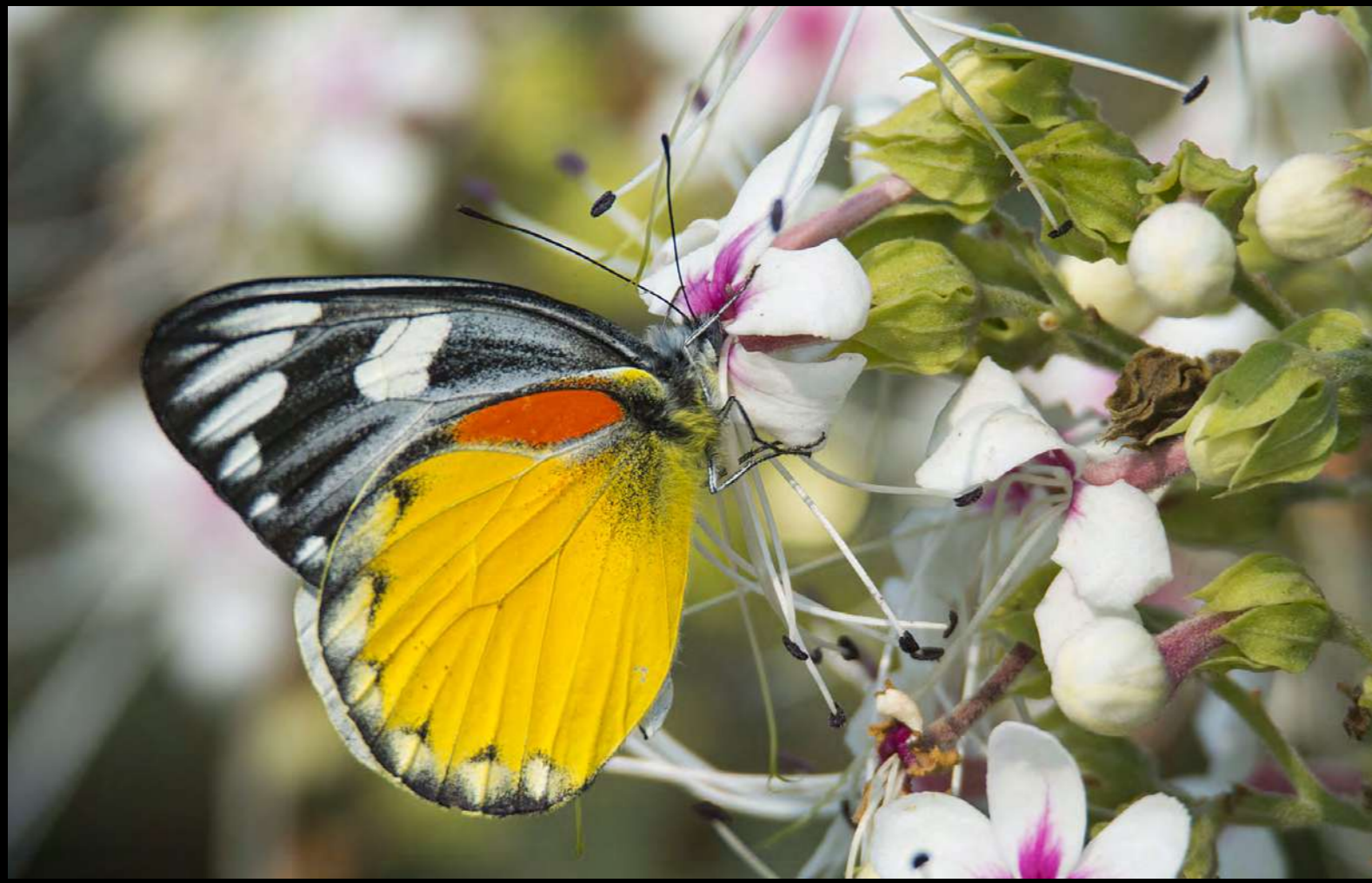
Grasshopper nymph, ■ family Chorotypidae, a new undescribed species.




Male and female ■
Oriental pied hornbill
Anthracoceros albirostris.



Top left, Common birdwing *Troides helena*;
 top right, cryptic moth *Celenna festiviaria*;
 bottom right, Great Mormon *Papilio memnon*;
 bottom left, Red-spot Jezebel *Delias descombesi*.



A Western hoolock gibbon (Hoolock hoolock) adult male is shown hanging from a bamboo branch in a forest. The gibbon has black fur and a white stripe across its face. It is surrounded by dense green bamboo foliage.

Western hoolock gibbon 
Hoolock hoolock,
adult male

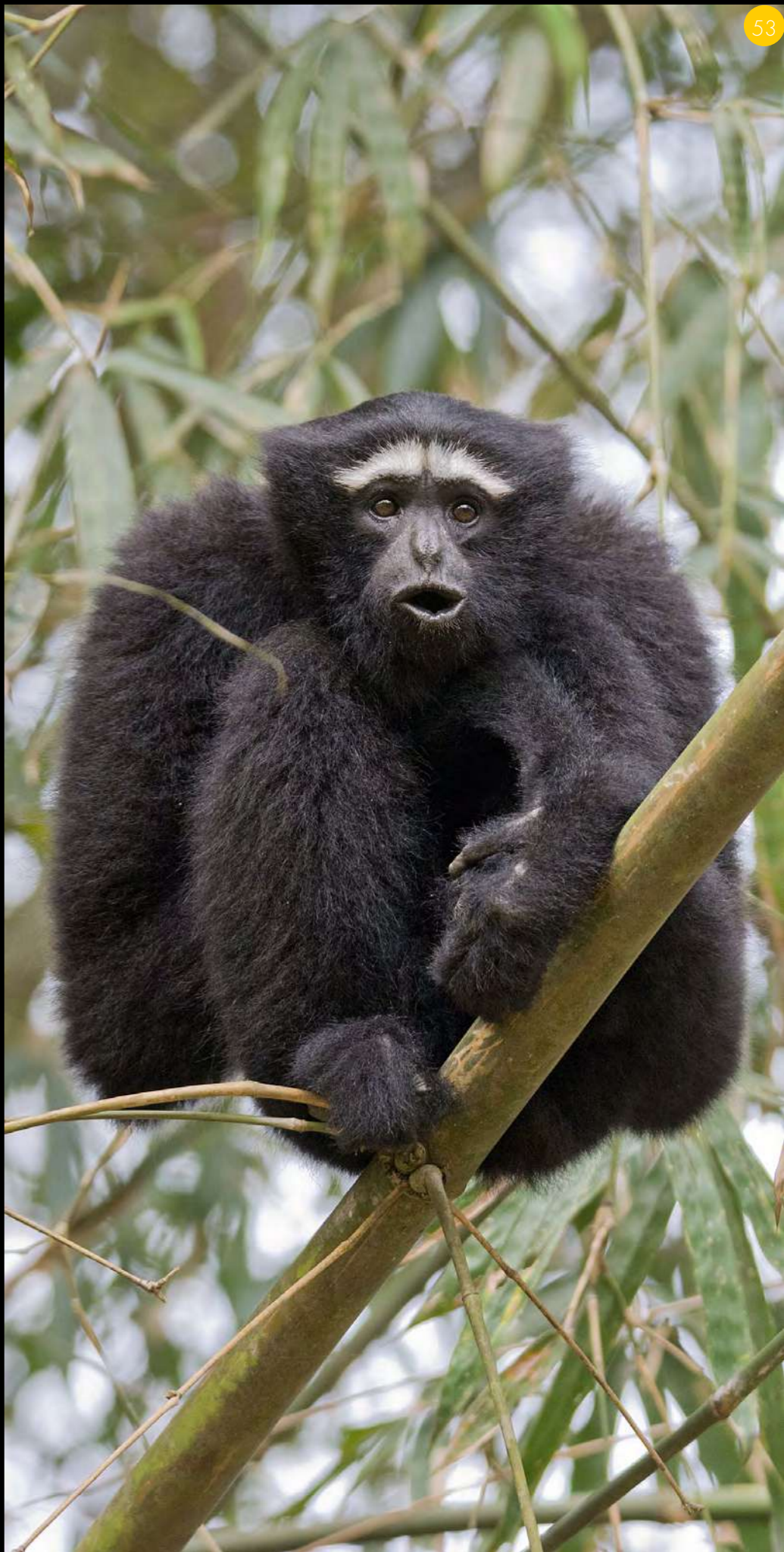


Top left, Striped tree frog ■
Chiromantis vittatus;
top right, Common Indian
Toad *Duttaphrynus*
melanostictus; bottom left and
bottom right, Ground frog
Microhyla aff. *ornata*.





Vocalizing adult male of ■
Western hoolock gibbon
Hoolock hoolock.



Top left, undescribed new species of grasshopper, *Phaesticus* sp.; top right, Ledrinae nymph, family Cicadellidae; bottom right, undescribed new species of cryptic Shrimp katydid, subfamily Pseudophyllinae; bottom left, Owlfly larva, family Ascalaphidae.





Left, Curved spiny spider ■
Gasteracantha arcuata; right,
Green Huntsman spider *Olios*
cf *milleti*, family Sparassidae.





■ A male Ruby-cheeked sunbird *Anthreptes singalensis* feeding off an arboreal ant nest.



■ Left, tree orchids in bloom; right, Northern pig-tailed macaque *Macaca leonina*.

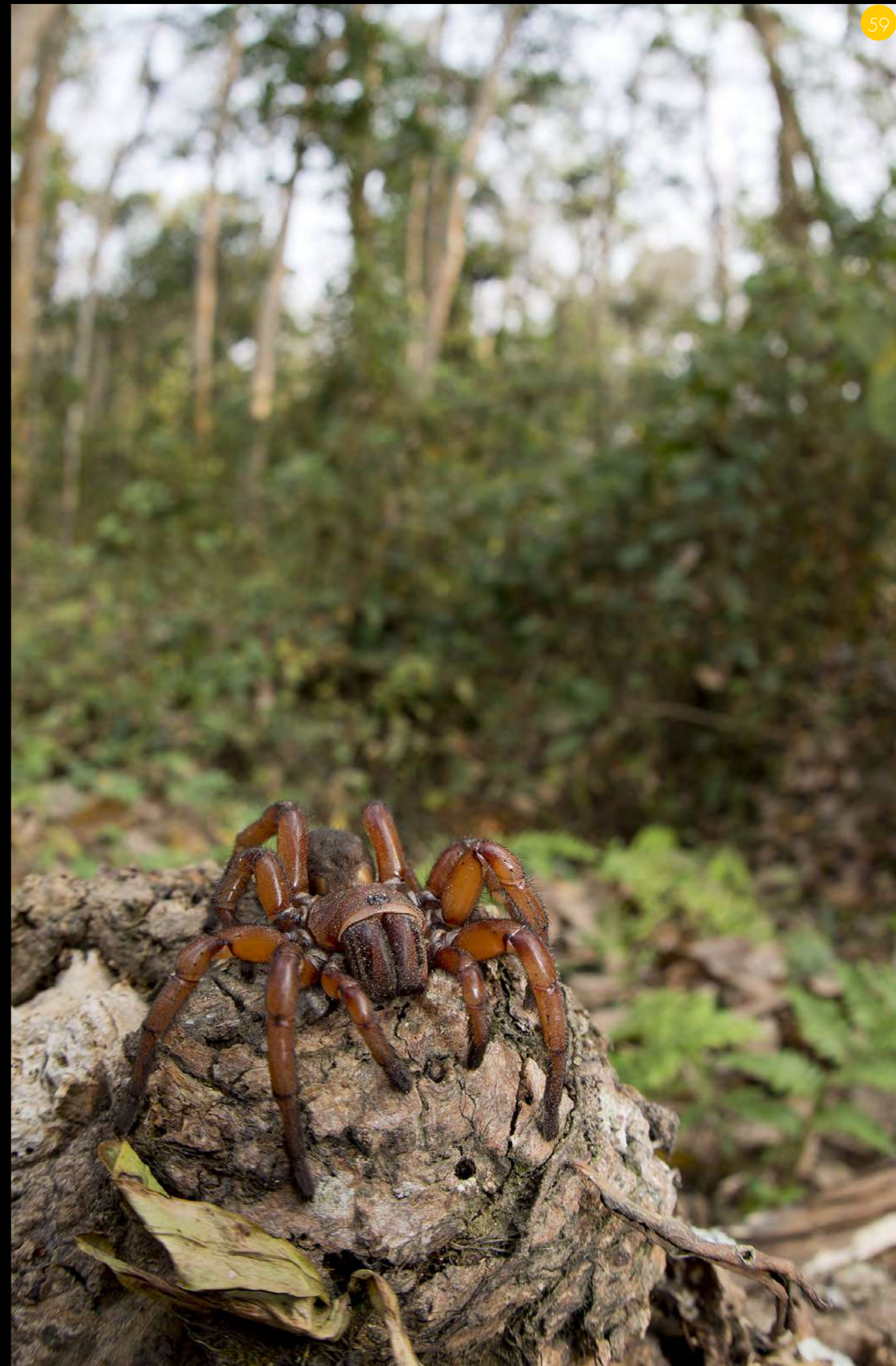




■ Left, baby Rhesus macaque *Macaca mulatta*; right, Assassin bug *Epidius* cf. *famulus*, family Reduviidae.



■ Left, Asian barred owlet
Glaucidium cuculoides;
right, giant mygalomorph
spider, family Nemesiidae,
Damarchilus sp.,
possibly *D. rufus*.



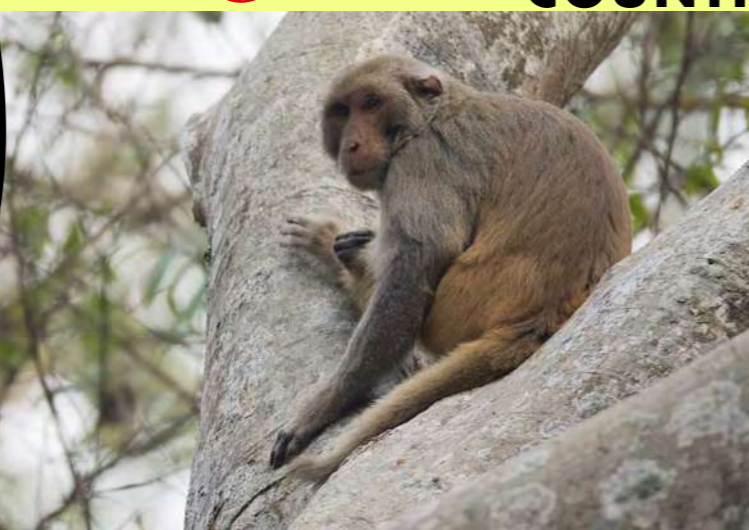


Left, portrait of an ■
adult male Western
hoolock gibbon
Hoolock hoolock;
right, Stalk-eyed fly,
family Diopsidae.



At-a-glance travel guide

COUNTRY OF DESTINATION: INDIA



USEFUL TIPS FOR YOUR EXPEDITION

Some simple, common sense, field-tested advice and information to make the best out of your trip and avoid hassles, worries and problems

ROUTE: Your flight - most probably originating from Delhi or Kolkata - will land at Lokpriya Gopinath Bordoloi International Airport, Guwahati. We suggest to have your guide and vehicle picking you up from there and then drive to Jorhat. The Hoollongapar Gibbon Sanctuary can be reached daily by car with a short drive from Jorhat.

MEANS OF TRANSPORT: The Sanctuary can only be explored on foot, and the presence of leopards and elephants calls for visitors to be always accompanied by an armed Park warden. The forest trails are easily marked and followed and very well maintained, but the use of strong, comfortable shoes

and camouflaged or green/brown/khaki clothing is strongly suggested as you will need to be as inconspicuous as possible when attempting to track and approach your subjects.

CURRENCY: Indian Rupee, with Euros and USD being commonly accepted in upscale lodges (none of which can be found in Jorhat). Remember to change a sizeable amount of cash on arrival in India as you will not have many opportunities to do so later on in the countryside.

ACCOMODATION: We can safely suggest our personal friend Diganta Gogoi's **Gibbon Resort and**

Travels, a lovely, very clean little lodge (only six rooms!) with great home food, and which is relatively close to the Sanctuary. Diganta is a wonderful guide, a committed conservationist and an excellent wildlife photographer with a deep knowledge of the Sanctuary, and is *the* man to have around.

FOOD: Indian cuisine is one of the world's best, rivalling only with Italian or French for its richness of recipes and variety of ingredients. Do not be afraid to experiment - Indian food (which is quite safe in upscale lodges or in homestays) can vary from very mild to fiery hot, but it is always a fascinating sensorial experience. At Diganta Gogoi's Gibbon

A tiny relict forest in Assam boasting an incredible biodiversity



Resort the food is distinctly Assamese in flavour and a joy to taste - don't miss the Bamboo rice and the seductive but treacherous Lao Pani (wine rice)!

LANGUAGE: Hindi and English (in the main cities).

WORRIES: None as long as you follow the Park's rules and walk carefully and silently. Keep in mind that the Sanctuary is a wilderness, and that encountering potentially dangerous wild animals such as an easily-angered elephant or a venomous snake is always a distinct possibility.

HEALTH: We never suffered any serious health problems in India, but it is always better to avoid street food of dubious origin and unbottled water, especially during transfers. Mosquitoes and leeches are not a problem in the Sanctuary, but it is a good idea to keep an eye on possible tick bites.

CLIMATE: The climate in Jorhat is usually quite pleasant, with temperatures ranging between fifteen to twenty-eight degrees in summer and around seven to eighteen degrees in winter. It rains very heavily during the monsoon between July and September, but that again is the best time to spot reptiles and amphibians. Hoollongapar Gibbon Sanctuary is probably best visited during the winter months, as the climate is very pleasant throughout the day and with humidity at a minimum during the months between October and March. The summers are not particularly hot, but there are chances of heavy sunlight and heat during noon.

BESIDES: Assam must have been an incredibly beautiful place before the British invaders occupied it, blindly razing to the ground its immense, untouched forests to make room for their highly profitable commercial tea estates. Having said that,

and granting that travelling back in time is not (yet) possible, one has to admit that the never-ending, gently rolling, finely manicured waves of the tea gardens covering most of Assam nowadays have a peculiar - if somewhat artificial - scenic charm. Tea lovers will have a field day here, with the possibility of buying their brew of choice (and many different wonderful spices too) from several organic, low-impact cultivations of very high repute such as Hathikuli Organic/Amalgamated Plantations. But besides tea, Assam has much more to offer to the discerning wildlife photographer - namely at least two spectacular National Parks of legendary status, ie Kaziranga NP and Manas NP, and one wonderful birdwatching site, Maguri bheel (or Maguri lake) at Dibru Saikhowa National Park. All three - plus several others - can be easily reached by private vehicle from Jorhat, and will soon be the subject of a series of extensive trip reports on this magazine. ●

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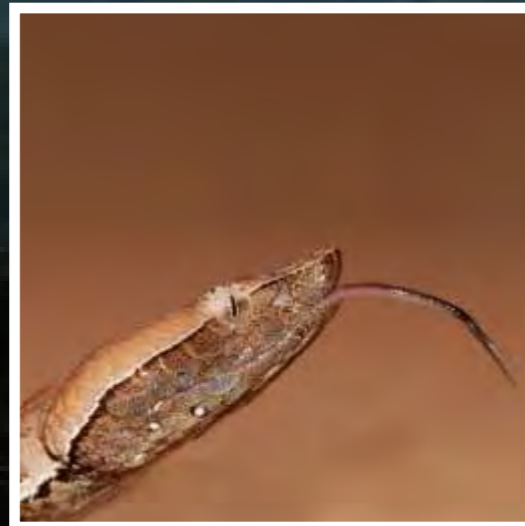
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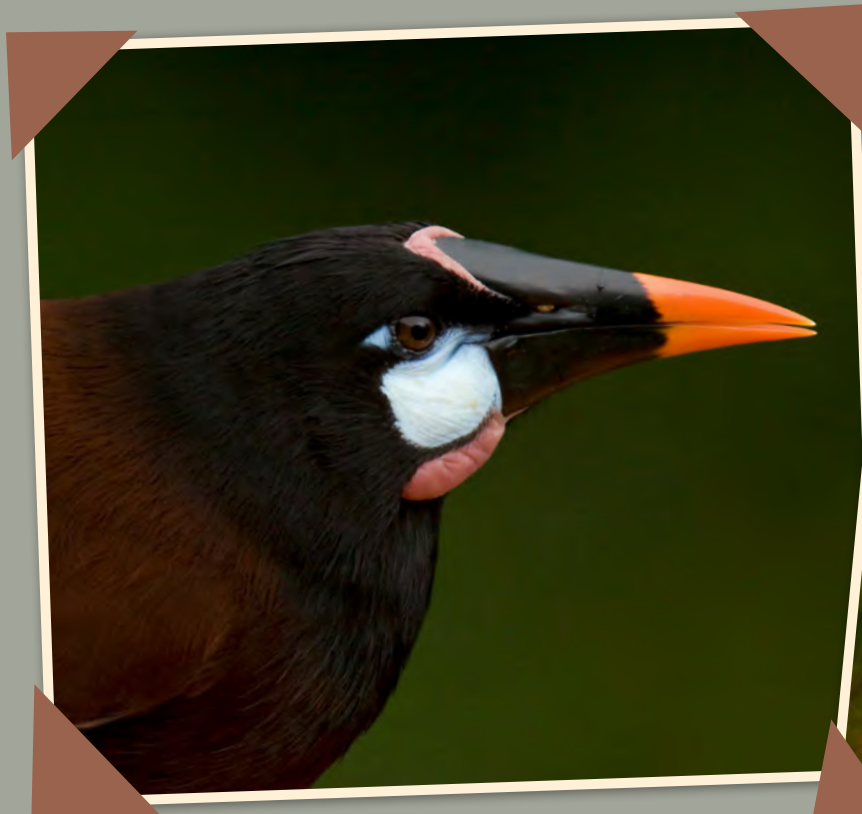
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WorldWideWonders



THE BROWN FUR SEALS OF CAPE CROSS

LORDS OF THE ATLANTIC

Smells, sounds and spectacular sights overwhelm the senses of travellers visiting the sprawling pinniped colonies along Namibia's foggy Skeleton Coast



Brown fur seal *Arctocephalus pusillus*

In this and the preceding page, two partial views of the Brown (or Cape) fur seal colony at Cape Cross, Namibia. While fur seals spend most of the year at sea, they never fully evacuate the rookeries as mothers and pups return to them throughout the year. There normally is no established dispersal from a colony.



Brown fur seal *Arctocephalus pusillus*

These seals have external ear flaps and very long whiskers (*vibrissae*) which may extend backward past the ear flaps, especially in adult males.

TEXT BY ANDREA FERRARI
PHOTOS BY ANDREA & ANTONELLA FERRARI

Those driving across Namibia and travelling along its legendary Skeleton Coast on the route from Windhoek to Etosha should not forget to plan a short detour to visit the spectacular Brown (or Cape) fur seal colony at Cape Cross, a desolate wind-swept beach by the ever-pounding, grey Atlantic ocean - even a brief visit with just an overnight stay at the beautiful **Cape Cross Lodge** will yield excellent photographic opportunities and wonderful memories. The Brown fur seal *Arctocephalus pusillus*, also known as the Cape fur seal, South African fur seal and Australian fur seal, is one of the nine species of pinnipeds in the *Otariidae* family, which are much more closely related to sea lions than true seals, sharing with them external ears, relatively long and muscular foreflippers, and the ability to walk on all fours. Fur seals - as their common name implies - are also marked by a dense underfur, which made them a long-time object of commercial hunting. Brown fur seals are very social animals, which often gather into colonies or rookeries in numbers ranging from 500–1500; they prefer to haul out and breed on rocky islands, rock ledges and reefs, and pebble and boulder beaches, but some large colonies can also be found on sandy beaches. Fur seals spend most of the year at sea, but are never too far from land. They have been occasionally recorded 160 km from land. The African fur seal population lives around

the southern and southwestern coast of Africa, from Cape Cross in Namibia and around the Cape of Good Hope to Black Rocks near Port Elizabeth in the Eastern Cape province. The Australian one is instead found in Bass Strait, at four islands off Victoria in southeastern Australia and on five islands off Tasmania. Australian fur seals were hunted intensively between 1798 and 1825 for commercial reasons, but hunting stopped in Australia in 1923, and their population is still recovering, causing increasing friction with South Australian fishermen as their range expands. South African fur seals currently have a very robust and healthy population, as harvesting of seals was outlawed in South Africa in 1990. Brown fur seals however are still slaughtered in Namibia. Permits are issued for the killing of pups for their luxurious fur and adult males for their genitalia, which are considered an aphrodisiac in some countries. It is also considered necessary to limit seal numbers in Namibia because of the supposed effect seals have on the country's fish harvest, but research by environmental groups disputes this. Wildlife photographers and nature lovers will naturally tend to strongly side with this latter view, as the idea itself of slaughtering such intelligent, interactive, highly vocal animals becomes quite unthinkable after having admired them freely socializing, resting and rearing their young in their harsh, barren and dangerous world. ●



Brown fur seal *Arctocephalus pusillus*

The brown fur seal is the largest and most robust of the nine species belonging to the family *Otariidae*. It has a large and broad head with external ear flaps and a pointed snout that may be flat or upturned slightly. Fur seals share with other otariids the ability to turn their rear limbs forward and move on all fours.

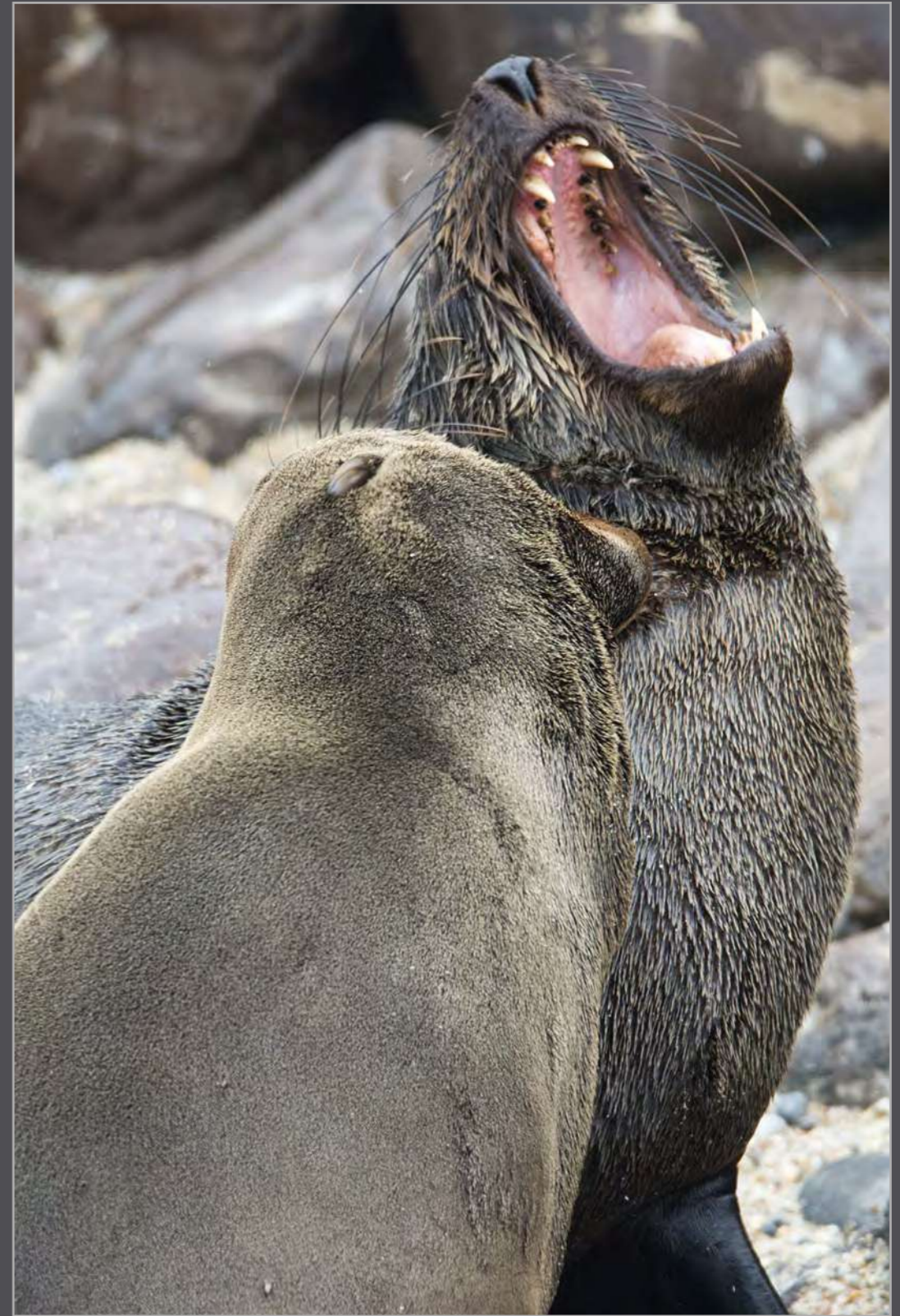


Brown fur seal *Arctocephalus pusillus*

Many fur seal species were heavily exploited by commercial sealers, especially during the 19th century when their fur was highly valued. Many populations, notably the Guadalupe fur seal, Northern fur seal, and Cape fur seal, suffered dramatic declines and are still recovering. Currently, most species are protected and hunting is limited.



Brown fur seal *Arctocephalus pusillus*
The hindflippers are short relative to the large body, with short, fleshy tips on the digits.



Brown fur seal *Arctocephalus pusillus*
Fur seals are fast, powerful hunters endowed with fearsome teeth.

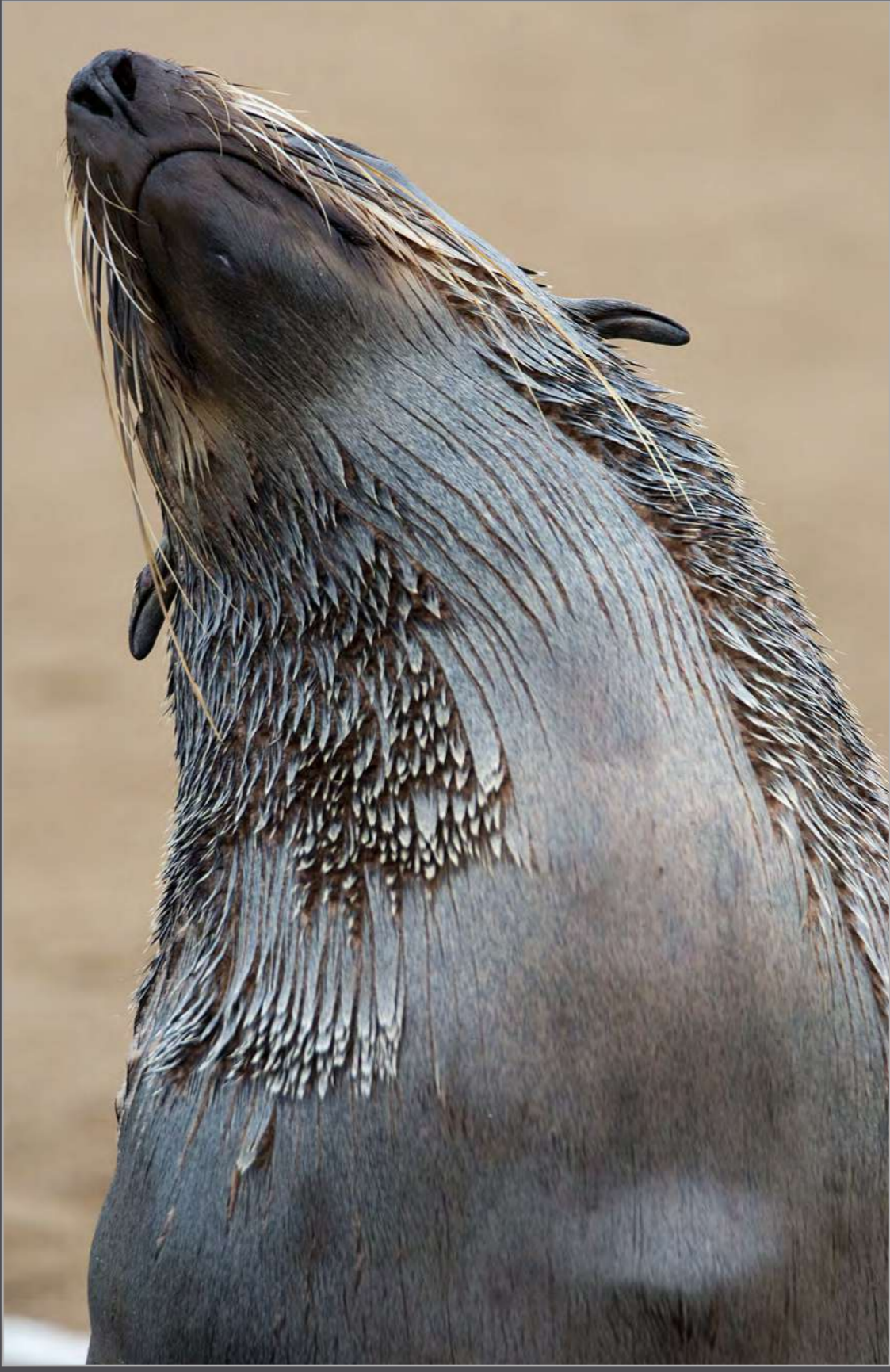


Cape gull *Larus vetula* feeding off Brown fur seal *Arctocephalus pusillus* pup carcass

After several continuous days of nursing the newborn pups, females go on extended foraging trips that can last as long as a week, returning to the rookery to feed their pups until they are weaned. Pup mortality however is high, as seen here. Males instead fast during the reproductive season, unwilling to leave their females or territories.



Brown fur seal *Arctocephalus pusillus*
 The Brown fur seal's main predator is the Great White shark, although they are also preyed upon by Killer whales. Land-based predators in Namibia include black-backed jackals and brown hyenas.



Brown fur seal *Arctocephalus pusillus*
 The brown fur seal dives for its food. The African subspecies can dive as deep as 204m and for as long as 7.5 minutes.



Cape gull *Larus vetula*

The African fur seal's diet is made of up to 70% fish, 20% squid and 2% crab, but other crustaceans, cephalopods and sometimes birds are also eaten. The acrid smell of their excrements permeates a rookery - and can be quite overwhelming. Here a pair of Cape gull *Larus vetula* buzz the colony while searching for dead pups.



Brown fur seal *Arctocephalus pusillus*

When not mating, fur seals lead a pelagic existence in the open sea. Fur seals feed on fish, squid, and krill. Several species of the southern fur seal also have sea birds, especially penguins, as part of their diets. The fur seals, in turn, are preyed upon by Great White sharks, Orcas, and occasionally by larger sea lions.



Great cormorant *Phalacrocorax carbo*

The harsh, hostile environment of the Cape fur seals of Cape Cross is shared by several other terrestrial and marine species. This adult Great cormorant *Phalacrocorax carbo* - a powerful diver and active hunter - is skimming the ice-cold waves of the Atlantic surf while searching for fish disturbed by the seals' activity.



Brown fur seal *Arctocephalus pusillus*
Pups are born black and molt to gray with a pale throat within three to five months.



Great cormorant *Phalacrocorax carbo*
The shipwrecks littering the Skeleton Coast often become nesting sites for cormorants and other sea birds.



Brown fur seal *Arctocephalus pusillus*

Fur seals are generally smaller than sea lions. However, their flippers tend to be proportionately longer, their pelage tends to be darker, and their *vibrissae* are more prominent. Males - seen here - are often more than five times heavier than the females, making them among the most sexually dimorphic of all mammal groups.



Brown fur seal *Arctocephalus pusillus*
Male territories are established through display, vocalisations, sparring and combat.



Brown fur seal *Arctocephalus pusillus*
The foreflippers of the fur seal are dark brown to black.



Brown fur seal *Arctocephalus pusillus*

Males of the African subspecies *A. p. pusillus* are 2.3 metres (7.5 ft) in length on average and weigh from 200 to 300 kilograms (440–660 lb). Females are smaller, averaging 1.8 metres (5.9 ft) in length and weighing an average of 120 kilograms (260 lb).



Great cormorant *Phalacrocorax carbo*

A panoramic shot of a low-flying flock of marauding Great cormorants above the waves of the Atlantic Ocean.



Ruddy turnstone *Arenaria interpres*

Several species of waders and shore birds share the environment of Cape Cross.



Grey-headed Gull *Larus cirrocephalus*

Several gull species can be observed along the shore.



Brown fur seal *Arctocephalus pusillus*

The foreflippers of fur seals are covered with sparse hair over about three-quarters of their length - notice the vestigial claws.



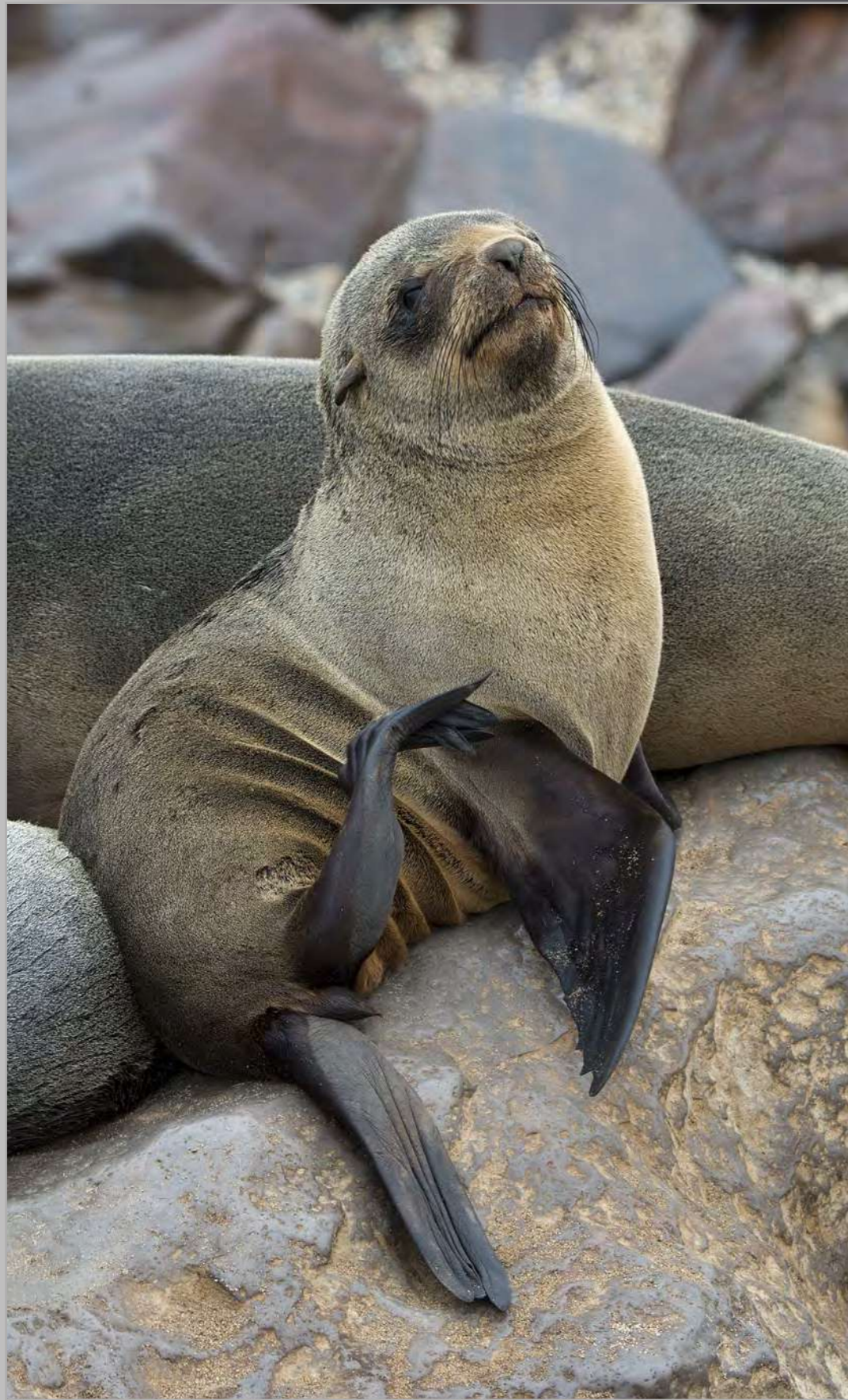
Brown fur seal *Arctocephalus pusillus*

Fur seals gather in large assemblages at specific beaches or rocky outcrops to give birth and breed. All species are polygynous, meaning dominant males reproduce with more than one female. For most species, total gestation lasts about 11.5 months, including a several-month period of delayed implantation of the embryo.

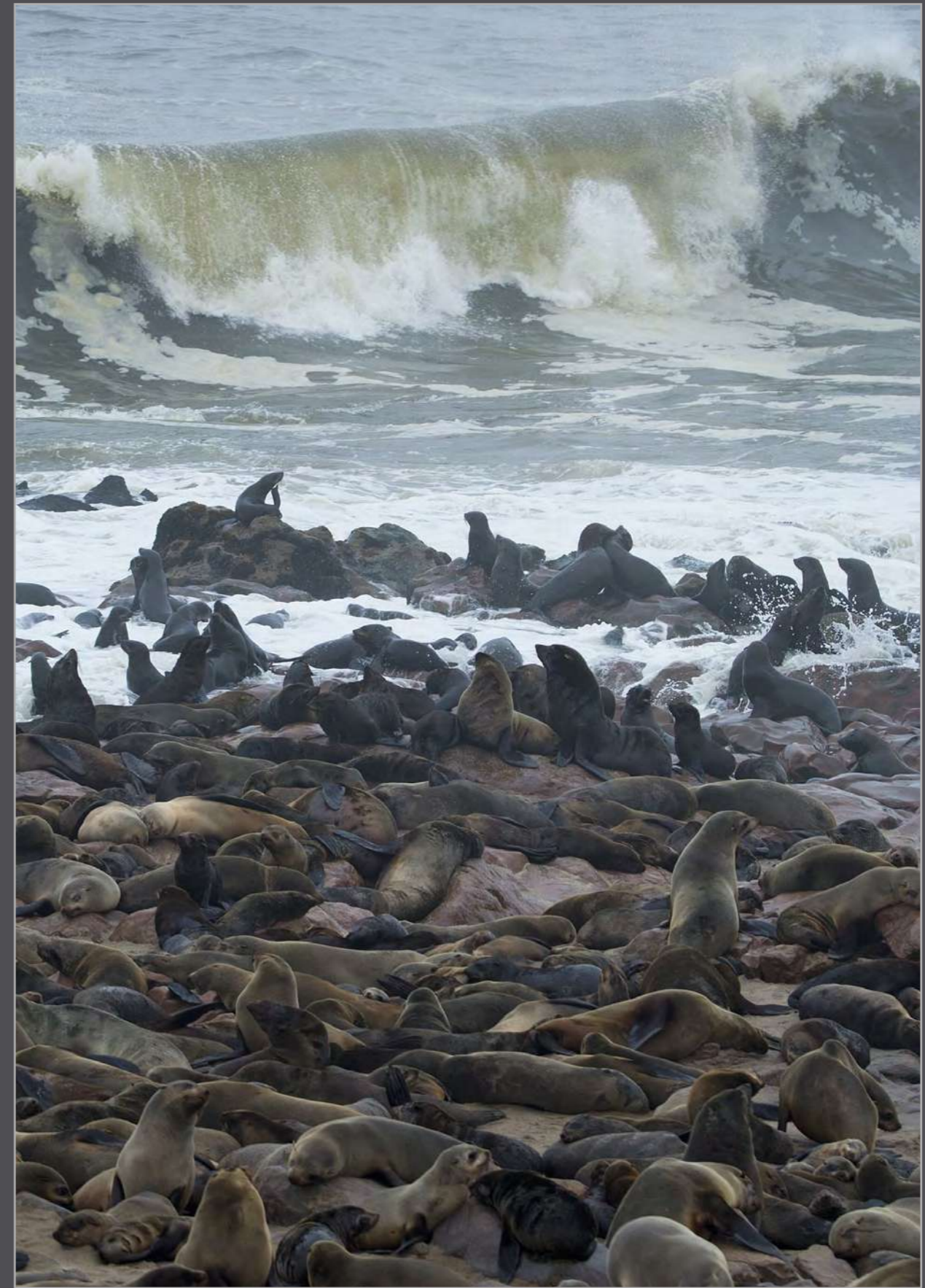


Brown fur seal *Arctocephalus pusillus*

Globally, most fur seal populations today can be considered healthy, mostly because they often prefer remote habitats that are relatively inaccessible to humans. Nonetheless, environmental degradation, competition with commercial fisheries, and climate change potentially pose threats to some populations.



Brown fur seal *Arctocephalus pusillus*
This species is an inquisitive and friendly animal when in the water.



Brown fur seal *Arctocephalus pusillus*
Males fur seals are dark gray to brown, while females are light brown to gray.



Brown fur seal *Arctocephalus pusillus*

Fur seals are very vocal. When a mother returns from sea to feed her pup, she emits a loud call which attracts all the nearby pups, but she only responds to her pup.



White-fronted Plover *Charadrius marginatus*

Like many other shore birds, Plovers are very cryptic and not easily spotted in their natural environment.

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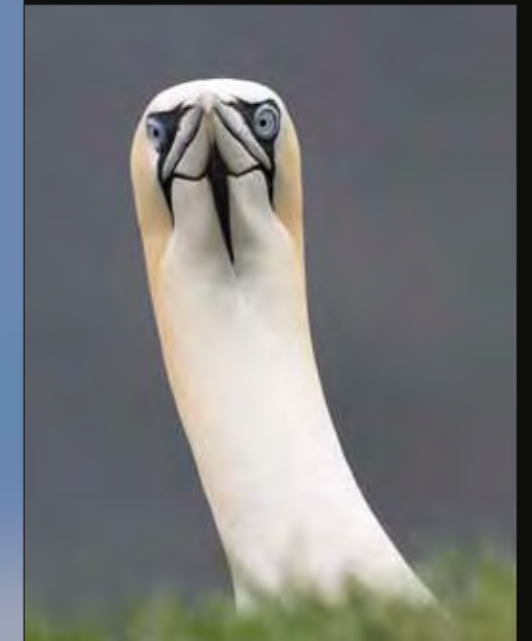
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David Hemmings - President, Nature's Photo Adventures



"My experience was EXCEPTIONAL! The trip exceeded my expectations in all areas. I hoped to get in a position to see owls and couldn't possibly have been happier. It was abundantly clear that David invested significant time and effort prior to the arrival of the group in scouting the area around Quebec and Ontario. He knew exactly where to go to find every species of owl. His knowledge and efforts were very much appreciated by the entire group. My primary objective was just getting in a position to photograph owls and was not expecting much in the way of photographic instruction. I was very pleasantly surprised and was very happy with the instruction. Prior to the trip I had a love/hate relationship with auto focus as it applies to photographing birds in flight. I've struggled with this for years. While I have a lot more to

learn, and need to work at honing my skills, the trip with NPA helped me tremendously in being able to photograph birds in flight. Photographing birds in flight was my main objective. Prior to the trip I was nearly clueless in comparison to my skills after the trip. You can also see from my bird list that I found the trip productive from a birding perspective as well".
Kevin McCarthy, USA

"I recommend NPA workshops! The level of services by workshop leaders was excellent. Quality of photographic instruction was exceptional and they

were always on hand to solve issues that arose, and I had more than my share of equipment issues. Quality of wildlife provided was good and I was amazed at how easily the subjects accepted new setups provided. Locations visited were right on for the species targeted. My most memorable moment was using the flash setups the first time and capturing an image of the Swordbill Hummingbird. I feel that my level of photography has improved with the custom functions that were set up on my camera for me and the resulting images that I obtained. Overall experience and

expectations were achieved and we were fortunate to have a very compatible group on our tour, which made it very enjoyable. This was my first workshop and I would recommend them to friends".
Rosemary Harris, Canada

"Great trip, great experience and great workshop leader. Great opportunity for capturing images of magnificent and uncommon (in southern USA) birds. Organizers contribute to great group dynamics and superb attitude. Cool techniques".
Eric Grossman, USA



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A LOOK INTO THE ABYSS

Life in the Dark is a fascinating and splendidly illustrated volume which - literally - sheds light on a mysterious universe where eerie creatures live in a world without light



A 1-meter long, bright blue caecilian *Caecilia* sp. from the Amazon basin, a fossorial amphibian with very long teeth. On the opening spread, a buniocephalid catfish - possibly *Xyliphius lepturus* - collected at a depth of 90 meters in the Amazon. Like many other species adapted to a life in the dark, it has no eyes.



The Common Fangtooth *Anoplogaster cornuta*, one of the deep ocean's most iconic fish due to its impressive (and very toothy) countenance.

TEXT AND PHOTOS
BY DANTÉ FENOLIO

*W*hy was *Life in the Dark* produced and what is it? It is easier for me to start with what this book is not. This book is not and has never been about me. There is no ego involved – trust me, there are countless wildlife photographers out there with greater skills than I have. And I don't care about personal accolades, awards, or recognition. The emphasis of this book is and must be on wildlife and on the plight of our remaining wild places. This book has a single purpose: to kick-start a discussion about biodiversity everywhere. In homes, coffee shops, and around water coolers – across the world. Even if it is successful, I fear the conversation is 15 or 20 years too late...but better late than never. As Jane Goodall wisely said, "There is still a lot left worth fighting for." Let's also focus on the positive. For example, the Pope just made the environment a priority! As a global society, we need to discuss the value of biodiversity (all living species on our planet). I'll argue our fate is irreversibly tied to biodiversity. I could say that biodiversity should be saved for its beauty alone – which I do believe. I could discuss the intricate connections between food webs around the world and explain how removing key elements of them will bring on devastating collapses and ripple effects that will

ultimately affect all life on this planet, and that also is true. Regardless, there are more pragmatic reasons for saving biodiversity. Allow me to use amphibians as an example to explain why and how saving biodiversity is directly in our best interest. To do this, I need to explain a little bit about amphibians. As a consequence of the incredible way in which they can breath, all amphibians share the ability to produce antimicrobial toxins, the sum of which represent a remarkable storehouse of compounds that comprise a pharmaceutical treasure chest for medical biochemists to harvest. While many species do have lungs, amphibians can also breath through their skin, which is moist and permeable. Air and water can pass through it freely, without the effort we expend in breathing—as long as they keep their skin moist. Dry skin ultimately leads to death in amphibians. Their moist, permeable skin was crucial in evolution, allowing them to leave a life in water to exploit recourses on the land. However, every advantage carries with it a disadvantage: skin that is always wet is a veritable feast for bacteria and fungi. The evolutionary defense in amphibians is present in every living species' skin: microscopic granular glands that secrete

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The Double-horned Golden-lined barbel *Synocyclocheilus bicornutus* is considered to be a top predator in the subterranean streams where it is found - in relatively small populations - in Xingren County, Guizhou, China. The conical spines on its snout indicate that this is a mature adult in breeding condition.



Dottybacks, Grammas and Firefishes are marine fishes found in the "twilight zone" at the depth where sunlight dims. Left, from the top, *Pichtichromis diadema*, *Pichtichromis dinar*, *Pseudochromis fridmani*, *Pseudochromis springeri* and *Gramma loreto*; right, from the top, *Nemateleotris decora*, *D. helfrichi* and *D. magnifica*.



Melanocetus johnsonii (top) and *Melanocetus murrayi* (bottom), two deep-water anglerfishes, both trawled from more than 1,000 meters deep.



The Fangtooth *Anoplogaster cornuta* is a marine species which inhabits depths between 300 and 5,300 meters, where it lives in complete darkness.



Flashing Tilefishes *Hoplolatilus chluapatyi* are commonly observed on Indo-Pacific rubble or sandy bottoms down to a depth of 55 meters.



The strikingly marked Blue-spotted Jawfish *Opistgnathus rosenblatti* lives in burrows it digs on tropical coral reefs in the eastern central Pacific Ocean.



Top, a large house centipede, family *Scutigera*, from China; bottom, the endangered Ozark Big-eared bat *Corynorhinus townsendii ingens*.

toxins, keeping microbes at bay. Many species produce unique blends of antimicrobial toxins, currently unknown to medicine. And therein is one very pragmatic reason why humans should do everything possible to keep amphibians (and biodiversity in general) around - they are reservoirs for treating microbial diseases. Only a few of the myriad biochemically active compounds in amphibian skin secretions are now in the testing/trial phase. Many are potentially life-saving. These compounds are of such vital importance because our current treatments for microbial diseases are becoming ineffective. The problem is antibiotic-resistance. As we use antibiotics, more and more lethal bacteria become resistant to them. Humanity now has only a single antibiotic that is effective against antibiotic-resistant strains of *Staphylococcus*, the bacteria that causes staph infections. Resistant bacterial strains can be deadly. My father's best friend entered a southern California hospital with a bad case of poison oak and died days later with an antibiotic resistant staph infection that he got in the hospital. How did bacteria become immune to antibiotics that once killed them efficiently? In essence, we have created "super bugs." Sometimes people fail to follow prescribed medication regimes. They end treatments early, while some bacteria remain. The bacteria that remain are the strongest and the most resistant. These reproduce rapidly and spread. With each treatment that leaves bacteria,

resistance increases. Bacterial forms evolve that are no longer killed by the medication that once would have eliminated them. As more and more bacterial strains develop resistance, more and more of us will die of simple bacterial infections. In short, we are running out of effective antibiotics. But all is not lost; amphibians (and greater biodiversity in general) may yet save the day. Skin secretions of dozens of amphibians have been demonstrated to kill antibiotic-resistant bacteria strains, and can provide blueprints for novel killers of other deadly bacteria. Likewise, amphibian skin secretions may be used to prevent or treat cancers, chronic pain, and other ailments. There is even an amphibian skin secretion that functionally inhibits the HIV virus from mucosal transmission. We know nothing about the skin secretions in the vast majority of the world's 7000+ amphibian species, but it is certain that there are thousands of unique compounds awaiting discovery. Are you willing to bet that any particular species considered to be "not worth saving" isn't the one with a skin secretion that could ultimately cure a human disease, treat a family member, or save your own life? But there is a huge problem, as much as half of the world's amphibians are either facing serious environmental problems, are in decline, or have gone extinct. Here's a quick exercise to demonstrate just how many of our medicines come from natural sources. Open your

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The extraordinary-looking Waterfall Climbing Loach *Cryptopora thamicola* is able to live for extended periods out of water, inhabiting CO₂-filled caves and crawling on its well-developed pectoral and pelvic fins out of the water to feed on bacteria growing on damp rocks. This specimen was photographed in northern Thailand.



This mesopelagic Cockatoo squid *Cranchia scabra* was captured in a trawl at a depth between 200 meters and the surface in the Sea of Japan.



Amphipods are deep-water crustaceans closely related to crabs, lobsters and shrimp. They represent an important food source to many marine animals.



Gunther's Boafish *Stomias affinis* features photophores along its full length - this one was captured in the Gulf of Mexico between 200 and 400 meters.



Two knife-fishes from South America: *Orthosternarchus tamandua* (top and middle) and *Compsaraia samueli* (bottom). Both can generate electric fields.



The Glass squid *Galiteuthis phyllura* (top) lives in northern Pacific waters; Black-eyed squids *Gonatus onyx* (bottom) are found in the Northern Pacific.



Barely the size of an almond, this larval (juvenile) octopus was captured in a trawl at a depth of 200-400 meters in the Gulf of Mexico.



The parasitic *candirù* or vampire fish *Vandellia cf. sanguinea* is a typical Amazonian basin species. This specimen was captured in the Rio Napo, Peru.

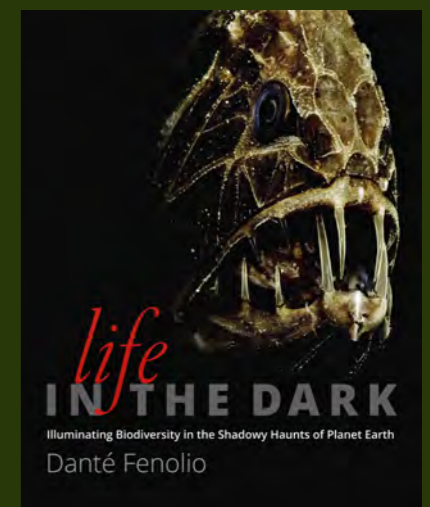
medicine chest. Make a written inventory. Go online and look into the origins of each medicine. You will be amazed at the number that came directly from nature. Think about the amphibian example I just provided and substitute any group of wildlife. So much of the world's biodiversity is in trouble that, more likely than not, the group you substitute will have a similar story. There is no telling where the next cure for a human disease will come from. Which species will provide a substance that conquers a cancer? Which animal will produce a chemical that treats heart disease? Is there an organism out there that produces a chemical that would eliminate particular addictions? While I hate to express the value of biodiversity to terms of human gain, it is the only argument some people will accept. Humanity simply cannot afford to turn its back on biodiversity. Our very future depends on it. But don't take my word for it. Look on the internet or read up on biodiversity... decide for yourself.

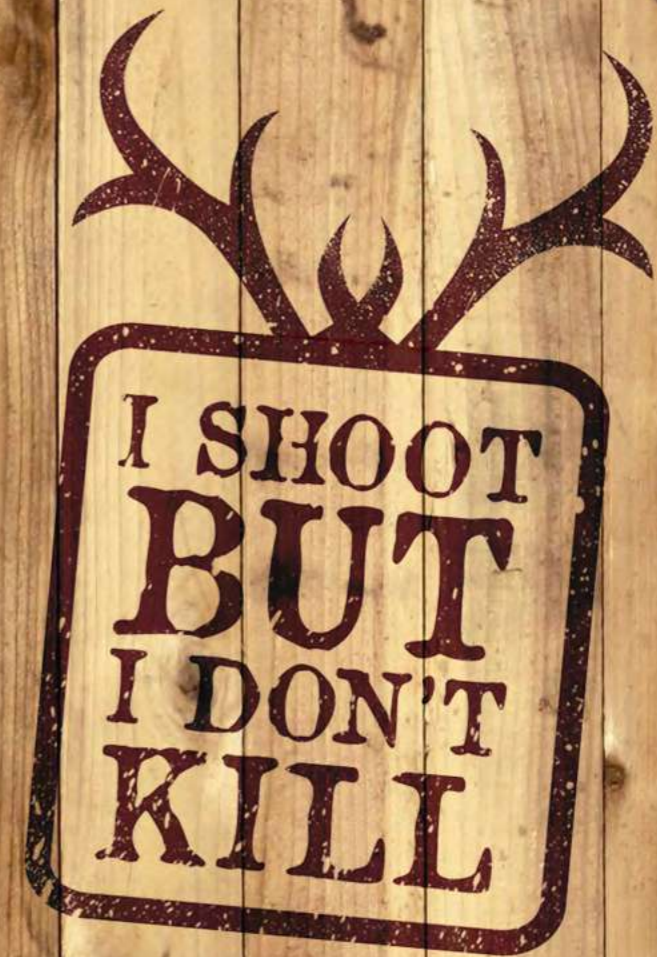
To be clear, the transition from a natural extract to a medicine is a lengthy and expensive process. Richard Conniff has published a great discussion of this process. For example, a particular chemical compound that is showing promise may be mixed in with dozens or even hundreds of other compounds. Isolating the important compound is difficult. Replicating it may be very costly and require a more efficient technology that will take time to develop. Nonetheless, if we don't

conserve our biodiversity today, the future will hold no natural reservoirs from which we can draw. They will be gone...By celebrating the beauty of biological diversity here, it is my hope that some will be inspired to take a closer look, and to make environmental protection a priority. We have little time left. Do this for future generations. Please, act now.



Author Danté Fenolio (above, photo by W.W. Lamar) - zoologist, biologist and wildlife photographer - is vice-president, conservation and research, at the San Antonio Zoo, Texas.





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Spotlight

A typical Costa Rican specimen of the Blue-jeans frog *Oophaga pumilio*.




COLORFUL AND POISONOUS DENDROBATIDS
RAINFOREST JEWELS

Technicolored, tiny and often dangerous, the gem-like frogs lurking on the Central and South American rainforest floor come in a dazzling variety of liveries

TEXT AND PHOTOS
BY CESAR BARRIO AMOROS



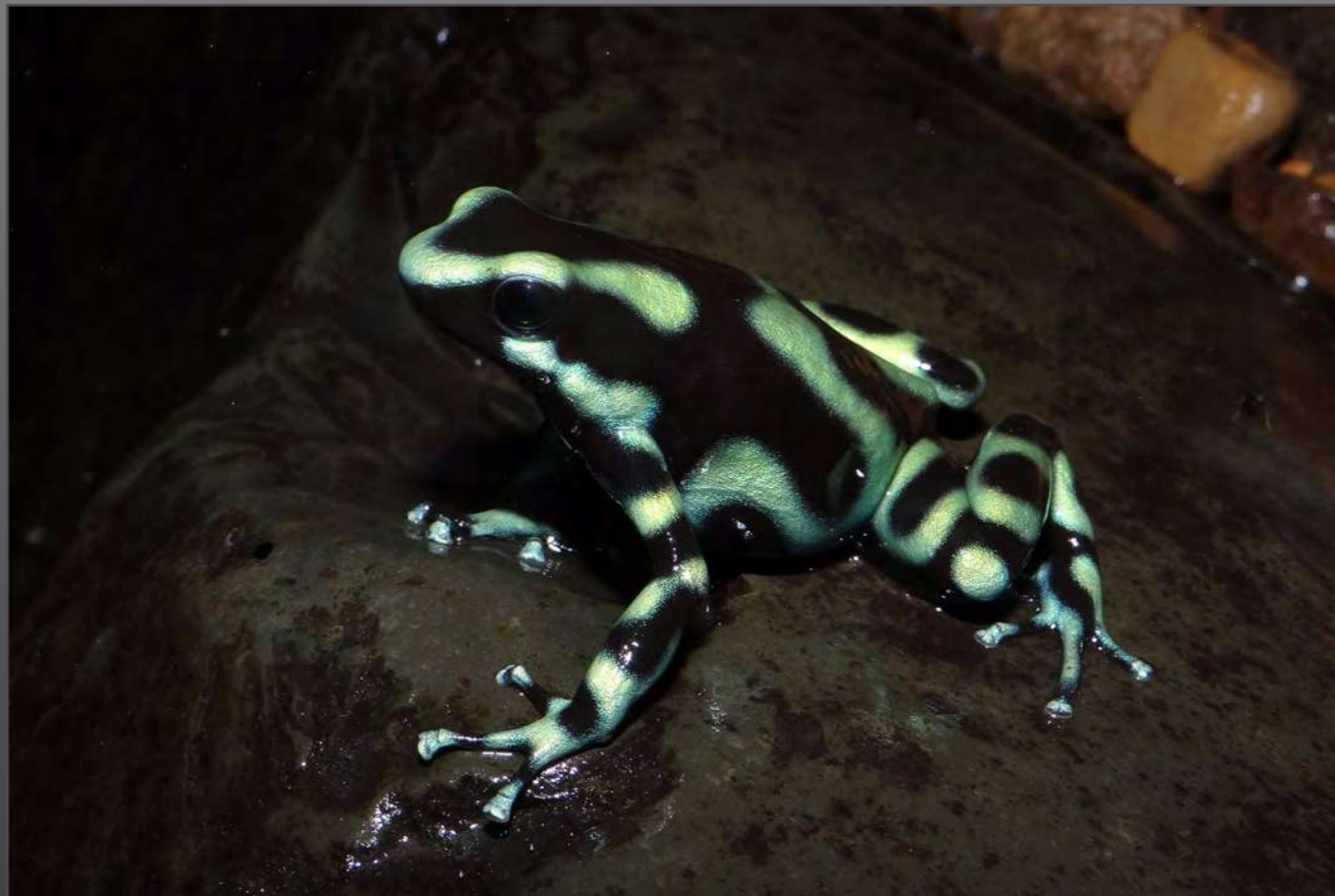
A yellow-green morph of  *Oophaga granulifera* from southern Costa Rica.

It is well known that some of the most appealing anurans in the world are the colorful and poisonous frogs belonging to the family *Dendrobatidae* (badly called poison arrow or dart frogs, as just two of them, *Phyllobates terribilis* and *P. bicolor* from Chococoan Colombia have been used by Amerindians to poison their darts). Several spots on the Neotropics stand out by the diversity of such rainforest jewels, such as the Upper Amazon and lower Central America. As I live in southern Costa Rica, very close to the Panamanian border, I have often had the opportunity to explore many times the Pacific and Caribbean rainforests of these two countries where these flamboyant frogs live. This is the realm of the *Oophaga* species and morphs. *Oophaga pumilio* is probably the most polymorphic species known among frogs. It occurs from mid-Nicaragua to northwestern Panama, but the real variation occurs in Bocas del Toro. *Oophaga granulifera* is a much less known species, similar in size and habits to *pumilio*, with a granular dorsal skin, and a few reported color morphs. Two more species are known in the western mountains of Panama, *Oophaga speciosa* and *O. arborea*, but these species are rare, and the first at least has not been seen for many years in the wild. A last species, *O. vicentei*, occurs in northern Panama, further east, and is

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Two *Oophaga pumilio* from Matina, province of Limón, Costa Rica.

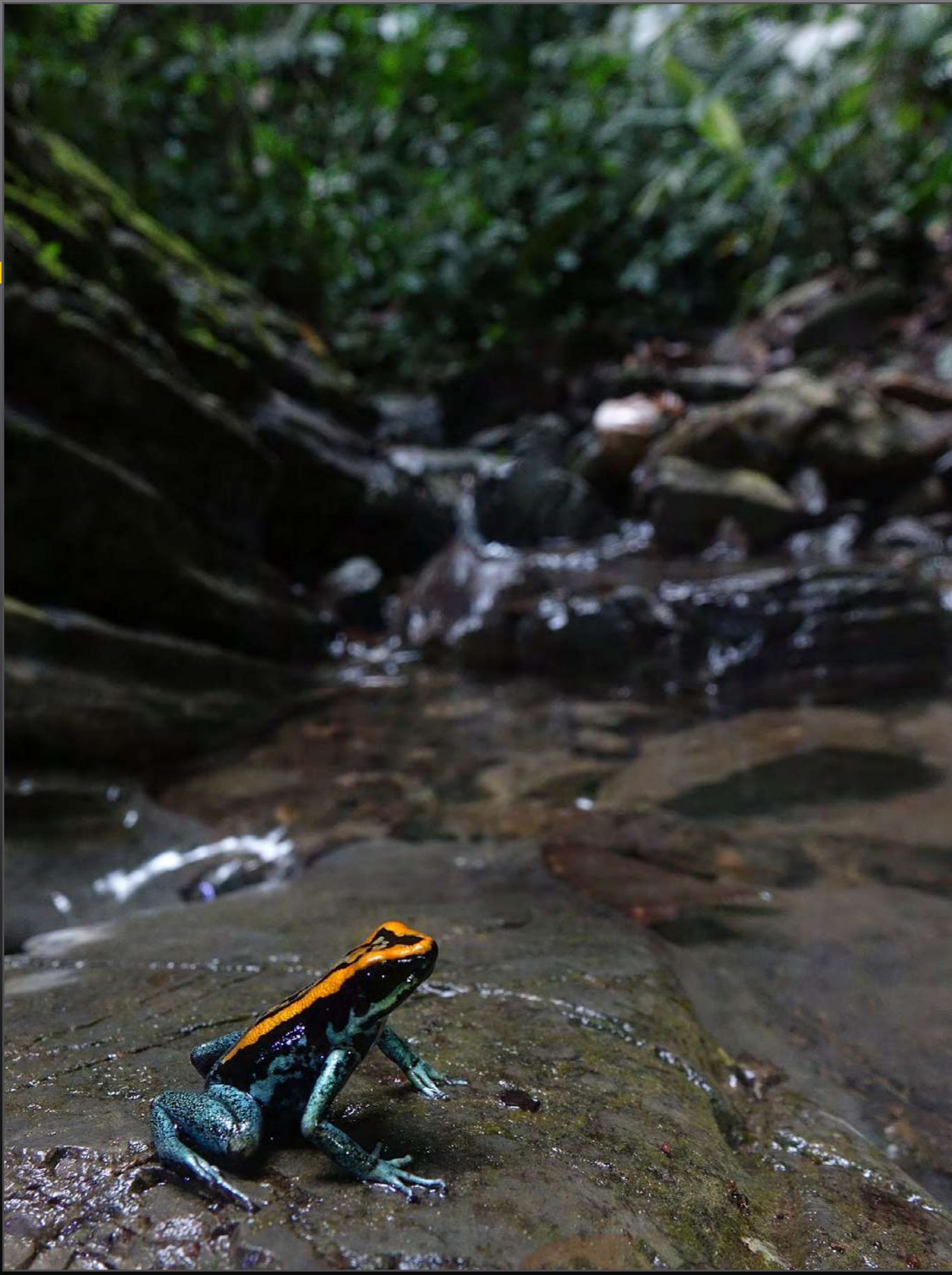


Top left, *Oophaga granulifera*, yellow morph; top right, *Dendrobates auratus* from Mareas; bottom left, *Phyllobates lugubris*; bottom right, another variation of *Oophaga pumilio*, this time from Isla Colòn, Panama.

■ *Oophaga pumilio*
from Rio Gloria.



Right,  *Phyllobates vittatus*, an endemic species from South-western Costa Rica; far right, another *Oophaga pumilio* from Rio Gloria, Panama.



highly arboreal. Furthermore, two species of *Phyllobates*, *P. lugubris* at the Caribbean side of Nicaragua, Costa Rica and Panama, and *P. vittatus* only on the Costa Rica Pacific side could be the most toxic species of poisonous frogs in the region. One of the smallest dendrobatids also occurs in the area, *Andinobates claudiae*, and although it can be quite abundant in many localities both in the islands and mainland, it is a highly secretive species. The last and largest species to consider is *Dendrobates auratus*, with several morphs, especially in Panama. Let's take a closer look on each species.

terrestrial species living in the leaf litter of the rainforest floor. It is easier to see and hear during the rainy season when males call usually on top of exposed perches in the forest. The red and red and blue morphs are easy to spot among the leaf litter, while the yellow and green morphs are much more cryptic, and could be less poisonous. They utilize *phytotelmata* aquatic microhabitats (especially *Dieffenbachia*) to lay single eggs which will be fed with an unfertile egg laid by females. At night they are found sleeping on small leaves along creeks.

Oophaga granulifera: Endemic from southwestern Costa Rica. It is a

Oophaga pumilio: From mid Nicaragua to the Caribbean slopes of Costa Rica, all morphs are

Right, another colorful morph of *Oophaga pumilio* from Isla Bastimentos, Panama; far right, a striking blue morph of *O. pumilio* from the Aguacate peninsula, Panama.



predominantly red; some with blue or black legs and arms, some with only hands and feet blue, some red with dark spots, and some burgundy red. In Panama, the situation changes and aside of red with blue or completely red morphs, in Bocas del Toro archipelago and immediate mainland a whole fan of crazy varieties start to show the most polymorphic frog species in the world. In Isla Colon the dominant color is greenish yellow with black spots and orange or green legs; in Solarte they are pure orange or reddish with or without scattered small black spots; in San Cristobal they are red to orange with very small black spots and blue legs; Bastimentos probably shows the

widest variation on a single island, from red to orange to yellow or white background with more or less black spots, white flanks and legs. On mainland also there is a huge variation, from pure sea blue or with black spots to violet in Aguacate Peninsula to black and white in Robalo or yellow with long black spots or stripes with white and black legs, to similarly common blue jeans (red with blue legs) or completely red in the norther sector of mainland Bocas del Toro near the border with Costa Rica. Many questions arise about this uncommon and amazing variation. Why? Why a single species is so variable in colors? What advantages this adaptation gives? Are different morphs more

Right, two
 Oophaga
 granulifera
 among the
 dark, wet
 forest litter;
 far right,
 a dazzling
 specimen of
 Dendrobates
 auratus.



prone to acquire sexual partners or escape predators than others? Many investigators are still answering these and many other questions about the adaptation and evolution of this species. In different islands and localities in mainland I visited I can realize how different the various morphs are not only in color but also in behavior. While in mainland some red morphs are terrestrial, the painted (black and white and yellow and black: all highly aposematic) ones are arboreal. Same with red and orange morphs in the islands (Solarte, San Cristobal and Bastimentos), being more terrestrial than yellow or greenish in Colón for example; while blue and violet morphs are equally terrestrial and

arboreal. Also is notable a change in size, for example Red and blue pumilios (both in Costa Rica, Nicaragua and Panama) are much larger than spotted or bluish morphs. A paper by the team of Heike Pröhl back in 2007 treated the genetic diversity finding that three clades are present, one north or Rio Reventazón in Costa Rica to Nicaragua, with the available name of *Dendrobates (Oophaga) typographus*. Another clade from the Escudo de Veraguas island, which would correspond to a new species to describe, and the *pumilio sensu stricto* from southern Costa Rica and western Panama. Still much investigation must be done to solve the multiple mysteries of this outstanding species.

Oophaga vientei: This is a hard species to find, due to its highly arboreal habits. They inhabit large bromeliads from 3 to 20 m above the floor, and call frenetically all day long. Only in a few places *vicentei* can reach the soil or on large bromeliads. At Santa Fe, Panama, two morphs occur, one red, and other green. We failed to see the red one, on the top of a hill, but despite hearing many calls in the lowlands around, we only could see one green female at a large bromeliad 3 m above the forest floor.

Dendrobates auratus: This is the largest *Dendrobatidae* of Central America, attaining up to 4 cm. It is also quite variable, especially in Panama. Unfortunately I couldn't see yet the most astonishing color morphs. Where I live, in Pacific Costa Rica, they are predominantly black with green; in the Costa Rican Caribbean side and close Panama (including Bocas del Toro) are green with black; but further east some incredible morphs start to show, like black with white or intense blue with black, or entirely black with small green spots. I only managed to see one population of chocolate color with dirty white, interesting enough though.

Andinobates claudiae: On the contrary, this is the smallest species of dendrobatid (with *A. minutus*) of Central America, both barely surpassing one cm in length. It was a little difficult to figure out where it was to be found. André Schreiber

and I were searching for *Phyllobates lugubris* and *pumilio* along a creek in a forest in Isla Colón, when he saw something he believed to be a juvenile *P. lugubris*. Then we heard a weird call, and immediately knew that it was *claudiae*. Very fast, and escaping by hopping much longer than expected, at last we could take a few pictures and then released it.

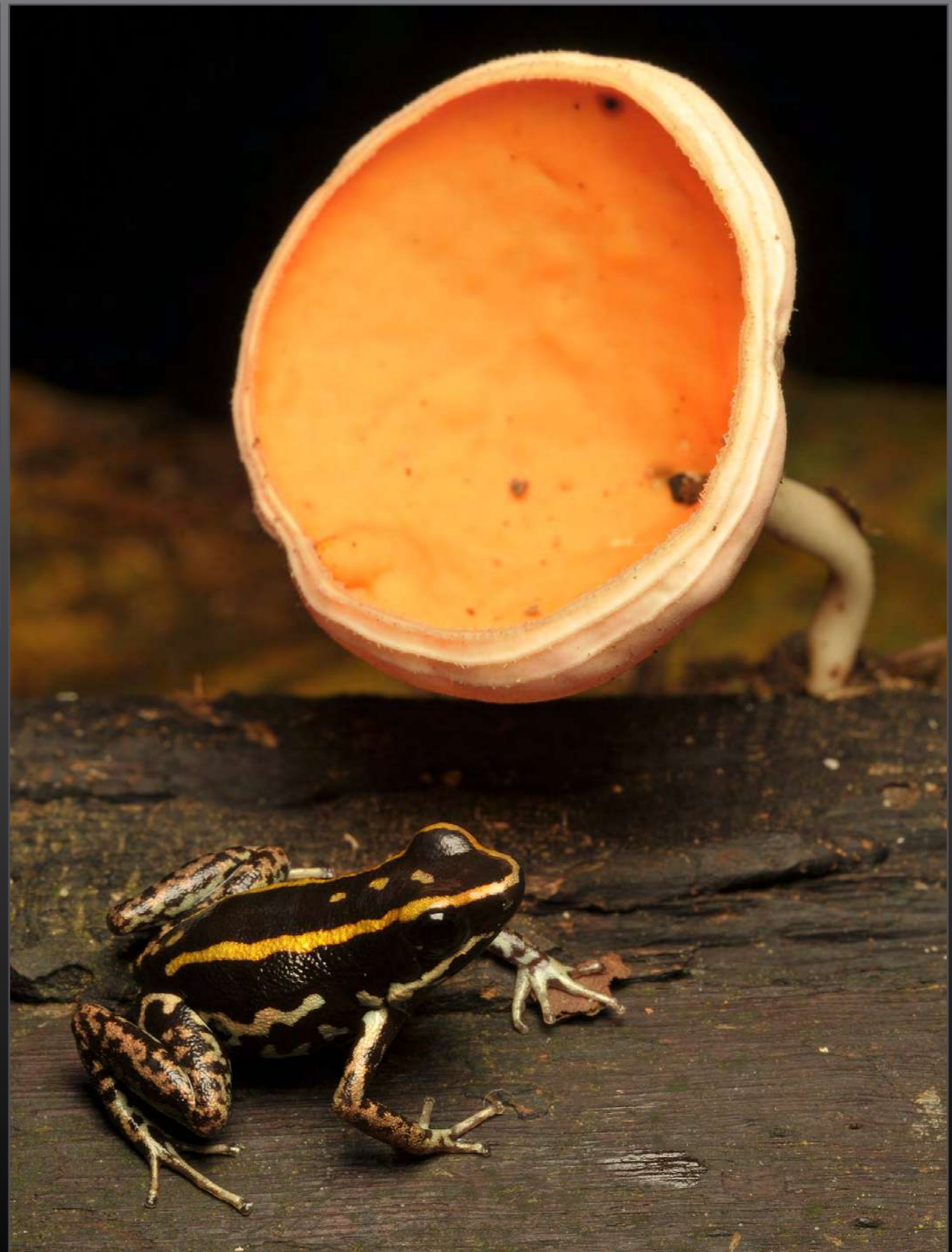
Phyllobates lugubris: This species is the smallest of two in Central America. It is quite abundant in proper habitats both in Costa Rica and Panama (I don't have experience yet in Nicaragua), but can be extremely rare at others. They are basically black with two narrow yellow dorsolateral stripes, some white spots on flanks and ventrally and pinkish with black marbled on legs. Contrary to other aposematic dendrobatids, *Phyllobates* likes to call while well hidden in holes or under debris. They like dark and narrow ravines, where they can hide in crab holes. At night I have found them sleeping on medium sized rocks in small creeks.

Phyllobates vittatus: This larger species has also brighter colors, black with orange to red wider dorsolateral stripes, white and black reticulation on flanks and venter and bluish with black marbled on legs. It also inhabits narrow or dark creeks inside holes, and hides immediately if they see any danger. This species has proven to be the most poisonous species in Central America, but not as much as their Colombian



A typical portrait of ■ *Oophaga granulifera* by a South-western Costa Rica creek and waterfall.

Right, a typical specimen of *Oophaga granulifera*; far right, the less flamboyantly patterned *Phyllobates lugubris*. The relative size of the small forest floor cup mushroom gives a good idea of how tiny *Dendrobatids* really are.



counterparts. It is endemic from southwestern Costa Rica.

A final note on my research: I have been accompanied in the field by many colleagues and friends, some of which I guided, some of which have guided me. I am highly grateful to all who share this passion with me: Angel Sosa, Claudia Koch, Eileen Marie Rivera, Gerardo Boa, the Tropical Herping team and André Schreiber. In writing this article I simply want to share with all the amazing variation of colors and morphs of these beautiful frogs. In no case I am encouraging collection, and thus, I don't give detailed localities for any species or morph.

About travelling in Costa Rica and Panama: These two small Central American countries are easy to visit and quite secure. Just taking normal care of your belongings and not leaving anything without proper attention is enough to enjoy your tour. In both countries US dollars are widely accepted. In Costa Rica there are plenty of good guides that can help organizing a trip and getting to the most incredible places (looking for frogs or whatever you want).

I arrange herping tours in Costa Rica and western Panama, as well as other South American countries. Interested parties can contact me writing to cesarlba@yahoo.com ●

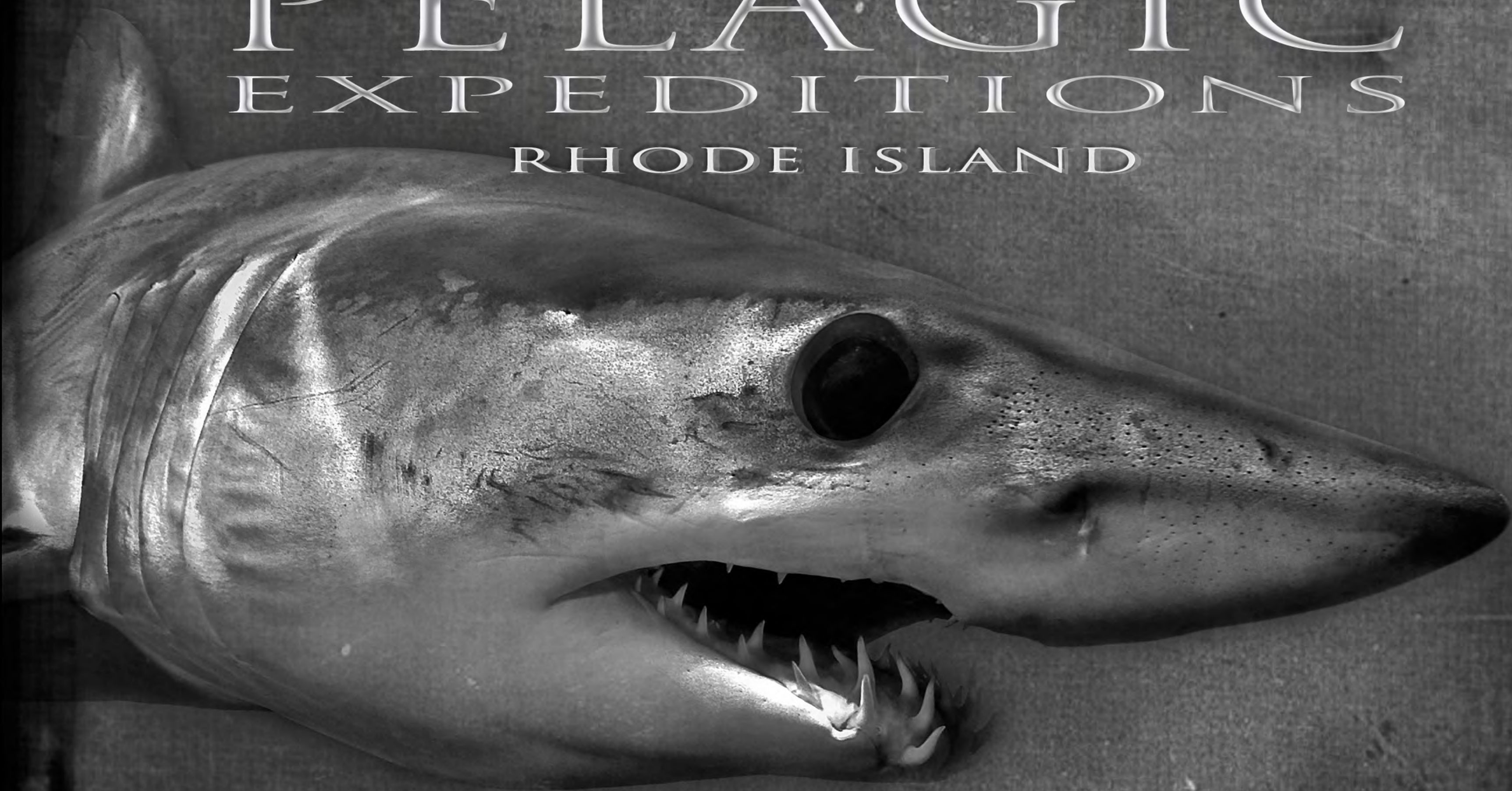


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The Parting Shot



Evan Arambul is an American amateur photographer who lives in Tucson, Arizona. Here's the story - in his own words - of his amazing encounter with a very rarely seen snake. "I have an infatuation with New World Crotalinae pitvipers, especially from Mexico. In late August we traveled to the Tehuacán Valley in the southwest portion of state of Puebla, Mexico. Returning late from looking for animals we decided to use a small

road branching into the mountains as a shortcut to get us back to the city. As we climbed the mountain road the rain became very heavy and temperature was at 13 degrees Celsius, and as we reached the crest of the mountain road we saw a small heavy-bodied snake illuminated white in our headlights. We grabbed our flashlights and ran back to the animal still in the center of the road - to our delight a beautiful and rare Black-tailed

horned viper *Mixcoatlus melanurus* lay there looking up at us unharmed. These pit-vipers have a relatively small distribution, being found in five locations only and occupying a small area of less than 5,000 sq.kms in southern Puebla and north central Oaxaca. They live in high, arid, tropical deciduous forest in the northern part of their range and seasonally dry pine-oak forest in the southern, and are in extreme danger of extinction". ●

AMAZON GRAAL

Jaguar encounters
in the Peruvian rainforest



**WINGED TERROR
OF ASIAN SKIES**
The Crested Hawk Eagle



PEACEFUL OGRES OF THE DEEP

The Sand Tiger Sharks
of North Carolina



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OF
KARTHIKEYAN**
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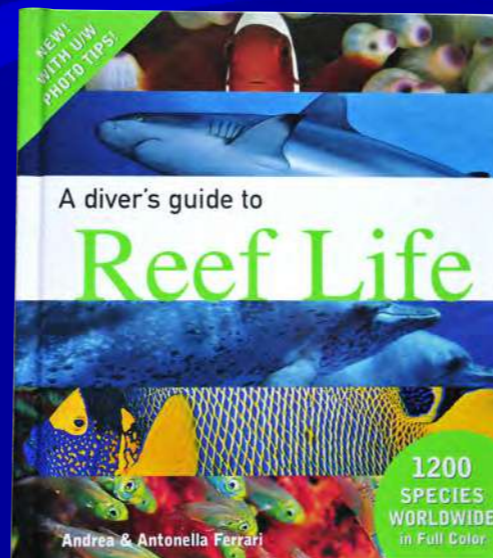
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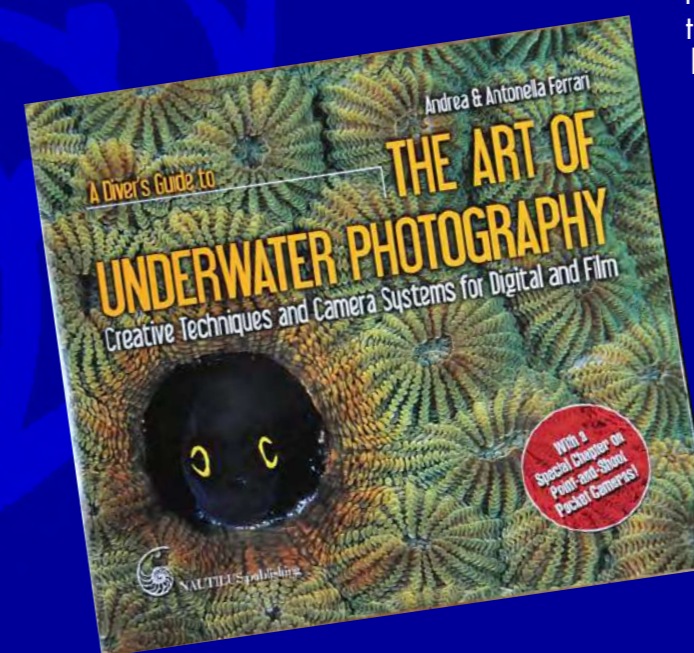
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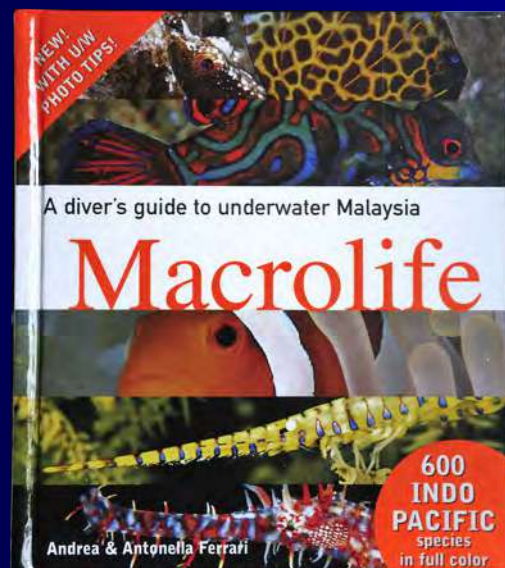
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